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ELEVENTH ANNUAL REPORT
OF THE
RECLAMATION SERVICE
1911-1912

F. H. NEWELL, DIRECTOR



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WASHINGTON
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1913.

ANNUAL REPORTS OF THE RECLAMATION SERVICE.

- *I. June 17 to Dec. 1, 1902; 317 pages, 46 plates, 65 figures. Cloth, 85 cents.
- *II. Through the field season of 1903; 550 pages, 49 plates, 56 figures. Cloth, 85 cents.
- *III. Through the field season of 1904; 653 pages, 59 plates. Cloth, \$1.25.
- *IV. Through the field season of 1905; 374 pages, 63 plates. Paper, 80 cents.
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- *VIII. Fiscal year 1908-9; 222 pages. Cloth, 40 cents; paper, 20 cents.
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- X. Fiscal year 1910-11; 290 pages. (Includes index Vols. I-X.) Paper, 25 cents.
- XI. Fiscal year 1911-12; pages, map. Cloth, 40 cents; paper, 25 cents.

*No copies available for distribution by Reclamation Service; may be purchased from Superintendent of Documents, Government Printing Office, at the price given. I and III each have case of drawings.

A price list of publications issued by the Reclamation Service can be obtained by application to the Director, Washington, D. C.

The monthly bulletin of the service, the "Reclamation Record," is printed about the middle of each month. It contains 16 or more pages of general construction news and notes of interest about the project. The subscription price is 50 cents per year.

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LETTERS OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
Washington, December 16, 1912.

SIR: In compliance with the provisions of section 2 of the act approved June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," I have the honor to transmit the accompanying Eleventh Annual Report of the Reclamation Service.

Very respectfully,

WALTER L. FISHER,
Secretary.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEPARTMENT OF THE INTERIOR,
UNITED STATES RECLAMATION SERVICE,
Washington, October 21, 1912.

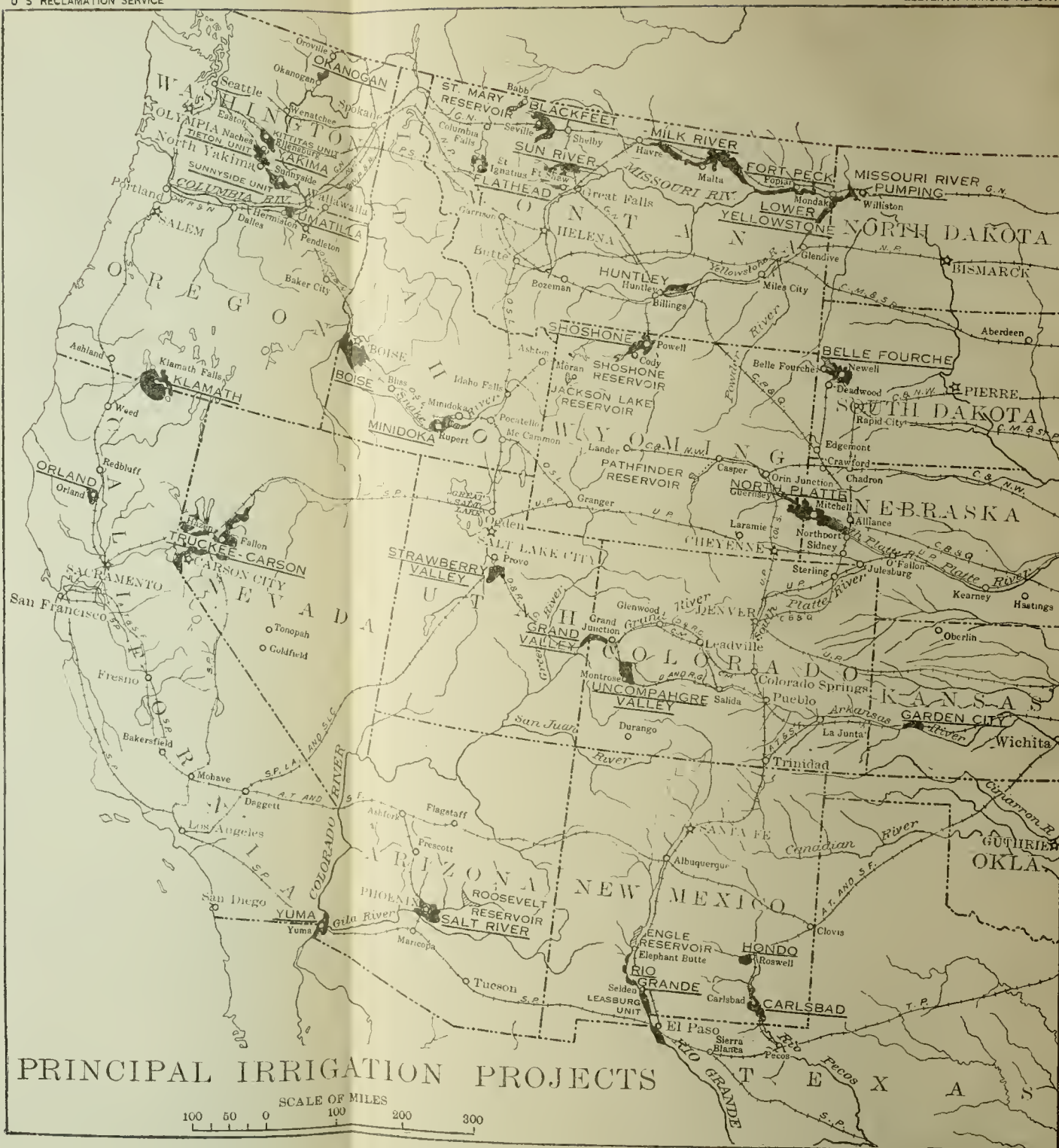
SIR: Transmitted herewith is the Eleventh Annual Report of the Reclamation Service. This report relates in particular to work completed and its progress during the fiscal year ending June 30, 1912, but contains also information in regard to previous operations, in order that the methods, progress, and results of reclamation work may be more readily understood.

Respectfully,

A. P. DAVIS, *Acting Director.*

The SECRETARY OF THE INTERIOR.





ELEVENTH ANNUAL REPORT OF THE RECLAMATION SERVICE.

F. H. NEWELL, *Director.*

GENERAL DISCUSSION.

INTRODUCTION.

At the end of 10 years of practical experience, it is appropriate to present a review of the conditions existing at the time of passage of the reclamation act,¹ the operations and results accomplished during the decade, and note the lessons taught thereby. The reclamation act is one of the most important and at the same time one of the most novel acts passed by Congress to aid in the development of the West. It puts into effect the principles of conservation by making use of the waste places of the arid region through the utilization of the waste waters, rendering the lands available as productive homes for citizens whose energies might otherwise have been wasted through lack of opportunity to secure a home. The act itself is extremely general, and leaves most of the details to executive discretion. It was known at the time of its passage that the conditions could not be anticipated nor safely predicted, as the work was largely pioneer in character and carried on at localities remote from lines of transportation and centers of population.

The wisdom of the framers of the act is shown in the fact that in the 10 years there have been relatively few amendments, and these have been mainly to correct certain manifestly inappropriate restrictions which were inserted in the law, chiefly as a matter of expediency to secure its passage. The most notable of these is the repeal of the original section 9, which attempted to limit expenditures largely by State lines. This was strongly opposed by the framers of the act, and the unfortunate results which ultimately followed were at the time clearly pointed out.

Object of the reclamation act.—The object of the act is the reclamation by irrigation of arid lands. The motive behind this object is one which is fundamental to the growth and maintenance of a democratic form of government. It is the providing of opportunities for citizens to obtain homes on small farms, where they may

¹ Approved June 17, 1902 (32 Stat. L., 388). See Appendix, page 199.

support their families. Under irrigation it is possible to practice intensive agriculture to the highest degree, and thus to produce the most valuable and certain crops. Under good administration, it follows that in irrigated regions the greatest number of citizens can be given such opportunities on the smallest area. Economic conditions also prevent any one man, or group of men from obtaining control, consolidating, and operating successfully these small irrigated holdings. With the high price of labor it has been found impracticable to produce crops wholesale on land of this character. The individual farmer who has health, strength, energy, and skill, especially if he has a family of considerable size, each of whom can do his or her part on the small farm, can make a far better living, and produce greater crop returns than is possible by the consolidation of the small farms into larger holdings. The tendency is to subdivide and thus reduce the size of these irrigated farms. In some parts of the arid West 40-acre tracts are divided into twenties, the twenties into tens, and with high-grade fruit culture even 5 acres will support a family, and is regarded as a competence.

In the first 10 years which have elapsed plans have been developed and construction has been begun on projects, many of them of considerable size, located in each of the arid States. Portions of each of these projects have been completed to an extent where water is being supplied to about 14,000 of these independent farms, and this number is steadily increasing. This by no means measures the extent of the activity, as the works have been planned to cover an area several times as large as that now utilized. At short intervals additional areas are being made available—this being accomplished, as a rule, more rapidly than the land is being brought under cultivation by the farmers. In other words, the work is well in advance of actual utilization. The most difficult of the problems are not those of engineering nor of construction, but those having to do with the human side—namely, the attracting or securing of the type of farmer who can and will make a success by intensive agriculture.

Fallacies entertained.—In looking back over the history of the 10 years it is interesting to note the outgrowth of many fallacies which were entertained when the work was initiated. The first, and perhaps the most striking, is the idea concerning the low cost of reclamation by irrigation. The early ideas of cost were based upon the results obtained by the pioneer. The first settlers, acting singly or in communities, built comparatively cheap and temporary canals in the localities where the engineering problems were least difficult and provided a supply of water which, without storage and without protection against floods, was frequently unreliable. The average cost per acre was estimated at an extremely low figure because of the fact that the actual cost was not recorded and the acreage which might be irrigated was, as a rule, highly exaggerated, no allowance being made for imperfect water supply nor for lands which for one reason or another could not be cultivated.

Another of the fallacies was in the assumption that as soon as water was provided this was practically the end of necessary expenditures. Little consideration was given to the large cost of leveling, subduing, and cultivating the soil and of providing the fertilizers which are necessary in an arid region. Because the arid lands contain certain mineral salts which in the East are sometimes useful as fertilizers,

it was assumed that the soil was necessarily fertile, not appreciating the fact that it frequently lacks the essential elements common in humid regions.

Another oversight in the earlier years was the neglect of full consideration of drainage and the importance of providing this to prevent much of the more valuable land from being destroyed by swamping or alkali. When large irrigation systems are constructed, covering extensive areas, and the water has been applied for several years, it has followed that 10, 15, or even 20 per cent of the total irrigated lands have been destroyed. To keep the lands in a condition of irrigability expensive drains must be provided.

It was not appreciated also that markets could not be had immediately for the crops raised and that much time must be required in developing good markets and in discovering those crops or varieties which are most profitable under the existing conditions of soil, climate, and transportation facilities.

But perhaps most important of all, it was not anticipated how difficult it would be to secure the right kind of farmers to handle the reclaimed land, and utilize it to advantage. It was assumed that as soon as land was brought under irrigation there would be a rush of men who would immediately cultivate every acre and begin the production of large and valuable crops. On the contrary, experience has shown that this is perhaps the most difficult part of the problem—far more so than the building of great structures. Most of the large enterprises, whether built with public or private funds, have been in this respect a disappointment, because of the slowness with which the lands have actually been utilized.

At the end of 10 years of study of these problems it is difficult to readjust the conception of things as they were when the reclamation act was passed. Fortunately, although there was large misconception on some fundamental facts, yet the act itself was so broadly framed that it has been readily adjusted to conditions quite different from those which were in the minds of its framers; as a result, the work has gone on as rapidly as the legal and financial limitations permitted.

Initiation of work under the reclamation act.—Immediately after the reclamation act was signed by President Roosevelt, on June 17, 1902, the Secretary of the Interior, E. A. Hitchcock, was advised by the Director of the Geological Survey, Charles D. Walcott, regarding the investigations which had already been made by the Geological Survey as to the extent to which the arid region could be reclaimed. During many years preceding the passage of the reclamation act the Geological Survey had been preparing topographic maps showing the streams which might be used in irrigation, and their catchment areas. Surveys had been made of many reservoir sites by what was then called the hydrographic branch of the Geological Survey; systematic measurements of stream flow had also been carried on, and general plans outlined for various storage schemes.

Thus, when the reclamation act became a law there was already employed, in investigation and in making plans, a considerable number of men experienced in such work. Under authority from the Secretary, these men were at once organized on July 2, 1902, into a sub-bureau known as the Reclamation Service, under the Director of

the Geological Survey, and this organization was continued until March, 1907, when the service was separated from the Geological Survey, and the former chief engineer was advanced to become the director of the service. The first annual report covering the conditions during 1902 contains a résumé of the general subject and of the history of previous investigations. The succeeding annual reports trace out step by step the operations of the service, and show the general evolution of its plans.

Surveys and examinations.—The first operations were those of survey and examination as prescribed in the act. A large body of facts was already available, having been obtained, as above stated, by the Geological Survey during previous years, and largely by the men who were later organized into the Reclamation Service. These data were at once supplemented by additional information needed for the construction of the works. As soon as plans could be outlined, advertisements for bids were issued and contracts let for beginning certain large structures.

During the first four years a considerable number of surveys and examinations were carried on, with the result that selection was made of one or more projects in each State where the conditions were most favorable for immediate construction. Practically all of the enterprises which have been entered upon were examined at that time, and since 1905 or 1906 no new projects have been taken up and very few investigated.

It was soon found that it would be necessary to set a somewhat rigid limit to the surveys and examinations, as there arose from every part of the arid and semiarid region insistent requests for examinations of all sorts of schemes. It was urged that the Government should make these examinations even if it did not have the necessary funds to build the works, so that the results might be available for private enterprise. It was soon found that to do this would require practically the entire reclamation fund, and that construction would be delayed and crippled. Another objection to this theory of the Government making surveys and examinations with a view to private construction lies in the fact that no survey or examination has conclusive value unless it is made with a full knowledge of the probable financial ability of the builders, and of other limiting facts. The Government, for example, might examine a project with a view to irrigating 100,000 acres, and later some private enterprise be started on a basis of 50,000 acres. While the general physical facts of stream flow, reservoir location, etc., would be helpful and instructive, yet it would be necessary to sacrifice much of the expensive part of the engineering estimates and conclusions because of some change of final location adopted, and different method of construction. The Geological Survey is continuing the topographic surveys and stream measurement. With these data it is possible to discuss various alternative schemes, but it has not been found wise to go further and attempt to prepare what might be called plans and specifications for works to be built by other organizations. It would be possible, at considerable expense, to make more or less ideal plans for irrigation development in many localities, but it is highly improbable that these plans would be adopted, or would be worth what they cost, should the time ever come to take up the work.

In the second section of the reclamation act are inserted the words, "including artesian wells." These were written under the assumption that artesian wells would prove to be an important factor in irrigation. Immediately upon the passage of the act hundreds of applications were made to drill deep or artesian wells in every part of the West. If the Secretary had acquiesced in these requests the entire fund available would not have been sufficient to drill these wells. It became evident, therefore, that some limiting rule must be adopted. A study of the use of such wells showed that very few of the successful wells were actually used in irrigation. The rule was wisely adopted on March 3, 1903 (32 L. D., 278), "that the reclamation fund can not be used for drilling wells for exploration, and that such wells may be paid for from the reclamation fund only in cases where there is sufficient knowledge in advance to make it probable that water will be obtained therefrom in such quantities as can be used for irrigation of lands, with the probability that the cost of the work will be returned to the reclamation fund." This at once quieted the demands for experimental drilling, coming often from localities where there was hope that if the Government would drill a hole sufficiently deep, even if water could not be found there, oil, or gas, or some valuable mineral might be discovered.

Indian irrigation.—Under an agreement made in 1907 between the Office of Indian Affairs and the Reclamation Service certain irrigation work on Indian reservations authorized by Congress and provided for in appropriations under the control of the Indian Office is being performed by the Reclamation Service. Plans and estimates for proposed work are prepared by engineers of the Reclamation Service and transmitted to the Office of Indian Affairs for review. If the plans and estimates are concurred in by the Office of Indian Affairs and are afterwards approved and authorized by the Secretary of the Interior, the work is prosecuted by the Reclamation Service in accordance therewith, and the cost is returned to the reclamation fund from the authorized Indian appropriations, upon statements rendered monthly. Important work of the Reclamation Service on Indian irrigation projects is described on pages 90 to 103, and the financial status of the work as a whole is shown by the table on page 273.

Evolution of plans.—The evolution of plans and the development of construction is shown from year to year in the annual reports, which recite briefly the principal facts and review the expenditures. There has also been printed monthly in the "Reclamation Record" an abstract of the report of progress to the Secretary, giving the percentage of completion of important details, and the progress made during the month.

As work has progressed it has been found necessary to revise the original plans, especially in respect to the degree of completion of the work. When the act was discussed in 1901 and 1902, it was generally assumed that the principal operations would be those of constructing the larger reservoirs and main-line canals, leaving to the farmers the building of the distribution system, in this respect following out the practice of the pioneers, who, individually, or in small groups, worked together to take the water out of the natural streams. The theory was entertained that the Government would in effect

provide conditions analogous to those found by the pioneers, by bringing water in main-line canals to points where the farmers could perform the remainder of the work themselves. The attempts to do this, however, were not successful. The characteristics of present settlers are in many respects entirely different from those of the older pioneer communities; there is not the spirit of cooperation which ruled the early pioneers; the class of people now attracted to the lands are not as capable of adapting themselves to existing conditions and initiating the building of distributing works. It was found that the construction of the reservoirs and main-line canals was not followed by the expected cooperation on the part of the settlers, and that to enable the lands to be cultivated it would be necessary to provide a complete system by which the water is taken to the vicinity of each farm.

The degree of completion of the works in other respects was found to be previously underestimated. Not only has it been found necessary to dig canals and laterals aggregating thousands of miles in length to reach each considerable body of irrigable land, but it was also found that a great number of structures must be provided which were not anticipated—for example, bridges and road crossings. Under ordinary pioneer conditions the settlers have either built the bridges and culverts or have endured the inconvenience of not having them. Where, however, the Government or any large corporation is building irrigation works this unfinished condition is not tolerated by the community. Every effort is made by the county and by all concerned to have strong, wide bridges, culverts, and innumerable other structures, which are not so very expensive each in itself, but which together add greatly to the cost of the work, as each of these hundreds of structures must be carefully located and built for permanence.

It thus resulted that the original estimates, based upon a few comparatively simple and large structures for storing and handling a considerable quantity of water, have been revised from time to time at the request or demand of the settlers to include many extensions. Thousands of small, permanent structures, mainly of concrete and steel, and consisting of gates, measuring boxes, flumes, siphons, culverts, and bridges, have been built. Had the people been content to take the water at a few points from the main-line canal and build these themselves the expenditures by the Government would have been notably less; but, on the other hand, it would not have been possible to have brought under cultivation any considerable part of the land now reclaimed.

Cost keeping.—When the first plans were made there were very few data available for the guidance of the engineer in preparing estimates of cost, especially under the pioneer conditions then prevailing. It was early appreciated that in order to continue the work effectively it would be necessary to have accurate records of the cost. For this reason a system of cost keeping was inaugurated, modeled on the best commercial practice and improved by experience. This has been of inestimable value, not only to the engineers employed by the Government, but to others preparing estimates for corporations and investors, as it has enabled them for the first time to obtain a full and accurate statement of the actual costs under the conditions

prevailing in the arid West. The cost-keeping system has been extended not only to the construction itself, but to the operation and maintenance, enabling also in this direction a better comprehension of the existing conditions. From the data thus obtained it has been possible to analyze the costs and the reasons why the anticipated expenditures have been exceeded, thus guarding against future uncertainty in many of these items.

Increase of cost.—The increase of cost of the works over the anticipated amount arises from two principal causes: First, because, as above stated, a very large number of additional structures have been provided; and, secondly, because of the increased cost of labor and materials. When the plans were made, during the years from 1902 to 1905, prices were relatively low. Since that date, as shown by the testimony of western railroad builders, contractors, etc., it appears that wages have increased probably 50 per cent or more, and that materials and the cost of subsisting the men have increased in many cases upwards of 60 per cent above the amount assumed in earlier years.

Had the prices remained the same it is quite probable that the works could have been completed, according to the extent of the original plans, at the estimated cost, but owing to the insistence upon the inclusion of additional expensive details and the general rise in values the total cost far exceeds that anticipated.

There are other factors which have led to increased cost over the early estimates, some of these being due to legislative and related causes. For example, the passage of the workmen's compensation act of May 30, 1908, has added notably to the expenditures. No one should object to the added cost on this account, as the compensation paid to the workmen for injuries, or to their relatives in case of death, is moderate and carefully safeguarded. Any outlay in this regard is an act of equity. The total amount expended since the date of the passage of the act is as follows:

1908 -----	\$9,711.39	1911 -----	\$15,861.39
1909 -----	19,587.98	1912 (to June 30) -----	10,756.21
1910 -----	22,579.40		

The rigid enforcement of the 8-hour act also tends to maintain the high cost. No discretion is left to the employer. Frequently where a half-hour additional work would finish a job it is necessary to drop it and bring a gang of men from a distance, at considerable expense, to complete some minor detail, thus taking nearly half a day to do something which could have been finished in a relatively short time while the machinery was in full operation. While the law itself is undoubtedly beneficial, yet, like any other good law, it may lead to embarrassing situations at times, and thus notably increase the total cost.

Relation of cost to values.—Although the cost per acre irrigated is considerably greater than was anticipated at the time of the passage of the reclamation act, yet this has been accompanied by an equal or even greater increase in value of results, so that if the acreage cost of irrigation has been doubled it may be claimed that the value received has been trebled. This is due to the general increase

in prices of lands and of agricultural products, as well as of labor and materials.

The fact that there has been such increase is shown by the growth of prices asked for the raw lands under both public and private projects. At the time the reclamation act was passed the reclaimable lands could be had at a nominal value—a little more than the cost of keeping the title and procuring the conveyance, or upwards of \$5 an acre. Within the 10 years subsequent to that time these lands have not been improved in any way, except by the building of the works by which water might be obtained but the asking price has jumped from \$50 to \$100 or more per acre. In some cases the prices asked for the raw land have increased a thousand per cent. It is this unearned increment which is really the great load which is holding back the rapid development of irrigated lands in the West, whether watered by the use of public or private capital. It has stimulated the work in one way, and at the same time has developed a class of men who are largely interested in getting a piece of land in the hope of selling a relinquishment of title. They have found that the profits from simply holding the irrigated lands out of the market are greater than those from utilizing these lands in the production of crops; the second or third comer, who may be the real farmer, thus has to incur not only the cost of clearing, leveling, and subduing the soil, adding improvements and paying for the water supply, but in addition has the burden, equaling or exceeding the other costs, of paying for the unearned increment charged for the land.

Valuation of present works.—Although the reclamation works as built represent a very large investment, yet under existing principles of valuation, this investment may be demonstrated to be a good one; that is to say, the works, if they could be sold as a whole, would probably bring much more than they cost. Such a valuation can be arrived at in any one of several ways, either on the basis of earning power or of cost of reproduction. This is an important consideration worthy of exact verification, because of the tendency to criticize the works as being extravagantly executed. This criticism arises from a very natural cause. It is believed by some of the farmers that if it can be shown that the works have cost an excessive amount they should be relieved of this excess charge and the water rights should be sold to them, not at the estimated cost, but on the basis of some assumed valuation reached by deducting what they have been led to believe are unnecessary expenditures. In comparing the works now finished with those built under similar conditions by private capital, it can undoubtedly be shown that the Government works as a whole have been more efficiently and economically constructed—taking into account their character and all overhead charges—than has been the case with other similar, large projects. It is somewhat difficult to make this demonstration because of the fact that there are few accessible records showing the actual cost of the larger private enterprises which are comparable in magnitude and completeness of construction with those of the Reclamation Service. Wherever it has been possible to ascertain the exact cost of these privately built works, including in these all proper administrative or overhead charges, such as

are included in the accounts of the Reclamation Service, the results have been gratifying, as showing the care exercised in securing the highest effectiveness and economy in the works built by the Government.

Amendments to the act.—The amendments to the reclamation act have been relatively simple, and have been initiated largely by local rather than general conditions. Most of them relate to work on the Indian reservations, or to interstate, or even international complications. There are about 50 separate acts which have modified or supplemented the reclamation act. These have been published in pamphlet form for convenience of reference (“Laws Relating to the Reclamation of Arid Lands by the United States”) and are also included in the manual of the service. Probably the most important of these amendments is that of June 25, 1910 (36 Stat., 835), relating to advances to the reclamation fund. An advance or appropriation of \$20,000,000 was made, under the terms of the above-noted amendment, to complete the reclamation projects, and such extensions as may be deemed necessary for the successful operation of the works; also to protect water rights claimed by the United States. This appropriation is in the nature of a transfer to the reclamation fund, and can be called upon only as needed to meet payments for works performed under existing law. These sums, so transferred, are to be reimbursed from the reclamation fund—the proviso being added that no part shall be expended upon any existing project until it shall have been examined and reported upon by a board of engineer officers of the Army designated by the President, and approved by the President as feasible and practicable, and worthy of such expenditure; nor shall any portion be used upon any new project. For the purpose of providing the Treasury with funds thus advanced, the Secretary of the Treasury has been authorized to issue certificates of indebtedness bearing 3 per cent interest, payable in five years, and beginning five years after the date of the first advance 50 per cent of the annual receipts shall be returned to the general fund until the total advance is repaid.

The arguments in support of this amendment were based largely upon the idea that there was a large body of settlers who had taken up land under the reclamation projects and who, trusting to the early completion of the works, were remaining on the land and enduring great hardship in endeavoring to hold their homestead entries. It was shown that there were considerable numbers of such settlers under and adjacent to every area on which surveys had been made by the Government and that this condition would continue indefinitely if settlement was permitted in advance of the actual construction of the works. In order, therefore, to remove the causes which made this deplorable condition possible, the amendment further provides that no entry shall be made hereafter and no entryman permitted to go upon the lands reserved for irrigation purposes until the Secretary of the Interior shall have established the unit of acreage and fixed the water charges and the date when the water can be applied, and made public announcement of these facts.

The completion of the lateral systems and other works then in hand soon enabled the water to be brought to many of these entry-

men. The portion of the amendment just noted stopped the increase in their number, so that the effect was immediately beneficial, and further complaint from this source ceased. This action called attention to the fact that the Government was prepared to irrigate far more land than was being used, and the real problem was not so much to relieve the needs of the relatively few men who were actually on the ground waiting for water as it was to get the best type of settlers and farmers to utilize the works already built.

Another, and very necessary provision, of this act of June 25, 1910, was the repeal of section 9 of the original reclamation act, which, by attempting to limit expenditures largely by State lines, tended to lack of economy and forced the construction of works where the need was not wholly established.

In addition there have been a number of amendments relating more particularly to land-office matters, and the action to be taken in specific cases in subdividing and disposing of lands, particularly in securing early title, and enabling the homestead entryman to secure patent, in order that he might borrow money more easily, or be enabled to sell the land and move away. Safeguards against consolidation of the entries are attempted so as to prevent a monopoly of the lands which have been reclaimed by the bounty of the Government.

The effect of various requirements of the act.—It is now possible, after a decade of experience, to point out the actual effect of various requirements of the reclamation act, which, at the time of its passage, were more or less theoretical. One of the most important of these requirements, and one which has been most frequently attacked and successfully defended, is that of the actual residence upon the land or in the vicinity.

This residence requirement has led to some hardship to individuals, because of the fact that as soon as survey parties appeared in the field men rushed in and took up land, often wholly in ignorance of the probabilities of reclamation. In some instances these men paid \$50 or \$100 to so-called "land locators" to point out to them the desirable spots. When the surveys were completed and the plans adopted it was found that many of these entries had been made upon areas which could not be reached with water at reasonable cost or where many years would elapse before extension of the system would cover the area.

These men, in order to obtain title to the lands, have been compelled to live with their families in the desert, awaiting the development of other areas. This condition was anticipated at the time of the passage of the act, and the attempt was made to exclude settlement until the works were built. This was opposed on the ground that no intelligent man would think of attempting to make settlement in a desert until the water was actually in sight.

The need of this requirement of actual settlement is based upon the fundamental conception of the objects of the act. It is not enough to simply reclaim the land. This may add to the material prosperity of a few, but it does not produce citizenship. Unless settlement is required, a man in a neighboring State may take up a desirable farm, have it irrigated at the expense of the Government, put a tenant on

it, and thus defeat the principal motive of the law—namely, the development of a self-supporting citizenship.

All attempts at modifying this provision regarding residence have been opposed because of the fundamental consideration. The events of the past 10 years have shown the wisdom of this, as under the private projects where residence is not required, the developments have been very largely along the line of the creation of tenant farms.

Size of farm unit.—Another of the novel features of the act which has been subject to criticism is that limiting the area of reclaimed land to the acreage which, in the opinion of the Secretary, may be reasonably required for the support of a family. Nearly every settler desires to obtain as much land as he can, because of the hope of obtaining the unearned increment in value of this land. As a consequence, nearly everyone attempts to hold at least 160 acres and to scatter his improvements over the entire area. He even tries to hold additional lands in the name of some near relative or friend. The result is, that, with scanty capital, he is not able to level and subdue all of the land and bring it to a profitable state of cultivation. It frequently happens that a man who would be prosperous on 40 acres fails on 160 acres. The result is not only disastrous to him, but to the project as a whole and to the object of the law in that he is unable to produce profitable crops, and thus deprives others of the benefits that would accrue if he made his payments promptly and the money was used over again to reclaim other lands.

The strongest pleas for the extension of the time of repayment and for the amelioration of the conditions come from men who are vainly trying to cultivate more land than they can successfully handle. They assert that the expenses are too great and that they must have relief. It may be true that with the kind of agriculture that they practice, with the indifferent cultivation and the poor seed obtained, they can not make a living.

In a number of instances where men have had possession of areas upon which they were making failures it has been advantageous to cut the unit in half. For example, one man made a failure on 40 acres. His holding was reduced to 20 acres, and as a result he is now making his payments promptly, is saving money, and, with a large family of small children, is intensively cultivating the 20 acres, and will soon have what to him is a competence. Such cases as this could be multiplied indefinitely, illustrating the wisdom of keeping down the size of the farm unit. In fact, if any errors have been made in the past, they have been more apt to be on the side of liberality in the size of the units. In few, if any, instances, have these proved to be too small, even when set at 20 or 10 acres.

Present investment.—The total net cost to June 30, 1912, was \$72,042,173.07. This may be considered under two heads, namely, the investment in works which are practically completed and from which returns are being received, and, second, the investment in portions of the works which can not be utilized until more work is done. Progress is being made from day to day in finishing portions and making available larger and larger areas for irrigation. The following table gives in concise form many of the items which have been

completed, and a more detailed table is given in the appendix pages 289 to 291.

Summary of results to June 30, 1912.

Area to be irrigated on completion of 28 projects	acres	3, 020, 689
Area for which the Service is prepared to supply water	do	1, 168, 530
Area under water-right applications	acres	452, 132
Area under rental contracts, etc	do	383, 572
Total		835, 704
Reservoir capacity	acre-feet	4, 833, 070
Canals built:		
Capacity over 800 second-feet	miles	310
Capacity 301 to 800 second-feet	do	454
Capacity 50 to 300 second-feet	do	1, 083
Capacity less than 50 second-feet	do	5, 229
Wastewater ditches built	do	278
Total canals and ditches		7, 354
Tunnels, 72 in number, total length (113,534 feet)	miles	21. 5
Storage and diversion dams, volume	cubic yards	8, 702, 267
Dikes, 80 miles in length, volume	do	3, 553, 000
Canal structures built, number		35, 108
Bridges, number 2,908, total length	feet	61, 193
Pipe laid, concrete	feet	395, 553
Pipe laid, tile	do	35, 733
Pipe laid, steel and iron	do	28, 483
Pipe laid, wood	do	171, 017
Total (120 miles)		630, 786
Flumes built:		
Concrete	feet	2, 424
Steel	do	59, 207
Wood	do	303, 848
Total (69 miles)		365, 479
Buildings, number costing over \$200 each	buildings	786
Roads constructed	miles	659
Railroads constructed	do	44
Telephone lines constructed (phones in use, 838)	do	2, 118
Power transmission lines constructed	do	311
Water power developed	horsepower	22, 290
Material excavated:		
Earth	cubic yards	79, 790, 814
Indurated	do	6, 037, 065
Rock	do	4, 846, 402
Total excavated		90, 674, 381
Riprap, in place	cubic yards	377, 407
Paving, in place	square yards	439, 940
Concrete, in place	cubic yards	1, 157, 507
Cement used (including 338,452 barrels manufactured by United States)	barrels	1, 389, 555

Crop returns.—The degree of completion of the works and of their utilization by settlers is most completely shown by the crop returns and by comparison of these with similar figures for all other irrigation works. It is to be noted that the average of these crop returns is far less than should be the case with better cultivation, this being due to the newness of the land, lack in many cases of fertilizers, and the inexperience of the majority of the irrigators. Each year the lands, as a whole, are being improved, but this is not conspicuously shown in the average crop values, because each year more new land is brought under cultivation, thus reducing the average.

Comparative summary operation and maintenance results 1909, 1910, and 1911.

Items.	1909 (20 projects).	1910 (22 projects).	1911 (23 projects).
Area irrigated:			
Under water-right applications, acres.....	176,942	208,318	270,459
Under rental contracts, etc., acres.....	233,686	256,105	294,222
Total irrigated, acres.....	410,628	473,423	564,681
Total number of acres could irrigate.....	730,601	917,751	1,015,494
Farms irrigated.....	9,503	11,676	13,708
Water-right applications.....	3,657	5,325	9,528
Miles of canals operated.....	2,993	3,945	4,853
Cost of operation:			
Total.....	\$379,332	\$437,488	\$449,558
Per acre irrigated.....	\$0.92	\$0.92	\$0.80
Cost of maintenance:			
Total.....	\$557,101	\$544,478	\$608,683
Per acre.....	\$1.36	\$1.15	\$1.08
Cost of operation and maintenance:			
Total.....	\$936,433	\$981,966	\$1,058,238
Per acre.....	\$2.28	\$2.07	\$1.88
Value of crops:			
Total.....	\$11,920,663	\$12,974,639	\$13,121,224
Per acre.....	\$29.10	\$27.50	¹ \$23.30
Population of farms.....	53,812	63,149	69,638
Quantity of water diverted to land:			
Total in acre-feet.....	1,523,638	1,635,696	2,079,033
Per acre.....	3.7	3.5	3.7

¹ Average value of crops per area actually cropped over \$28 per acre.

The average crop value, as shown in the above table for 1909, was \$29.10; in 1910 it dropped to \$27.50; and in 1911 to \$23.30. This reduction in the average is due to the rapid increase in the number of farms and in the acreage irrigated and probably to greater accuracy in the returns. It is not believed that it indicates any deterioration in the land as a whole, although there has been a gradual increase of area of swamped lands due to excessive use of water on the newer farms. There is a tendency for the better land lying along the streams to decrease in crop production unless protected by careful drainage and handled in the best method.

The average value of crops per acre in 1909 on irrigated land for the whole arid West, as shown by the census for 1910, is about \$25; so that it may be said that the results obtained on reclamation projects are fairly comparable with those prevailing throughout that section of the country. Without going into a careful analysis of the crops it may be stated that the returns show that for ultimate success a more economical use of the water is essential. This must be accompanied by more thorough cultivation and the introduction of special crops adapted to the soil, climate, and markets. The tendency has been to adhere too closely to the old methods of agriculture and to the ordinary field crops, which can not be produced under irrigation with the same degree of success as is possible with improved varieties.

The first effort of the irrigator on new lands, after these have been leveled and put in good condition, is to grow alfalfa or some similar plant of the clover or pea family, which will put nitrogen into the soil. It is necessary to spread a blanket of alfalfa over the surface and then to turn the plants under the surface in order to supply organic matter to the soil. The following table shows the acreage of the principal crops raised and the percentage of the total acreage represented by each. There is, of necessity, some duplication in these figures as some of the land is in orchard and is cultivated between

the rows and in other cases more than one crop per year has been produced.

Crop acreage, 1911.

Crop.	Acreage.	Per cent.	Crop.	Acreage.	Per cent.
Alfalfa.....	253,576	42.0	Melons and canteloupes.....	2,841	0.5
Barley.....	28,320	4.7	Oats.....	55,007	9.1
Beans.....	1,589	0.3	Onions.....	197	—
Beets.....	8,214	1.4	Pasture.....	47,128	7.8
Cane (sugar).....	343	0.1	Potatoes.....	14,985	2.5
Corn.....	14,177	2.3	Rye.....	2,124	0.4
Cotton.....	3,606	0.6	Sorghum.....	1,189	0.2
Flax.....	2,156	0.3	Speltz.....	904	0.2
Fruit.....	42,143	7.0	Wheat.....	76,472	12.7
Garden.....	3,994	0.7	Miscellaneous.....	23,732	3.9
Hay (clover, timothy, etc.).....	19,432	3.2			
Hops.....	417	0.1	Total.....	602,546	100.0

Operating force.—As the projects or portions of projects approach completion and water can be furnished to the settlers, it has been found necessary to gradually organize an operating force, using for this purpose the men who have had previous experience in that line or those who are thoroughly familiar with the construction of the works and have demonstrated ability in dealing with the various problems which have arisen. The project engineer who up to that time has had charge of the construction is replaced with the irrigation manager, who may or may not be an engineer, but whose interest is primarily in the successful delivery of water to the settlers at the proper time and in the quantities needed.

To secure efficient operation it has been found necessary to install records of delivery of water and systems of cost keeping similar to those maintained during construction. There has been a notable lack of definite information available on such important points as the quantity of water delivered to individuals and the relation of this to crop production, as well as the cost of maintaining any large system, so that here the records are of value not only in connection with the efficient and economic operation of these particular works but to the public in general in showing for the first time the full facts concerning these important problems. The more important facts relative to operation and maintenance during the past fiscal year are given in the discussion of projects, and a summary of results for the calendar year 1911, in tabular form, is given in the Appendix, pages 292 and 293.

Drainage.—Since the beginning of irrigation the rise in the ground waters on the various projects has been marked. On some of the projects the water plane has risen over considerable areas to such an extent as to render the lands unfit for cultivation, and in a few cases limited areas have actually been submerged. The cause of this excessive rise in ground waters is evidently due, first, to the adequate supply of water furnished; and, second, to the excessive use of water on the part of the settlers, many of whom were in the beginning without experience in irrigation. In addition to excess irrigation waters, there are also some unavoidable losses from canals and laterals, which reach the subsoil and contribute to some extent in raising the water plane.

Where the irrigation is confined to small areas or narrow valleys with open subsoil conditions, the rise in ground waters is not ordinarily sufficient to interfere with agricultural operations, the excess waters which are put on the land during the irrigation season being in general drained out and carried away before the next season's irrigation is begun. Where, however, large areas are being irrigated and where the ground water must travel for a considerable distance before finding any natural outlet, a general rise in the water plane ordinarily occurs. The keeping down of the water plane to the required depth below the surface can be accomplished by the construction of drainage works and by reducing the quantity of water used in irrigation to a minimum.

In order to maintain the irrigability of the land, investigations are being carried on relative to the elevation of ground waters, and wherever necessary the construction of drainage works is being undertaken. On account of the varying conditions of soils and topography encountered on the different projects various plans for drainage are required. The general purpose, however, in each case is the same, this being the removal from the subsoil of excess waters which have been carried into it through over-irrigation and unavoidable seepage from canals and laterals.

A description of the drainage work in progress will be found under the discussion of projects.

Efficiency and economy.—In organizing the Reclamation Service and in carrying on its operations continual study has been made to improve the efficiency and economy of the work. Much of this has been experimental in character, as it has not been obvious at first what course of procedure was best. It has required in some cases months of observation and of careful records to determine what are the most effective methods of procedure.

In all cases efficiency must be placed above economy. When efficient service has been secured then the economical considerations are taken up. The methods of construction, of operation and maintenance, of keeping records, and of other operations are being studied by men interested in similar lines at home and abroad, and if imitation is to be considered an approval of the work, then we have definite evidence of this approval, as the methods developed by the Reclamation Service are being widely copied.

There has been an almost continual series of investigations of the work and its results by men both from this country and abroad. Nearly every foreign country having large areas of arid lands has been represented by visitors who have studied the works on the ground, and particularly the methods and analyses of cost. Official and unofficial representatives from Great Britain and its colonial possessions, notably from South Africa and from Australia, have visited the works; also engineers and agricultural experts from various portions of the German Empire, from Austria, Russia, Spain, and other European countries, and from Mexico and South America. These men have been interested not only in irrigation but in the control and conservation of flood waters.

Besides the foreign visitors there has been an almost constant series of inspection by engineers and economists of national repute, who have been interested in the developments from a professional

standpoint. Investigations have been made from time to time by Members of Congress, acting singly or in committees. The results of their observations, so far as available, have been gratifying, in that the criticisms have usually been helpful, and where constructive have been quickly utilized as far as practicable.

Future work.—The continuation of reclamation work in the future is dependent upon the success of the farmers upon the land and their ability to make the payments, enabling funds to be used over again. Future operations rest on the effective efforts of the farmers; they can easily discharge their debts to the Government if they can raise sufficiently large crops and obtain a good market for them. On the other hand, failure on the part of the majority of the farmers to practice economy of water, to thoroughly cultivate the soil, and to plant the best varieties of crops must be followed by inability to discharge the debt and by corresponding delay in extending the irrigated areas in accordance with the needs of the growth of the West. The whole Nation is keenly interested in the success of these farmers as demonstrating the ability of the people to handle these public utilities and to put into practical operation the principles of conservation.

The problem is largely one of human nature. There is no question but that the physical elements of success are present, and that if the majority of farmers will use the same energy and skill as is practiced by, say, 20 per cent of them, general prosperity will prevail and irrigation systems can be rapidly extended. This applies not only to the work being done by the Reclamation Service but to that under private auspices, as both are equally involved, in that further extensions are dependent upon present success of the farm. The problem, as now presented, is not so much one of engineering, or of soil or climate, as it is of purely human elements—of getting the competent settler, namely, one who can and will take advantage of the opportunity offered and put it to such use as will enable him to make a comfortable living and secure a competence for old age—thus encouraging others. In the past there has been no systematic effort to control the character of settlement; the opportunities were offered to all, the man coming first having the first opportunity. As a result a great many men have seized the opportunity who do not have any particular ability, and who have been attracted more by the novelty of the situation or by the hope of getting something for nothing than from any real desire to become an irrigation farmer. Too many men have attempted the work without previous experience, and without the necessary capital or farm equipment to enable them to succeed.

One of the desirable safeguards is that of requiring at the outset an advance payment for the water right—say a tenth—sufficient to demonstrate the good faith of the applicant. Where men have been able to procure land for a little or nothing they have usually attempted to hold an area entirely too large to put to economic use, and have spread their efforts over an 80-acre farm, for example, when they are not competent to handle more than 20 acres; having little or nothing at stake, they have nothing but their time to lose, and do not value that very highly.

A study of the successes already made by the settlers, and careful comparison of these with similar enterprises elsewhere, indicates

beyond a doubt that the reclamation act is succeeding, and that larger and better results will be attained each year. The principal need is stability, such as that brought about by time. There has been continual agitation for revision of the law and rumors of radical changes, but as time goes on conditions become more nearly established. When this stability is generally recognized it is believed that progress will continue along lines leading to the realization of the largest hopes of the advocates of reclamation of the waste places through conservation of the water supply.

General data.—The following table presents general data regarding the various projects:

General data regarding projects.

	Net cost.				Number of acres in completed project.	Area for which water is available during 1912.	Area under water-right applications and rental contracts to June 30, 1912.
	To June 30, 1912.		During fiscal year 1912.				
	Building.	Operation and main-tenance.	Building.	Operation and main-tenance.			
Arizona, Salt River.....	\$9,508,831.12	-----	\$382,551.93	-----	230,000	Acres. 160,000	Acres. 160,000
Arizona-California:							
Colorado River.....	43,709.23	-----	49.50	-----			
Yuma.....	5,660,384.88	\$30,620.39	1,516,941.77	\$11,182.93	131,000	16,000	16,000
California, Orland.....	544,810.79	-----	53,395.33	-----	14,200	14,200	4,200
Colorado:							
Grand Valley.....	265,756.34	-----	189,754.25	-----	53,000	-----	-----
Uncompahgre Valley.....	4,765,651.00	-----	323,060.00	-----	140,000	32,000	28,000
Idaho:							
Boise.....	6,646,323.93	-----	2,081,627.54	-----	243,000	200,000	57,959
Minidoka.....	4,169,373.69	329,694.16	217,136.11	156,207.54	118,700	111,300	93,700
Kansas, Garden City.....	378,963.86	-----	753.19	-----	10,677	-----	-----
Montana:							
Blackfeet.....	577,732.95	-----	195,319.63	-----	122,500	10,800	-----
Flathead.....	916,527.30	8,148.67	319,389.45	8,148.67	152,000	32,000	8,920
Fort Peck.....	192,488.44	-----	12,053.37	-----	152,000	7,000	-----
Huntley.....	908,552.29	136,917.48	73,204.91	31,961.67	32,405	28,805	23,744
Milk River.....	958,790.92	-----	109,674.38	¹ 2,723.61	219,557	7,800	350
Sun River.....	847,974.72	18,377.86	118,491.37	¹ 4,644.88	216,346	16,346	10,913
Montana-North Dakota, Lower Yellow-stone.....	2,749,536.48	279,672.38	² 672.08	119,004.58	60,116	37,609	29,542
Nebraska-Wyoming:							
North Platte.....	5,489,777.23	² 93,955.34	748,935.95	² 390,673.15	129,270	104,511	86,378
Nevada, Truckee-Carson.....	4,559,276.43	127,942.58	650,907.70	² 134,559.06	206,000	43,761	44,929
New Mexico:							
Carlsbad.....	796,468.21	² 5,457.26	200,450.91	² 57,410.51	20,277	20,277	20,249
Hondo.....	353,752.07	-----	4,986.00	-----	10,000	-----	1,150
New Mexico-Texas:							
Rio Grande.....	722,059.97	-----	488,535.64	-----	155,000	25,000	25,000
Rio Grande Dam appropriation.....	959,333.11	-----	275,762.65	-----	-----	-----	-----
North Dakota, Mis-souri River Pumping.....	710,862.85	139,179.81	3,739.03	28,271.18	26,182	12,107	³ 12,239
Oklahoma, Cimarron.....	9,067.92	-----	312.13	-----	-----	-----	-----
Oregon:							
Central Oregon.....	40,391.67	-----	136.16	-----	-----	-----	-----
Umatilla.....	1,342,669.98	71,920.78	111,768.31	9,009.32	25,000	17,252	13,781
Oregon-California, Klamath.....	2,154,220.15	20,054.81	218,396.55	² 5,019.9	72,000	30,000	28,087
South Dakota, Belle Fourche.....	3,132,572.06	56,824.62	333,544.15	19,978.05	100,000	65,852	⁴ 42,479

¹ This figure represents only that cost which has not been prorated or charged to projects.

² Revenues and adjustments exceed gross cost.

³ 1911.

General data regarding projects—Continued.

	Net cost.				Number of acres in completed project.	Area for which water is available during 1912.	Area under water-right applications and rental contracts to June 30, 1912.
	To June 30, 1912.		During fiscal year 1912.				
	Building.	Operation and maintenance.	Building.	Operation and maintenance.			
Utah, Strawberry Valley.....	\$1,842,561.74	-----	\$666,269.16	-----	60,000	-----	-----
Washington:							
Okanogan.....	591,588.83	¹ \$18,396.28	28,772.77	² \$10,760.58	9,900	9,900	9,837
Yakima.....	5,824,546.55	2,308.81	845,474.84	34,628.32	137,437	114,688	80,080
Wyoming, Shoshone.....	3,772,386.57	60,474.14	89,415.84	33,972.89	164,122	41,322	22,158
Secondary projects ³	586,992.94	-----	5,096.72	-----	-----	-----	-----
Town-site development.....	15,677.85	-----	2,680.80	-----	-----	-----	-----
General accounts.....	¹ 2,559.00	-----	¹ 514.67	-----	-----	-----	-----
Total.....	72,042,173.07	1,164,327.61	10,267,401.29	² 153,426.63	3,010,689	1,158,530	825,704

¹ Revenues and adjustments exceed gross cost.² This figure represents only that cost which has not been prorated or charged to projects.³ See p. 22.

NOTE.—In the preparation of the above table all of the credits from incidental operations, as profits from mercantile stores, receipts from the sale of power and light, irrigation water, etc., have been deducted from the gross costs for building or for operation and maintenance dependent upon whether the revenues arose from building operations or from operation and maintenance work. This has resulted in a material reduction in both building and operation and maintenance, and for three projects the operation and maintenance costs to date are exceeded by the revenues and adjustments.

For the year 1912 several projects show an excess of revenues over costs in operation and maintenance. For the North Platte and Carlsbad projects, the portion of this excess as shown at the close of the year is caused by other conditions. On the North Platte project the public notices heretofore provided for certain collections which were credited to building in past years, and by public notice dated December 30, 1911, this became a credit to operation and maintenance. The bookkeeping entries transferring these collections from building repayments to operation and maintenance repayments were made during the year 1912, and consequently appear in this statement as an offset against costs for that year, although they were accumulated in prior years.

A further reason for this large credit on the North Platte project, as well as on the Carlsbad project, is the changed public notice which transferred from the cost of operation to that of building the large expenditures for drainage work and for betterments of work already constructed. This necessitated the transfer of the cost of certain work formerly included under operation and maintenance to building cost, thus reducing the apparent cost of operation for the year 1912.

POWER DEVELOPMENT.

In the construction of reclamation projects for irrigating arid lands, it sometimes becomes necessary to develop water power as being the cheapest or most available means of operating the building equipment. If the physical and market conditions are such that it is feasible to continue the operation of the power plant after its construction uses are over, the power may, in some cases, be used for pumping water. In a few cases, a small amount has been available for lighting and other purposes in the neighboring towns on the reclamation projects. In connection with several of the projects, the construction of storage or diversion dams, from which water is to be drawn for irrigation, provides the hydraulic works by which a large amount of power can be developed. The utilization of such power facilities is authorized by Congress in act of April 16, 1906 (34 Stat., 116).

The chief use for power by the Reclamation Service has been for the purpose of pumping. Raising water for irrigation may be divided into two classes:

(a) Where the available water supply is greater than required by the land that can be economically covered by gravity, power may be used for pumping from the gravity canals upon higher lands which would otherwise remain dry.

(b) Where the available land is greater than the available water supply, the latter may be increased by pumping from underground sources or from streams that are too low to be diverted by gravity upon the irrigable lands.

Arizona, Salt River project.—The most notable example of the utilization of the by-product of power of irrigation works for the increase of water supply from under ground is on the Salt River project, where the power canal used for construction purposes and the Roosevelt Reservoir furnish a very large amount of power whenever it is necessary to draw water from the reservoir. This power is developed and used primarily for pumping from wells in the Salt River Valley, where a large supply of water is available underground, and it is estimated that the increased acreage that can be irrigated by this means is about 40,000 acres. The total development of power on this project at present is about 8,000 kilowatts. Further developments are now in process of installation by the water-users' association at points in Salt River Valley, where the drops in the canals can be utilized for this purpose. It is believed that the total amount of power which can be economically developed in connection with this project is above 16,000 kilowatts.

Arizona-California, Yuma project.—On the Yuma project a drop in the canal will be developed and the power used for pumping water from the gravity canal to the high mesa, above Yuma, where some very choice citrus-fruit land can be irrigated. A portion of this power will also be utilized for drainage pumping.

Colorado, Uncompahgre Valley project.—Numerous opportunities exist and will ultimately be utilized for developing power from the irrigation water at various drops in canals in the Uncompahgre Valley, Colo. This power will be used for the three purposes of meeting drainage conditions in certain parts of the valley, adding to the irrigation water supply, and probably, in some cases, raising water to a higher level than can be covered by the gravity canals.

Idaho, Boise project.—On the Boise project, about 1,500 kilowatts of electrical energy have been developed at the Boise Diversion Dam by the use of water which must be allowed to pass this dam to supply prior irrigation rights below. This power was developed and is being used for purposes of construction of the Arrowrock Dam, about 15 miles farther up the river. When construction is completed, it may be utilized for irrigation pumping or drainage purposes, or both.

Idaho, Minidoka project.—The most important instance of the first class is on the Minidoka project, where about 7,000 kilowatts of electrical energy are developed at Lake Walcott by using the water that must be allowed to pass down Snake River for prior rights in the neighborhood of Twin Falls. The current is generated in five separate units and transmitted about 13 miles at a pressure of 33,000 volts to three pumping stations, which pump about 650 cubic feet per

second to a height of 31 feet above the gravity canal, at which level about 10,000 acres are irrigated, and the balance of the water is pumped to an elevation of 31 feet higher, where another canal irrigates about 15,000 acres, and the remainder of the water is pumped an additional 31 feet to the highest level, from which about 23,000 acres are irrigated.

Montana, Huntley project.—This project presents an example of rather peculiar type of the first class of irrigation pumping where a drop in the canal is utilized for pumping a portion of the water to a higher level than the gravity canal, and where the power and pumping units are combined. In this case, the water wheel is of the turbine type and is directly connected with a centrifugal pump, the entire operation being automatic and requiring only such attention as is necessary to prevent the entrance of trash and adjust the amount of water, the bearings being water lubricated. About 4,000 acres of land are thus reached which lie too high for the gravity canal.

Montana-North Dakota, Lower Yellowstone project.—On the Lower Yellowstone project a small direct pumping unit, similar to the one described in connection with the Huntley project, is now under construction to supply about 3,000 acres of irrigable bench land.

Nebraska-Wyoming, North Platte project.—On the North Platte project, in Wyoming, the Pathfinder Dam, past which more than a million acre-feet of water must pass every irrigation season, affords an opportunity for developing a large amount of power. There is at present no available use which justifies the development of this power.

Nevada, Truckee-Carson project.—On the Truckee-Carson project about 1,000 kilowatts of electrical energy are being developed at the point where the Truckee main canal discharges its waters into the Carson River. This power was developed and is being used for the construction of the Lahontan Dam to form a storage reservoir on the Carson River. After the completion of the dam this power will be available for pumping water from the gravity canals upon some very fine bench land, and will also be used for relieving the drainage conditions on some of the flatlands of the project by pumping water from underground which will incidentally augment the irrigation supply.

New Mexico-Texas, Rio Grande project.—The Rio Grande project, in New Mexico, for which a large storage dam is under construction, will afford opportunity for developing a large amount of power which can be used to augment the water supply of southern New Mexico by pumping from underground.

North Dakota, Missouri River Pumping project.—In North Dakota the extensive deposits of lignite near Williston are being utilized to develop power for pumping the water of Missouri River upon the adjacent irrigable lands.

Utah, Strawberry Valley project.—On the Strawberry Valley project, in Spanish Fork Valley, Utah, about 500 kilowatts of electrical energy have been developed for construction purposes and used for the construction of the Strawberry Tunnel, the Strawberry Valley Storage Dam, and other works connected with the project. When construction is completed, this power will be available for pumping water from underground for the combined purposes of drainage and irrigation. Part of this land is at present too wet for cultivation, but

if drained will require irrigation. It is believed that an advantageous location of wells will increase the irrigation water supply, while reclaiming some very rich swamp land. This combination of function is also utilized to some extent in Salt River Valley.

Washington, Okanogan project.—On the Okanogan project the water stored in the Conconully Reservoir will be utilized to furnish power for augmenting the water supply by pumping from the Okanogan River.

Washington, Yakima project.—Direct pumping to higher levels is accomplished on the Yakima project by means of a battery of hydraulic rams, which, for small installations, is probably the simplest and most economical device yet employed. This method is used in a small way on several of the projects. On the Tieton unit of the Yakima project numerous drops exist where power might be cheaply developed during the irrigation season, but as yet no such development has been carried out.

Wyoming, Shoshone project.—On the Shoshone project the big storage dam affords an excellent opportunity for the development of power, but no uses in this vicinity have yet appeared which justify this development.

Power output.—In most cases the output of power from plants built by the Reclamation Service are limited or modified by the irrigation demands which are everywhere made primary. Where power is developed by drawing water from a reservoir or by drops in the canals, such power is usually available only in the irrigation season and can not be used at other seasons without wasting water which might be utilized for irrigation. This limitation adapts itself well to irrigation uses, being available in about the proportions required for irrigation pumping.

On the Minidoka project the reverse condition is presented. Here the power is developed at a diversion dam where irrigation water required for the lower valleys is utilized during the irrigation season for irrigation pumping. During the winter a large amount of natural flow continues past this dam, but the irrigation demands have ceased. The condition is, therefore, presented where a large amount of power is available in the winter which is required during the summer for irrigation pumping. To properly conserve this power, special inducements have been offered for its use for heating purposes in the towns on the project. Under these circumstances heat can be furnished by means of electric heaters at approximately the cost of coal. Its greater convenience and cleanliness has led to such use to a considerable extent, but the available market is so limited that a large amount of winter power still remains unused. Investigations are under way to determine the feasibility and cost of utilizing this winter power in the manufacture of nitrogen products for fertilizers and other uses, and it is believed that eventually this power installation may become an important factor in maintaining and increasing the fertility of adjacent lands and perhaps in developing other special industries adapted to intermittent use of power.

On the Salt River project the possibilities of power development are far beyond the requirements of irrigation pumping, and are, furthermore, fluctuating in quantity, owing to the varying head in the reservoir which is to be utilized upon the wheels. A contract

has recently been executed by which the surplus not required in the valley is to be delivered to a neighboring mining camp without any obligation for continuous delivery, but with an agreement by the company to take all available power whenever available up to a specified limit. Such a market is exceedingly rare, but owing to the high price of fuel in this country the mining company finds it profitable to pay three-fourths of a cent per kilowatt-hour for all power taken under the above conditions, which, of course, necessitate a full installation of steam power on the part of the company and a readiness to put the steam plant into operation on short notice at any time. Under the contract the steam plant of the company may be utilized by the United States for its own purposes in case of serious accident to the water-power plant. This fortunate conservation of the entire power possibilities of the Salt River project will, in the long run, prove profitable to the irrigators under the project.

The following table gives, in summarized form for reference, the capacity, output, and construction costs for each of the five most important power plants of the service:

Power-plant data.

Project.	Name of plant.	Capacity (horse-power).	Cost to June 30.	Cost per horse-power.	Output (kilowatt-hours).	
					Sold.	Used by United States Reclamation Service.
Arizona, Salt River.....	Roosevelt.....	¹ 6,000	\$438,600	² \$59	4,770,843	711,041
Idaho, Boise.....	Boise ³	3,000	172,000	57	36,720	74,590
Idaho, Minidoka.....	Minidoka.....	10,000	412,800	41	1,700,000	14,800,000
Nevada, Truckee-Carson.....	Lahontan ⁴	1,600	81,600	49	-----	-----
Utah, Strawberry Valley.....	Spanish Fork.....	1,600	57,900	36	304,870	2,625,000

¹ 9,380 horsepower on completion.

² Estimated cost on completion.

³ Operation begun May 12, 1912.

⁴ Plant running but intermittently on construction work for 6 months.

SECONDARY PROJECTS.

In addition to the primary irrigation projects which have been approved by the Secretary of the Interior for detailed investigation or for construction, and which are discussed on pages 45 to 198 a number of secondary projects have been investigated at various times since the organization of the Reclamation Service. The work on the secondary projects has in general been limited to the gathering of information as to water supply and the determination of the character and extent of irrigable lands.

The following secondary projects have been investigated:

Arizona: Little Colorado, San Carlos, and San Pedro.

California: Owens Valley, Sacramento Valley, and San Joaquin.

Colorado: White River.

Idaho: Dubois and Port Neuf.

Montana: Clark Fork, Crow Reservation, Lake Basin, Madison River, and Marias.

Nebraska: South Platte.

Nevada: Walker River.

New Mexico: La Plata, Las Vegas, and Urton Lake.

North Dakota: Bismarck, Little Missouri, Nesson, Washburn, and Bowman.

Oklahoma: Cimarron and Red River.

Oregon: Malheur.

Utah: Bear Lake and Utah Lake.

Washington: Palouse and Priest Rapids.

Wyoming: De Smet.

Information relative to these projects can be found in preceding reports by consulting the index in the Tenth Annual Report.

LEGISLATION.

The reclamation act and acts of Congress affecting the operations thereunder have been printed in preceding annual reports from the fifth to the tenth, inclusive. For convenience of reference the reclamation act is reprinted in the Appendix, page 199, together with laws affecting operations thereunder that have not heretofore been printed in the annual reports.

DECISIONS OF THE SECRETARY OF THE INTERIOR.

Below is given under suitable headings a digest of important decisions which have been rendered by the Secretary of the Interior during the past year relating to operations under the reclamation act:

FURNISHING WATER TO SQUATTERS.

As an emergency measure to save growing crops the director is authorized to supply squatters upon withdrawn lands under the reclamation projects with water on a rental basis, pending decision as to their rights to the land, subject to the provision that water shall be furnished only to such settlers as file applications therefor which shall contain the following language:

The undersigned hereby agrees that neither the receipt of this application nor the furnishing of water or anything done hereunder shall operate in any manner as a recognition of any rights or claims of the undersigned in or to lands concerning which this application is made. (First Assistant Secretary, May 27, 1912.)

AQUISITION OF RIGHTS OF WAY.

In dealing with individuals, corporations, or organizations of city, county, or State, no contract should be made nor words used which require that the Government submit its affairs or agree that judgment be passed upon its accounts by any individual or organization. When dealing with railroads or public bodies whenever right of way is necessary the attempt should be made to secure a fair and liberal contract, and in the event such contract can not be procured by negotiation then resort should be had to condemnation proceedings. (Acting Secretary, Feb. 23, 1912.)

WATER USERS' ASSOCIATIONS.

The director is authorized to release from stock subscription any and all lands in any and all projects heretofore or hereafter shown by official survey or by the original or amended farm unit plats to be nonirrigable; also to assent to the reduction of stock subscription for any such lands to the acreage so shown as irrigable. (Acting Secretary, Mar. 11, 1912.)

WATER RIGHTS.

The purchaser of lands upon deferred payments is the equitable owner of the land so long as he is not in default of payment. Purchasers of such lands in good standing—that is, not in default—may subscribe for and purchase water rights for lands held under such contracts subject to the limitation of area prescribed in the reclamation act and the public notices issued in pursuance thereof. (Acting Secretary, Sept. 11, 1911; 40 L. D., 270.)

Where the irrigable area of a legal subdivision in an entry within a reclamation project is shown on the approved farm unit plat to be greater than the entire area of such legal subdivision shown on the prior township plat, applications for water and payments therefor should be made on the basis of the actual irrigable area and not on the basis of the acreage shown on the township plat. (First Assistant Secretary, Mar. 23, 1912; 40 L. D., 600.)

ENTRIES.

A homestead entry within a reclamation project is not limited to the seven-year period fixed for consummation of ordinary homestead entries elsewhere on the public domain, but may be completed within the time fixed by the public notice for compliance with the requirements of the reclamation act unless the project be abandoned. Such abandonment will terminate the seven-year period, and thereafter the entry will fall within the general class of entries and be governed by the general homestead laws. (First Assistant Secretary, Oct. 6, 1911; 40 L. D., 291.)

RELINQUISHMENT OF PART OF ENTRY.

A homestead entryman subject to the reclamation act may relinquish a part of his farm unit and have the payments which had been made on the relinquished part credited on the charges against the retained part, provided that the amendment in question may be allowed without jeopardizing the interests of the Government in the collection of charges against the portion of the tract relinquished. The entryman desiring to make such relinquishment shall submit his application therefor to the project engineer, who will transmit the same with his recommendation through the proper channels to the Director, who, if he finds no objection, will proceed as in other cases of proposed amendments of farm units. (Acting Secretary, Dec. 18, 1911; 40 L. D., 312.)

PAYMENTS.

Where payment is tendered for part only of either an annual installment of building charges or an annual operation and maintenance charge, receivers may accept the same if the insufficient tender is, in the opinion of the receiver, caused by misunderstanding as to the amount due and approximates the same. In such cases receipts will issue for the amount paid and the money deposited to the credit of the reclamation fund and the water user allowed 30 days to make payment of the balance due. If the balance is paid within such period additional receipt will issue therefor, otherwise report will be made to the Commissioner of the General Land Office. In all other cases of insufficient tenders receivers will issue receipts therefor and return the money to the water user, stating the reason for its return. (Regulations approved Apr. 29, 1912, 40 L. D., 641, 673.)

DESERT LAND ENTRIES.

A desert entryman of lands within a reclamation project who seeks to secure water for the reclamation thereof from the project must as a condition precedent to his right to water, relinquish to the Government all of the land embraced within his entry in excess of 160 acres. (First Assistant Secretary, Jan. 20, 1912; 40 L. D., 386.)

An unperfected desert land entry in a reclamation project which has been reduced to 160 acres by relinquishment of the excess area under the act of June 27, 1906 (34 Stat., 520), and has thereby become subject to the reclamation act and qualified to take water from the project, may be assigned in part under the provisions of the act of March 28, 1908 (35 Stat., 52). (First Assistant Secretary, Mar. 11, 1912; 40 L. D., 622.)

CANCELLATION OR RELINQUISHMENT.

If any entry subject to the reclamation act is canceled or relinquished, the payments for water-right charges already made and not assigned in writing to a prospective or succeeding entryman are forfeited. All unpaid water-right charges are canceled by relinquishment or cancellation of the entry, except as provided by the specific provisions of the public notices applicable to particular projects. Any person who thereafter enters the same land must in the absence of assignment in writing or public notice to the contrary pay the water-right charges as if the land had never been previously entered. No credit may be allowed in such cases for the payment made by the prior entryman, and a new entryman must pay at the time of filing his homestead application and water-right application such charges for building, operation, and maintenance as are required by the public notice in force at the time on the particular project. (First Assistant Secretary, Feb. 2, 1912; 40 L. D., 399.)

The provision in section 5 of the act of June 25, 1910, as amended by the act of February 18, 1911, that upon relinquishment of an entry within a reclamation withdrawal, the lands so relinquished shall be subject to homestead settlement and entry under the reclamation act has reference only to lands covered by second-form withdrawals and has no application to lands withdrawn under the first form.

The act of February 18, 1911, contemplates only entries legally made prior to the act of June 25, 1910, and afterwards relinquished. It does not apply to an entry erroneously allowed while the lands were embraced in the first-form withdrawal. (First Assistant Secretary Dec. 29, 1911; 40 L. D., 406.)

CONTEST.

A successful contestant of an entry within a reclamation project will be required in making entry in exercise of his preference right to pay the building charge in force at the time his application is filed, and is not entitled to the rate in effect when the former entry was made nor to credit for the payments made by the former entryman. (First Assistant Secretary, Jan. 29, 1912; 40 L. D., 458.)

AUTHORITY FOR SALE OF WATER.

Water in irrigation canals constructed and operated under the reclamation act which has not become appurtenant to any land and is not yet needed for irrigation, may be temporarily disposed of by lease in the discretion of the Secretary of the Interior, the proceeds to become part of the reclamation fund. Water in this situation is property incidentally acquired under the reclamation act and such disposal thereof is in accordance with the principles laid down by departmental ruling of March 10, 1906 (34 L. D., 480), as to the temporary lease of lands acquired for reclamation works. (Assistant Secretary, Apr. 4, 1912; 40 L. D., 573.)

WITHDRAWAL.

A withdrawal of lands susceptible of irrigation from an irrigation project is effective as to lands in a school section upon which a settlement was existing at the date of the township survey and at the date of such withdrawal, where the settler failed to make entry within the period allowed by law to settlers to place their claims of record. Thereafter the settler in making entry is restricted to any one of the farm units covered by his settlement. (First Assistant Secretary, Mar. 11, 1912; 40 L. D., 586.)

Where land embraced within a homestead entry is withdrawn for use in connection with a reclamation project, pending a contest which resulted in the cancellation of the entry, the successful contestant, upon restoration of the land, is entitled to a period of 30 days from the date of such restoration within which to exercise his preference right of entry. (Assistant Secretary, Apr. 3, 1912; 40 L. D., 607.)

The proviso to the act of February 18, 1911 (36 Stat., 917), that "where entries made prior to June 25, 1910, have been or may be relinquished in whole or in part, the land so relinquished shall be subject to settlement and entry under the homestead law as amended by the act of June 17, 1902," has reference solely to lands withdrawn as susceptible of irrigation and subject to homestead entry at the time of application therefor and has no application to lands withdrawn by the Government for use in the construction and operation of the project. (Assistant Secretary, Apr. 3, 1912; 40 L. D., 627.)

RESERVATION OF RIGHT OF WAY.

All public lands west of the one hundredth meridian taken up under allotment, sale, homestead, or other form of disposal subsequent to the act of August 30, 1890 (26 Stat., 391), as to which there is no claim by reason of settlement, occupancy, or otherwise, prior to that date, are subject to the reservation provided by that act to be expressed in the patent of right of way for ditches or canals constructed by authority of the United States. The purpose of such legislation was to reserve to the United States such lands as might be needed in the prosecution and furtherance of the plan of reclamation as subsequently outlined by the legislation of Congress. (First Assistant Secretary, Apr. 12, 1911; 40 L. D., 28.)

PUBLIC NOTICES AND ORDERS.

During the fiscal year ending June 30, 1912, 39 formal public notices and orders were issued by the Secretary of the Interior for the purpose of opening various areas to entry and regulating water-right charges and other matters in connection with the operation of the different projects. On many of the projects graduated payment water-right charges have been adopted. Under this system the water-right applicant makes a relatively small payment at first, and the annual payments are gradually increased throughout the 10-year period instead of being uniform, according to the method first adopted. This plan gives the settler a better opportunity to make early improvements, and by getting his land in good condition for irrigation during the first few years he is enabled to produce larger crops and is better prepared to meet all payments. The public notices issued are printed in the appendix, pages 204 to 244.

LITIGATION.**COLORADO, GRAND VALLEY PROJECT.**

Argument on the exceptions filed by the attorneys for the United States in the proceedings to adjudicate the priorities of water rights in water district No. 42 (mentioned in the Tenth Annual Report) was made before Judge Cavender, of the State district court, on April 8 to 11, 1912, inclusive. On June 30 the court had not yet rendered an opinion in the matter.

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

In the suit instituted in the District Court of the State of Colorado for the adjudication of water rights in water district No. 40, affecting the Uncompahgre Valley project, a statement of the claims of the United States has been filed and evidence in support of its claims was also presented. Hearings for the presentation of evidence by the various claimants have been held from time to time. The proceedings may be closed at the fall term of the court.

In the suit for the adjudication of water in water district No. 62 hearings for the presentation of evidence have been had from time to time. A statement of claim on behalf of the United States was

filed and evidence in support thereof has also been presented. Hearings will be had from time to time until the proceedings close, which will probably be at the fall term of the district court.

On March 7, 1911, condemnation proceedings were commenced in the United States District Court for the District of Colorado against Aylmer F. Reeves to secure a strip of land for canal right of way across the northwest quarter of the southwest quarter of section 21, township 49 north, range 10 west, N. M. P. M., for the King lateral extension ditch. On May 6, 1911, an order giving the United States immediate possession of the premises sought to be condemned was filed. On May 6, 1911, the respondent, Aylmer F. Reeves, filed a reply which, among other things, raises the question of the constitutionality of the reclamation act. Reply of the United States was filed June 13, 1911. The trial of this cause was, with the consent of counsel, allowed to go over from the fall term (1911) of the United States district court sitting at Montrose, Colo., to the same term of the present year.

On April 20, 1912, condemnation proceedings were commenced in the United States District Court for the District of Colorado against Jesse O'Neill and James O'Neill to secure a parcel of land for canal right of way in section 23, township 49 north, range 10 west, N. M. P. M., for the Spring Creek lateral. On May 3, 1912, the defendants filed their answer and asked for the appointment by the court of a commissioner to determine the necessity for the taking of the right of way in controversy. On June 15, 1912, a reply to the answer of the defendants was filed on behalf of the United States. On June 26, 1912, a hearing was had at Denver, Colo., at which the question of the right of the defendants to have a commissioner appointed was argued. The court has this matter now under advisement.

On February 6, 1912, John A. Masters and W. G. Miller brought an injunction suit in the State district court against Charles T. Pease and Louis Meyer, personally, project engineer and foreman, respectively, of the Reclamation Service, to restrain the defendants from going upon certain lands of the plaintiffs and constructing the West Canal across the same, and a temporary restraining order was issued on the same date. The suit was really against the United States and was brought for the purpose of contesting the validity of the reservation of right of way authorized by the act of August 30, 1890. On February 22, 1912, the State court rendered an opinion, holding in substance that the act of August 30, 1890, created no reservation, principally because of indefiniteness, and made the injunction permanent. No appeal was taken, but a new injunction suit was commenced by the United States in the United States district court against John Masters and others, in which the same matters and questions were involved. This suit is referred to in the following paragraph:

On April 25, 1912, an injunction suit was commenced in the United States District Court for the District of Colorado by the United States against John A. Masters, Martin Van Horn, and other defendants to restrain them from interfering with the construction of the West Canal across the lands of defendants on the route selected for said canal under the provisions of the act of August 30, 1890. On the same date the court granted a temporary restraining order. A hearing was had on May 17, 1912, and on June 12, 1912, opinion was rendered sustaining the validity of the reservation and ordering that

a temporary injunction be issued until final hearing. No appeal has been taken.

On September 11, 1905, an action entitled "The United States of America, to the use of the Montrose Hardware Co. et al., plaintiffs, v. C. D. McPhee et al., defendants," was commenced in the State district court. This suit was instituted by the creditors who furnished material and labor to the Taylor-Moore Construction Co., against the sureties on the bond of said company in connection with its contract for the construction of the Gunnison Tunnel. On March 24, 1908, judgment was entered dismissing said suit, from which plaintiffs appealed to the State supreme court. On December 12, 1911, following judgment, an order was issued reversing the judgment of the district court and remanding the cause to the district court for a new trial. On March 23, 1912, a petition and intervention was filed on behalf of the United States. On April 9, 1912, a demurrer of plaintiff to the petition and intervention by the United States of America was filed. A demurrer by defendant, J. B. Orman, to said petition of intervention of the United States was also filed on April 27, 1912. Other pleadings in the way of amended answers have also been filed since January 1, 1912. No date for the trial or for hearings of argument on the demurrer has been set.

IDAHO, BOISE PROJECT.

The suit of the United States v. Boydstun et al., for the condemnation of lands, has been dismissed, the construction of the Payette division having been abandoned.

The suit of the United States v. Andrew Dowling et al., for the condemnation of lands for the Arrowrock Railroad, has been amicably settled out of court.

In the action against the Highland Valley Power Co. et al., to quiet title to certain lands required for storage dam at Arrowrock, the agents of the company threatened to do mining and blasting on the land in dispute near the Government camp, and a temporary restraining order was asked for, and temporary injunction was issued by the court.

On December 7, 1911, another complaint was filed against the Highland Valley Power Co. and Peter J. Smith, on account of (1) failure to maintain their dam in safe condition and endangering Government property below the dam; (2) failure to file maps, etc., and receive the approval of the Secretary of the Interior, as required by the act of 1895 and regulations thereunder; and (3) for raising the height of their dam and reservoir by using flashboards after the withdrawal of the land by the United States. A temporary restraining order *pendente lite* was issued December 9, 1911.

July 25, 1911, Frank P. Ross brought suit in the district court against J. W. Maney et al., contractors constructing the Arrowrock Railroad, seeking to restrain the construction across land which the plaintiff alleged was located by him as placer claims. The matter has been settled out of court and suit dismissed.

On September 12, 1911, an action was commenced in the United States circuit court against Bridget Quirk to set aside patent to a tract of land in the Arrowrock Reservoir site.

On December 19, 1911, an action was commenced in the United States circuit court against Joseph B. Nibler and the county of Elmore, Idaho, to condemn certain lands required for the Arrowrock Reservoir site. Judgment issued, whereby the sum of \$3,000 was required to be paid for the lands, in accordance with stipulation between the parties.

In the action heretofore commenced against the State of Idaho for the condemnation of lands within the Arrowrock Reservoir site and the Minidoka project, the case was settled by stipulation and judgment entered for the purchase price agreed upon. This action was brought because it appeared that under State laws the United States could not otherwise secure satisfactory title in fee.

Another action against the State of Idaho for the condemnation of a tract of land for the Arena wasteway on the Boise project was commenced on June 24, 1912.

In the case of Farmers' Cooperative Ditch Co. *v.* The Riverside Irrigation District (Ltd.) et al., which was commenced in August, 1902, for the purpose of securing an adjudication of the rights and priorities of appropriations in the Boise River, on August 1, 1911, the court entered an order establishing 0.6 of a miner's inch per acre, measured at the point of diversion from the river, as the duty of water and ordered water distributed on that basis for the season of 1911, and until further order of court.

Suit was commenced by Page & Brinton, contractors, in the Court of Claims, for \$119,856.54, arising out of dispute as to classification of material on a construction contract on the main canal. Petition was filed on February 27, 1912.

IDAHO, MINIDOKA PROJECT.

The case of the Twin Falls Canal Co. *v.* Chas. N. Foster et al., brought in the district court to determine the priorities of the parties to the use of the waters of the Snake River, was removed to the Federal court. On August 11, 1911, a stipulation was filed for the distribution of the water during the season of 1911 in the same manner as in the previous year. On August 12 a temporary order for season of 1911 was issued putting the stipulation into effect. The case was remanded to the State court, and in May, 1912, a temporary order was issued, practically identical with the order issued in previous years for the distribution of the waters of the Snake River for the season of 1912.

On September 18, 1911, Richard Poulton commenced an action in the district court against Earl R. Richards et al. to enjoin the Government engineers and contractors from constructing a drainage ditch across plaintiff's homestead. The contention of Government that right of way across this homestead was reserved under act of August 30, 1890, is sustained by decision of the court September 26, 1911.

The case of the United States *v.* The Minidoka & Southwestern Railway Co. et al., seeking permanent injunction and temporary restraining order prohibiting defendants from going on certain reserved lands on the canals or rights of way of the plaintiff, and from constructing a railroad thereon, and for damages and costs, commenced on December 29, 1909, was appealed to the United States

Circuit Court of Appeals. On February 15, 1911, the court overruled the defendant's objections to the sufficiency of assignment of errors, and on September 5, 1911, the decision of the lower court was reversed, and the contentions of the Government were sustained. It was held that until a railroad company has filed its profile, and obtained the approval thereof by the Secretary of the Interior, it has acquired no rights against the Government by the purchase of rights of way from the entrymen, the filing of articles of incorporation, and partial construction of the railroad. An appeal has been taken to the United States Supreme Court.

On February 21, 1912, the United States commenced an action in the United States district court against the Salt Lake & Idaho Railroad Co. et al. for a permanent injunction and temporary restraining order, prohibiting the defendants from going upon reserved lands or the canals and rights of way of the Government, and from constructing a railroad thereon, and praying for damages and costs. A temporary restraining order has been issued.

KANSAS, GARDEN CITY PROJECT.

On March 14, 1912, the Camden Iron Works filed a petition in the Court of Claims claiming \$9,271.86, being for \$5,560 liquidated damages deducted by the United States under paragraph 33 of contract with the company to furnish certain pumping apparatus and \$3,711.86 withheld by the United States until final acceptance of the apparatus. The claimant has offered testimony, but at the close of the fiscal year no evidence on behalf of the United States had been taken.

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

An action has been brought by the United States against John F. Gabel for the unlawful appropriation of water from an irrigation canal of the United States. Trial is set for October 8, 1912.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

On April 1, 1910, the North Platte Canal & Colonization Co., a corporation, filed a petition in the Court of Claims, claiming \$34,441.96 and interest, as damages for the alleged failure to deliver sufficient irrigation water during the irrigation seasons of 1906 and 1907, and on the same date the company filed a petition in the same court, claiming \$100,000 as damages for the refusal of the Government to acknowledge their intention to and willingness to deliver 500 second-feet of water to a power plant which the company claims it intends to construct. Both cases are pending before the Court of Claims on demurrers interposed by the United States.

NEW MEXICO, CARLSBAD PROJECT.

In the case of the United States *v.* Judkins et al., in the United States District Court for the Fifth Judicial District of New Mexico, an action for the adjudication of the water rights of Black River and tributaries, opinion with findings of fact was filed September 11, 1911, and final decree was entered January 3, 1912.

NEW MEXICO, HONDO PROJECT.

The case of the United States *v.* Lillie C. Klasner, in the United States District Court for the Sixth Judicial District of New Mexico, seeking an injunction to restrain the defendant from the unlawful use of the waters of the Rio Hondo, was dismissed May 25, 1911, at plaintiff's cost, upon motion of the United States attorney made pursuant to report of special agent of the Department of Justice.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

An action for the adjudication of the water rights of the Rio Grande in Texas, entitled "El Paso Valley Water Users' Association *v.* W. H. Austin et al.," was filed in the United States District Court for the Western District of Texas, April 29, 1912.

OREGON, UMATILLA PROJECT.

On May 17, 1909, a petition was filed with the State board of control for the determination of the relative rights to the waters of Umatilla River and its tributaries. An amended petition was filed on February 11, 1910, and the determination was ordered by the board of control on March 7, 1910. The statement and proof of the United States was filed September 5, 1910. Conflicting claims were made by several hundred water users, and the United States filed 188 contests raising duty of water and priority issues. Three contests were initiated against the Government, and there were some 40 or 50 between private parties on the stream system. Evidence was taken in the contests from May 21 to June 3, 1912, when an adjournment was had until September 16, 1912.

On May 31, 1911, complaint was filed by the city of Stanfield in the Circuit Court of the State of Oregon for Umatilla County against the Umatilla River Water Users' Association and Herbert D. Newell (project engineer, Umatilla project), the plaintiff claiming that the project feed canal, by reason of seepage, had caused the ground water to rise and flood the streets and fill the cellars of the city. A restraining order was issued, but was not served until June 10, 1911, at which time the parties entered into a stipulation, with the view of securing an order providing that the restraining order might be disregarded. Upon petition by the United States, the case was removed to the Federal court. On November 13 the case was remanded to the State tribunal. Demurrer to the answer of the Government has been disposed of, and a trial will be had during August.

The Maxwell Land & Irrigation Co., on November 14, 1911, filed a bill of complaint in the Circuit Court for Umatilla County against the Hermiston Bank & Trust Co., praying that the latter be enjoined from disposing of certain lands of the plaintiff in pursuance of a trust deed, in which said company was empowered to sell such lands of the Maxwell Land & Irrigation Co. as were not sold to eligible water-right applicants within stated periods. Temporary restraining order was issued *ex parte*, and the United States attorney for Oregon was, on June 19, 1912, authorized to take appropriate steps as to protect Government interests.

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

The suit of the United States *v.* the Widell-Finley Co., mentioned in the Tenth Annual Report, was tried in the United States Circuit Court, Second Division, Mankato, Minn., October 24, 1911, and resulted in a verdict for the defendants. Appeal has been taken by the United States.

On February 9, 1912, the Widell-Finley Co., a corporation, Messrs. Hoerr, Kron, and Eberhart, sureties, and Henry W. Volk, trustee in bankruptcy, filed a petition in the Court of Claims claiming \$111,900.64 for work performed by the company prior to suspension and \$90,951.38 for work performed since suspension, such claims being based on an alleged improper classification. The sum of \$25,000 is claimed for machinery and equipment of the company taken over by the United States at the time of suspension. No evidence had been taken in this case at the close of the fiscal year.

WASHINGTON, OKANOGAN PROJECT.

A suit was instituted November 28, 1911, in the Superior Court of the State of Washington for Okanogan County, by W. S. Bennett and wife against the Okanogan Water Users' Association, Ferd Bonstedt, project engineer, et al., to quiet plaintiffs' title to water and to enjoin the association, the project engineer, and others, including the water commissioner, from interfering with certain alleged water rights of the plaintiffs. The legal representatives of the United States appeared and demurred for the project engineer. The demurrer has not been set for hearing.

In January, 1912, the United States brought suit against W. S. Bennett and wife in the District Court, Eastern District of Washington, Northern Division, to quiet the title of the United States against alleged excessive claims of the defendants to water from Salmon River. This case came on for hearing during the June term at Spokane and early decision is anticipated, and meanwhile a stipulation covers the amount of water to be allowed defendants.

In March, 1912, complaint was filed by the United States in the District Court of the Eastern District of Washington, Northern Division, against E. K. Pendergast and wife to quiet the title of the United States to its water rights and to determine those of the defendants. An agreement was made out of court and incorporated in a contract executed by defendants.

WASHINGTON, YAKIMA PROJECT.

In the suit of D. P. Baker *v.* Chas. H. Swigart, E. McCulloh, and R. K. Tiffany, officers of the United States in charge of the Sunnyside unit, in the United States circuit court, the right of the United States to collect operation and maintenance charges from water-right applicants was denied. On July 10, 1911, an order for injunction *pendente lite* was entered. On March 29, 1912, a decision was rendered asserting jurisdiction over the cause and upholding the right of the United States to charge operation and maintenance fees as a condition precedent to delivery of water. A decree was entered accordingly, dismissing the action. An appeal was perfected and the injunction continued upon the filing of an increased bond.

The suit of the United States *v.* Theodore Weisberger and the Empire State Surety Co. in the United States Circuit Court for the Eastern District of Washington, Southern Division, is for the recovery of \$51,095.05, excess cost of completing contract of defendant for lining the main canal of the Tieton unit after the contract was suspended. The defendant set up a counterclaim of \$84,604.28 and interest. Trial was begun on February 14, 1912, before judge and jury, the court ruling against the defendants in the matter of the counterclaim, and on February 23 a verdict was entered for defendants. On February 29 the United States moved for judgment, notwithstanding the verdict.

The case of W. A. Bell *v.* J. S. Conway and David O'Hara, referred to on page 16 of the Tenth Annual Report, was tried in the October term and judgment entered in favor of the plaintiff. In this case plaintiff sought to replevin certain machinery claimed under a chattel mortgage from Theodore Weisberger.

The suit of the United States *v.* H. K. Luce, Standard Building Co., and Ira Petty for the recovery of personal property valued at about \$10,000 came on for hearing, and on February 15, 1912, an order was issued dismissing the defendants' counterclaim. An amended answer was then filed, and on April 23 a decision was entered in favor of the Government, and the case was dismissed.

The suit of the United States *v.* H. K. Luce, the Standard Building Co., and the Empire State Surety Co., instituted in the United States Circuit Court for the Western District of Washington in June, 1911, was brought to recover excess cost of construction work completed by the Government at the contractor's expense after suspension, the amount involved being \$9,772.13. A transfer has been made to the eastern district of Washington, and the defendant has leave to file an amended answer. This case will probably be tried during the October term.

On May 30, 1912, suit was filed by H. K. Luce and the Standard Building Co. against Chas. H. Swigart and wife and E. McCulloh and wife in the Superior Court of the State of Washington for Yakima County, the principal defendants being Government officers in charge of the Sunnyside unit, and the suit being brought against them individually for the alleged conversion of construction supplies and equipment, the property of the plaintiffs. Motion that the complaint be made more definite and certain was filed by the defendants, and the case awaits the hearing of this motion.

The case of Julius Anthon and wife *v.* The United States in the Circuit Court of the Eastern District of Washington for \$10,000 damages for alleged breach of right-of-way contract and injury to land during the construction of the Mabton siphon, Sunnyside unit, is referred to on page 16 of the tenth annual report. On February 23 judgment was entered in favor of the plaintiffs in the sum of \$1,250, which is satisfactory to the United States, as the only point in controversy was as to amount of damage.

The suit of the United States *v.* State of Washington et al., brought in the United States Circuit Court for the Eastern District of Washington, for the purpose of condemning certain property needed for the Sunnyside unit, is referred to on page 16 of the tenth annual report. Title to the land has been perfected in R. W. Ashton, and

agreement has been made for the purchase of this property from Ashton.

The suit of the United States *v.* H. E. Nicolai, instituted in the United States Circuit Court, Eastern District of Washington, for the purpose of abating a nuisance consisting of a dam partially constructed above the Sunnyside main canal, referred to on page 16 of the tenth annual report, is being held in abeyance.

The suit of the United States *v.* Sarah A. Wright et vir., referred to on page 16 of the tenth annual report, for specific performance of a contract for the purchase of land, was settled by tender of deed, and the case has been dismissed.

On January 17, 1912, three suits were instituted by the United States in the District Court of the United States for the Eastern District of Washington, Southern Division, against the Union Gap Irrigation Co. The first was an action to enjoin the diversion of water in excess of a flow conceded by contract between the defendant and the United States. On February 23 an order was entered for the appointment of a referee to take testimony, and from March 11 to 16 evidence was taken. Brief has been filed by the United States, and the case awaits the answering brief.

The second case against the same defendant is an action to recover \$1,500 damages caused by washouts from defendant's canal above the Sunnyside main canal. This case is at issue.

The third action was a bill in equity to enjoin the operation of the irrigation system of the defendant until proper spillways and other safeguards have been installed. On February 13 a stipulation was entered, allowing the defendants time to build the spillways and to do the other work asked for in the complaint.

On May 1, 1912, a petition was filed by the United States against Geo. W. Chute and wife in the United States District Court, Eastern District of Washington, Southern Division, for condemnation of an easement necessary for the relocation for the Snipes Mountain lateral, Sunnyside unit. The granting of an order of necessity was resisted, the right to relocate the lateral in question for power development purposes being denied. Hearing was had on May 21 and briefs have been filed.

On June 25, 1912, an action was commenced by the United States *v.* Westside Irrigation Co. in the District Court of the United States for the Eastern District of Washington, Southern Division, to secure a permanent injunction against the diversion of water in excess of the quantity named in limiting agreement.

On June 27, 1912, complaints were filed in the District Court of the United States for the Eastern District of Washington, Southern Division, against Aumiller et ux., the Granger Land Co. and Non-Forfeiture Land Co., Meyer and Davidson, Meyer and Buchanan, and Meyer and Nessley, to enforce the payment of overdue operation and maintenance charges against lands under the Sunnyside unit, under contracts for supplying water to which the United States is the successor in interest of the Washington Irrigation Co. These actions are not yet at issue.

In September, 1911, suit in condemnation was brought against Rosella Heaton and husband for an easement necessary for right of way purposes under the Tieton unit. This case has been compromised and dismissed.

PURCHASES OF RIGHTS AND PROPERTY.

Section 7 of the reclamation act provides that where, in carrying out the provisions of the act, it is necessary to acquire any rights or property, the Secretary of the Interior may acquire them for the United States by purchase or by condemnation through judicial process. A total of \$203,765.66 was paid during the fiscal year 1912 for the acquisition of such rights and property. The following statement shows, by projects, the amount paid to June 30, 1911, the amount paid during the fiscal year 1912, and the total:

Purchases of rights and property.

Project.	Amount.		
	To June 30, 1911.	During fiscal year 1912.	Total.
Arizona: Salt River.....	\$675,133.99	\$10,168.75	\$685,302.74
Arizona-California: Yuma.....	78,110.60	28,669.50	106,780.10
California: Orland.....	133,001.65	200.00	133,201.65
Colorado:			
Grand Valley.....		7,400.00	7,400.00
Uncompahgre Valley.....	133,184.08	907.00	134,091.08
Idaho:			
Boise.....	274,017.08	70,805.50	344,822.58
Minidoka.....	49,518.00	732.50	50,250.50
Kansas: Garden City.....	894.00		894.00
Montana:			
Flathead.....	8,351.74		8,351.74
Huntley.....	1,001.72		1,001.72
Milk River.....	22,878.50	2,275.80	25,154.30
Sun River.....	15,850.75		15,850.75
Montana-North Dakota: Lower Yellowstone.....	20,258.10	113.00	20,371.10
Nebraska-Wyoming: North Platte.....	214,386.53	775.00	215,161.53
Nevada: Truckee-Carson.....	54,068.99	170.00	54,238.99
New Mexico:			
Carlsbad.....	150,000.00		150,000.00
Hondo.....	170,000.00		170,000.00
New Mexico-Texas: Rio Grande.....	230,150.95	24,550.00	254,700.95
North Dakota: Missouri River pumping.....	2,932.50	30.00	2,962.50
Oregon: Umatilla.....	29,282.57	3,566.80	32,849.37
Oregon-California: Klamath.....	533,191.59	6,503.30	539,694.89
South Dakota: Belle Fourche.....	48,402.55	1,336.98	49,739.53
Utah: Strawberry Valley.....	8,058.59	14,217.13	22,275.72
Washington:			
Okanogan.....	29,636.00	400.52	30,036.52
Yakima.....	296,767.03	20,053.02	316,820.05
Wyoming: Shoshone.....	176,634.56	10,890.86	187,525.42
Total.....	3,355,762.07	203,765.66	3,559,527.73

A more detailed statement for the fiscal year, giving, by projects, the name of the vendor, a description of the property acquired, the consideration paid in each case, and the date of the deed, will be found in the Appendix, pages 245 to 258.

FINANCES.**SUMMARY.**

A review of the data appearing in the following tables shows there was on hand at the beginning of the fiscal year nearly \$5,000,000, and that during the year collections increased this amount to almost \$17,000,000, while during the same period expenditures were made totaling about \$11,600,000, leaving a balance of approximately \$5,250,000 on June 30, 1912. The actual amounts received from the sale of public lands and entered upon the books during this period include the amounts collected by the local offices during the fiscal year ending prior to the beginning of this report and also about two-thirds of the amounts collected from that source during the current year.

This was made possible by the prompt action on the part of the General Land Office and the Treasury Department in the auditing and settlement of receipts from this source. Collections on account of water-right repayments, operation, and maintenance returns and miscellaneous revenues have continued the steady increase in amount that has been maintained in the past years.

The reclamation fund, which includes the moneys received from the sale of public lands and town-site lots, has now reached the grand total of \$75,059,201.41. This, together with the \$1,000,000 appropriated for use in the construction of the Rio Grande (Engle) Dam, constitutes the present capital of the service.

During the year 34,884 disbursement vouchers and 3,308 collection vouchers were prepared and settled and transfer vouchers adjusting accounts between the projects for the transfer of the value of services and equipment numbered 928. To the present time there have been transferred between the projects property and services valued at \$3,875,292.64. By this system of transfers from one place to another it is possible to get approximately the full value of every piece of equipment owned by the service.

CASH TRANSACTIONS.

Below is shown in the statement of cash receipts and payments a summarized exhibit of the cash transactions during the year:

Statement of cash receipts and payments.

RECEIPTS.

On hand July 1, 1911 (Tenth Annual Report, Table 16) (cash in project offices \$10,009.35, accounted for below in miscellaneous collections)	\$4, 960, 396. 78
Receipts during year:	
Original receipts—	
Public-land sales	\$9, 389, 707. 19
Town-site lands	84, 692. 90
	9, 474, 400. 09
Repayments of water-right charges	983, 699. 09
Miscellaneous receipts	1, 486, 354. 41
Collections in project offices not classified and remitted	5, 951. 29
Collections in local land offices not remitted	22, 842. 12
Total	16, 933, 643. 78

PAYMENTS.

From reclamation fund	\$11, 387, 430. 65
From Rio Grande Dam appropriation	275, 768. 35
Balance on hand June 30, 1912:	
Reclamation fund—	
In Treasury	\$4, 206, 026. 55
In depositories to credit of special fiscal agents	994, 957. 93
Cash in project offices and local land offices awaiting remittance	28, 793. 41
Rio Grande Dam appropriation in Treasury	40, 666. 89
	5, 270, 444. 78
Total	16, 933, 643. 78

ASSETS AND LIABILITIES.

Below are submitted a balance sheet and a statement of operation and maintenance, showing in summary form the status of the operations under the reclamation act at the close of the fiscal year.

Statement of assets and liabilities to June 30, 1912.

ASSETS, COLLECTIONS, AND COST OF IMPROVEMENTS.

Cash:

With Treasurer United States, reclamation fund	\$4, 206, 026. 55	
In depositories to credit of special fiscal agents, reclamation fund	994, 957. 93	
With Treasurer United States, Rio Grande Dam appropriation	40, 666. 89	
		\$5, 241, 651. 37

Collections returnable to fund through Treasury:

In project offices	5, 951. 29	
In local land offices	22, 842. 12	
		28, 793. 41

Accounts receivable:

Uncollected freight refunds	3, 658. 91	
Uncollected water rentals	48, 104. 47	
Uncollected miscellaneous rentals	66, 161. 34	
Do	126, 827. 89	
Uncollected water-right building charges	1, 069, 185. 53	
Uncollected water-right operation and maintenance charges	139, 922. 70	
		1, 453, 860. 84

Inventories:

Mercantile stores	68, 827. 41	
Equipment in use—		
Government animals	\$212, 549. 60	
Mechanical and other equipment	1, 337, 414. 81	
		1, 549, 964. 41

Materials, supplies, and equipment in store—		
houses	708, 239. 94	
Cement	93, 736. 77	
Structural iron and steel	45, 891. 93	
Lumber	119, 022. 59	
Explosives	19, 551. 06	
Forage	33, 319. 88	
Fuel	24, 488. 56	
Products of local operations	40, 714. 69	
Goods in transit	1, 434. 14	
Unadjusted transfers between projects	35, 632. 14	
Undistributed cost (freight and handling on inventory property)	22, 354. 77	
		2, 763. 178. 29

Gross cost of improvements

Less credits from incidental operations:

Rentals of cottages	\$56, 511. 92	
Rentals of grazing and farm lands	86, 328. 53	
Rentals of power and light	222, 157. 13	
Rentals of irrigating water	1, 258, 353. 93	
Rentals and tolls, telephone lines	8, 067. 34	
Revenues—miscellaneous	50, 096. 26	
Profits on mess-house operations	65, 401. 71	
Profits on mercantile-store operations	166, 925. 57	
Profits on hospital operations	5, 508. 51	
Profits on miscellaneous operations	116, 582. 80	

2, 033, 033. 70

Statement of assets and liabilities to June 30, 1912—Continued.

ASSETS, COLLECTIONS, AND COST OF IMPROVEMENTS—continued.

By adjustments:

Contractors' freight refunds---	\$128, 154. 71
Forfeitures of defaulting bidders and contractors-----	59, 754. 46

187, 909. 17

\$2, 221, 842. 87

\$72, 142, 925. 06

Deferred operation and maintenance-----	1, 164, 327. 61
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Total assets-----	82, 794, 736. 58
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LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:

Unpaid labor-----	\$289, 197. 80
Unpaid purchases-----	247, 361. 47
Unpaid contract estimates-----	162, 557. 13
Unpaid contract holdbacks-----	111, 591. 17
Unpaid freight and express-----	179, 849. 28
Unpaid passenger fares-----	6, 906. 29
Unpaid land agreements-----	244, 555. 27
Unredeemed coupon books-----	2, 376. 22
Unredeemed meal tickets-----	2, 647. 05
Unpaid miscellaneous-----	55, 404. 01

\$1, 302, 445. 69

Reserves:

For amortization of original cost by repayment—

Building charges accrued_	\$4, 600, 263. 85
Advance collections of building charges-----	448, 803. 13
Building charges forfeited-----	7, 290. 17

5, 056, 357. 15

For depreciation of equipment-----	221, 128. 69
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5, 277, 485. 84

Unadjusted credits: Earnings of Government animals-----	155, 603. 64
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Capital:

Reclamation fund-----	\$75. 059, 201. 41
Rio Grande Dam-----	1, 000, 000. 00

76. 059, 201. 41

Total liabilities-----	82, 794, 736. 58
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Operation and maintenance statement to June 30, 1912.

EXPENSES.

Cost, ledger-----	\$2, 674, 944. 52
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REVENUES.

Operation and maintenance charges:

Accrued-----	\$1, 041, 590. 14
Collected in advance-----	13, 210. 26
Forfeited-----	1, 156. 16
Rentals of lands and buildings-----	4, 431. 72
Rentals of power and light-----	2, 094. 45
Rentals of irrigating water-----	357, 463. 01
Miscellaneous revenues-----	90, 671. 17
Deferred revenues-----	1, 164, 327. 61

2, 674, 944. 52

“Deferred revenues” is here used to designate the excess of costs of operation and maintenance of irrigating works over receipts prior to the complete settlement of the lands served by them.

For additional financial statements see Appendix, pages 268 to 275.

TRANSPORTATION AND PURCHASES.

(Chicago office.)

An agreement, involving a substantial reduction in freight rates, was entered into with the Western Pacific Railway Co. on August 1, 1911, and special concessions in freight rates from important shipping points to particular points of delivery on various projects have been granted by the following companies:

Oregon-Washington Railroad & Navigation Co.	Atchison, Topeka & Santa Fe Railway Co.
Mallory Steamship Lines.	Oregon Short Line Railroad Co.
Morgan Steamship Line.	Wells, Fargo & Co. Express.

On July 1, 1911, the unsettled bills for freight and express charges amounted to \$65,493.45. There were received during the fiscal year for administrative examination bills amounting to \$618,855.87, and bills amounting to \$640,105.34 were examined and bases for settlement arranged with the claimants, leaving outstanding June 30, 1912, unsettled bills amounting to \$44,243.98. Claims made by the transportation companies on freight and express charges settled during the fiscal year amounted to \$640,105.34, and the amount due thereon, after examination at the transportation office, was \$610,740.23. The commercial charges on these bills would have been \$1,055,733.27.

On June 30, 1912, the records of the transportation office showed the status of expense bills covering shipments consigned to contractors to be as follows:

Expense bills on hand July 1, 1911-----	\$348. 27
Expense bills received during fiscal year-----	48, 656. 87
Expense bills on which claims were filed with transportation companies during fiscal year-----	45, 867. 57
Freight claims against transportation companies made on above expense bills-----	20, 807. 95
Expense bills, not subject to concessions, on hand or received during fiscal year-----	2, 851. 23
Expense bills on hand June 30, 1912-----	286. 34

A total of 2,205 purchases of supplies for field use, amounting in cost to \$930,018.53, was made through the Chicago office during the fiscal year.

The following table gives general data regarding freight and express charges since 1906:

Year.	Bills settled.	Commercial charges.	Deducted on account of freight contracts, etc.	Per cent deducted.
1906-7-----	\$278,782.10	\$470,863.26	\$192,081.16	40.8
1907-8-----	369,583.04	577,830.42	208,247.38	36.0
1908-9-----	778,047.12	1,403,970.10	625,022.98	44.5
1909-10-----	437,032.61	758,808.76	321,776.15	42.4
1910-11-----	405,360.55	666,876.59	261,516.04	39.2
1911-12-----	610,740.23	1,055,733.27	444,993.04	42.1

UNIT PRICES UNDER FORMAL SPECIFICATIONS.

In a table in the Appendix, page 276, are given the principal unit prices bid for work and materials and contract unit prices therefor in connection with formal specifications, proposals for which have

been received by the Reclamation Service during the fiscal year ending June 30, 1912. Formal specifications issued during the year include those numbered from 191 to 216, inclusive. In almost all cases contracts have been awarded to the lowest bidder, but as the contracts have been awarded on definite divisions of the work as a whole, it has frequently happened that the contract price for a particular item is higher than the lowest bid on that item. Unit bids and contract prices for cement, explosives, headgates, machinery, and electrical equipment are not included in the table referred to.

ELECTRICAL AND MECHANICAL ENGINEERING.

(Los Angeles office.)

The chief electrical and mechanical engineer, with offices at Los Angeles, Cal., has general supervision of design, construction, and operation of the electric power plants of the service, of which there are seven at present constructed, with a total capacity of 20,000 kilowatts. Plans are now under way which will increase this total capacity of plants to 25,000 kilowatts. The following is a general report on the progress of electrical and mechanical work during the fiscal year ending June 30, 1912:

Arizona, Salt River project.—In connection with power plants being constructed by the Salt River Valley Water Users' Association, the South Consolidated plant was designed and construction supervised; the Arizona Falls plant was designed and the foundations are under construction and the Crosscut power plant was designed. Two variable head turbine units at the Roosevelt power plant were completed and installed; pumping units for the Chandler district were completed and tested, and three of these units installed and placed in operation. The transmission line for furnishing power to the town of Glendale was completed, and construction was commenced on a transmission line connecting the Arizona Falls and Crosscut power plants. Specifications were drafted for the High Line pumping plant to be built by an association of the landowners. The plant will have a capacity of 60 second-feet at a lift of 45 feet, and will be located south of Tempe.

Arizona-California, Yuma project.—Some studies were made concerning the possibility of utilizing hydraulic power at the Laguna Dam, and a tentative design prepared for a power plant at a drop in the main canal, on the California side of the Colorado River.

Idaho, Boise project.—The design of the Boise power plant was completed and the power plant constructed and placed in operation for the first time on May 3, 1912. The normal rated capacity of this plant is 1,875 kilovolt alternating. On account of peculiar conditions at the site of this plant, butterfly gates were installed to control the turbine pits. The transmission line from Barberton to the Arrowrock substation, 19 miles in length, was completed early in the year and for a time power was supplied by the Idaho-Oregon Co. Later, a second transmission line, 17 miles long, was constructed from the power plant to Arrowrock, and both lines are now utilized by the power plant. Sluicing gate outlets for Arrowrock Dam were designed and specifications prepared.

Idaho, Minidoka project.—The power system on the Minidoka project was successfully operated throughout the year. During the non-irrigation season all the pumps were given a thorough overhauling and one new pumping unit was installed in each section, bringing the pumping capacity of the project during the height of the season very close to the full capacity of the power plant, namely, about 6,000 kilowatts. Temporary pumping units for drainage purposes have been installed on the project and specifications prepared for the West End pumping plant, consisting of two 20 second-foot pumps with a lift of 20 feet. Specifications have been issued for permanent pumping apparatus. The operation of the system for 1912 began on May 12, and the maximum load on the plant prior to June 30 was 6,500 kilowatts.

Montana, Milk River project.—Some estimates were prepared and preliminary work done on the development of power for construction purposes on the St. Mary storage unit.

Nebraska-Wyoming, North Platte project.—During the non-irrigation season the installation of the balanced valves at Pathfinder Dam was completed and they were placed in operation at the beginning of the irrigation season of 1912.

Nevada, Truckee-Carson project.—The Lahontan power plant, consisting of two 625-kilovolt alternating generators, operated by turbines under a head of 115 feet, was designed, constructed, and placed in operation on November 1, 1911. Operation has continued with only minor interruptions since that date. The maximum peak load at the present time slightly exceeds 800 kilowatts. Power is used in the construction of the dam for cableways, pumps, and stationary motors, as well as for electric shovel and drag-line scraper.

New Mexico-Texas, Rio Grande project.—The design and construction of the Engle steam power plant of 1,500-kilowatt capacity, consisting of three 500-kilowatt steam turbine units, was completed, and the plant was put in operation in February, 1912. Plans were made for the distribution of the electric power for the construction of the Engle Dam and a large portion of the necessary apparatus was purchased. Some studies were made on the development of hydroelectric power at the Engle Dam.

North Dakota, Missouri River Pumping project.—Considerable study was given to the question of operating the power plant during the winter for furnishing power to the city of Williston, and a tentative draft of contract was prepared to cover this sale of power.

Utah, Strawberry Valley project.—A transmission line for supplying the towns of Payson and Salem was completed and the town of Payson was supplied with power. Preliminary studies of possible future enlargement of the power plant were made.

Washington projects.—Considerable study was given to the possibilities of pumping on the Okanogan project and on the Sunnyside unit of Yakima project.

CEMENT TESTS.

(Denver office.)

The amount of cement for which tests were made during the fiscal year ending June 30, 1912, was 160,553 barrels, of which 149,303 barrels were accepted and 11,250 barrels rejected. The following

table shows the number of barrels for which tests have been made, and the amount and per cent accepted, from 1904, when the testing laboratory was opened, to 1912:

Cement tested.

Year.	Amount for which tests were made.	Accepted.	
		Amount.	Per cent.
	<i>Barrels.</i>	<i>Barrels.</i>	
Jan. 1, 1904, to June 30, 1906.....	90,586	83,013	91.6
1907.....	164,279	159,279	96.9
1908.....	131,631	122,631	93.2
1909.....	196,097	163,733	83.5
1910.....	140,293	127,743	91.1
1911.....	93,986	88,986	94.6
1912, to June 30.....	160,553	149,303	92.9
Total.....	977,425	894,688	91.5

The specifications under which cement was purchased during fiscal year 1912 and the methods of testing employed in the laboratory conformed in general to the standard specifications for cement and the methods of testing recommended by the American Society for Testing Materials. Future purchases, however, will be made under the new United States Government specifications issued under date of May 1, 1912. In the Appendix, pages 266 to 267, will be found a table which gives the average results of all tests on accepted cement from January 1, 1904, to June 30, 1912.

Regular sets of long-time tests have been continued, and special investigations have been carried on, as follows: Sand tests (both tensile and compressive) for various projects, including a continuation of such tests for the Arrowrock Dam on the Boise project; a continuation of sand-cement tests (both tensile and compressive) for the same structure, together with similar tests for the Truckee-Carson and other projects; water analyses for various projects; tests and analyses in connection with the disintegration of concrete by alkali; and miscellaneous tests and analyses as required. Analyses of samples from points where disintegration of concrete from alkali action has taken place show that the principal salts causing this action are the sulphates, and especially sodium and magnesium sulphate. In the hope of finding a practical remedy for the difficulty, test specimens, representing various materials and proposed remedial methods, will be made and tested in the field at points where alkali conditions prevail.

PERSONNEL.

On June 30, 1912, the force of the Reclamation Service comprised 6,468 persons, subdivided as follows: Classified employees, 497; registered employees, 1,235; and laborers, etc. (employed temporarily and locally on the various projects), 4,739. In addition the employees of contractors working on reclamation projects numbered 626. A more detailed statement, giving the administrative personnel of the service, and the number of employees by projects, classified as above, will be found in the Appendix, pages 293 to 296.

INJURIES TO EMPLOYEES.

Under the terms of the act of May 30, 1908, regarding injuries to employees of the United States and compensation therefor, 328 injuries to employees of the Reclamation Service were reported during the calendar year 1911, the corresponding figures for 1910 being 202; for 1909, 173; and for the seven months of the year 1908 subsequent to the passage of the act, 62. The number of injuries reported per 1,000 employees has shown a steady increase from 36 in 1909 to 38.8 in 1910 and 52.9 in 1911. In 1911 claims for compensation were allowed in 129 of the cases of reported injury, or 39.3 per cent; in 1910, in 101 cases, or 50 per cent; and in 1909, in 97 cases, or 56.1 per cent. The number of injuries for which claims for compensation were allowed per 1,000 employees has remained practically the same during the past three years, being 20.2 in 1909, 19.4 in 1910, and 20.8 in 1911. The average compensation paid amounted to only \$122.96 in 1911, as compared with \$223.36 in 1910; \$201.94 in 1909; and \$303.48 in 1908.

Further detailed statistics showing the number of injuries and compensation paid, by projects, will be found in the Appendix, pages 296 and 297.

DISCUSSION OF PROJECTS*

[A brief statement of the origin of each project and of the preliminary investigations made, and a concise description of the construction work completed prior to July 1, 1910, may be found in the ninth annual report. For principal current contracts and public notices see Appendix.]

ARIZONA—SALT RIVER PROJECT.¹

LOCATION.

Counties: Maricopa and Gila.

Townships: 3 S. to 3 N., Rs. 1 to 6 E. and 3 to 5 N., Rs. 11 to 14 E., Gila and Salt River meridian.

Railroads: Santa Fe, Prescott & Phoenix; Arizona Eastern.

Railroad stations and population, 1910: Phoenix, 11,134; Tempe, 1,473; Mesa, 1,692; Chandler,² Glendale,² and Peoria.²

WATER SUPPLY.

Source of water supply: Salt and Verde Rivers, and wells in various parts of the valley.

Area of drainage basins at Granite Reef Dam: Salt River, 6,250 square miles; Verde River, 6,000 square miles.

Annual run-off in acre-feet: Salt River at Roosevelt (5,760 square miles), 1889 to 1911, maximum, 3,260,000; minimum, 154,000; mean, 808,000 acre-feet. Verde River at McDowell (6,000 square miles), 1889 to 1911, maximum, 1,850,000; minimum, 117,000; mean, 582,000 acre-feet.

DATA FOR COMPLETE PROJECT.

Reservoir: Roosevelt—Area, 16,320 acres; capacity, 1,284,000 acre-feet; length of spillway, 400 feet; elevation of spillway, 220 feet above stream bed.

Storage dam: Roosevelt—Type, rubble masonry, arch gravity; maximum height, 280 feet; length of crest, 1,125 feet; volume, 342,000 cubic yards.

Diversion dams: Granite Reef—Type, rubble concrete weir; maximum height, 38 feet; length of masonry, 1,000 feet; volume, 40,000 cubic yards. Power canal—Type, rubble concrete weir; maximum height, 12½ feet; length of masonry, 400 feet; volume, 8,000 cubic yards.

Length of canals now in use: 32 miles with capacities greater than 800 second-feet; 64 miles with capacities from 301 to 800 second-feet; 71 miles with capacities from 50 to 300 second-feet; 409 miles with capacities less than 50 second-feet.

Tunnels: Number, 23; aggregate length, 10,980 feet.

Dikes and levees: Aggregate length, 1,000 feet; volume, 42,700 cubic feet.

Pumping plants: Present development, 8 batteries.

Water power: Roosevelt Power Plant, 9,380 horsepower; South Consolidated Power Plant, 2,144 horsepower; Arizona Falls Power Plant, 1,125 horsepower; New Crosscut Power Plant, 6,432 horsepower; total, 19,081 horsepower. Present development, 6,030 horsepower at Roosevelt.

Irrigable area: Main project, 230,000 acres, of which 190,000 acres are under gravity system, and 40,000 acres under pumping system; Gila Indian Reservation, 10,000 acres.

Present status of irrigable lands: 16,000 acres entered subject to the reclamation act; 14,080 acres of State lands, 200,000 acres in private ownership; 10,000 acres Indian lands.

¹ Includes work on Gila Indian Reservation lands, about 10,000 acres.

² Unincorporated; population not available.

RESULTS TO JUNE 30, 1912.

MAIN PROJECT.

Canals: 32 miles with capacities of more than 800 second-feet; 64 miles with capacities from 301 to 800 second-feet; 71 miles with capacities from 50 to 300 second-feet; 409 miles with capacities of less than 50 second-feet.

Waste water ditches and drains: 14 miles.

Tunnels: Completed.

Storage dam: Completed.

Diversion dams: Completed.

Dikes and levees: Completed.

Pumping plants: 5; capacity, 10 second-feet each.

Canal structures: Costing over \$2,000 each, concrete, 27. Costing from \$500 to \$2,000 each, concrete, 220. Costing from \$100 to \$500 each, concrete, 166; wood, 409. Costing less than \$100 each, concrete, 32; wood, 50.

Bridges: Steel—3 more than 50 feet in length; total length, 200 feet. Combination—8 more than 50 feet in length; 19 less than 50 feet in length; total length, 1,156 feet. Wood—3 more than 50 feet in length; 119 less than 50 feet in length; total length, 1,950 feet. Concrete—5 more than 50 feet in length; 10 less than 50 feet in length; total length, 745 feet.

Culverts: Concrete—48; length, 2,675 feet. Wood—61; length, 2,000 feet.

Pipe laid: Concrete—11,000 feet.

Flumes: Concrete—8; length, 220 feet.

Buildings: Offices, 1; residences, 17; power plants, 1; transformer station, 1; barns and storehouses, 10; switching and substations, 4; pumping stations, 5.

Wells: 29; aggregate depth, 798 feet.

Roads: 147 miles; cost per mile, \$4,110.

Telephone lines: 145 miles. Telephones in use, 75.

Transmission lines: 115 miles.

Material excavated: Class 1, earth, 2,917,222 cubic yards; class 2, indurated material, 1,000,000 cubic yards; class 3, rock, 580,354 cubic yards.

Riprap: 7,000 cubic yards.

Paving: 2,047 square yards.

Cement used: 409,707 barrels; 338,452 barrels manufactured by the United States.

Concrete placed: 333,454 cubic yards.

GILA INDIAN RESERVATION.

Canals: 11.2 miles with capacities from 50 to 300 second-feet; 9.4 miles with capacities of less than 50 second-feet.

Waste-water ditches and drains: 0.55 mile.

Dikes or levees: Total length, 5,000 feet; volume, 9,362 cubic yards.

Canal structures: Costing over \$2,000 each, concrete, 5; costing from \$500 to \$2,000 each, concrete, 5; costing from \$100 to \$500 each, concrete, 40.

Bridges: Combination—9 less than 50 feet in length; total length, 270 feet. Concrete—1; length, 25 feet.

Culverts: Concrete, 15; length, 300 feet.

Buildings: Residences, 1; power station, 1; pumping stations, 8; barns and storehouses, 2.

Wells: 10; aggregate depth, 2,054 feet (8 wells completed).

Roads: 10 miles.

Telephone lines: 22½ miles; telephones in use, 7.

Transmission lines: 22½ miles.

Material excavated: Class 1, 302,285 cubic yards; class 2, 16,261 cubic yards; class 3, 9,452 cubic yards.

Paving: 2,154 square yards.

Concrete: 1,687 cubic yards.

Cement used: 2,109 barrels.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1912: 160,000 acres; Indian lands, 10,000 acres.

Area under rental contracts or other arrangements, season 1911-12: 160,000 acres; Indian lands, 10,000 acres.

Length of the two irrigating seasons: 365 days; summer, June 1 to September 30; winter, October 1 to May 31.

Average elevation of irrigable area: 1,200 feet above sea level.

Average annual rainfall on irrigable area: 8 inches.

Range of temperature on irrigable area: 22° to 117°.

Character of soil of irrigable area: Sandy loam, with clay in places.

Principal products: Semitropical fruits, alfalfa, grain, cotton.

Principal markets: Phoenix and other Arizona towns, Pacific coast cities and eastern markets.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands are being irrigated under rental contract.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun: 1902.

Construction recommended by the director: March 7, 1903.

Construction authorized by Secretary: March 14, 1903.

Cement mill completed and machinery installed: March, 1905.

Temporary hydro-electric power plant installation completed: March, 1906.

Grand, Water Power, Salt River Valley, Maricopa, and Joint Head Canals purchased June 15, 1906.

Sand crushing plant completed: August, 1906.

Power Canal completed: October, 1906.

Arizona Canal purchased: June 20, 1906.

Irrigation by the Reclamation Service begun: May 15, 1907.

Granite Reef Dam completed: August, 1908.

Appropriator's Canal acquired: January 19, 1909.

Transmission line from Roosevelt to Phoenix completed: May, 1909.

South Canal completed: June, 1909.

Consolidated Canal purchased: July 10, 1909.

Permanent hydro-electric power plant put in operation: August, 1909.

Eastern Canal completed: December, 1909.

Operation of cement mill ceased: August 1, 1910.

Roosevelt Dam completed February 5, 1911; formal dedication, March 18, 1911.

Entire project 93.7 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Salt River project provides for the storage of water in the Salt River Reservoir, controlled by the Roosevelt Dam, at the confluence of Tonto Creek and Salt River, about 78 miles northeast of Phoenix and the diversion of water from the Salt and Verde Rivers by the Granite Reef Dam, about 4 miles below the mouth of the Verde, into the enlarged Arizona Canal, supplying the north-side unit, and into the South Canal, supplying the south-side unit.

A power plant at Roosevelt generates power from stored water in the reservoir and from water delivered from the power canal, heading at a diversion dam in Salt River, 19 miles above the storage dam. Other power plants are being established at several drops in canals. A portion of the power developed is now used for pumping water and ultimately will be used for the extension of the irrigated area, the surplus being sold for industrial purposes.

Of the features comprising this plan there have been completed the power canal with its diversion dam, Roosevelt Dam, Granite Reef Diversion Dam, 5 units of the Roosevelt power plant, transmission lines to Phoenix and the Gila River Indian Reservation, together with necessary switching and substations, the South Canal, the Eastern Canal, 4 batteries of wells equipped for pumping in the

Mesa district, and the Clemens and San Francisco wells. Work has continued on the enlargement of the Arizona Canal, approximately 30 of the 42 miles being completed; on the construction of laterals under the Arizona and the Grand Canals; and on the general distributing system on the south side of the river. Well drilling and completion of the installation of pumping equipment in such wells as had been drilled were discontinued early in 1912. The San Francisco well was completed, and work has progressed on the construction of various secondary transmission lines and the installation of additional units at Roosevelt. The principal future construction consists of the work to be done by the water users' association on the Salt Lateral, Cross Cut Canal, Arizona Falls power plant, Cross Cut power plant, South Consolidated power plant, and necessary transmission lines. Work is in progress at the present time on each of these features except the Salt Lateral, where delay has been occasioned in procuring necessary rights of way.

Plans for the Gila River Indian Reservation work include a diversion dam; a main canal to divert flood waters from the Gila River at a point about $3\frac{1}{2}$ miles east of Sacaton into a 10,000-acre distribution system on the north side of the river; a system of 10 wells with caissons and electric pumping equipment to supplement this intermittent flood supply; a system of wells on the south side of the river in the vicinity of Casa Blanca, necessary transmission lines and sub-power stations to operate these wells and the agency pumping plant with electric power from the Roosevelt power house; and the possible utilization of the bed of the Little Gila River as a diversion canal. Of the features included in this plan there have been completed the flood-water canal, 13 miles of laterals, 9 wells on the north side of the river, with complete pumping equipment, transmission lines to these wells and across the river, and the centrifugal pump at the agency, formerly driven by a steam engine, but now connected with an induction motor.

CONSTRUCTION DURING FISCAL YEAR.

Roosevelt power plant.—The cable span connecting the Roosevelt power house and transformer house was completed, the apparatus in the 2,300-volt switch room was installed, and the auxiliary transformers and switchboard, as well as the graphic and recording watt-meter switchboard were put into service. Two variable head water-wheels receiving water through the 10-foot penstock were erected and put into service, and runways and stairways serving generating units 1, 2, and 3 were installed.

Pumping plants and power transmission.—In the valley, Battery E wells were put into service, Battery F completely developed and put into service, and Battery B equipped with a permanent pumping unit. Construction work at Battery D was suspended owing to shortage of funds. A 10,000-volt transmission line was built, running from the Clemens well with a branch from Tempe to the San Francisco wells. Six wells were drilled at the San Francisco pumping plant site, the machinery installed, and the plant put into operation. The wire was strung on the Glendale extension of the transmission line and the circuit was put into operation at 40,000 volts, serving the Southwestern Sugar & Land Co.

Canal systems.—Work on the enlargement of the Arizona Canal was continued throughout the year, 319,658 cubic yards of material being removed. Four concrete structures were constructed during the year, containing 141 cubic yards of concrete. On the south-side unit 26 turnouts, 2 siphons, and 3 truss bridges, containing 379 cubic yards of concrete were installed, and 114,000 cubic yards of earth were excavated. One thousand feet of concrete pipe, varying in size from 14 inches to 30 inches, was laid.

Gila River Indian Reservation.—The drilled well at well No. 3 was cleaned out and pumping equipment installed. One 16-inch well was drilled at the site of well No. 1, and another well was started but operations were ordered suspended. Transformers were installed at the intake of the Sacaton flood canal and at the wasteway structure, the motor-driven mud pump being connected up and put into operation, and two motors put into service to operate the gates. A transmission line was constructed across the Gila River to the agency. The centrifugal pump formerly driven by a steam engine was connected to an induction motor and the necessary transformers and switches installed.

WATER USERS' WORK.

The South Consolidated power plant was started, the structure being built by contract was practically completed and the installation of the machinery well advanced. As a whole, the plant and necessary structures in connection with it were about 75 per cent completed. Two of the cottages required for the operators were built by contract. The 40,000-volt transmission line connecting the plant to the switching station was completed. At the Arizona Falls power plant site the siphon spillway was finished and excavation for the power plant started.

OPERATION AND MAINTENANCE.

Irrigation works operated during the season of 1911-12, included the Roosevelt Reservoir, the Granite Reef Dam, the complete canal system on the north side unit; and the South, Eastern, Consolidated, and Mesa systems, and a portion of the Western Canal, on the south side unit; augmented by such supply as could be utilized from Batteries B, E, and F, the Clemans well in the Mesa district, and the San Francisco well in the San Francisco district. Water was supplied to the canals on the north side unit through the Arizona Canal and to those on the south side unit through the South Canal. The total area irrigated and cultivated under the canals supplied by the Reclamation Service approximated 129,000 acres. About 30,000 acres more on the south side of the river were supplied with water through the Utah, Tempe, and San Francisco Canals operated by their respective organizations independently of the Reclamation Service. Approximately 160,000 acres have been irrigated, an increase over the previous year of about 10,000 acres, to accomplish which there was diverted from the water supply during the year ending June 30, 1912, 785,979 acre-feet, of which approximately 471,588 acre-feet was actually applied to the land. On July 1, 1911, the elevation of the water surface in the reservoir was 156.30 feet,

representing 460,974 acre-feet of stored water, and on June 30, 1912, at elevation 170.55 feet, the amount was 603,970 acre-feet. The maximum point, however, was reached on May 7, when the elevation was 179.22 feet, amounting to 703,218 acre-feet. The net gain at the end of the fiscal year was 142,966 acre-feet, after satisfying extraordinary demands on the system during the months of April, May, and June, when the maximum demands were made.

Some additions have been made to the lateral systems, principally by the operation and maintenance crews. Concrete and wooden structures have been built where replacements were necessary. The total length of canals and laterals operated by the Reclamation Service on June 30, 1912, was 576 miles as compared with 534 miles on June 30, 1911. Of the above 576 miles 392 are on the north side and 184 on the south side.

The gravity supply has been materially augmented by the four batteries in operation south of Mesa. These batteries furnished on an average 10 second-feet each, and proved especially beneficial in certain sections during the cold season, as the temperature of the water in the wells is considerably higher than that of the water in the gravity canals. This will be of great benefit to the fruit growers.

The year has been one of average run-off, and it was possible to furnish at all time an adequate supply of water for irrigation, even to take care of a larger amount of land than has been in cultivation, besides furnishing a supply for lands having no appropriation in either the Salt or Verde Rivers. The water was furnished the water users under rental contracts at the rate of 60 cents per acre for the summer season, from June 1 to September 30, and for \$1 per acre for the winter season, from October 1 to May 31.

SETTLEMENT AND IRRIGATION.

The population of the valley is steadily increasing, and taxable property values in Maricopa County more than doubled between 1905 and 1911, increasing from \$10,867,000 in 1905, the year in which the contract for the Roosevelt Dam was signed, to \$21,947,000 in 1911.

The agricultural year here is divided into two seasons, a summer season devoted to the cultivation of alfalfa, sugar beets, garden truck, sorghum and kindred cereals, small fruits, canteloupes, melons, etc., commencing with June 1 and ending September 30, and a winter season devoted principally to the cultivation of alfalfa, cereals, and citrus fruits, commencing on October 1 and ending May 31 of the year following, irrigation being carried on throughout the whole year. The dairy industry is important, and is carried on throughout the entire year.

The highest percentage of cultivated land is in alfalfa, followed by grain and pasture, these three representing over 90 per cent, while the remaining 10 per cent is distributed over a wide range of products. Excessive rains during the summer of 1911 destroyed a large percentage of the hay crop, and cold weather seriously damaged the citrus fruit. During 1912, however, excellent crops of alfalfa and grain have been harvested for which good prices have been obtained, the prices for grain being the best that have been known for years on the project.

The following statement shows the increase in acreage under cultivation since 1905:

Area under cultivation, Salt River project.

Year.	Acreage.	Increase over preceding year.	
		Amount.	Per cent.
1905-6.....	96,864		
1906-7.....	104,016	7,152	7.4
1907-8.....	112,579	8,563	8.2
1908-9.....	126,718	14,139	12.6
1909-10.....	131,364	4,646	3.7
1910-11.....	150,661	19,297	14.7
1911-12.....	160,000	9,339	6.2

On the Gila Indian Reservation very little progress has been made, as all work has been stopped and no wells are in operation excepting at the agency school farm. Approximately 4,500 acres of land was under cultivation.

FEATURE COSTS TO JUNE 30, 1912.

Storage works:

Roosevelt Dam.....	\$3,182,092.85	
Sluicing tunnel.....	125,410.04	
Hydraulic gates.....	249,841.27	
Reservoir, clearing site, moving camp, over-flow weir, etc.....	23,361.06	
Outlet tunnel.....	55,713.49	
Approach to east end of dam.....	13,530.55	
Lands submerged by reservoir.....	152,414.04	
Additions, betterments, and repairs.....	534.66	
		\$3,802,897.96

Power system:

Diversion dam, Livingston.....	118,470.89	
Power canal, construction and betterments.....	1,253,183.55	
Penstock tunnel (from power canal).....	65,242.17	
Auxiliary penstock (from power canal).....	8,319.69	
Dam penstock (through Roosevelt Dam).....	100,571.81	
Hydro-electric power plant No. 1 (Roosevelt).....	302,701.13	
Hydro-electric power plant No. 2 (South Consolidated).....	8,773.17	
Hydro-electric power plant No. 3 (New cross cut).....	1,067.23	
Hydro-electric power plant No. 4 (Arizona Falls).....	4,771.63	
Hydro-electric power plant No. 5 (Tempe cross cut).....	66.00	
Transformer house (Roosevelt Dam).....	135,934.91	
Switching station plant.....	41,689.45	
Substation No. 1 plant (8 miles south of Mesa).....	30,630.41	
Substation, Phoenix plant.....	12,719.69	
Substation, Glendale plant.....	5,091.99	
Transmission line, 45,000-volt (Roosevelt to Phoenix).....	335,770.49	
Transmission line, 10,000-volt.....	53,649.34	
Transmission line to South Consolidated power plant.....	893.07	
Secondary transmission line, Glendale.....	12,046.42	
		2,491,593.04

Granite Reef Diversion Dam (completed; for details see Tenth Annual Report)-----		\$622, 784. 04
North side canal system, construction:		
Arizona Canal (includes purchase price)----	\$738, 727. 21	
Grand Canal (includes purchase price)-----	299, 777. 17	
Maricopa Canal (includes purchase price)---	26, 265. 99	
Salt River Valley Canal (includes purchase price)-----	17, 743. 39	
Water Power Canal (includes purchase price)-	15, 729. 99	
New Cross-Cut Canal-----	3, 761. 77	
		1, 102, 005. 52
South side canal system, construction:		
South Canal-----	155, 722. 49	
Eastern Canal (includes purchase price)----	186, 507. 60	
Consolidated Canal (includes purchase price)-	194, 588. 64	
Mesa Canal-----	51, 492. 16	
Tempe Canal-----	577. 90	
Eureka Canal (purchase price)-----	9, 269. 00	
San Francisco Canal (purchase price)-----	12, 891. 00	
Western Canal-----	85, 492. 24	
		696, 541. 03
Pumping plants:		
Mesa district-----	97, 507. 70	
San Francisco district-----	29, 040. 94	
		126, 548. 64
Plant accounts:		
Miscellaneous plant and buildings-----	478, 443. 91	
Less depreciation-----	412, 699. 49	
		65, 744. 42
Real estate (rights and property), lands purchased, not submerged-----		32, 028. 05
Irrigable lands:		
Farm units-----	\$9, 929. 30	
Utah Canal-----	288. 68	
		10, 217. 98
Telephone system, construction and betterments-----		68, 892. 49
Roads, construction and maintenance:		
Roosevelt-Phoenix-----	\$412, 565. 45	
High Line-----	93, 857. 03	
Tonto-----	78, 909. 56	
Miscellaneous-----	18, 608. 99	
		603, 941. 03
Examination of project as a whole:		
Agua Fria cement investigations-----	833. 50	
Underground water supply-----	16, 201. 64	
Surveys-----	42, 230. 38	
Investigations, Phoenix Valley-----	4, 512. 69	
Hydrography-----	12, 874. 68	
General reconnoissance-----	835. 85	
Verde reconnoissance-----	4, 024. 97	
Water analysis-----	2, 274. 87	
		83, 788. 58
Operation of power plant No. 1-----		116, 567. 82
Well operation:		
Mesa district-----	\$3, 721. 82	
San Francisco wells-----	648. 21	
		4, 370. 03
North side canal system; operation, maintenance, and betterments:		
Arizona Canal-----	249, 179. 65	
Grand Canal-----	97, 816. 96	
Maricopa Canal-----	79, 868. 64	
Salt River Valley Canal-----	98, 185. 74	
Crop report-----	4, 568. 05	
		529, 619. 04

South side canal system; operation, maintenance,
and betterments:

South Canal-----	\$3,453.13
Eastern Canal-----	24,180.54
Consolidated Canal-----	128,801.15
Mesa Canal-----	32,852.22

\$189,287.04

Inventory of cost-ledger supplies----- 569.60

Gross cost----- 10,547,396.31

Less unadjusted credits (to be distributed to features later)---- 751.99

10,546,644.32

Deductions for water rentals, power, etc----- 1,037,813.20

Net cost----- 9,508,831.12

ARIZONA-CALIFORNIA, COLORADO RIVER PROJECTS.

IRRIGATION PLAN.

The Colorado River projects consist of a number of possible irrigable developments on the lower Colorado River in Arizona and California, the principal of which are the Blythe-Parker and Needles projects. The irrigation plan of these projects provides in general for the diversion of water from Colorado River for irrigation of lands near the river; the diversion for the Blythe-Parker project being made at Headgate Rock, near Parker, Ariz., about 120 miles above Yuma, and the diversion for the Needles project being made a few miles north of Mohave City, Ariz., and about 200 miles above Yuma. The normal low-water supply of Colorado River is insufficient for present satisfactory irrigation of these projects, and their success therefore will depend on the storage of water in the drainage areas of the Grand and Green River systems, forming the Colorado River.

INVESTIGATIONS.

In 1903 topographic surveys were made of the lands along the Colorado River from the Mexican border to about 100 miles north of Needles. Beginning in 1904 and continuing intermittently to the present time, preliminary examinations and surveys of reservoir sites on the Grand and Green River systems have been made as follows: The Kremmling, Windy Gap, and Lehman, on the Grand River; the Grand Lake, at the head of the North Fork of Grand River; the Flaming Gorge, Island Park, and Browns Park, on Green River; and two sites on Yampa River, a tributary of Green River. Diamond-drill and wash borings at the proposed dam site for Browns Park Reservoir were begun in the summer of 1907 and continued through the seasons of 1908 and 1909.

No investigations have been made during the fiscal year ending June 30, 1912, except stream gaging.

FEATURE COSTS TO JUNE 30, 1912.

Preliminary examination and surveys----- \$43,709.23

ARIZONA-CALIFORNIA, YUMA PROJECT.

LOCATION.

Counties: Yuma, Ariz.; Imperial, Cal.

Townships: 3 to 13 S., Rs. 21 to 25 W., Gila and Salt River meridian; 9 to 17 S., Rs. 16 to 23 E., San Bernardino meridian.

Railroad: Southern Pacific.

Railroad stations and population, 1910: Yuma, Ariz., 2,914; and Potholes,¹ Cal.

WATER SUPPLY.

Source of water supply: Colorado River.

Area of drainage basin: 229,000 square miles above Laguna Dam.

Annual run-off in acre-feet of Colorado River at Yuma (287,000 square miles), 1902 to 1911: Maximum, 25,900,000; minimum, 7,960,000; mean, 16,500,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Diversion dam: Laguna—Type, Indian weir; maximum height, 40 feet in main channel, 19 feet outside of main channel; length of masonry, 4,780 feet; volume of masonry, 66,714 cubic yards; rock fill, 375,018 cubic yards; area flooded, 6,400 acres.

Length of canals: 15 miles with capacities greater than 800 second-feet; 17 miles with capacities from 301 to 800 second-feet; 110 miles with capacities 50 to 300 second-feet; 260 miles with capacities less than 50 second-feet.

Dikes: Aggregate length, 388,080 feet.

Tunnels: Concrete-lined siphon under Colorado River, length 930 feet, internal diameter 14 feet.

Water power: Estimated total, 1,000 horsepower at drop in main canal.

Irrigable area: 131,000 acres.

Present status of irrigable lands: 30,000 acres entered subject to the reclamation act, 44,000 acres withdrawn from entry, 57,000 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 17.2 miles with capacities of more than 800 second-feet; 4.5 miles with capacities of from 301 to 800 second-feet; 38.2 miles with capacities of from 50 to 300 second-feet; 102.6 miles with capacities less than 50 second-feet.

Waste-water ditches and drains: 3.4 miles.

Diversion dam: Completed.

Siphon, including connections: Completed; length 930 feet; 7,750 cubic yards of masonry; capacity, 1,400 second-feet.

Dikes: Total length, 276,280 feet; volume, 2,818,154 cubic yards.

Canal structures: Costing over \$2,000 each; concrete, 13. Costing from \$500 to \$2,000 each, concrete, 25; wood, 1. Costing from \$100 to \$500 each, concrete, 176; wood, 50. Costing less than \$100 each, concrete, 260; wood, 195.

Bridges: Combination—3 with length of 50 feet or more; total length, 222 feet. Wood—2 with length of 50 feet or more; 20 less than 50 feet; total length, 798 feet. Concrete—4 with length of 50 feet or more; 13 less than 50 feet; total length, 553 feet.

Flumes: Concrete, 1; length, 30 feet. Wooden, 4; length, 460 feet.

Buildings: Office, 1; residence, 1; barns and storehouses, 5; pump houses, 2.

Roads: 25.0 miles.

Railroad track: 1.2 miles.

Telephone lines: 141 miles. Telephones in use, 60.

¹ Unincorporated, population not available.

Material excavated: Class 1, earth, 7,443,494 cubic yards; class 2, indurated material, 370,167 cubic yards; class 3, rock, 716,019 cubic yards.
 Riprap: 59,406 cubic yards.
 Paving: 100,163 square yards.
 Cement used: 103,366 barrels.
 Concrete placed: 95,558 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 16,000 acres.
 Area under water-right applications and rental contracts, season of 1912: 16,000 acres.
 Length of two irrigating seasons: 365 days.
 Elevation of irrigable area: 100 to 300 feet above sea level.
 Average annual rainfall on irrigable area: $2\frac{1}{2}$ inches.
 Range of temperature on irrigable area: 22° to 118° .
 Character of soil of irrigable area: Bottom lands, rich alluvium; mesa lands, Fresno gravelly sand.
 Principal products: Semitropical fruits, alfalfa, grain, cotton.
 Principal markets: Los Angeles and San Francisco, Cal.; Arizona towns; eastern markets for early produce.

LANDS OPENED FOR IRRIGATION.

Date of public notices: January 12, 1910; March 8, 1912.
 Location of lands opened: Townships 15 and 16 S., R. 23 E., San Bernardino meridian.
 Present status of irrigable lands opened: 6,503 acres entered subject to the reclamation act and the act of April 21, 1904.
 Limit of area of farm units: Public, 40 acres.
 Duty of water: 5 acre-feet per acre per annum at the farm.
 Building charge per acre of irrigable land: \$55 and \$66.
 Annual operation and maintenance charge: \$1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1902.
 Construction recommended by board of engineers, April 8, 1904.
 Construction authorized by Secretary May 10, 1904.
 Canal system of Colorado Valley Pumping & Irrigating Co. purchased March 15, 1907.
 First irrigation by Reclamation Service, season of 1907.
 Canal system of Yuma Valley Union Land & Water Co. (Farmers' Gravity Canal) purchased February 3, 1908.
 Rollins Ditch (including Ives heading pumps and ditches) purchased July 23, 1908.
 Laguna Dam completed March, 1909.
 Colorado River siphon completed June 29, 1912.
 Gravity water from Laguna Dam furnished to Yuma Valley through siphon June 29, 1912.
 Entire project 73.7 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Yuma project provides for the diversion of water from the Colorado River at the Laguna Dam 10 miles northeast of Yuma, Ariz., into two canal systems, one heading on the California side, conveying water to the irrigable lands on that side of the river, including those in the Yuma Indian Reservation, crossing the river at Yuma through an inverted siphon, and serving lands in the Colorado Valley below Yuma; and the other heading on the Arizona side of the stream and watering lands in the Colorado and Gila Valleys lying east of the Colorado and north

of the Gila. The plan also provides for a large pumping plant about $2\frac{1}{2}$ miles below Yuma on the East Main Canal for raising water to irrigate 40,000 acres of mesa land; and for a small pumping plant at the terminus of the gravity canal on the Arizona side of the river below Laguna Dam, for raising the water through a small lift to irrigate about 6,000 acres. The lands adjacent to the Gila and Colorado Rivers are protected from overflow of these streams by means of dikes. The Laguna Dam, 162 $\frac{1}{2}$ miles of canals and laterals, 3 $\frac{1}{2}$ miles of drainage ditches, the Colorado River siphon 930 feet in length and 14 feet in diameter, and about 70 per cent of the levee system are completed.

Construction work for this season has been suspended and the force is employed in river-front protection and work incident to the priming of the new canals. It is anticipated that in the autumn work will again be inaugurated in Yuma Valley and the lateral system for this area completed. Some work will also probably be done upon the drainage system for the Yuma Indian Reservation. The pumping system for the bench lands south of Yuma and the canal system for the lands in Arizona below the Gila River remain for future construction.

CONSTRUCTION DURING FISCAL YEAR.

Laguna Dam.—During the fiscal year a small force has been employed from time to time in protecting the river bank on the California side from erosion and overhauling machinery and equipment. There have also been manufactured and placed in the California sluiceway immediately below the apron of the sluice gates about 1,500 concrete blocks 3 feet by 3 feet by 4 feet, to prevent erosion.

Colorado River siphon.—Preliminary work on this feature was commenced in November, 1909. The structure consists of circular concrete shafts, connected by a circular concrete-lined tunnel of 14 feet internal diameter and 930 feet long. After an unsuccessful attempt to drive the tunnel with open headings a compressed air plant was installed on June 30, 1911, and the siphon was completed on June 29, 1912. On the same day the structure was put into service and the canals in Yuma Valley are now obtaining water from Laguna Dam. The construction of the siphon, with the shafts, involved the excavation of 16,730 cubic yards of material and the placing of 7,314 cubic yards of concrete.

Canals.—The main canal through the Indian reservation, from a point about $1\frac{1}{2}$ miles below Laguna Dam to the site of the proposed power house about 9 miles below, involving the excavation of 1,293,543 cubic yards, was completed prior to April 1, 1912. In November, 1911, construction was begun on the main canal and lateral system in Yuma Valley. Up to June 30, 1912, there had been constructed on this feature 78.6 miles of canals involving the excavation of 1,607,892 cubic yards. During this period the farmers constructed under contract 3.8 miles of laterals involving the excavation of 50,391 cubic yards. In February and March of 1912 about 3 $\frac{1}{2}$ miles of the lower portion of the drainage system on the Yuma Indian Reservation were constructed, 77,110 cubic yards of material being removed.

Forces were also engaged in the construction of the lateral system on the Arizona side of the river immediately below Laguna Dam. About 12.7 miles of small canals were excavated involving the handling of 126,603 cubic yards of material. Numerous canal structures have also been completed.

Levees.—In April, 1912, about 11,061 cubic yards of material was placed to complete the Yuma Valley levee adjacent to the Mexican boundary.

River front protection.—Permeable dikes (spur dikes constructed of piles, brush, and earth) have been built on the Arizona side of the river about 6 to 8 miles above Yuma and between 8 and 13 miles below.

OPERATION AND MAINTENANCE.

During the fiscal year there were approximately 10,500 acres under cultivation. About 2,500 acres were situated in the first unit opened for settlement on the Yuma Indian Reservation, the remaining 8,000 acres being supplied with water on a rental basis by the temporary pumping systems in the Yuma Valley. Water for the lands on the Indian reservation is supplied by gravity from Laguna Dam through a permanent system of canals. This unit contains about 6,500 acres of irrigable land, of which 4,000 acres are cleared but only 2,500 acres are under cultivation. Seepage water during the freshet stage of the river has done considerable damage and delayed preparations for agriculture to a considerable degree. It is anticipated that a satisfactory drainage system will be provided before another flood. During the year a total of about 18,800 acre-feet of water was furnished to 172 farm units. The rotation system is used and water is delivered about every 10 days in the summer and every 14 days in the winter time. On account of the permanent character of the structures, little work has been necessary on the system, excepting clearing the canals of weeds. In the unit opened there are 9 miles of canals with capacities between 50 and 300 second-feet, and 35 miles with capacities less than 50 second-feet. About 25 miles of permanent telephone line has been erected for use in connection with the water service. In the Yuma Valley below Yuma the three temporary pumping plants formerly owned by the farmers, known as the Farmers' pump, the Scoop Wheel, and the Rollins pump, have furnished during the year 36,659 acre-feet of water to about 300 water users, irrigating about 8,000 acres of land. This area is in widely scattered tracts and a 15-day rotation service has been maintained. Repairs to the canals and structures have been of a temporary nature, pending the utilization of gravity water from Laguna Dam. The gravity supply entered the valley on June 29, resulting in the discontinuance of the Rollins pump and the Scoop Wheel, but the Farmers' pump has been operated one shift daily to supply a small area at the upper end of the valley which can not be reached by gravity from the dam. It is anticipated that this pump will be superseded in the near future by a more modern one. The canal systems in the Yuma Valley include 9 miles of canals ranging from 70 to 100 second-feet and 38 miles with capacities less than 50 second-feet. About 25 miles of telephone line are maintained in connection with the water service.

SETTLEMENT AND IRRIGATION.

All but one of the 173 farm units opened on the Indian reservation in March, 1910, are occupied, the area at the present time under cultivation being about 2,500 acres. Except where damaged by seepage water these farms produce well. Alfalfa is the principal crop grown, valley land, well watered and farmed, producing 8 to 10 tons per acre per year, which, when baled, sells at an average price of \$12 per ton. Next to alfalfa the most productive crops are barley and corn, both crops being raised on the same land during the year. In Yuma Valley under the pumping systems approximately 4,000 acres are in alfalfa, and during the past winter 2,000 acres were planted to barley. Between \$150,000 and \$200,000 worth of alfalfa seed will be harvested during the summer of 1912. It is expected that a rapid improvement in agricultural conditions will follow the use of gravity water from Laguna Dam.

FEATURE COSTS TO JUNE 30, 1912.

Laguna Dam:

Excavation, class 3.....	\$638,807.49	
Excavation, class 2.....	134,143.42	
Rock in dam.....	208,059.81	
Concrete core walls.....	177,905.03	
Rock paving.....	9,175.53	
Concrete paving.....	246,619.60	
Sheet piling, upper wall.....	39,095.12	
Sheeting for lower wall.....	3,434.90	
Clearing above dam.....	177.76	
Cofferdam.....	90,816.66	
River-front protection.....	31,021.19	
Rock training dike.....	5,355.85	
Flood expense.....	57,087.89	
Diking and ditching at toes of dam.....	17,555.89	
Preliminary and general expense.....	5,537.77	
Clearing face of dam and razing cofferdam.....	7,374.29	
Repairs and maintenance.....	662.20	
		\$1,672,830.40

Sluice and regulator works:

Sluice-gate excavation.....	519.44	
Sluiceway pier and abutments construction.....	52,878.58	
Sluice and regulator gates installation.....	77,068.62	
Sluiceway walls and lining.....	82,216.73	
Sluiceway paving.....	22,623.05	
Bridges.....	10,124.76	
Canal heading walls and linings.....	25,865.30	
Sluiceway excavation.....	26,387.52	
Power house.....	17,806.44	
Sluiceway protection and repairs.....	35,853.19	
Sluice-gate protection and repairs.....	157.02	
Modification of regulator gates.....	324.11	
		351,824.76

Distribution system:

Reservation canals.....	327,961.03	
Arizona canals.....	115,537.31	
Yuma Main Canal.....	572,432.14	
Colorado River siphon.....	661,333.06	
Yuma Valley canals.....	435,775.06	
		2,113,038.60

Protective system:

Gila Valley levees.....	170,182.73	
Yuma Valley levees.....	306,733.34	
Reservation levees.....	269,736.56	
		746,652.63

Pumping plants and canal system:		
Steam plant.....	\$111,534.07	
Gravity plant.....	130,214.53	
Pumping plant No. 3.....	56,389.19	
Operation Yuma Valley canal system.....	431.99	
		\$298,569.78
Surveys:		
Preliminary to selection of project.....	171,616.32	
After selection of project.....	43,792.53	
		215,408.85
Real estate, lands purchased, etc.....		130,258.15
Administration of project as a whole:		
General expense prior to 1907.....	\$99,226.90	
General expense since 1907.....	260,916.07	
		360,142.97
Inventory of building cost ledger supplies.....		742.03
Total building cost.....		5,889,468.17
Operation and maintenance:		
Diversion works.....	\$3,212.83	
Sluice and regulator works.....	36,575.77	
Reservation unit.....	28,940.79	
		68,729.39
Total building and operation and maintenance cost.....		5,958,197.56
Less unadjusted credits (to be distributed to features later).....		46,779.27
		5,911,418.29

CALIFORNIA, ORLAND PROJECT.

LOCATION.

Counties: Glenn and Tehama; reservoir in Colusa County.

Townships: 21 to 23 N., Rs. 2 to 4 W., Mount Diablo meridian.

Railroads and other transportation lines: Southern Pacific Railroad and river steamers on Sacramento River.

Railroad stations and population, 1910: Orland, 836; Greenwood¹ and Malton,¹ Cal.

WATER SUPPLY.

Source of water supply: Stony Creek.

Area of drainage basin: Above diversion dam, 735 square miles; above East Park Dam, 102 square miles.

Annual run-off in acre-feet: Stony Creek, near Fruto (601 square miles), 1901 to 1911, maximum, 940,000; minimum, 308,000; mean, 559,000. Little Stony Creek at East Park Dam (102 square miles), 1907-1911, maximum, 170,800; minimum, 25,600; mean, 84,600.

DATA FOR COMPLETE PROJECT.

Reservoir: East Park—Area, 1,800 acres; capacity, 45,600 acre-feet; length of spillway, 415 feet; elevation of spillway, 85 feet above stream bed.

Storage dam: East Park—Type, concrete gravity section, arch plan; maximum height, 129 feet; length of crest, 250 feet; volume, 12,200 cubic yards.

Diversion dam: Type, sheet piling capped with concrete; length, 900 feet; volume, 550 cubic yards.

¹ Unincorporated; population not available.

Length of canals: No canals with capacities greater than 300 second-feet; 23 miles with capacities from 50 to 150 second-feet; 74 miles with capacities less than 50 second-feet.

Dikes: Aggregate length, 625 feet; volume, 4,000 cubic yards.

Water power: None developed; estimated total, 600 horsepower.

Irrigable area: 14,200 acres.

Present status of irrigable lands: A small tract remains open to entry subject to the reclamation act. All the remainder is in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: Completed.

Storage dams: Completed.

Dikes: Completed.

Canal structures: Costing over \$2,000 each—concrete, 3. Costing from \$500 to \$2,000 each—concrete, 10. Costing from \$100 to \$500 each—concrete, 51; wood, 7. Costing less than \$100 each—concrete, 1,027; wood, 14.

Bridges: Less than 50 feet in length—combination, 56; total length, 510 feet. Wood, 3; total length, 70 feet. Concrete, 109; total length, 550 feet.

Culverts: Concrete—56; length, 2,138 feet.

Pipe laid: Concrete—626 feet.

Flumes: Steel—2; length, 365 feet.

Buildings: Offices, 1; residences, 1; barns and storehouses, 4.

Wells: 3; aggregate depth, 200 feet.

Telephone lines: 50 miles, rented. Telephones in use, 7.

Material excavated: Class 1, earth, 348,388 cubic yards; class 2, indurated material, 49,124 cubic yards; class 3, rock, 2,700 cubic yards.

Riprap: 1,200 cubic yards.

Paving: 1,590 square yards.

Cement used: 21,205 barrels.

Concrete placed: 19,829 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 14,200 acres.

Area under rental contracts, season of 1912: 4,200 acres.

Length of irrigating season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 225 feet above sea level.

Average annual rainfall on irrigable area: 17 inches (1911–12, 11.5 inches).

Range of temperature on irrigable area: 26° to 114°.

Character of soil of irrigable area: Sandy and gravelly loam, silt loam.

Principal products: Alfalfa, citrus and other fruits, and vegetables.

Principal markets: San Francisco, Cal.; Portland, Oreg.; eastern markets.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands are being irrigated under rental contracts.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys made in 1906.

Construction recommended by board of engineers, November 12, 1906.

Construction authorized by Secretary December 18, 1906.

Miller Buttes concrete headworks for South Canal completed November, 1908.

Canal system of Stony Creek Irrigation Co. purchased May 21, 1909.

Lemon Home Canal purchased March 26, 1910.

East Park Dam completed July 31, 1910.

First irrigation by Reclamation Service, season of 1910.

Construction of south side lateral system and high-line canal completed April, 1911.

Entire project 84 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Orland project provides for the storage of water in a reservoir controlled by East Park Dam on Little Stony Creek, at a point about 40 miles southwest of Orland, Cal., and the diversion of water from Stony Creek at Miller Buttes, $9\frac{1}{2}$ miles northwest of Orland, into two canal systems, one on either side of the creek, for the irrigation of lands in the vicinity of Orland. The South Canal system is to irrigate 8,000 acres, and the North Canal 6,000 acres, a purchased canal system being incorporated in each. The plan also includes a high-line canal, from which power may be developed for the irrigation of 3,000 acres by pumping ground water from depths of from 30 to 40 feet. The storage works are completed, as well as the rebuilding of the Stony Creek Canal and the construction of the High Line Canal and the distribution system on the south side. Work now under way, or to be undertaken in the near future, includes the installation of a traveling excavator at the south side headworks to remove gravel about to enter the South Canal near the headworks and to keep the diversion channel open in the bed of Stony Creek; a permanent diversion for the North or Lemon Home Canal; the construction of controls in the laterals to supply the land substituted for the area formerly included within the corporate limits of Orland; the concrete lining of a small part of the lateral system; and a connecting lateral to take the place of the main lateral through the town of Orland.

The present limits of the Orland project may be considered as a unit of the Sacramento Valley project. It may be extended by constructing additional reservoirs on Stony Creek and its tributaries. The chief additional reservoir sites available are Millsite, on Stony Creek, near Fruto; Briscoe, on Briscoe Creek, near Elk Creek; Stonyford, on Stony Creek, at Stonyford; and Stony Gorge, on Stony Creek, near Elk Creek.

CONSTRUCTION DURING FISCAL YEAR.

The extension to East Park spillway, involving 12,400 cubic yards of excavation and 1,550 cubic yards of concrete, was completed. The timber structures in the North Canal were replaced with concrete, a total of 41 minor concrete structures being built during the year. Two thousand eight hundred and fifty square yards of concrete lining was placed in the High Line fills, 12,200 square yards in the lateral system, and 400 square yards for the protection of Hambright Creek crossing. One thousand linear feet of 12 to 24 inch concrete pipe was manufactured for use on the project.

OPERATION AND MAINTENANCE.

The Stony Creek Irrigation Canal on the south side and the Lemon Home or North Canal on the north side of Stony Creek were turned over to the service for operation in 1910, the lands served during that year being principally those irrigated under the old systems. No stored water was available, and the irrigation season ended on July 13. The irrigation works operated during the season of 1911 included the East Park reservoir, the diversion works on the north and south sides of Stony Creek, and 64 miles of laterals—19 on the north side and 45 on the south. Water was continuously run in the canals

from April 15 to November 8, inclusive, a period of 208 days. Draft on the storage at East Park commenced on July 8 and continued until November 7, a total of 24,000 acre-feet being discharged from the reservoir during that period. Water was furnished on a rental basis for \$2 per acre to 2,660 acres, 10,350 acre-feet being distributed to this area. During the present season about 70 miles of laterals are in operation, and up to June 30, 7,800 acre-feet had been distributed for the irrigation of 4,200 acres.

SETTLEMENT AND IRRIGATION.

Practically all of the irrigable land in the project is in private ownership, and has been subdivided into units not exceeding 40 acres each. The average area of the farms irrigated in 1911 (outside of the town of Orland) was 17 acres. The number of units irrigated was 188, containing a population of 640. Sixty-five per cent of the land irrigated was of new planting, mostly alfalfa, the crop value being merely nominal. The following statement shows the acreage and value of irrigated crops in 1910 and 1911:

Value of crops, Orland project.

Year.	Irrigated acreage.		Total value of crops.
	Alfalfa.	Orchard and miscellaneous.	
1910.....	500	200	\$35,000
1911.....	2,168	273	60,210

FEATURE COSTS TO JUNE 30, 1912.

Storage works:

East Park reservoir lands.....	\$73,373.28	
East Park Dam and dikes.....	175,748.65	
East Park spillway extension.....	28,182.28	
Stonyford reservoir examination.....	128.28	
Millsite reservoir examination.....	328.21	
		\$277,760.70

Diversion system headworks:

Diversion Dam.....	7,403.45	
Headgates, south side.....	4,242.55	
Diversion Dam sluiceway.....	5,049.76	
South Main Canal conduit.....	1,707.88	
Excavation, south side.....	3,711.18	
Diversion weir, north side.....	7.21	
		22,122.03

Canal system (including purchase price):

North Main Canal.....	22,380.00	
South Main Canal.....	51,147.14	
High Line Canal.....	19,772.44	
Priming South Main Canal.....	53.29	
Lining High Line Canal.....	1,899.98	
		95,252.85

Lateral system:

North side lateral excavation.....	28,152.49	
South side lateral excavation.....	31,079.96	
Priming laterals.....	609.39	
Canal lining laterals.....	4,534.83	
		64,376.67

Structures:

Pipe bridges	\$4, 778. 73
South Canal drops	3, 870. 76
Spillways	1, 212. 19
Special structures	4, 272. 32
Checks and drops, lateral system	16, 387. 23
Farm turnouts	12, 078. 16
Railroad crossings	6, 924. 88
Deck bridges over 10-foot span	1, 151. 19
Deck bridges under 10-foot span	3, 031. 03
Lateral turnouts	823. 06
Timber deck bridges, High Line	157. 75
High Line, pipe culverts	1, 067. 96
High Line, flume	3, 461. 55
High Line, chute	2, 179. 78
Pipe lines, 12-inch	306. 12
Pipe lines, 18-inch	321. 52
Pipe culverts, 18-inch	1, 332. 66
Highway concrete bridges	1, 011. 67
North Canal drops	627. 42
Pipe culverts, 12-inch	103. 43
Pipe culverts, 14-inch	164. 52
Timber farm turnouts	91. 03
High Line pipe culverts, 12-inch	94. 65
Timber checks and drops	170. 98
Hambright protection	286. 94
	<hr/> \$65, 907. 53

Buildings:

Office building	2, 504. 87
Barn building	481. 64
Wagon shed	92. 25
Storehouse building	701. 90
Engineer's cottage	2, 244. 04
Tank house	719. 36
Garage	113. 06
Equipment shed	105. 64
Diversion works storehouse	135. 94
	<hr/> 7, 098. 70

Administration of project as a whole, general expense	5, 619. 40
Headquarters grounds, cultivation and maintenance	6, 948. 80
Operation and maintenance during construction (distributing system)	<hr/> 22, 467. 27

Total building cost	<hr/> 567, 553. 95
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COLORADO, GRAND VALLEY PROJECT.

LOCATION.

County: Mesa.

Townships: 1 N., Rs. 1 E. and 1 to 3 W.; 2 N., Rs. 2 and 3 W.; 1 S., Rs. 1 E. and 1 W., Ute meridian. 9 S., Rs. 101 to 104 W.; 10 S., Rs. 98, 101, and 103 W.; 11 S., Rs. 98 and 99 W., sixth principal meridian.

Railroads: Denver & Rio Grande; Colorado Midland.

Railroad stations and population,¹ 1910: Palisade, 900; Clifton;¹ Grand Junction, 7,754; Fruita, 881; St. Loma,¹ and Mack,¹ Colo.

WATER SUPPLY.

Source of water supply: Grand River.

Area of drainage basin: 8,550 square miles above Palisade.

Annual run-off in acre-feet of Grand River at Palisade, 1897 to 1899 and 1902 to 1911: Maximum, 5,200,000; minimum, 2,300,000; mean, 3,660,000.

¹ Unincorporated; population not available.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Diversion dam: Type, concrete foundations supporting movable steel gates 10 feet in height; maximum height, 19 feet; length of movable crest, 320 feet, supplemented by 10 sluice-gate openings, each 15 feet in width; length of masonry, 650 feet; volume, 6,500 cubic yards.

Length of main canals: 6.2 miles with capacities greater than 800 second-feet; 36.8 miles with capacities from 301 to 800 second-feet; 21 miles with capacities from 50 to 300 second-feet; 5 miles with capacities less than 50 second-feet.

Tunnels: 3; aggregate length, 12,950 feet.

Water power: 2,000 horsepower (estimated).

Irrigable area: 53,000 acres.

Present status of irrigable lands: 13,670 acres entered subject to the reclamation act; 16,400 acres withdrawn from entry; 22,930 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Construction not commenced. One barn and storehouse built.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Length of irrigation season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 4,700 feet above sea level.

Average annual rainfall on irrigable area: For 19 years, 8.21 inches; for calendar year 1911, 8.42 inches.

Range of temperature on irrigable area: -15° F. to 100° F.

Character of soil of irrigable area: Sandy loam, sandy mesas, and adobe.

Principal products: Fruit, sugar beets, alfalfa.

Principal markets: Large cities east of Rocky Mountains for fruit; other products, local.

IRRIGATION PLAN.

The irrigation plan of the Grand Valley project provides for the diversion of water from the Grand River by a dam to be located about 8 miles northeast of Palisade, Colo., into a canal system on the north side of the river, for the irrigation of lands lying north and west of Grand Junction, Fruita, and Mack, Colo. About 42,750 acres will be supplied by gravity and 10,250 acres by electrically operated pumping plants to be located on the gravity canal.

PROGRESS DURING FISCAL YEAR.

Negotiations with the individual owners of land in the Mesa County Irrigation District required for right of way for the main canal have been actively conducted, and contracts have been obtained in the case of 110 of the 113 tracts on which offers have been made. No offers have been made on lands within homestead entries or on improved patented lands across which right of way has been granted by subscription for stock in the Grand Valley Water Users' Association. Offers have been tendered for the canal right of way in the Grand River Canyon, not reserved for such use by the patent, or which is improved. On June 30, 1912, agreements had been secured for $87\frac{1}{2}$ per cent of the right of way on which offers had been made, and five tracts, entered before October 2, 1888, had been transferred to the United States in accordance with agreements. The locations of monuments marking the right-of-way boundaries have been checked or corrected.

The site of the proposed power development for the project has been mapped on a scale of 50 feet to the inch, with a 2-foot contour interval, and locations made of the laterals to supply the pumping areas.

WATER APPROPRIATION.

Appropriation of water for the Grand Valley project is claimed to date from July 2, 1902. The rights of the project to such date of priority were presented before the local district court in April, 1912, when argument was heard on the objections to the report of the referee in the adjudication case, filed on April 15, 1911. On June 30, 1912, the court still held the case under advisement.

Negotiations with the Mesa County and the Palisade Irrigation Districts have been undertaken to secure a more economical use of the flow of the Grand River and economy in the cost of delivering water to the districts, and draft of a form of contract approved by the department was submitted to the districts on June 8, since which time they have been awaiting the advice of their attorney.

FEATURE COSTS TO JUNE 30. 1912.

Examination of project as a whole:	
Triangulation-----	\$544. 23
Topography, general-----	7, 348. 27
Surveys, Grand Valley Canal area-----	479. 35
Hydrography-----	2, 715. 14
Surveys, designs, and estimates for alternate canal locations-----	6, 311. 89
	<hr/>
	\$17, 398. 88
Administration of the project as a whole, general expense-----	45, 562. 21
Irrigable lands, farm unit subdivision-----	1, 034. 98
Rights of way:	
Surveys-----	\$3, 463. 54
Purchases-----	177, 662. 26
	<hr/>
	181, 125. 80
Diversion dam and headwork: Diamond drilling-----	3, 482. 21
Main canal (Canyon) Division No. 1: Surveys-----	8, 619. 79
Main canal (Mesa County District) Division No. 2: Surveys-----	2, 687. 73
Main canal, Division No. 3 (to Little Salt Wash)-----	5, 550. 04
	<hr/>
Total building cost-----	265, 461. 64

COLORADO, UNCOMPAHGRE VALLEY PROJECT.**LOCATION.**

Counties: Montrose and Delta.

Townships: 15 S., Rs. 94 to 96 W., sixth principal meridian; 48 to 51 N., Rs. 7 to 12 W., New Mexico meridian.

Railroad: Denver & Rio Grande.

Railroad stations and population, 1910: Montrose, 3,254; Olathe, 458; and Delta, Colo., 2,388.

WATER SUPPLY.

Sources of water supply: Gunnison and Uncompahgre Rivers.

Area of drainage basins: Gunnison River, 4,140 square miles; Uncompahgre River, 500 square miles.

Run-off in acre feet, April to November, inclusive: Gunnison River at River Portal (4,140 square miles), 1904 to 1911—maximum, 1,900,000; minimum, 840,000; mean, 1,500,000. Uncompahgre River at Fort Crawford (500 square miles), 1896-1899, 1903-1905, 1908-1911—maximum, 260,000; minimum, 176,000; mean, 215,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoir: Taylor Park—Area, 2,260 acres; capacity, 106,000 acre-feet; length of spillway, 125 feet; elevation of spillway, 150 feet above stream bed.

Storage dam: Taylor Park—Type, undetermined; maximum height, 160 feet.

Diversion dams: One, crib and rock fill; one, pile and timber; four, type and design not determined.

Length of canals: 30 miles with capacities greater than 300 second-feet; 100 miles with capacities from 50 to 300 second-feet; 200 miles with capacities less than 50 second-feet.

Tunnels: 12; aggregate length, 42,000 feet.

Dikes: Aggregate length, 3,000 feet.

Water power: None developed; estimated total, 10,000 horsepower.

Irrigable area: 140,000 acres.

Present status of irrigable land: 15,000 acres entered subject to the reclamation act; 19,000 acres withdrawn from entry; 106,000 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 11.7 miles with capacities of more than 800 second-feet; 14.9 miles with capacities from 301 to 800 second-feet; 50.9 miles with capacities from 50 to 300 second-feet; 105.2 miles with capacities less than 50 second-feet.

Tunnels: 7; total length, 34,934 feet.

Diversion dams: Crib; volume, 1,700 cubic yards of rock fill and 1,500 cubic yards of concrete.

Dikes or levees for protection from overflow: Total length, 2,200 feet; volume, 5,423 cubic yards.

Canal structures: Costing over \$2,000 each—Concrete, 20; wood, 12; metal siphons, 2. Costing from \$500 to \$2,000 each—Concrete, 11; wood, 25. Costing from \$100 to \$500 each—Concrete, 17; wood, 33. Costing less than \$100 each—wood, 662.

Bridges: Wood—3 over 50 feet in length; 35 less than 50 feet in length; total length, 972 feet.

Culverts: Concrete—21; length, 2,523 feet.

Pipe laid: Concrete—894 feet; steel and ingot iron—5,642 feet.

Flumes: Steel—29; length, 4,978 feet. Wood—21; length, 1,239 feet.

Buildings: Offices, 5; residences, 13; power plants, 2; barns and storehouses, 17.

Roads: 21.1 miles.

Railroad track: $6\frac{1}{2}$ miles.

Telephone lines: 33 miles. Telephones in use, 23.

Transmission lines: 7 miles.

Material excavated: Class 1, earth, 1,112,968 cubic yards; class 2, indurated material, 578,458 cubic yards; class 3, rock, 363,616 cubic yards.

Cement used: 72,290 barrels.

Concrete placed: 78,247 cubic yards.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands are being irrigated under rental contracts.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 32,000 acres.

Area under water rental contracts, season of 1912: 28,000 acres.

Length of irrigating season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 6,000 feet above sea level.

Average annual rainfall on irrigable area for 12 years, 9 inches; 1911, at Montrose, 11.79 inches.

Range of temperature on irrigable area: -20° to 98° .

Character of soil of irrigable area: Red sandy gravel, adobe, and clay loam.

Principal products: Alfalfa, grain, fruits, sugar beets, potatoes, and vegetables.

Principal markets: Denver, Colo.; Chicago, Ill.; local mining camps.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in June, 1901.
Construction recommended by director March 7, 1903.
Construction authorized by Secretary March 14, 1903.
South Canal completed May, 1908.
Montrose and Delta Canal purchased May 4, 1908.
Loutsenhizer Canal purchased September 25, 1908.
First irrigation by Reclamation Service, season of 1908.
Gunnison Tunnel completed for present use June, 1910.
Gunnison River water for irrigation first turned through tunnel July 6, 1910.
Gunnison River Diversion Dam completed January, 1912.
Entire project 54.9 per cent completed, June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Uncompahgre Valley project provides for the diversion of water from the canyon of Gunnison River by means of a tunnel about 6 miles long and a canal 11 miles long to supplement the flow of Uncompahgre River in the irrigation of lands in Uncompahgre Valley. To distribute the waters of the Uncompahgre and Gunnison Rivers, thus combined, the plan provides for the purchase, enlargement, and extension of the more important private ditches taking water from Uncompahgre River and for supplementing them by laterals diverting from the South Canal and by high-line canals, one on either side of the valley, taking water from Uncompahgre River.

The construction of a diversion dam in the Gunnison River, the South Canal, and South Canal lateral system have been completed. The Gunnison Tunnel has been completed to the extent necessary for its present use, further lining having been postponed. The Montrose and Delta and the Loutsenhizer Canal systems have been purchased and enlarged, and contracts for the transfer of the Reservation and North Mesa Ditches to the Government have been approved by the department. The owners of the Chipeta, Selig. Homerun, Colorow, Garnet, High Line, and Boomer Canals have made arrangements to transfer their irrigation works to the United States. Numerous laterals have been constructed and work is now in progress on the West Canal. The construction of the East and Selig Canal systems, and investigation of the Taylor Park dam site will be taken up in the near future.

CONSTRUCTION DURING FISCAL YEAR.

Gunnison River Diversion Dam.—The construction of this dam was begun in December, 1910, and continued until May, 1911, when work was suspended on account of high water. On August 20, 1911, construction work was resumed and continued until the completion of the dam during the latter part of January, 1912. The construction of the weir involved the excavation of 10,500 cubic yards of material, and the placing of 1,500 cubic yards of concrete and 1,700 cubic yards of rock fill.

Gunnison Tunnel.—Ten thousand and two linear feet of new concrete floor and 84 feet of arch were placed, and 743 linear feet of ruptured floor and side walls were removed and replaced with reinforced concrete.

Taylor Park Reservoir.—A log cabin and log stable were built at the dam site, preparatory to investigating foundations and materials for construction.

South Canal System.—The rail grilles and concrete piers supporting them in the drops along the line were removed and replaced with concrete, carried to the regular canal grade. Four hundred and ten feet of ruptured floor were replaced with reenforced concrete, and 216 linear feet of side walls and floor were covered with a 4-inch face of the same material. To supply water to the Cedar Valley High Line two diversion gates, located below the second drop, were removed and installed at the lower end of the portal cut, and from the gates a concrete culvert 6 feet wide, 5 feet high, and 200 feet in length, was built under the tracks of the Denver & Rio Grande Railroad, the lower end of the culvert connecting with a concrete-lined channel 399 feet in length. In the construction of the culvert and channel 410 cubic yards of concrete were placed.

Four laterals varying in capacity from 10 to 30 second-feet and aggregating 6.1 miles in length were constructed, and 2 steel flumes, 3 wooden flumes, 4 head gates, 1 timber flume, wasteway and bulkhead combined, 2 pipe drops 1,350 feet long, 22 timber drops, 2 rock drops, and rock chute 150 feet long, were built on the lateral system. Seven new taps were built and 35 replaced.

East Canal System.—In the construction of the East Canal by Government forces 10,000 cubic yards of blue shale were excavated, and 85,000 cubic yards were dredged, under contract, in the enlargement of the old Loutsenhizer Canal. A highway bridge of 40-foot span was constructed at station 270, and 10 taps and measuring weirs were built along the line of the canal.

West Canal System.—A contract was entered into, involving the excavation of 191,100 cubic yards, and the driving of 1,750 linear feet of tunnel, and from March 1 to June 30, 1912, 91,300 cubic yards had been excavated and 1,620 linear feet of tunnel driven. Excavation by Government forces involved the removal of 10,000 cubic yards. There were also constructed 2 concrete culverts, 7 corrugated iron culverts with concrete end walls and collars, 1 concrete overhead drain, 6 bridges, 5 weirs, and 11 spill boxes.

Montrose and Delta Canal System.—The new Montrose and Delta Canal headworks is a combination concrete sluiceway and lined channel and concrete canal-way, located about 321 feet below the site of the present wooden structures, and its construction involved the excavation of 3,363 cubic yards and the placing of 688 cubic yards of concrete. A concrete rating flume, having a length of 20 feet and clear width of 23 feet, was built about 500 feet below the new headworks. To protect the headworks, a dike of earth and gravel, faced with bundles of willows anchored to deadmen, was built. The dike is 1,650 feet long and contains a volume of 4,623 cubic yards.

On the Spring Lateral 2.7 miles of canal, with a capacity of 20 second-feet, were excavated, and 1 wooden sluiceway, 4 timber drops, 2 wooden flumes, and 1 galvanized steel flume were constructed. On the Franklin Mesa Lateral 1 timber headwork, 11 timber drops, and 14 spill boxes were built. The High Mesa Siphon, an ingot iron pipe 26 inches in diameter and 3,808 feet long, connecting High Mesa to Franklin Mesa, was placed, and a reenforced concrete inlet, outlet, and two manhole boxes were built along the line. On the High Mesa Lateral 4 wooden bridges and 37 timber drops were constructed. On the King Lateral Extension 5 galvanized steel flumes, having a total

length of 448 feet, were built and the concrete approaches to 17 flumes completed.

OPERATION AND MAINTENANCE.

During the season of 1911 the Reclamation Service supplied water for the irrigation of 25,350 acres of land, 15,109 acres of which were supplied from the Montrose and Delta Canal, 5,524 acres from the Loutsenhizer Canal, and 362 acres from the South Canal. The High Line, Reservation, Colorow, and Garnet Ditches were supplied with Gunnison water for the irrigation of 4,355 acres. About 113,789 acre-feet of water were diverted into the canals operated by the service, 98,822 acre-feet being delivered to the land. Water was furnished on a rental basis, the charge being \$80 per second-foot for the season for all consumers along the South and Montrose and Delta Canals; while those consumers possessing water rights in the Loutsenhizer Canal were assessed \$20 per second-foot for Uncompahgre water and \$60 additional per second-foot for Gunnison water. Private ditches were furnished with Gunnison water at the South Canal outlet for \$60 per second-foot. The Gunnison Tunnel and South Canal were operated from June 1 to October 10; the Montrose and Delta Canal was shut down for seven days to clean out gravel deposits in the head-gate channel, and the Loutsenhizer Canal was shut down six days on account of a slide on the upper bank along an adobe hill. During the irrigation season the operating force was employed in regulating the distribution of water and making minor repairs, and during the remainder of the year in cleaning the canal of vegetable growths and deposits of sand and in repairing and installing structures.

SETTLEMENT AND IRRIGATION.

The large landholders have continued to subdivide their holdings, and many sales of small tracts to new settlers have been made. The following table shows the acreage of various crops under cultivation in 1910 and 1911:

Area under cultivation, Uncompahgre Valley project.

Crop.	Acreage under cultivation.		Increase.	
	1911	1910	Amount.	Per cent.
Alfalfa.....	19,734	22,100	-2,366	- 10.2
Oats.....	6,334	3,075	3,259	105.9
Wheat.....	4,106	1,425	2,681	188.1
Potatoes.....	5,024	2,950	2,074	70.3
Beets.....	1,395	2,000	- 605	- 30.2
Beans.....	329			
Onions.....	132			
Corn.....		125		
Garden.....	750	275	475	172.7
Orchards.....	6,351	5,650	701	12.4
Miscellaneous.....	663			
Total.....	44,818	37,600	7,218	19.2

The estimated average value per acre for all crops was \$59.48; for onions, \$269.50; potatoes, \$183.04; orchard, \$127.60; orchard mixed and other crops, \$70; beets, \$83.42; and garden, \$80.34. The prices for produce were high, especially for potatoes, and as a whole the farmers had a prosperous season, although some of the apple growers

were late in picking, and suffered from the early frosts. The late spring of 1912 prevented too early budding of fruit trees, and consequently for the first time in years a full peach and apricot crop will be harvested.

FEATURE COSTS TO JUNE 30, 1912.

Storage: Preliminary examination, Taylor Park Dam-----	\$2, 823. 92
Cimarron Lateral topography-----	1, 319. 11
Gunnison Tunnel:	
Headworks, head gates, excavation and concrete-----	\$21, 058. 65
Gunnison River weir-----	112, 887. 67
River portal heading-----	1, 026, 557. 61
West portal heading-----	1, 639, 808. 89
Portal cut excavating and lining-----	118, 292. 78
Tunnel road-----	37, 552. 93
Engineering-----	43, 018. 76
Paid contractor-----	18, 890. 05
	<hr/> 3, 018, 067. 34
Canal system:	
Purchase of existing canal systems (outstanding water rights and real estate)-----	142,937. 21
General expense, preliminary operation-----	30, 708. 22
South Canal—	
Main Line-----	811, 132. 96
Cedar Valley-----	26, 944. 77
High Line Canal-----	7, 616. 47
Lateral systems-----	32, 921. 19
Montrose and Delta Canal—	
Main Line-----	176, 778. 72
King Lateral-----	13, 087. 64
King Lateral extension-----	127, 275. 09
East Coal Creek Lateral-----	8, 105. 42
Franklin Mesa Lateral-----	7, 158. 95
High Mesa Lateral-----	43, 567. 06
Spring Lateral-----	7, 253. 75
California Mesa Lateral-----	4, 585. 66
Spring Creek Mesa Lateral-----	2, 207. 32
Lateral systems-----	598. 19
Loutsenhizer Canal—	
Main Line-----	31, 982. 15
Lateral systems-----	2, 238. 10
West Canal—	
Main Line-----	89, 614. 47
Lateral systems-----	3, 207. 74
East Canal-----	40, 718. 17
Selig Canal-----	3, 344. 76
Garnet Canal-----	278. 50
Ironstone Canal-----	538. 98
North Mesa Canal-----	975. 35
	<hr/> 1, 615, 776. 85
Buildings: Montrose office-----	16, 065. 41
Telephone systems: Construction-----	6, 507. 28
Preliminary topography, surveys-----	64, 765. 72
Irrigable lands, farm unit subdivision and soil examination-----	3, 224. 23
Examination of project as a whole: Expert engineering, hydrography, geology, lateral investigation, reconnoissance, etc-----	32, 394. 37
Administration of project as a whole:	
General expenses-----	\$145, 216. 44
Montrose office-----	39, 958. 27
	<hr/> 185, 084. 71
Power development, surveys-----	262. 50
	<hr/> 4, 946, 291. 44
Total building cost-----	4, 946, 291. 44
Less unadjusted credits (to be distributed to features later)----	3, 718. 75
	<hr/> 4, 942, 572. 69

IDAHO, BOISE PROJECT.

LOCATION.

Counties: Ada, Boise, Canyon, and Elmore.

Townships: 1 S. to 5 N., Rs. 6 W. to 6 E., Boise meridian, and Ts. 21 and 22 S., R. 46 E., Willamette meridian.

Railroads: Oregon Short Line; Boise, Nampa & Owyhee; Idaho Northern; Boise & Interurban; Boise Valley; Arrowrock.

Railroad stations and population, 1910: Boise, 17,358; Nampa, 4,205; Caldwell, 3,543; Meridian, 619; and Kuna,¹ Idaho.

WATER SUPPLY.

Source of water supply: Boise River.

Area of drainage basin: 2,610 square miles.

Annual run-off in acre-feet of Boise River near Highland (2,610 square miles), 1895 to 1911—maximum, 3,100,000; minimum, 1,200,000; mean, 2,270,000.

DATA FOR COMPLETE PROJECT.

Reservoirs: Deer Flat—Area, 9,835 acres; available capacity, 177,600 acre-feet; no spillway. Arrowrock—Area, 2,780 acres; available capacity, 230,000 acre-feet; length of spillway, 400 feet; elevation of spillway above stream bed, 256 feet.

Storage dams: Upper Deer Flat—Type, earth fill; maximum height, 70 feet; length of crest, 4,000 feet; volume, 1,170,200 cubic yards. Lower Deer Flat—Type, earth fill; maximum height, 40 feet; length of crest, 7,200 feet; volume, 1,130,800 cubic yards. Deer Flat Forest—Type, earth fill; maximum height, 16 feet; length of crest, 950 feet; volume, 22,500 cubic yards. Arrowrock—Type, rubble concrete; maximum height, 350 feet; length of crest, 1,075 feet; volume, 530,000 cubic yards.

Diversion dam: Boise—Type, rubble concrete weir; maximum height, 45 feet; length of crest, including logway, 246 feet; volume, including canal headworks, 21,750 cubic yards.

Length of canals: 40 miles with capacities greater than 800 second-feet; 57 miles with capacities from 301 to 800 second-feet; 165 miles with capacities from 50 to 300 second-feet; and 690 miles with capacities less than 50 second-feet.

Tunnel: Arrowrock diversion; cross section, 25 feet by 30 feet; length, 487 feet.

Water power: 3,000 maximum horsepower developed at Boise River Dam; horsepower at Arrowrock Dam not determined.

Irrigable area: 243,000 acres, including 36,000 acres of doubtful land located within boundaries of private irrigation districts.

Present status of irrigable lands: 67,219 acres entered subject to the reclamation act; 492 acres withdrawn from entry under first form withdrawal of the reclamation act and under the act of June 25, 1910; 22,720 acres of State lands; 152,569 acres in private ownership; total, 243,000 acres.

RESULTS TO JUNE 30, 1912.

Canals: 40 miles with capacities more than 800 second-feet; 57 miles with capacities from 301 to 800 second-feet; 165 miles with capacities from 50 to 300 second-feet; 690 miles with capacities less than 50 second-feet.

Waste-water ditches and drains: 50 miles.

Tunnels: 1; total length, 487 feet.

Storage dams: Volume, 2,749,500 cubic yards of earth.

Diversion dams: Volume, 21,749 cubic yards of masonry.

Crib construction: Total length, 30 feet; volume, 9,000 cubic yards of rock fill; lumber in place, 460 M feet.

¹ Unincorporated, population not available.

Canal structures: Costing over \$2,000 each—Concrete, 56. Costing from \$500 to \$2,000 each—Concrete, 70; wood, 30. Costing from \$100 to \$500 each—Concrete, 2,000; wood, 1,790. Costing less than \$100 each—Concrete, 1,000; wood, 4,653.

Bridges: Wood, 50 feet or more in length, 38; less than 50 feet, 833; total length, 12,840 feet.

Culverts: Wood, 284; length, 4,000 feet.

Pipe laid: Concrete, 30,000 feet; steel, 1,700 feet; wood, 24,718 feet.

Flumes: Steel, 47; length, 33,077 feet. Wood, 110; length, 4,040 feet.

Buildings: Offices, 11; residences, 28; power plants, 1; hospitals, 2; barns and storehouses, 38.

Wells: 3; aggregate depth, 500 feet.

Roads: 28 miles.

Railroad track: 19 miles (standard gage).

Telephone lines: 210 miles; telephones in use, 130.

Transmission lines: 26 miles.

Material excavated: Class 1, earth, 6,793,981 cubic yards; class 2, indurated material, 1,044,444 cubic yards; class 3, rock, 346,891 cubic yards; unclassified, 2,523,500. (Probably about 10 per cent class 2.)

Riprap: 9,680 cubic yards.

Paving: 3,450 square yards.

Concrete placed: 59,864 cubic yards.

Masonry: 2,018 cubic yards.

Cement used: 83,543 barrels.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 200,000 acres, including 18,000 acres of lands in territory of New York Canal Co.

Area under rental contracts and other arrangements, season of 1912: 57,959 acres.

Length of irrigation season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 2,500 feet above sea level.

Average annual rainfall on irrigable area: At Boise station for 34 years, 13.35 inches (1911, 15.35 inches).

Range of temperature on irrigable area: -28° F. to 107° .

Character of soil of irrigable area: Clayey loam, light sandy loam, and sandy loam.

Principal products: Alfalfa, wheat, oats, potatoes, apples, prunes, and small fruits.

Principal markets: Boise, Nampa, Caldwell, and Meridian, Idaho; Portland, Ore.; and eastern cities.

LANDS OPENED FOR IRRIGATION.

The project has not yet been formally opened.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: $2\frac{1}{2}$ acre-feet per acre per annum at the farm.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1902.

Construction recommended by board of engineers, February 15, 1905.

Construction authorized by Secretary, March 27, 1905.

Main canals of New York Canal Co. and Idaho-Iowa Lateral & Reservoir Co. acquired March 3, 1906.

First irrigation by Reclamation Service: Season of 1906.

Boise River Dam completed September, 1908.

Lining Main Canal completed November, 1910.

Arrowrock Dam construction authorized January 6, 1911.

Upper Deer Flat embankment completed March, 1911.

Deer Flat Forest embankment completed June, 1911.

Lower Deer Flat embankment completed January, 1912.

Enlargement of Main Canal completed February, 1912.

Boise River power plant completed May, 1912.

Project, exclusive of Boise River storage, 97 per cent completed June 30, 1912.

Project, inclusive of Boise River storage, 52 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Boise project provides for storage of water in the Arrowrock Reservoir on Boise River about 20 miles above Boise and in Deer Flat Reservoir near Caldwell and Nampa, Idaho; the diversion of water from Boise River by the Boise River Dam about 8 miles above Boise; the distribution of water on the south side of Boise River through the Main Canal leading from the dam to the Deer Flat Reservoir, distributing laterals heading in the Main Canal, distributing canals heading in the Deer Flat Reservoir and distributing canal systems heading in the Boise River below the Boise River Dam; and the distribution of water on the north side of the Boise River to a small area of land east of Boise through a canal system heading at the Boise River Dam. The Boise River Dam, the Deer Flat Reservoir, and the entire canal system, except three small pipe lines and a few minor structures for land not yet improved, are completed. Construction work on Arrowrock Reservoir and on two of the uncompleted pipe lines is in progress.

CONSTRUCTION DURING FISCAL YEAR.

Arrowrock Railroad.—A standard-gauge railroad 17 miles long with maximum grade $1\frac{1}{2}$ per cent and maximum curvature 12° , has been built to Arrowrock from Barber Junction, on the Oregon Short Line branch from Boise. This work was under way at the beginning of the fiscal year, and the railroad was completed to Arrowrock early in November, 1911, since which time a daily train has been operated between the two points. The roadbed was built by contract and the structures and track by Government forces. There are three timber bridges along the line—one at Gooseneck, over Boise River, with a total length of 442 feet; another across the south end of the Highland Dam on Boise River, with a total length of about 165 feet; and the third at Arrowrock, over Boise River, with a total length of 366 feet.

Boise River power plant and transmission lines.—The construction of a power plant at the Boise Diversion Dam, about 15 miles below Arrowrock, and of duplicate transmission lines to the dam site at Arrowrock, was started in June, 1911, and the plant completed and put into operation in May, 1912. The plant has an average capacity of about 2,000 horsepower, with a maximum capacity of about 3,000 horsepower, and consists of three 850-horsepower vertical hydraulic turbines, each directly connected to a 625 k. v. a. generator. The power house is constructed of reenforced concrete. Power is generated at 2,200 volts, and is transmitted to the Arrowrock substation at 23,000 volts.

Arrowrock wagon roads.—Work on wagon roads to improve transportation facilities between Barber Junction and Arrowrock and between Gooseneck and Arrowrock has been continued, and about 10 miles of a new road have been completed around and above the flow line of the proposed reservoir to replace the old stage road which passed directly through the reservoir site.

Arrowrock camp.—The erection of a construction camp at Arrowrock to accommodate about 1,000 men was begun before the beginning of the fiscal year. This camp has been in use since August, 1911,

and was practically completed at the end of June, 1912. Complete water and sewerage systems have been constructed and connected with practically all the buildings.

Arrowrock construction plant installation.—Two 12-ton cableways, each of about 1,500-foot span, have been installed and have been in operation for several weeks. A screening and crushing plant to prepare excavated material for use in concrete has been erected on the south side of the river and is in operation, and a concrete-mixing plant is being built. Five derricks, two of which have a capacity of 10 tons, a 70-ton steam shovel, and a drag-line excavator, with a 3-cubic yard bucket, have been installed. A cement-storage shed, with a capacity of about 18,000 barrels, has been erected, and a sand-cement plant consisting of a drier, a ball mill, and three tube mills, with a capacity of 750 to 1,000 barrels per day, is being constructed. Two air compressors with a combined capacity of about 850 cubic feet of free air per minute have been installed, and several pumps ranging in size from 4 to 12 inches, which have been in use in connection with the construction of the diversion works, are being installed for use in the main excavation for the dam.

Arrowrock diversion works.—Construction of works for diverting the Boise River around the dam site was begun in July, 1911, and the diversion tunnel, which was started early in August, was completed in January, 1912. This tunnel is 30 feet wide, 25 feet high, and has a length of 487 feet under cover with bell-mouth construction at either end, and is driven entirely through hard granite. Work on the timber-crib cofferdams for diverting the river into the tunnel at the inlet end and protecting the work from backwater at the lower end is well under way.

Arrowrock spillway excavation.—Excavation for a spillway on the north side of the river has been opened as far as necessary to prepare it for steam-shovel work, and has been discontinued until such time as the material excavated can be used in the masonry of the dam.

Arrowrock Dam excavation.—The loose material has been cleaned down from the north abutment of the dam and keyways above the water line roughed out. Some excavation work has also been done on the south side of the river above the water line, and work on the main excavation in the river bed below the water line will be started in a short time.

Enlarging Main Canal.—Work on the enlargement of the Main Canal was completed on December 15, 1911, involving the handling of 179,913 cubic yards of earth, 187,404 cubic yards of indurated material, and 40,000 cubic yards of rock. About one-half of the work was done during the fiscal year 1912. Work on the enlargement of the rock cut on the Main Canal was completed on February 5, 1912, involving the excavation of 16,300 cubic yards of material.

Deer Flat Reservoir.—Upon completion of the facing of the Upper Deer Flat Embankment with gravel and the construction of the Deer Flat Forest Embankment, work was started on the facing of the Lower Deer Flat Embankment with gravel, requiring the placing of 226,400 cubic yards of material. The work was finished during January, 1912, completing the construction of the Deer Flat Reservoir.

Distribution system.—The extensions of the distribution system during the year cover an additional area of about 35,000 acres of

land, and work has been started on the remaining 5,000 acres, practically completing this feature of the project. The work involved the excavation of 1,866,931 cubic yards of earth, 296,344 cubic yards of indurated material, and 137,631 cubic yards of rock, practically all of which was done under small contracts. The 3,788 structures on the lateral system were installed by Government forces and involved the use of 26,139 linear feet of flumes, 3,064,128 feet board measure of lumber, 14,153 barrels of cement, and 295,946 pounds of steel.

Telephone system.—Extensions were made to the telephone system during the fiscal year to important points on the project and to Arrowrock Dam, making the total mileage of pole lines built approximately 149, equivalent to 210 miles of single metallic circuit.

Boise office building.—During the fiscal year 1912 work was begun on an office building for use as central quarters in constructing and operating the project, the building being completed on January 17 and the installation of the plumbing and heating apparatus on February 5, 1912.

Drainage work.—Construction with a drag-line excavator of a 4-mile drainage ditch from the Upper Deer Flat Embankment to Wilson Slough was begun in the spring of 1912, to carry away surface drainage from Deer Flat Reservoir and lower the water plane over the lands below the Upper Deer Flat Embankment. Preliminary surveys are in progress on a general drainage system for the Pioneer Irrigation District, and negotiations are pending with the district on a plan for constructing some of the principal ditches.

OPERATION AND MAINTENANCE.

Historical review.—Government water was first delivered to lands in the Boise project during the season of 1909, although New York Canal water had been carried for that company and delivered to owners of stock of the company since March 3, 1906, the date of the contract for delivery of water between the United States and the New York Canal Co. During 1909 the Reclamation Service was prepared to irrigate 42,000 acres of new land and 21,300 acres of land were actually irrigated, including 18,000 acres irrigated by water of the New York Canal Co. The rental price was 75 cents per acre-foot for flood water, no stored water being available. The flood-water season was, however, exceptionally long, and some water was available until September 16.

During 1910 the service was prepared to irrigate 90,000 acres of new land, 33,377 acres being irrigated, including the 18,000 acres of land irrigated with New York Canal Co.'s water. Flood water lasted until August 6, and 8,233 acre-feet of stored water were available from the Deer Flat Reservoir. The rental price of water remained at 75 cents an acre-foot for both flood and stored water, water being available from the reservoir until August 25. During 1911, 45,575 acres were irrigated, including the 18,000 acres irrigated by water of the New York Canal Co., the service being prepared to furnish water to 120,000 acres of new land. The flood-water season terminated on August 15, and there was stored in the Deer Flat Reservoir 54,967 acre-feet of available water. Flood water was rented at

75 cents per acre-foot, and stored water at \$1.25 per acre-foot. Comparatively little stored water was used, and at the end of the irrigation season there was 20,100 acre-feet of water still available in the reservoir.

During 1912 there are 57,959 acres in cultivation, including the 18,000 acres of New York Canal Co.'s land. The project is completed with the exception of the Arrowrock Reservoir and extensions covering about 5,000 acres of land. The service is now prepared to furnish flood water to 146,500 acres of new lands and stored water to 53,500 acres of these lands. Stored water can also be furnished to a portion of the old lands in the Nampa-Meridian and Pioneer Irrigation districts. The remainder of the lands in these districts, the land in the New York Canal territory, and a portion of the new lands of the project are dependent on Arrowrock Reservoir for a late supply of water, so that until the reservoir is completed not all of the acreage embodied in the project will be capable of irrigation throughout the entire season. During the season of 1912 the rental price of flood water has been fixed at 40 cents per acre-foot and of stored water at 60 cents per acre-foot. With these prices it is anticipated that the preparation of land under the project will continue and much late seeding will be accomplished with stored water.

Idaho-Iowa Lateral & Reservoir Co. reservoirs.—The Kuna Reservoir of the Idaho-Iowa Lateral & Reservoir Co. has been filled during the year in accordance with the contract with that company. The Hubbard Reservoir has been purchased by the United States and will be used as a wasteway for the main canal. Only a small amount of water was turned into this reservoir during the year. Owing to construction work on the Watkins and Katherine Reservoir embankments the United States was released for the season of 1912 from its obligation to fill these reservoirs.

Maintenance of canal system.—A small stretch of the concrete lining, which had disintegrated owing to frost during placing, was taken out and replaced, and about 10,000 feet of the lower bank of the main canal lined with gravel. A wasteway gate from the main canal into Hubbard Reservoir was constructed, providing a wasteway at the lower end of the upper stretch of the main canal. Most of the work performed by the operation department has consisted of repairing and installing small structures, and no breaks of any consequence have occurred.

SETTLEMENT AND IRRIGATION.

Settlement on the project throughout the year has been practically at a standstill. Some State land has been sold at prices considerably below those of 1910 and 1911, there have been a few relinquishments, and a little private land has been sold. Of the 57,959 acres now under cultivation, 40 per cent is in hay, 40 per cent in grain, 13 per cent in orchard, and 7 per cent in miscellaneous crops. The crop returns during 1911 were generally satisfactory, although the gross return per acre was not large. As little stored water was used, not much late preparation and seeding of land was accomplished.

The following table shows the acreage and average value per acre of various crops in 1910, 1911, and 1912:

Crop returns, Boise project.¹

[On acreage for which crop census was taken.]

Crop.	1910		1911		1912	
	Aeres.	Average value per acre.	Aeres.	Average value per acre.	Aeres.	Average value per acre.
Wheat.....	3,785	\$11.70	6,733	\$12.97	7,156	-----
Oats.....	2,273	11.82	3,799	14.68	6,152	-----
Barley.....	82	10.46	288	13.72	1,466	-----
Corn.....	20	12.61	264	14.84	1,337	-----
Rye.....	76	8.35	97	8.65	365	-----
Alfalfa seed.....			298	33.82	321	-----
Clover seed.....					702	-----
Potatoes.....	659	40.71	324	45.64	992	-----
Alfalfa.....	2,912	15.93	6,273	17.50	10,762	-----
Timothy.....			93	19.47	23	-----
Clover.....	5	16.00	397	11.50	1,140	-----
Grain hay.....	1,704		630	12.07	427	-----
Pasture.....	345	5.00	4,135	5.12	232	-----
New orchard.....	689	10.00	3,039	30.23	3,491	-----
Bearing orchard.....			165	81.83	305	-----
Miscellaneous.....	329	10.00	340	26.63	470	-----
Total taken.....	12,929	12.82	26,875	16.40	35,341	² \$20.00

¹ On land irrigated with Government water.

² Estimated.

FEATURE COSTS TO JUNE 30, 1912.

Administration of project as a whole (exclusive of Boise River storage).....	\$276, 206. 55
Examination of project as whole:	
Surveys.....	\$38, 505. 08
Hydrography.....	18, 554. 48
	57, 059. 56
Diversion works, dam, Boise River:	
Location.....	944. 70
Original construction.....	269, 463. 75
Repairing.....	73, 970. 78
	344, 379. 23
Main South Side Canal:	
Location and survey.....	6, 515. 02
Right of way.....	3, 542. 41
Canal construction.....	1, 058, 418. 11
Structures.....	185, 841. 49
Lining (concrete and timber).....	304, 098. 60
	1, 558, 415. 63
Distributing system from main canal:	
Location and survey.....	46, 486. 72
Right of way.....	6, 296. 05
Canal construction.....	566, 649. 96
Structures.....	449, 865. 43
Drainage and wasteway system.....	84, 247. 68
	1, 153, 545. 84
Storage, Deer Flat Reservoir:	
Location and survey.....	3, 871. 29
Right of way.....	222, 971. 17
Upper embankment.....	304, 555. 71
Lower embankment.....	288, 602. 37
Forest embankment, equalizing channels, and puddling reservoir.....	92, 030. 22
	912, 030. 76

Distributing system from reservoir:

Location and survey-----	\$24, 689. 60	
Canal construction, earthwork-----	323, 200. 93	
Structures-----	321, 157. 70	
Drainage-----	114, 056. 14	
		\$783, 104. 37

Boise River storage:

General expense-----	95, 483. 00	
Preliminary investigation and survey-----	63, 590. 11	
Right of way, Arrowrock Reservoir-----	57, 680. 02	
Arrowrock Railroad-----	361, 659. 68	
Power plant and transmission line-----	210, 257. 63	
Telephone line-----	8, 368. 88	
Wagon roads-----	49, 659. 05	
Repairs and betterments, diversion dam-----	3, 747. 93	
Clearing Arrowrock Reservoir-----	1, 350. 25	
General accounts, Arrowrock Dam-----	43, 375. 34	
Camp construction-----	93, 239. 35	
Camp maintenance-----	27, 178. 83	
Preparatory expense and plant installation-----	113, 410. 24	
Diversion works-----	227, 490. 20	
Spillway-----	26, 756. 96	
Dam proper-----	29, 912. 29	
		1, 413, 159. 76

Drainage in Pioneer Irrigation District----- 822. 76

Penitentiary Canal (completed; for details see Tenth Annual Report----- 20, 740. 39

Irrigable lands:

Farm units, subdivision-----	\$23, 360. 60	
Crop reports, investigations, etc-----	20, 550. 97	
		43, 911. 57

Telephone system:

Location and survey-----	657. 03	
Construction-----	30, 958. 67	
Operation-----	6, 466. 08	
		38, 081. 78

Operation and maintenance (during construction):

Reservoir-----	45, 375. 75	
Main canal system-----	151, 530. 03	
Penitentiary Canal-----	7, 714. 44	
		204, 620. 22

Inventories—mess, corrals, shops, hospitals, etc----- 47, 680. 95

Total building and operation and maintenance (during construction)----- 6, 853, 759. 37

IDAHO, MINIDOKA PROJECT.

LOCATION.

Counties: Lincoln and Cassia, Idaho; Jackson Lake Reservoir, Uinta, Wyo.
 Townships: 8 to 11 S., Rs. 22 to 25 E., Boise meridian; Jackson Lake Reservoir, Ts. 44 to 46 N., Rs. 114 to 116 W., sixth principal meridian, Wyoming.
 Railroads: Oregon Short Line; Salt Lake & Idaho.
 Railroad stations and population 1910: Acequia,¹ Rupert 297, Heyburn,¹ Burley,¹ and Ashton 502, Idaho.

WATER SUPPLY.

Source of water supply: Snake River supplemented by storage.
 Area of drainage basin: 22,600 square miles above diversion dam.

¹ Unincorporated; population not available.

Annual run-off in acre-feet of Snake River at Montgomery Ferry and Neely (16,000 square miles), 1896 to 1911: Maximum, 8,900,000; minimum, 3,830,000; mean, 6,620,000. South Fork of Snake River at Moran, Wyo. (980 square miles), 1904 to 1911: Maximum, 1,640,000; minimum, 920,000; mean, 1,320,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: Jackson Lake—Area, 22,600 acres; capacity, 380,000 acre-feet; length of spillway, 160 feet; elevation of spillway above stream bed, 24 feet. Lake Walcott—Area, 11,350 acres; total capacity, approximately 150,000 acre-feet; capacity above fixed crest of spillway, 53,500 acre-feet; length of spillway, 2,385 feet; elevation of fixed crest of spillway, 42 feet above stream bed.

Storage and diversion dams: Jackson Lake—Type, reinforced concrete piers with twenty 5 feet by 8 feet radial gates, terminating in an earth embankment 2,850 feet long on the north side and 200 feet long on the south side; maximum height of concrete section above foundation, 40 feet; above stream bed, 28 feet; earth embankment 4 feet higher than concrete section; length of crest, concrete section, 206 feet; earth, 3,050 feet; volume, 63,345 cubic yards of earth and 3,649 cubic yards of concrete. Minidoka—Type, rock fill with concrete regulating works; maximum height, 86 feet; length of masonry, 201 feet; length of rock fill, 736 feet; volume, 242,500 cubic yards.

Length of canals: 12 miles with capacities greater than 800 second-feet; 32 miles with capacities from 301 to 800 second-feet; 105 miles with capacities from 50 to 300 second-feet; approximately 650 miles with capacities less than 50 second-feet.

Dikes: Aggregate length, 3,100 feet.

Water power: 10,000 horsepower developed.

Irrigable area: Entire project about 118,700 acres; gravity unit, 70,000 acres; south side pumping unit, 48,700 acres.

Present status of irrigable lands (entire project): 95,100 acres entered subject to the reclamation act; 1,600 acres open to entry; 19,900 acres of State lands; 2,100 acres in private ownership.

RESULTS TO JUNE 30, 1912.

MAIN PROJECT.

Canals: 11.8 miles with capacities more than 800 second-feet; 32.2 miles with capacities from 301 to 800 second-feet; 104.9 miles with capacities from 50 to 300 second-feet; 400.6 miles with capacities less than 50 second-feet.

Waste-water ditches and drains: 62.6 miles.

Storage dams: Volume, masonry, 16,564 cubic yards; earth, 146,677 cubic yards; rock fill, 79,321 cubic yards; total, 242,562 cubic yards.

Dikes or levees for protection from overflow: Total length, 3,100 feet; volume, 3,472 cubic yards.

Canal structures: Costing over \$2,000 each—Concrete, 24; wood, 1. Costing from \$500 to \$2,000 each—Concrete, 45; wood, 5. Costing from \$100 to \$500 each—Concrete, 799; wood, 74. Costing less than \$100 each—Concrete, 24; wood, 2,431.

Bridges: Wood, 25, 50 feet or more in length; 76, less than 50 feet in length; total length, 3,974 feet.

Culverts: Concrete, 20, 1,976 feet in length; wood, 279, 8,313 feet in length.

Pipe laid: Concrete, 2,255 feet.

Flumes: Concrete, 2, 190 feet in length; steel, 11, 488 feet in length; wood, 65, 3,530 feet in length.

Buildings: Offices, 3; residences, 8; barns and storehouses, 12; power plants, 1; pumping stations, 3; drainage pumping stations, 2.

Wells: 14, aggregate depth, 857 feet.

Roads: 8 miles.

Telephone lines: 168 miles. Telephones in use, 72.

Transmission lines: 48.6 miles.

Material excavated: Class 1, earth, 7,709,292 cubic yards; class 2, indurated material, 198,528 cubic yards; class 3, rock, 413,399 cubic yards.

Paving: 88,715 square yards.

Cement used: 39,692 barrels.

Concrete placed: 35,955 cubic yards.

STORAGE UNIT.

[Jackson Lake.]

Storage dam: Volume, 3,649 cubic yards of masonry; 63,345 cubic yards of earth; 4,037 cubic yards of rock fill; total, 71,031 cubic yards.

Buildings: Offices, 1; bunk houses, 2.

Roads: 36 miles.

Telephone lines: 70 miles. Telephones in use, 7.

Material excavated: Class 1, earth, 116,558 cubic yards; class 3, rock, 6,749 cubic yards.

Coal mined: 661 tons.

Riprap: 4,037 cubic yards.

Paving: 11,364 square yards.

Cement used: 3,182 barrels.

Concrete placed: 3,649 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 111,300 acres.

Area under water-right applications and rental contracts, season of 1912: 93,700 acres.

Length of irrigating season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 4,225 feet above sea level.

Average annual rainfall on irrigable area: 12.36 inches, average of 6½ years; 11.92 inches in 1911.

Range of temperature on irrigable area: —11° to 100°.

Character of soil of irrigable area: On north side of river sand and sandy loam predominate; about one-third of the area is clay loam. On the south side of the river the soil is a disintegrated lava ash.

Principal products: Alfalfa, grasses, rye, wheat, oats, sugar beets, potatoes, small fruits.

Principal markets: Pocatello, Idaho; Salt Lake, Utah; Butte and Helena, Mont.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto (gravity unit): Public notices—March 9, 1907; November 23, 1908; February 11, 1909; March 30, 1909; February 7, 1910; March 22, 1910; June 10, 1910; October 13, 1910; November 3 and November 25, 1910; January 23, 1911; December 30, 1911; March 21, 1912. Orders—July 19, 1907; December 10, 1907; July 9, 1908; December 27, 1910; March 18, 1911; March 31, 1911; May 4, 1911; June 8, 1911. (South side pumping unit): Orders—March 24, 1911; March 19, 1912; May 13, 1912.

Location of lands opened: Ts. 8 to 10 S., Rs. 22 to 25 E., Boise meridian.

Present status of irrigable lands opened: 72,760 acres entered subject to the reclamation act; 6,000 acres open to entry; 8,100 acres of State land; 360 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 3 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$22, \$30, and \$40.

Annual maintenance and operation charge: \$1.50 and \$1.75 per acre of irrigable land. About 25,000 acres in the south side pumping unit are being irrigated in 1912 on a rental basis.

CHRONOLOGICAL SUMMARY.

First surveys with reference to storage possibilities in 1902.

Reconnaissance and preliminary surveys for main project begun March, 1903.

Construction recommended by board of engineers, March 21, 1904.

Construction authorized by Secretary April 23, 1904.

Minidoka Dam completed September, 1906.

Temporary dam on the Moran site, Jackson Lake, completed in 1907.

North canal and distributing system completed July, 1907.

First irrigation by Reclamation Service, season of 1907.

Power house completed for present use December 1, 1909.

Surveys and borings for permanent dam at Jackson Lake made in 1909 and 1910.

Wagon road (36 miles) to site of dam at Jackson Lake completed August 5, 1910.

Installation of machinery for 10,000 horsepower completed August, 1911.

Jackson Lake Dam completed November 25, 1911.

Gravity unit 88.5 per cent completed June 30, 1912.

South side pumping unit 92 per cent completed June 30, 1912.

Entire project 90 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Minidoka project provides for the diversion of the waters of Snake River by a combined storage, diversion, and power dam about 6 miles south of Minidoka, Idaho, into two canal systems, one on either side of the river, watering lands in the vicinity of Acequia, Rupert, Heyburn, and Burley, Idaho. Power developed at the dam is utilized primarily for pumping water from the canals to irrigate high lands, but also for pumping for drainage purposes, and for furnishing heat, light, and current for commercial use to the towns on the project and the farms adjacent to them. Storage for the project is provided mainly by a reservoir constructed in the upper drainage basin of Snake River at Jackson Lake, Wyo. This is supplemented by the reservoir formed by the Minidoka Dam, and known as Lake Walcott. Jackson Lake Dam and Minidoka Dam are completed. The irrigation systems for the gravity unit and the south side pumping unit and the drainage system for the gravity canals are under construction.

CONSTRUCTION DURING FISCAL YEAR.

Power station.—New runners were installed in four of the turbine units, considerably increasing the efficiency of the plant and all of the draft tubes were stiffened and braced more thoroughly to resist vibrations. The duplicate transmission line across the Snake River to the second lift pumping station was completed in July, 1911, and was immediately put into service, effecting a lower line loss, and affording a duplicate method of transmission in the event of needed repairs.

South side pumping stations.—One additional unit was installed at each of the three pumping stations, and concrete pressure pipes were constructed to carry the discharge. These units were at first planned as relay equipment, but it is now believed that all of the equipment will be required for regular service during the height of each season. Two of the new pumps are of 125 second-feet normal capacity, and were installed at the second and third lift stations, respectively, while the third, with a capacity of 75 second-feet, was installed at the first station. During the winter repairs were made to the generating and pumping machinery.

Minidoka Dam.—The embankment at the south end of the spillway, consisting of rock fill faced with earth, was strengthened by driving to bedrock a line of sheet piles in the earth fill and relaying the rock paving on the upper slope. The paving was grouted and a masonry parapet wall 2 feet in height was built the full length of the embankment as a protection against wave action, the work being done by Government forces in the fall of 1911 and the spring of 1912.

North side canal system.—To provide a more satisfactory delivery of water to the farm units in the gravity system, and to eliminate other undesirable conditions, it seemed desirable to gradually take over the sublateral system operated by small districts, and accordingly, in the spring of 1912, seven of the longest sublaterals were rebuilt, provided with new structures, and operated during the season. A large number of sublaterals will be rebuilt in the fall of 1912 and prepared for operation. Weirs and orifices were placed at the heads of several of the sublaterals as the beginning of a more thorough system of water measurements.

South side canal system.—A small amount of work was done on a short stretch of the main south canal to raise the banks to the full height. The three feeder canals carrying water to the pumping stations and the second and third lift canals were enlarged. One additional concrete barrel was added to the third lift siphon crossing at Marsh Creek. Several permanent canal checks were built, and additional laterals and small structures for the State lands were constructed, practically completing the distribution system for the main portion of the pumping unit.

Town sites and project extensions.—A survey was made of Acequia town site and the portion south of the railroad was staked out into lots and small tracts. A topographic survey was made of the Acequia pumping extension which requires a 35-foot lift and covers about 10,000 acres north of Acequia town site. No construction work is planned for this unit in the near future. Location surveys were made for the distribution system of the west end pumping extension, covering about 2,200 acres at the west end of the gravity unit.

Commercial power.—The sale of power for commercial use showed a steady growth during the year while the use of current for heat was increased by a reduction in the rate in the fall of 1911. Only a few short interruptions in the service occurred during the year.

North side drainage system.—Work with the two steam excavators was continued except during the winter months. Five 10-inch drainage wells were drilled into the rock at points where experience indicated that a successful disposal of flood waters could be secured and two electrically operated pumps were installed for drainage purposes, one at Gibsons Lake and one at Boersch's Lake. The former lake was eliminated and the latter was being rapidly lowered at the close of the year. About 100 6-inch cased inspection wells have been drilled to a depth of 12 feet at regular intervals about the project, and frequent readings are taken of the elevations of the water plane for purposes of study.

Jackson Lake Dam.—During the year the concrete core wall in the dike was completed. The earthwork was finished in October, 1911, and the riprapping of the upstream face in November. The excavation of the river channel above and below the dam was completed and the forces disbanded in November, 1911. During June, 1911, 250,000 acre-feet of water were stored and used during the season, delivery beginning on August 1.

OPERATION AND MAINTENANCE.

The first water was delivered to the canal system of the gravity unit in 1907. Water was turned into the canals on April 1, 1908, and was available during the regular irrigation season. The light

and sandy soil was easily moved by the strong winds until held down by grasses or stubble and the growing of crops was very difficult. The pumping unit canals were built during the season, and a small area of land was irrigated by means of a temporary pumping plant at the first lift station. In 1909 heavy winds in the spring retarded progress in the sowing of crops, but larger areas were seeded to grasses, while subirrigation also assisted in preventing damage due to the winds. On the pumping unit less trouble from wind was experienced because of the difference in the soil. As one permanent pumping unit at each lift had been installed, there was water available for the area irrigated, and crops were successful. Larger areas were irrigated on both units of the project in 1910. The subirrigated area was found to be increasing on the north side of the river, and work was instituted on the drainage system. Although the Jackson Lake temporary dam failed in July, 1910, and prematurely released the stored water, steps were taken to conserve the available supply and no crops suffered.

During the irrigation season of 1911, which began on April 1 and ended October 31, water was furnished to both the gravity unit and to the south side pumping unit. On the pumping unit water was furnished on a rental basis, but no advance payment was required. There was a sufficient supply of water for the project at all times, as 250,000 acre-feet were stored at the Jackson Lake Dam. Over 100,000 acre-feet of this amount was sold to a private company. There were delivered 266,600 acre-feet at the heads of sublaterals on the gravity unit to 34,700 acres of cultivated land and on the pumping unit 60,472 acre-feet were delivered to farm units comprising 20,900 cultivated acres. The more porous and light soils on the gravity unit require larger heads of water than under the pumping system, but each year the duty of water is increasing. On the north side of the river trouble was experienced from the growth of moss in the canals during the height of the season, necessitating dragging the channels with chains.

It is estimated that 40,000 acres are being irrigated under the gravity system in 1912 and 25,000 under the pumping unit, and the indications for good crops are promising. Rainy, cool weather at the beginning of the season rendered the use of water under the latter unit unnecessary until May 12, when the pumps were brought into operation, water being supplied on a rental basis. The flood flow of the Snake River was unusually large and there will probably be an abundance of water available with 380,000 acre-feet already stored at Jackson Lake Dam.

A system of rotation in delivery is being inaugurated under the pumping system, which will be worked out more thoroughly in 1913. Under the gravity unit the district sublaterals are being taken over and operated by the service as fast as conditions will permit, some of the longest and most difficult to maintain being thus operated during the season of 1912.

On June 20, 1912, proof of beneficial use of water was submitted to the State engineer in connection with State permit No. 66 for this project. Approximately 91,000 acres were shown to have been reclaimed up to that date.

SETTLEMENT AND IRRIGATION.

The issuance of the public notice of December 30, 1911, for lands under the gravity unit stimulated the settlement of vacant farm units, many filings having been made during the last half of the fiscal year ending June 30, 1912. Many farm units have been subdivided, and the general tendency appears to be toward the smaller holdings. Substantial business buildings have been erected in Burley, and a new railroad branch from that town to the Raft River Valley was graded, but no rails have yet been laid. The State land board held two public sales of State holdings on the project in April, 1912, and a considerable area was disposed of.

The crop yield in 1911 was good, in view of the short season. Grain raised on alfalfa land returned large yields; the area sown to grasses increased, and although the hay crop was not as heavy as in some former years there was a good eastern demand and it was practically all disposed of. Large numbers of sheep were brought into the project during the winter and much of the hay was consumed in this way. Sugar beets gave excellent promise on the pumping lands, and arrangements were completed by the sugar interests for growing at least 5,000 acres of beets in 1912.

The following table shows the acreage, average yield per acre, and value of the principal crops raised in 1909, 1910, and 1911:

Value of principal crops, Minidoka project.

Crop.	1909 ¹			1910			1911		
	Area.	Average yield.	Value.	Area.	Average yield.	Value.	Area.	Average yield.	Value.
	<i>Acres.</i>			<i>Acres.</i>			<i>Acres.</i>		
Wheat..... bushels..	9,950	30	\$286,600	7,430	20	\$96,700	10,980	20	\$131,600
Oats.....do.	8,950	50	290,900	6,490	35	102,200	8,170	30.5	90,300
Alfalfa.....tons.	9,470	4	113,600	16,200	2	129,600	19,620	2.75	236,500
Timothy.....do.	280	4	13,400				380	1.5	3,800
Clover.....do.	450	4	22,100				1,250	2.5	13,300
Mixed grasses.....do.	240			2,200	3	39,500	4,320	1.34	32,400
Barley..... bushels..	340	30	6,500	200	15	1,800	464	22.5	6,300
Corn.....do.	500	30	400	590	20	8,200	1,000	12.75	8,900
Potatoes.....do.	1,170	10	14,000	1,500	85	1,300	1,560	100	78,400
Pasture.....do.	170			264			3,929		
Orchard.....do.	860			1,125			1,487		
Sugar beets.....tons..	260	12	14,000	180	8	7,000	310	12	16,800

¹ It is probable that average yields and values stated for 1909 are too high.

The following statement shows the increase in total cultivated acreage from 1907 to 1911:

Area under cultivation, Minidoka project.

Year.	Acreage.	Increase.	
		Amount.	Per cent.
1907.....	14,900		
1908.....	25,700	10,800	72.5
1909.....	33,200	7,500	29.1
1910.....	37,700	4,500	13.5
1911.....	55,600	17,900	47.5

ESTIMATED COST OF CONTEMPLATED WORKS.¹

Works for the irrigation of high lands.....	\$72,000
Reconstruction of gravity unit sublaterals.....	9,400
Power station completion.....	15,200
South side pumping stations.....	27,200
Distribution system, south side pumping unit.....	32,000
Measuring devices, gravity unit.....	1,500
Telephone system.....	1,500
General expense.....	9,500

FEATURE COSTS TO JUNE 30, 1912.

Gravity system:		
Diversión dam and spillway.....		\$570,164.78
Main canals, north and south side—		
Earthwork.....	\$540,917.83	
Structures.....	81,614.43	
West end extension.....	12,882.90	
		635,415.16
Distributing system:		
Earthwork.....	296,065.20	
Structures.....	194,300.98	
		490,366.18
Pumping system, power plant at dam:		
Buildings.....	91,299.48	
Machinery and installation.....	261,762.33	
Enlargement of diversion channel.....	59,748.03	
Operation and maintenance of, when not charged to operation and maintenance of project.....	16,584.50	
Portion to operation and maintenance—commercial power.....	2,840.93	
		432,235.27
Pumping system, pumping stations:		
Temporary plant, south side.....	9,617.65	
Station No. 1, machinery, pressure pipe, and camp No. 1.....	168,099.43	
Station No. 2, machinery, pressure pipe, and camp No. 2.....	160,054.84	
Station No. 3, machinery, pressure pipe, and camp No. 3.....	95,357.90	
Operation and maintenance of, when not charged to operation and maintenance of project.....	24,835.84	
Station No. 4, west end pumping.....	65.00	
		458,030.66
Commercial power building, transformer substation.....		17,064.37
Wasteways and feeders:		
Earthwork.....	\$517,108.16	
Structures.....	180,243.79	
Operation of canal system when not charged to operation and maintenance of project.....	44,325.64	
		741,677.59
Transmission system:		
Building.....	50,411.63	
Operation.....	1,963.88	
Portion to commercial power.....	1,056.82	
		53,432.33
Telephone system:		
Building.....	26,583.71	
Operation.....	2,453.97	
		29,037.68
Real estate (rights and property; lands purchased).....		35,316.29
Buildings, construction.....		60,116.27
Irrigable lands, farm units, subdivisions.....		3,720.16

¹These figures represent not total estimated costs, but expenditures authorized prior to June 30, 1912, on the principal items of contemplated construction.

Roads and highways:

Construction	\$3,796.46
Maintenance	2,193.59

\$5,990.05

Wells, drilling

3,127.06

Examination of project as a whole

75,969.58

Administration of project as a whole:

General expense	\$134,387.10
Engineering—undistributed to features	32,034.85
Beneficial use of waters	583.77

167,005.72

Total building cost	3,778,669.15
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Operation and maintenance:

Gravity system—

Telephone system	\$7,252.08
Experimental farm	13,161.71
Dam headworks	942.29
Canals and sublateral system	98,121.32
Water from Jackson Lake	10,245.58
Engineering charges	11,084.16
Administration	55,375.28
Wasteway system	249,137.87

445,320.29

Pumping system—

Telephone system	1,208.09
Power division	30,804.13
General expense, canal division	15,060.98
Canal division	28,255.39
Water from Jackson Lake	856.00

76,184.61

Total operation and maintenance cost	521,504.90
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Total building and operation and maintenance cost	4,300,174.05
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SNAKE RIVER STORAGE UNIT.

Swan Valley Reservoir	\$11,374.74
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Jackson Lake Dam (temporary)	31,119.30
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Jackson Lake Dam (permanent):

Administrative expense	\$1,365.67
Investigations and surveys	8,948.33
Reservoir right of way	3,426.50
Testing	7,264.86
Grovont bridge investigations	191.03
Buildings and quarters	32,870.41
Ashton-Moran road construction	17,366.64
Telephone line construction	5,302.43
Diversion works	55,832.29
Excavation for foundation	20,556.36
Dam proper	203,008.75
River channel improvement	37,464.42
Protection work	20,408.42
Operation and maintenance (during construction)	12,680.03

426,686.14

Total Snake River Storage Unit	469,180.18
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Total building and operation and maintenance cost (during construction)	4,769,354.23
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KANSAS, GARDEN CITY PROJECT.**LOCATION.**

Counties: Finney and Kearney.
 Townships: 23 and 24 S., Rs. 32 to 34 W., sixth principal meridian.
 Railroad: Atchison, Topeka & Santa Fe.
 Railroad stations and population, 1910: Garden City, 3,171; and Deerfield, 152.

WATER SUPPLY.

Source of water supply: Shallow wells near Arkansas River, and natural flow from the river.

DATA FOR COMPLETE PROJECT.

Length of canals: 2.1 miles with capacities from 50 to 300 second-feet, and 1.7 miles with capacities less than 50 second-feet constructed and operated by the Reclamation Service; 20 miles of main canal and 12 miles of laterals constructed and operated by the water users.

Wells: 216; 15 inches diameter, 35 to 60 feet deep.

Steam power: 600 horsepower developed in steam-turbine power plant.

Irrigable area: 10,677 acres.

Present status of irrigable lands: All in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: Completed.

Canal structures: Concrete, 1, costing over \$2,000; wood, 3, costing \$100 to \$500 each.

Bridges: Wood, 3 less than 50 feet in length; total length, 60 feet.

Buildings: Residences, 1; barns and storehouses, 2; power house, 1; pump houses, 23.

Wells: 216; total depth, 8,800 feet.

Telephone lines: 5 miles. Telephones in use, 4.

Transmission lines: $4\frac{3}{4}$ miles.

Material excavated: Class 1, earth; 66,400 cubic yards.

Cement used: 7,571 barrels.

Concrete placed: 5,338 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: No water being supplied by Reclamation Service, on account of failure of water users to pay back charges.

Length of irrigating season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 2,925 feet above sea level.

Average annual rainfall on irrigable area: 20 inches.

Range of temperature on irrigable area: -20° to 105° .

Character of soil of irrigable area: Fertile black sandy loam.

Principal products: Alfalfa, sugar beets, melons, sweet potatoes, small fruits.

Principal markets: Garden City, Kans.; Kansas City, Mo.; Chicago, Ill.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: March 6, 1908, and November 30, 1908.

Location of lands opened: Ts. 23 and 24 S., Rs. 32, 33, and 34 W., sixth principal meridian.

Irrigable lands opened: 10,677 acres, all in private ownership.

Limit of area of farm units: 160 acres.

Duty of water: 2 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$37.50.

Annual operation and maintenance charge: \$2.75 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1904.
Construction recommended by board of engineers, September 5, 1905.
Construction authorized by Secretary October 5, 1905.
Power plant completed July, 1907.
Conduit and siphon completed July, 1907.
First irrigation by Reclamation Service, season of 1908.
Wells completed April, 1908.
Pumps: 10 installed in 1907, 13 installed in 1908.
Entire project 98 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Garden City project provides for the utilization by pumping of the underground flow of the Arkansas River Valley to supplement the normal flow of Arkansas River distributed through the Farmers ditch to irrigate lands northwest of Garden City, Kans.

A power house is located on the main line of the Atchison, Topeka & Santa Fe Railroad at Deerfield, Kans., and electrical energy is transmitted to 23 pumping stations, located along a concrete-lined canal 20,000 feet in length. The pumps are connected at 3 of these stations to 12 15-inch wells each and at 20 stations to 9 wells each. All of the features of this plan are completed.

CONSTRUCTION DURING FISCAL YEAR.

There has been no construction work in progress during the fiscal year.

OPERATION AND MAINTENANCE.

A public notice, dated March 6, 1908, opened for irrigation 10,656 acres of irrigable land. The delivery of water for irrigation was begun on April 1, 1908, from the 10 pumping units then installed, other pumping units being utilized as they were installed in June and July. There was little rainfall and practically no water in the river during the irrigation season of 1908, and the plant was operated almost continuously, the water plane being drawn down very low and the discharge from the pumps materially decreased. The removal of sand from the wells was found to be necessary at frequent intervals. During the season of 1908, 4,885 acres of land were irrigated in part with pumped water. On November 30, 1908, a public notice was issued providing for the 1908 operation and maintenance, thus increasing the charge for the building of the irrigation system to \$37.50. The plant was placed in operation for the season of 1909 on April 5, and water was furnished throughout the season, except when there was considerable rainfall or water was available in the river. By June 30, 1909, 75 certificates, providing water rights for 6,976 acres of irrigable land, had been issued. In 1909, during an operation period of 96 days and 7 hours, 7,555 acre-feet of water were pumped for use on 6,545 acres of land. Notwithstanding the fact that the output of the wells has not been as great as was anticipated, and various causes have combined to make the cost of operation and maintenance high, the operation of the project during the irrigation seasons of 1908 and 1909 was fairly successful.

Since 1909 no water has been pumped, and maintenance work has been confined to the necessary care of the plant.

SETTLEMENT AND IRRIGATION.

Payment of the Reclamation Service charges has not been made since 1909, and inasmuch as the public notices which have been issued provide that no water shall be furnished in any irrigation season until the operation and maintenance charges of the previous season have been paid, the plant at Garden City has been closed, and future operations will depend upon the action of the settlers. During the past two years effort has been made to stimulate the farmers under the project to a recognition of the value of the pumping plant as a supplemental source of supply, by the use of which at critical times crops are insured, wholly saved, or doubled in yield. The conditions around Garden City, with its sugar factory and excellent transportation facilities, are such that the farmers, under intelligent management, should be able to pay a large price for water during times of drought and make substantial profits, but the water users apparently do not take kindly to any system of payment for water as needed to supplement the natural river flow, nor are they willing to enter into any orderly arrangement such as has been adopted by other irrigated communities. Without such a system it is, of course, impracticable to proceed successfully, and the service is confronted with the alternative of nonuse of the plant. The plant itself is not a failure, but the people will not try to make it a success.

FEATURE COST TO JUNE 30, 1912.

Power station:

Power house and generating machinery, Deerfield,		
Kans-----	\$82,478. 12	
Power house accessories-----	26,710. 18	
		\$109,188. 30

Transmission line and electric installation (transmission line, pump house, electric lighting, etc.)-----	15,470. 75
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Pumping station:

Pumping houses and pumping units-----	\$55,628. 23	
Supply wells-----	53,697. 51	
		109,325. 74

Canal system:

Earthworks-----	59,038. 14	
Structures-----	29,595. 63	
		88,633. 77

Real estate (rights and property), lands purchased-----	1,349. 23
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Buildings-----	5,972. 46
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Irrigable lands, farm units, subdivisions-----	285. 66
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Preliminary examination, proposed extension of project-----	7. 89
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Administration of project as a whole-----	7,610. 88
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Operation and maintenance (during construction):

Operation-----	\$719. 67	
Telephone line-----	4. 19	
Transmission line-----	9. 63	
Power plant-----	31,241. 80	
Power plant accessories-----	1,541. 75	
Miscellaneous operating charges-----	11,713. 58	
Canal system-----	3,175. 25	
Care of plant during nonuse-----	2,333. 39	
		50,739. 26

Total building and operation and maintenance (during construction)-----	388,583. 89
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MONTANA, BLACKFEET (INDIAN) PROJECT.

LOCATION.

County: Teton.

Townships: 31 to 34 N., Rs. 5 to 10 W.: 29 N., R. 8 W.; 30 N., Rs. 6 to 9 W.; and 35 N., Rs. 6 and 7 W., Montana meridian.

Railroad: Great Northern.

Railroad stations: Browning, Blackfoot, Bombay, Seville, Garnet, and Cut Bank.

WATER SUPPLY.

Source of water supply: Cut Bank, Two Medicine, Badger, Birch, Whitetail, and Blacktail Creeks.

Area of drainage basins: 1,700 square miles.

Annual run-off in acre-feet: Cut Bank Creek at Cut Bank (971 square miles). 1906 to 1911—Maximum, 269,000; minimum, 142,000; mean, 206,000. Two Medicine Creek at Family (368 square miles), 1907 to 1911—Mean, 341,000. Badger Creek at Family (224 square miles), 1907 to 1911—Mean, 191,000. Birch Creek at Dupuyer (155 square miles), 1907 to 1911—Mean, 116,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: Two Medicine Lake—Area, 854 acres; capacity, 16,000 acre-feet; length of spillway, 56 feet; elevation of spillway, 25½ feet above stream bed. Spring Lake—Area, 1,400 acres; capacity, 29,000 acre-feet; length of spillway, 50 feet; elevation of spillway, 45 feet above stream bed. Four Horns—Area, 1,867 acres; capacity, 60,640 acre-feet; length of spillway, 50 feet; elevation of spillway, 57 feet above stream bed.

Storage dams: Two Medicine Lake—Type, earth embankment with rock-filled log crib and reenforced concrete controlling works; maximum height, 36 feet; length of crest, 900 feet. Spring Lake—Type, earth fill; maximum height, 50 feet; length of crest, 1,500 feet; volume, 75,000 cubic yards. Four Horns—Type, earth fill; maximum height, 62 feet; length of crest, 2,225 feet; volume, 149,000 cubic yards.

Diversion dams: For Badger, Birch, and Cut Bank Creeks, not designed. Two Medicine—Type, brush and rock; maximum height, 4 feet; length of weir, 165 feet; length of earth fill, 1,000 feet.

Length of canals: 40 miles with capacities greater than 300 second-feet; 144 miles with capacities from 50 to 300 second-feet; 600 miles with capacities less than 50 second-feet.

Dikes: Aggregate length, 800 feet.

Irrigable area: Entire project, 122,500 acres; Two Medicine unit, 48,000 acres; Badger unit, 33,000 acres; Cut Bank and Carlow units, 33,000 acres; Birch unit, 3,500 acres.

Present status of irrigable land: All lands on Indian reservation principally allotted to Indians.

RESULTS TO JUNE 30, 1912.

Canals: 49.5 miles with capacities from 50 to 300 second-feet; 154 miles with capacities less than 50 second-feet.

Canal structures: Costing over \$2,000 each—Concrete, 2; wood, 1. Costing from \$500 to \$2,000 each—Concrete, 2; wood, 7. Costing from \$100 to \$500 each—Wood, 5. Costing less than \$100 each—Wood, 827.

Bridges: Wood, 1 more than 50 feet in length; 27 less than 50 feet in length; total length, 631 feet.

Culverts: Wood, 82; length, 4,549 feet.

Pipes laid: Steel (corrugated), 1,280 feet.

Flumes: Steel, 2; length, 800 feet. Wood, 3; length, 503 feet.

Buildings: Offices, 1; residences, 1; barns and storehouses, 2.
Wells: 6; aggregate depth, 184 feet.
Roads: 7 miles.
Telephone lines: 84 miles. Telephones in use, 14.
Material excavated: Class 1, earth, 1,097,270 cubic yards; class 2, indurated material, 36,326 cubic yards; class 3, rock, 68,250 cubic yards.
Riprap: 531 cubic yard.
Paving: 285 square yards.
Cement used: 735 barrels.
Concrete placed: 635.5 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 10,800 acres.

Area irrigated season 1912: None to June 30.

Length irrigating season: From May 1 to September 30—153 days.

Average elevation of irrigable area: 3,850 feet above sea level.

Average annual rainfall on irrigable area: 16 inches (16.13 in 1911).

Range of temperature on irrigable area: -44° to 100° .

Character of soil of irrigable area: Principally rich, sandy loam; some gravelly loam and gumbo.

Principal products: Hay, grain, and vegetables.

Principal markets: Great Northern railroad towns from St. Paul to the Pacific coast.

LANDS OPENED TO IRRIGATION.

No lands have been opened to irrigation by public notice. All lands being irrigated are allotted to Indians.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys made in 1907.

Construction work on the Two Medicine unit begun July, 1908.

Surveys of Two Medicine Lake Dam begun in fall of 1909.

Construction of Two Medicine Lake Dam begun in July, 1911.

Location surveys of Badger unit begun in April, 1911.

Construction on Badger unit begun in June, 1911.

Two Medicine unit 64.8 per cent completed June 30, 1912.

Badger unit 18.9 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Blackfeet project provides for five irrigation systems on the Blackfeet Indian Reservation, as follows: (1) The Carlow Canal system, heading on the right bank of Cut Bank Creek and supplying water for 18,000 acres of land near Carlow and Seville; (2) the Cut Bank Canal System, heading on the left bank of Cut Bank Creek and supplying water for 20,000 acres of land north and east of the creek, 11,000 acres being outside the reservation; (3) the Two Medicine Canal system, diverting from the left bank of Two Medicine River and supplying water through the north branch canal, the Spring Lake Reservoir, and south branch canal to 48,000 acres of land; (4) the Badger Canal system, diverting water from the right bank of Badger Creek and supplying water direct through a feeder canal to 3,000 acres of land on Piegan Flats and through Four Horns Supply Canal and Reservoir to 33,000 acres of land between Badger and Birch Creeks; and (5) the Birch Creek Canal system, diverting from Birch Creek and supplying water to 3,500 acres of land between Birch and Blacktail Creeks. The irrigable lands of the project are located in general in the southeastern portion of the Blackfeet Indian Reservation, between Cut Bank and Birch Creeks.

Of the above plan the first development of the Two Medicine Canal system has been completed, including 36 miles of main canal with headworks and other structures, and a distributing system to deliver water to approximately 24,000 acres of land. On the Badger system 12 miles of the Four Horns Supply Canal and a small distributing system on Piegan Flats have been completed. Construction is in progress on Four Horns Supply Canal headworks, structures for the Piegan Flats distributing system, and upon Two Medicine Lake Dam. The Carlow, Cut Bank, and Birch Creek units remain to be constructed on completion of the Two Medicine and Badger units.

CONSTRUCTION DURING FISCAL YEAR.

Two Medicine unit.—During the fiscal year the excavation for lower Two Medicine Lake Dam was completed, cement and steel hauled to the dam site, the greater part of the pile driving completed, lumber for the dam sawed and hauled to the dam site, and all preparations made to complete the dam during 1912. On Two Medicine distributing system the main canal to 100 second-feet capacity and laterals to irrigate 24,000 acres were completed, 129 miles of laterals being built and approximately 800 small structures placed.

Badger unit.—The excavation of the Four Horns Feeder Canal was completed with the exception of about 3,000 yards of rock, and that for a distributing system on Piegan Flats to cover approximately 3,000 acres of land was nearly completed. A concrete headworks for the Piegan Canal was completed and work commenced on the headworks for Four Horns Supply Canal. All of the work has been done by Government forces, the excavation chiefly with Indian labor and teams.

OPERATION AND MAINTENANCE.

Practically no water has been delivered for irrigation, but there has been a flow the entire length of the main canal for several months. Most of the laterals have been primed, and it is possible to deliver water to any unit in an area of 24,000 acres.

FEATURE COSTS TO JUNE 30, 1912.

Storage works, Two Medicine Lake Reservoir:	
Examination surveys.....	\$3,030.47
Dam construction.....	48,139.08
	<hr/>
	\$51,169.55
Diversion works:	
Dam surveys, Two Medicine division.....	97.95
Canal headworks.....	17,041.77
Feeder canal headworks, Badger division.....	571.84
	<hr/>
	17,711.56
Canal system:	
Main Canal, division 1, Two Medicine division.....	251,072.04
Main Canal, division 2, Two Medicine division.....	54,564.67
South Canal, Two Medicine division.....	3,156.69
Feeder Canal, Badger division.....	96,243.49
Main Canal, Badger division.....	2,671.43
	<hr/>
	407,708.32
Lateral system:	
Main Canal, Two Medicine division.....	43,953.75
South Canal, Two Medicine division.....	2,170.22
Fisher Flats, Badger division.....	2,957.09
Piegan Flats, Badger division.....	13,529.58
	<hr/>
	62,610.64

Distributing reservoir and works:

Spring Lake Reservoir, Two Medicine division-----	\$1, 554. 91	
Four Horns Reservoir, Badger division-----	791. 65	
		\$2, 346. 56

Telephone line:

Construction-----	6, 322. 11	
Maintenance-----	362. 43	
		6, 684. 54

Roads and bridges: Construction----- 7, 262. 52

Buildings and grounds:

Construction-----	\$21, 241. 53	
Maintenance-----	731. 85	
		21, 973. 38

Administration of project as a whole----- 11, 061. 52

Examination of project as a whole:

Hydrography-----	\$3, 384. 69	
Surveys-----	3, 237. 10	
		6, 621. 79

Inventory of cost ledger supplies----- 1, 308. 75

Total building cost----- 596, 459. 13

MONTANA, FLATHEAD (INDIAN) PROJECT.

LOCATION.

Counties: Flathead, Missoula, Sanders.

Townships: 15 to 25 N., Rs. 17 to 25 W., Montana meridian.

Railroad: Northern Pacific.

Railroad stations: Evaro, Arlee, Ravalli, Dixon, and Perma, Mont.

WATER SUPPLY.

Source of water supply: Flathead, Jocko, and Little Bitter Root Rivers; Mud, Crow, Post, Mission, Dry, Finley, Agency, Big Knife, and Valley Creeks, and about 60 smaller streams.

Area of drainage basin: 8,000 square miles.

Annual run-off in acre-feet of Flathead River at Polson, 1908 to 1911: Mean, 8,420,000.

DATA FOR COMPLETE PROJECT.

Reservoirs: 16; aggregate area, 117,556 acres; aggregate capacity, 1,944,970 acre-feet, as follows:

Reservoir.	Area.	Capacity.	Length of spillway.	Elevation of spillway above stream bed.
	<i>Acres.</i>	<i>Acre-feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Big Draw-----	901	9, 330	100	25
Dog Lake-----	160	3, 200		30
Dry Fork-----	250	1, 918	100	25
Flathead Lake (Newell Dam)-----	107, 000	1, 800, 000	1, 000	180
Hubbart-----	480	20, 000	50	108
Kickinghorse-----	675	6, 800		23
Little Bitter Root Lake-----	3, 000	6, 000	20	3
Lower Crow Creek-----	300	9, 485	100	82
McConnell-----	100	2, 000		40
McDonald Lake-----	220	10, 600	200	51
Mission-----	300	3, 300	100	74
Ninepipe-----	1, 630	15, 100		30
Pablo-----	2, 100	29, 600		36
Polson-----	70	1, 700		80
St. Marys Lake-----	300	25, 000	50	52
Twin-----	70	937		25

Storage dams, as follows:

Storage dams.	Type.	Maximum height.	Length of crest.	Volume.
		<i>Feet.</i>	<i>Feet.</i>	<i>Cu. yds.</i>
Big Draw.....	Earth.....	35	3,600	137,000
Dog Lake.....	Loose rock and earth.....	35	2,250	67,000
Dry Fork.....	Earth.....	33	1,860	130,000
Hubbart.....	Loose rock and earth.....	118	450	302,000
Kickinghorse.....	Earth.....	31	3,700	181,000
Little Bitter Root Lake.....	do.....	10	300	4,000
Lower Crow Creek.....	do.....	92	860	330,000
McConnell.....	do.....	45	1,130	71,000
McDonald Lake.....	Loose rock and earth.....	57	1,500	214,000
Mission.....	do.....	80	2,500	346,000
Newell.....	Concrete.....	170	856	100,000
Ninepipe.....	Earth.....	38	2,180	162,000
Pablo.....	do.....	46	14,000	1,028,000
Polson.....	do.....	85	1,100	170,000
St. Marys Lake.....	Loose rock and earth.....	58	2,200	140,000
Twin.....	Earth.....	30	1,600	46,000

Diversion dams: Mainly log crib type, rock filled; dimensions not determined.

Length of canals: 14 miles with capacities greater than 300 second-foot; 82 miles with capacities from 50 to 300 second-foot; 800 miles with capacities less than 50 second-foot.

Tunnels: Aggregate length, 2,300 feet.

Water power: None developed. Possibility of developing about 300,000 horsepower from Flathead River and principal mountain streams.

Irrigable area: 152,000 acres, as follows: Jocko division, 16,000 acres; Mission division, 23,000 acres; Post division, 30,000 acres; Crow division, 14,000 acres; Pablo division, 40,000 acres; Polson division, 6,000 acres; Big Arm division, 3,000 acres; Little Bitter Root division, 15,000 acres; Camas division, 5,000 acres.

Present status of irrigable land: Entered under acts of Congress approved April 23, 1904, and May 29, 1908, 64,000 acres; open to entry, 8,000 acres; withdrawn from entry, none; State lands, 5,000 acres; private lands, 75,000 acres, mostly Indian allotments.

RESULTS TO JUNE 30, 1912.

Canals: 8½ miles with capacities from 301 to 800 second-foot; 61 miles with capacities from 50 to 300 second-foot; 201½ miles with capacities less than 50 second-foot.

Tunnels: 1; total length, 1,703 feet.

Storage dams: Volume, earth, 64,756 cubic yards.

Canal structures: Costing over \$2,000 each—Concrete, 16; wood, 1. Costing from \$500 to \$2,000 each—Concrete, 13; wood, 2. Costing from \$100 to \$500 each—Concrete, 26; wood, 91. Costing less than \$100 each—Wood, 540.

Bridges: Wood, 110 less than 50 feet in length; total length, 2,009 feet.

Culverts: Concrete, 6; length, 160 feet. Wood, 26; length, 420 feet.

Pipe laid: Concrete, 230 feet.

Flumes: Wood, 5; length, 3,700 feet.

Buildings: Offices, 5; residences, 21; barns and storehouses, 12.

Roads: 9 miles.

Telephone lines: 98 miles. Telephones in use, 17.

Material excavated: Class 1, earth, 1,509,193 cubic yards; class 2, indurated material, 88,447 cubic yards; class 3, rock, 21,633 cubic yards.

Riprap: 914 cubic yards.

Paving: 5,213 square yards.

Cement used: 4,747 barrels.

Concrete placed: 3,746 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912. 32,000 acres.

Area under water-right applications, season of 1912: 8,920 acres.

Length of irrigating season: May 1 to September 30—153 days.

Average elevation of irrigable area: 2,800 feet above sea level.

Average annual rainfall on irrigable area: 15 inches.

Range of temperature on irrigable area: -30° to 96° F.

Character of soil of irrigable area: Varies from light sandy loam to heavy clay.

Principal products: Grain, hay, apples, vegetables, small fruits, and cattle.

Principal markets: Missoula, Butte, Anaconda, and other mining and lumber towns and camps.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Proclamation of the President, May 22, 1909, opened lands to filing under certain rules as to registration, etc., first filing to be May 2, 1910.

Location of lands opened: Ts. 17 to 24 N., Rs. 19 to 24 W., Montana meridian.

Present status of irrigable area opened: About 64,000 acres have been entered; 8,000 acres open to entry; 75,000 acres in private ownership, mostly Indian allotments held by trust deed; 5,000 acres of State lands.

Limit of area of farm units: 160 acres. Average irrigable, about 40 acres.

Duty of water: Works will provide about 1.5 acre-feet per acre per annum at the farm.

Building charges: Not fixed.

Annual operation and maintenance charges: \$1 per acre-foot; minimum charge, \$1 per acre, 1911.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys made in 1907.

Construction authorized and first appropriation made by act of Congress approved April 30, 1908.

Construction of canals, Jocko division, begun May, 1909.

Construction of Newell Tunnel, Polson division, begun June, 1909.

Construction of Pablo Feeder Canal begun in 1910.

Construction of Kickinghorse Feeder Canal begun in 1911.

Kickinghorse Feeder Canal completed in 1912.

Per cent completed on June 30, 1912: Entire project, 15 per cent; Jocko division, 84 per cent; Mission division, 11.6 per cent; Post division, 34.7 per cent; Crow division, 3 per cent; Pablo division, 36.3 per cent; Polson division, 9.8 per cent; Big Arm division, 14.5 per cent; Little Bitter Root division, 0.4 per cent; Camas division, 0.6 per cent.

IRRIGATION PLAN.

The irrigation plan of the Flathead project provides for the irrigation of about 152,000 acres of land in various parts of what was the Flathead Indian Reservation, water being diverted from creeks and rivers rising in the Mission Mountains and conducted by canals directly to the land and to reservoirs for the storage of flood water. About 12 reservoirs will be constructed. Some of these are lakes the capacity of which will increase and others natural basins which will require only the building of embankments at low points. The water supply will be supplemented when necessary by pumping from Flathead Lake. Irrigable tracts on the Jocko, Mission, Post, Pablo, and Polson divisions, which contain the largest percentage of irrigable land allotted to the Indians, have been selected for the first development.

The following principal features have been completed: A distribution system covering approximately 5,000 acres of land north of the Jocko River, taking water from the Jocko River; a distribution system covering 6,000 acres on the south side of Jocko River, using the Finley, Agency, and Big Knife Creeks and Jocko River as water supply; Mission Lateral B, covering approximately 5,000 acres of

land between Mission and Post Creeks; a distribution system covering 16,000 acres of land lying under the Ninepipe Reservoir; and the Pablo Feeder Canal from Post Creek to the North Pablo Reservoir.

CONSTRUCTION DURING FISCAL YEAR.

Jocko division.—The Finley Creek system and lateral E from Jocko River, covering 4,500 acres of land on the south side of the Jocko River, were practically completed on June 30 and concrete headgates and wasteway constructed at East Finley Creek. About 20 miles of small ditches were built.

Mission division.—A construction camp to accommodate about 50 men was built at St. Marys Lake, a freight road $4\frac{3}{4}$ miles long was constructed from the camp to the edge of the timber, and a telephone line installed connecting the camp with headquarters, 10 miles distant. Surveys and investigation by test pits were made for the proposed tunnel into St. Marys Lake and for the proposed supply canal from Jocko River into the lake.

Post division.—The Kickinghorse Feeder Canal, $2\frac{1}{2}$ miles long and of 400 second-feet capacity, was completed and two inclined chute drops put in. The supply canal between Kickinghorse and Ninepipe Reservoirs has been excavated and the lateral system from Ninepipe Reservoir, covering approximately 16,000 acres, has been completed. About 60 miles of small ditches were constructed.

Pablo division.—Ten and a half miles of the Pablo Feeder Canal were excavated during the year, completing 28 of the proposed 39 miles, and concrete headgates and wasteways have been built at Mud, North Crow, South Crow, and Post Creeks. Controlling works at the South Pablo and North Pablo Dams were constructed and 4 miles of the feeder canal from the North Pablo Dam have been built. One and a half miles of supply canals between the reservoirs and 8 miles of Pablo Lateral A have also been completed. A quarry was opened during the winter to obtain rock for facing the Pablo Dams, and 1,835 cubic yards were quarried and hauled to the dam sites. It is expected that 20,000 cubic yards of rock will be quarried, hauled, and placed during the coming winter.

Polson division.—The excavation of Newell Tunnel was completed to the shaft, or a distance of 1,703 feet from the west portal. Work was stopped on January 1, 1912, and the camp closed.

OPERATION AND MAINTENANCE.

Irrigation began in 1910, 7,676 acre-feet of water being delivered to 1,071 acres in the Jocko division, and 2,260 acre-feet to 1,120 acres in the Mission division. No charge was made that year, as there was no operating department and water was delivered to Indian allotments only. In 1911, 4,470 acre-feet of water were delivered to 1,998 acres in the Jocko division; 321 acre-feet to 326 acres in the Mission division, and 46 acre-feet to 46 acres in the Post division. Early rains encouraged the farmers to do without irrigation until late in the season, when the crops were too far advanced to benefit from the water used.

For the season of 1912 water right applications have been received covering 8,920 acres. Water is being delivered on the Jocko division

by rotating different portions of the same laterals, on the Post division by rotation between different laterals, and on the Mission division by rotation of the entire system. The duty of water is estimated at 2 acre-feet per acre on the Jocko division and 1 acre-foot per acre on the Mission and Post divisions.

SETTLEMENT AND IRRIGATION.

Approximately all of the irrigable land not allotted to Indians has been homesteaded and many tracts have been filed on during the last year.

ESTIMATED COST OF CONTEMPLATED CONSTRUCTION.

<i>Jocko division:</i>		
Jocko River storage-----	\$100,000	
Lateral system for 5,000 acres-----	30,000	
		\$130,000
<i>Mission division:</i>		
St. Marys Lake Tunnel-----	35,000	
St. Marys Lake Dam-----	50,000	
St. Marys Lake Feeder Canal-----	55,000	
Mission Reservoir-----	180,000	
Lateral system for 18,000 acres-----	100,000	
		420,000
<i>Post division:</i>		
McDonald Lake storage-----	120,000	
Kickinghorse Reservoir-----	110,000	
Ninepipe Reservoir (to complete)-----	35,000	
Lateral system for 10,000 acres-----	75,000	
Moiese Valley system-----	65,000	
Lower Crow Reservoir-----	200,000	
		605,000
<i>Crow division:</i> Lateral system for 14,000 acres-----		110,000
<i>Pablo division:</i>		
Pablo Feeder Canal to Dry Creek-----	\$60,000	
Completion of Pablo Reservoirs-----	600,000	
Lateral system for 32,000 acres-----	250,000	
Portion of expense Newell Tunnel and power plant----	150,000	
		1,060,000
<i>Polson division:</i>		
East Lake Canal-----	60,000	
Polson Reservoir-----	100,000	
Pumping plant-----	60,000	
Lateral systems-----	30,000	
		250,000
<i>Big Arm division:</i>		
Pumping and power plant-----	60,000	
Lateral system for 3,000 acres-----	20,000	
		80,000
<i>Little Bitter Root division:</i>		
Little Bitter Root Lake storage-----	10,000	
Hubbart Reservoir-----	150,000	
Big Draw Reservoir-----	80,000	
Lateral system for 15,000 acres-----	150,000	
		390,000
<i>Camas division:</i>		
Dog Lake storage-----	50,000	
System of canals for 5,000 acres-----	50,000	
		100,000
		3,145,000

FEATURE COSTS TO JUNE 30, 1912.

Headquarters:		
Buildings and grounds-----	\$9, 060. 77	
Telephone system -----	8, 366. 88	
		\$17, 427. 65
Jocko division :		
Survey and design-----	22, 910. 35	
Canal system—		
Excavation -----	63, 377. 99	
Structures-----	14, 378. 61	
Headworks-----	6, 075. 06	
Lateral system—		
Excavation -----	14, 755. 14	
Structures-----	4, 282. 90	
Buildings and grounds, construction-----	3, 301. 15	
Bridges and roads-----	706. 98	
Gaging streams-----	2, 724. 68	
		132, 512. 86
Mission division :		
Survey and design-----	19, 278. 04	
Canal system—		
Excavation -----	12, 778. 85	
Structures-----	1, 235. 06	
Headworks-----	4, 490. 44	
Lateral system—		
Excavation -----	1, 796. 71	
Structures-----	1, 751. 15	
Buildings and grounds, construction-----	3, 905. 61	
Bridges and roads-----	8, 422. 07	
Gaging streams-----	1, 787. 21	
Storage works—		
St. Marys Lake Dam-----	1, 167. 33	
St. Marys Lake Reservoir shaft-----	1, 133. 44	
St. Marys Lake Tunnel-----	4, 733. 91	
McConnell Reservoir-----	425. 43	
		62, 905. 25
Polson division :		
Survey and design-----	6, 908. 16	
Canal system—		
Excavation -----	5, 523. 48	
Structures-----	76. 85	
Buildings and grounds, construction-----	8, 888. 26	
Bridges and roads—		
Power-plant road-----	1, 486. 89	
Shaft-camp road-----	1, 719. 31	
Roads, general-----	132. 47	
Gaging streams-----	1, 549. 74	
Storage works, reservoir-----	1, 356. 62	
Newell Tunnel—		
Sinking shaft-----	4, 461. 76	
Driving tunnel-----	77, 790. 78	
Dam-----	352. 68	
Power-plant construction-----	9, 116. 89	
Pumping station, plant construction-----	805. 12	
		120, 169. 01
Little Bitter Root division: Survey and design-----		3, 110. 61
Camas division: Survey and design-----		469. 61
Post division :		
Survey and design-----	\$42, 139. 46	
Canal system—		
Excavation -----	76, 832. 87	
Structures-----	15, 875. 05	
Headgates-----	16, 318. 08	
Lateral system, construction excavation-----	8, 157. 33	
Buildings and grounds, construction-----	231. 89	
Bridges and roads-----	6, 251. 96	

Post division—Continued.

Gaging streams-----	\$1,322.24	
Storage works—		
Lands submerged-----	535.78	
Dam-----	39,300.92	
Reservoir-----	545.44	
Outlet-----	11,772.92	
		\$219,283.94
Crow division: Survey and design-----		8,540.90

Pablo division:

Survey and design-----	\$46,876.61	
Canal system—		
Excavation-----	198,281.58	
Structures-----	22,442.47	
Headworks-----	4,703.57	
Lateral system—		
Excavation-----	10,685.60	
Structures-----	7,360.49	
Storage works—		
Dam-----	55,957.26	
Reservoir-----	12,723.42	
Buildings and grounds, construction-----	5,809.74	
Bridges and roads-----	7,184.11	
Gaging streams-----	335.67	
		372,360.52

Operation and maintenance (during construction):

Operation-----	5,308.00	
Maintenance-----	691.61	
Betterments-----	2,149.06	
		8,148.67
Inventory of cost-ledger supplies-----		1,692.45

Total building and operation and maintenance cost (during construction)-----	946,621.47
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MONTANA, FORT PECK (INDIAN) PROJECT.

LOCATION.

County: Valley.

Townships: 26 to 33 N., Rs. 40 to 55 E., Montana meridian.

Railroad: Great Northern.

Railroad stations: Wiota, Kintyre, Frazer, Oswego, Lohmiller, Wolf Point.

Macon, Chelsea, Poplar, Sprole, Brockton, Calais, and Blair, Mont.

WATER SUPPLY.

Source of water supply: Missouri and Poplar Rivers; Big Porcupine, Little Porcupine, Wolf, Smoke, and Big Muddy Creeks.

Area of drainage basins: Missouri River, 85,000 square miles; Poplar River, 3,000 square miles.

Annual run-off in acre-feet (1909-1911): Poplar River near Poplar—mean, 48,000; Big Porcupine Creek at Nashua—mean, 13,300; Little Porcupine Creek near Frazer—mean, 4,000; Wolf Creek at Wolf Point—mean, 5,600; Big Muddy near Culbertson—mean, 16,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

LITTLE PORCUPINE UNIT.

Storage reservoir: Area, 390 acres; capacity, 3,900 acre-feet.

Storage dam: Type, earth with brush mattress on slopes; volume, 32,600 cubic yards of earth; 9,400 square yards brush mattress.

Diversion dam: Little Porcupine—Type, concrete weir on rock-filled timber crib base; maximum height, 4 feet; length, 150 feet.

Length of canals: 1 mile with capacity from 50 to 300 second-feet; 13 miles with capacity of less than 50 second-feet.

Irrigable area: 2,000 acres.

POPLAR RIVER UNIT.

Diversion Dam B Canal: Type, concrete weir on rock-filled timber crib base; maximum height, 4 feet; length, 300 feet.

Length of canal: 11 miles with capacity over 50 second-feet; 22 miles with capacity less than 50 second-feet.

Poplar River C Canal: 5 miles of canal with capacity of 100 second-feet.

Dike: Length, 700 feet.

Irrigable area: 28,000 acres.

BIG PORCUPINE UNIT.

Diversion dam: Dimensions not determined.

Length of canal: 7 miles, 70 second-feet capacity.

Irrigable area: 4,000 acres.

BIG MUDDY UNIT.

Storage reservoirs: Wolf Creek, capacity, 4,550 acre-feet; Smoke Creek, capacity, 5,300 acre-feet.

Storage dams: Wolf Creek—Type, earth; contents, 85,300 cubic yards.

Smoke Creek—Type, earth; contents, 75,600 cubic yards.

Diversion dams: 3; dimensions not determined.

Irrigable area: 16,000 acres.

MISSOURI RIVER UNIT.

Headworks on Missouri River.

Length of canal: 100 miles with capacity of 625 second-feet at headworks.

Siphon: Under Milk River, 500 feet long.

Irrigable area: 84,000 acres.

Distribution system: First development to irrigate 60,000 acres; final development, 24,000 acres additional.

GALPIN BOTTOM PUMPING UNIT.

Location irrigable areas: Ts. 26 and 27 N., Rs. 41 and 42 E.

Proposed works: Pumping equipment for 20-foot lift with canals and distribution system to cover irrigable area of 10,000 acres.

MILK RIVER PUMPING UNIT.

Location of irrigable areas: Ts. 26 and 27 N., Rs. 42, 43, and 44 E.

Proposed works: Pumping plant to lift water from 10 to 20 feet out of Missouri River Gravity Canal and distribution system for irrigable area of 8,000 acres.

ENTIRE PROJECT.

Irrigable area: 152,000 acres.

Present status: Practically all lands in Indian reservation and chiefly allotted to Indians.

RESULTS TO JUNE 30, 1912.

Canals: 17 miles with capacities from 50 to 300 second-feet; 35 miles with capacities less than 50 second-feet.

Storage dams: Volume, 34,000 cubic yards of earths.

Diversion dams: 2; 450 feet long, 4-foot concrete weirs; volume, 407 cubic yards of concrete.

Canal structures: Concrete—7 costing over \$2,000 each; 2 costing from \$500 to \$2,000 each; 3 costing less than \$500 each.

Bridges: Combination, 1; length, 38 feet; wood, 2; total length, 60 feet.
Buildings: Offices, 1; residences, 5; barns and storehouses, 5.
Material excavated: Class 1, earth, 400,000 cubic yards.
Cement used: 913 barrels.
Concrete placed: 936 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season 1912: Little Porcupine unit, 2,000 acres; Poplar River unit, 5,000 acres.
Area irrigated, season 1912: None to June 30.
Length of irrigating season: From April 1 to August 15—137 days.
Average elevation of irrigable area: 2,000 feet above sea level.
Average annual rainfall on irrigable area: 13 inches.
Range of temperature on irrigable area: -40° to 100° F.
Character of soil of irrigable area: Heavy clay and loam.
Principal products: Hay, grain, and vegetables.
Principal markets: Local.

LANDS OPENED FOR IRRIGATION.

Pending the opening of the reservation the area to be furnished with water consists of the Indian allotments. The work of allotting has been practically completed and the areas allotted in each unit are as follows: Big Porcupine, 2,420 acres; Little Porcupine, 2,025 acres; Missouri Gravity Canal, 64,480 acres; Poplar River, 8,400 acres; Big Muddy, 13,360 acres.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys made in 1908.
Construction work on Little Porcupine unit begun September, 1909.
Construction work on Poplar River system begun September, 1910.
Little Porcupine unit 98 per cent completed June 30, 1911.
All construction work on project discontinued temporarily July 31, 1911.

IRRIGATION PLAN.

The irrigation plan of the Fort Peck project provides, in so far as the water supply is found sufficient, for the irrigation of lands in various parts of the Fort Peck Indian Reservation and adjacent territory, as follows: (1) 4,000 acres in the vicinity of Wiota Station, with flood water supply from the Big Porcupine Creek; (2) 2,000 acres in the vicinity of Frazer, with water supply from Little Porcupine Creek, conserved by storage; (3) 28,000 acres in the vicinity of Poplar and extending along Poplar River a distance of about 35 miles, with water supply from Poplar River, conserved by storage below the forks of Poplar River and West Branch; (4) 16,000 acres lying along the west side of Big Muddy Creek, with water supply from Big Muddy Creek, conserved by storage on Smoke and Wolf Creeks; (5) 50,000 acres of clear bench land and approximately 34,000 acres of brush and timber land extending along the Missouri River, with water supply from the Missouri River by a gravity canal heading near the site of old Fort Peck; (6) 10,000 acres known as the Galpin Bottom, lying above the Missouri River Canal west of Milk River and the Fort Peck Indian Reservation, with water supply by pumping from the Missouri River Gravity Canal, with a lift of about 20 feet; (7) 8,000 acres lying above the Missouri River Canal, east of Milk River, in the Fort Peck Indian Reservation, with water supply by pumping from the Missouri River Gravity Canal, with a lift of from 10 to 20 feet.

The features of the above irrigation plan which have been completed are the Little Porcupine unit to irrigate 2,000 acres and the first division of the Poplar River unit to irrigate 5,000 acres of land.

CONSTRUCTION DURING FISCAL YEAR.

Little Porcupine unit.—This unit, construction on which was begun in September, 1909, was completed during July, 1911.

Poplar River unit.—Construction of the first two divisions of this unit, consisting of the B or West Side Canal and the C or East Side Canal, was begun in September, 1910. The B Canal and half of the laterals and structures were completed at the end of the fiscal year 1911, and work on the C Canal was in progress and continued until July 31, 1911, when all work was discontinued because the appropriation was exhausted and no allotment had been made for continuing the work.

FEATURE COSTS TO JUNE 30, 1912.

Survey and designing:		
Galpin division	\$2, 973. 34	
Milk River division	3, 296. 20	
Frazer division	4, 532. 63	
Oswego division	3, 850. 14	
Wolf Point division	2, 996. 08	
Chelsea division	2, 605. 79	
Poplar division	3, 316. 72	
Big Muddy division	112. 33	
		\$23, 683. 23
Camps:		
Construction	1, 516. 78	
Maintenance	1, 180. 94	
		2, 697. 72
Water supply, Oswego division		850. 67
Stream gauging:		
Galpin division	\$74. 04	
Milk River division	110. 93	
Frazer division	110. 95	
Oswego division	508. 75	
		804. 67
Tunnels:		
No. 1, Frazer division (preliminary expense)	1, 029. 72	
No. 2, Frazer division (preliminary expense)	1, 032. 30	
		2, 062. 02
Little Porcupine unit:		
Survey and design	2, 396. 86	
Diversion dam and head gates	7, 640. 45	
Feeder canal	5, 228. 07	
Crossing under Great Northern Railway	4, 407. 15	
Small embankments	2, 779. 92	
Large embankments	6, 283. 31	
Outlet structures, concrete	2, 555. 63	
Distributing system (excavation and structures)	20, 384. 69	
		51, 676. 08
Poplar River unit:		
Survey and designing	3, 580. 13	
Poplar River Dam	8, 341. 43	
Canal B, head gates	1, 763. 51	
Canal B, excavation	34, 818. 66	
Canal B, structures	6, 270. 05	
Canal B, distributaries	9, 290. 58	
Canal B, distributary structures	3, 916. 93	
Canal C, head gates	1, 976. 85	

Poplar River unit—Continued.

Canal C, excavation-----	\$34, 274. 64	
Canal C, structures-----	22. 50	
Canal C, distributaries-----	55. 04	
Camp maintenance-----	3, 074. 11	
Buildings and grounds-----	4, 058. 15	
Stream gaging-----	771. 52	
		\$112, 214. 10
Administration of project as a whole: General expense-----		2, 817. 31
Inventory of cost ledger supplies-----		96. 07
		<hr/>
Total building cost-----		196, 901. 87
Operation and maintenance cost-----		188. 89
		<hr/>
Total building and operation and maintenance cost-----		197, 090. 76

MONTANA, HUNTLEY PROJECT.**LOCATION.**

County: Yellowstone.

Townships: 2 and 3 N., Rs. 27 to 31 E., Montana meridian.

Railroads: Northern Pacific; Chicago, Burlington & Quincy.

Railroad stations: Huntley, Osborn, Worden, Newton, Pompeys Pillar, Bull Mountain, Ballantine, and Anita, Mont.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre-feet of Yellowstone River at Huntley (12,000 square miles), 1904 to 1911: Maximum, 7,040,000; minimum, 4,590,000; mean, 5,840,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoir: High Line Equalizing Reservoir; capacity, 853 acre-feet.

Dam: High Line Reservoir; volume, 151,000 cubic yards of earth.

Length of canals: 10 miles with capacities greater than 300 second-feet; 19 miles with capacities from 50 to 300 second-feet; 273 miles with capacities less than 50 second-feet.

Tunnels: 3; aggregate length, 2,654 feet.

Water power: Estimated total, 600 horsepower; 286 net horsepower developed.

Irrigable area: Entire project, 32,405 acres.

Present status of irrigable land: Entered subject to the reclamation act, 23,321 acres; open to entry, 2,292 acres; in private ownership, 3,192 acres; withdrawn from entry, 3,600 acres.

RESULTS TO JUNE 30, 1912.

Canals: Completed.

Tunnels: Completed.

Canal structures: 24, costing over \$2,000 each; 30, costing from \$500 to \$2,000 each; 2,380 costing less than \$500 each.

Bridges: Combination; 135 less than 50 feet in length; total length, 2,040 feet.

Culverts: Concrete, 20; length, 600 feet. Wood, 230; length, 6,000 feet.

Pipe laid: Concrete, 2,100 feet; steel, 270 feet.

Flumes: Concrete, 1; length, 85 feet. Steel, 3; length, 1,150 feet. Wood, 20; length 2,285 feet.

Buildings: Offices, 1; residences, 11; pumping station, 1; barns and store-houses, 11.

Wells: 2; aggregate depth, 225 feet.
 Telephone lines: 23 miles. Telephones in use, 9.
 Material excavated: Class 1, earth, 1,638,795 cubic yards; class 2, indurated material, 22,190 cubic yards; class 3, rock, 12,600 cubic yards.
 Riprap: 880 cubic yards.
 Paving: 220 square yards.
 Cement used: 16,230 barrels.
 Concrete placed: 12,175 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1912: 28,805 acres.

Area under water-right applications, season of 1912: 23,744 acres.

Length of irrigating season: From May 1 to September 30—153 days.

Average elevation of irrigable area: 3,000 feet above sea level.

Average annual rainfall on irrigable area: For 6 years, 12.19 inches; for the calendar year 1911 it was 14.32 inches.

Range of temperature on irrigable area: -35° to 100° .

Character of soil of irrigable area: Ranges from heavy clay to light sandy loam.

Principal products: Alfalfa, oats, barley, potatoes, and sugar beets.

Principal markets: Billings, Mont.; St. Paul and Minneapolis, Minn.; Denver, Colo.; Kansas City, Mo.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: May 21, 1907; March 3, 1909; March 13, 1912.

Location of lands opened: Ts. 2 and 3 N., Rs. 27 to 31 E., Montana meridian.

Present status of irrigable lands opened: 23,321 acres entered subject to the reclamation act; 2,292 acres open to entry; 3,192 acres in private ownership.

Limit of area of farm units: 160 acres.

Duty of water: $2\frac{1}{2}$ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$30. Additional charge of \$4 per acre to Indians.

Annual operation and maintenance charge: \$0.60 per acre of irrigable land for season 1911; \$1 per acre of irrigable land for season 1912.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1904.

Construction recommended by board of engineers, February 26, 1905.

Construction authorized by Secretary, April 18, 1905.

First irrigation by Reclamation Service, season 1908.

Main unit completed in 1908.

Entire project 96 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Huntley project provides for the diversion of water from the south side of the Yellowstone River about 2 miles above Huntley, Mont., into a main canal which extends down the valley about 27 miles to a point 2 miles east of Bull Mountain. The greater portion of the water is distributed by gravity. Fourteen miles below the headgates a pumping plant is installed, and a small portion of the water is lifted 45 feet into a high-line canal which will feed the proposed High-Line Equalizing Reservoir. The high-line and reservoir line canals serve about 5,160 acres of land above the main canal in the vicinity of Ballantine, Anita, and Pompeys Pillar. The pumping plant is a reenforced concrete building containing two pumping units each with a capacity of 28 second-feet and each comprising a turbine water wheel directly connected with a centrifugal pump by means of a vertical shaft. Two hundred and eighty-six net horsepower is developed by a 34-foot drop in the main canal.

The proposed high-line canal reservoir will be located 7 miles below the intake of the high-line canal and will have a storage capacity of 853 acre-feet, created by throwing an earthen dam containing 151,000 cubic yards of material across the mouth of a coulee in the vicinity of Anita, Mont. The water stored in the equalizing reservoir will insure at all times an adequate supply to the reservoir line canal, which at present is fed direct from the high-line canal by a 34-foot concrete drop. During the present season the main canal is being utilized for irrigation purposes only as far as Lost Boy Creek and the high-line canal as far as the reservoir site. Practically all proposed construction with the exception of the reservoir was completed at the end of the fiscal year 1912.

CONSTRUCTION DURING FISCAL YEAR.

Extension of canals.—At the end of the fiscal year 1912 the construction of the extension of the project was completed, with the exception of a few minor structures, which will require only a few days for completion. The main canal was extended $8\frac{1}{2}$ miles to a point about 2 miles east of Bull Mountain, on the Northern Pacific Railway. This extension covers approximately 1,800 acres along the south bank of the Yellowstone River, all of which will be irrigated by gravity. The high-line canal, which was extended for a distance of 5.8 miles, and the 9-mile reservoir line canal, together cover about 1,800 acres in the lower part of Fly Creek Valley and on the bench immediately above the main canal adjacent to Pompeys Pillar. Water will be delivered by gravity to farms served by these canals, and only a few distributaries will be necessary.

Drainage work.—The construction of tile drains for the relief of the Ballantine seepage area was started June 1, 1912. At the close of the fiscal year 2,500 linear feet of this work had been completed, and about 6,200 linear feet remains to be laid. Plans were prepared and material delivered for the construction of a tile drain in the vicinity of Newton.

OPERATION AND MAINTENANCE.

The project was thrown open to entry in July, 1907, water being first distributed for irrigation purposes in June, 1908. During this season delivery was made to 200 farm units, 4,100 acres of which were under cultivation. The operating season of 1909 opened in May, and water was delivered to 8,500 acres of land, or approximately one-half the total acreage filed upon. Crops were progressing favorably up to July 27, when a severe hail storm occurred, which damaged the crops to an estimated amount of \$50,000. The season closed on October 1, water having been delivered to 300 farm units. On April 27, 1910, the irrigation season opened and water was delivered to 350 farms, with a total acreage under cultivation of 8,000 acres. The results of the season were very satisfactory. Water was turned out of the canal on October 1. The entire canal system on the first unit of the project was in operation during the season of 1911, from May 6 to September 30. Approximately 22,550 acre-feet of water was delivered to 428 farm units, aggregating 12,000 acres. During the summer indications of seepage appeared in many places. Near

Ballantine and Newton there were two waterlogged areas of about 160 acres each, while seepage appeared on 40 other farm units in areas varying from one-half to ten acres. During October and November subsurface investigations were made over the two largest tracts to locate tile drains. For the relief of the Ballantine area 7,000 linear feet of the main canal was lined with clay. The cost of operating for the year 1911 was \$5,061.64, and of maintenance \$27,265.21.

In 1912 maintenance work consisted of making repairs, betterments, etc., and cleaning canals. The operating season opened May 10 and water was delivered under a seven-day rotation scheme. There are about 16,300 acres of land under cultivation this season, embraced within approximately 500 farm units.

SETTLEMENT AND IRRIGATION.

The population of the project at the present time is approximately 2,000. The towns of Huntley, Ballantine, and Pompeys Pillar are growing gradually, and Worden is making rapid progress. During the fiscal year 66 new farm units were entered, amounting to 2,673 irrigable acres, and on June 30, 530 farm units, aggregating 23,321 irrigable acres, had been entered subject to the reclamation act, and water-right applications had been received covering 384 irrigable acres in private ownership.

The principal crops raised during the season of 1911 were alfalfa, grain, and sugar beets, old alfalfa averaging 3.7 tons per acre, with a maximum yield of 9 tons per acre. The sugar-beet crop was the most profitable, with an average return of \$60 per acre, the maximum yield being 24 tons per acre. The total estimated valuation for the year, including crop returns, stock sold, and stock on hand, was \$573,600.

The crop returns for the past two years are shown in the following statement:

Acreage and value of crops.

Crops.	Acreage.		Value.		Average value per acre.	
	1910	1911	1910	1911	1910	1911
Alfalfa.....	1,468	2,678	\$40,000	\$56,644	\$27.25	\$21.15
Hay and forage.....		1,354		9,196		6.79
Grain.....	3,629	3,747	43,000	55,081	11.85	14.70
Sugar beets.....	1,400	3,062	87,416	183,168	62.44	59.82
Vegetables.....	286	261	17,160	12,668	60.00	48.53

FEATURE COSTS TO JUNE 30, 1912.

Main canal and high-line canal:

Excavation.....	\$381,077.79	
Structures.....	87,059.37	
Railroad bridges and culverts.....	5,467.08	
		\$473,604.24

Distributing system:

Earthwork and structures.....	237,866.64	
Pumping plant, 34-foot drop, main canal.....	71,522.30	
Pryor Creek improvement.....	19,297.79	
		328,686.73

Canal extension.		
Surveys	\$10,548.62	
Camps, construction	1,424.53	
Contract No. 410 (earthwork)	38,629.93	
Contract No. 413 (structures)	31,017.45	
		\$81,620.53
Real estate (rights and property), land purchased	1,029.72	
Telephone line, construction	9,041.01	
Buildings and grounds, construction	17,745.03	
Supplemental construction	6,149.19	
Inventory of building cost (ledger supplies)	158.10	
		34,123.05
Total building cost		918,034.55

OPERATION AND MAINTENANCE.

Main canal	\$37,406.59	
Lateral system	108,654.62	
Structures	4,210.16	
Pumping plant	9,362.06	
Buildings and grounds	2,874.47	
Telephone system	344.38	
Demonstration farm	2,261.97	
Earthwork, Pryor Creek embankment	1,459.91	
Drainage investigations	1,696.47	
Drainage trenches, contract No. 452	5,226.36	
Drainage and seepage	5,686.21	
Undistributed expense	687.30	
		179,870.50
Inventory of operation and maintenance cost (ledger supplies)		342.39
Total operation and maintenance cost		180,212.89
Total building and operation and maintenance cost		1,098,247.44

MONTANA, MILK RIVER PROJECT.

LOCATION.

Counties: Teton, Hill, Blaine, and Valley.

Townships: 34 to 37 N., R. 14 W.; 34 N., R. 15 W.; 37 N., Rs. 11 to 13 W.; 27 to 33 N., Rs. 17 to 42 E., Montana meridian.

Railroads: Great Northern and Canadian Pacific.

Railroad stations and population, 1910: Browning;¹ Havre, 3,624; Chinook, 780; Harlem, 383; Dodson;¹ Malta, 433; Saco, 200;¹ Hinsdale, 173;¹ Glasgow, 1,158; and Nashua, 50;¹ Montana; Cardston and Woolford, Canada.

WATER SUPPLY.

Source of water supply: St. Mary Lakes, Swift Current Creek, and Milk River.

Area of drainage basin: St. Mary Lakes and Swift Current Creek, 292 square miles; Milk River at Havre, 5,050 square miles; Milk River at Malta, 10,700 square miles; Milk River at Hinsdale, 17,300 square miles.

Annual run-off in acre-feet of Milk River: At Havre (5,050 square miles), 1898 to 1911—Maximum, 424,000; minimum, 17,400; mean, 216,000. At Malta (14,000 square miles), 1903 to 1911—Maximum, 675,000; minimum, 29,400; mean, 296,000. At Hinsdale (17,300 square miles), 1909 to 1911—Maximum,

¹ Unincorporated, population not available.

599,000; minimum, 228,000; mean, 436,000. Of St. Mary River: At Babb (177 square miles), 1902 to 1911—Maximum, 535,000; minimum, 305,000; mean, 422,000. At international line (452 square miles), 1903 to 1911—Maximum, 1,220,000; minimum, 511,000; mean, 764,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: St. Mary Lakes—Area, 6,910 acres; capacity, 124,000 acre-feet (by dredging between lakes); length of spillway, 500 feet; elevation of spillway, 20 feet above water surface of the natural lake. McDermott Lakes—Height of dam not determined; probable area, 540 acres; capacity, 10,000 acre-feet; length of spillway, probably 100 feet; elevation of spillway, 25 feet above the water surface of the natural lake. Sherburne Lakes—Height of dam not determined; capacity about 30,000 acre-feet. Red Eagle Lakes—Height of dam, area, etc., not determined; capacity, probably about 5,000 acre-feet. Nelson Reservoir—Area, 6,380 acres; capacity, 141,815 acre-feet; no spillway.

Storage dams: St. Mary Lakes—Type, earth fill; maximum height, 32 feet; length of crest, 2,700 feet; volume, 135,000 cubic yards. McDermott Lakes—Type, rubble masonry (probably); maximum height, 30 feet; length of crest, 650 feet; volume not determined. Sherburne Lakes—Type, earth fill; height not determined. Red Eagle Lake—Type, rubble masonry (probably); height not determined. Nelson Reservoir—Type, earth fill; maximum height, 33 feet; length of crest, 15,135 feet; volume, 911,540 cubic yards.

Diversion dams: Swift Current Creek—Type, earth fill backed by rock-filled timber crib; length, 2,800 feet; maximum height, 13 feet. Chinook—Type and length not determined. Dodson—Rock-filled timber crib, with automatic crest; maximum height, 26 feet; length, 318 feet 7 inches. Vandalia—Type, reinforced concrete; height, 27 feet; length, 248 feet.

Length of canals: St. Mary Canal—Length, 28.8 miles; capacity, 850 second-feet. Chinook division not determined. Dodson division—44 miles with capacities greater than 800 second-feet; 110 miles with capacities from 50 to 300 second-feet; 190 miles with capacities less than 50 second-feet. Glasgow division—40 miles with capacities from 50 to 300 second-feet; 60 miles with capacities less than 50 second-feet.

Pressure pipes: There will be a double-barrel 7½-foot steel pipe across the St. Mary River of total length 3,300 feet, operating under a pressure head of 160 feet; a double-barrel 6½ foot steel pipe across Halls Coulee, of total length 1,500 feet, operating under a pressure head of 95 feet; and a 10-foot concrete pipe of total length 200 feet, operating under a pressure head of 10 feet.

Water power: For construction purposes, power plant of 800 kilowatts capacity.

Aggregate length of dikes: Dodson division (constructed), 22,700 feet.

Irrigable area: Entire project, 219,557 acres (Dodson division, first unit works completed for 7,800 acres).

Present status of irrigable land: 43,700 acres entered subject to reclamation act; 28,300 acres public lands unentered; 8,700 acres State lands; 108,857 acres in private ownership; 30,000 acres Indian lands.

RESULTS TO JUNE 30, 1912.

ST. MARY STORAGE.

Bridges: Wood, 2 more than 50 feet in length; 6 less than 50 feet in length; total length, 200 feet.

Buildings: Offices, 2; residences, 4; barns and storehouses, 4; sawmill, 1.

Roads: 65 miles.

Telephone lines: 25 miles. Telephones in use, 4.

Material excavated: Class 1, earth, 275,441 cubic yards; class 2, indurated material, 4,681 cubic yards; class 3, rock, 51,078 cubic yards.

DODSON DIVISION.

Canals: 8 miles with capacities more than 800 second-feet; 12 miles with capacities from 50 to 300 second-feet; 20 miles with capacities less than 50 second-feet.

Waste water ditches and drains: 6.5 miles.

Diversion dams: Volume—Masonry, 163 cubic yards; earth, 5,900 cubic yards; rock fill and crib, 16,713 cubic yards.

Dikes or levees for protection from overflow: Total length, 22,700 feet; volume, 119,500 cubic yards.

Canal structures: Concrete—6, costing over \$2,000 each; 3, costing from \$500 to \$2,000 each. Wood—16, costing from \$100 to \$500 each; 210, costing less than \$100 each.

Bridges: Steel—1 over 50 feet in length; 1 less than 50 feet in length; total length, 115 feet. Wood—1 over 50 feet in length; 24 less than 50 feet in length; total length, 604 feet.

Culverts: Concrete—1; length, 518 feet.

Flumes: Wood—8; length, 522 feet.

Buildings: Mess houses, 3; bunk houses, 6; barns and storehouses, 5.

Wells: 1; depth, 41 feet.

Roads: 2 miles.

Telephone lines: Rented. Telephones in use, 6.

Material excavated: Class 1, earth, 921,371 cubic yards; class 2, indurated material, 7,438 cubic yards; class 3, rock, 4,411 cubic yards.

Riprap: 5,707 cubic yards.

Paving: 1,443 square yards.

Cement used: 2,252.5 barrels.

Concrete placed: 1,710.3 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1912: 7,800 acres.

Area under rental contracts, season of 1912: 350 acres.

Length of irrigating season: From March 1 to September 15—185 days.

Average elevation of irrigable area: 2,200 feet above sea level.

Average elevation of St. Mary storage: 4,500 feet above sea level.

Average annual rainfall on irrigable area: For 29 years at Havre, 13.63 inches; for 6 years at Malta, 13.33 inches; 1911 at Malta, 18.30 inches.

Average annual rainfall on St. Mary storage: About 24 inches (Teton County), including the snow equivalent.

Range of temperature on irrigable area: -50° to 103° F.

Character of soil of irrigable area: Sandy loam and gumbo.

Principal products: Alfalfa, hay, grain, and vegetables.

Principal markets: Minneapolis and St. Paul, Minn.; local.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. Two thousand and seventy-four acres were irrigated under rental contracts in 1911 and 350 acres in 1912.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun by the Reclamation Service in 1902.

Construction recommended by director March 7, 1903.

Construction authorized by Secretary March 14, 1903.

Construction of St. Mary storage unit recommended by board of engineers September 19, 1904.

Construction of St. Mary storage unit authorized by Secretary March 25, 1905.

Construction begun July 27, 1906.

Dodson Diversion Dam completed in January, 1910.

Treaty with Great Britain relating to distribution between Canada and the United States of the waters of St. Mary and Milk Rivers signed January 11, 1909, and proclaimed May 13, 1910.

Vested water-right contract executed May 1, 1912.

Recommendations covering construction of the project approved by Secretary June 12, 1912.

First unit under Dodson South Canal 85 per cent completed June 30, 1912.

Entire project 12 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Milk River project provides for the storage of water in St. Mary Lakes by means of a dam at the outlet of Lower St. Mary Lake and its diversion through a canal 28.8 miles long, heading 1 mile below the reservoir and discharging into the North Fork of Milk River, thence flowing through Canada for 100 miles or more and returning to the United States; the storage of water in Nelson Reservoir, south of Milk River and 14 miles northeast of Malta; the discharge of stored water into Milk River as required; the diversion of water from Milk River by dams near Chinook into four canals, two on each side of the river, for the irrigation of lands near Chinook and Harlem, comprising the Chinook division; the diversion of water from Milk River by a dam near Dodson into two canals, the north side canal irrigating lands near Dodson, Wagner, and Malta, and the south side canal conveying water to Nelson Reservoir and irrigating lands near Wagner, Malta, Bowdoin, and Ashfield; the irrigation of lands on both sides of Milk River in the vicinity of Saco and Hinsdale from the stored waters of Nelson Reservoir, comprising the Malta division; and in the Glasgow division the diversion of water at Vandalia Dam into a canal on the south side of Milk River for the irrigation of lands near Tampico, Glasgow, and Nashua. In case the normal flow of Milk River at Vandalia Dam is not sufficient for the irrigation of lands in the Glasgow division, the stored waters in Nelson Reservoir will be returned to Milk River and diverted again at Vandalia Dam.

The features of the above irrigation plan which have been completed are: The Dodson Diversion Dam to the height of the fixed crest; Dodson Canal headworks; 8 miles of the Dodson South Canal, which will ultimately be 44 miles in length; Point of Rocks Equalizing Reservoir; and Foothill and River laterals, supplying water to about 7,800 acres of land above Malta. No construction work was in progress during the first half of the fiscal year. The principal features remaining to be constructed are the St. Mary storage works and diversion canal, Nelson Reservoir, Chinook Diversion Dam, Vandalia Dam, and canals and structures in the Chinook, Malta, and Glasgow divisions.

CONSTRUCTION DURING THE FISCAL YEAR.

On May 1, 1912, the Secretary of the Interior signed the vested water-right contract for the adjustment of private water rights and a board of engineers was immediately convened and recommendations made covering the features to be constructed with the allotted funds. Contracts were awarded for the construction of canals and structures on the first half of Dodson north unit and at the close of the fiscal year the contractors were on the ground assembling the necessary force and equipment. On the Fort Belknap Indian Reservation a small concrete conduit was constructed in December, 1911, to carry an irrigation canal of Indian claimants under the new channel of Peoples Creek. Work was started on an extension of Upper Peoples Creek Dike, but was suspended during the winter, since which time the ground has been too wet to resume

activities. Proposals for the work are to be opened August 1, 1912. Drawings and specifications have been completed covering the enlargement and extension of 34 miles of Dodson South Canal from Point of Rocks to Nelson Reservoir, and work is in progress on those covering the extension of Dodson North Canal from a point about 2 miles west of Wagner to the irrigable lands of the second unit opposite Malta; the Vandalia South Canal for a distance of about 40 miles from the diversion point to Nashua; and the lateral systems and waste water ditches under these canals.

OPERATION AND MAINTENANCE.

Construction work on Dodson Diversion Dam and the canal system was started in 1908 and works completed in June, 1910, for the irrigation of 7,800 acres of the first unit under Dodson South Canal. As the run-off of Milk River was very low and the private canal companies near Chinook and Harlem and the Fort Belknap Indians diverted the entire supply of water, no lands were irrigated that year. In April, 1911, water was diverted into Dodson South Canal and during the season 2,853 acre-feet were delivered to 2,074 acres of land. No water was delivered after July 20, and heavy rains in September made it unnecessary to operate the system after harvest time. The season of 1912 opened with an abundance of moisture in the ground and timely rains, with an absence of hot winds, and there were no applications for water until the end of June. About 500 acres will probably be irrigated during the present season.

SETTLEMENT AND IRRIGATION.

As no public notice announcing the opening of the project has been issued no progress has been made in settlement, although a few transfers have been made of deeded lands. Water is being delivered to patented and homesteaded lands on a rental basis.

When the land is subdued, alfalfa will be one of the staple crops, being grown successfully under private canal systems and pumping plants. Most of the soil throughout the valley is a sandy loam, well adapted to sugar beets, potatoes, and other crops requiring cultivation, and where gumbo is encountered excellent stands of small grains and alfalfa can be raised. The following table shows the acreage, yield, and value of the principal crops raised in 1911:

Value of crops, Milk River project.

Crop.	Acreage.	Yield.			Estimated values.			
		Total.	Average per acre.	Maximum per acre.	Unit price.	Total value.	Average per acre.	Maximum per acre.
		<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>				
Flax.....	634	5,141	8.1	18.5	\$2.20	\$11,310	\$17.82	\$40.70
Oats.....	607	14,458	23.8	60.0	.42	6,072	10.00	25.20
Wheat.....	416	5,270	12.7	35.0	.85	4,480	10.77	29.75
Barley.....	51	525	10.3	27.0	.80	420	8.24	21.60

ESTIMATE OF COST OF CONTEMPLATED WORKS.

MILK RIVER UNIT.

Chinook diversion dams (2)-----	\$150,000.00	
Chinook North Canal system-----	691,175.00	
Chinook South Canal system-----	548,125.00	
Dodson diversion:		
Automatic crest, Dodson Dam-----	\$10,000	
Flowage lands-----	10,000	
		20,000.00
Dodson North Canal, first unit-----	117,390.00	
Dodson North Canal, second unit-----	165,450.00	
Dodson South Canal, first unit, completion-----	21,289.00	
Dodson South Canal, enlargement-----	65,250.00	
Dodson South Canal, extension-----	505,700.00	
Nelson Reservoir-----	833,750.00	
Bowdoin Canal-----	298,935.00	
Ashfield Canal-----	147,875.00	
Nelson Reservoir North Canal-----	432,500.00	
Nelson Reservoir South Canal-----	331,875.00	
Vandalia diversion-----	202,025.00	
Vandalia South Canal-----	507,250.00	
Vandalia South Canal, extension-----	63,375.00	
		<u>\$5,101,955.00</u>

ST. MARY STORAGE UNIT.

General expense-----	\$175,000.00	
Reservoirs:		
McDermott Lakes-----	\$50,000	
Sherburne Lakes-----	100,000	
Red Eagle Lake-----	40,000	
St. Mary Lakes-----	300,000	
		490,000.00
St. Mary Canal (including structures)-----	1,612,000.00	
Roads and bridges (past and future)-----	58,720.00	
Project buildings (past and future)-----	35,200.00	
Telephone system-----	7,000.00	
Coal mines (past prospecting)-----	2,700.00	
Stream gaging (past and future)-----	7,000.00	
Investigations (past)-----	34,600.00	
Surveys, Blackfeet Reservation (past)-----	1,700.00	
Lands and rights of way-----	20,250.00	
		<u>\$2,444,170.00</u>
Total-----		7,546,125.00

FEATURE COSTS TO JUNE 30, 1912.

ST. MARY STORAGE UNIT.

Diversion system:		
Dam-----	\$651.52	
Main canal-----	132,774.28	
		<u>\$133,425.80</u>
Buildings, construction-----		18,563.15
Real estate (rights and property), lands purchased-----		14,253.75
Roads and highways:		
Browning-St. Mary-----	\$14,144.53	
Sawmill-canal-----	637.61	
Cardston-----	4,312.19	
		<u>19,094.33</u>
Telephone line, construction-----		1,832.81
Coal mine, prospecting-----		2,745.27
Waterworks, construction-----		1,480.46

Examination of unit:		
Hydrography	\$5,180.70	
Surveys	35,284.49	
Topography (Blackfeet Indian Reservation)	1,702.57	
		\$42,167.76
Administration of unit, general expense		52,353.89
Inventory of cost ledger supplies		795.94
Total building cost		286,713.16

MILK RIVER UNIT.

Diversion works:		
Dodson Dam	\$127,102.72	
South headgates	13,230.49	
Dike headworks	11,259.14	
Vandalia Dam	1,357.34	
		\$152,949.69
Reservoir: Nelson (preliminary expense)		387.29
Canal system:		
South Main Canal, Dodson	\$214,745.01	
South Canal, distributing system	71,943.93	
Main Canal, Vandalia	637.22	
North Main Canal, Dodson	10,087.66	
Main Canal, Bowdoin	1,883.02	
Distributing system, Bowdoin	2,190.77	
Distributing system, North Canal, Dodson	3,277.51	
Distributing system, Vandalia	4,732.71	
		315,232.82
Real estate (rights and property), lands purchased		13,341.31
Buildings (Dodson unit):		
Construction	\$7,094.46	
Maintenance	140.08	
		7,234.54
Operation and maintenance (during construction)		15,926.10
Examination of unit:		
Hydrography	\$17,313.45	
Surveys	36,782.17	
Water appropriation investigation	6,453.16	
		60,548.78
Administration of unit, general expense		106,748.60
Inventory of cost ledger supplies		256.67
		672,625.80
Total building and operation and maintenance cost (during construction)		959,338.96

MONTANA, SUN RIVER PROJECT.

LOCATION.

Counties: Teton, Lewis and Clark, Choteau, Cascade.
 Townships: 20 to 25 N., Rs. 3 E. to 8 W., Montana meridian.
 Railroad: Great Northern.
 Railroad stations: Vaughn, Power, Dutton, Collins, Largent, Fort Shaw, Simms, Riebling, and Gilman, Mont.

WATER SUPPLY.

Source of water supply: Sun River and tributaries, Deep Creek, Bowl Creek, and Basin Creek.

Area of drainage basins: Sun River, 1,070 square miles; Deep Creek, 260 square miles; Bowl Creek, 9 square miles; Basin Creek, 15 square miles.

Annual run-off in acre-feet, 1905-1911: North Fork of Sun River near Augusta—Maximum, 805,000; minimum, 378,000; mean, 638,000. Willow Creek, near Augusta, 1905-1911—Maximum, 35,300; minimum, 7,900; mean, 18,800. Sun River, at Sun River, 1906-1911—Maximum, 1,140,000; minimum, 380,000; mean, 816,000. South Fork of Sun River, near Augusta—Maximum, 147,000; minimum, 28,000; mean, 75,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: Willow Creek—Area, 2,696 acres; capacity, 86,000 acre-feet; length of spillway, 200 feet; elevation of spillway, 100 feet above stream bed. Sun River Storage¹—Area, 3,540 acres; capacity, 269,000 acre-feet; length of spillway, 580 feet; elevation of spillway above stream bed, 321 feet. Pishkun—Area, 1,542 acres; capacity, 45,700 acre-feet. Muddy Creek—Area, 1,828 acres; capacity, 33,000 acre-feet. Benton Lake—Area, 9,300 acres; capacity, 144,000 acre-feet.

Storage dams: Willow Creek—Type, earth fill; maximum height, 110 feet; length of crest, 1,045 feet; volume, 452,000 cubic yards. Sun River Storage—Type, masonry; maximum height, 329 feet; length of crest, 989 feet; volume, 296,500 cubic yards. Pishkun—Type, earth fill; maximum height, 48 feet; length of crest, 3,500 feet; volume, 440,000 cubic yards. Benton Lake—Type, earth fill; maximum height, 35 feet; length of crest, 120 feet; volume, 12,000 cubic yards.

Diversion dams: Sun River—Type, concrete masonry; maximum height, 140 feet; length of crest, 190 feet; volume, 3,300 cubic yards. Deep Creek—Type, reinforced concrete weir; maximum height, 12 feet; length of crest, 100 feet; volume, 500 cubic yards.

Length of canals: Fort Shaw unit—18 miles with capacities of from 50 to 300 second-feet; 103 miles with capacities less than 50 second-feet. Remainder of project—128 miles surveyed with capacities greater than 300 second-feet; smaller canals not located.

Tunnels: Number, 5; aggregate length, 5,224 feet.

Dikes: Number, 5; aggregate length, 22,000 feet.

Irrigable area: Entire project, 216,346 acres; Fort Shaw unit, 16,346 acres.

Present status of irrigable lands: 83,263 acres entered subject to the reclamation act; 2,585 acres open to entry; 73,803 acres withdrawn from entry; 15,165 acres of State land; 41,530 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 18 miles with capacities from 50 to 300 second-feet; 103 miles with capacities less than 50 second-feet.

Waste-water ditches and drains: 12 miles.

Tunnels: 1; total length, 584 feet.

Storage dams: Earth, volume, 191,756 cubic yards; rock fill, volume, 9,709 cubic yards.

Dikes or levees for protection from overflow: Total length, 3,192 feet; volume, 4,600 cubic yards.

Canal structures: Costing over \$2,000 each—Concrete, 6. Costing from \$500 to \$2,000 each—Concrete, 6. Costing from \$100 to \$500 each—Concrete, 38; wood, 16. Costing less than \$100 each—Concrete, 135; wood, 435.

Bridges: Steel, 8 less than 50 feet in length; total length, 225 feet. Combination, 1, 60 feet in length. Wood, 11, less than 50 feet in length; total length, 397 feet. Total length of all bridges, 682 feet.

Culverts: Concrete, 59; length, 1,935 feet. Wood, 1; length, 60 feet.

Pipe laid: Concrete, 1,600 feet; steel, 610 feet.

Flumes: Steel, 2; length, 330 feet. Wood, 1; length, 60 feet.

Buildings: Offices, 5; residences, 15; barns and storehouses, 8; mess houses, 3.

Wells: 2; aggregate depth, 200 feet.

¹ Formerly known as Warm Springs Reservoir.

Roads: 11 miles.

Telephone lines: 93 miles. Telephones in use, 16.

Material excavated: Class 1, earth, 725,328 cubic yards; class 2, indurated material, 23,400 cubic yards; class 3, rock, 7,068 cubic yards; wet, 23,589 cubic yards; puddle, 9,054 cubic yards.

Riprap: 7,999 cubic yards.

Paving: 714 square yards.

Cement used: 5,239 barrels.

Concrete placed: 4,417 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 16,346 acres.

Area under water-right applications, season of 1912: 10,913 acres.

Length of irrigating season: From May 15 to October 15—153 days.

Average elevation of irrigable area: 3,700 feet above sea level.

Average annual rainfall on irrigable area for 24 years: 12 inches; 1911, 12.99 inches.

Range of temperature on irrigable area: -40° to 100° .

Character of soil of irrigable area: Sandy loam, clay, adobe, and alluvium.

Principal products: Hay, grain, and vegetables.

Principal markets: Great Falls, Helena, and Butte, Mont.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: March 26, 1908; November 19, 1910; March 28, 1911; March 2, 1912.

Location of lands opened: Ts. 20 and 21 N., Rs. 1 to 3 W., Montana meridian.

Present status of irrigable lands opened: 10,667 acres entered, subject to the reclamation act; 2,585 acres open to entry; 281 acres of State lands; 2,096 acres in private ownership.

Limit of area of farm units: 160 acres.

Duty of water: 2 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$30 and \$36.

Annual operation and maintenance charge: \$1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1905.

Construction recommended by board of engineers, February 13, 1906.

Construction authorized by Secretary February 26, 1906.

Fort Shaw Main Canal completed July, 1908.

First irrigation by Reclamation Service, season of 1909.

Fort Shaw unit completed December, 1909.

Willow Creek Dam completed, present development, November 7, 1911.

Entire project 9 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Sun River project provides for the storage of water in Sun River Storage Reservoir on the North Fork of Sun River; in the Willow Creek Reservoir on Willow Creek; in Pishkun Reservoir north of Sun River; in the Muddy Creek Reservoir on Muddy Creek and in Benton Lake Reservoir, 8 miles north of Great Falls, Mont.; the diversion of water from Bowl and Basin Creeks, tributaries of Flathead River, across the Continental Divide to Sun River drainage; the diversion of water from the North Fork of Sun River through supply canals for the Willow Creek and Pishkun Reservoirs; the diversion of flood waters from Deep Creek into Benton Lake Reservoir; the diversion of water from Sun River, supplemented by stored waters released from Sun River Storage and

Willow Creek Reservoirs, into a canal system watering lands mainly in the abandoned Fort Shaw Military Reservation; the diversion of water from Pishkun Reservoir into Sun River Slope Canal, supplying water for lands in the Sun River Valley; the diversion of water from Deep Creek, supplemented by stored water released from Sun River Storage and Pishkun Reservoirs; and for the lower lands of the system by stored water released from Benton Lake Reservoir into a canal system supplying water to the lands in the Sun River and Teton River Valleys.

The Fort Shaw unit and the Willow Creek Dam (first development) of the project are completed. Final location surveys have been made for the Main Canal supplying Pishkun Reservoir and for the main canal supplying a part of Sun River Slope. Preliminary location surveys have been made for the main canals of the remainder of the project. Diamond drill borings have been made at the site of the proposed Sun River diversion and are now in progress at the site of the Sun River Storage Dam. Topographic surveys have been made of the irrigable lands on the proposed Teton River Slope; of a portion of the lands on the Sun River Slope; for Sun River Storage, Pishkun, Willow Creek, Muddy Creek, and Benton Lake reservoirs, and are now being made for the remainder of the irrigable land on the project.

CONSTRUCTION DURING FISCAL YEAR.

Willow Creek Dam.—Excavation with steam shovel was completed on November 7, 1911. The material was placed with dump wagons and dump cars in 6-inch layers and was well sprinkled and rolled, every precaution being taken to insure future stability. The upper face of the dam has been riprapped with heavy bowlders. On June 30, 1912, there were 11,000 acre-feet of water in Willow Creek Reservoir. Present capacity (70 feet high), 16,700 acre-feet.

OPERATION AND MAINTENANCE.

On the Fort Shaw unit during the season of 1911 the entire canal system, including 121 miles of canals and laterals, was in operation, irrigating 171 farm units, aggregating 6,892 acres. Two thousand five hundred acre-feet of water in Willow Creek Reservoir was available, but was not used, as the supply from the river was sufficient. The irrigating season began April 29 and closed September 30. From September 6 to September 30 no water was used for irrigation, but a small supply was run in the canals for domestic purposes. Approximately 24,192 acre-feet of water was diverted, of which 11,380 acre feet was delivered to the land and the balance lost by seepage and evaporation or wasted. A small maintenance force was employed at various times during the season in riprapping, building checks and turnouts, and cleaning ditches. The season of 1912 opened on June 1.

SETTLEMENT AND IRRIGATION.

During the past year settlement has progressed on the Fort Shaw unit, the population on the farms increasing from about 750 in 1911 to over 1,000 in 1912. During the spring of 1912 some of the settlers

relinquished a portion of their irrigable area, stating that they had more than they could handle. On June 30, 1912, there were 40 farm units still open to entry, 48 of the 60 lots in Simms town site which had been placed on the market had been sold and 12 of the 33 in Fort Shaw town site.

The following table shows the areas irrigated and principal crops raised during the years 1910 and 1911:

Crops raised, Sun River project.

Crop.	Acreage.		Yield.		Yield per acre.	
	1910	1911	1910	1911	1910	1911
Alfalfa.....tons	159	644		1,299		2.02
Barley.....bushels	160	165	1,163	4,480	7	28.9
Beets.....tons		9		111		12.3
Carrots.....do		1		3		3.0
Corn.....	25	2				
Flax.....bushels		29		128		4.4
Garden.....	98	93				
Grain hay.....tons		71		107		1.5
Grass.....		303				
Hay.....	135					
Millet.....tons	46	5		9		1.8
Oats.....bushels	1,568	2,498	20,564	76,421	13	30.6
Pasture.....	732					
Potatoes.....bushels	99	139	10,000	18,049	100	129.8
Rye.....	5					
Speltz.....bushels		2		40		20.0
Wheat.....do	1,050	2,091	9,934	49,110	9.5	23.5

FEATURE COSTS TO JUNE 30, 1912.

Storage works:

Willow Creek Dam.....	\$176,675.00	
Willow Creek outlet tunnel.....	17,030.11	
Willow Creek tunnel, driving and timbering shaft.....	9,510.19	
		\$203,215.30

Diversion works:

Canal headworks.....	17,610.01	
Spillway at headworks.....	1,031.52	
		18,641.53

Canal system:

Main Canal, division 1.....	91,415.31	
Simms Creek siphon.....	36,752.14	
Main Canal, division 2.....	46,554.96	
Willow Creek supply canal.....	215.41	
Lateral system.....	202,776.39	
		377,714.21

Telephone system: Construction..... 9,496.31

Real estate: Lands purchased..... 16,274.94

Irrigable lands: Farm unit subdivision..... 2,132.51

Buildings: Construction..... 23,628.12

North Side surveys:

Camp construction.....	\$4,065.96	
Camp maintenance.....	2,230.35	
Surveys, topography, etc., including undistributed balance.....	126,163.76	
		132,460.07

Plant accounts: Operative accounts..... 3,384.42

Administration of project as a whole: General expense..... 52,698.96

Examination of project as a whole: Hydrography..... 9,975.54

Highways: Sun River Canyon..... 10,811.50

Inventory of cost ledger supplies..... 1,269.07

Total building cost..... 861,702.48

OPERATION AND MAINTENANCE.

Main canal	\$9, 174. 80
Lateral A	8, 282. 52
Lateral C	3, 337. 37
Lateral D	2, 417. 08
Lateral C-5, K, and H	6, 002. 02
Miscellaneous structures	1, 793. 78
Buildings	286. 90
Telephone system	1, 686. 67
Administration (undistributed)	1, 666. 69
Publicity and settlement	5, 511. 93
Instruction and demonstration	1, 988. 62
Seepage investigations	233. 45
	<hr/> \$42, 381. 83
Total building and operation and maintenance cost	<hr/> 904, 084. 31

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

LOCATION.

Counties: Dawson, Mont.; McKenzie, N. Dak.

Townships: 18 to 26 N., Rs. 56 to 60 E., Montana meridian; 150 to 152 N., R. 104 W., fifth principal meridian.

Railroads: Northern Pacific, Great Northern, and Missouri River Railway.

Railroad stations and population 1910: Glendive, 2,428; Stipek¹; Intake¹; Burns;¹ Savage;¹ Crane;¹ Sidney. 345; Mondak,¹ Mont.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 66,000 square miles.

Annual run-off, in acre-feet: Yellowstone River at Glendive, Mont., 1903-1911—Maximum, 13,300,000; minimum, 8,500,000; mean, 10,700,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Diversion dam. Type, rock-filled timber weir; maximum height, 12 feet; length of crest, 700 feet; length of rock fill, 700 feet; volume, 12,807 cubic yards.

Length of canals: 49 miles with capacity greater than 300 second-feet; 19 miles with capacity from 50 to 300 second-feet; 129 miles with capacity less than 50 second-feet.

Dikes: Aggregate length, 35,600 feet.

Water power: Estimated 290 horsepower, none developed.

Irrigable area: Entire project 60,116 acres; first unit, 40,658 acres; extensions, 19,458 acres.

Present status of irrigable land: Entered subject to reclamation act, 14.-058.13 acres; open to entry, 3,931.30 acres; State lands, 1,644 acres; private lands, 40,482.09 acres.

RESULTS TO JUNE 30, 1912.

Canals: 49 miles with capacities from 301 to 800 second-feet; 19 miles with capacities from 50 to 300 second-feet; 129 miles with capacities less than 50 second-feet.

¹ Unincorporated; population not available.

Waste-water ditches and drains: 31 miles.

Diversion dams: Completed.

Dikes or levees for protection from overflow: Total length, 35,600 feet; volume, 138,276 cubic yards.

Canal structures: Costing over \$2,000 each—Concrete, 43; wood, 1. Costing from \$500 to \$2,000 each—Concrete, 60; wood, 2. Costing from \$100 to \$500 each—Concrete, 41; wood, 8. Costing less than \$100 each—Concrete, 33; wood, 771.

Bridges: Steel, 15 with lengths of 50 feet or more; 16 with lengths less than 50 feet; total length, 1,474 feet. Combination, 6 with lengths of less than 50 feet; total length, 141 feet. Wood—1 with a length of 50 feet or more; 134 with lengths less than 50 feet; total length, 1,645 feet.

Culverts: Concrete, 35; length, 3,574 feet. Wood, 50; length, 762 feet. Terra cotta, 31; length, 2,844 feet.

Pipe laid: Terra cotta, 14,381 feet.

Flumes: Concrete, 10; length, 840 feet. Wood, 23; length, 640 feet.

Buildings: Offices, 4; residences, 15; barns and storehouses, 18.

Wells: 8; aggregate depth, 220 feet.

Roads: 10.5 miles.

Telephone lines: 79 miles. Telephones in use, 29.

Material excavated: Class 1, earth, 6,220,243 cubic yards; class 2, indurated material, 182,733 cubic yards; class 3, rock, 189,111 cubic yards.

Riprap: 18,502 cubic yards.

Cement used: 27,105 barrels.

Concrete placed: 22,055 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to deliver water, season of 1912: 37,609 acres.

Area under water-right applications, season of 1912: 29,542 acres.

Length of irrigating season: May 15 to October 10—148 days.

Average elevation irrigable area: 1,900 feet.

Average annual rainfall on irrigable area: 16 inches.

Range of temperature on irrigable area: -46° to 110° F.

Character of soil of irrigable area: Deep sandy loam predominates; some alkali and gumbo.

Principal products: Grain, forage crops, and vegetables.

Principal markets: Minneapolis, St. Paul, and Duluth, Minn.; local markets consume forage crops and vegetables.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 21, 1908; April 24, 1909; March 7, March 24, May 1, August 28, and November 8, 1911; March 1 and April 30, 1912.

Location of lands opened: Ts. 18 and 19 N., R. 57 E.; Ts. 19 and 20 N., R. 58 E.; Ts. 21, 22, 23, 24, and 25 N., R. 59 E., and T. 24 N., R. 60 E., Montana principal meridian; Ts. 150 and 151 N., R. 104 W., fifth principal meridian.

Present status of irrigable area opened: 7,204.61 acres entered subject to the reclamation act; 779 acres open to entry; 1,504 acres State land; 31,170.48 acres private land.

Limit of area of farm unit: Public, 80 acres; private, 160 acres

Duty of water: $2\frac{1}{2}$ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$42.50 and \$45.

Annual operation and maintenance charge: \$1 per acre per annum for \$42.50 water-right applicants and \$2.50 per acre for 1912 for \$45 water-right applicants.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1903.

Construction recommended by board of engineers, April 23, 1904.

Construction authorized by Secretary May 10, 1904.

Main canal: 61 miles completed March, 1909.

Lower Yellowstone Dam completed February, 1910.

First irrigation by Reclamation Service, season 1909.

Entire project 95 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Lower Yellowstone project provides for the diversion of water from the Yellowstone River at a point 18 miles below Glendive, Mont., into a canal on the west side of the river, which extends down the valley a distance of 67 miles to the confluence of the Yellowstone and Missouri Rivers, conveying water for the irrigation of land lying between it and the Yellowstone River. The fall of the water which will be discharged from the main canal into lateral KK at a point 19 miles below the headgates will be utilized to operate turbines direct connected to centrifugal pumps for raising water to irrigate approximately 3,000 acres of excellent bench land. The completed features are the Lower Yellowstone Dam and diversion works; the main canal for a distance of 61 miles and the complete lateral system in connection therewith. Sublaterals and extensions of a few main laterals will be constructed as the needs of water users require. The features for future construction are the pumping plant, the remaining 6 miles of the main canal, and about 61 miles of laterals which, when completed, will irrigate approximately 20,000 acres.

CONSTRUCTION DURING FISCAL YEAR.

No new construction work was performed on the main canal or structures, but work was continued on the extension of the lateral system and the excavation of drains, which involved the handling of 19,000 cubic yards of earth.

OPERATION AND MAINTENANCE.

During the season of 1911, from May 18 to October 10, the diverting works, 61 miles of main canal, and 127 miles of laterals were operated without requiring any extensive repairs to the canal system, and 230 farm units, aggregating 21,817 acres, were irrigated. Of the 52,542 acre-feet of water diverted at the Lower Yellowstone Dam, 21,799 acre-feet were delivered to irrigators. A great deal of repair work has been necessitated on account of damage done by the spring run-off, which was the heaviest ever known in the lower Yellowstone Valley. During April, May, and June, 1912, the precipitation amounted to 8 inches, equaling one-half of the average annual rainfall, and as a consequence practically no irrigation has been done, only 31 of the 345 water users requesting water.

Soundings made at the Lower Yellowstone Dam in the fall of 1911 revealed the fact that the ice which had passed over the dam the previous spring at an unusually low stage of water had so damaged the apron as to permit serious erosion during the annual high water in June and July. Sections of timber in the apron and a large part of the rock filling and tops of the piles forming the apron substructure had been carried away and much of the large rock which had been placed immediately below the apron had been moved downstream. As soon as the extent of the damage became known steps were taken to make the necessary repairs before the break-up of the ice in the spring of 1912. During December and January a row of steel sheet piling was driven alongside the original line of

sheet piling at the lower end of the apron and rock was placed in the apron and below it, replacing all the eroded material up to an average height of about 1 foot above the original surface of the apron. About 4,000 cubic yards of rock were placed, averaging over 2 tons in weight, and a large proportion weighing from 5 to 7 tons. This work was completed on February 3, 1912, and the ice which went out within a few weeks with the highest water since the construction of the dam apparently caused no damage. To provide for future repairs, a cableway has been installed across the river immediately over the apron of the dam and 1,400 cubic yards, solid measure, of rock has been stock-piled under the cable.

SETTLEMENT AND IRRIGATION.

There is very little irrigable land on the Lower Yellowstone project open to entry, although there is a considerable area in private ownership, consisting chiefly of excess holdings, that must be disposed of under the terms of the reclamation act. Twelve homesteads covering 680 irrigable acres and 30 tracts of land in private ownership covering 2,998 irrigable acres have been taken up during the past year. Exchanges are frequently being made by landowners who have farmed as long as they care to, and who exchange their improved farms under the ditch for town or city property or "dry" land.

The completion of the Missouri River Railway from Glendive to Sidney, Mont., has had a stimulating effect on business in general throughout the entire valley. There are now on its line from Glendive the six stations of Stipek, Intake, Burns, Savage, Crane, and Sidney, all of which towns, together with Fairview and Mondak, show a marked increase in population and prosperity, with modern improvements and business facilities.

Of the seeded irrigable area for 1912 it is estimated that 35 per cent is in oats; 35 per cent in wheat; 15 per cent in barley; 10 per cent in alfalfa; 4 per cent in flax; and 1 per cent in various other crops.

The average return per acre in 1911 was \$14.35. Owing to the very late spring a reliable estimate of the yield for 1912 can not be given, but with weather conditions favorable for thrashing it is believed wheat will approximate 20 bushels per acre; oats, 45 bushels; barley, 35 bushels; flax, 10 bushels; and potatoes at least 150 bushels. Alfalfa can not be estimated at more than 2 tons per acre on account of the damage done by grasshoppers during the past three weeks.

FEATURE COSTS TO JUNE 30, 1912.

Diversion works: Lower Yellowstone Dam-----	\$325, 624. 78
Canal system:	
Earthwork-----	\$1, 415, 010. 62
Structures-----	577, 774. 09
	<hr/> 1, 992, 784. 71
Distribution system:	
Earthwork-----	214, 251. 83
Structures-----	20, 886. 86
	<hr/> 235, 138. 69
Bridges, highway (see details Tenth Annual Report)-----	74, 800. 76
Real estate-----	28, 799. 05

Buildings-----	\$18, 162. 03
Telephone system-----	23, 717. 32
Irrigable land, land and soil surveys and farm units-----	15, 356. 80
Examination of project as a whole-----	50, 452. 74
Administration of project as a whole-----	7, 860. 25
Total building cost-----	2, 772, 697. 13

OPERATION AND MAINTENANCE.

Main canal, earthwork-----	\$65, 116. 70
Main canal, structures-----	27, 678. 94
Lateral system-----	70, 071. 51
Dam, Lower Yellowstone-----	53, 659. 49
Demonstration farm-----	10, 306. 42
Telephone system-----	7, 830. 44
Real estate-----	759. 43
Buildings-----	59, 128. 00
General expenses-----	13, 943. 89
	\$308, 494. 82

Total building and operation and maintenance cost----- 3, 081, 191. 95

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

LOCATION.

Counties: Sioux, Scotts Bluff, Banner, and Morrill, Nebr.; Natrona, Carbon, Converse, and Laramie, Wyo.

Townships: 19 to 27 N., Rs. 48 to 67 W.; 26 to 30 N., Rs. 83 to 85 W., sixth principal meridian.

Railroads: Chicago, Burlington & Quincy; Union Pacific; Chicago & North Western; Colorado & Southern.

Railroad stations and population 1910; Bridgeport, 541; Bayard, 261; Minatare, 338; Scottsbluff, 1,746; Mitchell, 640; Morrill, 346; and Henry,¹ Nebr.; Torrington, 155; Vaughn,¹ Lingle,¹ Barnes,¹ Fort Laramie,¹ Whalen,¹ Guernsey, 274; and Casper, Wyo., 2,639.

WATER SUPPLY.

Source of water supply: North Platte River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre-feet of North Platte River: At Pathfinder, Wyo. (12,000 square miles), 1905 to 1911—maximum, 2,420,000; minimum, 870,000; mean, 1,420,000. At Guernsey or Whalen, Wyo., (16,200 square miles), 1900 to 1911—maximum, 2,690,000; minimum, 985,000; mean, 1,650,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: Pathfinder—Area, 21,774 acres; capacity, 1,025,000 acre-feet; length of spillway, 660 feet; elevation of spillway, 182 feet above stream bed. Reservoir No. 1—Area, 900 acres; capacity, 14,200 acre-feet; length of spillway, 100 feet; elevation of spillway, 18 feet above stream bed. Lake Minatare—Area, 2,240 acres; capacity, 67,025 acre-feet; length of spillway, 100 feet; elevation of spillway, 55 feet above stream bed. Reservoir No. 1, or Lake Alice.

Storage dams: Pathfinder—Type, broken range cyclopean rubble-masonry arch; maximum height, 218 feet; length of crest, 432 feet; volume, 60,210 cubic yards. Pathfinder Dike—Type, earth; maximum height, 40 feet; length of

¹ Unincorporated; population not available.

crest, 1,600 feet; volume, 162,000 cubic yards. Dam No. 1—Type, earth; maximum height, 28 feet; length of crest, 3,100 feet; volume, 234,000 cubic yards. Dam No. 1½—Type, earth; maximum height, 22 feet; length of crest, 2,250 feet; volume, 119,000 cubic yards. Minatare Dam—Type, earth; maximum height, 65 feet; length of crest, 3,370 feet; volume, 570,000 cubic yards.

Diversion dams: Whalen—Type, concrete weir; maximum height, 29 feet; length of masonry, 300 feet; length of earth fill, 2,200 feet; volume, 80,740 cubic yards.

Length of canals: 90 miles with capacities greater than 800 second-feet; 10 miles with capacities from 301 to 800 second-feet; 89 miles with capacities from 50 to 300 second-feet; 586 miles with capacities less than 50 second-feet.

Tunnels: 3; aggregate length, 985 feet.

Dikes: Aggregate length, 1,650 feet.

Water power: None developed.

Irrigable acreage, entire project: 129,270 acres (Nebraska, 107,521 acres; Wyoming, 21,749 acres); North Platte Canal & Colonization Co., 17,837 acres; first lateral district, 36,760 acres; second lateral district, 34,100 acres; third lateral district, 38,000 acres; miscellaneous tracts, 2,573 acres.

Present status of irrigable land: 75,947 acres entered subject to the reclamation act; 6,690 acres open to entry; 721 acres withdrawn from entry; 11,048 acres of State lands; 34,864 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 90 miles with capacities more than 800 second-feet; 9½ miles with capacities from 301 to 800 second-feet; 65 miles with capacities from 50 to 300 second-feet; 455 miles with capacities less than 50 second-feet.

Tunnels: Completed.

Storage dams: Volume—Masonry, 61,444 cubic yards; earth, 203,000 cubic yards.

Diversion dams: Volume—Masonry, 4,966 cubic yards; earth, 75,755 cubic yards.

Dikes or levees for protection from overflow: Total length, 1,650 feet; volume, 138,610 cubic yards.

Canal structures: Costing over \$2,000 each—Concrete, 26; wood, 4. Costing from \$500 to \$2,000 each—Concrete, 94; wood, 1. Costing from \$100 to \$500 each—Concrete, 838; wood, 14. Costing less than \$100 each—Concrete, 263; wood, 3,490.

Bridges: Steel, 11 with lengths of more than 50 feet; total length, 726 feet. Combination, 11 with lengths of more than 50 feet; total length, 726 feet. Wood, 2 with lengths of more than 50 feet; 88 with lengths less than 50 feet; total length 2,146 feet.

Culverts: Steel pipe, 70; length, 1,260 feet. Concrete, 21; length, 378 feet. Wood, 49; length, 784 feet. Vitrified, 49; length, 852 feet.

Flumes: Concrete, 2; length, 466 feet. Steel, 14; length, 3,256 feet.

Buildings: Offices, 2; residences, 6; barns and storehouses, 6.

Wells: 13; aggregate depth, 1,300 feet.

Telephone lines: 186 miles leased. Telephones in use, 30.

Material excavated: Class 1, earth, 9,170,432 cubic yards; class 2, indurated material, 564,251 cubic yards; class 3, rock, 200,470 cubic yards.

Riprap: 27,592 cubic yards.

Paving: 46,644 square yards.

Cement used: 115,460 barrels.

Concrete placed: 93,889 cubic yards (including mortar in Pathfinder Dam).

AGRICULTURAL AND CLIMATIC CONDITIONS.

INTERSTATE UNIT.

Area for which the service is prepared to supply water, season of 1912: 104,511 acres.

Area under water-right applications and rental contracts, season of 1912: 86,378 acres.

Length of irrigating season: From April 1 to September 30—183 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Average annual rainfall on irrigable area: 15 inches; 1911, 11.39 inches.

Range of temperature on irrigable area: —25° to 104°.

Character of soil of irrigable area: Sandy loam.

Principal products: Alfalfa, cereals, corn, sugar beets, potatoes.

Principal markets: Omaha, Nebr.; Kansas City and St. Joseph, Mo.; Denver, Colo.; central Wyoming.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: July 29, 1907; May 29, 1908; June 16, 1908; November 12, 1908; March 3, 1909; March 27, 1909; June 2, 1909; March 12, 1910; April 4, 1910; June 6, 1910; July 2, 1910; September 10, 1910; March 7, 1911; March 24, 1911; April 21, 1911; December 30, 1911; March 13, 1912; March 14, 1912; March 19, 1912; May 23, 1912; June 24, 1912.

Location of lands opened: Ts. 22 to 26 N., Rs. 52 to 65 W., sixth principal meridian.

Present status of irrigable lands opened: 56,039 acres entered subject to the reclamation act; 5,640 acres open to entry; 721 acres withdrawn from entry; 9,998 acres of State lands (including 2,179 acres of Carey Act lands); 32,113 acres in private ownership (including 12,289 acres of Carey Act lands).

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: $2\frac{1}{2}$ acre-feet per acre per annum at the farm.

Charges per acre of irrigable land: Building \$45 and \$55; annual operation and maintenance charge, \$1.25 per acre.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1902.

Construction recommended by director, March 7, 1903.

Construction authorized by Secretary March 14, 1903.

Contract with the North Platte Canal & Colonization Co. for right of way for first part of Interstate Canal, December 22, 1904.

First irrigation by Reclamation Service, season of 1908.

Interstate Canal, first 95 miles completed May, 1908.

Whalen Diversion Dam completed February, 1909.

Pathfinder Dam completed June, 1909.

Pathfinder Dike completed May, 1911.

Interstate Canal, 129 miles completed June 30, 1912.

Entire project, 82 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the North Platte project provides for the storage of flood waters of North Platte River in a reservoir controlled by the Pathfinder Dam, about 3 miles below the junction of the North Platte and Sweetwater Rivers and 50 miles southwest of Casper, Wyo., and in smaller reservoirs along the canal lines; and the diversion of water from North Platte River by a dam near Whalen, Wyo., into the Interstate Canal, supplying water for lands on the north side of the river, and into the Fort Laramie Canal, watering lands on the south side of the river.

The completed features are: Pathfinder Dam and Dike, Whalen Diversion Dam, the first two divisions of the Interstate Canal, lateral systems of districts 1 and 2 of the Interstate Canal system. Construction is in progress upon supplementary reservoirs, the third division of the Interstate Canal, and the third lateral district. The Fort Laramie Canal system remains for future construction.

CONSTRUCTION DURING FISCAL YEAR.

Pathfinder Reservoir.—Construction of the concrete spillway weir, built in a curved form across a gap in the north abutment of the dam, was started in the spring of 1911 and completed during the

winter, except for a small gap, left open so that water would not overflow the Soda Lake placers in the Sweetwater Basin. Work was resumed in October on the installation of the concrete bulkhead and cast-iron circular conduits leading the water from the valves into the south tunnel. The grillage chamber in front of the valve was completed in December, and the balanced valves and controlling system were installed and ready for operation by the end of January, 1912. A ladderway inclosed by concrete masonry was built extending down the south canyon wall to the control chamber of the balanced valves.

Interstate Canal.—Divisions 1 and 2 of the Interstate Canal, which include the first 95 miles, were completed in May, 1908. The third division includes the High line, the Low Line, and the Reservoir Supply Canals. Work on the High Line Canal was started in the fall of 1910 under small informal contracts, the cross-drainage and other structures being built by Government forces. On June 30, 1912, 31½ miles had been completed, and it is expected that the canal will be finished during September, 1912. The Reservoir Supply Canal, 5 miles in length and of 500 second-feet capacity, connects Reservoirs Nos. 1 and 3 (Lake Minatare). No construction work has been done on the Low Line Canal, but the surveys are sufficiently advanced to proceed at an early date with the construction of approximately 25 miles.

Supplementary storage.—In the development of the third lateral district it is necessary to provide supplemental storage reservoirs. There are three possible reservoir sites, known as Nos. 1, 2, and 3 (Lake Minatare), with capacities of 14,000, 27,000, and 67,000 acre-feet, respectively. Construction work was started on reservoir No. 1 in the summer of 1911 and during the fiscal year Dam No. 1½ was completed, closing a low saddle on the east boundary of the reservoir and involving the excavation of about 103,000 cubic yards of earth and the quarrying, hauling, and placing of about 16,000 cubic yards of rock. A concrete regulating structure was built in connection with Dam No. 1½, forming the principal outlet of the reservoir and supplying water to the reservoir supply canal. Test borings and investigations of dam site No. 1 were begun during the summer of 1911 and the excavation of the cut-off trench was started during the fall, but was suspended during the winter. Work was resumed in April, 1912. The construction of the earthwork on Dam No. 1 began about May 1 under contract and is practically completed, involving the excavation of about 205,000 cubic yards of earth and 13,200 cubic yards of brute clay. The hauling and placing of riprap material will be started within the near future and completed during the coming fall or winter.

Drainage investigations.—Surveys, leading to the construction of drainage works intended to lower the water plane over seeped areas, will begin during the year.

OPERATION AND MAINTENANCE.

The system operated during 1911 comprised the Pathfinder Reservoir, the Whalen Diversion Works, reservoir No. 1, and the first, second, and a portion of the third lateral districts, including 99 miles of main canal and 436 miles of laterals. Water was delivered to 759

farms, aggregating 44,736 acres in crops. Water was also furnished under contract to 61 farms in the North Platte Canal & Colonization Co. tract, aggregating 4,675 acres. The maximum diversion at the Whalen Dam into the Interstate Canal was 1,330 second-feet and the total diversion during the season was 366,670 acre-feet. The season began with an unusual drought in the spring, requiring a heavy delivery of water, but the discharge was reduced to 1,225 second-feet by the end of July and maintained at practically that amount until early in September, when a gradual reduction was made until the close of the irrigation season, on September 30. A break occurred in the Interstate Canal on July 16, which required six days to repair.

During the season of 1912, 67,167 acres of land are being supplied with water in the first, second, and third lateral districts under water-right applications, 1,368 acres under rental agreements, and 17,837 acres under contract with the North Platte Canal & Colonization Co. Of this acreage, there are cultivated 5,534 acres in the North Platte Canal & Colonization Co.'s tracts and 48,208 acres in the land subject to the reclamation act under water-right applications and rental agreements. Water was diverted into the main canal on May 8, or about six weeks later than in 1911, the maximum diversion to June 30 being 1,370 second-feet. There have been no breaks or interruptions of any consequence. The rotation system, begun in 1910 and continued in 1911, was modified by making the periods of water delivery and nondelivery each of four days' duration, whereas in the two preceding years water was furnished for six days, followed by three days' intermission. The change appears to be entirely satisfactory. On June 30, 1912, the Pathfinder Reservoir contained 965,580 acre-feet of water.

SETTLEMENT AND IRRIGATION.

There have been few changes in the conditions of settlement on the project during the year, but there are good opportunities for entering homestead lands, as well as for purchasing deeded lands at moderate prices, and it is believed that these will be taken advantage of by farmers from the eastern part of the State and elsewhere during the coming year.

The following table shows the acreage and value of various crops in 1909, 1910, and 1911, and the acreage in 1912:

Value of crops, North Platte project.

Crop.	1909		1910		1911		1912	
	Aeres.	Value.	Aeres.	Value.	Aeres.	Value.	Aeres.	Value.
Oats.....	13,742	\$109,882	12,779	\$65,463	12,875	\$95,079	9,643	-----
Wheat.....	7,263	83,650	9,897	59,973	6,759	61,965	4,326	-----
Corn.....	5,660	36,370	5,792	5,800	4,663	38,266	5,904	-----
Barley.....	1,892	10,685	1,205	3,112	996	7,885	1,150	-----
Rye.....	520	3,171	413	690	394	1,217	1,155	-----
Potatoes.....	3,549	135,899	4,651	94,170	3,448	35,697	1,342	-----
Sugar beets.....	668	19,310	474	8,320	405	14,830	714	-----
Alfalfa.....	4,314	13,199	10,461	\$7,080	17,207	172,447	27,113	-----
Speltz.....	901	6,733	979	3,856	800	4,150	250	-----
Miscellaneous.....	2,710	19,847	1,886	7,840	1,864	15,353	2,145	-----
Total.....	41,214	438,746	48,537	346,304	49,411	446,889	53,742	-----

The average crop yields in 1911 were low owing to the extreme drought early in the spring and damages from wind throughout the season, while a large acreage planted in potatoes was a total loss because of the blight. Seepage also affected considerable areas of low land under the project, including some valuable farm land, which necessitated the announcement of a higher charge per acre on all land on which the owner could not comply with the conditions of payment specified in his contract.

The season of 1912 opened with a large amount of moisture in the ground and conditions are encouraging to the farmers. Approximately 60 per cent of the area farmed is in alfalfa, and although hail damaged a number of farms in the Sheep Creek district, the prospect is excellent for a good crop.

EXAMINATION OF WATER APPROPRIATIONS.

Practically all the representatives of the older canal systems in the valley west of Bridgeport have expressed a desire to supplement their water rights to the direct flow from the river by Pathfinder storage. The Secretary of the Interior therefore approved a form of contract on February 3, 1912, for the sale of Pathfinder water. In the meantime surveys were made of all lands under canals west of North Platte, a reconnoissance examination of irrigation conditions was made of all lands west of Kearney, Nebr., and a report prepared showing the irrigation needs of the valley. In April a consulting board convened in Mitchell, Nebr., and it was decided to modify the form of contract so as to unify the interests of all canals in the valley. The present plan for the sale of Pathfinder water contemplates the adoption of a mutually satisfactory schedule of delivery to each purchasing company or district, without distinction of natural and storage flow and upon the payment for such amount of water as is shown from the schedule to be supplied from stored flow during years of low run-off, taking cognizance of the priority of each purchaser. This plan has met with the approval of all canal managers interested and a number of applications are now pending, with the probability that the matter of water rights below Pathfinder will be satisfactorily adjusted without serious litigation. A reconnoissance examination is also contemplated of the irrigation possibilities above the Pathfinder Reservoir and it is hoped that this will lead to a satisfactory adjustment of the controversies in that section between water appropriators and the United States.

FORT LARAMIE CANAL INVESTIGATIONS.

On July 24, 1911, on consulting board reported upon the preliminary surveys and data then available on the Fort Laramie Canal and recommended additional investigations and surveys. These were made and a report submitted to the consulting board, which convened in Mitchell the latter part of April, 1912. In a report dated May 3, 1912, the board recommended the construction of the project from Whalen to a point near Gering, embracing an irrigable area of about 107,000 acres, on condition that at least 95 per cent of the owners of deeded lands sign trust deeds, thereby insuring the repayment of the building charges to the reclamation fund. The recommendations of the board were approved by the department and the form of trust deed is being submitted to the landowners for signature.

FEATURE COSTS TO JUNE 30, 1912.

Storage works:		
Real estate (submerged lands)-----	\$205,490.06	
Pathfinder Dam-----	892,514.98	
Buildings: Gatekeeper's house, emergency gatehouse, and storehouse-----	19,252.57	
Pathfinder Dike-----	234,009.25	
Pathfinder Tunnels-----	199,669.21	
High-pressure gates-----	191,098.97	
Pile bridge-----	4,507.57	
Spillway dam-----	10,600.85	
Interstate reservoirs (supplemental storage)---	148,783.00	
		\$1,905,926.46
Diversion works:		
Whalen Dam, contract-----	199,912.61	
Whalen Dam, Government forces-----	33,346.36	
Guernsey Dam-----	11,308.73	
		244,567.70
Canal system:		
Earthwork-----	1,410,452.68	
Structures-----	607,494.29	
Surveys, third division main canal-----	14,290.10	
Surveys, Alcova-Casper Canal-----	1,222.09	
Surveys, Goshen Park-----	28,900.58	
Surveys, Fort Laramie Canal-----	19,169.95	
Riprap, third division main canal-----	400.01	
		2,081,929.70
Lateral system:		
Earthwork-----	385,148.53	
Structures-----	354,884.46	
Bridges-----	35,670.59	
Surveys, land lines-----	42,038.02	
		817,741.60
Real estate (rights and property), lands purchased (not sub- merged)-----		31,665.29
Water-right adjudications: North Platte River ditches-----		8,485.85
Drainage system-----		7,651.83
Preliminary operation and maintenance-----		430,289.47
General expense (undistributed)-----		2,036.45
Total building cost-----		5,530,294.35

OPERATION AND MAINTENANCE.

Pathfinder Dam:		
Distribution-----	\$2,380.14	
Repairs-----	34.17	
		\$2,414.31
First division, main canal:		
Distribution-----	5,796.08	
Protection-----	9,884.70	
Betterments-----	7,958.96	
Repairs-----	37,897.43	
		61,537.17
Rawhide, first and second lateral districts:		
Distribution-----	33,245.65	
Protection-----	6,559.09	
Betterments-----	2,977.89	
Repairs-----	22,738.30	
		65,520.93
Third lateral district:		
Distribution-----	4,745.44	
Protection-----	799.96	
Betterments-----	330.75	
Repairs-----	4,287.11	
		10,163.26

Reserve No. 1-----	\$940. 73	
Reserve No. 2-----	3, 298. 93	
		\$4, 239. 66
General expense (undistributed)-----		511. 69
		<hr/>
Total operation and maintenance cost-----		144, 387. 02
		<hr/>
Total building and operation and maintenance cost-----		5, 674, 681. 37

NEVADA, TRUCKEE-CARSON PROJECT.

LOCATION.

Counties: Churchill, Storey, and Lyon.

Townships: 17 and 18 N., Rs. 17 to 30 E.; 19 N., Rs. 26 to 31 E.; 20 N., Rs. 22 to 31 E., Mount Diablo meridian.

Railroad: Southern Pacific.

Railroad stations and population 1910: Fernley,¹ Hazen,¹ Fallon 741, and Lahontan,¹ Nev.

WATER SUPPLY.

Source of water supply: Truckee and Carson Rivers.

Area of drainage basin: 3,450 square miles.

Annual run-off in acre-feet: Truckee River at Tahoe (519 square miles), 1901 to 1911—Maximum, 703,000; minimum, 112,000; mean, 316,000. Truckee River, near Vista and Clark (1,740 square miles), 1900 to 1911—Maximum, 2,220,000; minimum, 394,000; mean, 915,000. Carson River at Empire (988 square miles), 1901 to 1911—Maximum, 655,000; minimum, 178,000; mean, 414,000.

DATA FOR COMPLETE PROJECT.

Reservoirs: Lake Tahoe²—Area, 125,000 acres; capacity, 750,000 acre-feet; length of spillway, 85 feet; elevation of spillway, 6 feet above stream bed. Alkali Flat—Area, 8,500 acres; capacity, 88,000 acre-feet. Lahontan—Area, 11,000 acres; capacity, 290,000 acre-feet; length of two spillways, 500 feet; elevation of spillways, 112 feet above stream bed.

Storage dams: Lake Tahoe—Type, concrete sluiceway regulator; maximum height, 14 feet; length of crest, 109 feet; volume, 425 cubic yards. Lahontan—Type, earth and gravel fill; maximum height, 124 feet; length of crest, 1,600 feet; volume, 770,000 cubic yards. Alkali Flat—Not designed.

Diversion dams: Truckee River—Type, concrete sluiceways; maximum height, 22 feet, 4 inches; length of masonry, 171 feet; length of earth fill, 1,160 feet. Carson River—Type, concrete sluiceways; maximum height, 20 feet 9 inches; length of masonry, 240 feet. Others not designed.

Length of canals in use (first unit): 42 miles with capacity greater than 800 second-feet; 62 miles with capacities from 301 to 800 second-feet; 80 miles with capacities from 50 to 300 second-feet; 508 miles with capacities less than 50 second-feet.

Tunnels: Number, 4; aggregate length, 2,840 feet.

Dikes: Aggregate length, 52,900 feet; volume 70,788 cubic yards.

Water power: Estimated total, 8,000 horsepower; developed, 1,660.

Irrigable area: Entire project, 206,000 acres; first unit, 96,573 acres.

Present status of irrigable lands: 21,067 acres entered subject to the reclamation act; 358 acres open to entry; 119,026 acres withdrawn from entry; 102 acres of State lands; 65,447 acres in private ownership (including 10,031 acres of railroad lands).

¹ Unincorporated; population not available.

² Control of Lake Tahoe not fully acquired.

RESULTS TO JUNE 30, 1912.

Canals: First unit, completed.

Tunnels: Completed.

Diversion dams: Volume, masonry, 6,028 cubic yards; earth, 29,803 cubic yards.

Dikes or levees for protection from overflow: Completed.

Canal structures: 70, costing more than \$2,000 each; 176, costing from \$500 to \$2,000 each; 1,383, costing less than \$500 each.

Bridges: Combination.—6 with lengths of 50 feet or more each; 8 with lengths of less than 50 feet each; total, 692 feet. Wood.—9 with lengths of 50 feet or more each; 117 with lengths of less than 50 feet each; total, 3,768 feet. Concrete.—One, 100 feet in length. Total length, 4,560 feet.

Pipe laid: Steel, 500 feet.

Buildings: Offices, 5; residences, 15; barns and storehouses, 6; power plants, 1.

Roads: 51½ miles.

Telephone lines: 128 miles. Telephones in use, 51.

Material excavated: Class 1, earth, 9,099,295 cubic yards; class 2, indurated material, 255,332 cubic yards; class 3, rock, 462,305 cubic yards.

Riprap: 16,555 cubic yards.

Paving: 43,987 square yards.

Cement used: 68,064 barrels.

Concrete placed: 50,746 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to deliver water, season of 1912: 43,761 acres.

Area under water-right applications and rental contracts, season of 1912: 44,929 acres.

Length of irrigation season: From April 1 to October 15—198 days.

Average elevation of irrigable area: 4,000 feet above sea level.

Average annual rainfall on irrigable area: 4 inches. (1911, 3.62 inches.)

Range of temperature on irrigable area: 0° to 105°.

Character of soil of irrigable area: Exceedingly variable; sand, sandy loam, clay, adobe, and volcanic ash.

Principal products: Alfalfa, small grain, potatoes, onions, sugar beets, and truck crops.

Principal markets: Nevada mining camps and California cities.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto: May 6, 1907; November 1, 1907; January 30, 1908; April 4, 1908; June 5, 1908; December 26, 1908; March 1, 1909; September 28, 1909; April 26, 1910; September 16, 1910; April 22, 1911; October 17, 1911; February 8, 1912; June 13, 1912.

Location of lands opened: Ts. 17 to 20., Rs. 23 to 31 E., Mount Diablo meridian.

Present status of irrigable lands: 21,067 acres entered subject to the reclamation act; 358 acres open to entry; 28,929 acres withdrawn from entry; 102 acres State lands; 46,117 acres in private ownership (including 10,031 acres of railroad lands).

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 3 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$22 and \$30.

Annual operation and maintenance charge per acre of irrigable land: \$0.75.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1902.

Construction recommended by director, March 7, 1903.

Construction authorized by Secretary March 14, 1903.

Truckee Canal completed June, 1905.

Carson River headworks and main distributing canals completed September, 1905.

First irrigation by Reclamation Service, season of 1906.

Truckee Canal chute completed November, 1910.

Lahontan Dam commenced January, 1911.

Lahontan Dam 18 per cent completed June 30, 1912.

Entire project 69 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Truckee-Carson project provides for the storage of water in a number of small reservoirs on the headwaters of Truckee River, in Lake Tahoe, in the Alkali Flat Reservoir, near Churchill, Nev., and in Lahontan Reservoir, on Carson River, near Hazen, Nev.; the diversion of water from Truckee River by a dam about 20 miles below Reno, Nev., into the Truckee Canal, supplying water to lands in the Truckee and Carson River Valleys and to the Lahontan Reservoir; the diversion of water from Carson River by a dam near Dayton, Nev., for storage in Alkali Flat Reservoir and irrigating lands in Churchill Valley below that reservoir; and the diversion of water from Carson River by a dam about 5 miles below the Lahontan storage dam into two canal systems, one on either side of the river, watering lands in the lower Carson River Valley.

The features of the above irrigation plan which have been completed are: The diversion dam in the Truckee River; the Truckee Canal, carrying water from this diversion and discharging into the Carson River above the site of Lahontan Dam; the Truckee Canal concrete chute; the diversion dam in Carson River, situated about 5 miles below Lahontan Dam; that portion of the complete distribution system which includes laterals taking out of Truckee Canal in the vicinity of Fernley and Hazen, and two main canal systems heading at Carson diversion dam and extending over the main portions of the project in Carson Sink, with Fallon as a center.

Construction is in progress on the Lahontan Dam for the storage of flood waters in the Carson River.

The features remaining for future construction are: The completion of the dam controlling the outflow from Lake Tahoe and the construction of distributing systems for the several extensions to the project which lie adjacent to and on all sides of the project as already constructed, and such extensions of the drainage system as are found necessary.

CONSTRUCTION DURING FISCAL YEAR.

Lahontan Dam.—The construction of the hydro-electric plant of 1,000 kilowatts capacity in duplicate 500-kilowatt units, designed to furnish power for operating the construction plant was completed in December, 1911, since which time it has been operated continuously for power and lights on the work and in the camp. While the power plant was under construction the excavation for portions of the foundation of the dam, including the large spillways, was in progress by ordinary steam-shovel method, and the excavation for spillways was completed in June, 1912. Immediately after electric power became available work on the cut-off wall was undertaken, the trench was sunk deep into the seamy rock of the river bed, the concrete wall was built, and beneath it borings were made to an additional depth of 30 feet, and grouted under pneumatic pressure of 100 pounds to the square inch, with the effect of sealing the small passages in the rock and making the foundation impervious. During the winter and spring the cut-off construction was completed across the river bed and to its full length into the right abutment of the dam. The extension into the left abutment was also completed well above the ground-

water level and, as far as necessary, for facilitating the other work in progress.

The construction of the double 9-foot diameter reenforced concrete conduit, extending from the head tower in the upper slope of the dam to the terminal pool at the downstream toe of the dam, was completed in June, 1912. The permanent concrete outlet conduit also serves as the temporary diversion conduit for carrying the stream flow around the lowest portion of the foundation pit, and at the close of the year the diversion dam and the timber outlet flume were being connected with the conduit for river diversion purposes. The excavation of the pool below the dam was partially done, and a portion of the pool wall was built high enough to support the temporary diversion flume.

A mill is under construction for regrinding Portland cement with a fine sand found at the site of the dam, which will produce a so-called "sand-cement" and effect a considerable economy in the cost of concrete work.

Lahontan-Fallon transmission line.—A contract was made with the city of Fallon for delivering a maximum of 200 kilowatts of power from the hydro-electric plant for lighting, pumping, and industrial uses at Fallon.

Truckee Diversion Dam.—To provide for the free passage of all ordinary drift there was constructed during the winter of 1911-12 a spillway in the middle of the dam which gives a clear opening of 15 feet in width by 10 to 12 feet in height, made by removing the upper portion of one of the piers between the gates and providing stop planks and needles for the control of the water at any desired elevation necessary for the operation of the Main Truckee Canal. In conjunction with this spillway construction a complete repair and reconstruction of the fish ladder was undertaken.

Truckee Canal check structures.—A concrete structure with wooden needles was constructed below Fernley for the purpose of checking the water in the Truckee Canal and enabling the discharge of sufficient quantities into the laterals supplying the Fernley district. A wooden structure for the same purpose was built into a rock cut of the main canal opposite Hazen.

Extension of laterals and drains.—A few small extensions of distributing laterals and groundwater drains have been constructed by Government forces.

OPERATION AND MAINTENANCE.

Project canals were first operated in 1905 after diversion dams were completed to deliver water to vested right owners whose source of supply had been interrupted by Government construction. The distribution system was partly operated in 1906, mainly on an experimental basis, regular deliveries of water not being made until late in the spring. The first unit of the project was opened to water-right application in 1907, and charges for operation and maintenance began in that year. In March, however, phenomenal floods occurred in the Carson and Truckee Rivers, resulting in such damage to the main canals that delivery of water was partially interrupted. There has been steady progress in agricultural development since 1908.

In 1909, 111,000 acre-feet of water was distributed with an average duty of 5 acre-feet per acre; in 1910, 94,000 acre-feet with a duty of 4.65 acre-feet per acre; in 1911, 92,000 acre-feet with a duty of 4.46 acre-feet per acre; thus showing a gradual improvement in the effective use of water. Owing to the extremely light snowfall of the past winter the water supply was inadequate during the early part of the season of 1912. The moderate freshets of June, however, served to insure a good first crop of alfalfa and the main grain crop was saved, while truck crops and sugar beets were well advanced, but at the end of the month the expected stringency began to be felt, and during the balance of the season there is danger that most crops will suffer for want of water.

A small force of men and teams is maintained to clean out small laterals and drains, most of the work being done in the fall, winter, and early spring. Frost interrupted the work for some weeks, but on the whole the laterals were well maintained, the drains particularly receiving especial attention so that they have been rather more effective than usual at this season.

SETTLEMENT AND IRRIGATION.

With a few minor exceptions where water can be economically delivered, the unsettled portion of the project has remained withdrawn from entry and water-right application, and further settlement is not being encouraged pending the completion of Lahontan Reservoir. The population at the end of 1911 numbered about 1,600 on 469 farms. Agricultural development has, however, continued, since most settlers are enlarging their cultivated areas, while many large private land holdings are being subdivided with the result that a more intensive method of farming is growing up. The construction of a large sugar mill at Fallon has stimulated sugar-beet culture, and the crop is in much better condition than last year with promise of a good yield. The average yield of alfalfa was not greater than in previous years, but better prices were obtained than ever before. The total value of crops raised on the project last year was about \$427,000, compared with approximately \$303,000 in 1910.

The following shows the irrigated acreage of various crops from 1906 to 1911.

Irrigated areas, Truckee-Carson project.

	1906	1907	1908	1909	1910	1911
Alfalfa.....	6,800	6,516	6,771	8,194	10,669	12,853
Small grain.....	2,575	1,913	3,626	5,345	4,066	3,594
Potatoes.....	67	155	430	386	315	446
Garden.....	72	115	167	178	149	161
Orchard.....	32	33	130	134	156	¹ 105
Other crops.....	38	63	89	117	658	1,422
Total cultivated crops.....	9,584	8,795	11,213	14,354	16,013	18,581
Native grass.....	11,200	11,950	10,833	14,913	11,549	11,553
Total irrigated.....	20,784	20,745	22,046	29,267	27,562	30,136

¹ Scattered fruit trees and areas planted to home orchard with other crops planted between the rows, not included in this item.

The following table gives comparative statistics of yield and value of various crops for 1909, 1910, and 1911.

Yield and value of crops, Truckee-Carson project.

Crops.	Yield in tons.			Value.			Value per ton.		
	1909	1910	1911	1909	1910	1911	1909	1910	1911
Alfalfa hay.....	21,265	31,413	31,421	\$170,120	\$188,478	\$251,368	\$8.00	\$6.00	\$8.00
Other hay.....	3,187	2,518	2,650	19,122	11,531	13,250	6.00	4.50	5.00
Small grain.....	2,972	1,916	2,192	104,020	67,060	70,144	35.00	35.00	32.00
Potatoes.....	1,793	1,670	2,662	26,896	33,400	66,550	15.00	20.00	25.00
Garden.....				10,375	10,540	12,280			
Fruit and miscellaneous.....				2,726	2,000	13,444			
Total.....				333,258	302,819	427,036			

The value of crops per acre classified according to size of farms, 1911, is shown in the following table:

Yield of various sizes of farms.

Size of farm in acres.	Average value of crop per acre.	Size of farm in acres.	Average value of crop per acre.	Size of farm in acres.	Average value of crop per acre.
0 to 20.....	\$16.00	60 to 80.....	\$19.70	120 to 140.....	\$17.25
20 to 40.....	18.30	80 to 100.....	24.45	140 to 160.....	10.30
40 to 60.....	25.00	100 to 120.....	15.10	More than 160.....	8.00

ESTIMATED COST OF CONTEMPLATED WORKS.

Lahontan Dam and storage reservoir:

Estimated cost.....	\$1,530,000
Cost to June 30, 1912.....	450,100
	<hr/> \$1,079,900

Lake Tahoe storage.....	70,000
Lateral system, district 5.....	61,000
Lateral system, Pyramid Lake division.....	500,000
Improvements to Truckee Canal.....	200,000
Lateral system, district 3.....	94,000
Lateral system, district 4.....	228,000
Lateral system, Carson Lake district.....	316,000
Alkali Flat Reservoir.....	400,000
Lateral system, Churchill Valley.....	131,000
Drainage as required.....	400,000

Hydro-electric development:

Estimated cost.....	\$120,000
Cost to June 30, 1912.....	92,400
	<hr/> 27,600
	<hr/> 3,507,500

FEATURE COSTS TO JUNE 30, 1912.

Buildings:

Headquarters and permanent buildings.....	\$38,967.44
Ditch tenders' houses.....	14,725.06
	<hr/> \$53,692.50

Distribution system:		
Main canal	\$446, 700. 61	
Lateral and drainage system	1, 341, 156. 36	
Carson River Channel	131, 301. 54	
Carson Diversion Dam	91, 336. 67	
Power-house drop, V line	62, 243. 62	
		\$2, 072, 738. 80
Examination of project as a whole:		
Examination, general	40, 007. 00	
Examination, reservoir sites and storage	60, 310. 65	
Hydrography	11, 461. 17	
Drainage investigations	535. 10	
Hydrographic survey	55, 002. 36	
		167, 316. 28
Experimental farms, building and operation		6, 299. 43
Storage system:		
Lake Tahoe Reservoir and regulating works	\$4, 701. 11	
Lahontan Reservoir and storage dam	450, 091. 23	
		454, 792. 34
Main Truckee Canal:		
Earthwork and structures, including Truckee Dam	1, 559, 511. 53	
Improvement	8, 293. 15	
Truckee concrete chute	28, 248. 54	
		1, 596, 053. 22
Pyramid Lake Canal:		
Preliminary location	2, 258. 86	
Examination	608. 09	
		2, 866. 95
Real estate:		
Rights of way and land purchased	55, 831. 71	
Right-of-way donations	1, 438. 85	
		57, 270. 56
Irrigable lands:		
Farm-unit subdivisions	3, 303. 48	
Location survey, miscellaneous	1, 441. 98	
Section lines, Carson Sink Valley	10, 342. 51	
Water-right examination	3, 612. 60	
Property and structure maps	1, 622. 29	
Resurvey and soil examination	1, 793. 86	
		22, 116. 72
Telephone system, construction		41, 945. 82
Carson Lake drain, preliminary expense		3, 690. 82
Administrative expense, undistributed		5, 130. 37
Hydro-electric development:		
Lahontan power plant	\$81, 559. 56	
Lahontan-Fallon transmission line	10, 674. 01	
Fallon substation	164. 81	
		92, 398. 38
Purchase of water right		8, 038. 46
Inventory of cost ledger supplies		4, 965. 28
Total building cost		4, 589, 315. 93

OPERATION AND MAINTENANCE.

Operation	\$100, 217. 15	
Maintenance	120, 531. 76	
		\$220, 748. 91
Total building and operation and maintenance cost		4, 810, 064. 84

NEW MEXICO, CARLSBAD PROJECT.**LOCATION.**

County: Eddy.

Townships: 18 to 24 S., Rs. 25 to 29 E., New Mexico meridian.

Railroad: Atchison, Topeka & Santa Fe System.

Railroad stations and population 1910: Carlsbad 1,736, Otis,¹ Loving,¹ and Malaga,¹ N. Mex.

WATER SUPPLY.

Source of water supply: Pecos River.

Area of drainage basin: 22,000 square miles.

Annual run-off in acre-feet of Pecos River at Carlsbad and Dayton (22,000 square miles), 1899 to 1911: Maximum, 912,000; minimum, 148,000; mean, 304,000.

DATA FOR COMPLETE PROJECT.

Reservoirs: Avalon—Area, 970 acres; capacity, 7,000 acre-feet; length of three spillways, 1,000 feet; two 21 feet in diameter tunnel spillways; spill at 12.8 feet above stream bed. Elevation of above three spillways, 21 feet above stream bed. McMillan: Area, 6,250 acres; capacity, 65,000 acre-feet; No. 1 spillway, 100 feet in length and 23.3 feet above stream bed. No. 2 spillway, 600 feet in length and 25 feet above stream bed. No. 3 spillway, 2,000 feet in length and 26 feet above stream bed.

Storage dams: Avalon—Type, earth and rock fill with concrete core wall; maximum height, 50 feet; length of crest, 1,380 feet; volume, 175,073 cubic yards. McMillan—Type, earth and rock fill; maximum height, 55 feet; length of crest, 1,686 feet; volume, 149,600 cubic yards.

Length of canals: 13 miles, with capacities greater than 300 second-feet; 12 miles, with capacities from 50 to 300 second-feet; 120 miles of canals and laterals, with capacities less than 50 second-feet.

Dikes: Aggregate length, 4,350 feet at Lake McMillan; volume, 103,650 cubic yards.

Irrigable area: 20,277 acres.

Present status of irrigable land: All in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 13 miles, with capacities from 301 to 800 second-feet; 12 miles, with capacities from 50 to 300 second-feet; 120 miles, with capacities less than 50 second-feet.

Waste water ditches and drains: 6 miles.

Tunnels: 2; total length, 200 feet.

Storage dams: McMillan—Volume, earth, 100,650 cubic yards; rock fill, 48,950 cubic yards. Avalon (storage and diversion)—Volume, masonry, 12,714 cubic yards; earth, 103,207 cubic yards; rock fill, 59,152 cubic yards.

Dikes or levees for protection from overflow: Total length, 4,350 feet; volume, 103,650 cubic yards.

Canal structures: Concrete—3 costing over \$2,000 each; 6 costing from \$500 to \$2,000 each; 34 costing from \$100 to \$500 each; 253 costing less than \$100 each.

Bridges: Wood, 1; length, 225 feet.

Pipe laid: Concrete, 1,000 feet.

Flumes: Concrete, 1; length, 497; steel, 1; length, 40 feet.

Buildings: Offices, 1; residences, 4; barns and storehouses, 10.

Wells: 1; depth, 127 feet.

Roads: 25 miles.

Material excavated: Class 1, earth, 529,460 cubic yards; class 2, indurated material, 20,880 cubic yards; class 3, rock, 78,285 cubic yards.

Riprap: 57,090 cubic yards.

Cement used: 17,345 barrels.

Concrete placed: 17,481 cubic yards.

¹ Unincorporated; population not available.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 20,277 acres.

Area under water-right applications, season of 1912: 20,249 acres.

Length of irrigating season: From March to November and two weeks in winter, 260 days.

Average elevation of irrigable area: 3,100 feet above sea level.

Average annual rainfall on irrigable area: 15 inches for 11 years; 16.79 inches for calendar year 1911.

Range of temperature on irrigable area: 0° to 110°.

Character of soil of irrigable area: Pecos—Sandy loam with large lime content.

Principal products: Alfalfa, cotton, grain, crops, grapes, melons, peaches, pears, and miscellaneous fruits.

Principal markets: Carlsbad, N. Mex.; Denver, Colo.; Chicago, Ill.; Kansas City, Mo.; Texas cities; New York, N. Y.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: December 17, 1907; November 30, 1908; June 2, 1909; November 17, 1909; October 7, 1910; March 13, 1911; February 17, 1912.

Location of lands opened: Ts. 21, 22, 23, 24 S., Rs. 26, 27, 28, 29 E., New Mexico meridian.

Irrigable lands opened: 20,277 acres; all in private ownership.

Limit of area of farm units: 160 acres.

Duty of water: 3 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$31 and \$45.

Annual operation and maintenance charge: \$1 and \$1.75 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1904.

Construction recommended by board of engineers, August 31, 1905.

Construction authorized by Secretary, February 24, 1906.

Canal system of Pecos Irrigation Co. purchased February, 1906.

Black River Canal: Reconstruction completed May, 1906.

First irrigation by Reclamation Service, season of 1907.

Avalon Dam: Reconstruction completed November, 1907. Spillway construction completed July, 1912.

McMillan Reservoir: Reconstructed 1907–1909. Capacity increased during fall and winter 1911–12.

Main canals and distribution system rebuilt, 1906 to 1909.

Project completed, 1912.

IRRIGATION PLAN.

The irrigation plan of the Carlsbad project provides for the storage of water in Lake McMillan, on Pecos River, near Lakewood, N. Mex., and in a storage and distributing reservoir on the same river near Carlsbad, N. Mex., controlled by Avalon Dam, and the diversion of water from Avalon Reservoir into a canal system, watering lands on both sides of Pecos River in the vicinity of Carlsbad.

The construction of the project was completed in 1912, and the principal features are: The Avalon and McMillan earth and rock-fill dams, the former having a concrete core wall; a concrete flume or aqueduct spanning the Pecos River, with 4 arches of 100 feet each; a reinforced concrete siphon 6 feet in diameter and 400 feet long, under Dark Canyon; about 50 miles of canals and laterals (exclusive of sublaterals and ditches); a concrete head-gate structure at each of the dams and 2 tunnels driven through rock, each 21 feet in diameter, lined with concrete, aggregating 200 feet in length, equipped with heavy cylindrical gates, operated by turbines (replacing concrete spillway, equipped with wooden emergency gates;

spillway having been closed with concrete). All check-gate, spillway, and head-gate structures on the canals, and all turnouts on the laterals, are of concrete construction.

CONSTRUCTION DURING FISCAL YEAR.

The principal construction during the fiscal year consisted of repairs and betterments at Lake McMillan and the building of two concrete spillway structures at Lake Avalon. The west embankment at Lake McMillan was rebuilt and raised to the original elevation of the main dam. The east embankment was raised 5 feet and strengthened on the face by placing more rock. The main dam was raised 3 feet, and additional rock was placed on the face. At Lake Avalon a concrete structure was built to replace earth spillway No. 2, and at spillway No. 1 two tunnels were driven beneath the original concrete structure and the old gate opening closed with concrete. The East Canal was narrowed and deepened for a distance of $3\frac{1}{2}$ miles to increase the velocity and lessen seepage, and repairs were made at the Hackberry and Dark Canyon crossings, which were damaged by the flood of July, 1911. A number of concrete farm turnouts and weirs were constructed, and 4 miles of drain ditch were built along the main canal in an effort to save adjacent farm lands.

OPERATION AND MAINTENANCE.

Historical review.—The Carlsbad project was acquired by purchase from the Pecos Irrigation Co. on February 24, 1906. The first water was delivered through the canals of the project during the season of 1907 on a rental basis at \$1.25 per acre-foot. On December 17, 1907, a public notice was issued which opened for irrigation 20,073 acres of land. By June 30, 1908, water-right applications had been received for 7,557 acres, a little more than that amount being in actual cultivation, and by June 30, 1909, water-right applications had been received for 14,000 acres of irrigable land, and crops were beginning to pay good returns. On small well-tilled farms returns have been good, but some of the farms are too large, and the owners have generally insufficient capital to develop properly.

The entire system under the project was operated during the season of 1911, the number of farms irrigated being 310, aggregating 14,803 acres. Part of this acreage was irrigated during the fall of 1911 for planting new alfalfa and produced no crops during the season. Repeated rains during the irrigation season made it necessary to turn water out of the canal from time to time so that aquatic growth caused little trouble. A flood on July 24, 1911, rendered useless two spillways at Avalon, caused a break in the west embankment at Lake McMillan and damaged the east embankment at the same place. Practically no water was held in storage at the end of the season on account of this accident. Repair work was completed during the winter and spring, and at the beginning of the irrigation season of 1912 there were 35,000 acre-feet of water in storage, reaching 55,000 acre-feet on June 15, 1912. Aquatic growth has been unusually troublesome during the season of 1912 and the delivery of water has been interfered with owing to the necessity of turning water out of the canals to sun kill the moss, experiments with crude oil to stop the growth of moss proving a failure. Up to June 30, 1912, approximately 16,000 acres were in cultivation.

SETTLEMENT AND IRRIGATION.

Settlement on the project has been slow. Many new families have come in, but there has been an exodus of old settlers who have exchanged their farms for other real estate. A relatively large number of men apparently purchase land as an investment, living in the towns and renting their farms. Negotiations are now under way with a Kansas City Development Co. to sell the project lands down to smaller holdings and to loan money to actual farmers strictly for development purposes. A considerable new acreage has been planted to alfalfa, and the crop acreage is larger than in former years.

The following table shows the acreage and value of the principal crops raised during each of the past five years:

Value of crops, Carlsbad project.

Crop.	1907		1908		1909		1910		1911	
	Acre.	Value.	Acre.	Value.	Acre.	Value.	Acre.	Value.	Acre.	Value
Alfalfa.....	1,807	\$24,930	2,674	\$43,246	3,118	\$69,885	3,964	\$129,975	6,218	\$113,410
Cotton.....	474	10,835	1,526	7,650	513	20,058	1,339	60,581	3,576	84,710
Sorghum crops.....	2,074	32,074	1,974	34,166	3,033	61,977	1,476	17,634	1,239	14,045
Fruit.....			460	2,250	460		105	2,847	547	35,948
Miscellaneous.....	106	2,475	601	16,000	326	4,401	492	6,280	770	9,640

FEATURE COSTS TO JUNE 30, 1912.

Storage works:

Avalon storage and diversion dam.....	\$308,519.22
McMillan storage dam.....	72,641.90
	<hr/> \$381,161.12

Canal distribution system:

Main, East Side, and Black River Canals.....	193,324.43
Lateral system.....	35,725.70
	<hr/> 229,050.13

Real estate, lands, and rights of way.....	151,904.96
Buildings.....	2,949.18
Preliminary examination.....	41,820.47
	<hr/>

Total building cost.....	806,885.86
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OPERATION AND MAINTENANCE.

Operation as a whole.....	\$42,474.94
Maintenance of Avalon Dam.....	452.58
Maintenance of East, Main, and Black River Canals..	16,172.86
Maintenance of laterals and ditches.....	14,003.58
Maintenance of buildings.....	486.34
Maintenance of experimental farm.....	1,870.81
Maintenance of evaporation station.....	737.98
	<hr/>

Total operation and maintenance cost.....	\$76,199.09
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Total building and operation and maintenance cost.....	883,084.95
Less unadjusted credits (to be distributed to features later).....	738.91
	<hr/>

882,346.04

NEW MEXICO, HONDO PROJECT.**LOCATION.**

County: Chaves.

Townships: 11 and 12 S., Rs. 22, 23, and 24 E., New Mexico meridian.

Railroad: Atchison, Topeka & Santa Fe Ry.

Railroad station: Roswell, N. Mex. (population 1910, 6,172).

WATER SUPPLY.

Source of water supply: Hondo River.

Area of drainage basin: 1,037 square miles.

Annual run-off in acre-feet of Hondo River at the diversion dam (1,037 square miles), 1903 to 1911: Maximum, 90,500; minimum, 2,100; mean, 29,000.

DATA FOR COMPLETE PROJECT.

Reservoir: Hondo—Area, 1,910 acres; capacity, 40,000 acre-feet.

Storage dams: 6 earth embankments; maximum height, 25 feet; aggregate length, 16,200 feet; volume, 421,350 cubic yards.

Diversion dam: Type, earth fill; maximum height, 20 feet; length, 100 feet; volume, 3,700 cubic yards.

Length of canals: 3 miles with capacities greater than 300 second-feet; 2 miles with capacities from 50 to 300 second-feet; about 45 miles with capacities less than 50 second-feet.

Irrigable area: 10,000 acres.

Present status of irrigable land: 240 acres entered subject to reclamation act, 9,760 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 3 miles with capacities from 301 to 800 second-feet; 2 miles with capacities from 50 to 300 second-feet; 45 miles with capacities less than 50 second-feet.

Storage dams: Completed.

Diversion dams: Completed.

Canal structures: Concrete, 10 costing \$500 to \$2,000 each; 77 costing less than \$500 each.

Bridges: Wood, 11; total length, 130 feet.

Buildings: Residences, 1.

Telephone lines: 14 miles. Telephones in use, 5.

Material excavated: Class 1, earth, 779,990 cubic yards; class 2, indurated material, 3,000 cubic yards; class 3, rock, 35,590 cubic yards.

Riprap: 86,360 cubic yards.

Cement used: 2,805 barrels.

Concrete placed: 3,810 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area under rental contracts season of 1912: 1,150 acres.

Length of irrigating season: From March to November—245 days.

Average elevation of irrigable area: 3,750 feet above sea level.

Average annual rainfall on irrigable area: 1895 to 1910, 14.3 inches; annual rainfall 1911, 16.4 inches.

Range of temperature of irrigable area: 0° to 100°.

Character of soil of irrigable area: Rich alluvium.

Principal products: Alfalfa and fruits.

Principal markets: Roswell, N. Mex.; Kansas City, Mo.; Chicago, Ill.; and Texas cities.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. One thousand one hundred acres are being irrigated under rental contracts.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers June 6, 1904.
Construction authorized by Secretary September 6, 1904.
Hondo Reservoir site purchased December 3, 1904.
Hondo Reservoir and Inlet Canal completed August, 1906.
Distributing canals completed April, 1907.
Project completed May, 1907.

IRRIGATION PLAN.

The irrigation plan of the Hondo project provides for the diversion of water from the Hondo River about 12 miles southwest of Roswell, N. Mex., through a short inlet canal, into a natural storage reservoir, the capacity of which is increased by embankments; the return of stored water to the river, and the diversion of water from the river by three dams, 2, 4, and 6 miles, respectively, below the reservoir, into canal systems watering lands in the vicinity of Roswell, N. Mex.

All features of this project are completed, and no construction work was in progress during the fiscal year.

OPERATION AND MAINTENANCE.

This project has been operated, when water was available, since 1907, and a varying supply of water has been delivered under water-rental contracts to an average of 1,000 acres of alfalfa and 200 acres of orchard lands each year.

The first water available from the Hondo River in 1911 was on April 25, 1,150 acres of land being irrigated during the season. Crop returns were small owing to the shortage of water, the average returns amounting to \$15 per acre. Owing to the necessity of diverting the water from the river direct to the land, thereby not utilizing the settling basin and reservoir, the laterals and ditches fill with silt, necessitating frequent cleaning. On July 24, 1911, a flood washed away the Inlet Canal bank in several places, requiring about 3,000 cubic yards of earthwork to replace the breaks. This damage was repaired within a week.

The first water to reach the project from the Hondo River during 1912 was on June 7, and up to June 30 about 1,000 acres of crops had been irrigated and the first cutting of hay harvested, a fair yield being reported.

SETTLEMENT AND IRRIGATION.

In 1911 the average return per acre from 1,000 acres of alfalfa amounted to \$15 and from 100 acres of orchard to \$47.

FEATURE COSTS TO JUNE 30, 1912.

Storage works:		
Reservoir and embankment-----	\$96,246.60	
Outlet canal, excavation, and embankment-----	57,772.59	
Protection embankment and outlet canal-----	825.48	
		\$154,844.67
Diversion system:		
Inlet canal, laterals, headworks, and earthworks--	58,362.38	
Dam, rock excavation-----	35,536.31	
		93,898.69
Distribution system: Laterals-----		38,979.34
Real estate (rights and property), lands purchased-----		21,633.96
Irrigable lands, farm unit subdivision-----		19,837.41
Buildings:		
Construction-----	\$1,738.99	
Maintenance-----	472.82	
		2,211.81
Telephone line:		
Construction-----	4,170.42	
Maintenance-----	73.91	
		4,244.33
Total building cost-----		335,650.21

OPERATION AND MAINTENANCE.

Operation as a whole-----	\$16,490.68	
Maintenance of inlet canal-----	1,112.66	
Maintenance of outlet canal-----	60.92	
Maintenance of reservoir-----	844.17	
Maintenance of distributing system-----	4,454.72	
Total operation and maintenance cost-----		\$22,963.15
Total building and operation and maintenance cost-----		358,613.36

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

LOCATION.

Counties: Socorro, Sierra, Dona Ana, N. Mex.; El Paso, Tex.

Townships: 8 to 29 S., Rs. 3 E. to 5 W., New Mexico meridian.

Railroads: Atchison, Topeka & Santa Fe, El Paso & Southwestern, Southern Pacific, and Texas & Pacific.

Railroad stations and population 1910: Elephant Butte,¹ Engle,¹ Rincon,¹ Selden,¹ Leasburg,¹ Dona Ana,¹ Las Cruces, 3,836, Mesilla Park,¹ Mesquite,¹ Vado,¹ Berino,¹ N. Mex.; La Tuna,¹ El Paso, 39,279, and Ysleta, Tex.

WATER SUPPLY.

Source of water supply: Rio Grande.

Area of drainage basin: 37,000 square miles.

Annual run-off in acre-feet of Rio Grande: At San Marcial (30,000 square miles), 1895 to 1911—Maximum, 2,420,000; minimum, 201,000; mean, 1,150,000. At El Paso, Tex. (38,600 square miles), 1889 to 1911—Maximum, 2,010,000; minimum, 50,700; mean, 927,000.

¹ Unincorporated; population not available.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: Engle¹—Area, 40,080 acres; capacity, 2,627,000 acre-feet; length of spillway, 300 feet; elevation of spillway, 193 feet above stream bed.

Storage dams: Engle—Type, rubble concrete gravity, straight; maximum height, 275 feet; length of crest, 1,200 feet; volume, 500,000 cubic yards. Embankment at gap in hills necessary to form reservoir; length, 1,960 feet; maximum height, 55 feet.

Diversion dams: One built (Leasburg)—Type, rubble concrete weir; maximum height, 9 feet; length of crest, 600 feet; length of earth embankment, 1,600 feet. Other diversion dams not yet designed.

Leasburg Canal: Length, 6 miles; capacity, 520 second-feet. Other canals not yet designed.

Irrigable area: 155,000 acres in the United States (including 25,000 acres in the Leasburg unit) and 25,000 acres in Mexico, making a total of 180,000 acres.

Present status of irrigable lands (in the United States), 1,423 acres entered under the reclamation act; 11,616 acres withdrawn from entry; 141,961 acres in private ownership.

RESULTS TO JUNE 30, 1912.

STORAGE UNIT.

Dikes or levees for protection from overflow: Total length, 1,900 feet; volume, 4,220 cubic yards.

Bridges: Steel, 1; length, 300 feet. Wood, 2, over 50 feet in length; total length, 816 feet.

Buildings: Offices, 1; residences, 88 (including 56 framed tents); power plant, 1; pumping station, 1; barns, storehouses, shops, etc., 35.

Wells: 1; depth, 20 feet.

Roads: 19.1 miles.

Railroad: 10½ miles.

Telephone lines: 12 miles. Telephones in use, 31.

Transmission lines: 6 miles.

Material excavated: Class 1, earth, 65,321 cubic yards; class 2, indurated material, 41,620 cubic yards; class 3, rock, 281,313 cubic yards.

Cement used: 10,459 barrels.

Concrete placed: 9,441 cubic yards.

LEASBURG UNIT.

Canal: 6 miles, with capacity of 520 second-feet.

Diversion dam: Number, 1; volume, 2,318 cubic yards of concrete; 1,878 cubic yards of rock fill.

Dikes: Total length, 1,700 feet; volume, 16,815 cubic yards.

Canal structures: Concrete, 4, costing more than \$2,000 each. Wood, 3, costing from \$500 to \$2,000 each.

Bridges: Wood, 3, with a length of 50 feet; total length, 150 feet.

Buildings: Residences (1 of concrete), 2; barns and storehouses, 2.

Wells: 2.

Roads: 6 miles.

Telephone lines: 6 miles. Telephones in use, 2.

Material excavated: Class 1, earth, 302,082 cubic yards; class 2, indurated material, 1,300 cubic yards; class 3, rock, 570 cubic yards.

Riprap: 520 cubic yards.

Cement used: 2,960 barrels.

Concrete placed: 2,966 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: Leasburg unit, 25,000 acres.

Area under rental contracts, season of 1912: 25,000 acres.

Length of irrigating season: From February 15 to November 15—274 days.

¹ Hereafter to be known as Elephant Butte.

Average elevation of irrigable area: 3,700 feet above sea level.
 Average annual rainfall on irrigable area: $9\frac{1}{2}$ inches.
 Range of temperature on irrigable area: 0° to 100° .
 Character of soil of irrigable area: Fertile alluvium and sandy loam.
 Principal products: Alfalfa, corn, wheat, melons, fruits, vegetables.
 Principal markets: Towns in Texas, New Mexico, Louisiana, and eastern cities.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands of Leesburg unit are being irrigated under rental contracts.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in March, 1903.
 Construction of Leasburg unit recommended November 29, 1905.
 Construction of Leasburg unit authorized December 2, 1905.
 Reclamation act extended to Texas June 12, 1906 (34 Stat., 259).
 Treaty with Mexico providing for distribution of waters of the Rio Grande proclaimed January 16, 1907.
 Construction of Engle Dam authorized by Congress and \$1,000,000 appropriated March 4, 1907 (34 Stat., 1357).
 Leasburg unit completed July, 1908.
 First irrigation by Reclamation Service (Leasburg unit), season of 1908.
 Construction of Engle Dam authorized by Secretary May 23, 1910.
 Construction plans of Engle dam approved by board of engineers June 6, 1910.
 Construction plans approved by Secretary October 26, 1910.
 Entire project 20 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Rio Grande project provides for the storage of flood waters of the Rio Grande in a reservoir controlled by Engle Dam, about 12 miles west of Engle, N. Mex., and the diversion of water from the Rio Grande, about 6 miles below the storage dam, for the irrigation of lands in Las Palomas Valley; about 24 miles below for watering lands in Rincon Valley; about 60 miles below for the irrigation of 25,000 acres in Mesilla Valley, known as the Leasburg unit, and about 120 miles below for supplying water to lands in El Paso Valley and furnishing 60,000 acre-feet of water per annum for use on land in El Paso Valley on the Mexican side of the Rio Grande. All the irrigation works required for Las Palomas and Rincon Valleys will be new; those for the Leasburg unit include a diversion dam, $6\frac{1}{2}$ miles of canal, and an extension of the existing 25,000-acre canal system to cover all the lands in the Mesilla Valley, and those required for El Paso Valley will supplement and improve present canal systems.

The only features of the above irrigation plan that have been constructed are the diversion dam, headworks, and main canal of the Leasburg unit.

Construction work is in progress on the Engle Dam and the features remaining for future construction are the canal systems for the Palomas, Rincon, and El Paso Valleys and the extension of the Leasburg unit.

CONSTRUCTION DURING FISCAL YEAR.

Engle Dam.—Preliminary work has been continued and all camp structures have been erected. The steam-electric power plant, driving nearly all the machinery and furnishing light for night work and

for the camp, has been completed. A permanent pumping station for water supply was constructed at the well, and an additional concrete water tank of 75,000 gallons capacity was built to supply the lower camp. Rock quarries were opened and equipped with electric derricks and the railroad was double tracked from the quarries to the dam site, a distance of 1 mile. Three cableways were erected over the dam site to convey materials and remove excavation from the flume section. Cement storage bins and the rock-crushing and concrete-mixing plants are nearly completed. Plans have been made and bids received for machinery for the manufacture of sand-cement and except for this plant practically all heavy equipment has been purchased and installed.

Excavation for the spillway was completed except for final trimming. Excavation for the flume was finished and the flume constructed except for the part passing through the section of the dam where the excavation had to be carried to a depth of 58 feet below the river bed. Good foundation, however, was secured and concreting was begun on June 27, 1912. This was the first concrete placed which will remain as a part of the dam. The material excavated for the flume was used to build the cofferdams, which will not be completed until the flume is ready to carry the river. The spring floods of the Rio Grande in 1912 were the greatest since 1905, and the high waters occasioned some delay and extra work at the dam site, but were successfully handled without much damage to the works.

Surveys.—Farm unit and topographic surveys were resumed in the Mesilla Valley, and were commenced in the Rincon Valley. Surveys and plans were made for the enlargement and extension of the Leasburg Canal system. Studies were also made of irrigation conditions on the Rio Grande above the project for the purpose of having an understanding of the past and present conditions and their bearing upon the future.

OPERATION AND MAINTENANCE.

During the year 1911 the diversion dam and main canal on the Leasburg unit were operated to supply water to the community ditches in Mesilla Valley. The yearly contract was made with the Elephant Butte Water Users' Association, by which the Government delivered through its canal to the headgates of the Las Cruces, Dona Ana, and Mesilla ditches water in such amount as was available for irrigating approximately 25,000 acres of land in the valley. Under this contract the maximum amount of water paid for was 130,000 acre-feet. About 885 farms, approximately 25,000 acres of land, were irrigated during the year. During the season of 1912 to July 1, 89,822 acre-feet of water have been delivered. The only maintenance work done consisted of repairs to the dam and canal structures.

SETTLEMENT AND IRRIGATION.

Although only about 25,000 acres of land are being irrigated by the Leasburg diversion there was a total of about 70,000 acres under irrigation during the season of 1911. This land is distributed through the Las Palomas, Rincon, Mesilla, and El Paso Valleys on the American side and the Juarez Valley in Mexico. The principal

crops raised were alfalfa, corn, wheat, beans, and a few orchards, the average value of crops per acre amounting to \$30. Over 50 per cent of the land in cultivation was planted to alfalfa. Crop conditions for 1912 up to July 1 were favorable, although there was a late spring on the entire project.

FEATURE COSTS TO JUNE 30, 1912.

Preliminary examination:		
Hydrographic surveys-----	\$12, 871. 15	
Topographic surveys and investigations—		
General-----	\$57, 477. 13	
Soil and cement-----	1, 475. 45	
		58, 952. 58
Canal surveys—		
Mesilla Valley-----	26, 921. 52	
El Paso Valley-----	9, 260. 19	
Rincon Valley-----	3, 741. 98	
		39, 923. 69
		<u>\$111, 747. 42</u>

STORAGE UNIT.

Real estate (rights and property)—Land submerged-----	310, 954. 44	
Examination-----	19, 894. 99	
Borings-----	10, 944. 96	
Spillway-----	24, 641. 15	
		366, 435. 54
Buildings and plants-----	174, 594. 66	
Building and operating account-----	1, 013. 76	
Power plant:		
Power-plant building-----	\$16, 242. 66	
Power-plant machinery-----	101, 660. 36	
Transmission system-----	22, 016. 49	
Cooling tower-----	2, 577. 53	
Coal and ash handling machinery-----	11, 487. 37	
Water purifying and circulating system-----	2, 551. 95	
		156, 536. 36
Water supply system:		
Wells and pumping plant-----	11, 619. 74	
Concrete tanks-----	8, 317. 73	
Distribution system in general-----	19, 343. 44	
		39, 280. 91
Railroad (Butte Junction to dam site):		
Surveys-----	3, 348. 18	
Railroad proper-----	121, 933. 33	
Grading for terminal tracks and buildings-----	32, 014. 93	
Main railroad yard-----	14, 687. 59	
Trestle works, Ash and Spring Canyons-----	20, 527. 83	
Track scales-----	2, 684. 76	
		195, 196. 62
Roads and bridges:		
Roads-----	35, 692. 04	
Bridges-----	7, 399. 38	
		43, 091. 42
		<u>608, 699. 97</u>
Less depreciation on plants and buildings-----	45, 922. 80	
		<u>562, 777. 17</u>
Buildings and plants under construction:		
Air-compressing plant-----	\$914. 24	
Concrete-mixing plant-----	17, 769. 79	
Rock-crushing plant-----	19, 458. 79	

Buildings and plants under construction—Continued.

Cement-product storage plant-----	\$4,243.05	
Sandstone quarries-----	22,914.74	
Railroad east side of river-----	1,689.78	
		\$66,990.39
Construction cableway and towers:		
Head cable towers-----	8,646.60	
Tail cable towers-----	10,687.10	
Main cableways, installing machinery-----	61,847.07	
		81,180.77
Flume and cofferdams:		
Preliminary for excavation and construction of cofferdams, flume intake and outlet-----	32,549.82	
Excavation and flume, construction of flume, flume intake and outlet, and cofferdams-----	157,903.32	
Construction flume woodwork-----	3,562.30	
Concreting flume section-----	21,721.57	
Concreting dam sections of flume-----	4,745.08	
		220,482.09
Engle dam:		
Excavation for foundation of dam (flume section)-----		95,822.77
Inventory, unused supplies-----		10,115.08
Total building cost (Rio Grande unit)-----		<u>1,516,564.99</u>

LEASBURG UNIT.

Preliminary examination:

Surveys-----	\$5,776.78
Real estate (rights and property)-----	1,556.67
Irrigable lands, farm units and subdivision-----	5,994.62

Diversion dam:

Sluicing and headworks-----	\$8,065.95
Concrete weir and abutment-----	73,827.41
Embankment at west end-----	4,495.91
	86,389.27

Main canal:

Excavation station 0-59-----	31,030.46
Excavation and structure station 60- 309-----	43,847.98
Sand sluiceway-----	6,749.38
Change in river channel-----	13,809.33
	95,437.15

Telephone system-----

Roads-----	893.44
Bridges-----	234.13
	398.08

\$196,680.14

Buildings and plants:

Concrete house-----	3,031.66
Tool house, stable, corral and bunk house, water tower, fencing, tents, and windmill-----	2,028.80
	5,060.46

Total building cost (Leasburg unit)-----201,740.60

Operation and maintenance: Operation-----17,570.50

Maintenance—

Main canal and sluiceway-----	\$1,676.48
Change river channel-----	87.00
Dam, sluice, and headgates-----	314.00
Canal structures-----	284.54
Flood protection-----	99.00
Buildings and plants-----	1,405.17
Headquarters grounds-----	84.75
	3,950.94

Total operation and maintenance cost-----21,521.44

RECAPITULATION.

Building cost:	
Rio Grande unit-----	\$1, 516, 564. 99
Leasburg unit-----	201, 740. 60
Operation and maintenance cost: Leasburg unit-----	21, 521. 44
<hr/>	
Total building and operation and maintenance cost (dur-	
ing construction)-----	1, 739, 827. 03
Less unadjusted credits (to be distributed to features later)---	2, 000. 00
	<hr/>
	1, 737, 827. 03

NORTH DAKOTA, MISSOURI RIVER PUMPING PROJECT.¹

LOCATION.

County: Williams.
 Townships: 152 to 155 N., Rs. 100 to 104 W., fifth principal meridian.
 Railroad: Great Northern.
 Railroad stations and population, 1910: Buford,² Trenton,² Marley,² and Williston, 3,124, N. Dak.

WATER SUPPLY.

Source of water supply: Missouri River.
 Area of drainage basin: 155,000 square miles.
 Mean run-off of Missouri River near Williston, May to October, 1905 to 1907: 15,000,000 acre-feet.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Length of canals: Buford-Trenton unit—6 miles with capacities from 50 to 300 second-feet; 39 miles with capacities less than 50 second-feet. Williston unit—3 miles with capacities from 50 to 300 second-feet; 57 miles with capacities less than 50 second-feet.

Electric power: Generated by steam-power plant near Williston—1,500 horsepower for Buford-Trenton unit; 1,500 horsepower for Williston unit.

Irrigable area: Buford-Trenton unit (entire unit), 15,035 acres; first division, 4,060 acres; extensions, 1,375 acres; canal B, upper bottom division, 2,600 acres; canal B, lower bottom division, 4,000 acres; Trenton flat, 3,000 acres. Williston unit (entire unit), 11,147 acres—first division, 8,047 acres; west bottom division, 1,900 acres; east bottom division, 1,200 acres.

Present status of irrigable lands: Buford-Trenton unit—288 acres entered subject to the reclamation act; 251 acres open to entry; 1,640 acres withdrawn from entry; 411 acres of State lands; 12,445 acres in private ownership. Williston unit—54 acres entered subject to the reclamation act; 289 acres open to entry; 67 acres of State lands; 10,737 acres in private ownership.

RESULTS TO JUNE 30, 1912.

BUFORD-TRENTON UNIT.

Canals: 1 mile with capacities from 50 to 300 second-feet; 14 miles with capacities less than 50 second-feet.

Canal structures: Concrete, 2 costing more than \$2,000 each; 1 costing from \$500 to \$2,000; 8 costing \$100 to \$500 each; costing less than \$100, wood 23.

Bridges: Combination—4 less than 50 feet in length; total length, 68 feet.

¹ Hereafter this project to be known as North Dakota Pumping Project.

² Unincorporated; population not available.

Culverts: Concrete, 6; total length, 230 feet; wood, 23; total length, 398 feet.

Pipe laid: Concrete, 2,762 feet; steel, 434 feet.

Flumes: Concrete 1, length 42 feet; steel 1, length 296 feet.

Buildings: Office, 1; residences, 3; barns and storehouses, 2.

Pumping stations: Permanent, 1; floating barge, 1.

Telephone lines: 29 miles. Telephones in use, 2.

Transmission lines: 29 miles.

Material excavated: Class 1, earth, 69,600 cubic yards; class 2, indurated material, 50 cubic yards.

Paving: 240 square yards.

Cement used: 2,599 barrels.

Concrete placed: 1,654 cubic yards.

WILLISTON UNIT.

Canals: 3 miles with capacities from 50 to 300 second-feet; 43 miles with capacities less than 50 second-feet.

Canal structures: 8 costing more than \$2,000 each; 11 costing from \$500 to \$2,000 each; 22 costing \$100 to \$500 each; costing less than \$100; concrete 3, wood 75.

Bridges: Combination, 12, less than 50 feet in length; total length, 225 feet; wood, 3, less than 50 feet in length; total length, 31 feet.

Culverts: Concrete, 25; total length, 1,112; wood, 78; total length, 2,263.

Pipe laid: Concrete, 2,283 feet; steel, 326 feet.

Flumes: Steel 3, length 296 feet; wood 2, length 213 feet.

Buildings: Offices, 2; residences, 6; barns and storehouses, 5; power station, 1.

Pumping stations: Permanent, 2; floating barge, 1.

Telephone lines: 4 miles. Telephones in use, 5.

Transmission lines: 4 miles.

Material excavated: Class 1, earth, 219,100 cubic yards; class 2, indurated material, 16 cubic yards.

Coal mined: 24,855 tons.

Paving: 990 square yards.

Cement used: 3,329 barrels.

Concrete placed: 2,632 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: Buford-Trenton unit, 4,060 acres; Williston unit, 8,047 acres.

Area under water-right applications, season of 1911: 12,239 acres.

Length of irrigation season: From June 5 to August 30—87 days.

Average elevation of irrigable area: 1,900 feet above sea level.

Average annual rainfall on irrigable area (past 10 years): 13.2 inches.

Range of temperature on irrigable area: -49° to 107° .

Character of irrigable area: Ranges from sandy loam to heavy clay gumbo.

Principal products: Small grains, alfalfa, and vegetables.

Principal markets: Local, St. Paul, Minneapolis, and Duluth, Minn., Chicago, Ill.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Buford-Trenton unit, April 8, 1908; March 9, 1911; May 13, 1911; and June 25, 1912; Williston unit, April 27 and November 30, 1908; April 30, 1909; March 9 and April 14, 1911; and June 25, 1912.

Location of lands open: Buford-Trenton unit, Ts. 152 and 153 N., Rs. 103 and 104 W., fifth principal meridian; Williston unit, Ts. 154 and 155 N., Rs. 100 and 101 W., fifth principal meridian.

Present status of irrigable lands: Buford-Trenton unit—288 acres entered subject to reclamation act; 251 acres open to entry; 91 acres of State lands; 3,430 acres in private ownership. Williston unit—54 acres entered subject to

the reclamation act; 289 acres open to entry; 67 acres of State land; 7,637 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: Two acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: Thirty-eight dollars under old public notices.

Annual operation and maintenance charge: Seventy cents per acre of irrigable land and 50 cents per acre-foot of water actually used, under old public notices; \$1.50 per acre of irrigable land and \$1 per acre-foot of water used, order of May 13, 1911.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers September 22, 1905.

Construction authorized by Secretary January 23, 1906.

First division, Buford-Trenton unit, completed November, 1907.

Power and pumping plants, Williston unit, completed for present use in the fall of 1907; first division completed in the spring of 1908.

Pumping plant and transmission lines, Buford-Trenton unit, completed for present use in the spring of 1908.

First irrigation by Reclamation Service, season of 1908.

Power installation completed for 2,000 horsepower June 30, 1910.

Buford-Trenton unit 38 per cent completed June 30, 1912; Williston unit 64 per cent completed June 30, 1912.

Entire project 50 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Missouri River Pumping project provides for a central steam turbine power plant located near Williston, operating pumps and generating electricity for the operation of other pumps on the Buford-Trenton and Williston units. On the Buford-Trenton unit water is pumped from a barge into a settling basin 30 feet above the river, and is then lifted by a permanent pumping station into a canal 50 feet above the settling basin for the irrigation of bench lands near Buford. A transmission line 28.3 miles in length delivers power for the operation of the pumps. The plan of the Williston unit provides for a series of motor-driven, centrifugal pumps on a barge in the Missouri River; a settling basin receiving the water from the barge, and a main canal of 100 second-feet capacity extending along Little Muddy Creek to the power plant, where two sets of steam-driven turbines operate centrifugal pumps to lift water 51 feet into E canal. From the main canal, about midway between the river and the power plant, electrically driven pumps raise 35 second-feet 28 feet into B canal, and from this canal 20 second-feet are raised an additional 28 feet into C canal. The main power station is located close to a 9-foot vein of lignite coal, from which fuel is obtained.

The features of the above irrigation plan which have been completed are: The central power station, coal mine, and transmission lines; at Buford-Trenton unit, two pumping stations, settling basin, and canal system; at Williston unit, four pumping stations, two settling basins, and canal system. No construction work is in progress at the present time. Features remaining for future construction are: The enlargement of the power house and installation of additional machinery; at Buford-Trenton unit, extension of high-line canal and construction of low-line canal and laterals for irriga-

tion of bottom lands; at Williston unit, construction of east and west bottom canal systems, with additional intake and pumping stations.

OPERATION AND MAINTENANCE.

Although the project was formally opened in 1908, the season was one of preparation both for the farmers and the power plant and distribution system. In 1909 enough rain fell to raise a crop, without much irrigation, but the year 1910 was very dry, and the most skeptical were convinced that irrigation is uniformly necessary. In 1911 an order was issued granting a new basis of charges for three years and requiring a uniform increase in the acreage to be watered. On the two units applications for water were made covering 5,504 acres. A severe hailstorm, however, destroyed a considerable percentage of the crops of the Williston unit, and as a result the water users of the Williston unit petitioned the Secretary of the Interior for postponement of the payments due on account of the 1911 operation. An order granting such relief was signed by the Secretary on June 25, 1912.

During the season of 1911 the power plant, coal mine, transmission lines, two barge pumping stations, four permanent pumping stations, settling basins, and 50 miles of canal were operated. On the Buford-Trenton unit 1,472 acre-feet of water were delivered to 21 farms, aggregating 1,333 acres, of which 1,163 acres were irrigated. On the Williston unit 77 farms, comprising 4,171 acres, were served with 2,952 acre-feet of water, 2,426 acres being irrigated. During the pumping season of 1911, 5,362 tons of coal were mined, at an average cost of \$1.50 per ton, including \$0.14 per ton for maintenance of mine. During the first six months of 1912 the power plant was not operated and no water was delivered.

SETTLEMENT AND IRRIGATION.

The population on the farms in the two units in 1911 was about 160, the reason for the small population being that most of the farmers live in town. It is now realized that the homestead entries of 160 acres of land are too large, and the surplus will be sold off as rapidly as buyers can be found. Crops are becoming more diversified, and each year the acreage in alfalfa increases. The following table gives statistics regarding the acreage irrigated and the value of the crops produced during each of the years from 1908 to 1911:

Value of crops, Missouri River Pumping project.

	1908	1909	1910	1911
Buford-Trenton unit:				
Acres irrigated.....	810	159	457	1,163
Value of crops.....	\$12,489	\$3,687	\$3,395	\$13,460
Average value of crops per acre.....	\$15.30	\$23.19	\$7.43	\$18.00
Williston unit:				
Acres irrigated.....	1,048	1,450	1,403	2,426
Value of crops.....	\$13,583	\$32,378	\$21,023	\$34,995
Average value of crops per acre.....	\$5.30	\$18.71	\$14.98	\$23.16

FEATURE COSTS TO JUNE 30, 1912.

Coal-mine development.....		\$12,685.98
Williston power plant:		
Power plant.....	\$157,628.63	
Transformer station at barge.....	2,446.22	
Excavation.....	977.63	
Concrete work.....	8,804.57	
Reenforcing-steel work.....	180.90	
Structural-steel work.....	686.10	
Roofing work.....	1,324.65	
Millwork.....	521.60	
Water conduits.....	1,048.55	
Machinery, installation and testing.....	54,692.65	
Temporary end in boiler room.....	387.89	
		228,699.39
Williston pumping substation A.....		12,550.36
Williston barge.....	\$35,354.27	
Floating boom at barge.....	691.04	
Scow pontoon.....	1,256.27	
		37,301.58
Williston pumping substation B.....		7,386.45
Buford-Trenton barge.....	\$32,899.38	
Boom and scow pontoon.....	705.81	
		33,605.19
Buford-Trenton substation A.....		32,484.77
Transmission and telephone line.....		37,451.43
Williston canals and basin:		
Distributing system.....	\$122,595.65	
Equalizing reservoir.....	1,071.87	
Spillway at reservoir.....	502.08	
Turnout at reservoir.....	217.00	
Diverting structure at reservoir.....	565.34	
Sluicing boat.....	763.32	
Bank protection at settling basin.....	103.58	
Bank revetment, Missouri River.....	1,598.63	
		127,417.47
Buford canals and basin:		
Settling basin.....	6,698.08	
Brush mattress (settling basin).....	117.42	
Concrete pressure pipe.....	19,624.92	
Canals and structures.....	23,207.87	
Canal B.....	2,181.89	
Six Mile flume.....	713.05	
		52,543.23
Buildings and plants.....		15,899.93
Real estate.....		5,620.25
Irrigable lands: Surveys and town sites.....		14,255.42
Examination of project as a whole.....		33,718.90
Administration of project as a whole.....		66,197.46
		717,817.81

OPERATION AND MAINTENANCE.

General expense.....		\$4,137.91
Williston unit:		
Coal mine.....	\$1,447.07	
Power plant.....	66,502.16	
Power-plant camp maintenance.....	1,014.34	
Pumping substation A.....	2,654.94	
Barge.....	18,367.20	
Pumping substation B.....	1,764.71	
Transmission and telephone line.....	1,729.40	
Canal system and basin.....	13,975.82	
Buildings (detached).....	282.94	
		107,738.58

General expense—Continued.

Buford-Trenton unit:	
Barge	\$22,363.44
Pumping substation A	25,399.30
Transmission and telephone line	5,283.38
Canal system and basin	7,077.59
Buildings (detached)	73.08
	<hr/>
Inventory of cost-ledger supplies	\$60,196.79
	<hr/>
Total operation and maintenance cost	106.95
	<hr/>
Total building and operation and maintenance cost	172,180.23
	<hr/>
Total building and operation and maintenance cost	\$89,998.04
Less unadjusted credits (to be distributed to features later)	4,961.03
	<hr/>
	\$85,037.01

OREGON, CENTRAL OREGON PROJECTS.

IRRIGATION PLAN.

The Central Oregon projects consist of a number of possible irrigation developments in the State of Oregon, located in the Deschutes, Snake, and Columbia River Basins and in the interior basin. The irrigation plan of these projects provides in general for utilization of the waters of various small streams in these drainage basins.

INVESTIGATIONS.

A reconnaissance was made in 1903 of some of the streams and irrigable areas of these projects, and stream measurements and investigations of water supply have been carried on since that date.

In 1908 a reconnaissance, covering in part projects previously reported on but much more complete and thorough than investigations previously attempted, was made in central and eastern Oregon. Irrigation projects on Crooked, Ochoco, Tumalo, and Rosland Rivers, in the Deschutes River Basin; on the Chewaucan, Ana, Pauline, Rock Fort, Silvies, and Blitzen Rivers, and Silver Creek, in the interior basin; on Powder River, in the Snake River Basin; and on the John Day and Umatilla Rivers, in the Columbia River Basin, were investigated with considerable care; and new gauging stations were established along the more important streams.

FEATURE COSTS TO JUNE 30, 1912.

Preliminary examination and surveys	\$40,391.67
65371°—13—11	

OREGON, UMATILLA PROJECT.**LOCATION.**

County: Umatilla.

Townships: 4 and 5 N., Rs. 28 and 29 E., Willamette meridian.

Railroads: Oregon-Washington Railroad & Navigation Co.; Northern Pacific.

Railroad stations and population 1910: Hermiston, 647; Umatilla, 198.

WATER SUPPLY.

Source of water supply: Umatilla River.

Area of drainage basin: 1,610 square miles.

Annual run-off in acre-feet of Umatilla River at Yoakum: (1,200 square miles) 1903 to 1911—Maximum, 694,000; minimum, 250,000; mean, 474,000.

SUMMARY OF DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoir: Cold Springs—Area, 1,500 acres; capacity, 50,000 acre-feet; length of spillway, 330 feet; elevation of spillway, 90 feet above stream bed.

Storage dam: Cold Springs—Type, earth fill; maximum height, 98 feet; length of crest, 3,800 feet; volume, 757,000 cubic yards earth and gravel, 32,500 cubic yards rock fill, and 3,900 cubic yards concrete.

Diversion dam: Type, concrete weir; maximum height, 2.5 feet; length of masonry, 400 feet; length of earth fill, 780 feet; volume, 296 cubic yards concrete, 6,400 cubic yards earth and gravel, and 810 cubic yards rock fill.

Length of canals: 25 miles with capacities greater than 300 second-feet; 25 miles with capacities from 50 to 300 second-feet; 100 miles with capacities less than 50 second-feet.

Tunnels: 1; length, 34 feet.

Dikes: Aggregate length, 1,400 feet; volume, 8,000 cubic yards.

Water power: Drainage outfall, 75 horsepower (not developed).

Irrigable area: Whole project, 25,000 acres; Hermiston unit, 6,968 acres; second unit, 4,350.5 acres; third unit, 3,957.5 acres; fourth unit, 1,976.5 acres.

Present status of irrigable land: 10,794 acres entered subject to the reclamation act; 156 acres open to entry; 1,746 acres withdrawn from entry; 38 acres State lands; 12,266 acres private lands.

RESULTS TO JUNE 30, 1912.

Canals: 25 miles with capacities from 301 to 800 second-feet; 25 miles with capacities from 50 to 300 second-feet; 100 miles with capacities less than 50 second-feet.

Waste-water ditches and drains: 6 miles.

Storage dam: Cold Springs, completed.

Diversion dam: Completed.

Tunnel: Completed.

Dikes or levees for protection from overflow: Completed.

Canal structures: Costing over \$2,000 each, concrete, 13; costing from \$500 to \$2,000 each, concrete, 7; costing from \$100 to \$500 each, concrete, 25; costing less than \$100 each, concrete, 282; wood, 249.

Bridges: Steel, 1; total length, 185 feet. Wood, 34; total length, 816 feet. Concrete, 1; total length, 31 feet.

Culverts: Concrete, 4; length, 130 feet.

Pipe laid: Concrete, 77,100 feet; wood, 10,500 feet.

Flumes: Steel, 21; total length, 1,000 feet. Wood, 4; total length, 365 feet.

Buildings: Offices, 1; residences, 6; barns and storehouses, 6.

Roads: 6.5 miles.

Telephone lines: Local company supplies service. Telephones in use, 15.

Material excavated: Class 1, earth, 2,250,000 cubic yards; class 2, indurated material, 108,000 cubic yards; class 3, rock, 42,200 cubic yards.

Riprap: 34,500 cubic yards.

Paving: 4,200 square yards.

Cement used: 30,000 barrels.

Concrete placed: 19,550 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1911: 17,252 acres.

Area under water-right applications, season of 1912: 13,781 acres.

Length of irrigation season: From March 20 to October 16—210 days.

Average elevation of irrigable area: 470 feet above sea level.

Average annual rainfall on irrigable area: 7.35 inches.

Range of temperature on irrigable area: -28° F. to 115° F. (ordinary minimum, 0° F.).

Character of soil irrigable area: Sandy loam and volcanic ash.

Principal products: Alfalfa, fruits, berries, vegetables.

Principal markets: Portland, Oreg., and Spokane, Wash.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 27, 1907; August 3, 1908; November 12, 1908; April 3, 1909; January 6, 1910 (two); February 28, 1911; May 16, 1911; March 2, 1912.

Location of lands opened: Ts. 4 and 5 No., Rs. 28 and 29 E., Willamette meridian.

Present status of irrigable area opened: 8,300 acres entered subject to reclamation act; 156 acres open to entry; 217 acres withdrawn from entry; 8,806.5 acres private lands.

Limit of area of farm units: Public, 40 acres; private, 160 acres.

Duty of water: 2.8 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$60 and \$70.

Annual operation and maintenance charge: \$1.30 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in 1905.

Construction recommended by board of engineers October 27, 1905.

Construction authorized by Secretary December 4, 1905.

Diversion dam and feed canal completed August, 1907.

Cold Springs Dam completed June, 1908.

Hermiston unit completed June, 1908.

Maxwell Canal system purchased June 4, 1908.

First irrigation by Reclamation Service, season of 1908.

Cold Springs Reservoir filled to maximum capacity May 1, 1911.

Entire project 80.7 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Umatilla project provides for the diversion of water from the Umatilla River above Echo, Oreg., through a feed canal into a storage reservoir controlled by Cold Springs Dam. Water is diverted from the reservoir through an outlet canal; from the feed canal by means of a by-pass connecting the feed and outlet canals, and from the Umatilla River by the Maxwell Canal, heading near Butter Creek, into a distribution system watering land in the Umatilla and Columbia River Valleys near Hermiston, Oreg. The features which have been completed are: The diversion works, feed canal, Cold Springs Dam, by-pass, main distributary, and laterals for the first, second, third, and fourth units. Three drain ditches have been built, one of which is in process of enlargement. The main construction work in progress is the placing of mortar lining in the distribution system and additional concrete lining in the feed canal.

The features remaining for future construction embrace the watering of lands lying between the feed canal and the present distribution system by means of direct pumping, the watering of lands in the

vicinity of Umatilla, and the watering of lands lying above the present distributaries by means of electric pumping from power to be developed at the outfall of the drain ditch and at other points. Other lands near the Columbia River will be included in future units, and canals and laterals will be constructed as needed.

CONSTRUCTION DURING FISCAL YEAR.

Feed Canal.—One thousand seven hundred and twenty-six linear feet of side lining, 141 linear feet of bottom lining, and 72 linear feet of full lining were placed in the canal by Government forces. The total length of full concrete or mortar lining in the feed canal on June 30, 1912, was 8,096 linear feet, the total length of side and bottom lining was 141 linear feet, and the total length of side lining was 10,404 linear feet.

Cold Springs Dam.—The only work at Cold Springs Dam consisted in placing about 450 linear feet of 3-inch drain tile near the south end of the dam to carry off seepage water and dumping a little rock fill at the sides of the drop from the feed canal to the reservoir.

Distribution system.—The irrigable area was not extended and no new distributaries were built, but 57,000 square yards of mortar have been placed in the distribution system, 44,000 linear feet being wholly or partially lined, and 2,520 cubic yards of mortar being placed. During the year 3,900 linear feet of 20-inch and 4,100 linear feet of 16-inch machine-banded wood-stave pipe were laid and 3,890 linear feet of 12-inch, 6,740 linear feet of 16-inch, and 5,580 linear feet of 20-inch cement pipe. Sixty concrete turnouts were cast in the yard and assembled in the field. Work on enlarging the Hermiston drain with a drag bucket excavator began in February, 1912, and at the end of the fiscal year 66,000 cubic yards of material had been removed from the Hermiston drain, 15,200 cubic yards from the Hat Rock drain, and 1,000 cubic yards from the Cold Springs drain. Two truss bridges of 42-foot span each were placed across the Hermiston drain.

OPERATION AND MAINTENANCE.

Season of 1908.—Water was first admitted into the Feed Canal in the fall of 1907, and the first water reached Cold Springs reservoir in February, 1908. The canal was operated into June, 25,750 acre-feet being diverted from the river and 21,000 acre-feet delivered to the reservoir, with a maximum storage of 10,600 acre-feet in June. The distribution system was operated from March to September, 12,100 acre-feet of water being delivered to 2,400 acres. The Maxwell Canal was acquired in June, 1908, but was not operated that year.

Season of 1909.—Water was admitted to the Feed Canal in November, 1908, and the canal was operated into June, 1909, 52,400 acre-feet being diverted from the river and 41,000 acre-feet delivered to the reservoir. A maximum storage of 27,000 acre-feet was reached in June. The distribution system was operated from March to October, 34,000 acre-feet being delivered to 5,100 acres. The Maxwell Canal was operated during the late spring and early summer.

Season of 1910.—Water was admitted to the Feed Canal in November, 1909, and the canal was operated into June, 1910, 68,000 acre-feet

being diverted from the river and 59,000 acre-feet delivered to the reservoir. A maximum storage of 43,000 acre-feet was reached in May. The distribution system was operated from March to October, 40,200 acre-feet being delivered to 6,100 acres. The Maxwell Canal was operated during the late spring and early summer.

Season of 1911.—Water was admitted to the Feed Canal in November, 1910, and the canal was operated into June, 1911, 80,770 acre-feet being diverted from the river and 71,196 acre-feet delivered to the reservoir. A maximum storage of 50,000 acre-feet was reached in May, 1911. The Maxwell Canal was operated from March, 1911, to September, 1911, 6,814 acre-feet being diverted from the river. The distribution system was operated from March 20 to September 15, 1911, and a total of 55,185 acre-feet were distributed, 48,371 acre-feet being delivered by Cold Springs Reservoir and 6,814 acre-feet diverted by the Maxwell system. The area of the irrigated holdings was 8,600 acres and the area actually irrigated 3,500 acres.

Season of 1912.—Diversion of water through the Feed Canal was resumed on November 13, 1911, and was continued until June 25, 1912, 74,200 acre-feet being diverted from the river and 63,500 acre-feet reaching the reservoir. The reservoir was filled on April 16, 1912, the available storage being 50,000 acre-feet. A maximum storage of 50,300 acre-feet was reached on April 19, May 8 and 9, and June 4 and 5, the available storage on June 30, 1912, being 45,700 acre-feet. Delivery of water through the distribution system was commenced on April 1, with a total discharge from the reservoir up to June 30 of 19,600 acre-feet. Diversion of water through the Maxwell Canal was commenced on the same date, the total diversion amounting to 6,300 acre-feet. The area of irrigated holdings during the present season is estimated at 9,000 acres and the area actually irrigated at 4,000 acres.

SETTLEMENT AND IRRIGATION.

The total population on the project was 1,100 in 1911, 470 living within the platted portion of Hermiston and 630 outside.

Settlement has advanced slowly, two vacant homesteads remaining in the third unit and seven in the second. Seven tracts of Northern Pacific land, totaling 154 irrigable acres, are not yet covered by water-right applications, and there has been little progress in the sale of Maxwell lands, fully 2,000 acres not being covered by water-right applications. The estimated value of buildings and other improvements was \$452,000 and the estimated value added to the land through agriculture was \$264,000. No revenue was derived from orchard products, while strawberries hardly supplied the local demand, probably a larger quantity being shipped in than were shipped out. Local consumers took the greater part of the alfalfa grown, although several carloads of baled alfalfa were shipped. Vegetables and small fruits were not grown in sufficient quantity to meet the local demand.

During the irrigation season of 1912 there was an increased acreage seeded to alfalfa and in orchards, the latter generally showing a fairly satisfactory growth. Many settlers are cultivating potatoes quite extensively, several carloads having been shipped.

WEST EXTENSION.

In January, 1911, the department ordered surveys to be made to determine the feasibility of extending the Umatilla project west of the Umatilla River. The reservoir site was mapped, investigations were made of the various storage-dam sites, the irrigable area was mapped, and estimates were made of the cost of watering the land. A preliminary report and estimate was prepared and transmitted to the department December 8, 1911. A board of engineers convened at Hermiston, Oreg., on January 29, 1912, and on February 8, 1912, recommended that 30,000 acres be watered at an estimated cost of about \$100 per acre. The recommendation was approved by the Secretary on March 7, 1912, contingent on satisfactory arrangements being made with not less than 95 per cent of the private lands involved, and negotiations with the landowners are still pending.

FEATURE COSTS TO JUNE 30, 1912.**Storage works:**

Cold Springs Dam.....	\$373, 671. 11	
Buildings at dam.....	12, 772. 15	
Inlet works.....	13, 163. 58	
Main spillway.....	33, 998. 89	
Feed Canal near dam.....	2, 426. 58	
Outlet works.....	6, 766. 72	
		<hr/>
		\$442, 799. 03

Storage feed canal:

Diversion works and canal.....	241, 732. 08	
Repairing and priming.....	12, 370. 84	
Wasteways.....	7, 221. 59	
Bridges and crossings.....	2, 583. 68	
Concrete lining and cut-off wall.....	32, 693. 30	
Buildings.....	2, 970. 52	
		<hr/>
		299, 572. 01

Distribution system:

Canals and laterals.....	82, 872. 10	
By-pass drops, turnouts and miscellaneous structures.....	39, 887. 25	
Pipe lines.....	216, 742. 05	
Crossings and bridges.....	5, 760. 47	
Priming canals.....	3, 381. 84	
Subdivision of land.....	1, 089. 81	
Reconstruction and repairs, old Maxwell system.....	3, 062. 82	
Drainage.....	40, 382. 85	
Lining canals.....	42, 561. 37	
		<hr/>
		435, 740. 56

Demonstration farm: Barns, other buildings, and fences.....	3, 421. 47	
Rights and property: Real estate and water-right adjudication.....	55, 895. 20	
Buildings, Hermiston.....	9, 206. 47	
Examination of project as a whole: Surveys and designs.....	24, 956. 00	
West branch of project.....	25, 729. 32	

West extension, examination and investigation:

Topographic surveys, irrigable lands.....	\$25, 409. 61	
Dam-site investigation.....	21, 294. 00	
Reservoir-site topographic survey.....	2, 293. 05	
		<hr/>
		48, 996. 66

Total building cost.....	<hr/>	1, 346, 316. 72
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OPERATION AND MAINTENANCE

Operation feed canal.....	\$21, 315. 36
Operation reservoir.....	5, 060. 69
Operation laterals.....	20, 076. 75

Maintenance feed canal-----	\$14,548.43	
Maintenance laterals-----	42,925.05	
Maintenance pipe lines-----	2,701.74	
Maintenance drainage system-----	802.84	
Betterments feed canal-----	5,167.43	
Betterments reservoir-----	1,563.62	
Betterments laterals-----	7,043.07	
Betterments pipe lines-----	20.83	
Betterments Government buildings, headquarters-----	1,186.61	
Betterments Government buildings, feed canal-----	905.82	
Betterments Maxwell Dam-----	305.15	
		\$123,623.40
Total building and operation and maintenance cost-----		1,469,940.12

OREGON-CALIFORNIA, KLAMATH PROJECT.

LOCATION.

Counties: Klamath, Oreg.; Siskiyou and Modoc, Cal.

Townships: 38 to 41 S., Rs. 8 to 14 E., Willamette meridian; 46 to 48 N., Rs. 1 to 8 E., Mount Diablo meridian.

Railroad: California Northeastern.

Railroad stations and population, 1910. Klamath Falls, 2,758; Midland¹ and Ady,¹ Oreg.

WATER SUPPLY.

Source of water supply: Upper Klamath Lake and Clear Lake.

Area of drainage basin: 3,700 square miles.

Annual run-off in acre-feet, 1904 to 1911: Link River at Klamath Falls—Maximum, 2,530,000; minimum, 1,450,000; mean, 1,790,000. Lost River and Willow Creek at Clear Lake—Maximum, 255,000; minimum, 35,000; mean, 129,000. Lost River at Olene and Merrill, 1904-1911—Maximum, 475,000; minimum, 150,000; mean, 277,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: Upper Klamath Lake—Area, 60,000 acres; capacity, 200,000 acre-feet. Clear Lake—Area, 25,000 acres; capacity, 462,000 acre-feet; length of spillway, 357 feet; elevation of spillway, 24 feet above stream bed.

Storage dam: Clear Lake—Type, rock fill; maximum height, 33 feet; length of crest, 790 feet; volume, earth, 23,100 cubic yards; rock, 33,500 cubic yards.

Diversion dam: Lost River—Type, hollow reenforced concrete; maximum height, 40 feet; length of masonry, 290 feet; length of earth fill, 385 feet. Volume—Concrete, 5,550 cubic yards; earth fill, 13,100 cubic yards.

Length of canals: 10 miles with capacities greater than 300 second-feet; 58 miles with capacities from 50 to 300 second-feet; 184 miles with capacities less than 50 second-feet.

Tunnel: 1; length, 3,300 feet.

Dikes: Aggregate length, 2,800 feet, exclusive of marsh reclamation.

Power development: Not determined.

Irrigable area: Entire project, 72,000 acres; first unit, 30,000 acres; second unit, 7,000; Tule Lake, 35,000 acres.

¹ Unincorporated; *population not available.

Present status of irrigable land: 44 acres entered subject to the reclamation act; 23 acres open to entry; 32,000 acres withdrawn from entry; 40,000 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 9 miles with capacities greater than 800 second-feet; 1 mile with capacity from 300 to 800 second-feet; 42 miles with capacities from 50 to 300 second-feet; 76 miles with capacities less than 50 second-feet.

Waste-water ditches and drains: 26 miles.

Tunnels: Completed.

Storage dam: Completed.

Diversion dam: Completed.

Dikes or levees for protection from overflow: Total length, 5,700 feet; volume, 40,300 cubic yards.

Canal structures: Costing over \$2,000 each—Concrete, 9; wood, 2. Costing from \$500 to \$2,000 each—Concrete, 9. Costing from \$100 to \$500 each—Concrete, 23; wood, 7. Costing less than \$100 each, 750.

Bridges: Wood, 19 over 50 feet in length; 84 less than 50 feet in length; total length, 3,680 feet.

Culverts: Concrete, 3; length, 410 feet. Wood, 8; length, 400 feet.

Pipe laid: Concrete and vitrified, 1,471 feet; steel, 172 feet.

Flumes: Wood, 6; length, 6,500 feet.

Buildings: Offices, 1; residences, 6; barns and storehouses, 12.

Wells: 6; aggregate depth, 690 feet.

Roads: 6 miles.

Telephone lines: 66 miles. Telephones in use, 40.

Material excavated: Class 1, earth, 1,991,256 cubic yards; class 2, indurated material, 300,594 cubic yards; class 3, rock, 104,724 cubic yards.

Riprap: 7,894 cubic yards.

Paving: 5,603 square yards.

Cement used: 22,550 barrels.

Concrete placed: 17,165 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Areas for which the service is prepared to supply water, season of 1912: 30,000 acres.

Area under water-right applications and rental contracts, season of 1912: 28,087 acres.

Length of irrigation season: From May 1 to September 30—153 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Average annual rainfall on irrigable area, for 8 years: 13.6 inches; 1911, 10.2 inches.

Range of temperature on irrigable area: -10° to 100° .

Character of soil of irrigable area: Disintegrated basalt, volcanic ash, and diatomaceous earth, being largely classified as Yakima sandy loam.

Principal products: Alfalfa, hay, grain, and vegetables; stock, poultry, and dairy products.

Principal markets: Portland, Oreg.; Sacramento and San Francisco, Cal.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: November 18 and December 7, 1908; August 24, 1909; June 9, 1910.

Location of lands opened: Ts. 38 S., R. 9 E.; 39 S., Rs. 8 to 10 E.; 40 S., Rs. 9 to 11 E.; 41 S., Rs. 10 to 12 E., Willamette meridian; and 48 N., R. 5 E., Mount Diablo meridian.

Present status of irrigable lands opened: 44 acres entered subject to the reclamation act; 23 acres open to entry; 30,841 acres in private ownership.

Limit of area of farm units: 160 acres.

Duty of water: 1.8 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable area: \$30.

Annual operation and maintenance charge: \$0.75 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnaissance made in October and November, 1903.

Preliminary surveys begun in 1904.

Construction recommended by a board of engineers, May 1, 1905.

Construction authorized by Secretary, May 15, 1905.

Canal system of Klamath Falls Irrigation Co. purchased July 28, 1906.

Adams Canal purchased October 15, 1906.

Main Canal completed August, 1907.

First irrigation by Reclamation Service, season of 1907.

Keno Canal completed October, 1908.

South Branch Canal completed March, 1909.

Clear Lake Dam completed January, 1910.

Lost River Diversion Dam completed June, 1912.

Lost River Diversion Channel completed April, 1912.

Entire project 71 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Klamath project involves the utilization of Clear Lake and Upper Klamath Lake as storage reservoirs. The storage in Clear Lake, with the aid of the Lost River diversion works recently completed, combined with evaporation from Tule Lake during the next eight years, is expected to reclaim 35,000 acres of land now submerged under the northerly portion of Tule Lake. The 30,000 acres of land now being irrigated lie in Oregon in a narrow strip extending 30 miles in a southeasterly direction from Klamath Falls to the California line, receiving water from the Upper Klamath Lake through the Main, South Branch, and Adams Canal systems. Extensions from this system, to be known as the North and South Poe Valley and Nuss Lake laterals, together with the Griffith lateral, diverted from the Lost River Dam, are now under construction, and will irrigate Poe Valley and a belt of land lying east of Lost River between Olene and Merrill, amounting to over 6,000 acres. Water is also diverted from Upper Klamath Lake on the west side of Link River near Klamath Falls, through the Keno power canal, a little over a mile in length, which will ultimately furnish power for pumping or other purposes.

CONSTRUCTION DURING FISCAL YEAR.

Lost River diversion.—In order to keep water out of Tule Lake a dam has been built on lower Lost River about 4 miles below Olene Gap, consisting of a hollow reenforced concrete dam in horseshoe form 40 feet high, 290 feet long, connecting with earth fills at each end, aggregating 385 feet in length. Work was started in April, 1911, and was practically concluded at the end of June, 1912. The dam raises the water level of Lost River about 24 feet and diverts its flow up to a discharge of 300 second-feet, through a canal 8 miles long, into the Klamath River. The canal has a bottom width averaging about 40 feet, a depth of 4.3 feet, and involved the excavation of 373,000 cubic yards of material. Work on the canal was begun in March, 1911, and completed in April, 1912.

Drainage work.—About 7 miles of the main drain and branches were enlarged by means of a drag-line excavator, 90,000 cubic yards of wet material being moved. As this machine was too large for general use it was transferred and a smaller traveling gasoline excavator ordered for further betterment work.

OPERATION AND MAINTENANCE.

Operation began with the season of 1907, water being distributed that year and the following on a rental basis. Deliveries were made through the Main and East Branch Canals, constructed by the Government, and through the Adams Canal, acquired by purchase October 15, 1906, the South Branch Canal having been built in the meantime. Farm unit plats for the first unit were completed in 1908 and the announcement of the construction charge of \$30 per acre, payable in 10 annual installments, was made on November 8, 1908.

During 1911 the entire first unit system, comprising 128 miles of canals and laterals, was operated successfully, and 366 farms totaling 23,869 acres were irrigated, the amount of water delivered being about 1.2 acre-feet per acre, or 28,640 acre-feet. Water was turned into the Main Canal on May 8 and deliveries were continuous throughout the irrigation season of 146 days. The maximum diversion in 24 hours from Upper Klamath Lake into the Main Canal was 722 acre-feet; minimum, 50 acre-feet; mean average per day for irrigating season, 391 acre-feet; making an approximate total diversion of 57,100 acre-feet. In addition, water was delivered through the Keno Canal under contract for power purposes, and Clear Lake was utilized as a storage reservoir for the purpose of holding water back from Tule Lake, the total storage on June 30, 1912, being 247,000 acre-feet.

SETTLEMENT AND IRRIGATION.

Settlement has not gone on as rapidly during the past year as in 1909 and 1910, the marked increase of the two previous years being due to the influx of Bohemian colonists who purchased land on the northern shore of Tule Lake, east of Merrill. The growth of the towns, however, has been decided, particularly that of Klamath Falls, and it is probable that the population of the irrigated zone is now over 7,000, as compared with the estimates of 3,500 and 4,600 for 1908 and 1909, respectively. Most of the right of way has been secured for the Modoc Northern Railway, which is to run the entire length of the first unit in a southeasterly direction from Klamath Falls toward Alturas, Cal., but construction has been deferred.

The following table shows the agricultural development from 1907 to 1911:

Area irrigated, 1907 to 1911.

	1907	1908	1909	1910	1911
Total area irrigated.....acres..	8,900	9,872	21,384	23,108	23,869
Number of farms irrigated.....	90	110	243	354	366
Average size of irrigated farms.....acres..	99	90	88	65	65

Copious spring rains, followed by warm weather, both coupled with irrigation, give promise of abundant crops for the year 1912. The principal crops grown are alfalfa, timothy, grain hay, barley, wheat,

oats, and potatoes. The following table gives the acreage, yield per acre, and value of the principal crops for the years 1907 to 1911:

Value of crops, Klamath project.

Crop.	1907	1908	1909	1910	1911	Average.
Alfalfa:						
Acres.....	4,341	4,724	4,994	5,941	5,494	5,100
Yield per acre.....tons..	2.7	2.9	3.7	2.2	2.7	2.8
Value.....	\$87,464	\$95,242	\$117,871	\$100,415	\$103,824	\$100,963
Timothy:						
Acres.....	14	106	255	143	549	213
Yield per acre.....tons..	3.2	2.0	3.7	1.8	3.1	2.7
Value.....	\$450	\$2,060	\$9,400	\$2,749	\$13,656	\$5,663
Grain hay:						
Acres.....	239	753	789	2,668	2,184	1,326
Yield per acre.....tons..	1.1	1.0	1.3	1.0	1.5	1.2
Value.....	\$3,076	\$9,972	\$10,120	\$27,302	\$26,024	\$15,300
Barley:						
Acres.....	1,786	1,343	3,431	3,493	3,313	2,673
Yield per acre.....bushels..	33.6	23.4	28.2	23.7	26.8	27.1
Value.....	\$31,931	\$26,680	\$82,361	\$82,865	\$62,254	\$57,218
Wheat:						
Acres.....	177	590	2,690	2,655	2,386	1,700
Yield per acre.....bushels..	26.4	17.4	17.8	18.5	20.5	20.1
Value.....	\$2,800	\$9,254	\$46,873	\$44,100	\$36,604	\$27,922
Oats:						
Acres.....	351	324	703	1,144	1,450	794
Yield per acre.....bushels..	39.2	27.3	52.1	35.0	39.2	38.6
Value.....	\$5,506	\$4,422	\$18,309	\$18,054	\$28,385	\$14,935
Potatoes:						
Acres.....	30	28	75	91	217	88
Yield per acre.....bushels..	200	115	155	89	121	136
Value.....	\$5,489	\$3,526	\$11,173	\$11,731	\$15,722	\$9,528

ESTIMATED COST OF CONTEMPLATED WORKS.

Second unit laterals.

Poe Valley canals.....	\$71,640
Nuss lateral.....	11,564
Griffith lateral.....	14,841
Olene crossing.....	5,000
East Branch extension.....	5,160
Distribution system.....	19,358
Miscellaneous rights of way.....	5,000
General expense.....	13,000
Total.....	145,563

FEATURE COSTS TO JUNE 30, 1912.

Canal system:	
Main Canal.....	\$518,931.51
Main Canal laterals.....	48,727.71
West Branch Canal.....	42,699.54
Griffith lateral.....	989.09
Nuss lateral.....	533.77
Olene crossing.....	849.42
Keno Canal.....	98,984.39
South Branch Canal.....	188,449.15
South Branch laterals.....	57,065.19
Poe Valley Canal.....	4,545.63
Poe Valley laterals.....	1,064.19
West Side Canal (upper project).....	4,257.11
East Side Canal (upper project).....	5,577.12
Carr extension of Adams Canal and flume.....	14,050.62
	\$986,724.44

Storage works:

Clear Lake Dam-----	\$114,605.38	
Clear Lake Dikes-----	12,803.23	
Clear Lake Reservoir, maintenance-----	5,921.77	
Horse Fly Reservoir-----	670.49	
		\$134,000.87

Diversion works: Headquarters, Griffith lateral----- 956.05

Buildings:

Headquarters (office, barns, storehouse, etc.)---	\$11,092.28	
Gatekeepers and employees' cottages-----	5,389.44	
		16,481.72

Drainage:

Langells Valley drain (upper project)-----	433.30	
Lower project-----	30,688.86	
Lower lake and pumping plant-----	11,616.58	
		42,738.74

Telephone system----- 21,363.35

Real estate (rights and property): Canals, rights of way, and land purchased----- 619,352.15

Examination of project as a whole:

Preliminary expense-----	\$47,356.44	
Hydrographic work-----	19,979.32	
Modoc unit (reconnaissance and soil map)-----	5,624.34	
		72,960.10

Experimental farm (including buildings and other improvements)-- 15,235.39

Administration of project as a whole: Balance undistributed--- 23,637.63

Plant account:

Rock-crushing plant-----	\$3,143.27	
Keno Canal power plant-----	788.51	
South Branch power plant-----	740.10	
		4,671.88

Tule Lake reclamation:

Lost River Dam-----	130,899.07	
Lower River diversion channel-----	110,618.29	
Maintenance-----	1,254.53	
Tule Lake outlet-----	10,806.81	
		253,578.70

Total building cost----- 2,191,701.02

OPERATION AND MAINTENANCE.

General expense-----	\$30,804.07	
Property, maintenance, and improvements-----	730.07	
Earthwork, repairs, and betterments-----	27,032.69	
Structures, repairs, and betterments-----	15,040.34	
Drainage-----	604.03	
Water distribution-----	12,931.82	
Telephone repairs and betterments-----	2,516.77	
Corral expense-----	9,085.29	
Cement pipe, manufacture of-----	180.61	
Gates and fences-----	782.68	
Worden farm-----	2,021.84	
Keno Canal, operation and repairs-----	1,449.35	

Total operation and maintenance cost----- \$103,179.56

Total building and operation and maintenance cost----- 2,294,880.58

Less unadjusted credits (to be distributed to features later)----- 943.79

2,293,936.79

SOUTH DAKOTA, BELLE FOURCHE PROJECT.**LOCATION.**

Counties: Butte and Meade.

Townships: 6 to 10 N., Rs. 3 to 8 E., Black Hills meridian.

Railroads: Chicago & North Western; Chicago, Burlington & Quincy; Chicago, Milwaukee & St. Paul.

Railroad stations and population, 1910: Belle Fourche 1,352. Newell,¹ Nisland,¹ Fruitdale,¹ Sturgis 1,739, and Whitewood 390, S. Dak.

WATER SUPPLY.

Source of water supply: Belle Fourche River.

Area of drainage basin: 4,265 square miles.

Annual run-off in acre-feet of Belle Fourche River at diversion dam (4,265 square miles), 1903 to 1911: Maximum, 433,000; minimum, 129,000; mean, 284,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoir: Belle Fourche—Area, 8,010 acres; total capacity, 210,000 acre-feet; available capacity, 203,770 acre-feet; length of spillway, 314 feet; elevation of spillway, 100 feet above stream bed.

Storage dam: Belle Fourche—Type, earth fill; maximum height, 115 feet; length of crest, 6,200 feet; volume, 1,600,000 cubic yards.

Diversion dam: Type, concrete weir; maximum height, 23 feet; length of masonry crest, 400 feet; volume—concrete, 12,149 cubic yards; earth, 6,040 cubic yards.

Length of canals: 6½ miles with capacities greater than 800 second-feet; 55 miles with capacities from 301 to 800 second-feet; 105 miles with capacities from 50 to 300 second-feet; 460 miles with capacities less than 50 second-feet.

Tunnel: 1; length, 1,306 feet.

Irrigable area: About 100,000 acres.

Present status of irrigable lands (entire project), 24,345 acres entered subject to the reclamation act; 4,316 acres open to entry; 16,000 acres withdrawn from entry; 5,500 acres of State lands; about 50,000 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 6½ miles with capacities of more than 800 second-feet; 43 miles with capacities from 301 to 800 second-feet; 85 miles with capacities from 50 to 300 second-feet; 314 miles with capacities less than 50 second-feet.

Waste-water ditches and drains: 11 miles.

Tunnel: Completed.

Storage dam: 1, volume, earth, 1,546,000 cubic yards.

Diversion dam: Completed.

Canal structures: Costing over \$2,000 each—Concrete, 26. Costing from \$500 to \$2,000 each—Concrete, 101; wood, 19. Costing from \$100 to \$500 each—Concrete, 184; wood, 176. Costing less than \$100 each—Concrete, 14; wood, 1,439.

Bridges: Steel, 5, with a total length of 360 feet; wood, 3, with length greater than 50 feet each, total length, 180 feet; 221 with lengths less than 50 feet each, total length, 2,818 feet; concrete, 2, total length, 28 feet.

Culverts: Concrete, 31, total length, 2,742 feet; steel, 14, total length, 1,428 feet; vitrified tile, 98, total length, 4,704 feet.

Pipe laid: Concrete, 4,350 feet; wood, 3,892 feet; vitrified tile, 20,500 feet.

Flumes: Steel, 7, total length, 3,500 feet; wood, 15, total length, 5,470 feet.

Buildings: Offices, 3; residences, 9; barns and storehouses, 9.

¹ Unincorporated; population not available.

Wells: 2, artesian, total depth, 1,968 feet.
 Railroad track: 6 miles, 36-inch gauge.
 Telephone lines: 71 miles. Telephones in use, 29.
 Material excavated: Class 1, earth, 6,272,200 cubic yards; class 2, indurated material, 133,380 cubic yards; class 3, rock, 42,120 cubic yards.
 Riprap: 1,620 cubic yards.
 Paving: 67,690 square yards.
 Cement used: 67,263 barrels.
 Concrete placed: 51,743 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 65,852 acres.

Area under water-right applications, season of 1912: 42,479 acres.

Length of irrigating season: From May 1 to October 10—163 days.

Average elevation of irrigable area: 2,800 feet above sea level.

Average annual rainfall on irrigable area: Average for past six years, 13 inches; 1911, 6.94 inches.

Range of temperature on irrigable area: -28° to 103° .

Character of soil of irrigable area: North side of Belle Fourche River, principally heavy clay, with scattered areas of sandy clay loam; south side, sandy loam. All of the soils are heavy enough not to be disturbed by winds.

Principal products: Grain, alfalfa, potatoes, sugar beets, garden truck, and small fruit.

Principal markets: Omaha, Nebr.; Chicago, Ill.; and mining towns in the Black Hills.

LANDS OPENED FOR IRRIGATION.

Dates of public notices, regulation, and orders relating thereto: June 21, 1907; May 29, 1908; January 18, 1909; February 19 and November 26, 1910; January 24, March 9, May 4, and December 30, 1911; February 3 and May 2, 1912.

Location of lands opened: T. 7 N., Rs. 5 to 7 E.; T. 8 N., Rs. 3 to 7 E.; T. 9 N., Rs. 2 to 6 E.; T. 10 N., Rs. 3 to 5 E., Black Hills meridian.

Present status of irrigable lands opened: 20,810 acres entered subject to the reclamation act; 4,316 acres open to entry; 3,771 acres of State lands; 36,955 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 2 acre-feet per acre per annum at the farm.

Building charge, per acre, of irrigable land: \$30, \$35, and \$40.

Annual operation and maintenance charge: \$0.60 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers, April 29, 1904.

Construction authorized by Secretary May 10, 1904.

Diversion dam and inlet canal completed September, 1907.

South Canal and lateral system completed April, 1910.

Belle Fourche Dam completed June, 1911.

First section of North Canal completed January, 1908.

Second section of North Canal and lateral system completed June, 1912.

First irrigation, season of 1908.

Entire project 93 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Belle Fourche project provides for the diversion of water from Belle Fourche River by means of a dam about 2 miles below Belle Fourche, S. Dak., and a short inlet or supply canal into a storage reservoir controlled by the Belle Fourche

Dam on Owl Creek, a tributary of Belle Fourche River; the distribution of water from the inlet canal to a small area of land; and the distribution of water from the reservoir through two canal systems to lands on both sides of the Belle Fourche River.

The features of the above irrigation plan completed are: The diversion dam and headworks, inlet canal, Belle Fourche Storage Dam, South Canal, first and second divisions of the North Canal, laterals under the South Canal, and laterals under the first and second divisions of the North Canal. The features remaining for future construction are: The last 18 miles of the North Canal and approximately 150 miles of laterals, including Willow Creek and Nine Mile laterals and their branches.

CONSTRUCTION DURING FISCAL YEAR.

North Canal.—The second division of the North Canal and its structures, including the Horse and Indian Creek flumes, were completed during the fiscal year, the excavation being done by contract and the structures built by Government forces. This division covers about 18,000 acres of land located between Indian Creek and Dry Creek, including lands under the Townsite Lateral, supplying the town of Newell and adjacent lands.

Lateral system.—The lateral system constructed during the fiscal year comprises that under the second division of the North Canal and sublaterals under the first division of the Nine Mile lateral. The main laterals were constructed under informal contracts and the sublaterals and structures by Government forces.

OPERATION AND MAINTENANCE.

The first water for irrigation on the Belle Fourche project was turned into the South Canal on April 14, 1908, and during the season 48½ miles of canals and laterals were operated, furnishing water for about 4,000 acres of land. As no water could be stored in the reservoir, it was furnished through the Dry Creek Canal, excavated in the bed of the reservoir from its upper end near the terminus of the Inlet Canal to the concrete conduit through the uncompleted dam. During the season of 1909 the same canal system was in operation and the irrigated area was increased to 5,600 acres. Water was turned into the canals on April 20 and delivery was continued without serious interruption throughout the season. Spring rains were plentiful and the crops grew well without early irrigation.

During the season of 1910 the diverting works, Inlet Canal, storage works, the first section of the North Canal, the entire South Canal and lateral system, including 60 miles of main canals and 230 miles of laterals, were operated from May 1 to October 1, and 312 farms, aggregating 15,410 acres of land, were irrigated. The second unit of the project was opened for irrigation by public notice of February 19, 1910. Approximately 66,000 acre-feet of water were diverted and 30,000 acre-feet used for irrigation. In May the reservoir was sufficiently completed to be utilized for storage, and in August contained 12,000 acre-feet of water. The spring was very dry and practically all crops had to be irrigated.

During 1911, 33,360 acres were covered by water-right applications and 19,786 acres were in crop and irrigated. Water was turned into the reservoir on March 15, and with the exception of two days the entire flow of the Belle Fourche River was diverted through the Inlet Canal into the reservoir. During the season 42,228 acre-feet were diverted and 32,400 acre-feet delivered to the farms. The irrigation season closed on October 10, at which time there were 11,000 acre-feet in storage in the reservoir. The season was very dry and practically all crops had to be irrigated. The crops raised were wheat, oats, corn, potatoes, alfalfa, and garden products.

During the season of 1912 the first, second, and third units are being irrigated, the third unit comprising 19,500 acres of irrigable land having been opened by public notice of May 2, 1912. The same canal system is being operated this year as in 1911, together with the second division of the North Canal and a small area under Nine Mile lateral. At the close of the fiscal year 42,479 acres were covered with water-right applications, and 30,378 acres were being irrigated. Water was stored in the reservoir during the winter of 1911 and the spring of 1912, and on June 30, after delivering 28,100 acre-feet for irrigation and wasting 25,000 acre-feet into Owl Creek, there were 69,000 acre-feet in storage. The season has been favorable, copious rains making spring irrigation unnecessary, and on June 30 the crops were in good condition.

SETTLEMENT AND IRRIGATION.

In the area opened to settlement there are 416 public land farm units, and on June 30, 1912, 339 of these had been entered. Thirty-three units have been entered during the fiscal year and water-right applications have been received for 309 farms in private ownership, comprising about 72 per cent of the private lands for which water could be supplied and which are subject to assessment. The three towns of Nisland, Fruitdale, and Newell have each increased slightly in population during the year, and the population on the farms is about 3,000.

The following table presents statistics regarding irrigation and crop distribution since 1908:

Irrigation statistics, Belle Fourche project.

	1908	1909	1910	1911	1912
Area which the service was prepared to irrigate.....acres	11,923	11,923	47,568	47,542	65,852
Area covered by water-right applications.....do	5,400	7,440	28,547	33,360	42,479
Percentage of total area covered by water-right applications.....	45.3	62.5	60.2	70	64.3
Percentage of total area irrigated.....	33.6	47	32.5	41.6	46.1
Area irrigated.....acres	4,025	5,613	15,410	19,786	30,378
Percentage of cultivated acreage planted to—					
Wheat.....	15	25	29	39	37
Oats.....	52	28	19	22	19
Corn.....	20	11	11	9	9
Alfalfa.....	1	10	11	12	15
Potatoes.....	2	0.3	1	2	1
Barley.....	1	1	1	1	1
Flax.....			2	2	
Gardens.....	1	2	1	3	4
Miscellaneous.....	7	23	25	12	14

FEATURE COSTS TO JUNE 30, 1912.

Diversion dam and structures-----		\$117,322.76
Supply canal and structures (completed; for details see Tenth Annual Report)-----		331,182.00
Storage works:		
Dam and appurtenances—Belle Fourche—		
Orman & Crook contract-----	\$276,916.36	
National Surety Co. contract-----	877,242.75	
Belle Fourche Reservoir-----	1,837.84	
		1,155,996.95
North Canal—		
Division A (completed; see Tenth Annual Report)-----	110,371.90	
Division B—		
Excavation-----	\$113,446.96	
Structures-----	77,962.21	
		191,409.17
Division C—		
Surveys and designs-----	244.24	
Excavation-----	64,224.13	
Structures-----	31,867.62	
		96,335.99
Division D—		
Survey and design-----	461.13	
		398,578.19
South Canal—(completed; see Tenth Annual Report)-----		487,258.04
Lateral system—		
Division A (completed; see Tenth Annual Report)-----	\$246,605.74	
Division B-----	107,829.83	
Division C-----	64,325.91	
		418,761.48
Telephone system, construction-----		12,232.51
Real estate (rights and property):		
Lands purchased (not submerged)-----	\$34,113.02	
Lands purchased (submerged by reservoir)-----	19,724.77	
		53,837.79
Irrigable lands, farm unit subdivision-----		19,795.61
Buildings-----		26,637.81
Demonstration farm-----		4,023.45
Reconnaissance, examination-----		2,593.94
Extraordinary expense (flood)-----		1,811.19
Nine Mile Creek extension:		
Excavation-----	\$26,564.85	
Structures-----	9,701.08	
		36,265.93
Betterments:		
Installation of balanced valves-----	52,031.86	
Graveling toe of Belle Fourche Dam-----	22,119.14	
		74,151.00
Inventory of cost ledger supplies-----		1,906.03
Total building cost-----		3,142,354.68

OPERATION AND MAINTENANCE.

Orman unit:		
Main Canal—inlet-----	\$12,868.22	
South Canal-----	7,444.59	
North Canal-----	7,696.28	
Laterals-----	32,917.70	
Flume-Indian Creek-----	88.74	
		\$61,015.53
Dam—Belle Fourche-----		9,410.66
65371°—13—12		

Drainage:

Seepage ditches-----	\$3, 619. 60	
Toe of Belle Fourche Dam-----	14, 494. 82	
		\$18, 114. 42

Vale unit:

South Canal -----	13, 048. 97	
Lateral A -----	7, 197. 99	
Lateral C -----	12, 219. 01	
		32, 465. 97

Newell unit:

North Canal (preliminary)-----	438. 41	
Lateral -----	3, 866. 69	
Flume, Horse Creek-----	88. 17	
		4, 393. 27

Total building and operation and maintenance cost-----	3, 267, 754. 53
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Less unadjusted credits (to be distributed to features later)-----	16, 818. 04
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	3, 250, 936. 49
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UTAH, STRAWBERRY VALLEY PROJECT.

LOCATION.

Counties: Utah and Wasatch.

Townships: 8 and 9 S., Rs. 1 to 3 E., Salt Lake base and meridian.

Railroads: Denver & Rio Grande; San Pedro, Los Angeles & Salt Lake.

Railroad stations and population, 1910: Spanish Fork, 3,464; Payson, 2,397; and Springville, 3,356, Utah.

WATER SUPPLY.

Source of water supply: Strawberry and Spanish Fork Rivers and a number of small streams and springs not on the watersheds of these two.

Area of drainage basins: Strawberry River, 175 square miles; Spanish Fork River, 670 square miles.

Annual run-off in acre-feet: Strawberry River in Strawberry Valley, 1903 to 1906 and 1909 to 1911—Maximum, 150,000; minimum, 49,000; mean, 74,500. Spanish Fork River at Spanish Fork (670 square miles), 1903 to 1911—Maximum, 227,000; minimum, 65,000; mean, 119,400.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoir: Strawberry Valley; area, 8,200 acres; capacity, 278,000 acre-feet; length of spillway at dam, 60 feet; elevation above stream bed, 58 feet.

Storage dam: Strawberry—Type, earth fill, with concrete core wall; maximum height, 71 feet; length of crest, 485 feet; volume, 110,000 cubic yards.

Diversion dam: Spanish Fork—Type, reenforced concrete weir; maximum height, 16 feet; length of masonry, 70 feet; length of earth fill, 25 feet.

Length of canals: $5\frac{1}{2}$ miles, with capacities greater than 300 second-feet; 40 miles, with capacities from 50 to 300 second-feet; and 100 miles, with capacities less than 50 second-feet.

Tunnels: Aggregate length, 22,758.5 feet.

Dikes: Aggregate length, 1,800 feet.

Water power: 1,600 horsepower developed; estimated total, 3,500 horsepower.

Irrigable area: 60,000 acres.

Present status of irrigable land: Greater part in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 5 miles, with capacities from 301 to 800 second-feet; 3 miles, with capacity from 50 to 300 second-feet.

Tunnels: 5, with a total length of 21,993 feet.

Storage dams: Volume, earth, 122,094 cubic yards.

Diversion dams: Volume, masonry, 1,261 cubic yards; earth, 300 cubic yards.

Dikes or levees for protection from overflow: Total length, 500 feet; volume, 1,350 cubic yards.

Canal structures: Concrete—6 costing over \$2,000 each; 2 costing from \$500 to \$2,000 each.

Bridges: Wood, 19 with lengths less than 50 feet each; total length, 400 feet; concrete, 1 with length of 10 feet.

Culverts: Concrete, 1; length, 110 feet.

Buildings: Office, 1; residences, 3; barn and storehouse, 1; power house, 1.

Roads: 39 miles.

Telephone lines: 35 miles; telephones in use, 11.

Transmission lines: Length, 46½ miles.

Material excavated: Class 1, earth, 454,000 cubic yards; class 2, indurated material, 34,718 cubic yards; class 3, rock, 105,000 cubic yards.

Riprap: 7,400 cubic yards.

Paving: 3,171 square yards.

Cement used: 32,677 barrels.

Concrete placed: 30,536 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water during the season of 1912: None.

Length of irrigating season: April 15 to September 30 (168 days).

Average elevation of irrigable area: 4,600 feet above sea level.

Average annual rainfall on irrigable area: 18 inches; at Payson for 6 years: 20.14 inches (1911, 18.79 inches); at Provo for 17 years: 13.71 inches.

Range of temperature on irrigable area: -10° to 95° ; mean temperature at Provo, 49.3° .

Character of soil of irrigable area: Sandy loam and gravel and black alluvium. Much of the soil is underlain by a coarse gravel and the natural drainage is excellent.

Principal products: Alfalfa, hay, cereals, sugar beets, fruits, and vegetables.

Principal markets: Salt Lake City, Utah, and adjacent towns and mining districts.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers, October 2, 1905.

Construction authorized by Secretary, December 15, 1905.

Excavation of tunnel commenced October, 1906.

Power canal commenced May, 1907; completed December, 1908.

Construction of Strawberry Dam, Indian Creek Dike, and Indian Creek and Trail Hollow Diversion Canals commenced in July, 1911.

Strawberry Tunnel holed through June 20, 1912.

Entire project 62 per cent completed June 30, 1912.

IRRIGATION PLAN.

The irrigation plan of the Strawberry Valley project provides for the storage of water in a reservoir on Strawberry River; the discharge of this stored water through Strawberry Tunnel, approximately $3\frac{3}{4}$ miles long, into Diamond Fork, a tributary of Spanish

Fork River, and the diversion of water from Spanish Fork River into canal systems watering lands east and south of Utah Lake. A hydroelectric plant on the south side of the river, $3\frac{1}{4}$ miles below the diversion dam, supplies power for construction and commercial purposes. Part of the power developed will ultimately be used for pumping water for the irrigation of high lands and drainage of low lands.

The completed features of the irrigation plan are: The diversion dam on Spanish Fork River, the power canal, and the first unit of the power plant. In connection with this work 39 miles of roads have been constructed; 35 miles of telephone lines and three power transmission lines for construction and commercial purposes. Construction is in progress on Strawberry Tunnel, Strawberry Dam, Indian Creek Dike, Indian Creek, and Trail Hollow Diversion Canals and necessary structures. Features remaining for future construction are the High Line Canal and the reconstruction and extension of existing distribution systems.

CONSTRUCTION DURING FISCAL YEAR.

Strawberry Dam.—Construction work was begun on June 18, 1911, and the river was diverted through a sluicing tunnel in September, 1911. The embankment placed during the fiscal year amounted to 39,215 cubic yards of earth, and the concrete core wall has been brought up rapidly. The dam is about 35 per cent completed.

Indian Creek Dike.—The dike will be of earth containing a light reenforced concrete core wall, with the upstream slope heavily paved, and has the following dimensions: Height, 37 feet; length along top, 1,300 feet; upstream slope, 3 to 1; downstream slope, 2 to 1; top width, 20 feet; volume, 100,000 cubic yards. The construction is by contract, the contractor establishing camp on July 16, 1911. The embankment placed during the fiscal year amounted to 42,404 cubic yards. The dike is about 36 per cent completed.

Indian Creek and Trail Hollow Diversion Canal.—The canals are being built under contract, and construction began on September 8, 1911, the excavation during the fiscal year amounting to 88,590 cubic yards. The canals are about 60 per cent completed. The terminal drop and concrete intake structures are also being built by contract, but practically no work was done during the fiscal year.

Strawberry Tunnel.—Construction work during the fiscal year was carried on, as in previous years, by Government forces, three shifts working in each heading. The east portal was opened up in October, 1911, the muck being handled by trams hauled by mules. The amount of water encountered was comparatively small and was handled without serious difficulty by one 4-inch, one 6-inch, and one 8-inch pump. At the west portal, as in previous years, all muck was handled by electric locomotives. The heavy flow of water first encountered in December, 1910, continued until the completion of the work, but in spite of the great difficulties encountered good progress was almost continuously made. The material encountered in both headings for the most part consisted of hard gray and soft red sandstone, shale, and very hard limestone, much of which disintegrated rapidly upon exposure to the air, and in the west portal head-

ing especially it was necessary at times to timber close to the heading and frequently to replace timbering on account of swelling ground. The headings met at 7 o'clock a. m., June 20, 1912, with the following results: Difference in alignment, 0.18 foot; grade, 0.13 foot; and excess of slope-board measurement over summit over distance through tunnel, 2.05 feet.

The work of lining the tunnel from the west portal was continued throughout the year with fair progress. The heavy flow of water greatly hindered the work, and during the latter months it was necessary to slow down on account of being so close to the heading. It is expected that the entire tunnel will be lined with material brought from the west portal crushing and mixing plant. During the year 8,358 linear feet of bottom lining were placed and 8,193 linear feet of top and arch lining. Excavation for the cut and cover section of the open channel at the east portal of the tunnel was begun in October, 1911, using a drag line excavator supplemented by pick and shovel. In March and April of 1912 the excavation of the shaft for the controlling works at station 182 was begun and completed.

Surveys and investigations.—Topographic surveys were made of approximately 20 square miles in addition to the irrigable area already surveyed, and preparations are being made to continue this work. A complete scheme was developed for the proposed distribution system and a careful study made of the value and utility of existing canal systems. The irrigation investigations begun in 1910 were continued. These have for their object the determination of the probable water consumption, the character and extent of crops that will be raised, based on present conditions, and the economic utilization of all possible water resources.

FEATURE COSTS TO JUNE 30, 1912.

Storage works:

Strawberry Dam, construction	\$74,520.78	
Strawberry Dam, construction plant	46,553.00	
Reservoir maintenance	5,066.16	
Indian Creek and Trail Hollow Diversion Canal	15,887.76	
Indian Creek Dike	47,717.50	
Sluicing tunnel	20,937.95	
		\$210,683.15

Strawberry tunnel:

Driving tunnel	722,709.34	
Surveys, reconnaissance, alignment, and levels	7,399.14	
Tramway and concrete plant, west portal, equipment and installation	48,022.60	
Construction plant, east portal, equipment and installation	11,957.82	
East portal cut	6,532.23	
Lining tunnel	210,839.96	
Controlling works	5,695.07	
Entrance channel	2,840.39	
Outlet structures	68.87	
Removing air line, etc., from tunnel	709.02	
		1,016,774.41

Tunnel plant:

Power-house tunnel	2,447.91	
Electric power house	4,845.55	
Hauling and storing machinery	14,158.95	
		21,452.41

Power Canal:

Excavation, classes 1, 2, 3, and 4-----	\$136,028.18	
Driving and lining tunnels Nos. 1 and 2-----	49,458.45	
Lining canal, resloping, and cleaning-----	48,668.62	
Structures (aqueduct, culvert 139+03, wasteway, sandbox, excavation, and concrete)-----	40,629.74	
Spanish Fork Reservoir-----	4,492.63	
Spanish Fork Diversion Dam-----	39,695.90	
Spanish Fork River improvements-----	5,882.81	
Bridge over wasteway-----	273.52	
Bridge over tailrace-----	143.01	
Bridge No. 2a-----	563.57	
Bridge No. 3b-----	548.57	
Canal improvements-----	6,574.08	
Bridge over wasteway-----	458.72	
Sidewalks and footbridges-----	785.16	
Raising concrete lining-----	1,601.11	
Concrete arch covering-----	3,096.07	
Gates in fore bay-----	824.65	
River bridge canal-----	2,524.60	
		\$342,289.44

Hydro-electric power plant:

Excavation (building proper) concrete founda- tions, construction of buildings, machinery, and installation-----	47,184.56	
Penstock construction-----	8,241.13	
Transmission line construction-----	31,841.75	
Spanish Fork power line-----	4,204.35	
Payson power line-----	6,540.27	
Power plant improvements-----	2,472.88	
Operation and maintenance, balance-----	6,705.68	
		167,190.62

High Line Canal:

Earth and rock work-----	13,730.62	
Head gates and diversion-----	481.19	
		14,211.81
Wagon roads-----		41,262.91

Telephone system:

Construction-----	\$14,578.61	
Maintenance-----	2,786.92	
		17,365.53
Real estate (rights and property, lands purchased)-----		22,622.13

Buildings, construction of:

Camp Quinton-----	\$37,688.98	
Diamond Switch camp-----	5,872.94	
Power-house camp-----	10,609.48	
Diversion Dam camp-----	6,812.71	
Sulphur Springs camp-----	637.07	
Strawberry Dam camp-----	14,295.53	
East portal camp-----	8,409.79	
		84,326.50

Irrigable lands:

Surveys, topographic-----	7,070.89	
Investigation of water rights-----	8,398.09	
		15,468.98

Examination of project as a whole, hydrography-----	7,011.85	
Distribution system, preliminary investigation-----	3,948.89	
Inventory of cost ledger supplies-----	815.09	

Total building cost-----	1,905,383.75
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WASHINGTON, OKANOGAN PROJECT.**LOCATION.**

County: Okanogan.

Townships: 33 to 34 N., Rs. 25 to 27 E., Willamette meridian.

Railroad: Great Northern.

Railroad station and population, 1910: Oroville, Wash., 495; 50 miles from project.

WATER SUPPLY.

Source of water supply: Salmon Creek.

Area of drainage basin: 152 square miles.

Annual run-off in acre-feet of Salmon Creek at Jones's ranch near Malott (152 square miles), 1903 to 1911: Maximum, 56,500; minimum, 13,000; mean, 30,200.

DATA REGARDING COMPLETED PROJECT.

Reservoirs: Salmon Lake—Area, 200 acres; capacity, 2,000 acre-feet. Conconully—Area, 640 acres; capacity, 13,000 acre-feet; length of spillway, 180 feet; elevation of spillway, 56 feet above stream bed.

Storage dam:—Conconully—Type, hydraulic earth fill; maximum height, 64 feet; length of crest, 1,000 feet; volume, 336,000 cubic yards.

Diversion dam: Salmon Creek—Type, concrete weir; maximum height, 4 feet; length of masonry, 50 feet; length of earth fill, 80 feet; volume, 801 cubic yards.

Length of canals: None with capacities greater than 300 second-feet; 12 miles with capacities from 50 to 300 second-feet; 29 miles with capacities less than 50 second-feet.

Length of tunnel: 395 feet.

Irrigable area: Entire project, 9,900 acres; first unit, 2,052 acres; second unit, 6,085 acres; third unit, 410 acres; old water rights, 1,353 acres.

Present status of irrigable lands (entire project): 1,234 acres entered subject to the reclamation act; 8,666 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 12 miles with capacities from 50 to 300 second-feet; 29 miles with capacities less than 50 second-feet.

Waste-water ditches and drains: 1 mile.

Tunnels: Number, 1; total length, 395 feet.

Storage dams: Volume, 336,000 cubic yards.

Diversion dams: Volume—Masonry, 131 cubic yards; earth, 630 cubic yards; rock fill, 130 cubic yards.

Canal structures: Costing over \$2,000 each, concrete, 1; costing from \$500 to \$2,000 each, concrete, 2; costing from \$100 to \$500 each, wood, 5; costing less than \$100 each, wood, 450.

Bridges: Wood, 3, with lengths less than 50 feet each; total length, 100 feet.

Culverts: Concrete, 9; length, 516 feet.

Buildings: Offices, 1; residences, 5; barns and storehouses, 3.

Roads: 2 miles.

Telephone lines: 25 miles; telephones in use, 15.

Material excavated: Class 1, earth, 636,000 cubic yards; class 2, indurated material, 96,750 cubic yards; class 3, rock, 50,000 cubic yards.

Riprap: 1,050 cubic yards.

Paving: 925 square yards.

Cement used: 3,840 barrels.

Concrete placed: 3,332 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1912: 9,900 acres.

Area under water-right applications, rental contracts, etc., to June 30, season of 1912: 9,837 acres.

Length of irrigating season: May 1 to September 1, 123 days.

Average elevation of irrigable area: 1,000 feet above sea level.

Average annual rainfall on irrigable area: At Omak, Wash., for last three years, 8.15 inches; total for 1911, 7.86 inches. At Conconully, Wash., at base of Salmon River watershed, average for 12 years, 16.37 inches; total for 1911, 18.07 inches.

Range of temperature on irrigable area: -10° to 105° F.

Character of soil of irrigable area: Volcanic ash and gravel on upper benches and sand and gravel on low lands along Okanogan River.

Principal products: Fruit, hay, grain, and vegetables.

Principal markets: Local.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: November 12, 1908; March 12, 1910; April 8, 1910; February 23, 1911; March 28, 1911; April 29, 1912.

Location of lands opened: Ts. 33 and 34 N., Rs. 26 and 27 E., Willamette meridian.

Present status of irrigable area opened: Entered subject to the reclamation act, 1,234 acres; open to entry, none; State lands, 29 acres; private lands, 8,825 acres.

Limit of area of farm units: Public, 40 acres; private, 40 acres.

Duty of water: $2\frac{1}{2}$ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$65. Owing to proposed reconstruction of portions of project, new contract has been executed with Okanogan Water Users' Association providing for a maximum building charge of not more than \$110 per acre.

Annual operation and maintenance charge: \$2 per acre of irrigable land for all lands where stay of proceedings was taken advantage of; otherwise, \$2.25 per acre.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers, October 9, 1905.

Construction authorized by Secretary, December 2, 1905.

Salmon Lake inlet and outlet completed, July, 1908.

First irrigation by Reclamation Service, season of 1908.

Conconully Dam completed, August, 1910.

Entire project completed, October, 1910.

IRRIGATION PLAN.

The irrigation plan of the Okanogan project provides for the storage of water in Salmon Lake and in Conconully Reservoir controlled by Conconully Dam on Salmon Creek, about 2 miles below Conconully, Wash.; the control of Salmon Lake Reservoir by a short inlet canal from Salmon Creek and concrete outlet works; the control of Conconully Reservoir by means of an outlet tunnel discharging into Salmon Creek below the storage dam; and the diversion of water from Salmon Creek by a dam about 12 miles below the reservoir into a canal system watering lands in the valley of Okanogan River between Riverside and Okanogan, Wash.

All of the features of the project—consisting of the inlet canal and outlet works to Salmon Lake; Conconully hydraulic filled dam, spillway, and outlet works; the diversion weir and distribution system—are completed and have been in use during the irrigation seasons of 1910, 1911, and 1912.

CONSTRUCTION DURING FISCAL YEAR.

Canal lining, drainage, etc.—During the fall of 1911, and the spring of 1912, 18,215 lineal feet of the canals of the distribution system were lined, requiring 1,045 cubic yards of concrete. This work was rendered necessary by excessive seepage losses during previous irrigation seasons. The Pogue drainage ditch, involving the excavation of 3,250 cubic yards of earth, was constructed during April, 1912, to drain land flooded by seepage water from the canals. Diversion dams have been constructed in Salmon River for certain of the old ditches, the control of which has been transferred to the United States by agreement with the respective owners.

Colville extension and pumping plants.—During the summer and fall of 1911, surveys and estimates were made for the proposed extension of the project to include about 3,600 acres of land in the Colville Indian Reservation, lying along the Okanogan River opposite the main body of the project. This extension, if authorized, will be constructed under the plan of cooperation between the Indian Service and the Reclamation Service with funds belonging to the Colville Indians, the tribal funds receiving the benefit from such construction. Plans and estimates were also made during the fall and winter of 1911 for supplementing the gravity supply by pumping water from the Okanogan River to irrigate about 2,200 acres of land lying in Robinson Flat. This and the Colville extension scheme contemplate the development of power at drops in the canals or at a power plant to be constructed in Ruby Canyon below the Conconully Dam.

Future work.—The outlet channel from Salmon Lake will be deepened and an embankment built across the lower end of the lake, raising the water surface 3 feet and providing 1,000 acre-feet additional storage. Surveys and estimates will be made to determine the cost of extending the present distribution system so as to provide for the delivery of water to each 5-acre tract where necessary or desirable.

OPERATION AND MAINTENANCE.

Water for irrigation was first distributed in 1908 when the flood waters of Salmon River were rented to the owners of about 1,000 acres of land. In 1909 the first unit of the project, consisting of 2,052 acres, was opened and received water throughout the season, Conconully Dam having been near enough completion to impound sufficient water to irrigate this area. In 1910 the second unit of the project, consisting of 6,085 acres, was opened. During this year over 2,000 acres, or 20 per cent of the entire area of the project, was planted to fruit trees. In 1911 the run-off of Salmon River was the lowest on record, being only 17,350 acre-feet at the gauging station at Jones's ranch and 15,800 acre-feet at the measuring weir below the outlet from Conconully Reservoir. Seepage losses from the canals amounted to over 50 per cent, and the water actually delivered to the lands cultivated amounted to only 1.18 acre-feet per acre. The shortage did not materially injure the young orchards where they were properly cared for, but other crops suffered severely.

The irrigation season of 1911 began April 19, and closed September 3, during which period the entire distribution system, including 41

miles of canals, was operated and 339 farms, aggregating 6,467 acres of land, were irrigated. The water in the reservoirs was exhausted on August 1, but rains during that month furnished sufficient water for one more irrigation. Early in the season water deliveries were made in continuous flow, but after six or eight weeks, when it was discovered that the supply would be short, this method of delivery was changed to the rotative system.

Two serious washouts occurred, one at station 65 of the main canal, and the other at station 134 of the upper main canal, but caused no land damages. Proper materials not being at hand with which to repair the breaches, it was necessary to construct temporary wooden flumes across the breaks. Leaks in the canal system caused considerable trouble throughout the season, necessitating strict patrol.

SETTLEMENT AND IRRIGATION.

As there is no railroad running into the project very few land buyers or homeseekers visited this section during the year, and consequently very few sales were recorded. It is anticipated that the Oroville-Pateros branch of the Great Northern Railway will be completed and train service instituted in 1913, as the grade for the extension of the branch from Pateros to Wenatchee is now under construction throughout its entire length. Most of the orchards are in splendid condition, being well cared for and having made very good growth. Quite a crop of small fruits, such as apricots, peaches, and berries, will be harvested this year from the orchards in the first unit. The season of 1912 has been unusually favorable so far, copious rains having fallen throughout the spring and all the trees having made a remarkable growth.

The following table shows the average yield and value of the principal crops raised during the years 1909, 1910, and 1911:

Value of crops, Okanogan project.

Crops.	1909			1910			1911		
	Area.	Yield.	Value.	Area.	Yield.	Value.	Area.	Yield.	Value.
	<i>Acres.</i>	<i>Tons.</i>		<i>Acres.</i>	<i>Tons.</i>		<i>Acres.</i>	<i>Tons.</i>	
Alfalfa.....	409	2,454	\$49,000	360	1,026	\$15,390	560	1,271	\$12,790
Clover and timothy.....	395	790	19,750	242	464	8,730	218	399	3,900
Grain hay.....	392	588	10,480	546	327	6,400	509	470	4,700
Corn fodder.....	420	840	8,400	453	738	7,380	609	835	8,350
Potatoes.....	36	216	4,320	14	237	7,110	131	415	8,300
Beans.....	30	15	2,135	30	11	1,100	24	7	500
Garden truck.....	21	-----	3,150	114	-----	7,980	170	-----	7,450
Tomatoes.....	19	-----	3,800	-----	-----	-----	-----	-----	-----
Berries and small fruit.....	9	-----	2,250	12	-----	2,000	11	-----	1,075
Bearing orchard.....	100	-----	25,000	55	-----	15,400	55	-----	12,699
Nursery stock.....	12½	-----	25,000	-----	-----	9,000	-----	-----	12,000
Total.....	1,843	4,903	153,285	1,826	2,803	80,490	2,287	3,397	71,764
Trees planted.....	980	¹ 70,284	-----	2,135	¹ 169,250	-----	1,500	¹ 145,425	-----
Area irrigated.....	3,696	-----	-----	4,421	-----	-----	6,467	-----	-----
Farms irrigated.....	169	-----	-----	259	-----	-----	339	-----	-----
Water delivered to land.....	-----	² 2.5	-----	-----	² 2.46	-----	-----	² 1.18	-----

¹ Number of trees planted.

² Acre-feet.

The decreased yield in 1911, as compared with that of the two previous years, in proportion to the area under irrigation, is due partly to the fact that there was a shortage of water and partly because there was no available market for the products.

EXAMINATIONS OF WATER APPROPRIATIONS.

When the Reclamation Service entered the Okanogan Valley, the low water flow of the Salmon River, the only source of supply, had already been fully appropriated. A few of the ranchers had organized the Conconully Lake Reservoir Co. and constructed a crude reservoir at Conconully Lake. A contract was entered into with the company, giving the Government the right to the use of the lake, and agreements limiting the rights of the old appropriators to 3 acre-feet per annum for certain specified acreages were entered into by all of the larger users of water on the Salmon River, with two exceptions. Of these two the successor in interest of one has since entered into a contract satisfactory to the Government, and the rights of the other are under adjudication in the case of the *United States v. Bennett*, now pending in the Federal court.

The limiting agreements, however did not give the Government any authority to regulate the headworks or the flow into the canals and were, therefore, not entirely satisfactory. In 1911 an effort was made to secure further contracts giving the control of the head-gates of the respective ditches to the Government, and containing in turn a grant by the Government of a right to certain amounts of water. These contracts were successfully negotiated in the case of seven ditches, involving 55 individual rights.

FEATURE COSTS TO JUNE 30, 1912.

Storage works:		
Salmon Lake Reservoir	\$5,366.80	
Conconully Reservoir	328,169.26	
		\$333,536.06
Diversion system:		
Weir	4,164.49	
Main canal, main laterals, and sublaterals	241,909.51	
		246,074.00
Roads, highways to dam site		1,096.05
Buildings		4,075.00
Telephone system		2,889.20
Farm-unit survey of irrigable lands		1,889.92
Colville extension, examination		4,603.27
Total building cost		594,163.50

OPERATION AND MAINTENANCE.

Salmon Lake Reservoir	\$64.04	
Conconully Reservoir	1,590.79	
Diversion system	35,244.47	
Headquarters camp	5,220.27	
Telephone system	375.84	
Inventory of cost-ledger supplies	105.93	
		\$42,601.34
Total building and operation and maintenance cost		636,764.84
Less unadjusted credits (to be distributed to features later)		2,504.68
		634,260.16

WASHINGTON, YAKIMA PROJECT.

LOCATION.

Counties: Yakima, Benton, and Kittitas.

Townships: 8 to 22 N., Rs. 11 to 25 E., Willamette meridian.

Railroads: Northern Pacific; Chicago, Milwaukee & Puget Sound; Oregon-Washington Railroad & Navigation Co.

Railroad stations and population, 1910: Grandview, 320; Sunnyside, 1,379; Outlook;¹ Granger, 453; Zillah;¹ Mabton, 666; Byron;¹ Ellensburg, 4,209; Thorp;¹ Yakima, 263; North Yakima, 14,082; Naches;¹ Alfalfa;¹ Toppenish, 1,598; and Parker,¹ Wash.

WATER SUPPLY.

Source of water supply: Yakima River and tributaries.

Area of drainage basin: 5,050 square miles.

Annual run-off in acre-feet of Yakima River at Union Gap, 3,300 square miles; 1897 to 1911—maximum, 4,370,000; minimum, 2,390,000; mean, 3,360,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: Bumping Lake—Area, 1,350 acres; capacity, 34,000 acre-feet; length of spillway, 235 feet; elevation of spillway, 40 feet above stream bed. Lake Clealum—Area, 4,680 acres; capacity, 490,000 acre-feet; length of spillway, 660 feet; elevation of spillway, 115 feet above stream bed. Lake Kachess—Area, 4,800 acres; capacity, 210,000 acre-feet; length of spillway, 250 feet; elevation of spillway, 53 feet above stream bed. Lake Keechelus—Area, 2,550 acres; capacity, 165,000 acre-feet; length of spillway, 265 feet; elevation of spillway, 58 feet above stream bed. McAllister Meadows—Area, 2,000 acres; capacity, 183,000 acre-feet; length of spillway, 225 feet; elevation of spillway, 180 feet above stream bed.

Storage dams: Bumping Lake—Type, earth fill; maximum height, 45 feet; length of crest, 3,500 feet; volume, 233,852 cubic yards. Lake Clealum—Type, earth fill; maximum height, 125 feet; length of crest, 1,150 feet; volume, 600,000 cubic yards. Lake Kachess—Type, earth and gravel fill; maximum height, 60 feet; length of crest, 1,400 feet; volume, 250,000 cubic yards. Lake Keechelus—Type, earth fill; maximum height, 68 feet; length of crest, 6,300 feet; volume, 500,000 cubic yards. McAllister Meadows—Type, earth and rock fill; maximum height, 195 feet; length of crest, 950 feet; volume, 1,200,000 cubic yards.

Diversion dams: Sunnyside—Type, concrete ogee weir; maximum height, 8½ feet; length, 500 feet. Tieton—Type, concrete and rock-filled crib; maximum height, 3 feet; length of masonry, 110 feet; length of earth and rock fill, 320 feet. Wapato—type, concrete weir; maximum height, 8 feet; length of masonry, 500 feet.

Length of canals: Sunnyside unit—31 miles with capacities greater than 800 second-feet; 19 miles with capacities from 301 to 800 second-feet; 33 miles with capacities from 50 to 300 second-feet; 430 miles with capacities less than 50 second-feet. Tieton unit—12 miles with capacities greater than 300 second-feet; 32 miles with capacities from 50 to 300 second-feet; 193 miles with capacities less than 50 second-feet. Wapato unit—30 miles with capacities greater than 300 second-feet; 50 miles with capacities from 50 to 300 second-feet; 178 miles with capacities less than 50 second-feet.

Tunnels: Tieton unit, 6; aggregate length, 10,963 feet.

Dikes: Aggregate length—Sunnyside unit, 1,600 feet; Tieton unit; 350 feet; Wapato unit, 2,000 feet.

¹ Unincorporated; population not available.

Water power: Sunnyside unit, 2,000 horsepower; Tieton unit, 4,000 horsepower, estimated; Wapato unit, 9,000 horsepower, estimated.

Irrigable area: Entire project, 319,437 acres; Sunnyside unit, 102,824 acres; Tieton unit, 34,613 acres; Wapato unit, 120,000 acres; Kittitas unit, 62,000 acres.

Present status of irrigable lands: Sunnyside unit—1,569 acres entered subject to the reclamation act; 1,040 acres withdrawn from entry; 2,880 acres of State lands; 97,335 acres in private ownership. Tieton unit—1,568 acres entered subject to the reclamation act; 448 acres open to entry; none withdrawn from entry; 2,274 acres of State lands; 30,323 acres in private ownership. Wapato unit—120,000 acres of Indian lands. Kittitas unit—none entered subject to the reclamation act or open to entry; 5,500 acres withdrawn from entry; 6,500 acres of State lands; 50,000 acres in private ownership.

RESULTS TO JUNE 30, 1912.

STORAGE UNIT.

Storage dams: Earth—2; volume, 312,800 cubic yards. Rock-fill crib—3.

Bridges: Steel—1; length, 115 feet. Wood—6 with lengths of 50 feet or more; total length, 470 feet.

Pipe laid: Concrete, 1,936 feet (conduits).

Buildings: Residences, 3.

Wells: 1; depth, 42 feet.

Roads: 46 miles.

Telephone lines: 52 miles. Telephones in use, 16.

Material excavated: Class 1, earth, 658,760 cubic yards; class 2, indurated material, 31,360 cubic yards; class 3, rock, 706 cubic yards.

Riprap: 12,370 cubic yards.

Paving: 11,784 square yards.

Cement used: 13,686 barrels.

Concrete placed: 10,024 cubic yards.

SUNNYSIDE UNIT.

Canals: Completed.

Waste water ditches and drains: 9 miles.

Diversion dams: Volume—masonry, 2,291 cubic yards.

Dikes or levees for protection from overflow: Total length, 1,600 feet; volume, 18,000 cubic yards.

Canal structures: Costing over \$2,000 each—concrete, 56; wood, 1. Costing from \$500 to \$2,000 each—concrete, 7. Costing from \$100 to \$500 each—concrete, 180; wood, 4. Costing less than \$100 each—concrete, 40.

Bridges: Steel—1; length, 500 feet; wood—7 with a length of 50 feet or more; 28 with a length less than 50 feet; total length, 1,150 feet.

Culverts: Concrete—15; length, 1,870 feet.

Pipe laid: Concrete, 6,192 feet; steel, 1,600 feet; wood, 102,500 feet.

Flumes: Wood, 500; length, 202,000 feet.

Buildings: Offices, 3; residences, 17; barns and storehouses, 4.

Telephone lines: 124 miles. Telephones in use, 40.

Material excavated: Class 1, earth, 2,674,540 cubic yards; class 2, indurated material, 48,251 cubic yards; class 3, rock, 46,767 cubic yards.

Paving: 8,230 square yards.

Cement used: 18,540 barrels.

Concrete placed: 17,690 cubic yards.

TIETON UNIT.

Canals: Completed.

Waste-water ditches and drains: $\frac{1}{2}$ mile.

Tunnels: Completed.

Diversion dams: Volume—masonry, 609 cubic yards; earth, 2,070 cubic yards; rock fill, 301 cubic yards.

Dikes or levees for protection from overflow: Total length, 350 feet; volume, 584 cubic yards.

Canal structures: Costing over \$2,000 each, concrete, 19; wood, 16. Costing from \$500 to \$2,000 each—concrete, 79; wood, 6. Costing from \$100 to \$500 each—concrete, 327; wood, 43. Costing less than \$100 each—wood, 43.

Bridges: Wood—8 with a length of 50 feet or more; 165 with a length of less than 50 feet; total length, 3,548 feet.

Culverts: Concrete—62; length, 4,214 feet.

Pipe laid: Concrete—249,754 feet; steel—6 feet; wood—29,407 feet.

Flumes: Steel—16; length, 9,551 feet. Wood—121; length, 67,847 feet.

Buildings: Offices, 2; residences, 13; barns and storehouses, 3.

Roads: 30 miles.

Telephone lines: 59 miles. Telephones in use, 47.

Material excavated: Class 1, earth, 759,636 cubic yards; class 2, indurated material, 470,374 cubic yards; class 3, rock, 257,570 cubic yards.

Riprap: 5,423 cubic yards.

Paving: 19,087 square yards.

Cement used: 36,708 barrels.

Concrete placed: 24,562 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1912: Sunnyside unit, 80,075 acres; Tieton unit, 34,613 acres.

Area under water-right applications and rental contracts, season of 1912: Sunnyside unit, 65,319 acres; Tieton unit, 20,770 acres.

Length of irrigating season: Sunnyside unit, April 1 to October 31, 214 days; Tieton unit, May 1 to October 1, 153 days.

Average elevation of irrigable area: 1,000 feet above sea level.

Average annual rainfall on irrigable area: At Sunnyside, from 1895 to 1911, 6.55 inches; for 1911, 6.46 inches. At North Yakima, for 1909 and 1910, 6.03 inches; for 1911, 5.16 inches.

Range of temperature on irrigable area: -21° to 110° F.

Character of soil of irrigable area: Sunnyside unit—on about three-fourths of the unit the soil is sandy loam or volcanic ash from 10 to 60 feet deep. The remainder is decomposed basalt, underlain by gravel or a combination of this with the above-named soils; Tieton unit—volcanic ash.

Principal products: Forage, hops, vegetables, and fruit.

Principal markets: Seattle, Tacoma, and Spokane, Wash.; eastern cities.

LANDS OPENED FOR IRRIGATION.

SUNNYSIDE UNIT.

Dates of public notices: November 18, 1908; March 2, 1909; April 18, 1910; April 19, 1910; May 2, 1910; March 15, 1911; February 29, 1912; May 31, 1912.

Location of lands opened: Ts. 8 to 11 N., Rs. 20 to 25 E., Willamette meridian.

Present status of irrigable lands opened: 1,569 acres entered subject to the reclamation act; none open to entry; 576.75 acres of State lands; 78,044 acres in private ownership.

Duty of water: 3 acre-feet per acre per annum at the farm.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: \$52.

Annual operation and maintenance charge: \$0.95 per acre of irrigable land.

TIETON UNIT.

Dates of public notices and orders: November 7, 1910; March 8, 1911; April 14, 1911; January 24, 1912; February 21, 1912; April 18, 1912; May 10, 1912.

Location of lands opened: Ts. 12 to 15 N., Rs. 16 to 19 E., Willamette meridian.

Present status of irrigable lands opened: 1,568.23 acres entered subject to the reclamation act; 448.43 acres open to entry; 2,274 acres of State lands; 29,993.61 acres in private ownership; 329 acres of railroad lands.

Duty of water: 2.17 acre-feet per acre per annum at the farm.

Limit of area of farm units: Public, 40 acres; private, 160 acres.

Building charge per acre of irrigable land: \$93.

Annual operation and maintenance charge: \$1.50 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys in 1903.
Report of board of engineers recommending construction October 16, 1905.
Construction of Sunnyside and Tieton units authorized by Secretary December 12, 1905; Wapato unit, June 16, 1906.
Sunnyside Canal purchased June 23, 1906.
Lake Kachess Dam (temporary crib) purchased December 12, 1906.
Lake Keechelus Dam (temporary crib) completed April, 1907.
First irrigation by Reclamation Service, Sunnyside unit, season of 1907.
Sunnyside diversion dam reconstruction completed October, 1907.
Lake Clealum Dam (temporary crib) completed November, 1907.
Tieton diversion dam completed December, 1908.
Tieton Main Canal completed in 1909.
Construction Lake Kachess permanent dam begun in May, 1910.
Bumping Lake Dam completed in 1910.
First irrigation by Reclamation Service, Tieton unit, season 1911.
Enlargement Sunnyside Main Canal, completed October 1, 1911.
Distribution system, Sunnyside unit, completed in 1911.
Tieton unit completed winter 1911-12.
Per cent completed June 30, 1912: Storage unit, 17; Sunnyside unit, 88; Tieton unit, 94.

IRRIGATION PLAN.

The irrigation plan of the Yakima project provides for the storage of flood waters of the Yakima River and its tributaries in Kachess, Keechelus, Clealum, and Bumping Lakes, and in a reservoir at McAllister Meadows; the diversion of water from the Yakima River for the irrigation of 62,000 acres of land on both sides of the river in the vicinity of Ellensburg, comprising the Kittitas unit; the diversion of water from the east bank of the Yakima River near Parker for the irrigation of 100,000 acres of land by means of the old Sunnyside Canal, as improved and extended by the Reclamation Service, comprising the Sunnyside unit; the diversion of water from the Tieton River below McAllister Meadows for the irrigation of 34,700 acres of land lying between the Naches River and Ahtanum Creek in the vicinity of North Yakima, comprising the Tieton unit; and the diversion of water from the west bank of the Yakima River near Parker for the irrigation by means of the canal system of the Yakima Indian Reservation, as improved and extended by the Reclamation Service, of 106,000 acres of land by gravity and 14,000 acres of land by pumping with power developed at drops in the canals, comprising the Wapato unit. The plan also provides for the development of power from drops in the main canals and laterals of the Sunnyside and Tieton units to be used for pumping irrigation water and for other purposes.

The following features of the above irrigation plan have been completed: Sunnyside unit—diversion dam, enlargement of main canal, Sulphur Creek wasteway, and the distribution system. Tieton unit—Bumping Lake storage dam, diversion dam, main canal, distribution system. Construction work is in progress upon Kachess Dam. The features for future construction are: Pumping plants and necessary distribution systems on the Sunnyside unit, Keechelus and Clealum dams and McAllister Meadows Reservoir, and the completion of Kittitas and Wapato units, upon which no work has thus far been undertaken.

CONSTRUCTION DURING FISCAL YEAR.

STORAGE UNIT.

Kachess Dam.—The dam is located on Kachess River about 1,700 feet below the most southerly point of Lake Kachess. It is of the earth and gravel type, with a maximum height of 60 feet, a crest length of 1,400 feet, and will contain about 250,000 cubic yards of material. The bulk of the excavation for the dam conduit and open channel was done with steam shovel. The work was started about the middle of June, and the excavation was completed during the latter part of August. Preparations were made early in September for constructing the dam conduit; but on account of the necessity of furnishing water for use in the lower valley during September, it was not possible to begin concreting until October 10. The conduit was completed November 26, including the foundation for the gate tower and the setting of gate frames, the volume of concrete placed being about 1,400 cubic yards. On account of the lateness of the season and the inability to keep a dry trench only a small portion of the slope paving was completed last season, but work was resumed May 21, 1912, and completed June 25, 1912, the total amount of paving in the channel being 1,200 cubic yards. Construction of the reinforced concrete gate tower was resumed June 1, 1912, and practically completed at the end of the fiscal year. The cut-off trench was excavated partly by teams and partly with drag-line excavator. The work was commenced early in May, 1911, and the westerly portion was sufficiently advanced in July to permit starting the excavation for the core wall. The construction of the core wall was commenced September 23 and the portion beneath the base of the dam was completed November 30. The portion above this, a narrow tongue of concrete extending into the slopes and built as the fill advanced, was completed in June, 1912. The total amount of concrete placed in the core wall was 2,150 cubic yards. The construction of the embankment was commenced in April, 1912, and the material is being obtained from two borrow pits, one furnishing the fine material for the upstream portion, while the other furnishes gravelly material for the downstream portion. The placing of small stones and riprap on the faces of the embankment keeps pace with the filling. Work on the spillway was carried on intermittently during the latter part of 1911 and a large portion of the excavation completed. Its construction was resumed in May, 1912, and is now 45 per cent completed. The excavation and paving are practically finished and preparations are being made to commence on the concreting.

An important feature of the development of Lake Kachess as a storage reservoir is the tapping of the lake at a depth of 30 feet below the original outlet, thus obtaining a large amount of sub-storage. The outlet channel is about 1,100 feet long with a bottom width of 12 feet and side slopes 3 to 1. The average depth of cutting is 27 feet in a stiff blue clay that requires blasting. About 70,000 cubic yards of material had been excavated at the end of the fiscal year, or 75 per cent of the total.

The excavation for the lake outlet conduit was completed August 23, 1911. This trench was about 1,400 feet long with a maximum cut of 55 feet and involved the removal of 60,000 cubic yards of material,

most of which was so firmly cemented as to require blasting. The excavation was followed closely by the construction of the conduit, involving the placing of 2,300 cubic yards of reinforced concrete; this was completed during the latter part of August, 1911. The excavation for the open channel between the two conduits was mainly done with steam shovel and drag-line excavator, and as soon as completed the slopes and bottom near the ends of the channel were paved.

At the end of the fiscal year the Kachess Dam and auxiliary structures were 75 per cent completed and the principal items of work accomplished were as follows: Clearing, 18.5 acres; grubbing, 1.5 acres; excavation, 315,000 cubic yards; concrete, plain, 2,500 cubic yards; concrete, reinforced, 3,670 cubic yards; paving, dry, 1,100 cubic yards; paving, mortar, 1,025 cubic yards; riprapping, 1,175 cubic yards; embankment and backfill, 108,000 cubic yards.

SUNNYSIDE UNIT.

Canal system.—The enlargement of the main canal by excavator and dredge was completed about October 1, 1911, and about 54,000 cubic yards of material were removed by teams during the year. Concrete headworks were built for the Rocky Ford and Mabton feeder canals and the Euclid lateral, and all wooden turnouts along the main canal were replaced by combination steel and concrete turnouts. The enlargement of Snipes Mountain Canal and of the South Branch Canal was completed with the exception of the first 3 miles of the former, including two drops, and the two drops at the head of the latter.

All of the larger laterals have been completed and many miles of small laterals, flumes, and pipe lines have been constructed for delivering water to lands for which applications have been received. The topographic survey of the Sunnyside unit has been completed as far as it will be required, and a complete map of the distribution system for operation purposes is well under way.

TIETON UNIT.

Canal system.—The main canal was completed in 1909 with the exception of the installation of the machinery for operating the five automatic spillways. Two of these were completed and put in operation in 1910 and the other three during the spring of 1912. Of the three branches of the distribution system, the Naches branch was completed in the spring of 1910, the Cowiche-Yakima branch in the fall of the same year, and the Wide Hollow branch during the year 1911. About $2\frac{1}{2}$ miles of wagon road between the project headquarters and the main canal in the Tieton Canyon have been constructed.

OPERATION AND MAINTENANCE.

SUNNYSIDE UNIT.

The Sunnyside Canal was built by the Northern Pacific, Yakima, and Kittitas Irrigation Co., being completed in 1893. Development was slow until 1900, when the Washington Irrigation Co. acquired

the canal and railroad lands and started a campaign of settlement and development. The canal and irrigation system was purchased by the Government and first operated in 1906, the officials of the company remaining in charge of the operation during that year as agents of the Government. In 1907 and 1908 a small additional area was irrigated under water rental contracts, as no construction had been done and the service was not prepared to furnish water for any considerable area of new land. In 1909 water was first delivered under the Mabton and extension divisions and water-right applications accepted, covering all lands which had formerly been supplied on a rental basis. In 1910 water was available for the first time for practically all lands which the owners wished to develop, and the stimulus to settlement and development was shown by the large increase in the irrigated area and in the growth of the towns within the project. In 1911 the rapid growth continued, and water was furnished for the first time to lands under the old private irrigation system adjacent to the town of Prosser, on the south side of the river. During the present year water was made available for all lands that can be irrigated by gravity flow from the main canal with the exception of isolated tracts which can not be made immediately productive because of lack of drainage.

The canal and distribution system was operated from July 1 to November 1, 1911, without serious accident. From April 1 to June 30, 1912, water delivery was good, the only accident being a break in the main canal on April 29. The entire flow of the canal was turned into the Sulphur Creek wasteway and repairs begun. The damage was repaired and a full head flowing within 48 hours. The cost of repairing the break was about \$400, and the damage to farm land and crops did not exceed \$500. Complaints relative to water delivery have been few and in no case has there been shown actual damage from insufficiency of water supply.

The maximum diversion at the intake during the year was 929 second-feet, the average being 753 second-feet, and during the season of 1911 water was delivered to approximately 59,000 acres. Delivery is now being made to about 61,000 acres. The total area of land for which water is now available from the Sunnyside Canal is 80,075.61 acres, classified as follows:

Land for which water is available.

Kind of water right.	Acres.	Rate.	Amount.
Konewock.....	3,080.00	Free.	-----
Washington Irrigation Co.....	17,788.27	\$1.00	\$17,788.27
Do.....	912.16	.50	456.08
Do.....	34.80	1.50	52.20
Washington Irrigation Co. and additional Government water right.....	25,410.38	.95	24,139.86
Declared available by public notice.....	32,850.00	.95	31,207.50
Total.....	80,075.61	-----	73,643.91

In addition, a small acreage is being served with water upon a rental basis, the revenue from which will be approximately \$1,000, making the total accrual \$74,643.91.

The following is a summary of water diversion and delivery for the fiscal year (parts of two irrigation seasons).

Total at intake.....	acre feet.....	314, 909
Total delivered to land.....	do.....	179, 308
Acreage served.....		56, 000-61, 000
Acre-feet per acre, intake measurement.....		5. 385
Acre-feet per acre, delivered to land.....		3. 062

TIETON UNIT.

Irrigation was begun on May 4, 1910, flood water being delivered until August 16 under rental contracts to about 1,660 acres of land. No storage was available during 1910, and it became necessary to close down the canal when the flow of the Tieton River reached a point where it was all appropriated. The Bumping Lake Dam was completed in 1910, and irrigation was continuous throughout the season of 1911 from May 1 to September 30, water being served to 7,180 acres. Delivery of 1.91 acre-feet per acre was made in intermittent flow, four service periods having been the general rule. During the season of 1912 water is being delivered to about 20,000 acres.

SETTLEMENT AND IRRIGATION.

SUNNYSIDE UNIT.

The general development and growth of the district irrigated from the Sunnyside Canal has been steady during the past year, but not so rapid as in previous years. There has been a slight falling off in immigration and in land sales by speculators, but the farmers have made progress in developing their holdings and are practically all in a position to receive a good return. There has been comparatively more building on the farms than in the towns and villages during the past year, many of the older farms showing permanent and substantial improvements, and about 20 miles of good gravel roads have been built.

The principal crops grown are fruits, including peaches, apples, pears, berries, grapes, etc.; forage crops, consisting principally of alfalfa, timothy, and clover hay; and vegetables, of which potatoes are the principal crop; while cabbage, asparagus, tomatoes, egg plant, onions, and other garden products are being grown in increasing quantities. The fruit crop for 1911 was below the average but commanded good prices, and it is estimated that the total value of all crops for 1911 was in excess of \$3,500,000. The average return per acre from all lands to which water was delivered was \$59.90. Excluding irrigated land planted to young orchard and producing no crop and other irrigated areas not under cultivation, the land actually producing crops during the year 1911 amounted to 39,974 acres, on which the average return per acre was \$88.48. This estimate includes only crops actually sold from the farm, the value of products consumed on the farm being approximately \$365,000.

The crop prospects for 1912 are good. The first cutting of alfalfa was all in the stack before June 20 with practically no damage from rain, and the second crop is well started. The crop of timothy and

clover is heavy and the first cutting is under way. The fruit crop will probably be heavy, as every old orchard is bearing to its capacity and several thousand acres of young orchard are expected to produce good crops for the first time. A large acreage of potatoes, tomatoes, and other garden products has been planted, and the condition of the crop is excellent.

The following table shows the acreage and value of crops in 1910 and 1911:

Value of crops.

Crop.	1910		1911	
	Acres.	Value.	Acres.	Value.
Alfalfa.....	20,630	\$990,240	25,034	\$1,052,683
Timothy and clover.....	2,250	135,000	2,202	132,120
Bearing orchard.....	4,630	1,389,000	4,940	1,235,000
Young orchard.....	8,240	-----	11,499	-----
Small grains.....	1,000	56,000	1,273	76,380
Corn.....	1,100	61,600	1,477	88,620
Pasture.....	1,410	42,300	1,163	34,890
Garden crops.....	700	140,000	673	134,600
Potatoes.....	1,710	218,880	1,616	258,560
Hops.....	150	45,000	391	195,500
Nursery crops.....	200	200,000	200	200,000
Special crops.....	650	13,000	-----	-----
Miscellaneous.....	5,020	30,200	2,578	128,900
Total.....	47,690	3,321,220	53,076	3,537,258

TIETON UNIT.

The population of the project is about 1,000, and development has been at a rapid rate. Construction is about to begin on a railroad to serve a portion heretofore remote from market, and a village known as Tieton has sprung up at the expected terminal, where a church has been finished and a rural high school is under construction. At another point a rural high school has been built at a cost of \$15,000, and many substantial residences and permanent farm buildings have been erected. The lands are divided into about 1,000 holdings, 40 per cent of which are in 10-acre tracts or less. About 20 per cent of the acreage is still in holdings greater than 160 acres, but these are being rapidly reduced. A drawing was held in June, 1912, and practically all the public land has been entered.

The climatic and soil conditions are particularly adapted to apples, while alfalfa, potatoes, corn, hops, and small grains are also raised. The total value of crops grown on 273 farms, representing 7,180 acres of irrigated land, amounted to \$206,519, or \$28.75 per acre, in 1911. Excluding the acreage in fruit trees producing no revenue, the average value of crops per acre amounted to \$43. The crop prospects for 1912 are excellent.

EXAMINATIONS OF APPROPRIATIONS OF WATER.

When the Reclamation Service first contemplated construction work in the Yakima Valley the waters of the Yakima River had been largely overappropriated, and the Secretary of the Interior, under

date of December 12, 1905, set forth several conditions precedent to governmental activities in the valley—one being the termination of litigation before the courts and the settlement, by signed agreements, of the amounts of water claimed by various holders of water rights in the valley. This latter condition was met by the execution of instruments known as “limiting agreements,” under the terms of which various individuals and corporations set forth the amount of their claims in the Yakima River and its tributaries and specifically limited those claims to the amounts indicated.

Another condition was the passage of an act by the State legislature granting to the United States the right to acquire and use for storage purposes the title to the beds and shores of any navigable lake or stream which could be utilized for construction purposes, the right to appropriate water, and the right to exercise the power of eminent domain. Such an act was passed on March 4, 1905, and under its terms the State land commissioner was authorized to withdraw from any or all appropriation under any law of the State all of the unappropriated waters of any stream or streams upon which investigations were being made by the United States. In pursuance of section 3 of the act the officers of the Reclamation Service, on behalf of the United States, under date of May 4, 1905, and April 26, 1906, served notices upon the State land commissioner to the effect that the United States contemplated an investigation to determine the feasibility of irrigation works in the Yakima Basin. The effect of this notice was to withdraw from further appropriation all of the unappropriated waters of the Yakima River and its tributaries. This was followed by the necessary certificate of feasibility under dates of April 18 and December 17, 1906, and later, upon request of the United States, the State land commissioner extended the period of withdrawal to February 20, 1913.

In addition to the withdrawals specified, the United States filed appropriations covering 1,000 cubic feet of water per second at Lake Keechelus by notice recorded October 10, 1906, and 3,000 cubic feet of water per second at Lake Clealum by notice recorded October 10, 1906, both of which notices were recorded in Kittitas County.

The United States has also acquired, by contract of December 12, 1906, the rights of the Cascade Canal Co. at Lake Kachess, and by contract of May 26, 1906, the rights of the Union Gap Irrigation Co. at Lake Clealum, and in addition the United States is successor in interest to the Washington Irrigation Co. in connection with its appropriation for the Sunnyside irrigation system. On June 23, 1906, this company deeded to the Government the Sunnyside Main Canal, with its water appropriation. This appropriation is one of the earliest in the valley and originally consisted of 1,000 second-feet, the appropriation having been made on September 2, 1890, followed by an amended claim made March 23, 1891. To this amount is added 50 cubic feet, to which the United States has title as successor in interest of the Konewock Ditch Co., under an appropriation claimed to have been initiated in 1881.

FEATURE COSTS TO JUNE 30, 1912.

BENTON UNIT.

Preliminary examination and surveys-----	\$11, 167. 45
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KITTITAS UNIT.

Preliminary examination and surveys-----	\$19, 366. 90
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STORAGE UNIT.

Lakes Clealum, Keechelus, and Kachess:

General expense -----	\$45, 532. 00
Real estate, land submerged-----	20, 996. 07
Crib dams, construction and maintenance----	108, 771. 52
Kachess Dam, construction-----	356, 078. 65

	\$531, 378. 24
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Wagon roads and highways, construction and maintenance-----	5, 506. 68
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Telephone system, construction and maintenance-----	1, 067. 44
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Buildings:

Camp construction and maintenance-----	\$25, 228. 63
Watchman's house, Lake Kachess-----	2, 023. 45

	27, 252. 08
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Examination of unit, reservoir reconnoissance-----	1, 924. 88
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Inventory of cost ledger supplies-----	9, 116. 25
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Total building cost of unit-----	576, 245. 57
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SUNNYSIDE UNIT.

Preliminary expense -----	\$47, 190. 69
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Diversion works, dam and headworks-----	54, 564. 65
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Canal system (main canal):

Purchase price -----	\$248, 690. 64
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Excavation—

Enlargement-----	646, 061. 55
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Extension -----	13, 251. 09
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	908, 003. 28
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Structures—

Drops -----	69, 018. 56
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Culverts -----	33, 811. 75
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Turnouts -----	33, 958. 35
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Bridges -----	4, 786. 56
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Rocky Ford headworks-----	2, 603. 96
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Outlet weir (mile, 59.70)-----	1, 889. 55
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Miscellaneous -----	32, 454. 64
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	178, 523. 37
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Real estate (rights and property)-----	44, 424. 83
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Zillah wasteway -----	36, 114. 68
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Snipes Mountain division:

Headworks -----	\$9, 327. 11
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Excavation (enlargement) and drops-----	32, 708. 67
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	42, 035. 78
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Sulphur Creek wasteway, structures:

Headworks -----	11, 473. 62
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Excavation -----	46, 226. 03
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Lining -----	281, 002. 56
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Outlet drops-----	3, 641. 04
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	342, 343. 28
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Mabton division, structures and laterals:

Headworks -----	6, 468. 00
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Feeder canal-----	23, 278. 23
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Pipe line-----	145, 112. 89
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River crossing-----	26, 774. 32
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Intake and outlet-----	4, 890. 15
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Flumes, excavation, and laterals-----	20, 460. 11
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Wasteway -----	1, 794. 28
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	228, 777. 98
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Prosser division, structures and laterals:		
Intake and outlet-----	\$2,476.34	
Pipe line-----	71,657.85	
Laterals (main system)-----	19,315.16	
		\$93,449.35
Distribution system:		
Topographic surveys-----	39,884.92	
Excavation and miscellaneous structures-----	249,260.67	
		289,145.59
Pumping plant, investigation-----		2,050.86
Drainage, investigation-----		10,340.68
Buildings:		
Headquarters and grounds-----	\$23,482.76	
Patrol house and grounds-----	9,669.46	
		33,152.22
Telephone system-----		13,755.82
Irrigable lands, farm units subdivision-----		19,778.10
Inventory of cost ledger supplies-----		1,013.52
Total building cost of unit-----		2,344,664.68
Operation and maintenance:		
Operation-----	\$93,388.21	
Maintenance—		
Main canal-----	106,380.78	
Diversion dam and laterals-----	2,786.95	
Laterals-----	71,161.26	
Spillway-----	4,611.52	
General expense-----	98,107.71	
Total operation and maintenance cost of unit-----		376,436.43
Total building and operation and maintenance cost of unit-----		2,721,101.11

TETON UNIT.

Bumping Lake and McAllisters Meadows:		
Bumping Lake Dam (construction)-----	\$509,059.22	
McAllisters Meadows (investigation)-----	11,651.03	
Inventory of cost ledger supplies-----	398.59	
		\$521,108.84
Diversion system:		
Dam-----	11,711.99	
Headworks-----	3,300.14	
		15,012.13
Tieton Main Canal:		
Earthwork, open canal-----	263,969.84	
Driving tunnels, etc-----	295,851.55	
Manufacturing and placing shapes-----	463,518.26	
Auxiliary structures-----	92,491.56	
		1,115,831.21
Distributing system:		
General expense-----	57,791.62	
North Fork channel and diversion dams-----	24,543.50	
Main laterals and structures-----	690,933.87	
Sublaterals and structures-----	448,880.69	
		1,222,149.68
Wagon roads:		
Tieton Main Canal-----	51,422.44	
Valley division (distributing system)-----	5,827.62	
		57,250.06
Telephone system:		
Main canal line-----	6,236.62	
Valley division line (distributing system)-----	18,812.16	
		25,048.78
Real estate (rights and property), main canal-----		2,768.60

Buildings and grounds:

Headquarters-----	\$24, 167. 68	
Patrol houses-----	15, 776. 27	
		\$39, 943. 95
Examinations and surveys, main canal-----		18, 638. 00
Inventory of cost ledger supplies-----		237. 44

Total building cost of unit-----	3, 017, 988. 69
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Operation and maintenance:

Operation main canal, North Fork channel and diversion dams-----	\$2, 053. 41	
Operation main laterals-----	3, 549. 81	
Operation sublaterals-----	3, 894. 13	
Maintenance main canal, North Fork channel and diversion dams-----	2, 176. 87	
Maintenance laterals-----	6, 876. 05	
Maintenance buildings and grounds-----	2, 714. 35	
Bumping Lake Dam and reservoir-----	1, 297. 81	
General expense-----	19, 978. 65	

Total operation and maintenance cost of unit-----	42, 541. 08
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Total building and operation and maintenance cost of unit-----	3, 060, 529. 77
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WAPATO UNIT.

Examination of unit as a whole-----	\$31, 451. 36	
Real estate, rights, and property (legal expense)--	58. 45	
Preliminary investigations-----	4, 618. 09	
		\$36, 127. 90

RECAPITULATION BY UNITS.

Building cost:

Benton-----	\$11, 167. 45	
Kittitas-----	19, 366. 90	
Storage-----	576, 245. 57	
Sunnyside-----	2, 344, 664. 68	
Tieton-----	3, 017, 988. 69	
Wapato-----	36, 127. 90	
		\$6, 005, 561. 19

Operation and maintenance cost:

Sunnyside-----	376, 436. 43	
Tieton-----	42, 541. 08	
		418, 977. 51

Total building and operation and maintenance cost-----	6, 424, 538. 70
Less unadjusted credits (to be distributed to features later)-----	1, 272. 27
	6, 423, 266. 43

WYOMING, SHOSHONE PROJECT.

LOCATION.

Counties: Park and Bighorn.

Townships: 52 to 58 N., Rs. 97 to 104 W., sixth principal meridian.

Railroad: Chicago, Burlington & Quincy.

Railroad stations and population, 1910: Cody, 1,132, Corbett,¹ Ralston,¹ Powell, 200, Garland,¹ Mantua,¹ and Frannie,¹ Wyo.

WATER SUPPLY.

Source of water supply: Shoshone River.

Area of drainage basin: 1,480 square miles.

Annual run-off in acre-feet of Shoshone River near Cody (1,480 square miles), 1902 to 1911, maximum, 1,420,000; minimum, 905,000; mean, 1,125,000.

DATA FOR COMPLETE PROJECT.

[Estimated for uncompleted features.]

Reservoirs: Shoshone—Area, 6,600 acres; capacity, 456,000 acre-feet; length of spillway, 300 feet; elevation of spillway, 233 feet above stream bed. Ralston—Area, 200 acres; capacity, 2,100 acre-feet. (Utilized as a settling basin; storage, 990 acre-feet.)

Storage dams: Shoshone—Type, rubble concrete arch; maximum height, 328 feet; length of crest, 200 feet; volume, 75,544 cubic yards.

Diversion dam: Corbett—Type, reenforced concrete weir; maximum height, 18 feet; length of masonry, 400 feet; length of earth fill, 435 feet; volume of concrete, 4,951 cubic yards; earth, 5,200 cubic yards.

Length of canals: 10 miles with capacities greater than 800 second-feet, 33 miles with capacities from 301 to 800 second-feet, 77 miles with capacities from 50 to 300 second-feet; 397 miles with capacities less than 50 second-feet.

Tunnels: Number, 11; aggregate length, 19,246 feet.

Power development: Not determined.

Irrigable area: Entire project, 164,122 acres; first unit, 15,237 acres; second unit, 15,976 acres; third unit, 3,731 acres; fourth unit, 6,378 acres; subsequent units, 122,800 acres.

Present status of irrigable land (entire project): 21,628 acres entered subject to the reclamation act, 16,817 acres open to entry, 123,140 acres withdrawn from entry, 6,430 acres of State lands, 2,144 acres in private ownership.

RESULTS TO JUNE 30, 1912.

Canals: 10 miles with capacities of more than 800 second-feet, 14 miles with capacities from 301 to 800 second-feet, 26 miles with capacities from 50 to 300 second-feet, 192 miles with capacities less than 50 second-feet.

Waste water ditches and drains: 21½ miles.

Tunnels: Completed.

Storage dams: Volume, concrete, 75,544 cubic yards.

Diversion dams: Volume, concrete, 4,951 cubic yards; earth, 5,200 cubic yards.

Dikes or levees for protection from overflow: Total length, 435 feet; volume, 5,200 cubic yards.

Canal structures: Costing over \$2,000 each—Concrete, 30; wood, 1. Costing from \$500 to \$2,000 each—Concrete, 34. Costing from \$100 to \$500 each—Concrete, 85; wood, 7. Costing less than \$100 each—concrete, 840; wood, 305.

¹ Unincorporated; population not available.

Bridges: Steel—4 with lengths of 50 feet or more; 3 with lengths of less than 50 feet; total length, 416 feet. Wood—8 with lengths of 50 feet or more; 81 with lengths of less than 50 feet; total length, 1,653 feet. Concrete—10 with total length of 96 feet.

Culverts: Concrete, 362 with a length of 10,953 feet; wood, 84 with a length of 2,827 feet.

Pipe laid: Cast iron, 14,034 feet; steel, 649 feet.

Flumes: Concrete—1; length, 54 feet. Steel—1; length, 80 feet. Wood—106; length, 4,474 feet.

Buildings: Offices, 4; residences, 32; barns and storehouses, 12.

Wells: 7; aggregate depth, 384 feet.

Roads: 47 miles.

Telephone lines: 60 miles. Telephones in use, 19.

Material excavated: Class 1, earth, 1,989,763 cubic yards; class 2, indurated material, 52,642 cubic yards; class 3, rock, 312,808 cubic yards.

Riprap: 3,177 cubic yards.

Paving: 10,031 square yards.

Cement used: 141,383 barrels.

Concrete placed: 121,039 cubic yards.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1912: 41,322 acres.

Area under water-right applications, season of 1912: 22,158 acres.

Length of irrigating season: From April 15 to October 15—180 days.

Average elevation of irrigable area: 4,500 feet above sea level.

Average annual rainfall on irrigable area: 1907 to 1911, 5.56 inches; (1911, 5.97 inches).

Range of temperature on irrigable area: -31° to 101° .

Character of soil of irrigable area: Light sandy and clay loams.

Principal products: Alfalfa, grain, vegetables, and fruits.

Principal markets: Omaha, Nebr.; Kansas City, Mo.; Chicago, Ill.; Billings, Mont.; and local.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto: November 25, 1907; April 3, 1908; May 8, 1909; February 6, 1911; March 25, 1911; May 20, 1911; November 8, 1911; February 9, 1912; and March 23, 1912.

Location of lands opened: Ts. 54 to 56 N., Rs. 98 to 100 W., sixth principal meridian.

Present status of irrigable lands opened: 21,628 acres public land entered subject to the reclamation act; 16,817 acres open to entry; 409 acres of State lands; 2,144 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 2 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: \$50 on first unit, \$51 on second, and \$52 on third and fourth.

Annual operation and maintenance charge: \$1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1903.

Construction recommended by board of engineers, February 1, 1904.

Construction authorized by Secretary February 10, 1904.

Corbett diversion dam completed June, 1907.

Corbett Tunnel completed November, 1907.

First irrigation by Reclamation Service, season of 1908.

Garland Canal completed in 1908.

Shoshone Dam completed January, 1910.

Entire project 50 per cent completed June 30, 1912; first, second, third, and fourth units completed.

IRRIGATION PLAN.

The irrigation plan of the Shoshone project provides for the storage of flood waters of Shoshone River in a reservoir controlled by Shoshone Dam, about 8 miles above Cody, Wyo.; the diversion of water from Shoshone River by a dam at Corbett, about 16 miles below the reservoir and through the Corbett Tunnel into a canal system supplying water to lands on the north side of the river in the vicinity of Ralston, Powell, Garland, Mantua, and Frannie; the diversion into the Willwood Canal for the irrigation of lands on the south side of the Shoshone River; and the diversion into the north side High Line from the Shoshone Dam for the irrigation of lands lying on the north side of the Shoshone River above the Garland Canal system and extending from the lower end of the Shoshone Canyon near Cody to the divide between the Shoshone River and Clarks Fork drainage.

The Shoshone Dam, Corbett Dam, Corbett Tunnel, Garland Canal, about 12 miles of the Frannie Canal, and the lateral and distributary system for approximately 42,000 acres in the vicinity of Ralston, Powell, and Garland, Wyo., have been completed.

Future operations include the construction of the High Line Canal, the Willwood Canal, and the extension of the Frannie Canal to cover lands in the vicinity of Frannie, Wyo.

CONSTRUCTION DURING FISCAL YEAR.

Between Forks Highway and canal structures.—Work was continued on the construction of canal structures in the fourth unit until September 26, 1911, when the crew and equipment were moved to the site of the South Fork bridge across the South Fork of the Shoshone River, about 17 miles southwest of Cody, Wyo. Work was started from this point on the construction of the Between Forks Highway and the concrete abutments for the bridge, the work being done by Government forces. After constructing about half of the 11 miles of road, work was suspended because of the failure of Park County to provide rights of way. The abutments for the bridge, containing 136 cubic yards of reenforced concrete, were completed February 6, and the 100-foot steel through-span superstructure on June 7, 1912. The construction of canal structures in the fourth unit was resumed on April 29, and was practically completed by the end of the fiscal year.

Drainage work.—On October 30, 1911, a contract was executed for the construction of drainage ditches near Powell and Garland, Wyo., involving the excavation of approximately 180,000 cubic yards of material, and the contractor commenced work on November 7. The unusually severe winter resulted in very slow and unsatisfactory progress, and upon request of the contractor the contract was suspended on April 18, 1912, with the work 15 per cent completed. The work was immediately undertaken by Government forces, and at the end of the fiscal year was 37.8 per cent completed.

OPERATION AND MAINTENANCE.

Water was first turned into the canal in 1908, but the records of use for that year are not complete. The following table shows the use of water for seasons 1909 to 1912:

Use of water.

Year.	Taken into main canal.	Delivered to water users.	Irrigated.
	<i>Acre-feet.</i>	<i>Acre-feet.</i>	<i>Acres.</i>
1909.....	36,257	22,973	7,851
1910.....	48,241	30,351	12,735
1911.....	54,862	35,787	16,216
1912 (to June 30).....	23,334	13,789	15,297

During the season of 1911 the Shoshone Dam, Corbett diversion, Garland Canal, 10 main laterals and 66 distributaries, aggregating 240 miles of canal, were operated. The same works have been in operation in 1912, including 11 additional distributaries.

The principal difficulty experienced in maintaining the canals occurs in the spring, when considerable trouble results from the erosion of banks and washing out of small structures, due largely to frost loosening the soil.

The following statement shows the extent of the area affected by seepage in 1910, 1911, and 1912:

Area affected by seepage.

	1910	1911	1912 (to June 30).
Area so affected as to be too wet to cultivate.....acres..	255	884	2,114
Area so affected as to materially reduce crop yields.....acres..	87	655	1,316
Number of farm units affected.....	29	111	164

The drainage work now being done and the contemplated construction of approximately 15 miles of main trunk-line tile drains are designed to lower the ground-water plane in the affected areas.

In the latter part of 1911 the surveys on the Willwood and High Line Canal systems were completed and a complete preliminary location made of the High Line Canal and main laterals and a preliminary location of the Willwood Main Canal and diversion site.

SETTLEMENT AND IRRIGATION.

Although the rate of settlement decreased somewhat during the fiscal year, 31 farm units, aggregating 1,640 irrigable acres, were taken by homestead entry, making a total on June 30, 1912, of 368 farm units, with an irrigable area of 21,628 acres. Water rights were also taken out for 10 acres in private ownership. On March 23, 1912, the fourth unit, containing 84 farm units and 6,378 acres of irrigable land, was opened to entry, and 7 farm units, with an area of 732 acres, have been filed on. April 4, 1912, additional

lots in the Powell town site were offered at public auction, and 7 town lots and 8 acre tracts were sold on the date of opening for \$4,795. One town lot was also sold during the year at its appraised value of \$500.

The estimated value of crops grown in 1911 was \$122,400. Alfalfa is the leading crop, showing a steady increase in acreage during the past four years. The first cutting for 1912 has been harvested, and although a good yield is reported where not affected by seepage a considerable amount was damaged somewhat by showers after being cut.

The following statement shows the acreage sown to various crops for the past three years:

Acreage of various crops.

Crop.	1910	1911	1912 (to June 30).
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
Alfalfa.....	5,051	8,615	10,841
Timothy.....	23	—	27
Spring wheat.....	2,264	1,795	2,777
Winter wheat.....	632	385	330
Oats.....	3,779	3,925	3,235
Barley.....	79	82	293
Speltz.....	11	31	27
Corn.....	42	33	12
Potatoes.....	216	272	99
Beets.....	28	20	44
Beans.....	182	57	6
Peas.....	12	7	5
Garden.....	148	147	246
Orchard.....	87	64	221
Pasture.....	129	1,572	129
Millet.....	5	—	12
Emmer.....	45	52	26

ESTIMATED COST OF CONTEMPLATED WORKS.

Frannie Canal extension.....	\$750,000
Willwood Canal.....	1,200,000
High Line Canal.....	1,900,000
Total.....	3,850,000

FEATURE COSTS TO JUNE 30, 1912.

Storage works (Shoshone Dam and Reservoir):		
Lands submerged by reservoir.....	\$213,830.99	
Dam and appurtenances.....	939,073.71	
Tunnel—		
Lower outlet.....	20,975.96	
Upper outlet.....	20,718.95	
		\$1,194,599.61
High Line Canal, examination and surveys.....		41,054.59
Corbett diverting works:		
Dam.....	\$97,715.18	
Tunnel.....	1,168,550.46	
Settling basin, dam, and spillway.....	25,066.78	
		1,291,332.42
Garland Canal and lateral:		
Survey and examination.....	6,412.36	
Earthwork.....	600,650.90	
Structures.....	355,170.60	
		962,233.86

Frannie Canal extension and laterals:

Surveys and examination—

Earthwork	\$11, 592. 20
Structures	442. 88

\$12, 035. 08

Willwood diverting system (completed; see Tenth Annual Report for details)

1, 036. 00

Willwood Canal and laterals

12, 305. 35

Roads and highways:

Shoshone Canyon	\$57, 015. 21
Shoshone Reservoir	52, 246. 00
Shoshone Reservoir, Between Forks division	7, 443. 35
Garland Flats	1, 833. 62

118, 538. 18

Telephone system:

Construction	3, 021. 17
Maintenance	1, 214. 87

4, 236. 04

Highway bridges:

Steel	7, 286. 50
Wood	12, 104. 12
Concrete	11, 304. 19

30, 694. 81

Buildings

42, 867. 99

Irrigable lands, farm units

8, 951. 35

Examination of project as a whole

62, 110. 22

Administration of project as a whole

3, 534. 05

Inventory of cost ledger supplies

1, 308. 50

Total building cost	3, 786, 838. 05
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OPERATION AND MAINTENANCE.

Operation, all features

\$40, 320. 51

Maintenance:

Garland Canal	71, 894. 16
Corbett Diversion Dam	2. 81
Corbett Tunnel	122. 69
Sluicing tunnel	93. 75
Settling basin, dam, and spillway	8. 82
Roads and bridges	273. 95
Demonstration farm	1, 910. 05
Administration charges (undistributed)	401. 02
Shoshone Dam and Reservoir	2, 912. 43
Inventory of cost ledger supplies	46. 03

\$117, 986. 22

Total building and operation and maintenance cost	3, 904, 824. 27
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APPENDIX.

LEGISLATION.

RECLAMATION ACT.

AN ACT Appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, beginning with the fiscal year ending June thirtieth, nineteen hundred and one, including the surplus of fees and commissions in excess of allowances to registers and receivers, and excepting the five per centum of the proceeds of the sales of public lands in the above States set aside by law for educational and other purposes, shall be, and the same are hereby, reserved, set aside, and appropriated as a special fund in the Treasury to be known as the "reclamation fund," to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semi-arid lands in the said States and Territories, and for the payment of all other expenditures provided for in this act: *Provided*, That in case the receipts from the sale and disposal of public lands other than those realized from the sale and disposal of lands referred to in this section are insufficient to meet the requirements for the support of agricultural colleges in the several States and Territories, under the act of August thirtieth, eighteen hundred and ninety, entitled "An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts, established under the provisions of an act of Congress approved July second, eighteen hundred and sixty-two," the deficiency, if any, in the sum necessary for the support of the said colleges shall be provided for from any moneys in the Treasury not otherwise appropriated.

SEC. 2. That the Secretary of the Interior is hereby authorized and directed to make examinations and surveys for, and to locate and construct, as herein provided, irrigation works for the storage, diversion, and development of waters, including artesian wells, and to report to Congress at the beginning of each regular session as to the results of such examinations and surveys, giving estimates of cost of all contemplated works, the quantity and location of the lands which can be irrigated therefrom, and all facts relative to the practicability of each irrigation project: also the cost of works in process of construction, as well as of those which have been completed.

SEC. 3. That the Secretary of the Interior shall, before giving the public notice provided for in section four of this act, withdraw from public entry the lands required for any irrigation works contemplated under the provisions of this act and shall restore to public entry any of the lands so withdrawn when, in his judgment, such lands are not required for the purposes of this act; and the Secretary of the Interior is hereby authorized, at or immediately prior to the time of beginning the surveys for any contemplated irrigation works, to withdraw from entry, except under the homestead laws, any public lands believed to be susceptible of irrigation from said works: *Provided*, That all lands entered and entries made under the homestead laws within areas so withdrawn during such withdrawal shall be subject to all the provisions, limitations, charges, terms, and conditions of this act; that said surveys shall be prosecuted diligently to completion, and upon the completion thereof, and of the necessary maps, plans, and estimates of cost, the Secretary of the Interior shall determine whether or not said project is practicable and advisable, and if determined

to be impracticable or unadvisable he shall thereupon restore said lands to entry; that public lands which it is proposed to irrigate by means of any contemplated works shall be subject to entry only under the provisions of the homestead laws in tracts of not less than forty nor more than one hundred and sixty acres, and shall be subject to the limitations, charges, terms, and conditions herein provided: *Provided*, That the commutation provisions of the homestead laws shall not apply to entries made under this act.

Sec. 4. That upon the determination by the Secretary of the Interior that any irrigation project is practicable, he may cause to be let contracts for the construction of the same, in such portions or sections as it may be practicable to construct and complete as parts of the whole project, providing the necessary funds for such portions or sections are available in the reclamation fund, and thereupon he shall give public notice of the lands irrigable under such project, and limit of area per entry, which limit shall represent the acreage which, in the opinion of the Secretary, may be reasonably required for the support of a family upon the lands in question; also of the charges which shall be made per acre upon the said entries, and upon the lands in private ownership which may be irrigated by the waters of the said irrigation project, and the number of annual installments, not exceeding ten, in which such charges shall be paid and the time when such payments shall commence. The said charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction of the project, and shall be apportioned equitably: *Provided*, That in all construction work eight hours shall constitute a day's work, and no Mongolian labor shall be employed thereon.

Sec. 5. That the entryman upon lands to be irrigated by such works shall, in addition to compliance with the homestead laws, reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and before receiving patent for the lands covered by his entry shall pay to the Government the charges apportioned against such tract, as provided in section four. No right to the use of water for land in private ownership shall be sold for a tract exceeding one hundred and sixty acres to any one landowner, and no such sale shall be made to any landowner unless he be an actual bona fide resident on such land, or occupant thereof residing in the neighborhood of said land, and no such right shall permanently attach until all payments therefor are made. The annual installments shall be paid to the receiver of the local land office of the district in which the land is situated, and a failure to make any two payments when due shall render the entry subject to cancellation, with the forfeiture of all rights under this act, as well as of any moneys already paid thereon. All moneys received from the above sources shall be paid into the reclamation fund. Registers and receivers shall be allowed the usual commissions on all moneys paid for lands entered under this act.

Sec. 6. That the Secretary of the Interior is hereby authorized and directed to use the reclamation fund for the operation and maintenance of all reservoirs and irrigation works constructed under the provisions of this act: *Provided*, That when the payments required by this act are made for the major portion of the lands irrigated from the waters of any of the works herein provided for, then the management and operation of such irrigation works shall pass to the owners of the lands irrigated thereby, to be maintained at their expense under such form of organization and under such rules and regulations as may be acceptable to the Secretary of the Interior: *Provided*, That the title to and the management and operation of the reservoirs and the works necessary for their protection and operation shall remain in the Government until otherwise provided by Congress.

Sec. 7. That where in carrying out the provisions of this act it becomes necessary to acquire any rights or property, the Secretary of the Interior is hereby authorized to acquire the same for the United States by purchase or by condemnation under judicial process, and to pay from the reclamation fund the sums which may be needed for that purpose, and it shall be the duty of the Attorney General of the United States upon every application of the Secretary of the Interior, under this act, to cause proceedings to be commenced for condemnation within thirty days from the receipt of the application at the Department of Justice.

Sec. 8. That nothing in this act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with such

laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof: *Provided*, That the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right.

SEC. 9. That it is hereby declared to be the duty of the Secretary of the Interior in carrying out the provisions of this act, so far as the same may be practicable and subject to the existence of feasible irrigation projects, to expend the major portion of the funds arising from the sale of public lands within each State and Territory, hereinbefore named for the benefit of arid and semiarid lands within the limits of such State or Territory: *Provided*, That the Secretary may temporarily use such portion of said funds for the benefit of arid or semiarid lands in any particular State or Territory hereinbefore named as he may deem advisable, but when so used the excess shall be restored to the fund as soon as practicable, to the end that ultimately, and in any event, within each ten-year period after the passage of this act, the expenditures for the benefit of the said States and Territories shall be equalized according to the proportions and subject to the conditions as to practicability and feasibility aforesaid. (Section 9 repealed by act of June 25, 1910; 36 Stat., 835.)

SEC. 10. That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect. (32 Stat., 388.)

Approved, June 17, 1902.

WITHDRAWAL OF LANDS WITHIN INDIAN RESERVATIONS.

CHAP. 431. An act to provide for determining the heirs of deceased Indians, for the disposition and sale of allotments of deceased Indians, for the leasing of allotments, and for other purposes.

SEC. 13. That the Secretary of the Interior be, and he is hereby, authorized, in his discretion, to reserve from location, entry, sale, allotment, or other appropriation any lands within any Indian reservation, valuable for power or reservoir sites, or which may be necessary for use in connection with any irrigation project heretofore or hereafter to be authorized by Congress: *Provided*, That if no irrigation project shall be authorized prior to the opening of any Indian reservation containing such power or reservoir sites the Secretary of the Interior may, in his discretion, reserve such sites pending future legislation by Congress for their disposition, and he shall report to Congress all reservations made in conformity with this act.

Approved, June 25, 1910 (36 Stat., 858).

CANCELLATION OF INDIAN TRUST PATENTS WHERE LANDS ARE NEEDED FOR IRRIGATION PURPOSES.

SEC. 14. That the Secretary of the Interior, after notice and hearing, is hereby authorized to cancel trust patents issued to Indian allottees for allotments within any power or reservoir site and for allotments or such portions of allotments as are located upon or include lands set aside, reserved, or required within any Indian reservation for irrigation purposes under authority of Congress: *Provided*, That any Indian allottee whose allotment shall be so canceled shall be reimbursed for all improvements on his canceled allotment, out of any moneys available for the construction of the irrigation project for which the said power or reservoir site may be set aside: *Provided further*, That any Indian allottee whose allotment, or part thereof, is so canceled shall be allotted land of equal value within the area subject to irrigation by any such project.

Approved, June 25, 1910 (36 Stat., 859).

INDIAN ALLOTMENTS ON IRRIGATION PROJECTS.

SEC. 17. * * * And whenever it shall appear to the President that lands on any Indian reservation subject to allotment by authority of law have been or may be brought within any irrigation project, he may cause allotments of such irrigable lands to be made to the Indians entitled thereto in such areas

as may be for their best interest, not to exceed, however, forty acres to any one Indian, and such irrigable land shall be held to be equal in quantity to twice the number of acres of nonirrigable agricultural land and four times the number of acres of nonirrigable grazing land: *Provided*, That the remaining area to which any Indian may be entitled under existing law after he shall have received his proportion of irrigable land on the basis of equalization herein established may be allotted to him from nonirrigable agricultural or grazing lands: *Provided further*, That where a treaty or act of Congress setting apart such reservation provides for allotments in severalty in quantity greater or less than that herein authorized, the President shall cause allotments on such reservations to be made in quantity as specified in such treaty or act subject, however, to the basis of equalization between irrigable and nonirrigable lands established herein, but in such cases allotments may be made in quantity as specified in this act, with the consent of the Indians expressed in such manner as the President in his discretion may require.

Approved, June 25, 1910 (36 Stat., 860).

SURFACE PATENTS.

[PUBLIC—No. 141.]

AN ACT To supplement the Act of June 22, 1910,¹ entitled "An act to provide for agricultural entries on coal lands."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this act unreserved public lands of the United States, exclusive of Alaska, which have been withdrawn or classified as coal lands or are valuable for coal shall, in addition to the classes of entries or filings described in the act of Congress approved June twenty-second, nineteen hundred and ten, entitled "An act to provide for agricultural entries on coal lands," be subject to selection by the several States within whose limits the lands are situate, under grants made by Congress, and to disposition, in the discretion of the Secretary of the Interior, under the laws providing for the sale of isolated or disconnected tracts of public lands, but there shall be a reservation to the United States of the coal in all such lands so selected or sold and of the right to prospect for, mine, and remove the same in accordance with the provisions of said act of June twenty-second, nineteen hundred and ten, and such lands shall be subject to all the conditions and limitations of said act.

Approved, April 30, 1912.

MODIFYING RESIDENCE REQUIREMENTS OF RECLAMATION HOMESTEAD ENTRIES IN CERTAIN CASES.

[PUBLIC—No. 142.]

AN ACT For the relief of homestead entrymen under the reclamation projects in the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That no qualified entryman who prior to June twenty-fifth, nineteen hundred and ten, made bona fide entry upon lands proposed to be irrigated under the provisions of the act of June seventeenth, nineteen hundred and two, the national reclamation law, and who established residence in good faith upon the lands entered by him, shall be subject to contest for failure to maintain residence or make improvements upon his land prior to the time when water is available for the irrigation of the lands embraced in his entry, but all such entrymen shall, within ninety days after the issuance of the public notice required by section four of the reclamation act, fixing the date when water will be available for irrigation, file in the local land office a water-right application for the irrigable lands embraced in his entry, in conformity with the public notice and approved farm-unit plat for the township in which his entry lies, and shall also file an affidavit that he has reestablished his residence on the land with the intention of maintaining the same for a period sufficient to enable him to make final proof: *Provided*, That no

¹ For the text of the act of June 22, 1910, 36 Stat., 583, see Ninth Annual Report of the Reclamation Service, pp. 4-6.

such entryman shall be entitled to have counted as part of the required period of residence any period of time during which he was not actually upon the said land prior to the date of the notice aforesaid, and no application for the entry of said lands shall be received until after the expiration of the ninety days after the issuance of notice within which the entryman is hereby required to reestablish his residence and apply for water right.

Approved, April 30, 1912.

EIGHT-HOUR LAW.

[PUBLIC—No. 199.]

AN ACT Limiting the hours of daily service of laborers and mechanics employed upon work done for the United States, or for any Territory, or for the District of Columbia, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That every contract hereafter made to which the United States, any Territory, or the District of Columbia is a party, and every such contract made for or on behalf of the United States, or any Territory, or said District, which may require or involve the employment of laborers or mechanics shall contain a provision that no laborer or mechanic doing any part of the work contemplated by the contract, in the employ of the contractor or any subcontractor contracting for any part of said work contemplated, shall be required or permitted to work more than eight hours in any one calendar day upon such work; and every such contract shall stipulate a penalty for each violation of such provision in such contract of five dollars for each laborer or mechanic for every calendar day in which he shall be required or permitted to labor more than eight hours upon said work; and any officer or person designated as inspector of the work to be performed under any such contract, or to aid in enforcing the fulfillment thereof, shall, upon observation or investigation, forthwith report to the proper officer of the United States, or of any Territory, or of the District of Columbia, all violations of the provisions of this act directed to be made in every such contract, together with the name of each laborer or mechanic who has been required or permitted to labor in violation of such stipulation and the day of such violation, and the amount of the penalties imposed according to the stipulation in any such contract shall be directed to be withheld for the use and benefit of the United States, the District of Columbia, or the Territory contracting by the officer or person whose duty it shall be to approve the payment of the moneys due under such contract, whether the violation of the provisions of such contract is by the contractor or any subcontractor. Any contractor or subcontractor aggrieved by the withholding of any penalty as hereinbefore provided shall have the right within six months thereafter to appeal to the head of the department making the contract on behalf of the United States or the Territory, and in the case of a contract made by the District of Columbia to the Commissioners thereof, who shall have power to review the action imposing the penalty, and in all such appeals from such final order whereby a contractor or subcontractor may be aggrieved by the imposition of the penalty hereinbefore provided such contractor or subcontractor may within six months after decision by such head of a department or the Commissioners of the District of Columbia file a claim in the Court of Claims, which shall have jurisdiction to hear and decide the matter in like manner as in other cases before said court.

SEC. 2. That nothing in this act shall apply to contracts for transportation by land or water, or for the transmission of intelligence, or for the purchase of supplies by the Government, whether manufactured to conform to particular specifications or not, or for such materials or articles as may usually be bought in open market, except armor and armor plate, whether made to conform to particular specifications or not, or to the construction or repair of levees or revetments necessary for protection against floods or overflows on the navigable waters of the United States: *Provided*, That all classes of work which have been, are now, or may hereafter be performed by the Government, shall, when done by contract, by individuals, firms, or corporations for or on behalf of the United States or any of the Territories or the District of Columbia, be performed in accordance with the terms and provisions of section one of this act. The President, by Executive order, may waive the provisions and stipulations in this act as to any specific contract or contracts during time of war or a

time when war is imminent, and until January first, nineteen hundred and fifteen, as to any contract or contracts entered into in connection with the construction of the Isthmian Canal. No penalties shall be imposed for any violation of such provision in such contract due to any extraordinary events or conditions of manufacture, or to any emergency caused by fire, famine, or flood, by danger to life or to property, or by other extraordinary event or condition on account of which the President shall subsequently declare the violation to have been excusable. Nothing in this act shall be construed to repeal or modify the act entitled "An act relating to the limitation of the hours of daily service of laborers and mechanics employed upon the public works of the United States and of the District of Columbia," being chapter three hundred and fifty-two of the laws of the Fifty-second Congress, approved August first, eighteen hundred and ninety-two, as modified by the acts of Congress approved February twenty-seventh, nineteen hundred and six, and June thirtieth, nineteen hundred and six, or apply to contracts which have been or may be entered into under the provisions of appropriation acts approved prior to the passage of this act.

SEC. 3. That this act shall become effective and be in force on and after January first, nineteen hundred and thirteen.

Approved, June 19, 1912.

PUBLIC NOTICES AND ORDERS.

ARIZONA-CALIFORNIA—YUMA PROJECT.

PUBLIC NOTICE DATED MARCH 8, 1912.

Whereas under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), works for irrigation have been constructed or are in contemplation for the irrigation and reclamation of lands under the Yuma project, California, and the charges for building, operation, and maintenance must be paid by the water users, as required by said act, in not exceeding 10 annual installments; and

Whereas public notice of the said charges, the time and manner of payment, has been given for a portion of the project, the said charges being fixed so as to cover the estimated cost of building, operating, and maintaining the project as to the lands in question; and

Whereas under the provisions of the reclamation act a large number of the homestead entrymen and water-right applicants for lands in the said project have found it impracticable to make the payment of the building charge; and

Whereas the water users have not made the payments as required by the said public notice, for reasons which in many cases have been unavoidable on their part, it has accordingly been decided to offer such opportunity as may be reasonable and possible under the terms of the act of February 13, 1911 (36 Stat., 902), for the water users to secure easier terms of payment and at the same time recover for the reclamation fund, as required by the terms of the reclamation act, the cost of building, operation, and maintenance of the irrigation works as now estimated:

Now, therefore, the following public notice is issued under the terms of section 4 of the reclamation act and of the said act of February 13, 1911:

1. All applications for water rights heretofore filed under the terms of the public notices heretofore issued may be continued under the terms thereof if the said public notices be fully complied with by payment or otherwise on or before one month from the date of this notice.

2. For the purpose of avoiding the cancellation of entries and water-right applications for which the entrymen or owners shall have failed, on or before one month from the date of this notice, to comply, by payment or otherwise, with the public notice under which their water-right applications were made, it is hereby ordered that water-right applications at the increased rates herein named may be made as amendatory to water-right applications heretofore filed, and original entries and water-right applications shall be made at the new rates when none has been heretofore filed. The new rates shall apply also in cases where prior entries are canceled and new entries made without written assignment of credits for payments theretofore made. The portion of the charge

on account of building the irrigation system shall be \$66 per acre of irrigable land and shall be due and payable in not more than 10 annual payments, as follows:

	Per acre.		Per acre.
First installment-----	\$5.50	Sixth installment-----	\$7.00
Second installment-----	1.00	Seventh installment-----	9.00
Third installment-----	2.00	Eighth installment-----	10.00
Fourth installment-----	3.50	Ninth installment-----	11.00
Fifth installment-----	5.00	Tenth installment-----	12.00

Except as to the amount of the building charge and graduation of the installments thereof, as herein provided, applications under this paragraph shall be subject to the public notices heretofore issued, and the installments shall be due and payable at the times set forth therein.

3. Where water-right application is filed for which the increased building charge fixed in paragraph 2 is applicable, any payments heretofore made on account of the building charges thereon shall be credited on the first and subsequent building charges for the same tract.

4. Failure to comply with the terms of this and previous public notices and orders shall render existing homestead entries and water-right applications for public lands, or water-right applications for lands in private ownership, subject to cancellation, with the forfeiture of all rights thereunder, and of all moneys paid thereon, as provided by the reclamation act.

5. An entryman against whose entry there is no pending charge of non-compliance with the law or regulations, or whose entry is not subject to cancellation under the reclamation act, may relinquish his entry to the United States and assign in writing to a prospective entryman any credits he may have for payments made on his water-right application, and such assignee shall have the right to continue payment at the same building charge. A private land owner against whose water-right application there is no pending charge of non-compliance with the law or regulations, or whose water-right application is not subject to cancellation, may in like manner make written assignment of credits for payments made, and his grantee shall have the right to continue payment at the same building charge. Except as specifically provided in this notice, no benefit of a smaller charge than that fixed in the public notice in force at the time of filing water-right application shall accrue for any land, except when the entryman or private land owner holds written assignment made under the conditions herein stated.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

IDAHO—MINIDOKA PROJECT.

PUBLIC NOTICE DATED DECEMBER 30, 1911.

1. In accordance with the provisions of the act of June 17, 1902 (32 Stat., 388), known as the reclamation act, and the act of February 13, 1911 (36 Stat., 902), authorizing a withdrawal and modification of public notices issued under the reclamation act, the following public notice is hereby issued for the gravity unit of the Minidoka project, Idaho. Those lands for which written acceptance of its terms and new water applications are filed in due form, as hereinafter provided, which acceptances and applications when duly filed shall abrogate any former water-right applications for such lands, shall be relieved from the provisions and requirements of all public notices and orders heretofore issued therefor, except as may be herein provided.

2. Entrymen or owners whose applications for water rights have been heretofore filed and accepted, and who do not accept the terms and conditions of this notice, may continue to pay the charges as heretofore announced and continue to be guided by the provisions of the public notices and orders previously issued in connection with their lands.

3. Any entryman who, under the order of March 18, 1911, secured a stay of proceedings looking to cancellation of his entry by making the payments required therein, may, at his option, be governed by the terms of this notice, or by paying on or before March 15, 1912, the balance of the charges now due in excess of one full installment thereof, may resume payments in accordance with the public notices and orders heretofore issued. In default of action under this paragraph by March 15, 1912, the entry shall be subject to cancellation without further notice.

4. All entries hereafter made for any of the lands shown on the plats herein described, and all water-right applications hereafter filed therefor, shall be subject to the provisions herein contained, provided that in cases of written assignments of credits for at least one full installment of the charges for building, operation, and maintenance paid under the notices and orders heretofore issued, for lands which had not prior to such assignment become subject to the terms of this notice, the assignees or successors in interest may, if they so elect, continue to be governed by such previous notices and orders.

5. The limit of area for which water-right application may be made for public lands subject to the provisions of the reclamation act is shown for each unit on the farm unit plats of Tps. 9 and 10 S., R. 22 E.; Tps. 9 and 10 S., R. 23 E.; Tps. 8, 9, and 10 S., R. 24 E.; Tps. 8 and 9 S., R. 25 E., Boise meridian, approved by the Secretary of the Interior on June 18, 1910, and amendments thereof, and on file at the local land office at Hailey, Idaho. The limit of area for which water-right application may be made for lands in private ownership is 160 acres of irrigable land for each landowner.

6. The term "irrigable land" as herein used shall be understood to mean the irrigable land shown on the farm unit plats enumerated in paragraph 5.

(a) The term "gravity land" as herein used shall be understood to mean any irrigable land for which water can now or in the future may be furnished from the canal system at the grade of gravity distribution without additional expense on the part of the United States for construction purposes.

(b) The term "high land" as herein used shall be understood to mean any irrigable land situated above the grade of the gravity distribution of the water supply, which would, therefore, require additional works or expense to render it susceptible of irrigation. The lands listed in public notice of May 4, 1911, which are supplied with water by means of the raise in the banks of the C-2 Canal and the construction of laterals and other works in connection therewith are classed as "high lands."

(c) No deduction from the area on which payments are required on any farm unit will be made for lands above the grade of the distribution of the water supply, unless such high lands exceed three acres in area.

7. Works providing for the irrigation of certain of the high land areas in the project have been or will be constructed by the United States as funds become available for such purpose, and the estimated cost of such construction is included in the building charges announced herein. Maps indicating the general location of such lands are on file in the local land office at Hailey, Idaho, and in the office of the United States Reclamation Service, at Rupert, Idaho; but it is expressly understood that such maps are subject to modification after further investigation. The first installment of the charges for building, operation, and maintenance for such lands shall become due as provided in paragraph 22. No other construction work by the United States for the irrigation of high lands within the gravity unit is contemplated under the terms and conditions of this notice, but when any entryman or owner shall, by his own effort and expense, by leveling, grading, pumping, or other means, render any of the high land on his farm unit available for irrigation, water will be furnished therefor at the rates and terms provided herein, and the charges on such areas shall become due as provided in paragraph 22.

8. The cost of the construction of the project is in excess of the amount which will be returned by the repayment of the building charges heretofore announced. Acceptance of the terms and conditions of this notice, including the provision for graduated installments, shall carry with it the agreement to pay the building charges hereinafter stated. Such charges also include the estimated cost of providing works for the irrigation of the certain high land areas referred to in paragraph 7.

9. The building charge for all public land shown on the said farm unit plats for which an acceptance is filed under the terms of this notice shall be \$30 per acre, payable in installments as follows:

	Per acre.		Per acre.
First installment.....	\$1.00	Sixth installment.....	\$3.00
Second installment.....	1.50	Seventh installment.....	3.00
Third installment.....	2.00	Eighth installment.....	4.00
Fourth installment.....	2.00	Ninth installment.....	4.00
Fifth installment.....	2.50	Tenth installment.....	7.00

10. Lands in private ownership for which water-right applications shall have been presented at the local land office in due form by qualified applicants on or before March 15, 1912, shall be subject to the \$30 rate, payable according to the installments set forth in paragraph 9.

11. For all land in private ownership, for which water-right applications shall be made in due form by qualified applicants after March 15, 1912, and within one year from the date of this notice the building charge shall be \$40 per acre, payable in installments as follows:

	Per acre.		Per acre.
First installment-----	\$1.00	Sixth installment-----	\$4.50
Second installment-----	1.50	Seventh installment-----	5.00
Third installment-----	2.00	Eighth installment-----	5.50
Fourth installment-----	2.50	Ninth installment-----	6.50
Fifth installment-----	3.50	Tenth installment-----	8.00

12. For all lands in private ownership for which water-right applications shall be made in due form by qualified applicants more than one year from the date of this notice, and before such time as the Secretary of the Interior shall increase the charge by a subsequent notice, the building charge shall be \$40 per acre, payable in 10 equal annual installments.

13. For all land for which water-right applications have been heretofore made and for which acceptance of this notice shall be filed, accompanied by new water-right applications, the first installment of the building charge shall be due December 1, 1911, and subsequent installments on December 1 of each year thereafter.

14. All amounts heretofore paid or credited on account of the building charge for any farm unit shall, upon acceptance of the terms and conditions of this notice, be credited upon the building charges for the same farm unit and applied to the settlement of the installments as they become due until all of said amount has been applied. The remainder of any installment and all subsequent installments shall be due on the dates hereinbefore provided.

15. The operation and maintenance charges per acre for the year 1910 due December 1, 1910, and for all previous years shall be as announced in previous public notices, and no person who has heretofore filed a water-right application shall be qualified to accept the terms of this notice until all charges for operation and maintenance due and unpaid on his farm unit under previous public notices and orders have been paid; provided that the terms of this notice may be accepted before April 1, 1912, without prior payment of the operation and maintenance charge for 1911, which is payable on or before April 1, 1912. All amounts in excess of 75 cents per acre of irrigable land heretofore paid on account of the operation and maintenance charge against any farm unit for the year 1911 shall, upon acceptance of the terms and conditions of this notice, be credited upon the operation and maintenance account for the same farm unit and applied to the settlement of the installments as they become due until all of such amount has been applied.

16. As to the public lands now unentered and the public lands for which entry is hereafter canceled and new entry made without written assignment of credits, the first installment of the building charge and the first installment of the operation and maintenance charge, other than the drainage charge, shall become due on December 1 following the date of the entry thereof; and against the private lands for which water-right application has not yet been made, the first installment of the building charge and the first installment of the operation and maintenance charge other than the drainage charge shall become due on December 1 following the date when water-right application in due form is made therefor. Subsequent installments shall in each case become due December 1 of each year thereafter.

17. All entries hereafter made for any of the lands within the gravity unit shall be accompanied by water-right applications in due form, and all water-right applications hereafter filed, whether for public or for private lands, shall be accompanied by the amount of all charges which may have accrued against such lands and remain unpaid or not assigned in writing. Credits shall be allowed for water-right charges paid only when the same shall have been assigned in writing and when the water-right application was uncanceled of record at the date of the assignment.

18. No charges shall accrue against any public lands subject to entry until the date of entry, nor against any private lands for which water-right application has not yet been made until application therefor is made, except that portion of the operation and maintenance charge on account of drainage works, which will be separately stated and announced from year to year as a portion of the operation and maintenance charge, and become due on December 1 of each year. Drainage charges herein and hereafter announced shall accumulate against all the lands in that portion of the project to which such charges apply,

regardless of whether the lands be entered or unentered or whether water-right application has been made therefor or not. Before entry is allowed on any such public lands subject to entry or water-right application is accepted for any such public or private lands payment will be required of the sum of all unpaid drainage charges which became due in previous years.

19. It is impracticable to determine at this time the ultimate extent of drainage works which will be required to maintain the irrigability of the lands of the project. The cost of such works on the north side of Snake River will be apportioned over all lands on the north side of said river against which other charges under this notice are now apportioned, and subsequent amendment of these areas will be subject to similar future charges. All persons taking advantage of the terms of this notice and filing water-right applications hereunder agree to pay the operation and maintenance charges announced and to be announced by the Secretary of the Interior and agree that such operation and maintenance charges will include the cost of drainage works. Nothing contained in this paragraph shall be construed to change the terms for payment of drainage work by water-right applicants who do not accept the terms and conditions of this notice.

20. For lands subject to water-right charges under the terms of this notice the portion of the installment for operation and maintenance due December 1, 1911, shall be 75 cents per acre. The operation and maintenance charges for such lands, including drainage cost, due on December 1, 1912, and on December 1 of each year thereafter, until further notice, shall be \$1.50 per acre, of which 75 cents is the drainage charge. The operation and maintenance charge, as soon as data are available, will be fixed in proportion to the amount of water used, with a minimum charge per acre whether water is used thereon or not. Water will not be delivered during any year while the operation and maintenance charge for the previous year or years remains unpaid. The portion of the operation and maintenance charge for drainage for any year shall not exceed \$1 per acre.

21. All building charges are payable at the local land office at Hailey, Idaho, in not more than 10 annual installments, and full payment may be made at any time of any balance remaining unpaid, but final water-right certificate and patent will not issue until after certification that full and satisfactory compliance with the requirements of law has been shown as to payment, residence, cultivation improvement, and reclamation.

22. Charges for high lands for which water may hereafter be made available shall become due at such date after water becomes available for their irrigation as may be announced by the Secretary of the Interior.

23. This notice does not apply to the lands irrigated from the South Side pumping unit of the Minidoka project, but owners or entrymen of lands wholly or partly irrigable by gravity from the South Side Gravity Canal may obtain the benefit of this notice as to their gravity areas by filing acceptances as provided herein. No drainage charge shall be apportioned against such lands until the Secretary of the Interior shall determine that drainage works are to be constructed on the South Side and shall announce the charges therefor.

24. The following provisions are hereby established as necessary and reasonable regulations applying to all water users under the project, including those remaining subject to previous public notices and orders:

(a) In order to maintain the efficiency of the distributing or sublateral systems not owned by the United States so that all lands entitled to water may receive an adequate supply, the United States will, when necessary, furnish the work, supplies, materials, and services required to properly construct, maintain, and operate such laterals or sublaterals as at any time give evidence of inadequate attention on the part of the water users deriving a water supply therefrom. The cost of all such work, material, and services will be apportioned equitably against the land supplied by such laterals or sublaterals as part of the installment of the charges under the reclamation act. Such charges shall become due on December 1 of the year in which the work is done. No tract against which such charges may have become due will be entitled to water until same shall have been paid.

(b) In the operation and maintenance of the drainage system of the project repairs are at times necessitated through accident or negligence on the part of the individual water users or through damage caused by sublaterals supplying several such water users. In order that such damages may be promptly repaired, and the cost equitably apportioned, it is hereby ordered that if, after written notice from the project engineer to the responsible individual or proper officer of the district organization, as the case may be, such repairs are not

promptly and properly affected, then the United States will supply the necessary labor, material, and supplies for such work, and the charges shall be apportioned and collected in the same manner as provided in paragraph 24 (a), and no tract against which such charges may have become due will be entitled to water until same shall have been paid.

(c) In order to insure the delivery of water to all lands entitled thereto, the United States shall at all times have the right to control all headgates and other structures on the project, and shall have the right to possession of the keys to all locks thereon.

25. Acceptance of the provisions of this notice shall be in the following form, executed on a copy hereof:

FORM OF ACCEPTANCE.

I, entryman or owner of farm unit — in section —, T. — S., R. — E., B. M., in the Minidoka project, Idaho, do hereby accept the terms and conditions of the above, and consent to the abrogation of my former water-right application, and present herewith a new water-right application hereunder.

Date ———.

Witness to signature: _____.

26. All public notices and orders heretofore issued for the project shall remain in full force and effect except as herein specifically modified.

27. The stay of proceedings granted by orders of March 18 and March 31, 1911, shall terminate on March 15, 1912.

WALTER L. FISHER,
Secretary of the Interior.

ORDER DATED MARCH 19, 1912.

1. Under order of March 24, 1911, and to afford an opportunity for the irrigation of the lands above the gravity supply in the Minidoka project, Idaho, on the south side of Snake River, and as preliminary to the regular opening of that portion of the project, water was furnished as applied for on a rental basis for the irrigable lands of the south side pumping unit in the irrigation season of 1911.

2. In pursuance of the said order of March 24, 1911, it is hereby announced that the rental charges for operation and maintenance for the period from April 1, 1911, to December 31, 1911, shall be \$1.10 per acre for each acre of irrigable land within the project (whether or not water was used thereon), as shown on the farm unit plats approved March 1, 1911, and amendments thereof dated April 18, 1911. These charges will become due April 1, 1912, and no water will hereafter be furnished to any farm unit until payment of the amount due against such unit has been made to the proper agent of the United States Reclamation Service at Burley, Idaho.

3. In order to afford further opportunity for the irrigation of the lands in south side pumping unit, water will again be furnished as applied for on a rental basis for these lands during the season of 1912.

4. It is hereby announced that a minimum rental charge of \$1.25 for operation and maintenance for the year 1912 will be made for each acre of irrigable land, as shown on the plat described in paragraph 2, whether or not water is used thereon.

5. For that portion of the season beginning June 1 and ending August 31, the maximum amount of water which will be furnished for the minimum charge named in paragraph 4 is 1.75 acre-feet of water per acre of land actually in cultivation, approximately equal portions of said amount to be delivered during each month of said period at approximately a uniform rate so far as practical and not in excess of the applicant's proportionate share of the available water supply and capacity of works: *Provided, however,* That a rotation system of delivery may be installed to encourage an economical use of water, and in no case shall more water be delivered than is reasonably required for beneficial use.

6. All water used on any farm unit during June, July, and August in excess of 1.75 acre-feet per acre of land actually in cultivation thereon shall be charged for at the rate of 20 cents per acre-foot, as measured by the engineers of the Reclamation Service.

7. All rental charges for operation and maintenance for 1912, including both the minimum rate and the acre-foot charge shall be due on December 1, 1912,

and payable to the proper agent of the United States Reclamation Service at Burley, Idaho. No water will be furnished to any farm unit in 1913, or subsequent seasons until all charges due against such unit shall have been paid.

8. This is a preliminary order made prior to completion of the project to provide for the rental of water during the season of 1912 only, and is not to be construed as the public notice for said project or any part thereof; nor shall the rental charge herein provided for the maintenance and operation of said project for the season of 1912 be considered any part of the cost of construction, or charge for said project, but said cost of construction and charge will be hereafter announced by the Secretary of the Interior in the public notice to be hereafter issued for said project pursuant to the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388).

SAMUEL ADAMS,
First Assistant Secretary.

PUBLIC NOTICE DATED MARCH 21, 1912.

Whereas in pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), an order was issued on May 4, 1911, for the Minidoka project, Idaho, stating that additional works for the irrigation of certain areas irrigable from the C-2 Canal had been constructed and that water was available therefor in 1911, and announcing that a public notice would be thereafter issued announcing the charges, terms, and conditions under which water-right applications may be made for such lands; and

Whereas the public notice issued on December 30, 1911, provides that the charges for such high lands for which water may be available shall begin on the date to be announced by the Secretary of the Interior:

Therefore the following public notice is issued under the terms of section 4 of the reclamation act:

1. For the high land areas herein listed and shown on approved farm unit plats on file at the local land office at Hailey, Idaho, entries for which lands may be in effect on December 1, 1912, the first installment of the charges for building, operation, and maintenance shall become due on that date. Entries made subsequent to that date without written assignment of credits shall be subject to all of the charges, terms, and conditions of the public notice of December 30, 1911. Subsequent installments shall be due on December 1 of each year thereafter.

Farm unit.	Section.	Town- ship south.	Range east.	High land area irrigable by C-2 raise.
A.....	12	9	22	2
J.....	12	9	22	30
C.....	13	9	22	7
G.....	13	9	22	10
A.....	14	9	22	52
A.....	23	9	22	29
O.....	7	9	23	47
E.....	7	9	23	55
A.....	12	9	23	18
B.....	8	9	23	17
C.....	8	9	23	37
D.....	8	9	23	34
E.....	8	9	23	72
F.....	8	9	23	72
G.....	8	9	23	34
C.....	9	9	23	6
J.....	4	9	23	26
A.....	9	9	23	4
B.....	17	9	23	54
C.....	17	9	23	2
A.....	18	9	23	45
B.....	18	9	23	4
C.....	18	9	23	5
D.....	18	9	23	7

2. For public land farm units for which acceptances of the terms of the public notice of December 30, 1911, shall at any time be filed the rate of building charge shall be \$30 per acre, payable as therein set forth. This rate will apply not only to the gravity lands, but also to the high lands listed in paragraph 1. In the event of failure to file such acceptance, the building charges for such high lands shall be \$35 per acre, payable in 10 equal annual installments.

3. The annual charge for operation and maintenance other than the drainage charge for these high lands shall be at the same rate as for the other lands within the respective farm units.

4. The regulations regarding the payment of drainage charges as set forth in public notices of January 23, 1911, and December 30, 1911, shall apply to the lands hereinabove described.

5. No farm unit for which the temporary water application provided for in the order of May 4, 1911, was filed shall hereafter be entitled to water until all charges due thereon under said order shall have been paid.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

ORDER DATED MAY 13, 1912.

Whereas in pursuance of order of March 24, 1911, water was furnished in the season of 1911 to lands in the South Side pumping unit of the Minidoka project, Idaho, constructed under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388); and

Whereas it was announced in the said order that the charges for operation and maintenance for 1911 would be as thereafter announced, and payable at the beginning of the irrigation season of 1912; and

Whereas a number of settlers or landowners are financially unable to pay the rental charge for the season of 1911, announced as \$1.10 per acre by order of March 19, 1912, but are desirous of obtaining water for the season of 1912:

Therefore it is hereby ordered that any such settler or landowner who in good faith has actually cultivated and improved his land and has set out an orchard, or has alfalfa growing or seeded, or land cultivated and prepared for seeding, may obtain water for the season of 1912 upon the following conditions:

1. By filing with the project engineer application and affidavit on the form hereinafter set forth, which must be corroborated by two disinterested persons upon information and belief:

Application for extension of time for payment of 1911 operation and maintenance charges.

I, ———, owner or entryman of ———, sec. ———, T. ——— S., R. ——— E., containing ——— irrigable acres, do hereby apply for extension of time for payment of the rental charge for 1911, amounting to \$1.10 per acre, to December 1, 1912.

I have made the following progress in the cultivation of the soil: ———.

I have placed upon the land the following improvements: ———.

If this application is allowed, I hereby agree to pay, on December 1, 1912, the increased rental for 1911 of \$1.20 per acre, and also the rental charge for 1912 at the same time, amounting to \$1.25 per acre.

_____,
Applicant.

Affidavit by applicant.

STATE OF IDAHO, County of ———, ss:

———, of the ——— of ———, county of ——— and State of Idaho, being duly sworn, deposes and says that he is unable to make payment of the 1911 water rental charge at the present time, and that the statements contained in his application for extension of time for such payments are true.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———.

Corroboration of applicant's statements by two disinterested persons.

[1.]

STATE OF IDAHO, *County of* ———, ss:

————, of the ——— of ———, county of ——— and State of Idaho, being duly sworn, deposes and says that he has read the statements contained in the foregoing application and affidavit of ———, and that they are true to the best of his knowledge and belief.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———.

[2.]

STATE OF IDAHO, *County of* ———, ss:

————, of the ——— of ———, county of ——— and State of Idaho, being duly sworn, deposes and says that he has read the statements contained in the foregoing application and affidavit of ———, and that they are true to the best of his knowledge and belief.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———.

(NOTE.—These affidavits may be made before a judge or clerk of any court, justice of the peace, or notary public.)

2. Such application and affidavits must be filed with the project engineer not later than July 1, 1912.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

MONTANA—HUNTLEY PROJECT.

PUBLIC NOTICE DATED MARCH 13, 1912.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

For all irrigable lands shown on approved farm unit plats of lands under the Huntley project, Montana, the portion of the installment for operation and maintenance to become due on December 1, 1912, and on the same date of each year thereafter until further notice, shall be \$1 per acre of irrigable land.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

MONTANA—SUN RIVER PROJECT (FORT SHAW UNIT).

PUBLIC NOTICE DATED MARCH 2, 1912.

Whereas under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), works have been constructed for the irrigation and reclamation of lands under the Sun River project, Montana, and the cost thereof must be paid by the water users, as required by said act, in not exceeding 10 annual installments; and

Whereas public notices of the said charges, the time and manner of payment, have been given for the Fort Shaw unit of the project, the said charges being fixed so as to cover the estimated cost of building, operating, and maintaining the project as to the lands in question; and

Whereas under the provisions of the reclamation act a large number of the homestead entries and water-right applications have been subject to cancellation on account of delinquency in the payment of the building charge, but by orders of March 28 and November 8, 1911, issued under the act of February 13,

1911 (36 Stat., 902), action looking to cancellation for failure to make payments when due will not be taken within one month from the date hereof; and

Whereas the water users have not made the payments as required by the said public notices, for reasons which in many cases have been unavoidable on their part, and it has accordingly been decided to offer such opportunity as may be reasonable and possible under the terms of the said act of February 13, 1911, for the water users to secure easier terms of payment, and at the same time recover for the reclamation fund, as required by the terms of the reclamation act, the cost of the building, operation, and maintenance of the irrigation work as now estimated:

Now, therefore, the following public notice is issued under the terms of section 4 of the reclamation act, and of the said act of February 13, 1911:

1. All applications for water rights heretofore filed under the terms of the public notices heretofore issued may be continued under the terms thereof if the said public notices be fully complied with by payment or otherwise within one month from the date hereof.

2. For the purpose of avoiding cancellation of entries and water-right applications for which the entymen or owners shall have failed within one month from the date hereof to comply by payment or otherwise with the public notices and orders under which their water-right applications were made, it is hereby ordered that water-right applications at the increased rates herein named may be made within one month from the date hereof, as amendatory to water-right applications heretofore filed, and original entries and water-right applications shall be made at the new rates when none has been heretofore filed. The new rates shall apply also in cases where prior entries are canceled and new entries made without written assignment of credits for payments heretofore made. The portion of the charge on account of building the irrigation system shall be due and payable in not more than 10 annual payments, as follows:

	Per acre.		Per acre.
First year-----	\$3.00	Sixth year-----	\$3.50
Second year-----	1.00	Seventh year-----	4.00
Third year-----	1.50	Eighth year-----	4.50
Fourth year-----	2.00	Ninth year-----	5.00
Fifth year-----	2.50	Tenth year-----	9.00

Except as to the amount of the building charge, and graduation of the installments thereof, as herein provided, applications under this paragraph shall be subject to the public notices and orders heretofore issued, and the installments shall be due and payable at the times set forth therein.

3. Where water-right application is filed for which the graduated building charge fixed in paragraph 2 is applicable, any payments heretofore made on account of the building charges thereon shall be credited on the first and subsequent building charges for the same tract.

4. The portion of installment for operation and maintenance for all lands in the Fort Shaw unit, to become due on March 1, 1912, and on March 1 of each subsequent year, shall be \$1 per annum per acre of irrigable land, whether water is used thereon or not. The portion of the first installment for operation and maintenance shall be due and payable for public land farm units at the time of entry, and for private lands at the time of filing water-right application. No water will be furnished in any year until the operation and maintenance charges then due and for previous years have been paid. This increased charge shall apply to all lands in the Fort Shaw unit, whether or not amendatory water-right applications therefor are filed under the provisions of this notice.

5. Failure to comply with the terms of this and previous public notices and orders shall render existing homestead entries and water-right applications for public lands, or water-right applications for lands in private ownership, subject to cancellation, with the forfeiture of all rights thereunder, and of all moneys paid thereon, as provided by the reclamation act. Except as herein modified or repealed, the provisions of public notices and orders heretofore issued shall be in full force and effect.

6. An entryman against whose entry there is no pending charge of noncompliance with the law or regulations, or whose entry is not subject to cancellation under the reclamation act, may relinquish his entry to the United States and assign in writing to a prospective entryman any credits he may have for payments made on his water-right application, and such assignee shall have the right to continue payment at the same building charge. A private landowner against whose water-right application there is no pending charge of noncompliance with the law or regulations, or whose water-right

application is not subject to cancellation, may in like manner make written assignment of credits for payments made, and his grantee shall have the right to continue payment at the same building charge. Except as specifically provided in this notice, no benefit of a smaller charge than that fixed in the public notice in force at the time of filing water-right application shall accrue for any land, except when the entryman or private landowner holds written assignment made under the conditions herein stated.

SAMUEL ADAMS,
Acting Secretary of the Interior.

MONTANA-NORTH DAKOTA—LOWER YELLOWSTONE PROJECT.

ORDER DATED AUGUST 28, 1911.

By order issued May 1, 1911, under the provisions of the act of June 17, 1902 (32 Stat., 388), known as the reclamation act, and the act of February 13, 1911 (36 Stat., 902), announcement was made that water-right applications at \$45 per acre could be made and filed with the special fiscal agent of the Reclamation Service on or before May 24, 1911. In compliance with request made to the department for an extension of this period, it is hereby ordered that water-right applications may be accepted on or before December 1, 1911, if presented to the special fiscal agent of the Reclamation Service for the project, accompanied by a payment of \$1.50 per acre, and such water-right applications, if finally accepted in the manner provided by the said order of May 1, 1911, shall be subject to all the conditions and limitations thereof.

SAMUEL ADAMS,
Acting Secretary of the Interior.

PUBLIC NOTICE DATED MARCH 1, 1912.

Whereas by order of May 1, 1911, issued under the act of February 13, 1911 (36 Stat., 902), for the Lower Yellowstone project, Montana-North Dakota, it was proposed to establish a building charge of \$45 per acre of irrigable land, under certain conditions therein specified; and

Whereas on June 19, 1911, the department modified said order of May 1 by waiving the condition that water-right applications and payments presented thereunder should not become binding upon the Government until water-right applications with corresponding payments had been made for 80 per cent of the lands, holding that while the requisite acreage had not been signed up substantial compliance had been had therewith and that it was to the interest of the United States that the water-right applications offered and payments made be accepted; and

Whereas satisfactory compliance has been made.

Therefore the following public notice is issued under the terms of section 4 of the reclamation act, and of the said order of May 1, 1911:

1. All applications for water rights heretofore filed under the terms of the public notices heretofore issued except where water-right applications have been filed with the project engineer under the provisions of the order of May 1, 1911, may be continued under the terms thereof, if the said public notices be fully complied with by payment and otherwise, on or before March 15, 1912.

2. For the purpose of avoiding the cancellation of entries and water-right applications for which the entrymen or owners shall have failed, on or before March 15, 1912, to comply by payment and otherwise with the public notices under which their water-right applications were made, it is hereby ordered that water-right applications heretofore or hereafter made at the increased rates named in the order of May 1, 1911, may be accepted as amendatory to water-right applications heretofore filed, and original entries and water-right applications shall be made at the new rates when none has been heretofore filed. The new rates shall apply also in cases where prior entries are canceled and new entries made without written assignment of credits for payments theretofore made. The portion of the charge on account of building the irrigation system shall be \$45 per acre of irrigable land, and shall be due and payable in not more than 10 annual payments, as follows:

Dec. 1, 1913-----	\$2. 00	Dec. 1, 1918-----	\$4. 50
Dec. 1, 1914-----	4. 50	Dec. 1, 1919-----	4. 50
Dec. 1, 1915-----	4. 50	Dec. 1, 1920-----	4. 50
Dec. 1, 1916-----	4. 50	Dec. 1, 1921-----	4. 21
Dec. 1, 1917-----	4. 50	Dec. 1, 1922-----	7. 00

Except as to the amount of the building charge, the graduation of payments as herein provided, and the times when the instalments shall become due and payable, applications under this paragraph shall be subject to the public notices heretofore issued.

3. Where water-right application is filed for which the increased building charge fixed in paragraph 2 is applicable, any payments heretofore made on account of the building charges thereon shall be credited on the first and subsequent instalments of building charges for the same tract.

4. The operation and maintenance charge for 1912 shall be \$2.50 per acre, of which 50 cents per acre shall be payable on or before April 1, 1912, and the remainder of \$2 on or before December 1, 1912. The charge for operation and maintenance for subsequent years shall be hereafter announced.

5. An entryman against whose entry there is no pending charge of non-compliance with the law or regulations, or whose entry is not subject to cancellation under the reclamation act, may relinquish his entry and assign in writing to a prospective entryman any credits he may have for payments made on his water-right application, and such assignee shall have the right to continue payment at the same building charge. A private land owner against whose water-right application there is no pending charge of noncompliance with the law or regulations, or whose water-right application is not subject to cancellation, may in like manner make written assignment of credits for payments made, and his grantee shall have the right to continue payment at the same building charge. Except as specifically provided in this notice, no benefit of a smaller charge than that fixed in the public notice in force at the time of filling water-right application shall accrue for any land, except when the entryman or private landowner holds written assignment made under the conditions herein stated.

SAMUEL ADAMS,

Acting Secretary of the Interior.

ORDER DATED APRIL 30, 1912.

By virtue of the authority contained in the act of Congress approved June 17, 1902 (32 Stat., 388), it is hereby ordered that any settler under the Lower Yellowstone project, Montana-North Dakota, may receive water for irrigation in the season of 1912 without prior payment of the portion of the installment for operation and maintenance amounting to \$1.75 per acre, being the balance due for operation and maintenance for 1911, \$1.25 plus the advance payment required by existing public notices and orders for 1912, 50 cents per acre of irrigable land, subject, however, to the following conditions, viz:

1. Application for such extension of time of payment must be made to the project engineer through the Lower Yellowstone Water Users' Association not later than June 1, 1912.

2. Payment must be made not later than December 1, 1912, and the amount to be paid shall be \$1.95 per acre of irrigable land instead of \$1.75, and also the balance of \$2 per acre, which shall be due on that date for operation and maintenance for the season of 1912, provided, however, that if payment has heretofore been made of the \$1.25 balance for 1911, the amount to be paid on December 1, 1912, shall be \$2.55 per acre instead of 50 cents and \$2 as required by the public notices and orders heretofore issued.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

NEBRASKA-WYOMING—NORTH PLATTE PROJECT.

PUBLIC NOTICE DATED DECEMBER 30, 1911.

Whereas under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), works for irrigation and for the control of seepage waters have been constructed or are in contemplation at a cost of approximately five and one-half million dollars for the irrigation and reclamation of about 100,000 acres for the North Platte Project, Nebraska-Wyoming, and said cost must be repaid by the water-users, as required by said act, in not exceeding 10 annual installments divided into a building charge for the building of the works, and a charge for the operation and maintenance thereof; and

Whereas public notice of the said charges, the time and manner of payment has been given for two units of the project designated as the first and second lateral districts, the said charges being fixed so as to recover the cost of build-

ing, operating and maintaining the project as to the lands in question, as then estimated; and

Whereas by contract of April 25, 1906, between the United States and the North Platte Valley Water Users' Association and by supplemental contract of June 23, 1909, between the same parties, it was agreed that a building charge of \$45 per acre be imposed upon the lands under the project, and by public notices and orders heretofore issued provision was made for the filing of water-right applications in accordance therewith; and

Whereas for approximately 34,000 acres in the first lateral district, wherein water was made available in 1908, payment, in most cases, has been made of \$2 per acre on the portion of the instalment for the building charge of \$45 per acre of irrigable land fixed by said public notices, leaving now due and delinquent, in most cases, the further sum of \$3 per acre upon said building charge, and leaving now due and unpaid thereon two further instalments of \$5 each per acre; and

Whereas for approximately 32,000 acres in the Second lateral district, wherein water was made available in 1909, payment in most cases has been made of 50 cents per acre on the portion of the instalment for the building charge of \$45 per acre, leaving now due and delinquent, in most cases, the further sum of \$1.50 per acre upon said building charge, and leaving now due and unpaid two further installments of \$3 and \$5 per acre, respectively; and

Whereas under the provisions of the reclamation act, most of the homestead entries and water-right applications on public lands, and most of the water-right applications for lands in private ownership in said lateral districts have been subject to cancellation on account of said delinquency in payment of the building charge, but by orders of March 7, and March 24, 1911, issued under the act of February 13, 1911 (36 Stat., 902), a stay of proceedings was allowed under conditions therein stated; and

Whereas said order of March 24, 1911, provided for a water supply to be furnished until June 15, 1911, without prepayment on account of the charge for operation and maintenance, the sum of 25 cents per acre being required on or before June 15, 1911, to secure a water supply for the remainder of the irrigation season, upon condition that the sum of \$1 per acre be paid on or before December 1, 1911; and

Whereas the water users have failed to make the payments as required by said public notices for reasons which, in many cases, may have been unavoidable on their part, and it has accordingly been decided to offer such opportunity as may be reasonable and possible under the terms of the said act of February 13, 1911, for the water users to secure easier terms of payment, and at the same time to recover for the reclamation fund, as required by the terms of the reclamation act, the cost as now estimated of the building, operation, and maintenance of the irrigation work, including necessary additional works to collect and utilize the seepage waters, so far as the location and cost of the same can now be anticipated:

Therefore the following public notice is issued under the terms of section 4 of the reclamation act, and of the said act of February 13, 1911:

1. All applications for water rights heretofore filed under the terms of the public notices and orders heretofore issued may be continued under the terms thereof, if the said public notices and orders issued prior to March 7, 1911, be fully complied with by payment and otherwise on or before March 15, 1912. For lands in the second lateral district heretofore rendered subject to public notices for which no water-right application has heretofore been filed, such application may be filed on or before March 15, 1912, at the building charge of \$45 per acre of irrigable land, subject to the terms of the public notices and orders applicable thereto, heretofore or hereafter issued. The purpose of this paragraph is to give all landowners and entrymen thereto entitled further opportunity to secure the benefits of the terms of the contracts hereinbefore referred to, made by the United States with the North Platte Valley Water Users' Association.

2. For the purpose of avoiding the cancellation of entries and water-right applications, for which the entrymen or owners shall have failed on or before March 15, 1912, to comply by payment and otherwise with the public notices and orders under which their water-right applications were made, it is hereby ordered, that for lands in the first and second lateral districts, water-right application at a building charge of \$55 per acre of irrigable land, may be made as amendatory to water-right application heretofore filed, or original water-right application at the same charge shall be made where none has been heretofore filed, except as provided in paragraph 1 for the second lateral district.

Application under this paragraph shall be subject to the public notices and orders heretofore or hereafter issued, and the said building charge of \$55 per acre shall be due and payable in 10 graduated annual payments, as the portions of the annual installments, as follows:

Building charge payment.	Amount.	Due Dec. 1—	Building charge payment.	Amount	Due Dec. 1—
First.....	\$1	1911	Sixth.....	6	1916
Second.....	2	1912	Seventh.....	7	1917
Third.....	3	1913	Eighth.....	8	1918
Fourth.....	4	1914	Ninth.....	9	1919
Fifth.....	5	1915	Tenth.....	10	1920

3. Where water-right application at the building charge of \$55 per acre, fixed in paragraph 2, is filed for lands in the first and second lateral districts, any payments heretofore made on account of the building charge thereon shall be credited on the first and subsequent building charge payments for the same tract.

4. The portion of installment for operation and maintenance for the irrigation season of 1911 to be paid on or before December 1, 1911, as required by the order of March 24, 1911, shall be paid on or before March 15, 1912. For the irrigation season of 1912 and subsequent years the portion of the installment for operation and maintenance shall be \$1.25 per acre until further notice and shall be due annually on December 1 of the preceding year. No water shall be furnished in any year until payment of the portions of the installment for operation and maintenance then due.

5. Failure to comply with the terms of this and previous public notices and orders shall render existing homestead entries and water-right applications for public lands, or water-right applications for lands in private ownership, subject to cancellation with the forfeiture of all rights thereunder, and of all moneys paid thereon, as provided by the reclamation act.

6. This public notice shall not be construed as affecting subsisting water-right applications made at the building charge of \$35 per acre.

7. An entryman against whose entry there is no pending charge of noncompliance with the law or regulations, or whose entry is not subject to cancellation under the reclamation act, may relinquish his entry and assign in writing to a prospective entryman any credits he may have for payments made on his water-right application, and such assignee shall have the right to continue payment at the same building charge. A private landowner against whose water-right application there is no pending charge of noncompliance with the law or regulations, or whose water-right application is not subject to cancellation, may in like manner make written assignment of credits for payments made, and his grantee shall have the right to continue payment at the same building charge. Except as specifically provided in this notice, no benefit of a smaller charge than that fixed in the public notice in force at the time of filing water-right application shall accrue for any land, except when the entryman or private landowner holds written assignment made under the conditions herein stated.

8. The stay of proceedings granted by orders of March 7 and March 24, 1911, shall terminate on March 15, 1912.

WALTER L. FISHER,
Secretary of the Interior.

PUBLIC NOTICE DATED MARCH 14, 1912.

1. In pursuance of section 4 of reclamation act of June 17, 1902 (32 Stat., 388), public notices have heretofore been issued opening to irrigation lands in the first and second lateral districts, North Platte project, Nebraska-Wyoming.

2. Pending the issue of public notice announcing the limitations, charges, terms, and conditions under which water will be furnished to lands in the third lateral district, it was ordered on April 21, 1911, that water be furnished to lands in said district, shown on plats approved March 10, 1911, for the irrigation seasons of 1911 and 1912, without charge for operation and maintenance, in pursuance of the plan theretofore adopted in view of the provisions of contract with the North Platte Valley Water Users' Association, dated June 23,

1909. Such lands, with additional lands not heretofore irrigated, are hereby opened to irrigation in 1912, under the provisions hereinafter recited.

3. Notice is hereby given that water will be furnished from the North Platte project under the provisions of the reclamation act, in the irrigation season of 1912 and thereafter for the irrigable lands in the third lateral district shown upon farm unit plats of T. 22 N., R. 53 W., sixth principal meridian, approved March 4, 1912; T. 22 N., R. 54 W., sixth principal meridian, approved March 10, 1911; T. 23 N., R. 52 W., sixth principal meridian, approved March 4, 1912; T. 23 N., R. 54 W., sixth principal meridian, approved March 4, 1912; T. 23 N., R. 53 W., sixth principal meridian, approved March 4, 1912, on file at the local land office at Alliance, Nebr.

4. Homestead entries accompanied by applications for water rights and, as hereinafter provided, by the appropriate installment or installments of the charges for building, operation, and maintenance, may be made under the provisions of the said act for the farm units shown on said plats. Water-right applications may also be made for lands heretofore entered, and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated.

5. The limit of area per entry representing the acreage which in the opinion of the Secretary of the Interior may be reasonably required for the support of a family on the lands entered, subject to the provisions of the reclamation act, is fixed at the amounts shown on the plats for the several farm units. The limit of area for which water-right applications may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

6. The plats show by distinctive symbols (*a*) the lands opened to irrigation in 1911 and (*b*) those opened to irrigation in 1912.

7. The charges which shall be made per acre of land shown on the plats as opened to irrigation in 1911, whether public land farm units or lands heretofore entered or in private ownership, including the cost of drainage works for the control of seepage waters, so far as the location and cost of the same can now be anticipated, are divided into two parts as follows:

First. For building, and including in the first two years of new entries, and the first two irrigation seasons in other cases, the cost of operation and maintenance, \$55 per acre of irrigable land, payable in not more than 10 annual installments, graduated as follows:

Per acre of irrigable land.

First installment-----	\$1	Sixth installment-----	\$6
Second installment-----	2	Seventh installment-----	7
Third installment-----	3	Eighth installment-----	8
Fourth installment-----	4	Ninth installment-----	9
Fifth installment-----	5	Tenth installment-----	10

Full payment may be made at any time of any balance of the building charge remaining due, subject to the regulations of the General Land Office.

Second. The portion of installment for operation and maintenance for the irrigation season of 1913 and annually thereafter until further notice shall be \$1.25 per acre of irrigable land, whether water is used thereon or not, and shall be due annually on December 1 of the preceding year. No water will be furnished in any year until the portions for operation and maintenance of all installments then due shall have been paid. Accordingly no water will be furnished for the irrigation season of 1913 unless the portion for operation and maintenance of the installment due December 1, 1912, has been paid, and no water will be furnished in any subsequent year unless payment has been made of the portions of installments for operation and maintenance then due and unpaid. As soon as the data are available the operation and maintenance charges will be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land, whether water is used thereon or not.

8. All entries of lands not heretofore entered, and all entries of lands which have heretofore been entered and relinquished to the United States, but which are not accompanied by written assignment of credit, shall be accompanied by the amount of the first two installments, which will include the charges for building, operation, and maintenance, \$3 per acre of irrigable land. The third installment of the building charge, \$3 per acre, plus the charge for operation

and maintenance then in effect, shall be due on December 1 of the year succeeding the date of entry, and subsequent installments of charges for building, operation, and maintenance shall become due on December 1 of each year thereafter.

9. For lands heretofore entered and for lands in private ownership opened to irrigation in 1911, the first installment of \$1 per acre of irrigable land, plus the charges for operation and maintenance, shall be due on December 1, 1912, the second and all subsequent installments of the building charge, plus the appropriate charge for operation and maintenance then in effect, shall become due on December 1 of each year thereafter.

10. For lands shown on said plats as opened to irrigation in 1912, the same charges, limitations, and graduations of payment shall apply as for lands opened to irrigation in 1911, except that for lands in private ownership and lands heretofore entered the several installments of the charges for building, operation, and maintenance shall become due one year later. In all other respects the provisions of this notice shall apply alike to lands opened to irrigation in 1911 and those opened in 1912.

11. Failure to pay any two installments of the charges when due, whether on entries made subject to the reclamation act, or on water-right applications for other lands, shall render such entries and the corresponding water-right applications, or the water-right applications for other lands, subject to cancellation, with the forfeiture of all rights under the reclamation act, as well as of any moneys already paid.

12. All charges must be paid at the local land office at Alliance, Nebr. These charges may, for the convenience of applicants, be paid to the special fiscal agent of the United States Reclamation Service, assigned to the North Platte project, for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office; but in case this privilege is availed of, the necessary charges for the transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

ORDER DATED MARCH 13, 1912.

Whereas it has been represented to me by the president of the North Platte Valley Water Users' Association that many of the water users under the North Platte reclamation project will be seriously crippled financially if required to pay in advance the operation and maintenance charges for the season of 1912, amounting to \$1.25 per acre of irrigable land, and that the postponement of the liability for such charges until December 1, 1912, with an increase in the amount of such charges by the sum of 15 cents per acre of irrigable land will save such water users from the necessity of selling necessary work animals, seed, and farm equipment to meet such payment in advance, and will thereby enable them to make a crop during the season of 1912:

Now, therefore, by virtue of the authority given me by the act of Congress approved June 17, 1902 (32 Stat., 388), commonly called the reclamation act, and by acts supplementary thereto and amendatory thereof, it is hereby ordered:

1. That any water user in said project whose water-right application is subject to the public notice of December 30, 1911, for said project may receive water for irrigation in the season of 1912 without prior payment of the portion of the installment for operation and maintenance for 1912, amounting to \$1.25 per acre of irrigable land, subject to the following conditions:

2. Every such water user shall fully pay the unpaid balance, if any, of operation and maintenance charges for 1911 and prior years before any water is furnished to him for 1912.

3. Every water user desiring such extension shall, on or before April 30, 1912, make application therefor to the project engineer, who may, in his discretion, extend the time of payment for the operation and maintenance charges for 1912 until December 1, 1912. For all persons to whom such extension is granted the charge for operation and maintenance per acre of irrigable land for the season of 1912 shall be \$1.40 instead of \$1.25.

SAMUEL ADAMS,

Acting Secretary of the Interior.

PUBLIC NOTICE DATED MARCH 19, 1912.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and of the act of February 13, 1911 (36 Stat., 902), notice is hereby issued for the North Platte project, Nebraska-Wyoming, as supplemental to the public notice of December 30, 1911, for the said project, viz:

1. All entries of lands not heretofore entered, and all entries of lands heretofore entered and relinquished to the United States, which are not accompanied by written assignments of credit for payments theretofore made, shall be subject to the charges announced in the public notice of December 30, 1911, and shall be accompanied by the amount of the first two installments of the building charge, amounting to \$3 per acre as stated in paragraph 2 of the public notice of December 30, 1911. The third installment of the building charge shall become due on December 1 of the following year, and subsequent installments of charges for building shall become due on December 1 of each year thereafter until the charges are paid in full.

2. The portion of the first installment for operation and maintenance, \$1.25 per acre, or such other amount as may then be in effect, shall become due on December 1 of the year of entry, and the portions of subsequent installments shall be due on December 1 of each year thereafter.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

ORDER DATED MAY 23, 1912.

The time for filing applications for deferment of payment of the portion of the installment for operation and maintenance for the irrigation season of 1912 on the North Platte project, Nebraska-Wyoming, limited to April 30, 1912, by the order issued March 13, 1912, is hereby extended to June 15, 1912.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

PUBLIC NOTICE DATED JUNE 24, 1912.

In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given that water will be furnished from the North Platte project during the irrigation season of 1912 and thereafter for the irrigable lands in the third lateral district shown upon farm unit plat of T. 26 N., R. 62 W., sixth principal meridian, approved October 19, 1911, on file at the local land office at Cheyenne, Wyo., subject to the same charges, terms, and conditions as are prescribed in public notice dated March 14, 1912, for lands opened to irrigation in 1911, and orders and notices supplementary thereto or amendatory thereof.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

NEVADA—TRUCKEE-CARSON PROJECT.

NOTICE DATED OCTOBER 17, 1911.

The order issued September 16, 1910, for the Truckee-Carson project, Nevada, constructed in pursuance of the reclamation act of June 17, 1902 (32 Stat., 388), provides that until further notice entries and water-right applications for lands thereunder shall not be accepted.

On September 6 and 27, 1911, revised farm-unit plats were approved supplemental to and amendatory of those heretofore issued, as follows: T. 20 N., R. 23 E.; T. 20 N., R. 24 E.; T. 20 N., R. 25 E.; T. 19 N., R. 26 E.; T. 20 N., R. 26 E.; T. 19 N., R. 27 E.; T. 17 N., R. 28 E.; T. 18 N., R. 28 E.; T. 19 N., R. 28 E.; T. 17 N., R. 29 E.; T. 18 N., R. 29 E.; T. 19 N., R. 29 E.; T. 20 N., R. 29 E.; T. 19 N., R. 30 E.; T. 19 N., R. 31 E., Mount Diablo meridian.

Copies of the revised plats are on file at the local land office, Carson City, Nev., and at the office of the project engineer, Fallon, Nev.

These plats show those lands only for which water will be furnished until further notice, all other lands being excluded therefrom and remaining subject to the order of September 16, 1910.

CARMI A. THOMPSON,

Acting Secretary of the Interior.

PUBLIC NOTICE DATED NOVEMBER 9, 1911.

In pursuance of section 4 of the reclamation act approved June 17, 1902 (32 Stat., 388), notice is hereby given that the suspension, by order dated September 16, 1910, of public notices theretofore issued for the Truckee-Carson project, Nevada, and of farm unit plats theretofore filed for said project, is hereby revoked and annulled as to the public lands and lands in private ownership hereinafter listed and described, and water will be furnished for the same from the project upon the filling of proper applications to enter or water-right applications, or both, as the case may be:

	Irrigable area (acres).		Irrigable area (acres).
T. 17 N., R. 28 E., Mount Diablo meridian:		T. 20 N., R. 24 E., Mount Diablo meridian:	
Sec. 35, farm unit "A"-----	160	Sec. 18, NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ -----	10
T. 19 N., R. 30 E., Mount Diablo meridian:		T. 20 N., R. 25 E., Mount Diablo meridian:	
Sec. 26—		Sec. 18—	
Farm unit "A"-----	80	Farm unit "A"-----	55
Farm unit "B"-----	75	Farm unit "B"-----	55
Farm unit "C"-----	80	T. 20 N., R. 29 E., Mount Diablo meridian:	
Farm unit "D"-----	80	Sec. 22, farm unit "A"-----	117
Sec. 27—			
Farm unit "F"-----	72		
Farm unit "G"-----	73		
T. 20 N., R. 23 E., Mount Diablo meridian:			
Sec. 22, SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ -----	25		

Homestead entries, applications for water right, the charges, time and manner of payments, shall be governed by the terms of the public notices and orders heretofore issued and as to said lands suspended by said order of September 16, 1910, except that the first installment of the charges for building, operation, and maintenance shall become due December 1, 1911.

CARMÍ A. THOMPSON,
Acting Secretary of the Interior.

PUBLIC NOTICE DATED FEBRUARY 8, 1912.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. For all irrigable lands shown on the approved farm unit plats of lands under the Truckee-Carson project, Nevada, the portion of the installment on account of operation and maintenance to become due December 1, 1912, and annually on the same date of each year thereafter until further notice shall be 75 cents per acre of irrigable land.

2. The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid. Accordingly, no water will be furnished for the irrigation season of 1912 for any lands unless the portions of installments for operation and maintenance which became due December 1, 1911, and in prior years have been paid, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made of the portions of the installments for operation and maintenance then due and unpaid.

3. Any provisions of previous notices in conflict herewith are hereby modified to the extent of such conflict.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

APPLICATIONS AND CHARGES FOR WATER RIGHTS DATED JUNE 25, 1908.

REGULATIONS.

By order of November 1, 1907, the building charges for water rights on the Truckee-Carson project, both on public land under homestead entries and on land in private ownership, for which water-right applications were filed after

January 1, 1908, were increased from \$22 to \$30 per acre. The increased rate will not be required in the cases described in the following paragraphs:

1. Where a homestead entryman filed an application for a water right prior to January 1, 1908, and made the accrued payments thereon at the lower rate, or was not in default so as to render the entry and water right subject to cancellation for nonpayment and relinquished his entry, the new homestead entryman taking up the land relinquished will be required to file a supplementary application asking to be substituted to the rights of the prior entryman under the former application and to be allowed credit for the payments made and assigned to him, and will be entitled to complete the payments for the building charges at the rate of \$22 per acre, subject to the provisions of General Land Office circular of January 18, 1908 (36 L. D., 256).

2. Where a private land owner filed an application for a water right prior to January 1, 1908, and made the accrued payments thereon at the lower rate, or was not in default so as to render the water right subject to cancellation for nonpayment, and sold all or a part of his land, the purchaser of all or any part of this land will be required to file a supplementary application asking to be substituted to the rights of the prior land owner under the former application, and to be allowed credit for the payments made and assigned to him, and will be entitled to complete the payments for the building charges at the rate of \$22 per acre.

3. Where a homestead entryman did not file an application for a water right prior to January 1, 1908, for lands entered prior thereto, and on which an application could have been filed, such homestead entryman may, after January 1, 1908, and within 30 days after notice by the engineer of the Reclamation Service, that the irrigation system is prepared to furnish water as needed for the irrigation of the land, file an application, and make payments of the building charges at the rate of \$22 per acre.

4. Where a private land owner did not file an application for a water right prior to January 1, 1908, for lands on which an application could have been filed, but for which the Government was not ready to furnish water for the season of 1907, such private land owner, if he had prior to January 1, 1908, adjusted his claim to any vested water right, may, after January 1, 1908, and within 30 days after notice by the engineer of the Reclamation Service that the irrigation system is prepared to furnish water as needed for the irrigation of the land, file an application and make payment of the building charges at the rate of \$22 per acre.

This order cancels the regulations approved June 5, 1908, which did not provide for a supplementary water-right application in the first and second cases.

C. H. FITCH, *Acting Director*.

Approved, June 25, 1908.

FRANK PIERCE, *Acting Secretary*.

PUBLIC NOTICE DATED JUNE 13, 1912.

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given that water will be furnished from the Truckee-Carson project, Nevada, under the provisions of the reclamation act, beginning with the irrigation season of 1912, for the lands hereinafter listed and described:

	Irrigable area (acres).
T. 17 N., R. 29 E., Mount Diablo meridian:	
Sec. 8, SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ -----	40
T. 19 N., R. 31 E., Mount Diablo meridian:	
Sec. 18, NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ -----	38
Sec. 17, NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ -----	38
T. 20 N., R. 26 E., Mount Diablo meridian:	
Sec. 26, farm unit "H"-----	79

The suspension by order dated September 16, 1910, of public notices theretofore issued and of farm unit plats theretofore filed for said project, is hereby revoked and annulled as to the lands above listed in so far as the same are affected thereby.

Homestead entries, applications for water rights, the charges, time, and manner of payments shall be governed by the terms of the public notices and orders heretofore issued, except that the first installment of the charges for building, operation, and maintenance shall become due December 1, 1912.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

NEW MEXICO—CARLSBAD PROJECT.

PUBLIC NOTICE DATED FEBRUARY 17, 1912.

Whereas under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), works for irrigation have been constructed or are in contemplation at a cost of approximately \$900,000 for the irrigation and reclamation of about 20,000 acres for the Carlsbad project, New Mexico, and said cost must be repaid by the water users as required by said act in not exceeding 10 annual installments, divided into a building charge for the building of the works and a charge for the operation and maintenance thereof; and

Whereas public notice of the said charges, the time and manner of payment has been given, the said charges being fixed so as to recover the cost of building, operating, and maintaining the project as then estimated; and

Whereas most of the water-right applications for lands under the said project have been delinquent by reason of failure to make payment of two installments of building charges as required by public notice heretofore issued; and

Whereas the order issued March 13, 1911, under the provisions of the act of Congress approved February 13, 1911 (36 Stat., 902), provides for a stay of proceedings looking to cancellation of entries or water-right applications for failure to make payment of the building charge, such stay of proceedings to become effective upon payment on or before March 31, 1911, of the charges for operation and maintenance for the year 1910, provided all prior charges for operation and maintenance are paid, and subject also to compliance with the provisions of a public notice to be issued which shall provide for an increased building charge to be determined after further investigation; and

Whereas the water users have failed to make the payments as required by the public notice for reasons which, in many cases, have been unavoidable on their part, and it has been accordingly decided to offer such opportunity as may be reasonable and possible under the terms of the said act of February 13, 1911, for the water users to secure easier terms of payment, and at the same time to recover for the reclamation fund, as required by the terms of the reclamation act, the cost as now estimated of the building, operation, and maintenance of the irrigation works, including betterments and construction of necessary works in addition to those at first estimated:

Therefore the following public notice is issued under the terms of section 4 of the reclamation act and of the said act of February 13, 1911, for the lands shown on farm-unit plats of T. 21 S., R. 26 E., approved December 14, 1907; T. 22 S., R. 26 E., approved December 13, 1911; T. 21 S., R. 27 E., approved November 1, 1909; T. 22 S., R. 27 E., approved December 13, 1911; T. 22 S., R. 28 E., approved December 13, 1911; T. 23 S., R. 27 E., approved December 13, 1911; T. 23 S., R. 28 E., approved December 13, 1911; T. 23 S., R. 29 E., approved November 1, 1909; T. 24 S., R. 28 E., approved December 13, 1911; T. 24 S., R. 29 E., approved December 13, 1911.

1. All applications for water rights heretofore filed under the terms of the public notices and orders heretofore issued and which have complied with the terms of previous public notices and orders may be continued thereunder.

2. For all entries and water-right applications for which the entrymen or owners availed themselves of the stay of proceedings provided for by order of March 13, 1911, or who have failed to comply by payment and otherwise with the public notices and orders under which their water-right applications were made, it is hereby ordered that water-right application at a building charge of \$45 per acre of irrigable land may be made as amendatory to water-right applications heretofore filed or original water-right application at the same charge shall be made where none has been heretofore filed. The applications under this paragraph shall be subject to the public notices and orders heretofore issued, except as otherwise provided herein, and the said building charge of \$45 per acre shall be due and payable in 10 graduated annual installments, such portions of the annual installments to be as follows:

Building charge payment.	Amount.	Due Dec. 1—	Building charge payment.	Amount.	Due Dec. 1—
First.....	\$3.60	1912	Sixth.....	\$5.00	1917
Second.....	2.00	1913	Seventh.....	5.00	1918
Third.....	3.00	1914	Eighth.....	5.40	1919
Fourth.....	4.00	1915	Ninth.....	6.00	1920
Fifth.....	5.00	1916	Tenth.....	6.00	1921

3. Where water-right application at the building charge of \$45 per acre, as fixed in paragraph 2, is filed, any payments heretofore made on account of the building charge thereon and also a portion of each operation and maintenance charge heretofore paid at the rate of \$1.35 per acre to the extent of 35 cents per acre shall be credited on the first and subsequent building charge payments on the same tract. A portion of the amount of such credit shall be applied on each successive installment until it shall be entirely absorbed, on the following basis: Three dollars and ten cents per acre to be applied on the first installment and the remainder on the following installments.

4. For lands for which amendatory water-right applications shall be filed, as provided in paragraph 2 hereof, the portion of the installment for operation and maintenance due on December 1, 1911, and to become due on December 1 of each year thereafter until further notice, shall be \$1 per acre of irrigable land.

For lands which remain subject to the \$31 rate established by public notices heretofore issued, the portion of the installment for operation and maintenance due on December 1, 1911, shall be \$1.35 per acre; the portion to become due on December 1, 1912, and on December 1 of each year thereafter until further notice, shall be \$1.75 per acre of irrigable land.

No water will be furnished in any year until the portions for operation and maintenance of all installments then due shall have been paid. Accordingly no water will be furnished in the irrigation season of 1912 for any lands unless the portion for operation and maintenance of the installment due December 1, 1911, and for previous years, has been paid, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made of the portions of installments for operation and maintenance then due and unpaid.

5. Failure to comply with the terms of this and previous public notices and orders shall render the existing water-right applications subject to cancellation with the forfeiture of all rights thereunder and of all moneys paid thereon, as provided by the reclamation act.

6. Except as to the amount of the operation and maintenance charge, this public notice shall not be construed as affecting water-right applications for which payments are not in arrears more than one installment.

7. A private landowner against whose water-right application there is no pending charge of noncompliance with the laws or regulations, or whose application is not subject to cancellation, may make written assignment of credits for payments made, in favor of a subsequent applicant for the same tract, and his grantee shall have the right to continue payment at the same building charge. Except as specifically provided in this notice, no benefit of a smaller charge than that fixed in the public notice in force at the time of filing water-right applications shall accrue for any land except when the landowner holds written assignment made under the conditions herein stated.

8. The stay of proceedings granted by order of March 13, 1911, shall terminate on March 15, 1912.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

NORTH DAKOTA—MISSOURI RIVER PUMPING PROJECT.

BUFORD-TRENTON UNIT.

ORDER DATED JUNE 25, 1912.

Whereas in pursuance of the order of May 13, 1911, water was furnished in the season of 1911 to lands under the Buford-Trenton project, North Dakota, constructed under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388); and

Whereas the said order stated the charges, terms, and conditions under which water would be furnished during the seasons of 1911, 1912, and 1913; and

Whereas a number of settlers or landowners are financially unable to pay the charges in said order announced for the seasons of 1911 and 1912, but are desirous of obtaining water for the season of 1912:

Therefore it is hereby ordered that any such settler or landowner who in good faith has actually cultivated or improved his land and has alfalfa growing

or seeded, or land cultivated and prepared for seeding, may obtain water for the season of 1912 upon the following conditions:

1. By filing with the project engineer application and affidavit on the form hereinafter set forth, which must be corroborated by two disinterested persons upon information and belief:

Application for extension of time for payment of 1911 operation and maintenance charges.

I, ———, owner or entryman of ———, Sec. ———, T. ——— N., R. ——— W., containing ——— irrigable acres, do hereby apply for extension of time to December 1, 1912, for payment of the remainder of the charges for 1911, amounting to \$1 per acre for operation and maintenance and \$1 per acre-foot for all water delivered.

I have made the following progress in the cultivation of the soil: ———.

I have placed upon the land the following improvements: ———.

If this application is allowed, I hereby agree to pay, on or before December 1, 1912, as the balance of the increased charge, \$1.10 per acre (in lieu of \$1) for operation and maintenance for 1911, and \$1.10 per acre-foot for all water delivered in 1911; and, at the same time, an increased charge for 1912, aggregating \$1.55 per acre for operation and maintenance, and \$1 per acre-foot for all water delivered in 1912.

—————, Applicant.

Affidavit by applicant.

STATE OF NORTH DAKOTA,
County of Williams, ss.

—————, of the ——— of ———, county of ——— and State of North Dakota, being duly sworn, deposes and says that he is unable to make payment of the 1911 water charges at the present time, and that the statements contained in his application for extension of time for such payments are true.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———, 19—.

Corroboration of applicant's statements by two disinterested persons.

[1.]

STATE OF NORTH DAKOTA,
County of ———, ss.

—————, of the ——— of ———, county of ——— and State of North Dakota, being duly sworn, deposes and says that he has read the statements contained in the foregoing application and affidavit of ———, and that they are true to the best of his knowledge and belief.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———, 19—.

[2.]

STATE OF NORTH DAKOTA,
County of ———, ss.

—————, of the ——— of ———, county of ——— and State of North Dakota, being duly sworn, deposes and says that he has read the statements contained in the foregoing application and affidavit of ———, and that they are true to the best of his knowledge and belief.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———, 19—.

(NOTE.—These affidavits may be made before a judge or clerk of any court, justice of the peace, or notary public.)

2. Such application and affidavits must be filed with the project engineer not later than August 1, 1912.

3. The barge will not be launched in 1912 until application in pursuance of the provisions of this order shall have been filed for at least 1,500 acres or proper application and payment made for such area under the provisions of the public notices and orders heretofore issued.

SAMUEL ADAMS,
First Assistant Secretary.

WILLISTON UNIT.

ORDER DATED JUNE 25, 1912.

Whereas in pursuance of the order of April 14, 1911, water was furnished in the season of 1911 to lands under the Williston project, North Dakota, constructed under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388); and

Whereas the said order stated the terms and conditions under which and the charges for which water would be furnished during the seasons of 1911, 1912, and 1913; and

Whereas a number of settlers or land owners are financially unable to pay the charges in said order announced for the seasons of 1911 and 1912, but are desirous of obtaining water for the season of 1912;

Therefore it is hereby ordered that any such settler or land owner who in good faith has actually cultivated or improved his land and has alfalfa growing or seeded, or land cultivated and prepared for seeding, may obtain water for the season of 1912 upon the following conditions:

1. By filing with the project engineer application and affidavit on the form hereinafter set forth, which must be corroborated by two disinterested persons upon information and belief:

Application for extension of time for payment of 1911 operation and maintenance charges.

I, ———, owner or entryman of ——— Sec. ——— T. ——— N., R. ——— W., containing ——— irrigable acres, do hereby apply for extension of time to December 1, 1912, for payment of the remainder of the charges for 1911, amounting to \$1 per acre for operation and maintenance and \$1 per acre-foot for all water delivered.

I have made the following progress in the cultivation of the soil: ———

I have placed upon the land the following improvements: ———

If this application is allowed, I hereby agree to pay, on or before December 1, 1912, as the balance of the increased charge, \$1.10 per acre (in lieu of \$1) for operation and maintenance for 1911, and \$1.10 per acre-foot for all water delivered in 1911; and, at the same time, an increased charge for 1912, aggregating \$1.55 per acre for operation and maintenance, and \$1 per acre-foot for all water delivered in 1912.

—————, *Applicant.*

Affidavit by applicant.

STATE OF NORTH DAKOTA,
County of Williams, ss.

—————, of the ——— of ———, county of ——— and State of North Dakota, being duly sworn, deposes and says that he is unable to make payment of the 1911 water charges at the present time, and that the statements contained in his application for extension of time for such payments are true.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———, 19—.

Corroboration of applicant's statements by two disinterested persons.

[1.]

STATE OF NORTH DAKOTA,
County of ———, ss.

———, of the ——— of ———, county of ——— and State of North Dakota, being duly sworn, deposes and says that he has read the statements contained in the foregoing application and affidavit of ———, and that they are true to the best of his knowledge and belief.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———, 19—.

[2.]

STATE OF NORTH DAKOTA,
County of ———, ss.

———, of the ——— of ———, county of ——— and State of North Dakota, being duly sworn, deposes and says that he has read the statements contained in the foregoing application and affidavit of ———, and that they are true to the best of his knowledge and belief.

Subscribed and sworn to before me this ——— day of ———, 1912.

My commission expires ———, 19—.

(NOTE.—These affidavits may be made before a judge or clerk of any court, justice of the peace, or notary public.)

2. Such application and affidavits must be filed with the project engineer not later than August 1, 1912.

3. The barge will not be launched in 1912 until application in pursuance of the provisions of this order shall have been filed for at least 3,000 acres, or proper application and payment made for such area, under the provisions of the public notices and orders heretofore issued.

SAMUEL ADAMS,
First Assistant Secretary.

OREGON—UMATILLA PROJECT.

PUBLIC NOTICE DATED MARCH 2, 1912.

Whereas under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), works for irrigation have been constructed or are in contemplation for the irrigation and reclamation of lands under the Umatilla project, Oregon, and the cost thereof must be paid by the water users, as required by said act, in not exceeding 10 annual installments; and

Whereas it has been decided to offer such opportunity as may be reasonable and possible under the terms of the act of February 13, 1911 (36 Stat., 902), for the water users to secure easier terms of payment and at the same time recover for the reclamation fund, as required by the terms of the reclamation act, the cost of building, operation, and maintenance of the irrigation works as now estimated:

Now, therefore, the following public notice is issued under the terms of section 4 of the reclamation act and of the said act of February 13, 1911:

1. All applications for water rights heretofore filed under the terms of the public notices heretofore issued may be continued under the terms thereof, if the said public notices be fully complied with by payment or otherwise within two months from the date hereof.

2. For the purpose of avoiding the cancellation of entries and water-right applications for which the entrymen or owners shall have failed within two months from the date hereof to comply by payment or otherwise with the public notices and orders under which their water-right applications were made, it is hereby ordered that water-right applications at the increased rates herein named may be made within two months from the date hereof as amendatory

to water-right applications heretofore filed, and original entries and water-right applications shall be made at the new rates when none have been heretofore filed. The new rates shall apply also in cases where prior entries are canceled and new entries made without written assignment of credits for payments theretofore made. The portion of the charge on account of building the irrigation system shall be \$70 per acre of irrigable land, and shall be due and payable in not more than 10 annual payments, as follows:

Installments due (except as to first installments for certain farm units, payable at time of entry, as shown in schedule).	First unit.		Second unit.		Third unit. ¹		Fourth unit.	
	Now sub- ject to entry or entered under recla- mation act.	Other lands.	Now sub- ject to entry or entered under recla- mation act.	Other lands.	Now sub- ject to entry or entered under recla- mation act.	Other lands.	Now sub- ject to entry or entered under recla- mation act.	Other lands.
Dec. 1, 1908.....	\$6.00	\$6.00						
Dec. 1, 1909.....	6.00	6.00	² \$6.00	\$6.00				
Dec. 1, 1910.....	2.00	2.00	2.00	2.00	² \$18.00	\$2.00		
Mar. 1, 1912.....	3.50	3.50	3.50	3.50	2.00	3.00	² \$12.00	\$2.00
Mar. 1, 1913.....	5.00	5.00	4.50	4.50	2.00	4.00	2.00	3.00
Mar. 1, 1914.....	7.50	7.50	6.00	6.00	2.00	5.50	2.00	4.00
Mar. 1, 1915.....	10.00	10.00	8.00	8.00	3.00	7.00	3.00	5.50
Mar. 1, 1916.....	10.00	10.00	10.00	10.00	6.00	8.50	4.00	7.00
Mar. 1, 1917.....	10.00	10.00	10.00	10.00	8.00	10.00	7.00	8.50
Mar. 1, 1918.....	10.00	10.00	10.00	10.00	9.00	10.00	10.00	10.00
Mar. 1, 1919.....			10.00	10.00	10.00	10.00	10.00	10.00
Mar. 1, 1920.....					10.00	10.00	10.00	10.00
Mar. 1, 1921.....							10.00	10.00
Total.....	70.00	70.00	70.00	70.00	70.00	70.00	70.00	70.00

¹ Includes portions of farm units described in specified public notice for T. 4 N., R. 28 E., Willamette meridian, dated Jan. 6, 1910.

² Payment required at time of entry.

Except as to the amount of the building charge, and graduation of the installments thereof, as herein provided, applications under this paragraph shall be subject to the public notices and orders heretofore issued, and the installments shall be due and payable at the times set forth therein.

3. Where water-right application is filed for which the increased building charge fixed in paragraph 2 is applicable, any payments heretofore made on account of the building charges thereon, shall be credited on the first and subsequent building charges for the same tract.

4. Failure to comply with the terms of this and previous public notices and orders shall render existing homestead entries and water-right applications for public lands, or water-right applications for lands in private ownership, subject to cancellation, with the forfeiture of all rights thereunder, and of all moneys paid thereon, as provided by the reclamation act.

5. An entryman against whose entry there is no pending charge of noncompliance with the law or regulations, or whose entry is not subject to cancellation under the reclamation act, may relinquish his entry to the United States and assign in writing to a prospective entryman any credits he may have for payments made on his water-right application, and such assignee shall have the right to continue payment at the same building charge. A private landowner against whose water-right application there is no pending charge of noncompliance with the law or regulations, or whose water-right application is not subject to cancellation may in like manner make written assignment of credits for payments made, and his grantee shall have the right to continue payment at the same building charge. Except as specifically provided in this notice, no benefit of a smaller charge than that fixed in the public notice in force at the time of filing water-right application shall accrue for any land, except when the entryman or private landowner holds written assignment made under the conditions herein stated.

SAMUEL ADAMS,
Acting Secretary of the Interior.

PUBLIC NOTICE DATED MAY 8, 1912.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. The following public land farm units remain unentered in the third unit of the Umatilla project, Oregon, viz, T. 5 N., R. 28 E., sec. 26.—W. $\frac{1}{2}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$, farm unit "E"; E. $\frac{1}{2}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$, farm unit "F"; W. $\frac{1}{2}$ NW. $\frac{1}{4}$ SW. $\frac{1}{4}$, farm unit "D."

2. The said lands shall hereafter be subject to entry under the provisions of the reclamation act without initial payment of the amount heretofore required at the time of entry of other public land farm units in the third unit of said project, but the charges, time, and manner of payment shall be the same as required for lands in private ownership in the said third unit, as set forth in public notice of March 2, 1912, except as otherwise provided herein.

3. All entries hereafter made for any of the lands described, whether for lands not heretofore entered or for lands covered by prior entries which have been canceled by relinquishment or otherwise shall be accompanied by applications for water rights in due form and by all charges for building, operation, and maintenance which have theretofore become due and remain unpaid, or which were paid and were not duly assigned in writing. The remaining installments shall become due on the dates and be of the amounts provided for in public notice of March 2, 1912, under the heading "Other lands."

SAMUEL ADAMS,
First Assistant Secretary.

SOUTH DAKOTA—BELLE FOURCHE PROJECT.

PUBLIC NOTICE DATED DECEMBER 30, 1911.

In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of the act of February 13, 1911 (36 Stat., 902), public notice for the Belle Fourche project, South Dakota, is hereby issued as follows:

1. The order of January 24, 1911, suspending the provisions of prior public notices as to charges, time and manner of payment, is hereby revoked. All lands subject to public notices and orders heretofore issued shall be divided into four classes, A, B, C, and D, and shall be subject to the charges and terms of payment as hereinafter prescribed.

2. Class A includes all such public lands entered on or before January 24, 1911, and all such lands in private ownership held under trust deed, or signed under contract with the Belle Fourche Valley Water Users' Association on or before said date upon which but one annual installment of the charges for building, operation and maintenance was due and unpaid on December 1, 1910; and also those lands upon which the portions of two annual installments for the building charge were due and unpaid on December 1, 1910, but for which one of said building charge portions was thereafter paid within the time limited by the order of March 9, 1911, on or before March 31, 1911.

3. Lands of class A, for which water-right application had been filed, shall be subject to the provisions of the public notices and orders heretofore or hereafter issued, at a building charge of \$30 per acre of irrigable land, graduated as follows:

First installment \$1 per acre; second installment \$2 per acre; third to eighth installments, inclusive, \$3 each per acre; ninth installment \$4 per acre; and tenth installment \$5 per acre.

First installments shall become due for lands in the first unit on December 1, 1909, and in the second unit December 1, 1911, and subsequent installments on December 1 of each year thereafter.

4. Lands in class A, for which no water-right application has been made, shall, in accordance with the provisions of the contract entered into between the United States and the Belle Fourche Valley Water Users' Association, on February 7, 1911, be subject to the building charge of \$30 per acre, graduated as hereinbefore described, if water-right application therefor be filed within one year from the date of this notice; but in case of the failure to file water-right application within such time, or to pay the annual installments, as required by the public notices and orders applicable thereto, the lands shall be subject to the building charge and conditions of payments hereinafter imposed upon lands in class C.

5. Lands in class A may, upon application, be transferred to class B herein-after described, and become subject to all the charges, terms, limitations and conditions applicable thereto. Such applications, if approved by the project engineer, shall be filed in the local land office.

6. Class B includes all lands which would be included under class A, except for the fact that the building charge portions of the two annual installments due and unpaid December 1, 1910, have not been paid, but as to which lands a stay of proceedings looking to a cancellation was obtained by payment, on or before March 31, 1911, of \$1.50 per acre, as allowed by the order of March 9, 1911, said order having provided that the securing of a stay of proceedings would render the land subject to a building charge between \$35 and \$38 per acre of irrigable land. The said charge is hereby fixed at \$35 per acre of irrigable land, graduated as follows: First to third installments, inclusive, \$1 each per acre; fourth and fifth installments \$2 per acre; sixth installment \$3 per acre; seventh installment \$4 per acre; eighth installment \$5 per acre; ninth installment \$6 per acre; tenth installment \$10 per acre. The date when installments are due shall, for lands in the first unit, be December 1, 1909; and for lands in the second unit, December 1, 1911; and subsequent installments on December 1 of each year thereafter.

7. Class C includes all public lands subject to public notices and orders heretofore issued and vacant on and after January 24, 1911, and all lands in private ownership which on the said date were not held under trust deed, or were not signed under contract with the Belle Fourche Valley Water Users' Association.

8. Lands in class C shall, until further notice, be subject to a building charge of \$40 per acre of irrigable land, payable in graduated installments as follows: First and second installments \$2 each per acre; third and fourth installments \$3 each per acre; fifth and sixth installments \$4 each per acre; seventh and eighth installments \$5 each per acre; ninth and tenth installments \$6 each per acre. For public lands in this class entered after January 24, 1911, the first two installments shall be paid at the time of entry; the third installment shall be due December 1 of the following year; and subsequent installments shall be due on December 1 of each year thereafter.

For lands of this class in private ownership the first installment shall be due on the date specified in the public notices applicable thereto, and payment of all amounts due in excess of one installment for building, operation, and maintenance shall be made at the time of filing water-right application.

9. In every case where water-right application is filed under the provisions of this notice, any payments heretofore made on account of the building charge shall be credited on the first and subsequent building charge payments for the same tract. If the application becomes subject to cancellation, by reason of failure to make further payment, as required by the reclamation act, appropriate action shall be taken for the cancellation thereof and of any entry made in connection therewith, and all rights therefor under the reclamation act, as well as any moneys paid thereunder, shall be forfeited.

10. Class D includes all lands now or hereafter owned by the State of South Dakota subject to public notices and orders heretofore issued, and the same shall continue subject to the charge of \$30 per acre of irrigable land, graduated as hereinbefore stated, if water-right application be made within one year from the date hereof. All lands in class D for which water-right application shall not have been made within the said period of one year shall become subject to the charges, conditions, and limitations herein imposed on the lands in class C.

11. Nothing herein shall be construed as modifying the agreement between the United States and the Belle Fourche Valley Water Users' Association, dated February 7, 1911, providing for a building charge of \$30 per acre for certain lands therein described but not covered by this notice.

12. The portion of the installment for operation and maintenance shall, until further notice, be paid in accordance with public notices and orders heretofore issued.

13. An entryman against whose entry there is no pending charge of noncompliance with the law or regulations, or whose entry is not subject to cancellation under the reclamation act, may relinquish his entry and assign in writing to a prospective entryman any credits he may have for payments made on his water-right application, and such assignee shall have the right to continue payment at the same building charge. A private landowner against whose water-right application there is no pending charge of noncompliance with the law or regulations, or whose water-right application is not subject to cancella-

tion, may, in like manner, make written assignment of credits for payments made, and his grantee shall have the right to continue payment at the same building charge. No benefit of a smaller charge than that fixed by the public notice in force at the time of filing water-right application shall accrue for any land, except where the entryman or private landowner holds written assignment made under the conditions herein stated.

14. The stay of proceedings granted by order of March 9, 1911, shall terminate on March 15, 1912.

WALTER L. FISHER,
Secretary of the Interior.

ORDER DATED FEBRUARY 3, 1912.

Whereas the public notice issued for the Belle Fourche project, South Dakota, December 30, 1911, was in all its parts by section 1 thereof limited to "lands subject to public notices and orders heretofore issued," meaning thereby only those lands shown on farm unit plats for which announcement of water service had been made by said prior notices and orders; and

Whereas it has been represented that water users under the project having lands in private ownership held under trust deed or signed under contract with the Belle Fourche Valley Water Users' Association, which lands were not on December 30, 1911, shown on said farm unit plats nor included in said prior announcements of water service, are apprehensive lest section 4 of the said public notice may apply to or be construed as affecting such lands for which announcement of water service has not yet been made:

Therefore public notice is hereby given that the said public notice of December 30, 1911, has no reference whatever to lands not on the date thereof shown on said farm unit plats nor included in the said prior announcements of water service, but that the same were intended to be, and by paragraph 1 of said public notice were, excluded from the operation of said public notice so that the obligations theretofore existing with reference to them remain unchanged.

WALTER L. FISHER,
Secretary of the Interior.

ORDER DATED FEBRUARY 3, 1912.

By virtue of the authority contained in the act of Congress approved June 17, 1902 (32 Stat., 388), it is hereby ordered that any settler under the Belle Fourche project, South Dakota, who is in financial need, may receive water for irrigation in the season of 1912 without prior payment of the portion of the installment for operation and maintenance, amounting to 60 cents per acre of irrigable land, subject, however, to the following conditions, viz:

1. Application for such extension of time of payment must be made to the project engineer through the Belle Fourche Valley Water Users' Association not later than February 26, 1912. Such application shall be referred to the project engineer with report and recommendation by the board of directors of the association; and such application shall be allowed by the project engineer only in case he is satisfied that the applicant is in financial need.

2. Payment must be made not later than December 1, 1912, and the amount to be paid shall be 65 cents per acre of irrigable land, instead of 60 cents as provided for by notice of November 26, 1910.

WALTER L. FISHER,
Secretary of the Interior.

PUBLIC NOTICE DATED MAY 2, 1912.

Pursuant to the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. Water will be ready for delivery from the third unit of the Belle Fourche project, South Dakota, under the provisions of the reclamation act, in the irrigation season of 1912, for the irrigable areas shown on farm unit plats of T. 9 N., R. 4 E.; T. 10 N., R. 4 E.; T. 8 N., R. 5 E.; T. 9 N., R. 5 E.; T. 10 N., R. 5 E.; T. 7 N., R. 6 E.; T. 8 N., R. 6 E.; T. 9 N., R. 6 E.; T. 7 N., R. 7 E. Black Hills meridian, approved by the Secretary of the Interior on March 27, 1912, and on file in the local land office at Belle Fourche, S. Dak.

2. Homestead entries accompanied by applications for water rights, and, as hereinafter provided, by the appropriate installment or installments of the charges for building, operation, and maintenance may be made on and after May 25, 1912, beginning at 9 o'clock a. m., under the provisions of said act, for the farm units shown on said plats. Water-right applications may be made after the date hereof for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated.

3. Warning is hereby expressly given that no person will be permitted to gain or exercise any right whatever under any settlement or occupation begun prior to June 20, 1912, on any lands shown on said plats; provided, however, that this shall not interfere with any valid existing rights obtained by settlement or entry while the land was subject thereto.

4. The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown on the plats for the several farm units. The maximum limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

5. The lands included in this unit, and shown on the above-named farm unit plats shall be divided into four classes—A, B, C, and D—and shall be subject to the charges and terms of payment as hereinafter prescribed.

6. Class A includes all public lands in this unit entered on or before January 24, 1911, and all such lands in private ownership, held under trust deed or signed under contract with the Belle Fourche Valley Water Users' Association on or before said date.

Lands in class A shall be subject to a building charge of \$30 per acre of irrigable land, graduated as follows: First installment, \$1 per acre; second installment, \$2 per acre; third to eighth installments, inclusive, \$3 per acre; ninth installment, \$4 per acre; and tenth installment, \$5 per acre. The first installment shall become due on December 1, 1912, and subsequent installments on December first of each year thereafter.

In case of failure to file water-right application within two years from the date of this notice, or to pay the annual installments required by this public notice and orders applicable thereto, the land shall be subject to the building charge and conditions of payments hereinafter imposed upon lands in class C.

7. Lands in class A may, upon application, be transferred to class B hereinafter described, and become subject to all charges, terms, limitations, and conditions applicable thereto. Such applications, if approved by the project engineer, shall be filed in the local land office.

8. Class B includes all lands which would be included in class A, except for the fact that the entryman or owner of the land desires to take advantage of the graduated scale of payments, as hereinafter provided. Lands in class B shall be subject to a building charge of \$35 per acre of irrigable land, graduated as follows:

First to third installments, inclusive, \$1 per acre; fourth and fifth installments, \$2 per acre; sixth installment, \$3 per acre; seventh installment, \$4 per acre; eighth installment, \$5 per acre; ninth installment, \$6 per acre; and tenth installment, \$10 per acre. For class B lands the first installment shall be due on December 1, 1912, and subsequent installments on December 1 of each year thereafter.

9. Class C includes all public lands in this unit vacant on and after January 24, 1911, and all lands in private ownership which on the said date were not held under trust deed, or were not signed under contract with the Bellefourche Valley Water Users' Association. Lands in class C shall, until further notice, be subject to a building charge of \$40 per acre of irrigable land, payable in graduated installments as follows:

First and second installments, \$2 each per acre; third and fourth installments, \$3 each per acre; fifth and sixth installments, \$4 each per acre; seventh and eighth installments, \$5 each per acre; ninth and tenth installments, \$6 each per acre.

For public lands in this class entered on or after January 24, 1911, and also for private lands in this class, the first two installments shall be paid at the time of entry and filing of water-right application; the third installment shall be due December 1 of the following year, and subsequent installments shall be due on December 1 of each year thereafter.

10. Class D includes all lands in this unit now or hereafter owned by the State of South Dakota, and they shall be subject to the charges, limitations, terms, and conditions as for lands of class A, if water-right application be made within two years of the date thereof. All lands in class D for which water-right application shall not have been made within the said period of two years, shall become subject to the charges, conditions, and limitations imposed upon lands in class C.

11. The charges which shall be made per acre of irrigable land in the said entries and for lands heretofore entered or in private ownership which can be irrigated by the waters from the said irrigation project are in two parts as follows:

(a) For the building of the irrigation system, the amounts stated as applicable to the various classes of lands described, payable in not more than ten annual installments. Full payment may be made at any time of any balance of the building charge remaining due subject to the regulations of the General Land Office.

(b) For operation and maintenance for the irrigation season of 1912 and annually thereafter, until further notice, shall be 60 cents per acre of irrigable land, whether water is used thereon or not. For all lands in classes A and B the portions of the installments for operation and maintenance shall be due December 1, 1912, and annually on December 1 of each year thereafter, whether or not water-right application is made or water is used thereon. For lands of class C the portion of the first installment for operation and maintenance shall be paid at the time of entry or filing of water-right application; the portion of the second installment shall become due on December 1 of the following year, and subsequent portions on December 1 of each year thereafter.

12. The regulation is hereby established that no water will be furnished in any year until the portion of the installment for operation and maintenance for that irrigation season and for prior seasons shall have been paid. Accordingly, no water will be furnished for the irrigation season of 1912 for any lands unless the portion for operation and maintenance of the installment due December 1, 1912, or at the time of entry and filing of water-right application has been paid; and in like manner for subsequent years, no water will be furnished to lands until payment of said portion of the installment is made for the current and prior years. As soon as the data are available the portion of the installment for operation and maintenance will be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land, whether water is used thereon or not.

13. A number of farm units and tracts of private lands are so situated as to be irrigable partly under the second unit, opened to irrigation by public notice of February 10, and partly under the third unit, and water-right applications have heretofore been filed for the areas under the second unit. In such cases both areas are shown distinctively on the plats, and the added areas, irrigable in 1912, will be subject to all the terms and conditions of this notice, water-right applications being filed therefor as for other irrigable lands in the third unit.

14. Failure to make any two payments when due, whether on entries made subject to the reclamation act or on water-right applications for lands in private ownership, shall render the water-right applications in either case, and, if the lands are public lands, the entries also, subject to cancellation, with the forfeiture of all rights thereto under the reclamation act, as well as of any moneys paid.

15. An entryman against whose entry there is no pending charge of noncompliance with the law or regulations or whose entry is not subject to cancellation under the reclamation act, may relinquish his entry to the United States and assign in writing to a subsequent entryman any credits he may have for payments made on his water-right application; and such assignee shall have the right to continue payment at the same building charge. A private landowner against whose water-right application there is no pending charge of noncompliance with the law or regulations or whose water-right application is not subject to cancellation, may in like manner make written assignment of credits for payments made, and his assignee shall have the right to continue payment at the same building charge. No benefit of a smaller charge than that fixed by the public notice in force at the time of filing water-right application shall accrue for any land, except where the entryman or private owner holds written assignment made under the conditions herein stated.

16. All charges must be paid at the local land office at Belle Fourche, S. Dak.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

ORDER DATED MAY 2, 1912.

By virtue of the authority contained in the act of Congress approved June 17, 1902 (32 Stat., 388), it is hereby ordered that any settler under the Belle Fourche project, South Dakota, who is in financial need, including owners or occupants of lands heretofore entered or in private ownership within the third unit, but excluding lands hereafter entered, may receive water for irrigation in the season of 1912 without prior payment of the portion of the installment for operation and maintenance, amounting to 60 cents per acre of irrigable land, subject, however, to the following conditions, viz:

1. Application for such extension of time of payment must be made to the project engineer through the Belle Fourche Valley Water Users' Association not later than June 1, 1912. Such application shall be referred to the project engineer with report and recommendation by the board of directors of the association; and such application shall be allowed by the project engineer only in case he is satisfied that the applicant is in financial need.

2. Payment must be made not later than December 1, 1912, and the amount to be paid shall be 65 cents per acre of irrigable land, instead of 60 cents as provided for by public notices.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

WASHINGTON—OKANOGAN PROJECT.

ORDER DATED APRIL 29, 1912.

Whereas in pursuance of the acts of Congress approved June 17, 1902 (32 Stat., 388), and February 13, 1911 (36 Stat., 902), respectively, an order was promulgated on March 28, 1911, for the Okanogan project, Washington, granting until further notice a stay of proceedings looking to the cancellation of entries and water-right applications because of failure to make payment of the building charge, the said order being effective as to all entries and water-right applications subject to public notices and orders theretofore issued, upon payment on or before May 1, 1911, of \$1 per acre of irrigable land on account of the building charge, plus all charges for operation and maintenance due on or before said date, and subject also to compliance with the conditions of a public notice to be thereafter issued; and

Whereas it is not feasible at the present time to announce the amount of the charges which shall be made per acre of irrigable land nor the rate at which said charges shall be paid, and negotiations with the Water Users' Association and by the association with individual landowners are in progress for the purpose of assuring payment of an increased building charge which may amount to \$100 or more per acre to cover proposed improvements of such character as to conduce to the better assurance of the water supply:

Now, therefore, in pursuance of the said acts of Congress:

1. An additional stay of proceedings is hereby offered to all entrymen and water-right applicants subject to the provisions of the public notices and orders theretofore issued, who on or before May 15, 1912, execute and file in the local land office at Waterville, Wash., an acceptance in the form set forth in paragraph 7 of this order. Printed copies of this order may be used for such purpose. Such acceptance must be accompanied by payment of a rental charge for the season of 1912 of \$3 per acre of irrigable land in the area within the project held by the water-right applicant. The stay of proceedings herein granted shall remain in effect until further announcement by public notice or otherwise. Applicants who file such acceptance shall be subject to the provisions of the public notices hereafter to be issued fixing the annual rental charges and the increased cost of the project.

2. All water-right applicants who availed themselves of the former stay of proceedings, but who elect not to avail themselves of the stay of proceedings hereby offered, shall be subject to the public notices heretofore issued and to a building charge of \$70 per acre of irrigable land. The unpaid balance of said sum shall be due and payable in annual installments of \$8 each, the first of which shall be due on May 1, 1912. The last payment shall be \$8 or such less sum as may be necessary to complete the payment of the building charge of \$70 per acre.

3. An entryman against whose entry there is no pending charge of noncompliance with the law or regulations, or whose entry is not subject to cancellation

under the reclamation act, may relinquish his entry to the United States and assign in writing to a subsequent entryman any credits he may have for payments made on his water-right application, and such assignee shall have the right to continue payment at the same building charge. A private landowner against whose water-right application there is no pending charge of noncompliance with the law or regulations, or whose water-right application is not subject to cancellation may in like manner make written assignment of credits for payments made, and his grantee shall have the right to continue payment at the same building charge.

4. All entries and water-right applications hereafter made without valid written assignment of credits for payments theretofore made, shall be subject to a building charge of \$100 or more per acre, as may be hereafter fixed, and pending the issuance of public notice providing therefor, shall receive water upon payment of the rental charges herein or hereafter provided.

5. Operation and maintenance charges for all lands where the stay of proceedings under this order is not taken advantage of shall until further notice be \$2.25 per acre of irrigable land.

6. Upon failure to make payment as herein required on or before May 15, 1912, or the annual charges which may be hereafter announced, or to file water-right application as required by public notice, to be hereafter issued, the entry or water-right application, or both, as the case may be, which would otherwise be subject to cancellation will be promptly canceled. The acceptance of this order shall not be complete, notwithstanding the signature of the acceptance in paragraph 7 hereof, until formal execution and record of a contract for covenants running with the land to secure proper application for a water right subject to the terms of the public notice hereafter issued announcing the charges as ultimately determined by the Secretary of the Interior. Such contract, as well as necessary amendatory contract with the Okanogan Water Users' Association, must be made prior to July 1, 1912.

7. Acceptance of the further stay of proceedings herein offered shall be in the following form and may be executed on a copy of this order:

I, entryman or owner of ———, Section ———, Twp. ——— N., R. ——— E., W. M., on the Okanogan project, Washington, do hereby accept the stay of proceedings offered in paragraph 1 hereof subject to all conditions announced in this order, and inclose herewith the sum of \$3 per acre for the irrigable land herein described.

Date ————.

Witness as to signature: _____.

8. The stay of proceedings granted by the order of March 28, 1911, shall terminate on May 15, 1912, except as to those accepting this order; provided, however, that notwithstanding the filing of such acceptance such stay of proceedings shall terminate on July 1, 1912, if the provisions of paragraph 6 hereof relative to the execution and recordation of contracts shall not have been fully complied with.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

WASHINGTON—YAKIMA PROJECT.

SUNNYSIDE UNIT.

PUBLIC NOTICE DATED FEBRUARY 29, 1912.

In pursuance of the provisions of section 4 of the act of Congress approved June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. Water will be furnished from the Sunnyside unit, Yakima project, Washington, under the provisions of the reclamation act in the irrigation season of 1912 for irrigable lands shown on farm-unit plats of Willamette meridian, T. 8 N., R. 23 E.; T. 8 N., R. 24 E.; T. 8 N., R. 25 E.; T. 9 N., R. 23 E.; T. 9 N., R. 25 E., approved by the Secretary of the Interior February 19, 1912, and on file in the local land office at North Yakima, Wash.

2. A supplementary list to accompany said plats and showing all lands now ready for irrigation in the Sunnyside unit has been filed in the said local land

office showing in separate columns the area in each legal subdivision or farm unit opened to irrigation in the years 1909, 1910, 1911, and 1912, and the additional lands for which water will be furnished in 1913 and subsequent years will be shown on further supplemental lists to be duly filed in the said land office.

3. The terms of this notice shall not apply to any unentered lands shown on said farm-unit plats except the public lands shown on said plats in section 4, T. 8 N., R. 23 E., Willamette meridian, not heretofore shown on any list as open to water-right application but now shown on the accompanying list. Public notice as to other unentered lands will be given at a later date, and in the meantime such lands shall remain reserved from all forms of entry. Homestead entries will be received upon unentered lands in section 4, T. 8 N., R. 23 E., Willamette meridian, at the aforesaid land office on and after April 1, 1912.

4. The United States has recently taken over a private irrigation system in the Prosser division of the Sunnyside unit, and the owners of all lands having certain rights and interests therein and who desire to obtain the benefits of storage connected with the Sunnyside unit and other benefits due to the improvements of the irrigation system, shall be allowed on account of such rights and interests a credit of \$21 per acre for such lands and may file water-right applications at a building charge of \$31 per acre of irrigable land therein. All lands of this class are indicated on the farm-unit plats and lists hereinabove referred to. The said building charge shall be paid in equal annual installments not exceeding 10.

5. The regulation is hereby established for the entire Sunnyside unit, that the United States does not undertake to supply water within less than 60 days from the date of acceptance for any water-right application.

6. Except as otherwise provided herein, homestead entries, applications for water rights, the charges, time and manner of payments shall be governed by the terms of the public notice of March 15, 1911, for the Sunnyside unit.

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

PUBLIC NOTICE DATED MAY 31, 1912.

In pursuance of the provisions of section 4 of the act of Congress approved June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. Water will be furnished from the Sunnyside unit, Yakima project, Washington, under the provisions of the reclamation act in the irrigation season of 1912, for irrigable lands shown on farm unit plats of T. 9 N., R. 25 E., and Ts. 10 and 11 N., R. 21 E., Willamette meridian, approved by the Secretary of the Interior May 22, 1912, and on file in the local land office of North Yakima, Wash.

2. A list showing all lands ready for irrigation in the Sunnyside unit was filed with public notice of February 29, 1912, and a supplementary and amendatory list has been filed in the local land office showing additional areas which will be irrigated in 1912 and subsequent years and amendments of the prior list.

3. Homestead entries under the provisions of the reclamation act accompanied by applications for water rights and the first installment of the charges for building, operation, and maintenance may be made on and after June 15, 1912, for the following public land farm units, shown on said plats and list, viz:

Farm unit.	Section.	Town north.	Range east.	Farm unit.	Section.	Town north.	Range east.
G.....	20	9	25	C.....	2	10	21
H.....	20	9	25	F.....	2	10	21
D.....	2	10	21	G.....	2	10	21
F.....	2	10	21	A.....	2	10	21
H.....	2	10	21	B.....	2	10	21

The second installment shall be due on March 1 of the following year and subsequent installments shall become due on March 1 of each year thereafter until fully paid.

4. A large proportion of the above lands are above gravity flow from the system of the Sunnyside unit, and entrymen must assume all responsibility for raising water from said system to the land to be irrigated. Such fact shall not,

however, affect the charges to be paid to the United States for water rights under the said unit.

5. Warning is hereby expressly given that no person will be permitted to gain or exercise any right whatever under any settlement or occupation begun prior to July 15, 1912, on any of the above-described farm units, provided, however, that this shall not interfere with any valid existing rights obtained by settlement or entry while the land was subject thereto.

6. For lands in private ownership and lands heretofore entered, the first installment shall become due on June 1, 1912, and subsequent installments on March 1 of each calendar year thereafter until fully paid.

7. Except as otherwise provided herein, homestead entries, applications for water rights, the charges, time, and manner of payments shall be governed by the terms of the public notices of March 15, 1911, and February 29, 1912, for the Sunnyside unit.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

TIETON UNIT.

PUBLIC NOTICE DATED JANUARY 24, 1912.

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. Water will be furnished from the third district, Tieton unit, Yakima project, Washington, under the provisions of the reclamation act, beginning in the irrigation season of 1912, for the irrigable lands in private ownership (including State and railroad lands) for lands heretofore entered, and for lands filed upon under preference rights of entry, shown on the farm unit plats of Willamette meridian, T. 12 N., R. 16 E.; T. 12 N., R. 17 E.; T. 12 N., R. 18 E.; T. 13 N., R. 16 E.; T. 13 N., R. 17 E.; T. 13 N., R. 18 E., approved by the Secretary of the Interior December 14, 1911, and on file in the local land office at North Yakima, Wash.

2. All persons entitled to preference rights of entry upon the irrigable lands shown upon said plats will be notified by the local land office by registered mail that they will be allowed to make homestead entry for one farm unit, covered by their preference right, under the terms of the reclamation act and this notice, within 30 days from the date of such notice. Such homestead entries must be accompanied by applications for water rights, and as hereinafter provided, by the appropriate payment of the charges for building, operation and maintenance. Upon rejection of any homestead application under this public notice by the local land officers, an appeal to the Commissioner of the General Land Office must be filed in the usual manner and no motion for rehearing of the departmental decision rendered on such appeal will be considered. The rules of practice approved December 9, 1910, are modified accordingly, so far as they relate to cases arising hereunder. Water-right applications may be made after the date hereof for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated. Until further notice homestead entries will not be allowed for any farm units shown on said plats, except as hereinabove provided; nor for lands which may be subject to preference right, and for which no entry has been made, as herein provided.

3. The limit of area per entry representing the acreage which in the opinion of the Secretary of the Interior may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown on the plats for the several farm units.

4. The maximum limit of area for which water-right application may be made for lands in private ownership, shall be 160 acres of irrigable land for each land owner.

5. The charges which shall be made per acre of irrigable land in the said entries, and for lands heretofore entered or in private ownership, for which water will be furnished, beginning in the irrigation season of 1912, as aforesaid, are in two parts as follows:

(a) The building of the irrigation system, \$93 per acre of irrigable land, payable in not more than 10 annual installments, each payment not less than \$9.30 or some multiple thereof, per acre. Full payments may be made at any time of any balance of the building charge remaining due, subject to the regulations of the General Land Office.

(b) For operation and maintenance for the irrigation season of 1912, and annually thereafter until further notice, \$1.50 per acre of irrigable land, whether water is used thereon or not. As soon as data are available the operation and maintenance charges will be fixed in proportion to the amount of water used, with a minimum charge per acre, whether water is used thereon or not.

6. All entries made under preference right as provided in paragraph 2 hereof, and all other entries made under notices to be issued hereafter for any of the lands described, whether for lands not heretofore entered, or for lands covered by prior entries, which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form and by the first installment of the charges for building, \$27.90 per acre of irrigable land, and the appropriate charge for operation and maintenance, except in so far as payments have been duly made by the prior applicants and credits therefor duly assigned in writing. The second installment of the building charge—not less than \$9.30 per acre—and the appropriate charge for operation and maintenance shall become due on April 1 of the following year. Subsequent installments of the charges for building, operation, and maintenance shall become due on April 1 of each year thereafter until fully paid.

7. For lands in private ownership, and for lands heretofore entered, the first installment of the charges for building, operation, and maintenance, not less than \$16.80 per acre of irrigable land, shall become due on April 1, 1912, and subsequent installments shall become due on April 1 of each year thereafter until fully paid. Water-right applications filed in 1913 and subsequent years must be accompanied by payment of all installments for building, operation, and maintenance which have become due and remain unpaid for prior years. All installments of charges shall become due and payable as herein provided, whether or not water-right application is made therefor or water is used thereon.

8. The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges levied for that year and for prior years shall have been paid in full.

9. Failure to pay any two installments of the charges when due, whether on entries made subject to the reclamation act or on water-right applications for other lands, shall render such entries and the corresponding water-right applications, if any, or the water-right applications for other lands, subject to cancellation, with the forfeiture of all rights under the reclamation act, as well as of any moneys already paid.

10. All charges are payable at the local land office, North Yakima, Wash.

WALTER L. FISHER,
Secretary of the Interior.

PUBLIC NOTICE DATED FEBRUARY 21, 1912.

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), public notice was issued in regard to the third district, Tieton unit, Yakima project, Washington, under date of January 24, 1912, giving the terms and conditions under which entries were to be made for the lands therein described. Paragraph 6 of said notice is hereby amended to read as follows:

“6. All entries made under preference right as provided in paragraph 2 hereof, and all other entries made under notices to be issued hereafter for any of the lands described, whether for lands not heretofore entered, or for lands covered by prior entries, which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form, and by the first installment of the charges for building, \$9.30 per acre of irrigable land, and the appropriate charge for operation and maintenance, except in so far as payments have been duly made by the prior applicants and credits therefor duly assigned in writing. The second installment of the building charge—not less than \$9.30 per acre, and the appropriate charge for operation and maintenance, shall become due on April 1 of the following year. Subsequent installments of the charges for building, operation, and maintenance, shall become due on April 1 of each year thereafter until fully paid.”

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

PUBLIC NOTICE DATED APRIL 18, 1912.

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. Water will be furnished from the third district, Tieton unit, Yakima, project, Washington, under the provisions of the reclamation act, beginning in the irrigation season of 1912, for the public land farm units shown on the farm unit plats of T. 12 N., R. 16 E.; T. 12 N., R. 17 E.; T. 12 N., R. 18 E.; T. 13 N., R. 16 E.; T. 13 N., R. 17 E.; T. 13 N., R. 18 E., Willamette meridian, approved by the Secretary of the Interior December 14, 1911, and on file in the local land office at North Yakima, Wash.

2. Homestead entries, accompanied by applications for water rights and the first installment of the charges for building, operation, and maintenance may be made under the provisions of said act for the undisposed-of farm units shown on said plats in the manner hereinafter provided.

3. The limit of area per entry, representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown on the plats for the several farm units.

4. The charges which shall be made per acre of irrigable land in the said entries, for which water will be furnished, beginning in the irrigation season of 1912, as aforesaid, are in two parts as follows:

(a) The building of the irrigation system, \$93 per acre of irrigable land, payable in not more than 10 annual installments, each payment not less than \$9.30, or some multiple thereof, per acre. Full payment may be made at any time of any balance of the building charge remaining due, subject to the regulations of the General Land Office.

(b) For operation and maintenance for the irrigation season of 1912, and annually thereafter until further notice, \$1.50 per acre of irrigable land, whether water is used thereon or not. As soon as the data are available the operation and maintenance charges will be fixed in proportion to the amount of water used, with a minimum charge per acre, whether water is used thereon or not.

5. There will be not to exceed 44 farm units opened to general entry. Each unit contains approximately 40 acres, the irrigable acreage running from 20 acres upwards. Persons making entry for these farm units will be required to comply with all the terms and conditions of the homestead laws, and, before patent is issued, they will be required to reclaim one-half of the irrigable area of the land and to pay the water-right building charges, amounting to \$93 per acre of irrigable land and the yearly operation and maintenance charge to be determined from time to time, which at present is fixed at \$1.50 per year for each irrigable acre. The exact description of the units opened can not now be given, but farm unit plats will be on file in the local land office at North Yakima on and after May 6, showing the units to be opened to entry, and printed slips containing descriptions of the lands will then be available for distribution.

6. Homestead applications for the farm units shown on said plats may be executed by any person qualified to make homestead entry at any time on and after May 6, and up to and including May 25, 1912, before any duly authorized officer within the land district. Each homestead application must be accompanied by a properly executed water-right application and by a certified check on a national bank or money order drawn to the order of the receiver, Alfred C. Steinman, at North Yakima, Wash., for the amount of the first installment of the water-right charges for building, \$9.30 per acre of irrigable land, and for operation and maintenance for the season of 1912, \$1.50 per acre of irrigable land, and also the required fees and commissions amounting to \$6.50 per entry. The homestead application, the water-right application, and the certified check, or money order, and all other papers necessary to show the applicant to be a qualified homesteader must be inclosed in a sealed envelope, addressed to the register and receiver at North Yakima, Wash., and the upper left hand corner of the envelope must contain the name and address of the applicant and the description of the land by farm unit, section, township, and range, and be marked "Tieton unit." The papers so prepared and inclosed in a sealed envelope may be filed in person, through another, or through the mail in the United States land office at North Yakima, Wash., on May 25, 1912, between 9 a. m. and 4.30 p. m. All persons sending in their applications by mail should

post them at such time as to insure their being received at the local land office between these hours. All applications filed before 9 o'clock of that day will be returned without opening, and all applications filed after 4.30 of that day will be held until all applications filed hereunder are disposed of, when, if there are any vacant farm units for which delayed applications are filed, they will then be considered.

7. Warning is hereby expressly given that no rights can be obtained by settlement made on the land since the date of their withdrawal under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and prior to the allowance of entry hereunder, nor will any person be allowed to obtain preference right or other advantage through priority in presenting homestead application at the United States land office, or by holding a place in any line formed at that office, nor in any other manner than as herein provided for.

8. Where two or more persons apply for the same farm unit on the date above specified, the right to enter will be determined in the manner hereinafter prescribed, on June 5, 1912, at the United States land office at North Yakima, Washington.

9. No person will be allowed to present application to enter more than one farm unit, which must be specifically and fully described in the homestead application and water-right application, according to legal subdivision, section township, and range, and also by farm-unit description, in accordance with the approved farm-unit plat for the township. If any person presents application for more than one farm unit none of his several applications will be considered.

10. It shall be the duty of the register and receiver and the project engineer of the Tieton reclamation project to arrange all envelopes containing applications presented hereunder in alphabetical order, according to the names of the applicants shown on the outside thereof, without opening the same. They shall also prepare cards or slips of paper of uniform size, color, and appearance, and the names of the several applicants shall be written, one on each slip of paper, with a description of the farm unit applied for, and such cards or slips of paper shall be arranged according to the farm units applied for, so that all cards representing applications for one particular farm unit shall be assembled together.

11. The right of entry for each farm unit shall be determined in public, and before the right for each farm unit, for which more than one person has applied, is determined, it shall be the duty of the register of the local land office to make public announcement that such right is about to be determined. All cards or slips of paper representing applications to enter such farm unit will then be placed in a box or other receptacle provided for that purpose and the register of the land office shall publicly announce the name of each applicant at the time the card or slip of paper bearing his name is placed within the receptacle. All cards or slips of paper in the receptacle shall be thoroughly mixed and one card or slip of paper will then be drawn therefrom by some impartial and disinterested person, designated by the officer in charge, and the right to enter the farm unit will be accorded to the applicant whose name appears on the card or slip so drawn, provided he is duly qualified to make homestead entry, and the envelope containing his application will be immediately opened, and the papers examined by the local land office, and, if found to comply with the law and regulations thereunder, they will be given a serial number, and upon approval of the water-right application by the project engineer both the homestead and water-right applications will be allowed by the local land officers, but the receiver will not issue a receipt until the certified check where such accompanied the application has been paid. While applicants may be present at time right of entry is awarded, yet such presence is not necessary, as the applications of successful persons will be immediately allowed on the papers already filed and notice at once mailed the successful applicants.

12. The slips of paper bearing the names of the other applicants for the particular farm unit will be retained in the receptacle, and if, on examination, it shall be found that the applicant whose name is first drawn is not qualified to make a homestead entry, or the papers filed in support thereof are unsatisfactory, the register will thereupon reject his application, assigning reasons therefor, and allow the applicant the usual right of appeal, whereupon a second slip will be drawn from such receptacle in the same manner as the first slip was drawn, and the person whose name appears on said second slip shall be accorded

the right to make entry of the unit, if duly qualified and his showing is satisfactory. Such procedure shall be followed until a person is found who is qualified to make homestead entry and has met all requirements. Where a second drawing is necessary and entry is allowed thereon, such entry will be subject to the rights of the party whose application was first drawn, if, upon appeal, the action of the local land officers in rejecting his application be set aside.

13. When the right to enter all of the farm units applied for has been determined, the envelopes remaining unopened shall each be at once inclosed in an official Government envelope and returned by the local land officers to the persons whose names appear on the outside thereof.

14. In order that every person desiring to execute and present application for any of the farm units may be enabled to do so at the time allowed, without causing a rush, warning is hereby given that all such applications should be prepared and executed before some of the officers authorized by law at as early a date as possible after May 6, 1912.

15. After the expiration of the period for entry hereinbefore provided for, all entries made for any of the lands described, whether for lands not heretofore entered or for lands covered by prior entries which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form, and by all charges for building, operation, and maintenance then due, except where payments have been duly made by the prior applicants and credits therefor duly assigned in writing. The second installment of building charges shall become due on December 1, 1913. Subsequent installments shall become due on December 1 of each year thereafter until fully paid. All installments of charges shall become due and payable as herein provided, whether or not water-right application is made therefor or water is used thereon.

16. The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges levied for that year and for prior years shall have been paid in full.

17. Failure to pay any two installments of the charges when due, on entries made subject to the reclamation act, shall render such entries and the corresponding water-right applications, if any, subject to cancellation, with the forfeiture of all rights under the reclamation act, as well as of any moneys already paid.

18. All charges are payable at the local land office, North Yakima, Wash.

SAMUEL ADAMS,
First Assistant Secretary.

PUBLIC NOTICE DATED MAY 10, 1912.

In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), public notice was issued April 18, 1912, providing for the opening of certain farm units under the Tieton unit, Yakima project, Washington, and stating the terms and conditions under which the water rights might be obtained for said lands.

Paragraph 15 of the said notice is hereby amended to read as follows:

"15. After the expiration of the period for entry hereinbefore provided for, all entries made for any of the lands described, whether for lands not heretofore entered or for lands covered by prior entries which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form, and by all charges for building, operation, and maintenance then due. Where payments have been duly made by the prior applicants and credits therefor duly assigned in writing the entryman shall continue the payments thus begun. In other cases the entryman shall pay the first installment in full at the time of his entry; the second installment shall become due on April 1 of the calendar year following the date of entry; and subsequent installments shall become due on April 1 of each year thereafter until fully paid. All installments of charges shall become due and payable as herein provided, whether or not water-right application is made therefor or water is used thereon."

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

WYOMING—SHOSHONE PROJECT.

PUBLIC NOTICE DATED FEBRUARY 9, 1912.

Whereas under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), works for irrigation and for the control of seepage waters have been constructed or are in contemplation for the irrigation and reclamation of lands under the Shoshone project, Wyoming, the cost thereof must be repaid by the water users, as required by said act, in not exceeding 10 annual installments, divided into a building charge for the building of the works, and a charge for the operation and maintenance thereof; and

Whereas public notice of the said charges, the time, and manner of payment has been given for 3 units of the project, designated as the first, second, and third units, the said charges being fixed so as to recover the cost of building, operating, and maintaining the project as to the lands in question as then estimated; and

Whereas under the provisions of the reclamation act most of the homestead entries and water-right applications on public lands, and most of the water-right applications for lands in private ownership in the first and second units have been subject to cancellation on account of delinquency in payment of the building charge, but by order of March 25, 1911, issued under the act of February 13, 1911 (36 Stat., 902), a stay of proceedings was allowed under the conditions therein stated; and

Whereas the water users have not made the payments as required by said public notices for reasons which in many cases have been unavoidable on their part, and it has accordingly been decided to offer such opportunity as may be reasonable and possible under the terms of the said act of February 13, 1911, for the water users to secure easier terms of payment, and at the same time to recover for the reclamation fund, as required by the terms of the reclamation act, the cost of the building, operation, and maintenance of the irrigation works, including necessary additional works to collect and utilize the seepage waters, so far as the location and cost of the same can now be anticipated;

Therefore the following public notice is issued under the terms of section 4 of the reclamation act and of the said act of February 13, 1911:

1. All applications for water rights heretofore filed under the terms of the public notices heretofore issued may be continued under the terms thereof, if the said public notices be fully complied with by payment and otherwise, on or before March 15, 1912.

2. For the purpose of avoiding the cancellation of entries and water-right applications for which the entrymen or owners shall have failed, on or before March 15, 1912, to comply by payment and otherwise with the public notices under which their water-right applications were made, it is hereby ordered that water-right applications at the increased rates herein named may be made as amendatory to water-right applications heretofore filed, and original entries and water-right applications shall be made at the new rates when none has been heretofore filed. The new rates shall apply also in cases where prior entries are canceled and new entries made without written assignment of credits for payments theretofore made. The portion of the charge on account of building the irrigation system shall be \$50, \$51, and \$52 per acre for the first, second, and third units, respectively, and shall be due and payable in not more than 10 annual payments, as follows:

	First unit.	Second unit.	Third unit.
First installment.....	\$4.50	\$4.60	\$4.70
Second installment.....	1.00	1.00	1.00
Third installment.....	1.00	1.00	1.00
Fourth installment.....	2.50	3.40	4.30
Fifth installment.....	6.00	6.00	6.00
Sixth installment.....	6.00	6.00	6.00
Seventh installment.....	6.00	6.00	6.00
Eighth installment.....	6.00	6.00	6.00
Ninth installment.....	6.00	6.00	6.00
Tenth installment.....	11.00	11.00	11.00
Total.....	50.00	51.00	52.00

Except as to the amount of the building charge, applications under this paragraph shall be subject to the public notices and orders heretofore issued, and the installments shall be due and payable at the times set forth therein, except also that the portions of installments for operation and maintenance shall not accumulate, as therein provided, and the payments for building charges shall be graduated as herein provided.

3. Where water-right application is filed for which the increased building charge fixed in paragraph 2 is applicable, any payments heretofore made on account of the building charges thereon shall be credited on the first and subsequent installments of building charges for the same tract.

4. The portion of installment for operation and maintenance shall be \$1 per annum per acre of irrigable land, whether water is used thereon or not. The portion of the first installment for operation and maintenance shall be due and payable for public land farm units at the time of entry, and for private lands at the time of filing water-right application. No water will be furnished in any year until the operation and maintenance charges then due have been paid.

5. Failure to comply with the terms of this and previous public notices and orders shall render existing homestead entries and water-right applications for public lands, or water-right applications for lands in private ownership, subject to cancellation, with the forfeiture of all rights thereunder, and of all moneys paid thereon, as provided by the reclamation act.

6. An entryman against whose entry there is no pending charge of noncompliance with the law or regulations, or whose entry is not subject to cancellation under the reclamation act, may relinquish his entry and assign in writing to a prospective entryman any credits he may have for payments made on his water-right application, and such assignee shall have the right to continue payment at the same building charge. A private landowner against whose water-right application there is no pending charge of noncompliance with the law or regulations, or whose water-right application is not subject to cancellation, may in like manner make written assignment of credits for payments made, and his grantee shall have the right to continue payment at the same building charge. Except as specifically provided in this notice, no benefit of a smaller charge than that fixed in the public notice in force at the time of filing water-right application shall accrue for any land, except when the entryman or private landowner holds written assignment made under the conditions herein stated.

7. The stay of proceedings provided for by order of March 25, 1911, shall terminate on March 15, 1912.

8. The public notice of November 25, 1907, opening to irrigation lands in the first unit is hereby amended by revoking the following provision, viz:

"For all water-right applications filed in any year on or before June 15, the charges shall be collected for that irrigation season; but when the filing is made subsequent to that date in any year, so much as may be paid on account of operation and maintenance shall be a credit on account of the installment for the next year."

SAMUEL ADAMS,
First Assistant Secretary of the Interior.

PUBLIC NOTICE DATED MARCH 23, 1912.

Pursuant to the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. Water will be furnished from the Shoshone project, Wyoming, under the provisions of the reclamation act in the irrigation season of 1912 for the irrigable lands in the fourth unit shown on farm unit plats of township 55 north, ranges 99 and 100 west, and township 56 north, ranges 98 and 99 west, sixth principal meridian, approved March 11, 1912, by the Secretary of the Interior and on file in the local land office at Lander, Wyo.

2. Homestead entries, accompanied by applications for water rights and the first installment of the charges for building, operation, and maintenance, may be made on and after April 22, 1912, beginning at 9 o'clock a. m., under the provisions of said act for the farm units shown on said plats. Water-right applications may also be made for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is herein-after stated.

3. Warning is hereby expressly given that no person will be permitted to gain or exercise any right whatever under any settlement or occupation begun

prior to May 15, 1912, on any lands shown on said plats; provided, however, that this shall not interfere with any valid existing rights obtained by settlement or entry while the land was subject thereto.

4. The limit of area per entry, representing the acreage which in the opinion of the Secretary of the Interior may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown on the plats for the several farm units. The limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

5. The charges which shall be made for each acre of irrigable land in the said entries and for lands heretofore entered or in private ownership are in two parts as follows:

(a) The portion of the charge on account of building the irrigation system shall be \$52 per acre of irrigable land, payable in not more than 10 annual installments, as follows:

First installment-----	\$4.70	Sixth installment-----	\$6.00
Second installment-----	1.00	Seventh installment-----	6.00
Third installment-----	1.00	Eighth installment-----	6.00
Fourth installment-----	4.30	Ninth installment-----	6.00
Fifth installment-----	6.00	Tenth installment-----	11.00

(b) The portion of the charge on account of the operation and maintenance of the irrigation system for the irrigation season of 1912 and annually thereafter until further notice shall be \$1 per acre of irrigable land, whether water is used thereon or not. As soon as the data are available the operation and maintenance charges will be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land whether water is used thereon or not.

6. All entries made hereafter for any of the lands described, whether for lands not heretofore entered or for lands covered by prior entries which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form, and by the first installment of the charges for building, operation, and maintenance not less than \$5.70 per acre of irrigable land, except where payments have been duly made by the prior applicants and credits therefor duly assigned in writing. The second installment shall become due on December 1 of the following year. Subsequent installments shall become due on December 1 of each year thereafter until fully paid. For lands in private ownership and for lands heretofore entered the first installment of the said charges shall become due on December 1, 1912. The second installment shall be due on December 1, 1913. Subsequent installments shall be due on December 1 of each year thereafter until fully paid.

7. On some of the farm units in township 55 north, range 100 west, additional areas (shown on the plat inclosed in a square) will be irrigated at a later date by the construction of the high-line canal, at which time water-right applications will be required therefor.

8. The regulation is hereby established that no water will be furnished in any year until the portions for operation and maintenance of all installments then due shall have been paid. Accordingly, no water will be furnished for the irrigation season of 1913 for any lands unless the portion of the installment for operation and maintenance due on December 1, 1912, has been paid, and in like manner no water will be furnished in any subsequent irrigation season until payment has been made of the portions of the installments for operation and maintenance for the current and prior years.

9. Failure to pay any two installments of the charges when due, whether on entries made subject to the reclamation act or on water-right applications for other lands, shall render such entries and the corresponding water-right applications, if any, or the water-right applications for other lands, subject to cancellation with the forfeiture of all rights under the reclamation act, as well as of any moneys already paid.

10. All charges must be paid at the local land office at Lander, Wyo. The charges may, however, for the convenience of applicants be paid to the special fiscal agent of the United States Reclamation Service assigned to the Shoshone project for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office, but in case this privilege is availed of, the necessary charges for the transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

SAMUEL ADAMS,

First Assistant Secretary of the Interior.

PURCHASES OF RIGHTS AND PROPERTY.

ARIZONA, SALT RIVER PROJECT.

Vendor.	Description.	Consid- eration.	Date of deed.
Albarodo, Antonio.....	Improvements on strip of land in SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 8, T. 1 N., R. 4 E., containing 1.71 acres.	\$150.00	July 8, 1911
Barkdoll, M. M.....	Strip of land in NW. $\frac{1}{4}$ sec. 11, T. 1 S., R. 4 E., containing 7.69 acres.	1,400.00	Feb. 6, 1912
Craig, E. W., and wife.....	Strip of land 70 feet in width, in W. $\frac{1}{2}$ NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 33, T. 1 N., R. 4 E., containing 1.26 acres.	400.00	Feb. 20, 1912
Glendale Ice Co.....	Lot 7, block 23, Glendale, Ariz.....	521.50	May 25, 1912
Henness, J. H., and wife.....	Strip of land 70 feet in width, in NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ of sec. 33, T. 1 N., R. 4 E., containing 2.32 acres.	350.00	June 7, 1912
Jungermann, John, and wife.....	Strip of land 70 feet in width in NW. $\frac{1}{4}$ sec. 3, T. 1 S., R. 4 E., containing 3.33 acres.	350.00	May 16, 1912
Knox, T. A., and wife.....	Strip of land, 50 feet in width, in E. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 7, T. 1 S., R. 5 E.	226.50	Jan. 23, 1912
Moeur-Pafford Co.....	Strip of land in W. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 10, T. 1 S., R. 4 E., containing 2.26 acres.	430.00	Mar. 20, 1912
Olsen, Elling, and wife.....	Strip of land in NE. $\frac{1}{4}$ sec. 11, T. 1 S., R. 4 E., containing 6.08 acres.	1,155.00	Dec. 17, 1911
Petersen, Neils, and wife.....	Three strips of land in sec. 8, T. 1 S., R. 5 E., containing 3.33 acres.	700.00	Dec. 4, 1911
Saylor, C. A., and wife.....	Strip of land in NW. $\frac{1}{4}$ and SW. $\frac{1}{4}$ sec. 5, T. 1 S., R. 5 E., containing 3.62 acres.	651.00	Nov. 7, 1911
Shelley, J. Y., and wife.....	Strip of land in E. $\frac{1}{2}$ SE. $\frac{1}{4}$ of sec. 27, T. 2 N., R. 3 E.	50.00	Jan. 9, 1911
Spicer, Everett.....	Parcel of land in NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 27, T. 2 N., R. 3 E. (condemnation proceedings).	650.00	¹ May 16, 1912
Swallow, M. O., and wife.....	4 tracts of land in N. $\frac{1}{2}$ sec. 8, T. 1 S., R. 5 E., containing 6.14 acres.	771.00	Dec. 2, 1911
Tude, H. P.....	Tract of land in E. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 3, T. 1 S., R. 4 E., containing 8.48 acres.	550.00	Mar. 14, 1912
White, J. G. et al.....	Strip of land and improvements in S. $\frac{1}{2}$ SE. $\frac{1}{4}$ sec. 9, T. 1 N., R. 4 E., containing 2.56 acres.	800.00	Nov. 25, 1911
Yates, Ada M. et al.....	Strip of land in NW. $\frac{1}{4}$ sec. 12, T. 1 S., R. 4 E., containing 5.45 acres.	953.75	Dec. 18, 1911

ARIZONA-CALIFORNIA, YUMA PROJECT.

Vendor.	Description.	Consid- eration.	Date of deed, or for im- provements; date of contract to sell.
Alvarado, J. M., and wife...	N. 160-foot strip of block 3 of Townsend tract in lot 2, town of Yuma, Ariz., containing 1.25 acres.	\$685.00	May 19, 1912
Balsz, Alex., and wife.....	Lots 2 and 3 of block 3 of Stahl subdivision of Townsend tract in lot 2, town of Yuma, Ariz., containing 0.34 acre.	500.00	May 10, 1912
Boyd, Willis M., and H. M. Veach.	Improvements on strip of land in SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 29, T. 8 S., R. 23 W., G. and S. R. M.	200.00	Jan. 20, 1912
Breedlove, Charles D., and wife.	Improvements on strip of land in E. $\frac{1}{2}$ NW. $\frac{1}{4}$, E. $\frac{1}{2}$ SW. $\frac{1}{4}$, and E. $\frac{1}{2}$ NW. $\frac{1}{4}$, all in sec. 19, T. 9 S., R. 23 W., G. and S. R. M.	255.00	Mar. 11, 1912
Cheney, W. A., and wife.....	Improvements on strip of land in lot 1, sec. 33, T. 16 S., R. 22 E., S. B. M.	16.00	Jan. 23, 1912
Cunningham, S. D., and wife.	Improvements on strip of land in lot 1, sec. 19, T. 8 S., R. 23 W., G. and S. R. M.	202.50	Jan. 18, 1912
De Corse, Benjamin.....	E. part of block 85, town of Yuma, containing 0.91 acre.	1,400.00	Feb. 15, 1912
De Spain, Thomas L., and wife.	Part of lots 2 and 15 of block 5 of Townsend tract in lot 2, town of Yuma, Ariz., containing 0.28 acre.	200.00	Apr. 30, 1912
Figueroa, David.....	Improvements on strip of land in SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 29, T. 8 S., R. 23 W., G. and S. R. M.	100.00	Dec. 26, 1911
Gates, Albert, and wife.....	Improvements in a strip of land in W. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 29, T. 9 S., R. 23 W., G. and S. R. M.	10.00	Jan. 16, 1912

¹ Date of judgment.

Purchases of rights and property—Continued.

ARIZONA-CALIFORNIA, YUMA PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed, or for im- provements; date of contract to sell.
George, Calvin M., and wife.	Improvements on strip of land in NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 7, T. 9 S., R. 23 W., G. and S. R. M.	\$135.00	Dec. 30, 1911
Gibson, James D., and wife.	Improvements on strip of land in E. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 12, T. 9 S., R. 24 W., G. and S. R. M.	20.00	Jan. 13, 1912
Grothaus, L. C., and wife.	Improvements on strip of land in SE. $\frac{1}{4}$ sec. 20, T. 8 S., R. 23 W., G. and S. R. M.	685.00	Jan. 8, 1912
Haggerty, Saul A.	Lot 34 of E. $\frac{1}{2}$ block 3 of Stahl subdivision of Townsend tract in lot 2, town of Yuma, Ariz., containing 0.23 acre.	800.00	Apr. 22, 1912
Harmon, Wm. I., and wife.	Improvements on strip of land in NW. $\frac{1}{4}$ sec. 7, T. 9 S., R. 23 W., G. and S. R. M.	135.00	Apr. 30, 1912
Hiegel, Geo. P., and wife.	South part of block 51, town of Yuma, Ariz., containing 1.6 acres.	3,000.00	Feb. 9, 1912
Hinebaugh, William D., and wife.	Improvements on strip of land in lot 2, sec. 19, T. 8 S., R. 23 W., G. and S. R. M.	10.00	Jan. 20, 1912
Huss, S. P., and wife.	Improvements on strip of land in lot 2, sec. 19, T. 8 S., R. 23 W., G. and S. R. M.	238.50	Jan. 18, 1912
Kribbs, S. C., and wife.	Improvements on strip of land in N. $\frac{1}{2}$ NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 31, T. 8 S., R. 23 W., G. and S. R. M.	42.00	Apr. 1, 1912
Kelley, John D., and wife.	Improvements on strip of land in lot 1, sec. 19, T. 8 S., R. 23 W., G. and S. R. M.	24.00	Jan. 18, 1912
Kent, A. H., and wife.	Improvements on strip of land in E. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 29, T. 8 S., R. 23 W., G. and S. R. M.	500.00	Jan. 17, 1912
McKnight, H. B.	Improvements on strip of land in NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ frac. sec. 20, T. 8 S., R. 23 W., G. and S. R. M.	1,100.00	Dec. 30, 1911
Marable, Richard P., and wife.	Part of block 11 of Townsend tract in lot 3, sec. 20, T. 8 S., R. 23 W., G. and S. R. M., containing 1.1 acres.	500.00	May 6, 1912
Marshall, Ellery D., and wife.	Improvements on strip of land in S. $\frac{1}{2}$ SE. $\frac{1}{4}$ sec. 29, T. 16 S., R. 22 E., S. B. M. (Yuma County, Ariz.).	100.00	May 10, 1912
Marshall, Isham F., and wife.	Improvements on strip of land in sec. 29, T. 16 S., R. 22 E., S. B. M. (Yuma County, Ariz.).	125.00	May 13, 1912
Meadows, Charles H., and wife.	Improvements on strip of land in lot 3, sec. 32, T. 16 S., R. 22 E., S. B. M. (Yuma County, Ariz.).	34.00	Jan. 18, 1912
Modesti, Althea, and wife.	Improvements on strip of land in sec. 8, T. 9 S., R. 23 W., G. and S. R. M.	75.00	Jan. 31, 1912
Moore, S. E., and wife.	Improvements on strip of land in lot 3, sec. 24, T. 8 S., R. 24 W., G. and S. R. M.	42.50	Jan. 18, 1912
Moser, Walter A., and wife.	Improvements, and lot 1 of block 5 of Townsend tract in lot 2, town of Yuma, Ariz.	600.00	Jan. 6, 1912
Murray, J. S.	Lot 1 of the E. $\frac{1}{2}$ block 3 of the Stahl subdivision of Townsend tract in lot 2, sec. 20, T. 8 S., R. 23 W., G. and S. R. M., containing 0.27 acre.	300.00	May 3, 1912
Mustain, Shadrack A., and wife.	Improvements on strip of land in NE. $\frac{1}{4}$ sec. 25, T. 9 S., R. 24 W., G. and S. R. M.	171.00	Feb. 12, 1912
Patterson, O. C., and wife.	Improvements on strip of land in sec. 7, T. 9 S., R. 23 W., G. and S. R. M.	40.00	Dec. 30, 1911
Power, J. C., and wife.	Improvements on strip of land in sec. 24, T. 8 S., R. 24 W., G. and S. R. M.	800.00	Jan. 18, 1912
Power, W. E., and wife.	Improvements on strip of land in lots 1 and 2, sec. 32, T. 16 S., R. 22 E., S. B. M. (Yuma County, Ariz.).	99.00	Jan. 22, 1912
Ricks, George L., and wife.	Improvements on strip of land in SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 20, T. 8 S., R. 23 W., G. and S. R. M.	2,000.00	Dec. 11, 1911
Ruby, Joseph, and wife.	Improvements on strip of land in lot 2, sec. 33, T. 16 S., R. 22 E., S. B. M. (Yuma County, Ariz.).	152.00	Mar. 28, 1912
Scott, William M., and wife.	N. part of blocks 60 and 61, town of Yuma, Ariz., containing 2.43 acres.	3,300.00	Mar. 26, 1912
Sortillon, Alex, and wife.	Improvements on strip of land in S. $\frac{1}{2}$ NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ frac. sec. 20, T. 8 S., R. 23 W., G. and S. R. M.	900.00	Nov. 22, 1911
Southern Pacific Railroad Co.	Blocks 52 and 53, lots 5, 6, 7, and 8 in block 54, lots 4, 5, 6, 7, and 8 in block 55, and part of lot 9 in block 55, town of Yuma, Ariz., and containing 7.25 acres.	2,500.00	Mar. 15, 1912

Purchases of rights and property—Continued.

ARIZONA-CALIFORNIA, YUMA PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed, or for improvements; date of contract to sell.
Stratton, Thomas, and wife.	Lots 5, 6, 7, 8, 9, 10, 11, and 12 in block 62, town of Yuma, Ariz., and containing 1.25 acres.	\$3,200.00	Feb. 9, 1912
Sullivan, Patrick J., and wife.	Strip of land of lots 1 and 16, block 7, and part of lots 2 and 15, Townsend tract in lot 2, in town of Yuma, Ariz., and containing 1.102 acres.	604.00	Apr. 30, 1912
Sumner, Sarah C. (unmarried).	Improvements on strip of land in S. $\frac{1}{2}$ NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ frac. sec. 20, T. 8 S., R. 23 W., G. and S. R. M.	1,000.00	Nov. 22, 1911
Thomas, William (single)...	Improvements on strip of land in NE. $\frac{1}{4}$ sec. 29, T. 8 S., R. 23 W., G. and S. R. M.	400.00	Dec. 19, 1911
Townsend, O. F., and wife.	Lots 1 and 16 and N. 20 feet of lots 2 and 15 of block 9; lots 1, 2, 13, and 14 of block 13; and lots 1 and 12 and the N. 20 feet of lots 2 and 11 of block 15, Townsend addition to town of Yuma, Ariz., containing 3.78 acres, more or less.	1,074.00	Apr. 23, 1912
Walker, Mary E. (unmarried).	Improvements on strip of land in lot 2, sec. 24, T. 8 S., R. 24 W., G. and S. R. M.	150.00	Feb. 1, 1912
White, T. A., and wife.....	Improvements on strip of land in W. $\frac{1}{2}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 7, T. 9 S., R. 23 W., G. and S. R. M.	25.00	Mar. 4, 1912
Willis, J. H., and wife.....	Part of lot 2 of block 1 of the Townsend tract in lot 2, town of Yuma, Ariz., containing 0.19 acre.	150.00	Feb. 23, 1912
Worthington, James M., and wife.	Improvements on strip of land in SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 12, T. 9 S., R. 24 W., G. and S. R. M.	50.00	Feb. 13, 1912
Worthington, Joseph H., and wife.	Improvements on strip of land in SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 12, T. 9 S., R. 24 W., G. and S. R. M.	20.00	Feb. 13, 1912

CALIFORNIA, ORLAND PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Graves, William Robert.....	Part of NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 10, T. 22 N., R. 4 W., M. D. B. and M., 0.61 acre.	\$200.00	Oct. 2, 1911

COLORADO, GRAND VALLEY PROJECT.

Bricker, J. Wesley.....	Part of lot 4, sec. 4, T. 1 S., R. 1 E., Ute P. M., 2.188 acres.	\$1,700	June 21, 1912
Crocker, S. B., and wife.....	Part of NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 4, T. 1 S., R. 1 E., Ute P. M., 2.078 acres.	1,600	June 22, 1912
Elrod, R. C., and wife.....	Part of lot 3, sec. 4, T. 1 S., R. 1 E., Ute P. M., 1.385 acres.	1,100	June 20, 1912
Oliver, J. L.....	Part of E. $\frac{1}{2}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 4, T. 1 S., R. 1 E., Ute P. M., 2.165 acres.	1,600	Do.
Simmons, N. R. and T. W. and wife.	Part of lot 3, sec. 4, T. 1 S., R. 1 E., Ute P. M., 1.440 acres.	1,400	Do.

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

Blair, Bryson P., et al.....	Portion of SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 16, SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 15, W. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 22, and E. $\frac{1}{2}$ NE. $\frac{1}{4}$ and N. $\frac{1}{2}$ SE. $\frac{1}{4}$ sec. 21, all in T. 49 N., R. 10 W., N. M. P. M.	\$150.00	Dec. 1, 1911
Burroughs, C. W., and wife.	Portion of SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 20, T. 48 N., R. 9 W., N. M. P. M.	1.00	Mar. 6, 1912
Deeble, John, and Rollin, Frederick C.	Portion of N. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 22 and NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 15, T. 49 N., R. 10 W., N. M. P. M.	100.00	Oct. 23, 1911

Purchases of rights and property—Continued.

COLORADO, UNCOMPAHGRE VALLEY PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Dennis, E. G., and Griffith, A. S.	Portion of SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 32, T. 50 N., R. 10 W., N. M. P. M.	\$100.00	Nov. 7, 1911
Garoutte, J. B.	Portion of SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 12, T. 48 N., R. 10 W., N. M. P. M.	1.00	Nov. 7, 1911
Johnson, B. H.	Portion of NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 10, T. 48 N., R. 9 W., N. M. P. M.	1.00	Dec. 14, 1911
Kelly, Francis, and wife	Portion of SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 10, T. 48 N., R. 9 W., N. M. P. M.	1.00	Dec. 12, 1911
Lohr, Ralph D.	Portion of N. $\frac{1}{2}$ SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 15, T. 49 N., R. 10 W., N. M. P. M.	100.00	Oct. 23, 1911
Miner, Eli W.	Portion of NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 26, T. 48 N., R. 9 W., N. M. P. M.	150.00	Dec. 21, 1911
Plews, R. P.	Portion of NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 15, T. 49 N., R. 10 W., N. M. P. M.	100.00	Oct. 31, 1911
Sanburg, A. O., and wife	Portion of SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 4, T. 48 N., R. 9 W., N. M. P. M.	200.00	July 7, 1911
Do	Portion of SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ and NW. $\frac{1}{4}$ NW. $\frac{1}{4}$, sec. 10, NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 9, and SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ and SW. $\frac{1}{4}$ SE. $\frac{1}{4}$, sec. 4, T. 48 N., R. 9 W., N. M. P. M.	1.00	Dec. 12, 1911
Sigafus, Ina, and husband	Portion of E. $\frac{1}{2}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 26, T. 48 N., R. 9 W., N. M. P. M.	1.00	Oct. 30, 1911
Winters, A.	Portion of SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 10, T. 48 N., R. 9 W., N. M. P. M.	1.00	Jan. 16, 1912

IDAHO, BOISE PROJECT.

Barber Lumber Co. and Intermountain R. R. Co.	Right of way for railroad across secs. 28, 29, 33, T. 3 N., R. 3 E., B. M., containing 12.28 acres.	\$1.00	Nov. 4, 1911
Basil, Jesse	Part of secs. 23, 24, 25, and 26, T. 3 N., R. 5 E., 73.82 acres.	4,000.00	Apr. 5, 1912
Bedal, Wm., and wife	N. $\frac{1}{2}$ SW. $\frac{1}{4}$ and W. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 21, T. 3 N., R. 4 E., right of way double-power line, 50 feet apart.	250.00	Jan. 12, 1912
Call, Oliver P., and Grace Call	Right of way for double-transmission line over lot 2, sec. 21; lots 4 and 6, NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 15, and SE. $\frac{1}{4}$ of sec. 16, T. 3 N., R. 4 E.	150.00	June 4, 1912
Davis, Edwin H., et al.	Lots 4 and 5, block 2, Davis's third addition to Boise.	2,000.00	Feb. 6, 1912
Dowling, Andrew, et al.	Portions of secs. 14, 21, and 22, T. 3 N., R. 4 E., containing 12.9 acres.	2,250.00	May 11, 1911
Eastman, H. P.	All of Thos. Walker, Ludwig, Harvey, and Murphy placer claims in Boise and Elmore Counties.	400.00	May 26, 1911 Mar. 8, 1912
Fife, Clifford, and wife	Part of SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 6, T. 3 N., R. 2 E., B. M., 0.025 acre.	160.00	Aug. 8, 1911
Fouch, John M., and Joe E. Richerson.	100 feet right of way for railroad across Daisy and Riverside placer claims.	150.00	Feb. 17, 1912
Freund, J. A., and wife	Part of Golden Nugget placer mining claim, in secs. 29 and 32, T. 3 N., R. 4 E., B. M., consisting of a right of way 60 feet wide.	50.00	July 17, 1911
Freund, J. A., et al.	Part of Pinto placer mining claim in sec. 29, T. 3 N., R. 4 E., B. M., railroad right of way 60 feet wide.	100.00	Do.
Hammer, Francis, and wife	Part of SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ and S. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 3, and SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 2, T. 2 N., R. 3 E., B. M., right of way for double transmission line, 50 feet apart.	225.00	Sept. 7, 1911
Hayes, D. P.	Part of SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 33, T. 3 N., R. 3 E., B. M., containing 3.03 acres.	140.00	Sept. 13, 1911
Idaho-Iowa Lateral Reservoir Co.	Part of secs. 8, 9, 16, 17, and 21, T. 2 N., R. 1 E., Hubbard reservoir, and reservoir site.	48,000.00	Mar. 26, 1912
Kesh, Chas.	Part of lots 6, 7, and 10, sec. 25, T. 3 N., R. 5 E., 26.29 acres.	150.00	Aug. 29, 1911
Do	Part of lots 6, 7, and 10, sec. 25, T. 3 N., R. 5 E., 9.72 acres.	486.00	Jan. 3, 1912
Krall, John	License for wagon road across SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 21, T. 3 N., R. 4 E., B. M., 20-foot road.	100.00	Nov. 1911
Nevens, Thos.	All Lone Pine placer mining claim in T. 3 N., R. 5 E., B. M., 20 acres.	2,500.00	Aug. 29, 1911

Purchases of rights and property—Continued.

IDAHO, BOISE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Nibler, Joseph B.-----	Lots 10 and 11, and a portion of lot 12, sec. 11, and a portion of lot 7, sec. 10, T. 3 N., R. 5 E., B. M., containing 96.28 acres.	\$2,000.00	¹ Apr. 1, 1912
Perrault, Kate A., and husband.	Part of SE. $\frac{1}{4}$ sec. 19 and SW. $\frac{1}{4}$ of sec. 20, T. 3 N., R. 3 E., containing 3.99 acres.	600.00	Dec. 30, 1911
Richards, Frank W., and wife.	Part E. $\frac{1}{2}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 15, T. 2 N., R. 2 W., pipe line right of way.	65.00	Feb. 4, 1912
Ross, F. P.-----	Right of way for railroad over the Cougar and King placer claims 100 feet wide.	250.00	May 8, 1912
State of Idaho.-----	Part of secs. 16 and 36, T. 3 N., R. 5 E., 508.6 acres.	5,438.50	¹ May 2, 1912
Thompson, Geo. B., and wife.	Part E. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 27, T. 3 N., R. 1 E., 1.85 acres.	140.00	Dec. 27, 1911
Vaughn, Dora C., and G. H. Vaughn.	Part NW. $\frac{1}{4}$ NE. $\frac{1}{4}$, NE. $\frac{1}{4}$ NW. $\frac{1}{4}$, sec. 14, T. 3 N., R. 1 W., containing 1.54 acres.	200.00	July 8, 1911

IDAHO, MINIDOKA PROJECT.

Burley Townsite Co.-----	Lots 28, 29, block 122, townsite of Burley, Idaho.	\$92.50	Aug. 21, 1911
Idaho, State of.-----	Parts of secs. 23 and 24, T. 10 S., R. 24 E., B. M., 20.2 acres.	505.00	¹ May 2, 1912
John, D. M.-----	Parts of lot 2, sec. 6, T. 11 S., R. 23 E., B. M., and of lot 4, sec. 31, T. 10 S., R. 23 E., B. M.	135.00	Oct. 10, 1911

MONTANA, MILK RIVER PROJECT.

Nicholson, Daniel, et ux.	Lot 1, part NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 21; part S. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 22, T. 31 N., R. 26 E., M. P. M., 131.74 acres.	\$2,275.80	¹ Sept. 5, 1911
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MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

Harrison, Susie.-----	Part of SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 9, T. 23 N., R. 59 E., M. P. M., 3.4 acres.	\$85.00	Jan. 7, 1911
Northey, Rosa A., and husband.	Part N. $\frac{1}{2}$ NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 15, T. 23 N., R. 59 E., M. P. M., 1.12 acres.	1.00	Aug. 26, 1910
Northwestern Improvement Co.	Part NW. $\frac{1}{4}$ sec. 33, T. 20 N., R. 58 E., M. P. M., 3.28 acres.	1.00	Mar. 4, 1912
Do.-----	Part NW. $\frac{1}{4}$ sec. 33, T. 20 N., R. 58 E., M. P. M., 0.11 acre.	1.00	May 24, 1912
Overson, W. B., and wife.	Part NE. $\frac{1}{4}$ sec. 1, T. 21 N., R. 58 E., M. P. M., 2.5 acres.	25.00	Dec. 27, 1910

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

Lincoln Land Co.-----	Lots 1 and 2, of block 2, of the original town of Mitchell, State of Nebraska.	\$775.00	May 27, 1912
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NEVADA, TRUCKEE-CARSON PROJECT.

Durley, Lyle F., and wife.	Right of way for drain 59 feet wide across E. $\frac{1}{2}$ SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 2, T. 19 N., R. 30 E., M. D. M.	\$1.00	June 24, 1911
Fallon, city of, Nev.-----	Lot 50 feet by 100 feet for electrical substation, SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 36, T. 19 N., R. 28 E., M. D. M.	1.00	June 22, 1912
Grimes, W. C., and wife.	Rights of way for laterals and drains in secs. 24, 25, 26, and 35, T. 18 N., R. 29 E., M. D. M.	1.00	Jan. 28, 1912

¹ Judgment.

Purchases of rights and property—Continued.

NEVADA, TRUCKEE-CARSON PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Kent, I. H., and wife.....	Rights of way for laterals in secs. 1 and 13, T. 19 N., R. 30 E. and in secs. 7, 11, and 18, T. 19 N., R. 31 E., M. D. M.	\$1.00	June 11, 1910
Sierra Realty Co.....	Right of way for drain 50 feet wide in NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 3, T. 18 N., R. 28 E., M. D. M.	1.00	July 1, 1911
Trolson, A. M., and wife.....	Strip of land 150 feet wide in N. $\frac{1}{2}$ SW. $\frac{1}{4}$ and NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 20, T. 19 N., R. 27 E., M. D. B. and M.	165.00	Feb. 16, 1912.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

Abeyta, Adolfo, and wife...	7.38 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	\$200.00	Nov. 24, 1911
Abila, Jose, and wife.....	63.53 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	1,227.70	Nov. 3, 1911
Abila, Miguel (Serapio Abila tract).	4.63 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	115.75	Jan. 10, 1912
Armijo, Alfredo, and wife...	5 $\frac{1}{2}$ acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	439.20	Aug. 1, 1911
Baca, Estanislao.....	4 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	250.00	Nov. 2, 1911
Baca, J. E. E., and wife.....	103.99 acres in sec. 12, T. 9 S., R. 3 W., N. M. P. M., in Paraje.	2,500.00	Dec. 29, 1911
Barreras, Viviana Lopez de.	18.62 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	195.00	Nov. 8, 1911
Birner, Eluteria.....	61.85 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	568.55	Aug. 12, 1911
Catholic Church (J. B. Pitaval; church and lot).	0.52 acre in village of Paraje, in Pedro Armendaris grant, No. 33.	700.00	Dec. 21, 1911
Catholic Church (J. B. Pitaval).	4.65 acres, new cemetery, in village of Paraje, in Pedro Armendaris grant, No. 33.	75.00	Do.
Do.....	Church and lot in village of Cantadero, in Pedro Armendaris grant, No. 33, about $\frac{1}{2}$ acre.	300.00	Do.
Do.....	Old cemetery in village of Paraje, in Pedro Armendaris grant, No. 33, 1.30 acres.	50.00	Do.
Chavez, Higinia B. de.....	120.48 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	1,100.00	Oct. 30, 1911
Chavez, Cristobal.....	0.24 acre in village of Paraje, in Pedro Armendaris grant, No. 33.	85.00	Apr. 8, 1912
Chavez, Erynia.....	2.09 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	125.00	Nov. 10, 1911
Gabaldon, Manuel, and wife.	75.10 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	740.00	Nov. 4, 1911
Gonzales, Donaciano, and wife, Juana C.	14.65 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	312.50	Do.
Jaramillo, Marcos, and wife.	76.32 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	769.00	Nov. 6, 1911
Jojola, Jose Gonzales y.....	2.60 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	75.00	Aug. 10, 1911
Juarez, Marcelina Alderete de.	2.44 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	125.00	Sept. 27, 1911
Lopez, Filomena, and wife...	15.40 acres, sec. 12, T. 9 S., R. 3 W., N. M. P. M., village of Paraje.	625.00	Aug. 14, 1911
Lopez, Jesus.....	12.50 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	200.00	Aug. 26, 1911
Lopez, Jose Maria.....	43.10 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	701.25	Aug. 7, 1911
Lopez, Nencio, and wife...	1.03 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	125.00	Sept. 21, 1911
Lopez, Procopio.....	2.10 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	71.50	Oct. 30, 1911
Mendoza, Francisco, and wife.	17.50 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	197.50	Nov. 6, 1911
Montoya, Crecencia Tafoya de.	39.26 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	776.30	Do.
Mora, Estanislado, and wife.	36.40 acres in sec. 12, T. 9 S., R. 3 W., N. M. P. M., in village of Paraje.	696.00	Feb. 13, 1912
Mora, Felix, and wife.....	23.56 acres in sec. 12, T. 9 S., R. 3 W., N. M. P. M., in village of Paraje.	727.50	Sept. 20, 1911
Padilla, Dolores, and wife...	0.60 acre in village of Paraje, in Pedro Armendaris grant, No. 33.	125.00	Nov. 14, 1911
Roullier, August E., and wife.	12.3 acres at Canta Recio.....	3,141.50	Jan. 25, 1912
Do.....	40 acres at Canto Recio.....	200.00	Apr. 8, 1912
Do.....	23.9 acres at Canta Recio.....	319.50	Dec. 28, 1911

Purchases of rights and property—Continued.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Rouiller, August E., and wife.	27.81 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	\$459.05	Dec. 28, 1911
Do-----	Lot 1, sec. 25, and lots 3 and 4, and W. $\frac{1}{2}$ SE. $\frac{1}{4}$ sec. 26, T. 9 S., R. 3 W., 156.79 acres.	783.95	July 25, 1911
Do-----	SW. $\frac{1}{4}$ sec. 26, T. 9 S., R. 3 W., 160 acres.	800.00	Do.
Do-----	SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 34, and lots 3, 4, and 5, sec. 35, T. 9 S., R. 3 W., 117.10 acres.	585.50	Do.
Do-----	SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 9, T. 11 S., R. 3 W., 40 acres.	200.00	Do.
Do-----	W. $\frac{1}{2}$ NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ and lot 2, sec. 35, T. 9 S., R. 3 W., 152.30 acres.	761.50	Do.
Do-----	Lots 1 and 2, SW. $\frac{1}{4}$ NE. $\frac{1}{4}$, and E. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 26, T. 9 S., R. 3 W., 163.30 acres.	816.50	Do.
Do-----	Lots 7 and 8, sec. 4, and lots 1, 2, and 3, sec. 9, T. 10 S., R. 3 W., N. M. P. M., 124.19 acres.	620.95	Apr. 13, 1912
Sanchez, Samuel, and wife.	10.76 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	53.80	Nov. 10, 1911
Sedillo, Josefa Jaramillo de.	13.67 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	585.25	Nov. 18, 1911
Do-----	7.65 acres in village of Paraje, in Pedro Armendaris grant, No. 33.	114.75	Do.
Serna, Maurisio, and wife.	35.11 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	350.00	Aug. 4, 1911
Torres, Josefa Baca de.	19.37 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	160.00	Nov. 1, 1911
Valencia, Tomasa.	0.60 acre in village of Cantadero, in Pedro Armendaris grant, No. 33.	25.00	Nov. 3, 1911
Velarde, Jose, and wife.	14.50 acres in village of Cantadero, in Pedro Armendaris grant, No. 33.	375.00	Oct. 30, 1911

NORTH DAKOTA, MISSOURI RIVER PUMPING PROJECT.

McCutcheon, Jennie (Raum)	Part lot 4, block 22, original town site of Williston.	\$30.00	May 4, 1909
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OREGON, UMATILLA PROJECT.

Chamberlain, Corwin.	Improvements on strip in W. $\frac{1}{2}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 3, T. 4 N., R. 28 E., W. M.	\$96.30	Feb. 29, 1912
Donnelly, Frank and Della F.	Part of NW. $\frac{1}{4}$ and E. $\frac{1}{2}$ sec. 16 and W. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 15, T. 3 N., R. 29 E., W. M.	750.00	Sept. 28, 1910
Koontz, Cynthia A.	Part NE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 16, T. 3 N., R. 29 E., W. M.	82.50	May 13, 1912
Martin, R. L.	Improvements on strip in E. $\frac{1}{2}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 3, T. 4 N., R. 28 E., W. M.	53.00	Mar. 8, 1912
Northern Pacific Railway Co.	Part of E. $\frac{1}{2}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 35, T. 5 N., R. 28 E., W. M.	25.00	Nov. 3, 1910
The Inland Irrigation Co.	Part of SW. $\frac{1}{4}$ sec. 15, T. 3 N., R. 29 E., W. M.; S. $\frac{1}{2}$ S. $\frac{1}{2}$ sec. 9, T. 3 N., R. 29 E., W. M.; east 100 rods SE. $\frac{1}{4}$ sec. 5, T. 3 N., R. 29 E., W. M.; SW. $\frac{1}{4}$ sec. 4, T. 3 N., R. 29 E., W. M.; sec. 33, T. 4 N., R. 29 E., W. M.; W. $\frac{1}{2}$ sec. 34, T. 4 N., R. 29 E., W. M.; W. $\frac{1}{2}$ sec. 27, T. 4 N., R. 29 E., W. M.; sec. 13, T. 4 N., R. 28 E., W. M.; sec. 9, T. 4 N., R. 29 E., W. M.; new mill race right of way over SW. $\frac{1}{4}$ sec. 15, T. 3 N., R. 29 E., W. M.	2,560.00	Apr. 27, 1912

OREGON-CALIFORNIA, KLAMATH PROJECT.

Black, William M., and wife.	Part NE. $\frac{1}{4}$ sec. 34 and NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 39 S., R. 9 E., W. M., 14.1 acres.	\$705.00	Jan. 9, 1912
Bryant, John W.	Part NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 3 and SW. $\frac{1}{4}$ of NW. $\frac{1}{4}$ sec. 2, T. 39 S., R. 9 E.	1.00	Feb. 21, 1912
Court, C. L., and wife.	Part NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 27, T. 39 S., R. 9 E., W. M.	1.00	May 31, 1912
Do-----	Part NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 27, T. 39 S., R. 9 E., W. M., 0.56 acre.	19.60	May 18, 1911

Purchases of rights and property—Continued.

OREGON-CALIFORNIA, KLAMATH PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Cunningham, James L. and wife.	Part block 50, Nichols addition to city of Klamath Falls, Oreg.	\$100.00	Aug. 4, 1911
Davis, George L., and wife.	All lot 4, sec. 22, T. 39 S., R. 10 E., W. M.	1,427.30	Feb. 27, 1911
Do.	Part SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 22, T. 39 S., R. 10 E., W. M., 1.56 acres.	30.00	May 31, 1912
Horner, A. G.	Part lot 6, sec. 17, and lot 13, sec. 20, T. 39 S., R. 9 E., W. M.	1.00	Apr. 19, 1912
Hauger, Fritz R.	Part lots 1, 12, and 13, T. 39 S., R. 9 E., W. M.	1.00	May 6, 1912
Do.	Part N. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 21, T. 39 S., R. 9 E., W. M., 8.8 acres.	660.00	Feb. 7, 1911
Melhase, Gus.	Part lots 6, 7, 8, and 12, sec. 21, T. 39 S., R. 9 E., W. M., 9.6 acres.	900.00	Aug. 18, 1911
Do.	Easement across SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 21, T. 39 S., R. 9 E., W. M.	1.00	May 24, 1912
Pettit, H. C., and wife.	Part NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 26, T. 40 S., R. 10 E., W. M.	1.00	June 11, 1912
Poindexter, C. A.	Part SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 28, T. 39 S., R. 9 E., W. M.	1.00	June 1, 1912
Shive, W. T., and wife.	Part lots 1, 2, and 3, sec. 14, T. 39 S., R. 10 E., W. M., 6.19 acres.	125.00	June 17, 1912
Sutton, R. K., et al.	Part NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 20, S. $\frac{1}{2}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ SW. $\frac{1}{4}$, and SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 17, T. 39 S., R. 9 E., W. M., 5.83 acres.	2,066.40	May 13, 1911
Whitlatch, M. D., et al.	Part SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 6, T. 41 S., R. 11 E., W. M.	1.00	Oct. 4, 1911
Worden, Charles E., and wife.	Part lots 1 and 3, sec. 28, and lots 9 and 10, sec. 21, T. 39 S., R. 9 E., W. M., 8.88 acres.	420.00	Nov. 15, 1910
Do.	Part SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 32 and SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 31, T. 39 S., R. 9 E., W. M.	1.00	June 11, 1912
Wright, J. C., and wife.	Part NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 21, T. 39 S., R. 9 E., W. M., 0.32 acre.	40.00	Mar. 23, 1912
Do.	Part NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 21, T. 39 S., R. 9 E., W. M.	1.00	May 29, 1912

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

Blackman, Otto E., and wife.	Part of NE. $\frac{1}{4}$ sec. 7, T. 7 N., R. 7 E., B. H. M., 11.22 acres.	\$392.70	Feb. 23, 1912
Brandsberg, Tobias C.	Easement for right of way through W. $\frac{1}{2}$ SE. $\frac{1}{4}$, SE. $\frac{1}{4}$ SE. $\frac{1}{4}$, and NE. $\frac{1}{4}$ SW. $\frac{1}{4}$, sec. 34, T. 9 N., R. 3 E., and E. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 3 and SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 2, T. 8 N., R. 3 E., B. H. M.	1.00	Aug. 5, 1911
Cravens, David G.	Part SE. $\frac{1}{4}$ sec. 3, T. 9 N., R. 4 E., B. H. M.; 0.945 acre.	37.80	Oct. 6, 1911
Erickson, Axel, and wife.	Easement for right of way through W. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 17, T. 8 N., R. 6 E., B. H. M.	1.00	Apr. 3, 1912
Johnston, Nelle, and husband.	Easement for right of way through SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 2; NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 11; and W. $\frac{1}{2}$ NW. $\frac{1}{4}$, SE. $\frac{1}{4}$ NW. $\frac{1}{4}$, sec. 12, T. 8 N., R. 3 E., B. H. M.	1.00	July 28, 1911
Johnston, W. J., and wife.	Easement for right of way through NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ and W. $\frac{1}{2}$ SE. $\frac{1}{4}$ sec. 2, T. 8 N., R. 3 E., B. H. M.	1.00	Do.
Sisk, Chas. M., and wife.	Part E. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 18; SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 17, T. 7 N., R. 7 E., B. H. M.; 3.6 acres.	126.00	Apr. 24, 1912
Stewart, Harry H., and wife.	Part lots 1 and 2 and E. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 7, T. 7 N., R. 7 E., B. H. M.; 5.085 acres.	177.98	Aug. 28, 1911
Wright, Ella M., and husband.	Part N. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 17, T. 8 N., R. 4 E., B. H. M.; 7.98 acres.	598.50	Jan. 25, 1912

UTAH, STRAWBERRY VALLEY PROJECT.

Uintah Indians.	Secs. 18, 19, and 29-32, T. 2 S., R. 11 W.; secs. 1-36, T. 3 S., R. 11 W.; secs. 1-12, 15-22, and 27-32, T. 4 S., R. 11 W.; secs. 1-3, 10-15, 22-27, and 34-36, T. 2 S., R. 12 W.; secs. 1, 2, and 12, T. 3 S., R. 12 W.; 56,868.51 acres.	¹ \$1.25	(²)
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¹ Per acre. To be paid in five annual installments of \$14,217.13 each, one installment paid previous to July 1, 1912.² Act Apr. 4, 1910 (36 Stat., 285).

Purchases of rights and property—Continued.

WASHINGTON, OKANOGAN PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Abrams, J. H., and wife.....	Quieting title to right of way for part of main canal over portions of right of way formerly occupied by Ruffenach-East ditch, which was destroyed for a portion of its length in the construction of said main canal, and in settlement of water rights under said ditch.	\$25.84	Sept. 24, 1910
Folmsbee, C. E., and wife.....	do.....	25.84	Do.
Forsyth, J. W., and wife.....	do.....	16.15	Do.
Franke, Wm., and wife.....	do.....	19.38	Do.
and Martin Kattanek.			
Gay, J. C., and wife.....	do.....	61.87	Do.
Miller, Alfred.....	do.....	32.30	Do.
Ruffenach, Victor, and wife.....	do.....	90.44	Do.
Schild, Henry, and wife.....	do.....	6.46	Do.
Steiner, Frank C.....	do.....	29.07	Do.
Sweet, M. S., and wife.....	do.....	32.30	Do.
Sydow, Frederick, and wife.....	do.....	3.23	Do.
Ward, Clair, and Andrew.....	do.....	25.84	Do.
Refsing, jr.			
Wilshire, W. W., and wife.....	do.....	32.30	Do.

WASHINGTON, YAKIMA PROJECT.

Ashton, R. W.....	Irregular tract in SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 16, T. 11 N., R. 20 E., W. M.	\$1,260.00	June 1, 1912
Asselstine, Anthony C., et ux.....	Improvements along pipe line over N. $\frac{1}{2}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 36, T. 10 N., R. 22 E., W. M.	30.00	July 20, 1911
Averill, Adelbert.....	Improvements along the Snipes Mountain lateral over W. $\frac{1}{2}$ SW. $\frac{1}{4}$ E. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 26, T. 10 N., R. 22 E., W. M.	40.00	Nov. 27, 1911
Barnes, Lucy E.....	Defining right of way, Snipes Mountain lateral, over part of sec. 26, T. 10 N., R. 22 E.	1.00	Nov. 16, 1911
Bartley, J. H., et ux.....	25-foot strip over N. $\frac{1}{2}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 31, T. 11 N., R. 21 E., W. M.	525.00	Oct. 24, 1911
Beek, Rick.....	1.5 acres in NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ and SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 2, T. 9 N., R. 22 E., W. M.	300.00	Mar. 7, 1912
Benson, E. F., et ux.....	Easement for pipe line over lot 4, sec. 1, T. 8 N., R. 24 E., W. M.	1.00	Mar. 1, 1911
Do.....	Right of way for Prosser extension, secs. 31 and 32, T. 9 N., R. 25 E., W. M., and secs. 1, 2, and 17, T. 8 N., R. 24 E., W. M.	1.00	May 5, 1911
Do.....	Irregular tract in NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 1, T. 8 N., R. 24 E., W. M.	1.00	Jan. 2, 1912
Benton County.....	80-foot strip across NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 1, T. 8 N., R. 24 E., W. M.	1.00	May 3, 1911
Benton County Fair Association.	70-foot strip across SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Sept. 1, 1910
Biggam, James, et ux.....	Irrigation system in secs. 19, 20, 29, 30, 31, and 32, T. 9 N., R. 25 E., W. M.	5,325.79	Dec. 12, 1911
Bishop, Oliver.....	Defining right of way across N. $\frac{1}{2}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 3, T. 9 N., R. 22 E., W. M.	1.00	Dec. 6, 1911
Blough, Wiser F.....	Improvements, lot 11, block A, Geo. E. Shaw's acre tracts, sec. 25, T. 10 N., R. 22 E., W. M.	35.00	Mar. 7, 1912
Boutell, Ira D., and Alice; Washington Irrigation Co.	Defining right of way, Sunnyside Main Canal, through part of S. $\frac{1}{2}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ and N. $\frac{1}{2}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 13, T. 10 N., R. 22 E., W. M.	1.00	May 14, 1912
Brown, John J., et ux.....	Improvements on 100-foot strip over N. $\frac{1}{2}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 10 N., R. 22 E., W. M.	75.00	Nov. 18, 1911
Brown, O. S., et ux.....	70-foot strip across lots 9, 10, 11, and 12, E. F. Benson's orchard tracts, sec. 9, T. 8 N., R. 24 E., W. M.	1.00	Aug. 31, 1910
Buckner, J. M., et ux.....	Improvements on E. $\frac{1}{2}$ NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 22, T. 10 N., R. 21 E., W. M.	60.00	May 2, 1912
Burley, John J., et ux.....	Irregular tract in sec. 9, T. 10 N., R. 22 E., W. M.	2,900.00	Jan. 29, 1912
Burns, Andrew M., et ux....	100-foot strip over NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 31, T. 11 N., R. 21 E., W. M.	200.00	Nov. 8, 1911
Buxton, Harris C., et ux and Everett A. Buxton.	60-foot strip across tracts 1 and 2, E. $\frac{1}{2}$ tract 3, E. F. Benson's orchard tracts, sec. 9, T. 8 N., R. 24 E., W. M.	1.00	Apr. 29, 1911

Purchases of rights and property—Continued.

WASHINGTON, YAKIMA PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Campbell, A. M., et ux.....	30-foot strip across lot 8, Campbell's Addition to Prosser, sec. 11, T. 8 N., R. 24 E., W. M.	\$1.00	Sept. 1, 1910
Campbell, Fred A., et ux....	70-foot strip across lots 3, 4, and 5, E. F. Benson's orchard tracts, Sec. 9, T. 8 N., R. 24 E., W. M.	1.00	Aug. 31, 1910
Chamberlin, C. W., et ux....	35-foot strip across N. $\frac{1}{2}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 3, T. 10 N., R. 21 E., W. M.	280.00	Dec. 13, 1911
Chenaur, Edmond, et ux....	Improvements on strip across NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 31, T. 11 N., R. 21 E., W. M.	500.00	Nov. 11, 1911
Chesley, Chas. E., et ux....	22 $\frac{1}{2}$ -foot strip across SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 21, T. 10 N., R. 22 E., W. M.	68.00	Jan. 8, 1912
Christian, J. S.	Right of way for Prosser extension in sec. 10, T. 8 N., R. 24 E., W. M.	1.00	Aug. 31, 1910
Citizens State Bank, Prosser, Wash.	Right of way for Prosser extension in sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Apr. 20, 1911
Clabaugh, W. W., et ux....	25-foot strip across S. $\frac{1}{2}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ and SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ and NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 11 N., R. 21 E., W. M.	200.00	Feb. 10, 1912
Do.....	Right of way for Sunnyside Canal in NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ and SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 4, T. 10 N., R. 21 E., W. M.	60.00	Do.
Clark, Frederick.....	Traet in NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 32, T. 10 N., R. 22 E., W. M.	20.00	July 20, 1911
Clark, Robert T., et ux....	Defining right of way of Snipes Mountain lateral over south 30 acres SW. $\frac{1}{4}$ sec. 10, T. 9 N., R. 22 E., W. M.	1.00	Jan. 16, 1912
Cline, Maggie J., et vir.....	100-foot strip across NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 35, T. 10 N., R. 22 E., W. M.	1.00	Feb. 17, 1912
Cline, Margaret J., et vir....	Improvements, lot 3, block A, Geo. E. Shaw's acre tracts, sec. 25, T. 10 N., R. 22 E., W. M.	20.00	Mar. 6, 1912
Clover, S. King, et al.....	Defining right of way for Snipes Mountain lateral across part of E. $\frac{1}{2}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ and N. $\frac{1}{2}$ NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 3, T. 9 N., R. 22 E., W. M.	1.00	Dec. 6, 1911
Coyner, J. D.	25-foot strip across SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ and NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 11 N., R. 21 E., W. M.	72.00	May 11, 1912
Do.....	25-foot strip across SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ and NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 11 N., R. 21 E., W. M.	15.00	Feb. 5, 1912
Crookston, Andrew.....	50-foot strip across E. $\frac{1}{2}$ lot 2, sec. 4, T. 9 N., R. 22 E., W. M.	20.00	July 11, 1911
Davelaar, John G., et ux....	60-foot strip, right of way, Prosser extension, in sec. 6, T. 8 N., R. 25 E., W. M.	1.00	Sept. 17, 1910
Davis, Heman G., et ux....	25-foot strip across NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 33, T. 11 N., R. 21 E., W. M.	71.50	Jan. 27, 1912
Dickson, J. C., et ux.....	30-foot strip across part of SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 1, T. 8 N., R. 24 E., W. M.	1.00	Apr. 11, 1911
Dopps, E. P., et ux.....	20-foot strip across NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 8, T. 10 N., R. 22 E., W. M.	52.76	Sept. 12, 1911
Douglass, C. H., et ux.....	Improvements, SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 26, T. 13 N., R. 17 E., W. M.	50.00	Oct. 30, 1911
Drake, Isaac N., et ux.....	25-foot strip across NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 25, T. 11 N., R. 20 E., W. M.	65.00	June 22, 1912
Drumhiller, F. T., et ux....	Right of way over NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 21, T. 9 N., R. 23 E., W. M.	1.00	June 17, 1912
Eckstein, Chas. J., et ux....	Improvements along Snipes Mountain lateral over part of SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 10 N., R. 22 E., W. M.	1.00	Dec. 28, 1911
Ellis, G. L.	Strip across S. $\frac{1}{2}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 25, T. 11 N., R. 20 E., W. M.	180.00	Sept. 5, 1911
Finn, Margaret, et vir.....	Right of way, Prosser extension, over N. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 17, T. 8 N., R. 24 E., W. M.	1.00	Mar. 2, 1911
Forsell, James E., et ux....	Improvements on right of way, Ryder lateral, E. $\frac{1}{2}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 21, T. 9 N., R. 23 E., W. M.	18.00	June 18, 1912
Frye, Chas. H., et al.....	Right of way, Prosser extension, 80-foot strip, S. $\frac{1}{2}$ sec. 1, T. 8 N., R. 24 E., W. M.	1.00	Sept. 23, 1910
Furman, C. H., et ux.....	Improvements along Sunnyside Main Canal in SW. $\frac{1}{4}$ sec. 30, T. 11 N., R. 21 E., W. M.	35.00	Jan. 23, 1912
Gilbert, Luella B.	Right of way across SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 16, T. 11 N., R. 20 E., W. M.	114.00	Oct. 31, 1911 Jan. 6, 1912
Glenn, Samuel, et ux.....	Right of way, Prosser extension, sec. 10, T. 8 N., R. 24 E., W. M.	1.00	Nov. 26, 1910
Gould, Everett B., et ux....	50-foot strip across E. $\frac{1}{2}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ and 60-foot strip contiguous to E. $\frac{1}{2}$ SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 27, T. 10 N., R. 22 E., W. M.	1.00	Aug. 10, 1911

Purchases of rights and property—Continued.

WASHINGTON, YAKIMA PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Granger, Walter N., et ux.	Strip of land 17.5 feet wide across SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 5, T. 11 N., R. 20 E., W. M.	\$180.00	Aug. 5, 1911
Do.	35-foot strip over SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 35, T. 12 N., R. 19 E., W. M.	260.00	Do.
Hardman, Myrtle Irene, et vir, et al.	Right of way, Snipes Mountain lateral, over lot 10, block A, Shaw's acre tracts, sec. 25, T. 10 N., R. 22 E., W. M.	1.00	Mar. 14, 1912
Harrison, C. J., and Peplin, Arthur.	60-foot strip across lot 8 and W. $\frac{1}{2}$ lot 7, E. F. Benson's orchard tracts, sec. 9, T. 8 N., R. 24 E., W. M.	1.00	May 16, 1911
Hart, Dick, et ux.	Right of way, Sunnyside Main Canal, through SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 16, T. 11 N., R. 20 E., W. M.	247.50	Aug. 12, 1911
Heaton, David, et ux.	45-foot strip across NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 4, T. 12 N., R. 17 E., W. M.	250.00	Aug. 3, 1911
Heaton, Rosalia, et vir.	40-foot strip across N. $\frac{1}{2}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 9, T. 12 N., R. 17 E., W. M.	100.00	Mar. 25, 1912
Hedden, W. H., et ux.	Improvements on lots 13 and 14, Lichty's subdivision, lot 9, block A, Shaw's acre tracts, sec. 25, T. 10 N., R. 22 E., W. M.	20.00	Mar. 30, 1912
Hickok, R. J., et ux.	25-foot strip in S. $\frac{1}{2}$ SE. $\frac{1}{4}$ sec. 30, T. 11 N., R. 21 E., W. M.	200.00	June 29, 1911
Hicks, W. L., et ux.	$\frac{1}{2}$ acre in SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 3, T. 10 N., R. 21 E., W. M.	125.00	Mar. 31, 1911
Hillier, Edwin L.	Defining right of way, Snipes Mountain lateral, over part sec. 3, T. 9 N., R. 22 E., W. M.	(¹)	Dec. 2, 1911
Hilton, G. L.	Prosser extension, 30-foot strip in sec. 10, T. 8 N., R. 24 E., W. M.	1.00	Nov. 9, 1910
Hitchcock, Wm., et ux.	Damages to improvements in NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ and W. $\frac{1}{2}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 13, T. 10 N., R. 22 E., W. M.	50.00	July 29, 1911
Holmes, Hattie A.	Right of way for Prosser extension, 70-foot strip across tract 6, and E. $\frac{1}{2}$ tract 7, E. F. Benson's orchard tracts, sec. 9, T. 8 N., R. 24 E., W. M.	1.00	Sept. 10, 1910
Hubbard, Walter G., et ux.	Defining right of way over SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 3, T. 9 N., R. 22 E., W. M. (Snipes Mountain, lateral).	(¹)	Dec. 6, 1911
Jackson, Martin, et ux.	96-foot strip along right of way, Snipes Mountain lateral, in SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ and SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 32, T. 10 N., R. 22 E., W. M.	1.00	July 13, 1911
Jacoby, Lucy	Right of way, Prosser extension, 30-foot strip across N. $\frac{1}{2}$ SE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ of sec. 10, T. 8 N., R. 24 E., W. M.	1.00	Feb. 15, 1911
Jaeger, A. F., et ux.	Easement to deposit excavated material, sec. 30, T. 11 N., R. 21 E., W. M.	200.00	July 8, 1911
Jenks, H. J., et ux.	Right of way for Prosser extension easement for pipe line across lots 1 and 2, block O, town of Prosser.	1.00	Sept. 15, 1910
Jewell, Fred R., et ux.	Defining right of way, Snipes Mountain lateral, over irrigable part SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 3, T. 9 N., R. 22 E., W. M.	(¹)	Dec. 6, 1911
Jones, Joseph, et ux.	Defining right of way, south branch, Snipes Mountain lateral, SW. $\frac{1}{4}$ sec. 10, T. 9 N., R. 22 E., W. M.	(¹)	Jan. 16, 1912
Kemp, Fred O., et ux.	Improvements for NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ and E. $\frac{1}{2}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 13, T. 10 N., R. 22 E., W. M.	25.00	May 10, 1912
Ketring, John	Defining right of way for road to be granted United States or Yakima County through sec. 3, 14, 23, and 24, T. 14 N., R. 15 E., W. M.	1.00	Jan. 2, 1912
Knapp, A. P., et ux.	60-foot strip across lot 5, sec. 6, T. 8 N., R. 25 E., W. M.	1.00	May 3, 1911
Kortemeier, C., et ux.	Improvements along right of way pipe lines over S. $\frac{1}{2}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 15, T. 9 N., R. 22 E., W. M.	35.00	Apr. 15, 1912
Kuhne, Tony	80-foot strip across SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Dec. 22, 1910
Larson, Ole, et ux.	Defining right of way, south branch, Snipes Mountain, lateral over part SW. $\frac{1}{4}$ sec. 10, T. 9 N., R. 22 E., W. M.	(¹)	Jan. 16, 1912
Lemke, Frank, et ux.	Right of way for Sulphur Creek wasteway across NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 12, T. 9 N., R. 22 E., W. M.	(¹)	June 7, 1912

¹ Construction of canal by United States.

Purchases of rights and property—Continued.

WASHINGTON, YAKIMA PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Lesh, Dan E.-----	Right of way for B-1 lateral, 3.39 acres in N. 55 acres NW. $\frac{1}{4}$ sec. 35, T. 13 N., R. 17 E., W. M.	\$800.00	Nov. 30, 1911 (Mar. 30, 1912)
Lewis, J. W., et ux.-----	Improvements on right of way across W. $\frac{1}{2}$ SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 32, T. 10 N., R. 22 E., W. M.		
Lisle, L. N.-----	Right of way, Prosser extension, lot 16, Fruitvale acre tracts, sec. 10, T. 8 N., R. 24 E., W. M.	1.00	May 2, 1911
Do-----	Right of way, Prosser extension, 30-foot strip, sec. 10, T. 8 N., R. 24 E., W. M.	1.00	Sept. 3, 1910
Livengood, C. A., et ux.-----	Wasteway, NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 27, T. 14 N., R. 17 E., W. M.	175.00	Aug. 8, 1911
Longmuir, G. D.-----	Easement across lot 9, block 61, first subdivision, town of Prosser.	1.00	Aug. 5, 1911
Lucas, Carter T., et ux.-----	Easement in sec. 30, T. 11 N., R. 21 E., W. M.	360.00	July 8, 1911
Lukenbach, Frank K., et ux.-----	35-foot strip across S. $\frac{1}{2}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 3, T. 10 N., R. 21 E., W. M.	108.00	Feb. 6, 1912
Mathieson, George, et ux.-----	Improvements along Snipes Mountain lateral, across sec. 26, T. 10 N., R. 22 E., W. M.	100.00	Nov. 27, 1911
McCord, Joseph L., et ux.-----	Improvements on canal right of way through E. $\frac{1}{2}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 2, T. 10 N., R. 21 E., W. M.	18.00	Sept. 19, 1911
McCracken, Andrew, et ux.-----	Purchase of improvements along Sunnyside Main Canal in W. $\frac{1}{2}$ NW. $\frac{1}{4}$ and SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 32, T. 11 N., R. 21 E., W. M.	164.82	Oct. 23, 1911
McDiarmid, Joel P., et ux.-----	Defining right of way, Snipes Mountain lateral, across SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 34, T. 10 N., R. 22 E., W. M.	1.00	Dec. 30, 1911
Mentzer, C. W., et ux.-----	30-foot strip across SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 3, T. 10 N., R. 21 E., W. M.	(¹)	Apr. 25, 1912
Do-----	Easement, SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 4, T. 10 N., R. 21 E., W. M.	70.30	May 20, 1912
Merrill, U. G., et ux.-----	90-foot strip along right of way, Snipes Mountain lateral, in S. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 33, T. 10 N., R. 22 E., W. M.	1.00	July 20, 1911
Do-----	Improvements on right of way over SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 10 N., R. 22 E., W. M.	20.00	Do.
Merritt, Oliphant B., et ux.-----	Easement for pipe line across NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 6, T. 12 N., R. 18 E., W. M.	1.00	Nov. 15, 1911
Middlestead, G. E., et ux.-----	Right of way, Prosser extension, 30-foot strip, sec. 10, T. 8 N., R. 24 E., W. M.	1.00	Sept. 3, 1910
Middlestead, Gust., et ux.-----	Right of way, Prosser extension, 30-foot strip sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Sept. 3, 1910
Miller, Julia.-----	Right of way, Prosser extension, 30-foot strip sec. 10, T. 8 N., R. 24 E., W. M.	1.00	Aug. 31, 1910
Monahan, H., et ux.-----	Right of way for wasteway "S" in sec. 27, T. 14 N., R. 17 E.	300.00	Jan. 23, 1912
Mooy, Charles.-----	25-foot strip across part of sec. 33, T. 11 N., R. 21 E., W. M.	150.00	Feb. 10, 1912
Morrison, Barney, et ux.-----	Improvements along right of way, Snipes Mountain, lateral across lot 1, sec. 4, T. 9 N., R. 22 E., W. M.	75.00	July 20, 1911
Morrison, W. J., et ux.-----	Right of way, Sunnyside Canal, W. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 16, T. 11 N., R. 20 E., W. M.	228.00	Nov. 10, 1911
Mowatt, Sinclair, and May K. Petty et vir.-----	62 $\frac{1}{2}$ -foot strip on south side adjoining center line, Snipes Mountain, lateral across SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 10 N., R. 22 E., W. M.	1.00	July 11, 1911
Neuling, August.-----	Defining right of way and purchase of improvements along south branch Snipes Mountain, lateral over N. $\frac{1}{2}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 15, T. 9 N., R. 22 E., W. M.	100.00	Apr. 13, 1912
Nichols, G. M., et ux.-----	25-foot strip across N. $\frac{1}{2}$ N. $\frac{1}{2}$, and 45-foot strip across S. $\frac{1}{2}$ N. $\frac{1}{2}$ SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 11 N., R. 21 E., W. M.	195.00	Jan. 22, 1912
Nickleson, Leonard E., et ux.-----	Right of way for Ryder lateral through sec. 20, T. 9 N., R. 23 E., W. M.	(¹)	June 18, 1912
Nicolai, H. E., et ux.-----	Defining right of way, strip across SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 26, T. 10 N., R. 22 E., W. M.	1.00	Apr. 19, 1912
Do-----	Improvements along Snipes Mountain lateral over N. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 35, T. 10 N., R. 22 E., W. M.	75.00	Do.
Oldenstadt, Henry.-----	80-foot strip right of way, Prosser extension, sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Oct. 19, 1910
Oregon-Washington Railroad & Navigation Co.-----	Change in canal right of way, sec. 24, T. 9 N., R. 23 E., W. M.	1.00	Aug. 10, 1911

¹ Construction of canal by United States.

Purchases of rights and property—Continued.

WASHINGTON, YAKIMA PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Page, R. G., et ux.....	Defining right of way, Snipes Mountain lateral, across NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 34, T. 10 N., R. 22 E., W. M.	\$1.00	Dec. 12, 1911
Parker, Benjamin F.....	Purchase of improvements, 50-foot strip across S. $\frac{1}{2}$ NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 35, T. 10 N., R. 22 E., W. M.	75.00	Nov. 20, 1911
Pawson, Edward, et ux....	Defining right of way, Snipes Mountain lateral, through NE. $\frac{1}{4}$ sec. 3, T. 9 N., R. 22 E., W. M.	(1)	Feb. 5, 1912
Pearce, Robert E., et ux....	25-foot right of way, strip across S. $\frac{1}{2}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ and SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$, and 40-foot strip across NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 3, T. 10 N., R. 21 E., W. M.	108.50	Jan. 22, 1912
Pengruber, Peter, et ux., et al.	Right of way, Prosser extension, sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Apr. 11, 1911
Polinsky, Mike H., et ux., et al.	Improvements along right of way, Snipes Mountain lateral, across SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 26, T. 10 N., R. 22 E., W. M.	78.50	Nov. 18, 1911
Prosser Falls Land & Power Co.	Prosser Falls Canal.....	(2)	(Sept. 24, 1910 May 4, 1911)
Prosser, town of.....	Right of way, Prosser extension, easement for pipe line.	(1)	Dec. 20, 1910
Reed, Jacob S., et ux.....	Purchase of improvements along Snipes Mountain lateral, across E. $\frac{1}{2}$ E. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 28, T. 10 N., R. 22 E., W. M.	44.00	Aug. 18, 1911
Reimer, Carl C.....	Right of way, Prosser extension, 60-foot strip across SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 6, T. 8 N., R. 25 E., W. M.	1.00	Aug. 24, 1911
Reynolds, Richard F., et ux..	Right of way, south branch Snipes Mountain lateral, SW. $\frac{1}{4}$ sec. 10, T. 9 N., R. 22 E., W. M.	(1)	Apr. 5, 1912
Rich, Nelson, et ux.....	Right of way, Prosser extension, 80-foot strip across SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Oct. 19, 1910
Roady, Edward N.....	Right of way, Snipes Mountain lateral, 22 $\frac{1}{2}$ -foot strip along canal across NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 21, T. 10 N., R. 22 E., W. M.	68.00	Jan. 3, 1912
Roberts, W. L., et ux.....	Defining right of way, Ryder lateral, and purchase of improvements, E. $\frac{1}{2}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 20, T. 9 N., R. 23 E., W. M.	44.00	June 18, 1912
St. Paul & Tacoma Lumber Co.	Easement for Prosser pipe line, lots 2 and 15, block 20, town of Prosser.	1.00	Mar. 28, 1911
Sanford, Robert W., et al...	25-foot strip across S. $\frac{1}{2}$ SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 11 N., R. 21 E., W. M.	250.00	May 22, 1912
Saunders, H. C., et ux.....	60-foot strip across NW. $\frac{1}{4}$ sec. 6, T. 8 N., R. 25 E., W. M. (Prosser extension).	1.00	Sept. 17, 1910
Schlosser, Mark W.....	Purchase of improvements, lot 10, block A, George E. Shaw's acre tracts, sec. 25, T. 10 N., R. 22 E., W. M.	35.00	Mar. 9, 1912
Schriener, S. H., et al.....	Right of way, Snipes Mountain lateral, through SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ and NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 26, T. 10 N., R. 22 E., W. M.	1.00	Nov. 11, 1911
Shank, Corwin S., et ux....	Right of way, Snipes Mountain lateral, across SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 17, T. 10 N., R. 22 E., W. M.	100.00	May 28, 1912
Shark, Mark C., et ux.....	Right of way, Snipes Mountain lateral, across SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 34, T. 10 N., R. 22 E., W. M.	1.00	Dec. 13, 1911
Smart, Joseph, et ux.....	Prosser extension, 60-foot strip across S. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 10, T. 8 N., R. 24 E., W. M.	1.00	Apr. 29, 1911
Snowden, A. C., et ux.....	30-foot right-of-way strip across W. $\frac{1}{2}$ SE. $\frac{1}{4}$ SW. $\frac{1}{4}$: 20-foot strip across E. $\frac{1}{2}$ SW. $\frac{1}{4}$ SW. $\frac{1}{4}$: 35-foot strip across E. $\frac{1}{2}$ NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 3, T. 10 N., R. 21 E., W. M.	504.00	Jan. 24, 1912
Stearns, C. J., et ux.....	30-foot strip right of way through NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Jan. 24, 1911
Strandwold, Harold, et ux..	Prosser extension 40-foot strip NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Apr. 19, 1911
Sullivan, Louise A., et vir...	Improvements, Snipes Mountain lateral, E. $\frac{1}{2}$ SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 26, T. 10 N., R. 22 E., W. M.	10.00	Nov. 18, 1911
Sunnyside Commercial Co..	Defining right of way, Snipes Mountain lateral, Commercial addition to Sunnyside, sec. 26, T. 10 N., R. 22 E., W. M.	1.00	Nov. 13, 1911

¹ Construction of canal by United States.² Water right for Prosser lands.

*Purchases of rights and property—Continued.*WASHINGTON, YAKIMA PROJECT¹—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Sutherland, C. E., et ux.....	Defining right of way and purchase of improvements, Snipes Mountain lateral, E. $\frac{3}{4}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 10 N., R. 22 E., W. M.	\$75.00	Nov. 20, 1911
Tegtmeyer, W. A., et ux., et al.	Improvements on right of way E. $\frac{3}{4}$ E. $\frac{1}{4}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 2, T. 9 N., R. 22 E., W. M.	35.00	Nov. 15, 1911
Turner, H. W., et ux.....	Purchase of improvements across lot 13, block A, George E. Shaw's acre tracts, sec. 25, T. 10 N., R. 22 E., W. M.	425.00	Nov. 21, 1911
Do.....	Improvements along Snipes Mountain lateral, across lot 13, block A, Shaw's acre tracts, sec. 25, T. 10 N., R. 22 E., W. M.	72.50	Apr. 15, 1912
Vigna, Martin.....	50-foot strip for Ryder lateral across W. $\frac{1}{2}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 20, T. 9 N., R. 23 E., W. M.	28.85	May 27, 1912
Waite, M. L., et ux.....	Right of way across south branch, Snipes Mountain lateral, through SW. $\frac{1}{4}$ sec. 10, T. 9 N., R. 22 E., W. M.	(¹)	Jan. 16, 1912
Walden, Freeman, et ux.....	Purchase of improvements on 200-foot strip right of way through SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 22, T. 11 N., R. 20 E., W. M.	76.00	July 11, 1911
Washington Irrigation Co....	Strip of land in SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 31 and strip of land in SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ and NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 11 N., R. 21 E., W. M.	170.00	Nov. 22, 1911
Do.....	100-foot strip across NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 31, T. 11 N., R. 21 E., W. M.	1.00	July 13, 1911
Do.....	Defining original right of way, Snipes Mountain lateral, sec. 27, T. 10 N., R. 22 E., W. M.	1.00	Nov. 25, 1911
Washington, State of.....	50-foot strip, Snipes Mountain lateral, across NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ and 100-foot strip across NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 36, T. 10 N., R. 21 E., W. M.	(¹)	(²)
Watson, F. L., et ux.....	Right of way, Mabton pipe line, sec. 1, T. 8 N., R. 23 E., W. M.	150.00	Aug. 4, 1911
Wells, Horatio W., et ux....	Prosser extension, 80-foot strip across NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 11, T. 8 N., R. 24 E., W. M.	1.00	Feb. 20, 1911
Whiting, James W.....	Prosser extension, sec. 1, T. 8 N., R. 24 E., W. M.	1.00	Oct. 19, 1910
Yakima County.....	Defining northern boundary, Snipes Mountain lateral, over SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 34, T. 10 N., R. 22 E., W. M.	1.00	Jan. 27, 1912
Do.....	Defining right of way through sec. 3, T. 9 N., R. 22 E., W. M.	(¹)	Dec. 5, 1911
Do.....	Defining right of way, Snipes Mountain lateral, S. $\frac{3}{4}$ SE. $\frac{1}{4}$ sec. 26, and SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 10 N., R. 22 E., W. M.	(¹)	Feb. 19, 1912
Yakima Orchard Land Co....	30-foot strip across N. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 7, T. 12 N., R. 17 E., W. M.	78.00	Oct. 25, 1911
Young, Gertude E., et vir....	Improvements along Snipes Mountain lateral, lot 3, block A, George E. Shaw's acre tracts, sec. 25, T. 10 N., R. 22 E., W. M.	68.00	Mar. 6, 1912
Zibbell, E. W., et ux.....	25-foot strip in W. $\frac{1}{2}$ NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 11 N., R. 21 E., W. M.	229.00	Jan. 23, 1912

WYOMING, SHOSHONE PROJECT.

Andren, Claus, and wife....	16.9 acres in lot 57, T. 52 N., R. 102 W.....	\$157.87	July 1, 1911
Bradbury, C. A., and wife....	8 acres in secs. 19 and 20, T. 52 N., R. 102 W., sixth principal meridian.	313.36	Feb. 3, 1912
Cody Canal Association and State of Wyoming.	120 acres in sec. 20, T. 52 N., R. 102 W., sixth principal meridian.	2,806.95	{Dec. 11, 1909 {Sept. 29, 1911 {By contract
Lanchbury, Thos.....	Removal of stock pond in T. 54 N., R. 100 W....	35.00	{Sept. 8, 1906
Lincoln Land Co.....	5 acres in sec. 26, T. 55 N., R. 100 W.....	1.60	July 14, 1908
Upton, Lee.....	82.91 acres, lot 82, T. 52 N., R. 104 W.....	3,475.00	July 7, 1911
Upton, Elizabeth.....	37.8 acres in lot 55, T. 52 N., R. 104 W.....	1,525.00	Do.
Ward, John, and wife.....	5.6 acres in sec. 19, T. 52 N., R. 102 W.; 28.4 acres in sec. 24, T. 52 N., R. 103 W.	2,544.00	Apr. 10, 1911
Williams, Marion, and wife....	2.8 acres in sec. 35, T. 52 N., R. 103 W.....	32.68	Apr. 17, 1912

¹ Construction of canal by United States.² Sec. 6412, Rem. & Bal. Code.

PRINCIPAL CURRENT CONTRACTS.

In the following tables are shown, by projects, data relative to the principal contracts in operation or completed during the fiscal year ending June 30, 1912:

Principal current contracts.

ARIZONA, SALT RIVER PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1912.	Completion due.
35	Apr. 8, 1905	J. M. O'Rourke & Co.	Roosevelt Dam..	\$1,197,600.00	¹ \$1,744,848.50	
209	Nov. 1, 1907	Wagner Electric Co.	Transformers....	16,065.00	¹ 17,415.00	Feb. 10, 1912
359	Mar. 21, 1911	-----do-----	Transformers and motors.	7,778.18	¹ 7,138.18	June 25, 1911
358	Mar. 22, 1911	Byron-Jackson Iron Works.	Pumps.....	7,845.00	¹ 7,789.00	July 13, 1911
362	Apr. 6, 1911	S. Morgan-Smith Co.	Water wheels....	18,100.00	12,066.67	Dec. 17, 1911
365	Apr. 3, 1911	Westinghouse Electric & Manufacturing Co.	Switch board apparatus.	1,411.00	¹ 1,411.00	May 31, 1911
398	Aug. 8, 1911	Pittsburgh Transformer Co.	Transformers....	932.00	¹ 932.00	Sept. 2, 1911
402	Aug. 2, 1911	Moloney Electric Co.	-----do-----	5,720.00	3,330.00	Oct. 21, 1911
403	July 24, 1911	Westinghouse Electric & Manufacturing Co.	-----do-----	545.40	¹ 545.40	Sept. 7, 1911

ARIZONA-CALIFORNIA, YUMA PROJECT.

367	May 10, 1911	Chas. A. Haskin..	Air-compressor plant.	\$24,135.53	¹ \$24,135.53	June 28, 1912
415	Nov. 9, 1911	David Mulligan..	Excavation.....	45,714.00	¹ 43,964.03	Apr. 1, 1912
423	Dec. 7, 1911	Gillette & Montgomery.	-----do-----	42,507.50	¹ 44,188.73	Do.
416	Nov. 13, 1911	Pete Walker.....	-----do-----	82,730.00	¹ 90,694.72	Do.
421	Nov. 9, 1911	Standard American Dredging Co.	-----do-----	44,065.00	¹ 39,758.43	Do.
420	Nov. 20, 1911	Hudson-Johnson Construction Co.	-----do-----	46,674.00	¹ 41,598.39	Do.

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

427	Dec. 14, 1911	Saylor Construction Co.	East Canal enlargement.	\$18,060.00	\$16,994.00	² July 1, 1912
436	Feb. 15, 1912	Maney Bros. & Co.	West Canal excavation.	78,363.00	45,186.00	Sept. 1, 1912

IDAHO, BOISE PROJECT.

392	June 22, 1911	Maney Bros. & Co.	Main South Side Canal.	\$17,005.00	¹ \$13,894.62	Dec. 15, 1911
391	May 22, 1911	Westinghouse Electric & Manufacturing Co.	Electrical apparatus.	5,880.00	3,920.00	Aug. 20, 1911
379	-----do-----	E. I. Du Pont de Nemours Powder Co.	Explosives.....	20,000.00	8,191.49	May 15, 1913

¹ Completed.² Extended to July 31, 1912.

Principal current contracts—Continued.

IDAHO, BOISE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1912.	Completion due.
381	May 25, 1911	Allis - Chalmers Co.	Electrical apparatus.	\$19,455.00	¹ \$20,219.95	Dec. 2, 1911
382	-----do-----	-----do-----	Hydraulic turbines.	17,310.00	¹ \$17,199.00	Nov. 7, 1911
385	May 27, 1911	Maney Bros. & Co.	Railroad construction.	27,910.00	¹ 28,450.46	July 24, 1911
394	July 1, 1911	-----do-----	-----do-----	75,150.00	¹ 86,240.45	Oct. 20, 1911
383	May 29, 1911	General Electric Co.	Electrical apparatus.	6,096.00	¹ 7,781.63	Dec. 10, 1911
376	June 3, 1911	Illinois Steel Co.	Steel rails.	46,250.00	¹ 50,107.00	Oct. 21, 1911
384	June 9, 1911	Standard Underground Cable Co.	Copper wire.	6,357.00	¹ 8,101.34	Aug. 30, 1911
387	June 15, 1911	H. K. Porter Co.	Locomotive.	10,140.00	¹ 10,140.00	July 22, 1911
395	July 22, 1911	Lidgerwood Manufacturing Co.	Cableway apparatus.	29,676.00	22,257.00	Nov. 18, 1911
397	Aug. 11, 1911	Allis - Chalmers Co.	Electrical apparatus.	3,700.00	¹ 3,700.00	Mar. 6, 1912
103	May 19, 1906	Page & Brinton.	Main Canal, excavation.	\$135,900.00	¹ \$258,815.94	Oct. 28, 1908
332	Aug. 4, 1910	W. J. Hoy Construction Co.	Main South Side Canal.	194,200.00	¹ 226,603.18	Apr. 1, 1912
408	Sept. 11, 1911	Fulton Engine Works.	Butterfly gates.	9,848.00	¹ 9,848.00	Feb. 10, 1912
409	Oct. 5, 1911	Whiteway - Lee Construction Co.	Office building.	12,396.00	¹ 12,830.66	Jan. 17, 1912
412	Oct. 26, 1911	Idaho Hardware & Plumbing Co.	Heating and plumbing.	2,999.00	¹ 3,079.54	Feb. 5, 1912
425	Dec. 7, 1911	The Western Steel Headgate Co.	Steel headgates.	2,902.15	¹ 2,902.15	Feb. 15, 1912
428	Jan. 17, 1912	American Locomotive Co.	Steam shovel.	9,322.00	9,197.00	Feb. 13, 1912
414	Nov. 6, 1911	John A. Roebeling & Sons Co.	Copper wire.	3,480.25	¹ 3,555.39	Nov. 13, 1911
433	Feb. 14, 1912	American Hoist & Derrick Co.	Electric derrick hoists.	13,527.00	¹ 13,527.91	May 8, 1912
442	Mar. 29, 1912	Allis-Chalmers Co.	Cement plant.	10,245.00	7,683.75	May 21, 1912
443	Apr. 12, 1912	United Iron Works.	Rotary dryer.	1,260.00	945.00	May 3, 1912
----	June 12, 1912	Maschinenfabrik Augsburg-Nürnberg A. G.	Roller dam.	1,999.20	1,999.20	Oct. 25, 1912

IDAHO, MINIDOKA PROJECT.

55	July 8, 1905	Monarch & Porter.	Canals and structures.	\$194,826.75	\$185,047.11	Aug. 21, 1906
247	Aug. 5, 1908	Allis-Chalmers Co.	Electrical apparatus.	44,590.00	42,150.00	Sept. 30, 1911
248	-----do-----	-----do-----	Turbines and pumps.	206,807.00	71,764.27	Do.
250	Aug. 12, 1908	Westinghouse Electric & Manufacturing Co.	Electrical apparatus.	127,892.35	119,501.85	Aug. 2, 1911
259	Oct. 30, 1908					
279	Feb. 26, 1909	Fulton Engine Works.	Gates.	10,994.00	¹ 11,484.00	Mar. 25, 1909
290	June 23, 1909	-----do-----	Gate-controlling apparatus.	8,046.00	7,203.10	Jan. 29, 1911
325	May 6, 1910	General Electric Co.	Substation equipment.	12,788.00	10,307.03	Sept. 1, 1910
399	July 24, 1911	Wagner Electric Manufacturing Co.	Transformers.	225.00	¹ 225.00	Sept. 24, 1911
402	Aug. 2, 1911	Moloney Electric Co.	-----do-----	300.00	¹ 300.00	Sept. 6, 1911

¹ Completed.

Principal current contracts—Continued.

MONTANA, FLATHEAD PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1912.	Completion due.
407	Sept. 19, 1911	Nelson Rich.....	Pablo dams and canals.	\$116,000.00	\$75,082.82	July 31, 1912

MONTANA, HUNTLEY PROJECT.

410	Oct. 21, 1911	J. E. Hilton.....	Construction earthwork, schedules 1 to 6, inclusive.	\$29,085.00	¹ \$34,670.59	June 1, 1912
413	Oct. 10, 1911	J. S. Hilend.....	Construction structures, schedule 7.	32,549.25	18,449.96	July 1, 1912
452	May 27, 1912	Frederick Tews...	Construction drainage trenches.	2,420.50	668.50	Sept. 4, 1912

MONTANA, MILK RIVER PROJECT.

454	June 14, 1912	John S. Penson..	Earthwork and structures.	\$23,722.65	\$181.35	Dec. 31, 1912
455	June 21, 1912	-----do-----	Earthwork.....	47,638.00	-----	Do.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

334	Aug. 6, 1910	Pittsburgh Valve, Foundry & Construction Co.	Valves, 58-inch...	\$23,340.00	¹ \$14,077.15	Mar. 3, 1911
338	Oct. 12, 1910	Chas. F. Elmes Engineering Works.	Discharge pipe...	6,500.00	¹ 6,394.54	Dec. 31, 1910
447	Apr. 29, 1912	Kilpatrick Bros. & Collins Contracting Co.	Dam No. 1.....	41,510.00	34,090.00	Nov. 29, 1912
449	May 24, 1912	Bartlett & Kling..	Dam No. 3.....	348,047.00	-----	June 1, 1914

NEVADA, TRUCKEE-CARSON PROJECT.

369	May 1, 1911	General Electric Co.	Electrical apparatus.	\$8,213.00	\$5,091.33	Aug. 24, 1911
373	May 4, 1911	Pelton Water Wheel Co.	Hydraulic turbines.	9,740.00	¹ 10,406.04	Jan. 24, 1912
374	May 19, 1911	Wm. B. Pollock Co.	72-inch penstock.	4,086.36	¹ 4,086.36	July 20, 1911
397	Aug. 11, 1911	Allis - Chalmers Co.	-----do-----	225.00	¹ 178.33	Aug. 2, 1911
399	July 24, 1911	Wagner Electric Manufacturing Co.	Transformers....	135.00	¹ 135.00	Sept. 7, 1911
402	Aug. 2, 1911	Moloney Electric Co.	-----do-----	3,640.00	¹ 3,600.00	Sept. 21, 1911
442	Mar. 29, 1912	Allis - Chalmers Co.	Cement plant....	2,200.00	1,650.00	May 21, 1912
445	Apr. 26, 1912	Pittsburgh Transformer Co.	-----do-----	2,799.00	933.00	July 14, 1912
451	May 31, 1912	Westinghouse Electric & Supply Co.	Switchboard apparatus and lightning arresters.	1,739.00	-----	July 5, 1912
<i>Principal informal contracts.</i>						
----	July 1, 1911	Stephens-Adams Manufacturing Co.	Belt conveyers and gravel screens.	15,493.00	¹ 15,493.00	Aug. 15, 1911

¹ Completed.

Principal current contracts—Continued.

NEVADA, TRUCKEE-CARSON PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1912.	Completion due.
<i>Principal informal contracts—Con.</i>						
---	Mar. 17, 1911	Lidgerwood Manufacturing Co.	Cableway apparatus.	\$13,200.00	¹ \$13,200.00	Aug. 31, 1911
---	Sept. 16, 1911	Bucyrus Co.	Electric dragline excavator.	9,875.00	¹ 9,677.50	Nov. 25, 1911
---	Apr. 8, 1912	-----do-----	Electric - power shovel.	12,050.00	-----	June 27, 1912

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

336	Aug. 27, 1910	George B. Brady.	Branch railway..	\$51,370.00	¹ \$59,221.49	Jan. 11, 1911
375	May 23, 1911	Beaumont Lumber Co.	Lumber-----	9,741.95	¹ 9,804.91	July 11, 1911
390	June 12, 1911	General Electric Co.	Steam power plant.	31,370.00	20,919.67	Aug. 31, 1911
396	July 25, 1911	W. E. Anderson.	-----do-----	44,158.90	38,648.90	Jan. 26, 1912
397	Aug. 11, 1911	Allis - Chalmers Co.	Transformers....	450.00	¹ 356.67	Aug. 2, 1911
398	Aug. 8, 1911	Pittsburgh Transformer Co.	-----do-----	857.10	¹ 857.10	Sept. 8, 1911
399	July 24, 1911	Wagner Electric Manufacturing Co.	-----do-----	135.00	¹ 135.00	Sept. 7, 1911
400	Aug. 25, 1911	Lidgerwood Manufacturing Co.	Cableways-----	44,160.00	¹ 44,295.00	Dec. 23, 1911
406	Sept. 15, 1911	Elliott & Barry Engineering Co.	Steam heating plants.	2,450.00	¹ 2,450.00	Nov. 14, 1911

OREGON-CALIFORNIA, KLAMATH PROJECT.

347	Jan. 5, 1911	W. H. Mason....	Lost River diversion channel. Less portion suspended.	\$63,607.00 5,314.00	¹ \$54,964.88	Apr. 5, 1912
351	Jan. 28, 1911	Geo. C. Clark....	Lost River diversion works.	58,293.00 98,556.50	¹ 97,393.64	Dec. 31, 1911
	Apr. 17, 1911	Jas. W. Jory....	Lost River diversion channel.	7,600.00	¹ 5,988.06	Mar. 23, 1912
401	Aug. 9, 1911	-----do-----	-----do-----	4,060.00	¹ 4,011.31	Dec. 28, 1911
	Mar. 29, 1912	Stockton Iron Works.	Self-propelled ditch excavator.	6,125.00	¹ 6,125.00	June 29, 1912

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

234	Apr. 8, 1909	National Surety Co.	Dam and canals..	\$693,187.34	\$726,715.49	July 1, 1911
334	Aug. 6, 1910	Pittsburgh Valve, Foundry & Construction Co.	58-inch balanced valves.	11,670.00	¹ 11,756.58	Mar. 3, 1911
360	Mar. 29, 1911	Cornelius Cole....	Earthwork-----	37,130.00	¹ 39,959.64	Feb. 1, 1912
361	Apr. 1, 1911	J. W. McNeel....	-----do-----	19,970.00	¹ 23,942.89	Do.
364	Mar. 28, 1911	Seitz & Shevling.	-----do-----	16,740.00	¹ 18,619.25	Feb. 11, 1912
366	Apr. 18, 1911	Maney Bros. & Co.	-----do-----	76,400.00	¹ 77,587.10	Feb. 16, 1912
386	June 6, 1911	Dotson & Shirley.	Town-site lateral.	7,161.10	¹ 9,198.83	Sept. 30, 1911
422	Nov. 13, 1911	Pacific Coast Pipe Co.	Wood stave pipe.	5,013.02	¹ 5,009.97	May 15, 1912

¹ Completed.

Principal current contracts—Continued.

UTAH, STRAWBERRY VALLEY PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1912.	Completion due.
388	July 13, 1911	W. O. Morrison..	Construction of Indian Creek dike.	\$107,090.70	\$40,851.73	Oct. 1, 1912
	Sept. 5, 1911	Ely Construction Co.	Excavation of Indian Creek and Trail Hollow diversion canals.	26,560.00	10,772.82	Do.
448	May 31, 1912	Midwest Engineering Co.	Construction of terminal drop, chute, and bridge abutments, Indian Creek and Trail Hollow diversion canals.	16,308.30	445.76	Oct. 15, 1912
450	June 1, 1912	W. O. Morrison..	Construction of concrete intakes and bridges, Indian Creek and Trail Hollow diversion canals.	13,805.75	300.42	Do.
----	May 10, 1912	Vulcan Iron Works.	Construction of hoisting mechanism and miscellaneous material.	2,205.73	-----	Aug. 5, 1912

WASHINGTON, YAKIMA PROJECT, SUNNYSIDE UNIT.

293	Sept. 10, 1909	H. W. Hawley...	Wasteway channel and masonry structures.	\$65,062.00	¹ \$56,162.38	June 20, 1910
417	Nov. 16, 1911	Midland Engineering Co.	Wood stave pipe.	10,054.80	² 10,060.22	Mar. 25, 1912
418	-----do-----	-----do-----	Concrete structures.	2,025.00	² 1,931.54	Apr. 9, 1912
419	Nov. 9, 1911	Mathieson & Webber.	Enlarging Snipes Mountain lateral.	16,100.00	² 8,097.40	Mar. 15, 1912
424	Nov. 17, 1911	Albert L. Smith..	Pipe trench and backfill.	4,845.00	3,525.43	Jan. 30, 1912
426	Dec. 21, 1911	Mathieson, Mudd & Hans.	Canal excavation.	11,240.00	² 9,955.34	Feb. 1, 1912
----	Feb. 24, 1912	Midland Engineering Co.	Wood stave pipe.	3,138.82	² 3,264.63	Apr. 15, 1912
----	Feb. 26, 1912	O. S. Brown.....	Trench and lateral excavation.	1,675.00	² 1,691.57	Apr. 10, 1912
----	Apr. 8, 1912	D. G. Gustason...	Patrol house.....	875.00	² 909.78	June 4, 1912
----	-----do-----	F. R. Schoenberg..	-----do-----	1,052.50	² 1,176.00	Do.

WASHINGTON, YAKIMA PROJECT, TIEFON UNIT.

342	Dec. 6, 1910	Nelson Rich.....	Earthwork, main laterals.	\$115,070.00	¹ \$133,792.26	Oct. 19, 1911
349	Jan. 20, 1911	-----do-----	Earthwork, sub-laterals.	50,160.00	¹ 52,846.20	Oct. 9, 1911
404	Aug. 25, 1911	J. D. Glass.....	Patrol houses and cottages.	3,451.26	¹ 3,494.74	Dec. 12, 1911
405	Sept. 20, 1911	O. H. Stratton...	Wood stave pipe.	4,720.00	¹ 4,486.00	Nov. 25, 1911
	Apr. 1, 1912	G. A. Ross.....	Wagon road.....	3,770.00	¹ 4,969.40	Aug. 1, 1912

¹ Suspended.² Completed.

Principal current contracts—Continued.

WYOMING, SHOSHONE PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1912.	Completion due.
130	Sept. 10, 1906	United States Fidelity & Guaranty Co.	Shoshone dam...	\$469,479.12	¹ \$505,631.76	Jan. 31, 1910
411	Oct. 30, 1911	Lynn & Arnoldus.	Drainage ditches and culverts.	33,501.50	3,502.46	Apr. 1, 1912
440	Mar. 23, 1912	Jas. Y. Burke & Co.	Steel highway bridge.	2,224.00	¹ 2,224.00	June 7, 1912

¹ Completed.

CEMENT.

Contracts for cement.

[The table contains data relating to the contracts for cement in operation or completed during the fiscal year ending June 30, 1912.]

No.	Date.	Contractor.	Price per barrel f. o. b. works.	Estimated number of barrels.	Estimated value.	Estimated earnings June 30, 1912.	Completion due.
312	Feb. 7, 1910	Atlas Portland Cement Co.	\$0.80	14,000	\$11,200	¹ \$9,377.50	Dec. 31, 1910
317	Feb. 8, 1910	Colorado Portland Cement Co.	1.15	15,000	17,250	¹ 21,396.71	Mar. 10, 1911
318	Mar. 3, 1910	Atlas Portland Cement Co.	.80	7,000	5,600	¹ 5,639.50	Dec. 31, 1910
320	Feb. 25, 1910	Ash Grove Lime & Portland Cement Co.	.95	17,000	16,150	¹ 18,721.41	June 30, 1911
327	May 17, 1910	Cowell Portland Cement Co.	1.55	1,000	1,550	¹ 1,876.45	May 17, 1911
329	May 21, 1910	Pacific Portland Cement Co.	1.55	6,000	9,300	9,152.18	June 30, 1911
356	Feb. 28, 1911	do.	1.55	6,000	9,300	8,233.10	Dec. 31, 1911
368	Apr. 27, 1911	Iola Portland Cement Co.	.80	12,000	9,600	8,384.00	Mar. 31, 1912
370	May 10, 1911	Portland Cement Co. of Utah.	1.50	12,000	18,000	21,312.00	Do.
371	Apr. 29, 1911	Three Forks Portland Cement Co.	1.18	8,000	9,440	8,979.80	Do.
372	May 1, 1911	United Kansas Portland Cement Co.	.80	12,000	9,600	7,578.00	Do.
377	May 13, 1911	Pacific Portland Cement Co.	1.32	9,000	11,880	14,978.70	Do.
378	May 24, 1911	Riverside Portland Cement Co.	1.40	4,000	5,600	6,720.00	Do.
380	May 23, 1911	Southwestern Portland Cement Co.	1.37	10,000	13,700	13,736.00	Do.
389	May 18, 1911	Union Portland Cement Co.	1.30	16,500	21,450	19,658.60	Do.
393	May 20, 1911	Henry Cowell Lime & Cement Co.	1.24	43,000	53,320	42,736.00	Do.
429	Jan. 26, 1912	Iola Portland Cement Co.	.60	20,000	12,000	12,107.00	May 1, 1912
430	Jan. 23, 1912	Riverside Portland Cement Co.	1.37 ¹ / ₂	10,000	13,750	5,396.88	June 30, 1912
431	Feb. 19, 1912	Colorado Portland Cement Co.	.95	13,000	12,350	2,937.50	Mar. 31, 1913
432	do.	Iola Portland Cement Co.	.70	25,000	17,500	1,050.00	Do.
434	Mar. 1, 1912	Riverside Portland Cement Co.	1.37 ¹ / ₂	10,000	13,750	-----	Do.
435	Feb. 27, 1912	Pacific Portland Cement Co.	1.32	27,000	35,640	4,923.60	Do.
437	Mar. 14, 1912	Lehigh Portland Cement Co.	.75	8,000	6,000	888.00	Do.
439	Mar. 21, 1912	Ogden Portland Cement Co.	1.10	42,000	46,200	6,600.00	Do.
441	Mar. 30, 1912	Portland Cement Co. of Utah.	1.35	15,000	20,250	2,427.30	Do.
444	Apr. 22, 1912	Southwestern Portland Cement Co.	1.30	20,000	26,000	32.25	Do.
446	Mar. 21, 1912	Three Forks Portland Cement Co.	1.20	5,000	6,000	120.00	Do.
453	June 1, 1912	Ash Grove Lime & Portland Cement Co.	.70	10,000	7,000	-----	Do.

¹ Completed.

Purchases of cement during fiscal year 1912.

Contract No. :	Barrels.	Contract No. :	Barrels.
356-----	2,050	431-----	3,125
368-----	5,210	432-----	1,500
370-----	11,946½	435-----	3,730
371-----	7,045¼	437-----	1,200
372-----	9,700	439-----	6,000
377-----	11,040	441-----	1,798
378-----	4,800	444-----	25
380-----	10,100	446-----	100
389-----	15,122	Open market-----	2,775
393-----	26,400		
429-----	19,980		
430-----	3,925	Total-----	147,571½

NOTE.—The basis of award in cement contracts is usually that the sum of the price bid plus the freight charges from works to project for which cement is required shall be a minimum.

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Tabulation of cement tests from Jan. 1, 1904, to June 30, 1912.

[Average of accepted cement.]

Brand.	Quan- tity.	Fineness.		Setting time.		Specific gravity.	Composition of briquets.	Tensile strength.																	
		Passing No. 100 sieve.	Passing No. 200 sieve.	1 day.				7 days.		28 days.		3 months.		6 months.		1 year.		2 years.		3 years.		5 years.			
				N um b e r of briquets.	Pounds p e r square inch.			N um b e r of briquets.	Pounds p e r square inch.	N um b e r of briquets.	Pounds p e r square inch.	N um b e r of briquets.	Pounds p e r square inch.	N um b e r of briquets.	Pounds p e r square inch.	N um b e r of briquets.	Pounds p e r square inch.	N um b e r of briquets.	Pounds p e r square inch.	N um b e r of briquets.	Pounds p e r square inch.				
Ash Grove.....	Barrels. 18,850	Per ct. 95.2	Per ct. 82.5	Hrs. m. 3 30	Hrs. m. 6 46	3.17	{ Neat.. 3 to 1..	20	344	390	755	390	779	30	775	30	767	30	733	10	752	5	734	.....	.....
							
Atlas.....	17,690	96.2	78.2	1 45	5 02	3.17	{ Neat.. 3 to 1..	30	353	385	603	385	667	30	705	30	670	30	689	15	731	5	587	.....	.....
Cowboy.....	15,645	96.1	77.1	3 11	6 15	3.16	{ Neat.. 3 to 1..	30	294	575	756	575	876	30	845	30	840	30	810	25	780	25	736	15	732
							
El Toro.....	10,300	92.6	76.8	2 40	5 15	3.17	{ Neat.. 3 to 1..	170	295	249	591	249	736	175	777	120	801	65	818	5	833	.....	.....	.....
Golden Gate.....	197,333	95.6	77.3	3 19	5 45	3.12	{ Neat.. 3 to 1..	60	317	7,086	647	5,720	786	155	758	55	700	35	674	20	706	10	749	.....	.....
							
Ideal.....	125,087	95.2	77.8	3 18	7 02	3.13	{ Neat.. 3 to 1..	90	392	7,086	213	5,730	340	155	449	55	424	35	389	20	400	10	390	.....	.....
							
Iola.....	142,537	98.9	78.4	3 49	7 20	3.16	{ Neat.. 3 to 1..	110	368	2,697	781	2,519	371	90	441	90	445	90	460	80	443	65	414	40	411
							
Lehigh.....	1,200	95.3	81.4	2 35	5 00	3.15	{ Neat.. 3 to 1..	5	404	47	648	47	711	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
							
Marquette.....	32,155	94.7	77.3	3 18	7 05	3.15	{ Neat.. 3 to 1..	35	384	635	724	635	822	35	755	35	737	35	724	30	744	25	704	.....	.....
Mount Diablo.....	31,500	94.6	78.5	3 39	6 19	3.11	{ Neat.. 3 to 1..	25	396	331	682	331	752	25	793	10	688	5	636	5	638	5	753	.....	.....
							

Ogden.....	6,000	95.1	80.5	4 30	8 00	3.15	{ Neat..	10	293	185	698	185	743	5	584	5	605	5	666	.....	.....	.....	.....	.....
Red Devil (Montana).....	7,880	96.6	84.4	5 05	8 11	3.14	{ Neat..	20	373	185	308	185	418	5	430	5	415	5	426	.....	.....	.....	.....	.....
Red Devil (Utah).....	29,317	96.5	81.8	4 42	7 32	3.14	{ Neat..	35	374	315	354	315	445	20	472	15	433	10	390	.....	.....	.....	.....	.....
Red Diamond 1.....	19,711	96.1	74.8	3 57	8 22	3.15	{ Neat..	35	329	730	707	730	770	45	758	40	777	40	771	20	804	10	737	.....
Utah 1.....	15,482	96.3	79.0	4 51	7 44	3.15	{ Neat..	25	356	1,195	649	1,195	717	45	738	45	761	40	790	40	793	40	724	40
Riverside.....	17,800	96.2	81.4	5 24	8 42	3.14	{ Neat..	10	363	1,195	302	1,195	406	45	477	45	498	40	509	40	472	40	421	40
Standard (Napa).....	8,996	97.8	87.6	4 00	6 41	2.97	{ Neat..	10	295	638	600	638	695	25	701	20	763	5	768	.....	.....	.....	.....	.....
Sunflower.....	95,030	94.3	78.1	3 39	7 23	3.15	{ Neat..	70	363	638	321	638	420	25	453	20	456	5	482	.....	.....	.....	.....	.....
Universal.....	184,100	96.9	81.0	3 24	7 26	3.14	{ Neat..	70	343	320	680	320	727	10	731	5	703	.....	.....	.....	.....	.....	.....	.....
Yankton.....	28,464	96.3	80.4	3 53	8 28	3.21	{ Neat..	85	261	320	323	320	413	10	457	5	463	.....	.....	.....	.....	.....	.....	.....
Total.....	1,005,097	95.4	78.9	3 28	6 58	3.14	{ Neat..	945	337	24,532	682	23,186	782	1065	780	835	770	740	760	550	757	430	736	225
							{ 3 to 1..	.....	.....	24,532	267	23,186	383	1065	436	855	444	740	431	550	416	430	395	225

¹ Made by same company. Brand name changed from Red Diamond to Utah, June, 1910.

In considering the results of long-time tests, as shown above, it should be borne in mind that while the results for the different periods are approximately comparable, they are directly comparable, as in most cases there is a difference in the number of briquets represented by the results for various periods on the different brands, owing to the fact new sets are being started from time to time, the results of which become available at different periods.

FINANCES.

RECEIPTS, ALLOTMENTS, AND INVESTMENT, BY STATES.

The table following gives a statement of additions to the reclamation fund from the sale of public lands and town-site lots, by States, and also shows the amounts allotted and the net investment of the Government for irrigation work in each of the reclamation States:

TABLE 1.—*Receipts from the sale of public lands, allotments, and net investment, by States.*

States.	Actual receipts to Mar. 31, 1912.	Estimated receipts for quarter ending June 30, 1912.	Total estimated to June 30, 1912.	To June 30, 1912	
				Allotments.	Net investment.
Arizona.....	\$950,407.86	\$31,766.29	\$982,174.15	\$15,616,752.25	\$14,499,863.58
California.....	4,836,117.57	107,329.18	4,943,446.75	2,575,667.39	2,099,243.83
Colorado.....	6,078,628.29	98,638.65	6,177,266.94	7,884,352.95	4,885,959.17
Idaho.....	4,687,740.67	72,176.29	4,895,000.74	13,412,396.92	11,079,565.13
Idaho, sales of town lots.....	135,173.78				
Kansas.....	912,057.53	11,924.13	923,981.71	419,000.00	380,527.20
Montana.....	7,442,220.25	255,792.17	7,728,355.88	6,969,663.40	4,939,709.52
Montana, sales of town lots.....	30,343.46				
Nebraska.....	1,573,489.53	31,259.88	1,604,749.41	6,012,377.01	3,809,982.35
Nevada.....	469,775.52	9,653.63	479,429.15	6,218,503.63	4,584,157.25
New Mexico.....	3,600,990.10	59,114.99	3,660,105.09	4,485,543.12	1,625,138.62
North Dakota.....	11,611,724.79	76,968.15	11,688,692.94	2,224,628.85	1,844,067.74
Oklahoma.....	5,719,161.32	18,840.60	5,738,001.92	72,215.12	69,344.04
Oregon.....	10,063,349.89	64,731.19	10,128,081.08	4,323,990.27	2,910,725.66
South Dakota.....	6,409,711.89	147,742.92	6,601,246.24	3,300,000.00	3,083,149.11
South Dakota, sales of town lots.....	43,791.43				
Texas.....				2,104,000.00	352,319.00
Utah.....	1,583,050.35	35,191.61	1,618,241.96	3,459,877.02	1,879,358.09
Washington.....	6,262,198.77	39,854.66	6,302,053.43	7,660,607.63	6,128,171.46
Wyoming.....	3,778,354.41	283,387.38	4,082,655.79	6,982,417.38	5,332,142.57
Wyoming, sales of town lots.....	19,914.00				
Secondary projects.....				79,007.06	
Town-site development.....				23,000.00	15,677.85
General accounts.....				392,790.00	339,144.76
Total.....	76,209,201.46	1,344,371.72	77,553,573.18	94,216,790.00	69,858,216.93

During the fiscal year 1911 the General Land Office collected from the sale of public lands, not including town-site sales, a total of \$6,631,000.12, which resulted in the addition to the fund of \$6,135,547.76. The amount added to the fund was 92.528 per cent of the amount collected. During the fiscal year 1912 the gross receipts were \$6,324,012.34. Of this amount, \$4,473,628.28 has been credited to the reclamation fund, and it is estimated that there is a balance of \$1,344,371.72, which will be available before the end of the calendar year.

Table No. 2, page 33, of the Tenth Annual Report, gives a statement of the gross proceeds of sales and the corresponding receipts to the reclamation fund for each of the fiscal years from 1901 to 1910, inclusive.

TABLE 2.—*Total receipts from the sale of public lands and resulting additions to the reclamation fund.*

	Total receipts from reclamation States (not including town-site sales).	Additions to reclamation fund.	
		Amount (not including town-site receipts).	Per cent of total receipts.
Balance 1901-1910, inclusive.....	\$71,574,936.85	\$65,370,802.75	-----
1911.....	6,631,000.12	6,135,547.76	92.528
1912.....	6,324,012.34	± 5,818,000.00	91.998
Total.....	84,529,949.31	77,324,350.51	91.475

¹ Actually received, \$4,473,628.28. Estimated balance, not audited, \$1,344,371.72.

ALLOTMENTS, BY PROJECTS.

When funds become available, annual allotments are made by the Secretary of the Interior, in pursuance of which work is carried on. Table No. 3, below, gives a statement of the allotments from 1902 to June 30, 1912.

TABLE 3.—*Allotments for primary and secondary projects, town-site development, and general expenses to June 30, 1912.*

State.	Per cent chargeable.	Project.	1902-1911 (see Tenth Annual Report).	Additional during 1912.	Total.
Arizona.....		Salt River.....	\$9,665,000	\$300,000	\$9,965,000
Arizona-California.....	83.17	Colorado River.....	45,000	-----	45,000
Do.....	83.17	Yuma.....	5,820,000	900,000	6,720,000
California.....		Orland.....	608,000	10,000	618,000
Colorado.....		Grand Valley.....	1,225,000	200,000	1,425,000
Do.....		Uncompahgre.....	6,255,000	200,000	6,455,000
Idaho.....		Boise.....	6,767,000	1,500,000	8,267,000
Do.....		Minidoka.....	4,536,000	590,000	5,126,000
Kansas.....		Garden City.....	419,000	-----	419,000
Montana.....		Huntley.....	1,065,000	140,000	1,205,000
Do.....		Milk River.....	2,241,000	-----	2,241,000
Do.....		Sun River.....	872,000	300,000	1,172,000
Montana-North Dakota.....	70.30	Lower Yellowstone.....	2,995,000	285,000	3,280,000
Nebraska-Wyoming.....	70.30	North Platte.....	7,635,000	950,000	8,585,000
Nevada.....		Truckee-Carson.....	5,906,000	300,000	6,206,000
New Mexico.....		Carlsbad.....	725,000	195,000	920,000
Do.....		Hondo.....	359,000	-----	359,000
New Mexico-Texas.....	60.40	Rio Grande.....	4,910,000	350,000	5,260,000
North Dakota.....		Missouri River Pumping.....	1,033,000	150,000	1,183,000
Oklahoma.....		Cimarron.....	12,000	-----	12,000
Oregon.....		Central Oregon.....	45,000	-----	45,000
Do.....		Umatilla.....	1,850,000	100,000	1,950,000
Oregon-California.....	75.25	Klamath.....	2,934,000	60,000	2,994,000
South Dakota.....		Belle Fourche.....	3,150,000	150,000	3,300,000
Utah.....		Strawberry Valley.....	3,407,000	-----	3,407,000
Washington.....		Okanogan.....	616,000	36,000	652,000
Do.....		Yakima.....	6,626,000	300,000	6,926,000
Wyoming.....		Shoshone.....	4,128,000	270,000	4,398,000
		Secondary projects.....	666,000	-----	666,000
		Town-site development.....	23,000	-----	23,000
		General accounts.....	302,790	-----	302,790
Total.....			86,930,790	7,286,000	94,216,790

RECONCILING ADMINISTRATIVE ACCOUNTS WITH TREASURY DEPARTMENT BALANCES AND STATEMENTS.

The accounts of the Treasury Department are limited to the movement of cash, either by withdrawal or deposit to the appropriations involved. The administrative accounts of the Reclamation Service as entered in the tables herein show the amount, both for receipts and disbursements, upon an accrual basis. The cash account, however, must, if correct, agree with the Treasury Department statement of funds made available by appropriations, reimbursements, expenditures, and withdrawals. Table No. 4, below, shows a condensed statement of cash collected, appropriated, disbursed, and on hand, and table No. 5 gives a reconciliation of the amounts of the appropriations, withdrawals, and balances used in the preparation of these financial tables, with the figures shown by the statements of the Treasury Department.

TABLE 4.—*Reclamation fund account to June 30, 1912.*

Item.	Debit.	Credit.
Balance end of fiscal year 1911, as per Tenth Annual Report, page 35.....		\$35,584,801.32
Receipts during fiscal year 1912:		
Appropriation warrant—		
No. 14, Sept. 30, 1911.....	\$2,263.70	
No. 17, Oct. 18, 1911.....	2,971,837.25	
No. 25, Dec. 30, 1911.....	2,102,196.16	
No. 26, Dec. 30, 1911.....	1,061,514.35	
No. 28, Dec. 30, 1911.....	3,531.28	
No. 31, Jan. 31, 1912.....	1,121,999.74	
No. 33, Feb. 29, 1912.....	586,380.40	
No. 37, Mar. 30, 1912.....	143,507.64	
No. 39, Mar. 30, 1912.....	1,648.72	
No. 42, Apr. 30, 1912.....	767,360.14	
No. 45, May 10, 1912.....	588,262.04	
No. 49, June 12, 1912.....	116,118.27	
No. 51, June 29, 1912.....	7,780.40	
Total.....		9,474,400.09
Disbursements, 239,314 vouchers, as per Table 6.....	\$77,693,349.42	75,059,201.41
Collections, 18,411 vouchers, as per Table 7.....		7,835,132.49
Balance with Treasurer of the United States, as per Table 5.....	4,206,026.55	
Balance with special fiscal agents.....	994,957.93	
Total.....	82,894,333.90	82,894,333.90

TABLE 5.—*Balances of reclamation fund with the Treasurer of the United States to June 30, 1912.*

Item.	Appropriations.	Withdrawals.	Balances.
Total and balance end of fiscal year 1911, as per Tenth Annual Report, page 35, Table 5.....	\$35,584,801.32	\$61,771,096.05	\$3,813,705.27
Fiscal year 1912.....	9,474,400.09	8,930,014.45	4,308,090.91
For items in Reclamation Service accounts, but not included in above, add withdrawals on direct settlements by the auditor.....	\$14,570.94		
Add withdrawals on requisition.....	109,000.00		
123,507.94			
Deduct repayments on deposits \$5,026.55			
Deduct repayments on direct settlements.....	16,480.03		
21,506.58			
Net withdrawals.....		102,064.36	102,064.33
Total and balance as per Reclamation Service accounts.....	75,059,201.41	70,853,174.86	4,206,026.55

NOTE.—The appropriations, withdrawals, and balances for the fiscal year 1911, appearing in Table No. 5, page 35 of the Tenth Annual Report, are in agreement with the figures appearing in the Treasury Department "Combined statement of receipts and disbursements of the United States," p. 81.

On June 30, 1912, there was on deposit in the United States depositaries and subtreasuries, to the credit of special fiscal agents, checking balances aggregating a total of \$994,957.93.

DISBURSEMENTS, COLLECTIONS, AND TRANSFERS.

In Tables Nos. 7, 8, and 9, on pages 37 and 38 of the Tenth Annual Report, is given the disbursements, collections, and transfers, by quarters, from 1903 to 1911, inclusive. In the three tables below these figures are continued for the fiscal year 1912.

TABLE 6.—*Disbursement vouchers paid to June 30, 1912.*

Year.	Quarter ended.	Number of vouchers.	Amount.
Balance from tenth annual report.....		204,962	\$66,305,918.77
1912.....	{ Sept. 30, 1911	8,342	2,670,936.33
	{ Dec. 31, 1911	9,342	3,257,631.36
	{ Mar. 31, 1912	8,312	2,644,804.64
	{ June 30, 1912	8,356	2,814,058.32
Total to June 30, 1912.....		239,314	77,693,349.42

TABLE 7.—*Collection vouchers collected to June 30, 1912.*

Year.	Quarter ended.	Number of vouchers.	Amount.
Balance from tenth annual report.....		15,105	\$5,365,084.69
1912.....	{ Sept. 30, 1911	655	388,542.80
	{ Dec. 31, 1911	705	397,460.98
	{ Mar. 31, 1912	858	885,579.12
	{ June 30, 1912	1,088	798,464.90
Total to June 30, 1912.....		18,411	7,835,132.49

TABLE 8.—*Transfer vouchers approved to June 30, 1912.*

Year.	Quarter ended.	Number of vouchers.	Amount.
Balance from tenth annual report.....		3,978	\$3,329,611.81
1912.....	{ Sept. 30, 1911	192	80,922.40
	{ Dec. 31, 1911	236	95,210.35
	{ Mar. 31, 1912	264	232,925.33
	{ June 30, 1912	236	136,622.75
Total to June 30, 1912.....		4,906	3,875,292.64

INVESTMENT OF THE UNITED STATES IN PROJECTS.

Below is given a statement showing cash disbursed and received on account of the several projects and transfers between projects. The work of the service is grouped under five general heads, as follows: Primary projects, those for which definite allotments of funds are in effect and on which construction is under way; secondary projects, those for which no definite allotments of funds have been made and on which only preliminary studies and surveys have been made to determine their advisability and practicability; townsite operations under the acts of April 16 and June 27, 1906 (34 Stat., 116, 519); Indian irrigation projects; and general accounts, which represent those expenditures that are general in nature and are not directly chargeable to any project when first incurred, but which become a charge against all projects as a part of the general or overhead expenses of the service.

Table No. 9 gives the voucher transactions and net investment of the United States in the several primary projects to June 30, 1912.

TABLE 9.—Voucher transactions and net investments of the United States on primary projects to June 30, 1912.

State.	Project.	Debits.		Credits.				Net invest- ment.
		Disbursement vouchers.	Transfers received.	Collection vouchers.			Transfers issued.	
				Miscellaneous.	Water-right charges.			
					Building.	Operation and maintenance.		
Arizona.....	Salt River.....	\$10,851,327.61	\$281,511.05	\$1,338,448.50	\$100,000.00	.....	\$52,794.63	\$9,641,585.53
Arizona-California.....	Colorado River.....	42,235.20	7,159.61	760.32	.....	.....	4,925.26	43,709.23
Do.....	Yuma.....	5,979,693.38	155,857.79	249,443.95	82,345.29	\$23,353.60	15,122.62	5,765,285.71
California.....	Orland.....	549,645.78	31,083.92	22,166.27	.....	.....	3,691.69	554,871.74
Colorado.....	Grand Valley.....	95,331.13	9,153.51	72.29	.....	.....	2,997.27	101,415.11
Do.....	Uncompaigne.....	4,920,788.81	108,578.89	238,178.40	.....	.....	10,998.19	4,780,191.11
Idaho.....	Boise.....	6,918,257.24	230,574.64	143,300.93	.....	.....	45,180.05	6,938,350.90
Do.....	Minidoka.....	4,510,819.79	218,380.23	86,067.42	279,257.64	134,400.46	127,657.19	4,101,817.31
Kansas.....	Garden City.....	379,307.47	11,137.43	4,369.20	142.50	104.50	5,301.50	380,527.20
Montana.....	Huntley.....	1,185,705.62	44,389.48	33,286.55	154,517.46	40,920.64	114,411.95	886,958.50
Do.....	Milk River.....	985,082.24	72,739.40	15,318.34	.....	.....	38,193.67	1,004,369.63
Do.....	Sun River.....	896,151.92	65,095.26	12,467.44	63,788.61	11,823.26	10,186.37	863,581.50
Montana-North Dakota.....	Lower Yellowstone.....	3,051,221.01	84,404.66	38,337.33	12,267.00	18,099.42	24,712.65	3,041,709.27
Nebraska-Wyoming.....	Nebraska.....	5,140,231.40	603,863.71	94,657.60	106,780.85	86,713.87	17,220.87	5,438,721.92
Nevada.....	Truckee-Carson.....	4,704,374.54	205,774.10	45,142.54	184,471.29	78,413.01	30,468.18	4,571,633.62
New Mexico.....	Carlsbad.....	875,243.63	21,732.26	16,721.04	87,230.90	89,924.60	10,944.78	692,154.57
Do.....	Hondo.....	372,836.52	11,801.57	29,909.13	.....	.....	766.52	353,962.44
New Mexico-Texas.....	Rio Grande.....	927,523.81	92,322.30	123,173.14	.....	.....	15,875.48	880,797.49
North Dakota.....	Missouri River Pumping.....	886,477.09	183,858.43	7,393.77	3,801.72	8,868.53	176,375.39	873,896.11
Oklahoma.....	Cimarron.....	8,833.71	831.76	.....	.....	.....	26.55	9,128.92
Oregon.....	Central Oregon.....	43,014.03	1,744.30	1,303.58	.....	.....	3,063.08	40,391.67
Do.....	Umatilla.....	1,530,933.94	48,207.56	38,567.72	154,554.02	42,284.23	50,068.49	1,293,697.04
Oregon-California.....	Klamath.....	2,287,466.86	55,441.23	44,405.90	206,269.00	71,909.93	29,481.02	1,990,902.24
South Dakota.....	Belle Fourche.....	3,167,260.85	76,506.26	20,441.93	65,169.47	56,091.73	18,914.87	3,083,149.11
Utah.....	Strawberry Valley.....	1,854,935.52	62,878.84	84,694.93	.....	.....	6,638.36	1,826,481.07
Washington.....	Okanogan.....	1,632,312.90	22,709.19	33,807.93	23,436.07	33,400.25	7,735.53	1,556,442.31
Do.....	Yakima-Sunnyside.....	2,644,363.33	92,165.18	309,679.92	394,117.52	78,714.48	44,574.94	1,909,441.65
Do.....	Yakima-Tieton.....	2,851,034.75	546,955.75	69,453.28	98,589.30	47,864.74	219,387.36	2,962,695.82
Do.....	Yakima-Storage.....	577,561.77	45,936.14	5,815.85	.....	.....	898.01	616,784.05
Wyoming.....	Shoshone.....	3,879,757.34	121,508.90	72,900.99	139,764.11	54,938.57	42,053.96	3,691,608.61
Total.....		72,749,729.19	3,514,393.38	3,182,786.19	2,156,442.75	877,825.82	1,130,666.43	68,916,401.38

Below is given a summary of the figures shown in Table No. 9, to which has been added the investment figures for secondary projects, town-site developments, Indian irrigation, and miscellaneous.

TABLE 10.—*Recapitulation and verification of voucher transactions and all net investments of the United States paid from the reclamation fund to June 30, 1912.*

Item.	Debits.		Credits.			Net invest- ment.
	Disburse- ment vouchers.	Transfers issued.	Collection vouchers.		Transfers issued.	
			Miscel- laneous.	Water-right charges.		
Primary projects.....	\$72,749,729.19	\$3,514,393.38	\$3,182,786.19	\$3,034,268.57	\$1,130,666.43	\$68,916,401.38
Secondary projects.....	609,043.25	48,270.99	18,046.42	-----	52,274.88	586,992.94
Town-site develop- ment.....	5,283.90	10,639.36	11.90	-----	233.51	15,677.85
Indian irrigation.....	1,780,989.19	131,426.47	1,581,236.62	-----	24,936.82	306,242.22
Miscellaneous.....	2,548,303.89	170,562.44	18,782.79	-----	2,667,181.00	32,902.54
Total.....	77,693,349.42	3,875,292.64	4,800,863.92	3,034,268.57	3,875,292.64	69,858,216.93

COLLECTIONS.

The two tables below give information as to collections that have been made under the reclamation operations. Table No. 11 gives an analysis of the sources of all cash collections to June 30, 1912, by calendar years, and Table No. 12 gives, by projects, the amount returned for water-right charges.

TABLE 11.—*Sources of cash collections to June 30, 1912, by calendar years.*

Calendar year.	Miscellaneous sales.	Miscellaneous services.	Temporary water rentals.	Transportation refunds.
1903 to 1910 ¹	\$408,009.13	\$1,044,015.63	\$931,544.05	\$190,306.73
1911.....	106,837.11	822,974.92	384,458.06	14,715.90
1912 ²	319,416.28	244,991.83	250,555.77	16,843.06
Total.....	834,262.52	2,111,982.38	1,566,557.88	221,865.69

Calendar year.	Forfeitures by bidders and contractors.	Water-right repayments.		Overdisbursements.	Total.
		Building charges.	Operation and maintenance charges.		
1903 to 1910 ¹	\$34,000.00	\$1,068,216.83	\$283,364.55	\$24,306.93	\$3,583,763.85
1911.....	1,843.71	568,285.98	265,644.56	2,564.38	2,167,324.62
1912 ²	-----	519,939.94	328,816.71	3,480.43	1,684,044.02
Total.....	35,843.71	2,156,442.75	877,825.82	30,351.74	7,835,132.49

¹ Inclusive.

² Six months only.

TABLE 12.—Collection of water-right charges by projects to June 30, 1912.

State.	Project.	Building charges.	Operation and maintenance charges.	Total.	Re-funds.	Net collections.
Arizona.....	Salt River.....	\$100,000.00	-----	\$100,000.00	-----	\$100,000.00
Arizona-California.....	Yuma.....	82,345.29	\$23,353.60	105,698.89	-----	105,698.89
Idaho.....	Minkloka.....	279,257.64	134,400.46	413,658.10	-----	413,658.10
Kansas.....	Garden City.....	142.50	104.50	247.00	\$247.00	-----
Montana.....	Huntley.....	154,517.46	40,920.64	195,438.10	175.24	195,262.86
Do.....	Sun River.....	63,788.61	11,823.25	75,611.87	881.82	74,730.05
Montana-North Dakota.....	Lower Yellowstone.....	12,267.00	18,099.42	30,366.42	-----	30,366.42
Nebraska-Wyoming.....	North Platte.....	106,780.85	86,713.87	193,494.72	146.40	193,348.32
Nevada.....	Truckee-Carson.....	184,471.29	78,413.01	262,884.30	252.00	262,632.30
New Mexico.....	Carlsbad.....	87,230.90	89,924.60	177,155.50	-----	177,155.50
North Dakota.....	Missouri River Pumping.....	3,801.72	8,808.53	12,670.25	153.00	12,517.25
Oregon.....	Umatilla.....	154,554.02	42,284.23	196,838.25	72.55	196,765.70
Do.....	Klamath.....	206,209.00	71,909.93	278,118.93	94.50	278,024.43
South Dakota.....	Belle Fourche.....	65,169.47	56,091.73	121,261.20	-----	121,261.20
Washington.....	Okanogan.....	23,436.07	33,400.25	56,836.32	52.50	56,783.82
Do.....	Yakima-Sunnyside.....	394,117.52	78,714.48	472,832.00	2,097.60	470,734.40
Do.....	Yakima-Tieton.....	98,589.30	47,864.74	146,454.04	-----	146,454.04
Wyoming.....	Shoshone.....	139,764.11	54,938.57	194,702.68	891.64	193,811.04
Total.....	-----	2,156,442.75	877,825.82	3,034,268.57	5,064.25	3,029,204.32

The three tables below for the Rio Grande Dam appropriation give information similar to that appearing in the Tables 4 to 7 with corresponding titles for the Reclamation Service.

TABLE 13.—Special appropriation for Rio Grande (Engle) Dam (3½ Stat., 1357) to June 30, 1912.

	Debit.	Credit.
Appropriation warrant No. 19, Mar. 4, 1907.....	-----	\$1,000,000.00
Disbursements, 2,885 vouchers.....	\$959,423.89	-----
Collections, 23 vouchers.....	-----	90.78
Balance with Treasurer of United States.....	40,666.89	-----
Total.....	1,000,090.78	1,000,090.78

TABLE 14.—Balances of appropriations for Rio Grande (Engle) Dam with Treasurer of the United States, June 30, 1907, to June 30, 1912.

Fiscal year.	Appropriation.	Withdrawals.	Balances.
1907.....	\$1,000,000	-----	\$1,000,000.00
1908.....	-----	\$33,113.21	966,886.79
1909.....	-----	137,074.22	829,812.57
1910.....	-----	247,217.23	582,595.34
1911.....	-----	327,875.96	254,719.38
1912.....	-----	214,052.49	40,666.89
Totals and balances per Treasury accounts, June 30, 1912.....	1,000,000	959,333.11	40,666.89

NOTE.—The appropriations, withdrawals, and balances for the fiscal year 1911 appearing in Table No. 22, p. 50, of the Tenth Annual Report, are in agreement with the figures appearing in the Treasury Department, "Combined statement of receipts and disbursements of the United States, fiscal year 1911," p. 81.

TABLE 15.—*Disbursement and collection vouchers, appropriation for Rio Grande (Engle) Dam, paid and collected to June 30, 1912.*

Quarter ended.	Disbursement vouchers.		Collection vouchers.	
	Number.	Amount.	Number.	Amount.
Balance from Tenth Annual Report.....	2,353	\$683,655.54	21	\$85.08
Sept. 30, 1911.....	493	176,897.21	2	5.70
Dec. 31, 1911.....	19	7,809.45		
Mar. 31, 1912.....	14	77,843.67		
June 30, 1912.....	6	13,218.02		
Total.....	2,885	959,423.89	23	90.78

RECLAMATION DEPOSIT ACCOUNT.

Below is a statement of receipts, payments, and balances, and a list of the items making up the final balance to June 30, 1912, in this account. A description of the nature of this account appears on page 51 of the Tenth Annual Report.

TABLE 16.—*Receipts and payments from reclamation deposit account during fiscal year 1912.*

Dates.	Receipts.	Payment.	Balance.
July, 1911.....	¹ \$12,400		
August, 1911.....	24,000	\$24,000	\$12,400
September, 1911.....	11,350	11,750	12,000
October, 1911.....	12,600	8,200	16,400
November, 1911.....	11,325	16,500	11,225
December, 1911.....	34,075	37,200	8,100
January, 1912.....	1,300	7,500	1,900
February, 1912.....	8,500	1,200	9,200
March, 1912.....	30,600	5,500	34,300
April, 1912.....	4,500	33,300	5,500
May, 1912.....	11,400	4,500	12,400
June, 1912.....	56,950	16,200	53,150
June, 1912.....	7,510	54,900	5,760
Total.....	¹ 226,510	220,750	5,760

¹ Balance on hand July, 1911.

Amounts held pending award of contracts.

Bids opened.	For—	Bidder.	Amount.
May 21, 1912.....	Earthwork and structures, Dodson North Canal, Milk River project.	Midland Engineering Co.....	\$500
Do.....	do.....	J. S. Hilend.....	530
Do.....	do.....	Hayden Bros.....	1,620
Do.....	do.....	Wynn & O'Neill.....	1,120
Do.....	do.....	John S. Penson.....	500
Do.....	do.....	J. E. Hilton.....	1,120
Do.....	do.....	A. Lafond, jr.....	220
Do.....	do.....	Rolla Barnes.....	150
Total.....			5,760

No outstanding checks.

UNIT BIDS AND CONTRACT PRICES.

Unit bids and contract prices on formal specifications.

BACKFILLING.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Utah, Strawberry Valley	May 16, 1912	214	Diversion canal, structures, Indian Creek and Trail Hollow.	Cubic yards...	555	\$0.45	\$0.45	\$0.45
Do.....	.....do.....	215	.....do.....	.....do.....	250	.40	.45	.45

BRIDGES, STEEL.

Wyoming, Shoshone	Mar. 6, 1912	206	Highway bridge (100-foot span, 16 feet wide), South Fork, Shoshone River.	Number	1	\$2,190.00	\$2,224.00	\$2,224.00
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BRIDGES, WOODEN STRINGER.

Montana, Huntley	Sept. 1, 1911	193	Extension of canals, schedule 7, structures, 16-foot span.	Number	2	\$175.00	\$176.00	\$225.00
Do.....	.....do.....	193	Extension of canals, schedule 7, structures, 18-foot span.	.....do.....	3	185.00	192.00	300.00

CONCRETE, PLAIN.

Montana, Huntley	Sept. 1, 1911	193	Extension canals, schedule 7, structures.....	Cubic yards...	175	\$12.00	\$16.00	\$12.00
Nebraska-Wyoming, North Platte	Apr. 27, 1912	203	Dam No. 3, Lake Minatare.....	.....do.....	8,500	4.60	6.00	4.60
Montana, Milk River	May 21, 1912	210	Dodson South Canal, laterals, concrete, paving.....	.....do.....	42	16.00	16.50	(1)

CONCRETE, REINFORCED.

Montana, Huntley.....	Sept. 1, 1911	193	Extension of canals, schedule 7, structures.....	Cubic yards.....	917	\$13.00	\$18.00	\$13.00
Nebraska-Wyoming, North Platte.....	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, conduit.....	do.....	220	6.00	6.25	6.00
			Dam No. 3, Lake Minatare, spillway.....	do.....	460	5.00	6.00	6.00
Montana, Milk River.....	May 21, 1912	209	Dam No. 3, Lake Minatare, core wall.....	do.....	4,700	5.00	5.00	2 6.00
			Dodson North Canal and laterals, schedule 6, structures.....	do.....	1,500	9.80	11.90	3 9.80
Utah, Strawberry Valley.....	May 16, 1912	214	Indian Creek and Trail Hollow diversion canal, structures.....	do.....	560	16.60	20.00	16.60
Do.....	do.....	215	do.....	do.....	876	15.80	16.35	15.80

CONCRETE DIAPHRAGM.

Utah, Strawberry Valley.....	Aug. 7, 1911	191	Indian Creek and Trail Hollow diversion canal.....	Square feet.....	2,500	\$0.15	\$0.24	\$0.15
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CULVERTS, WOODEN.

Wyoming, Shoshone.....	Oct. 2, 1911	194	Drainage ditches, schedule 1, ditch A.....	Linear feet.....	120	\$0.30	\$0.60	\$0.30
Do.....	do.....	194	Drainage ditches, schedule 2, ditch B.....	do.....	270	.30	.60	.30
Do.....	do.....	194	Drainage ditches, schedule 3, ditch C.....	do.....	400	.40	.60	.40
Do.....	do.....	194	Drainage ditches, schedule 4, ditch D.....	do.....	100	.30	.60	.30
Do.....	do.....	194	Drainage ditches, schedule 5, ditch E.....	do.....	600	.30	.60	.30
Do.....	do.....	194	Drainage ditches, schedule 6, ditch F.....	do.....	110	.30	.40	.30
Do.....	do.....	194	Drainage ditches, schedule 7, ditch G.....	do.....	250	.30	.60	.30
Do.....	do.....	194	Drainage ditches, schedule 8, ditch H.....	do.....	185	.30	.40	.30

DRAIN PIPE, LAYING.

Nebraska-Wyoming, North Platte.....	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, laying 12-inch pipe.....	Linear feet.....	3,200	\$1.00	\$1.24	\$1.00
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¹ All bids rejected.² Handling steel, extra.³ Handling steel included.⁴ 3½-inch thick reinforced.

Unit bids and contract prices on formal specifications—Continued.

EMBANKMENT.

State and project.	Date.	Specifi- cation number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Flathead.....	Aug. 25, 1911	192	Pablo Dams and Canals, North Pablo Dam.....	Cubic yards.....	102,000	\$0.30	\$0.35	\$0.30
Do.....	do.....	192	Middle Pablo Dam, class A.....	do.....	8,000	.20	.25	.20
Do.....	do.....	192	Middle Pablo Dam, class B.....	do.....	8,000	.25	.30	.25
Do.....	do.....	192	South Pablo Dam.....	do.....	124,000	.32	.35	.32
Nebraska-Wyoming, North Platte.....	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, earth.....	do.....	465,000	.30	.34	.30
Do.....	do.....	203	Dam No. 3, Lake Minatare, gravel.....	do.....	125,000	.30	.35	.30
Do.....	do.....	203	Dam No. 3, Lake Minatare, trimming.....	do.....	6,000	.30	.50	.30

EXCAVATION, CLASS 1, EARTH.

Utah, Strawberry Valley.....	Aug. 7, 1911	191	Indian Creek and Trail Hollow Diversion Canal.....	Cubic yards.....	140,000	\$0.16½	\$0.19½	\$0.16½
Montana, Flathead.....	Aug. 25, 1911	192	Pablo Dams and Canals, Pablo Canals.....	do.....	80,000	.18	.20	.18
Do.....	do.....	192	Pablo Dams and Canals, lateral A.....	do.....	125,000	.15	.17	.18
Montana, Huntley.....	Sept. 1, 1911	193	Extension Canals, schedule 1.....	do.....	27,000	.14	.157	.14
Do.....	do.....	193	Extension Canals, schedule 2.....	do.....	25,000	.14	.157	.14
Do.....	do.....	193	Extension Canals, schedule 3.....	do.....	32,000	.14	.157	.14
Do.....	do.....	193	Extension Canals, schedule 4.....	do.....	18,000	.14	.175	.14
Do.....	do.....	193	Extension Canals, schedule 5.....	do.....	30,000	.14	.16	.14
Do.....	do.....	193	Extension Canals, schedule 6.....	do.....	27,000	.14	.157	.14
Do.....	do.....	193	Extension Canals (structures), schedule 7.....	do.....	9,000	.25	.45	.45
Wyoming, Shoshone.....	Oct. 2, 1911	194	Drainage ditches, ditch A, schedule 1.....	do.....	40,800	.18	.199	.18
Do.....	do.....	194	Drainage ditches, ditch B, schedule 2.....	do.....	18,800	.18	.199	.18
Do.....	do.....	194	Drainage ditches, ditch C, schedule 3.....	do.....	20,300	.18	.199	.18
Do.....	do.....	194	Drainage ditches, ditch D, schedule 4.....	do.....	12,200	.18	.199	.18
Do.....	do.....	194	Drainage ditches, ditch E, schedule 5.....	do.....	34,700	.18	.199	.18
Do.....	do.....	194	Drainage ditches, ditch F, schedule 6.....	do.....	18,500	.18	.199	.18
Do.....	do.....	194	Drainage ditches, ditch G, schedule 7.....	do.....	23,600	.18	.199	.18
Do.....	do.....	194	Drainage ditches, ditch H, schedule 8.....	do.....	7,300	.18	.199	.18
Arizona-California, Yuma.....	Oct. 12, 1911	196	Main Canal, California, schedule 1.....	do.....	228,000	.19½	.20	.19½
Do.....	do.....	196	Main Canal, California, schedule 2.....	do.....	195,000	.21½	.21½	.21½
Do.....	do.....	196	Main Canal, California, schedule 3.....	do.....	236,000	.20	.20	.20
Do.....	do.....	196	Main Canal, California, schedule 4.....	do.....	234,000	.18½	.21½	.18½
Do.....	do.....	196	Main Canal, California, schedule 5.....	do.....	234,000	.19½	.19½	.19½
Do.....	do.....	196	Main Canal, California, schedule 6.....	do.....	173,000	.20	.24	.20

Colorado, Uncompahgre Valley.....	Jan. 23, 1912	201	West Canal, Colorado, schedule 2.....	do.....	4, 000	.15	.16	.28
Do.....	do.....	201	West Canal, Colorado, schedule 3.....	do.....	8, 000	.15	.16	.28
Do.....	do.....	201	West Canal, Colorado, schedule 4.....	do.....	13, 000	.14	.15	.28
Do.....	do.....	201	West Canal, Colorado, schedule 5, tunnel portals.....	do.....	2, 000	.15	.20	.28
Do.....	do.....	201	West Canal, Colorado, schedule 6.....	do.....	5, 000	.13	.15	.28
Do.....	do.....	201	West Canal, Colorado, schedule 7.....	do.....	7, 000	.14	.15	.28
Do.....	do.....	201	West Canal, Colorado, schedule 8.....	do.....	15, 000	.15	.18	.28
Do.....	do.....	201	West Canal, Colorado, schedule 9.....	do.....	9, 000	.15	.15	.28
Do.....	do.....	201	West Canal, Colorado, schedule 10.....	do.....	10, 000	.15	.19	.28
Do.....	do.....	201	West Canal, Colorado, schedule 11.....	do.....	10, 000	.15	.18	.28
Do.....	do.....	201	West Canal, Colorado, schedule 12.....	do.....	12, 000	.15	.18	.28
Nebraska-Wyoming, North Platte.....	Apr. 22, 1912	203	Dam 3 (Lake Minatare) spillway.....	do.....	45, 000	.28	.30	.32
Do.....	do.....	203	Dam 3 (Lake Minatare) outlet channel.....	do.....	50, 000	.25	.26	.25
Montana, Milk River.....	May 21, 1912	209	Dodson North Canal and laterals, schedule 1.....	do.....	41, 500	.17	.19	.17
Do.....	do.....	209	Dodson North Canal and laterals, schedule 2.....	do.....	77, 000	.17	.20	.17
Do.....	do.....	209	Dodson North Canal and laterals, schedule 3.....	do.....	95, 000	.17	.19	.17
Do.....	do.....	209	Dodson North Canal and laterals, schedule 4.....	do.....	40, 000	.17	.19	.17
Do.....	do.....	209	Dodson North Canal and laterals, schedule 5.....	do.....	17, 000	.17	.19	.17
Do.....	do.....	209	Dodson North Canal, structures, schedule 6.....	do.....	6, 500	.35	.46½	.46½
Do.....	do.....	210	Dodson South Canal and laterals, schedule 1.....	do.....	3, 500	.22	.35	(1)
Do.....	do.....	210	Dodson South Canal and laterals, schedule 2.....	do.....	11, 000	.35	.....	(1)
Do.....	do.....	210	Dodson South Canal and laterals, schedule 3.....	do.....	8, 500	.35	.....	(1)
Do.....	do.....	210	Dodson South Canal and laterals, schedule 4.....	do.....	19, 500	.35	.....	(1)
Do.....	do.....	210	Dodson South Canal and laterals, schedule 5.....	do.....	15, 000	.29	.35	(1)
Do.....	do.....	210	Dodson South Canal and laterals, schedule 6.....	do.....	9, 000	.24	.35	(1)
Do.....	do.....	210	Dodson South Canal and laterals, structures, schedule 7.....	do.....	400	.75	.75	(1)
Utah, Strawberry Valley.....	May 16, 1912	214	Indian Creek and Trail Hollow Diversion Canal, structures.....	do.....	2, 200	.50	.54	.54
Do.....	do.....	215	do.....	do.....	4, 000	.28	.39	.28

EXCAVATION, CLASS 2, INDURATED MATERIAL.

Arizona-Cal fornia, Yuma.....	Oct. 12, 1911	196	Main Canal, California, schedule 1.....	Cubic yards.....	1, 000	\$0.30	\$0.35	\$0.35
Do.....	do.....	196	Main Canal, California, schedule 2.....	do.....	1, 000	.30	.35	.45
Do.....	do.....	196	Main Canal, California, schedule 3.....	do.....	1, 000	.20	.30	.20
Do.....	do.....	196	Main Canal, California, schedule 4.....	do.....	1, 000	.30	.33½	.33½
Do.....	do.....	196	Main Canal, California, schedule 5.....	do.....	1, 000	.45	.35	.35
Do.....	do.....	196	Main Canal, California, schedule 6.....	do.....	1, 000	.20	.30	.20
Colorado, Uncompahgre Valley.....	Jan. 23, 1912	201	West Canal, Colorado, schedule 2.....	do.....	2, 000	.30	.35	.35
Do.....	do.....	201	West Canal, Colorado, schedule 3.....	do.....	500	.30	.35	.35
Do.....	do.....	201	West Canal, Colorado, schedule 4.....	do.....	7, 000	.35	.40	.35
Do.....	do.....	201	West Canal, Colorado, schedule 5, tunnel portals.....	do.....	3, 000	.35	.41	.35
Do.....	do.....	201	West Canal, Colorado, schedule 6.....	do.....	4, 000	.30	.35	.35

1 All bids rejected.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 2, INDURATED MATERIAL—Continued.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Colorado, Uncompahgre Valley.	Jan. 23, 1912	201	West Canal, Colorado, schedule 7.	Cubic yards.	6,000	\$0.35	\$0.38	\$0.35
	do.	201	West Canal, Colorado, schedule 8.	do.	14,000	.35	.41	.35
	do.	201	West Canal, Colorado, schedule 9.	do.	11,000	.35	.41	.35
	do.	201	West Canal, Colorado, schedule 10.	do.	12,000	.35	.41	.35
	do.	201	West Canal, Colorado, schedule 11.	do.	3,500	.35	.41	.35
	do.	201	West Canal, Colorado, schedule 12.	do.	6,000	.35	.41	.35
Utah, Strawberry Valley	do.	191	Indian Creek and Trail Hollow Diversion Canal.	do.	2,500	.39	.50	.39
	Aug. 7, 1911	192	Pablo dams and canals, Pablo Canals.	do.	1,000	.35	.35	.35
	Aug. 25, 1911	192	Pablo dams and canals, lateral A.	do.	2,000	.30	.35	.35
	do.	193	Extension of canals, schedule 1.	do.	100	.50	.60	.50
	do.	193	Extension of canals, schedule 2.	do.	100	.50	.60	.50
	do.	193	Extension of canals, schedule 3.	do.	50	.50	.60	.50
Montana, Flathead.	do.	193	Extension of canals, schedule 4.	do.	50	.50	.60	.50
	do.	193	Extension of canals, schedule 5.	do.	50	.50	.60	.50
	do.	193	Extension of canals, schedule 6.	do.	50	.40	.50	.40
	do.	193	Extension of canals, structures, schedule 7.	do.	100	.90	1.00	.90
	do.	194	Drainage ditches, schedule 1, Ditch A.	do.	100	.40	.50	.40
	do.	194	Drainage ditches, schedule 2, Ditch B.	do.	100	.40	.50	.40
Wyoming, Shoshone.	do.	194	Drainage ditches, schedule 3, Ditch C.	do.	100	.40	.50	.40
	do.	194	Drainage ditches, schedule 4, Ditch D.	do.	100	.25	.40	.25
	do.	194	Drainage ditches, schedule 5, Ditch E.	do.	100	.25	.40	.25
	do.	194	Drainage ditches, schedule 6, Ditch F.	do.	100	.25	.40	.25
	do.	194	Drainage ditches, schedule 7, Ditch G.	do.	1,300	.40	.50	.40
	do.	194	Drainage ditches, schedule 8, Ditch H.	do.	100	.25	.40	.25
Nebraska-Wyoming, North Platte.	do.	203	Dam No. 3, Lake Minatare, outlet channel.	do.	7,000	.50	.60	.50
	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, spillway.	do.	2,000	.50	.60	.50
	do.	209	Dodson North Canal and laterals, schedule 1.	do.	100	.35	.50	.35
	May 21, 1912	209	Dodson North Canal and laterals, schedule 2.	do.	100	.35	.50	.35
	do.	209	Dodson North Canal and laterals, schedule 3.	do.	100	.35	.50	.35
	do.	209	Dodson North Canal and laterals, schedule 4.	do.	100	.35	.50	.35
Montana, Milk River.	do.	209	Dodson North Canal and laterals, schedule 5.	do.	100	.25	.35	.25
	do.	209	Dodson North Canal and laterals, schedule 6.	do.	100	.25	.35	.25
	do.	209	Dodson South Canal and laterals, schedule 1.	do.	10	.75	1.00	.75
	do.	210	Dodson South Canal and laterals, schedule 2.	do.	100	.35	.45	.35
	do.	210	Dodson South Canal and laterals, schedule 3.	do.	100	.35	—	.35
	do.	210	Dodson South Canal and laterals, schedule 4.	do.	100	.35	—	.35
Do.	do.	210	Dodson South Canal and laterals, schedule 5.	do.	100	.35	—	.35
	do.	210	Dodson South Canal and laterals, schedule 5.	do.	100	.35	.45	.35

Do.....	do.....	210	Dodson South Canal and laterals, schedule 6.....	do.....	100	.35	.....	(1)
Do.....	do.....	210	Dodson South Canal, structures, schedule 7.....	do.....	10	1.50	2.00	(1)
Utah, Strawberry Valley.....	May 16, 1912	214	Indian Creek and Trail Hollow Diversion Canal, structures.....	do.....	225	.80	1.20	1.20
Do.....	do.....	215	do.....	do.....	250	.80	.98	.80

EXCAVATION, CLASS 3, ROCK.

Utah, Strawberry Valley.....	Aug. 7, 1911	191	Indian Creek and Trail Hollow Diversion Canal.....	Cubic yards.....	2,000	\$0.80	\$0.85	\$0.80
Montana, Flathead.....	Aug. 25, 1911	192	Pablo dams and canals, lateral A.....	do.....	100	.80	1.00	.80
Do.....	do.....	192	Pablo dams and canals, lateral A.....	do.....	500	.25	.50	.75
Montana, Huntley.....	Sept. 1, 1911	193	Extensions of canals, schedule 1.....	do.....	50	.60	.65	.60
Do.....	do.....	193	Extensions of canals, schedule 2.....	do.....	7,000	.60	.70	.70
Do.....	do.....	193	Extensions of canals, schedule 3.....	do.....	1,100	.65	.70	.70
Do.....	do.....	193	Extensions of canals, schedule 4.....	do.....	50	.60	1.00	.60
Do.....	do.....	193	Extensions of canals, schedule 5.....	do.....	50	.60	1.00	.60
Do.....	do.....	193	Extensions of canals, schedule 6.....	do.....	50	.60	.80	.60
Do.....	do.....	193	Extensions of canals, structures, schedule 7.....	do.....	600	1.50	2.00	2.00
Do.....	do.....	194	Drainage ditches, Ditch A, schedule 1.....	do.....	100	.40	.50	.50
Do.....	do.....	194	Drainage ditches, Ditch B, schedule 2.....	do.....	100	.40	.50	.50
Do.....	do.....	194	Drainage ditches, Ditch C, schedule 3.....	do.....	100	.25	.40	.25
Do.....	do.....	194	Drainage ditches, Ditch D, schedule 4.....	do.....	100	.25	.40	.25
Do.....	do.....	194	Drainage ditches, Ditch E, schedule 5.....	do.....	100	.25	.40	.25
Do.....	do.....	194	Drainage ditches, Ditch F, schedule 6.....	do.....	100	.25	.40	.25
Do.....	do.....	194	Drainage ditches, Ditch G, schedule 7.....	do.....	100	.40	.50	.50
Do.....	do.....	194	Drainage ditches, Ditch H, schedule 8.....	do.....	100	.25	.40	.25
Arizona-California, Yuma.....	Oct. 12, 1911	196	Main Canal, California, schedule 1.....	do.....	1,000	.60	.75	.80
Do.....	do.....	196	Main Canal, California, schedule 2.....	do.....	1,000	.60	.75	.80
Do.....	do.....	196	Main Canal, California, schedule 3.....	do.....	1,000	.20	.40	.20
Do.....	do.....	196	Main Canal, California, schedule 4.....	do.....	1,000	.40	.55	.55
Do.....	do.....	196	Main Canal, California, schedule 5.....	do.....	1,000	.40	.55	.55
Do.....	do.....	196	Main Canal, California, schedule 6.....	do.....	1,000	.20	.40	.20
Colorado, Uncompahgre Valley.....	Jan. 23, 1912	201	West Canal, Colorado, schedule 2.....	do.....	200	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 3.....	do.....	100	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 4.....	do.....	100	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 5, tunnel portals.....	do.....	200	.45	.50	.45
Do.....	do.....	201	West Canal, Colorado, schedule 6.....	do.....	2,000	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 7.....	do.....	400	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 8.....	do.....	45	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 9.....	do.....	3,000	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 10.....	do.....	6,000	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 11.....	do.....	200	.45	.80	.45
Do.....	do.....	201	West Canal, Colorado, schedule 12.....	do.....	5,000	.45	.80	.45
Nebraska-Wyoming, North Platte.....	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, outlet channel.....	do.....	100	.50	.80	1.10
Do.....	do.....	203	Dam No. 3, Lake Minatare, spillway.....	do.....	100	.80	1.10	1.10
Do.....	do.....	203	Dam No. 3, Lake Minatare, outlet conduit (Brule clay).....	do.....	900	.75	.80	1.00

1 All bids rejected.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 3, ROCK—Continued.

State and project.	Date.	Specifi- cation number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Milk River.....	May 21, 1912	209	Dodson North Canal and laterals, schedule 1.....	Cubic yards.....	10	\$1.00	\$1.50	\$1.00
Do.....	do.....	209	Dodson North Canal and laterals, schedule 2.....	do.....	10	1.00	1.75	1.00
Do.....	do.....	209	Dodson North Canal and laterals, schedule 3.....	do.....	10	1.00	1.75	1.00
Do.....	do.....	209	Dodson North Canal and laterals, schedule 4.....	do.....	10	.30	1.00	1.00
Do.....	do.....	209	Dodson North Canal and laterals, schedule 5.....	do.....	10	.30	1.00	1.00
Do.....	do.....	209	Dodson North Canal (structures), schedule 6.....	do.....	10	1.75	2.00	1.75
Do.....	do.....	210	Dodson South Canal laterals, schedule 1.....	do.....	10	.50	1.00	(1)
Do.....	do.....	210	Dodson South Canal laterals, schedule 2.....	do.....	10	1.00	.....	(1)
Do.....	do.....	210	Dodson South Canal, laterals, schedule 3.....	do.....	10	1.00	.....	(1)
Do.....	do.....	210	Dodson South Canal, laterals, schedule 4.....	do.....	10	1.00	.....	(1)
Do.....	do.....	210	Dodson South Canal, laterals, schedule 5.....	do.....	10	1.00	.....	(1)
Do.....	do.....	210	Dodson South Canal, laterals, schedule 6.....	do.....	10	1.00	.....	(1)
Do.....	do.....	210	Dodson South Canal (structures), schedule 7.....	do.....	10	2.10	3.00	(1)
Utah, Strawberry Valley.....	May 16, 1912	214	Indian Creek and Trail Hollow Diversion Canal, structures.....	do.....	225	1.60	1.75	1.60
Do.....	do.....	215	do.....	do.....	250	1.40	1.40	1.40

EXCAVATION AND BACK FILLING, DRAINAGE TRENCHES.

State and project.	Date.	Specifi- cation number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Huntley.....	Apr. 15, 1912	207	Lines 1 to 4, 4 feet deep.....	Linear feet.....	1,400	\$0.23	\$0.50	\$0.23
Do.....	do.....	207	Lines 1 to 4, 4 to 5 feet deep.....	do.....	1,650	.25	.65	.25
Do.....	do.....	207	Lines 1 to 4, 5 to 6 feet deep.....	do.....	1,400	.27	.85	.27
Do.....	do.....	207	Lines 1 to 4, 6 to 7 feet deep.....	do.....	3,700	.33	1.10	.33
Do.....	do.....	207	Lines 1 to 4, 7 to 8 feet deep.....	do.....	100	.42	.45	.42
Do.....	do.....	207	Lines 1 to 4, 8 to 9 feet deep.....	do.....	100	.45	1.20	.45
Do.....	do.....	207	Line 5, 4 feet deep.....	do.....	100	.50	.55	(1)
Do.....	do.....	207	Line 5, 4 to 5 feet deep.....	do.....	900	.65	1.25	(1)
Do.....	do.....	207	Line 5, 5 to 6 feet deep.....	do.....	4,400	.85	1.50	(1)
Do.....	do.....	207	Line 5, 6 to 7 feet deep.....	do.....	1,500	1.05	1.25	(1)
Do.....	do.....	207	Line 5, 7 to 8 feet deep.....	do.....	1,000	1.25	1.45	(1)
Do.....	do.....	207	Line 5, 8 to 9 feet deep.....	do.....	100	1.50	1.65	(1)

FLUMES, STEEL, HAULING AND ERECTING.

Montana, Huntley.	Sept. 1, 1911	193	Extension of canals, schedule 7, structures:	Linear feet.	1,300	\$0.10	\$0.30	\$0.30
Do.	do.	193	2.54 feet top width semicircular flume.	do.	60	.15	.30	.30
Do.	do.	193	3.18 feet top width semicircular flume.	do.	60	.18	.35	.35
Do.	do.	193	5.09 feet top width semicircular flume.	do.	1,000	.20	.40	.40
Do.	do.	193	5.73 feet top width semicircular flume.	do.	65	.25	.45	.45
Do.	do.	193	7 feet top width semicircular flume.	do.	120	.25	.50	.50
Do.	do.	193	7.64 feet top width semicircular flume.	do.	160	.20	.40	.60
Montana, Milk River.	May 21, 1912	209	Dodson North Canal, schedule 6, 7.8 feet					

GATES, TURNOUT, HAULING AND SETTING.

Montana, Huntley.....	Sept. 1, 1911.....	193.....	Extension of canal, schedule 7, structures: 12-foot gate..... 18-foot gate.....	Number..... .....do.....	100 25	\$1.00	\$2.00	\$3.00
Do.....do.....	.....do.....	193.....				1.00	2.25	4.00

GRAVEL.

Nebraska-Wyoming, North Platte	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, unscreened.	Cubic yards.	14,000	\$0.45	\$0.45
Do.	do.	203	Dam No. 3, Lake Minatare, screened.	do.	11,500	.60	.60

LUMBER.

Montana, Huntley.....	Sept. 1, 1911.....	193.....	Extension of canals, schedule 7, structures.....	Feet.....	90,000.....	\$45.00.....	\$50.00.....	\$45.00.....
Nebraska-Wyoming, North Platte.....	Apr. 22, 1912.....	203.....	Dam No. 3, Lake Minatare, bracing or sheeting left in place.....	do.....	100,000.....	25.00.....	30.00.....	25.00.....
Montana, Milk River.....	May 21, 1912.....	209.....	Dodson North Canal, bridges and flumes.....	do.....	38,200.....	10.00.....	12.00.....	22.00.....
Do.....	do.....	209.....	Dodson North Canal, turnouts, checks, and drops.....	do.....	48,000.....	10.00.....	19.00.....	30.00.....

1 All bids rejected.

Unit bids and contract prices on formal specifications—Continued.

OVERHAUL.¹

State and project.	Date.	Specifi- cation number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Utah, Strawberry Valley.....	Aug. 7, 1911	191	Indian Creek and Trail Hollow Diversion Canal...	Cu. yds. per 100 ft.	8,000	\$0.02	\$0.02	\$0.02
Montana, Flathead.....	Aug. 25, 1911	192	Pablo dams and canals, North Pablo Dam.....	do.	10,000	.01½	.01½	.01½
Do.....	do.	192	Pablo dams and canals, Middle Pablo Dam.....	do.	32,000	.01½	.01½	.01½
Do.....	do.	192	Pablo dams and canals, Pablo canals.....	do.	190,000	.02	.02	.02
Do.....	do.	192	Pablo dams and canals, South Pablo Dam.....	do.	190,000	.01½	.01½	.01½
Do.....	do.	192	Pablo dams and canals, Lateral A.....	do.	15,000	.02	.02	.02
Montana, Huntley.....	Sept. 1, 1911	193	Extension of canals, schedule 1.....	do.	9,000	.02	.02	.02
Do.....	do.	193	Extension of canals, schedule 2.....	do.	3,000	.02	.02	.02
Do.....	do.	193	Extension of canals, schedule 3.....	do.	10,000	.02	.02	.02
Do.....	do.	193	Extension of canals, schedule 4.....	do.	1,000	.02	.02	.02
Do.....	do.	193	Extension of canals, schedule 5.....	do.	1,000	.02	.02	.02
Do.....	do.	193	Extension of canals, schedule 6.....	do.	1,000	.02	.02	.02
Arizona-California, Yuma.....	Oct. 12, 1911	196	Main Canal, California, schedule 1.....	do.	3,200	.02	.02	.02
Do.....	do.	196	Main Canal, California, schedule 2.....	do.	1,000	.02	.02	.02
Do.....	do.	196	Main Canal, California, schedule 3.....	do.	3,000	.02	.02	.02
Do.....	do.	196	Main Canal, California, schedule 4.....	do.	2,000	.02	.02	.02
Do.....	do.	196	Main Canal, California, schedule 5.....	do.	2,200	.02	.02	.02
Do.....	do.	196	Main Canal, California, schedule 6.....	do.	3,500	.02	.02	.02
Colorado, Uncompangre Valley.....	Jan. 23, 1912	201	West Canal, Colorado, schedule 1.....	do.	1,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 2.....	do.	1,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 3.....	do.	3,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 4.....	do.	500	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 5.....	do.	10,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 6.....	do.	5,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 7.....	do.	5,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 8.....	do.	5,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 9.....	do.	5,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 10.....	do.	3,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 11.....	do.	3,000	.02	.02	.02
Do.....	do.	201	West Canal, Colorado, schedule 12.....	do.	3,000	.02	.02	.02
Montana, Milk River.....	May 21, 1912	209	Dodson North Canal and laterals, schedule 1.....	do.	1,000	.02	.02	.02
Do.....	do.	209	Dodson North Canal and laterals, schedule 2.....	do.	31,000	.02	.02	.02
Do.....	do.	209	Dodson North Canal and laterals, schedule 3.....	do.	27,000	.02	.02	.02
Do.....	do.	209	Dodson North Canal and laterals, schedule 4.....	do.	6,200	.02	.02	.02
Do.....	do.	209	Dodson North Canal and laterals, schedule 5.....	do.	6,200	.02	.02	.02
Do.....	do.	210	Dodson South Canal, laterals, schedule 1.....	do.	2,800	.02	.02	.02
Do.....	do.	210	Dodson South Canal, laterals, schedule 2.....	do.	100	.02	.02	.02
Do.....	do.	210	Dodson South Canal, laterals, schedule 3.....	do.	1,000	.02	.02	.02
Do.....	do.	210	Dodson South Canal, laterals, schedule 4.....	do.	3,000	.02	.02	.02
Do.....	do.	210	Dodson South Canal, laterals, schedule 5.....	do.	500	.02	.02	.02
Utah, Strawberry Valley.....	May 16, 1912	214	Indian Creek and Trail Hollow Diversion, structures	do.	500	.02	.02	.02
Do.....	do.	215	do.....	do.	500	.02	.02	.02

PAVING.

Montana, Huntley.....	Sept. 1, 1911	193	Extension of canals, structures grouted.....	Square yards.....	200	\$1.00	\$2.00	\$1.00
Montana, Milk River.....	May 21, 1912	209	Dodson North Canal, schedule 6, dry paving.....	Cubic yards.....	200	2.80	3.00	2.80
Do.....	do.....	209	Dodson North Canal, schedule 6, grouted paving.....	do.....	255	2.95	3.50	2.95
Do.....	do.....	210	Dodson South Canal, laterals, grouted paving.....	do.....	28	5.00	9.00	(2) 7.20
Utah, Strawberry Valley.....	May 16, 1912	214	Indian Creek and Trail Hollow Diversion, structures.....	do.....	200	3.50	7.20	3.00
Do.....	do.....	215	do.....	do.....	225	3.00	4.00	3.00

PIPE, CONCRETE, HAULING AND LAYING.

Montana, Milk River.....	May 21, 1912	209	Dodson North Canal, schedule 6, 24-inch pipe.....	Linear feet.....	210	\$0.20	\$0.37	\$0.90
Do.....	do.....	209	Dodson North Canal, schedule 6, 30-inch pipe.....	do.....	220	.25	.50	1.10
Do.....	do.....	210	Dodson South Canal, laterals, schedule 7, 18-inch pipe.....	do.....	42	.30	1.00	(2)
Do.....	do.....	210	Dodson South Canal, laterals, schedule 7, 30-inch pipe.....	do.....	228	.50	.80	(2)

PIPE, METAL, HAULING AND PLACING.

Montana, Huntley.....	Sept. 1, 1911	193	Extension of canal, schedule 7, structures, 12-inch corrugated pipe.....	Linear feet.....	2,600	\$0.20	\$0.25	\$0.20
Do.....	do.....	193	Extension of canal, schedule 7, structures, 18-inch corrugated pipe.....	do.....	1,550	.30	.40	.30
Do.....	do.....	193	Extension of canal, schedule 7, structures, 24-inch corrugated pipe.....	do.....	300	.35	.40	.40
Do.....	do.....	193	Extension of canal, schedule 7, structures, 36-inch corrugated pipe.....	do.....	200	.50	.60	.50
Montana, Milk River.....	May 21, 1912	209	Dodson North Canal, schedule 6, structures, 14-inch cast-iron pipe.....	do.....	36	.25	.40	1.00
Do.....	do.....	209	Dodson North Canal, schedule 6, structures, 24-inch cast-iron pipe.....	do.....	24	.50	.70	1.50

PIPE, STEEL, FURNISHING AND LAYING.

Montana, Huntley.....	Sept. 1, 1911	193	Extension of canals, schedule 8, siphons, 18-inch diameter.....	Linear feet.....	115	\$1.75	\$2.50	(2)
Do.....	do.....	193	Extension of canals, schedule 8, siphons, 24-inch diameter.....	do.....	800	2.50	2.85	(2)

1 Contract price fixed by specifications.

2 All bids rejected.

Unit bids and contract prices on formal specifications—Continued.
PIPE, VITRIFIED, HAULING AND LAYING.

State and project.	Date.	Specifi- cation number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Huntley.....	Sept. 1, 1911	193	Extension of canal, schedule 7, 12-inch pipe.....	Linear feet.....	2,600	\$0.20	\$0.25	\$0.20
Do.....	do.....	193	Extension of canal, schedule 7, 18-inch pipe.....	do.....	1,350	.30	.40	.30
Do.....	do.....	193	Extension of canal, schedule 7, 24-inch pipe.....	do.....	700	.40	.60	.40
Montana, Milk River.....	May 21, 1912	209	Dodson North Canal, schedule 6, 24-inch pipe.....	do.....	210	.20	.35	.80
Do.....	do.....	209	Dodson North Canal, schedule 6, 30-inch pipe.....	do.....	220	.25	.45	1.00
Do.....	do.....	210	Dodson South Canal, schedule 7, 18-inch pipe.....	do.....	42	.30	1.00	(1)
Do.....	do.....	210	Dodson South Canal, schedule 7, 30-inch pipe.....	do.....	228	.50	.75	(1)

PREPARATION OF SURFACE.

Nebraska-Wyoming, North Platte.....	Apr. 22, 1912	203	Dam No. 3, Lake Minatare.....	Acres.....	15	\$135.00	\$140.00	\$200.00
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PUDDLING.

Montana, Huntley.....	Sept. 1, 1911	193	Extension of canals, schedule 7, structures.....	Cubic yards.....	600	\$0.50	\$1.50	\$3.00
Montana, Milk River.....	May 21, 1912	209	Dodson North Canal and laterals, schedule 6.....	do.....	750	.40	.50	.40
Do.....	do.....	210	Dodson South Canal, lateral structures.....	do.....	100	1.00	3.00	(1)

RIPRAP.

Montana, Huntley.....	Sept. 1, 1911	193	Extension of canals, schedule 7, structures.....	Cubic yards.....	150	\$3.00	\$3.50	\$6.00
Montana, Milk River.....	May 21, 1912	209	Dodson North Canal, schedule 6, structures.....	do.....	250	2.50	2.60	2.60

ROCK FILL.

Utah, Strawberry Valley.....	May 16, 1912	214	Indian Creek and Trail Hollow Diversion Canal, concrete intakes and bridges.	Cubic yards....	175	\$3.00	\$3.20	\$3.20
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SHEET PILING.

Montana, Huntley.....	Sept. 1, 1911	193	Extension of canals, schedule 7, structures.....	Feet B. M.....	20,000	\$50.00	\$55.00	\$55.00
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STAVE PIPE, FURNISHING AND PLACING.

South Dakota, Belle Fourche.....	Oct. 3, 1911	195	Wood stave pipe, siphon No. 1, 42 inches diameter..	Linear feet....	1,021	\$1.58	\$1.60	\$1.58
Do.....	do.....	195	Wood stave pipe, siphon No. 2, 42 inches diameter..	.....do.....	1,206	1.19	1.00	1.19
Do.....	do.....	195	Wood stave pipe, siphon No. 3, 30 inches diameter..	.....do.....	1,665	1.18	1.27	1.18

STEEL, REENFORCING, HANDLING, AND PLACING.

Nebraska-Wyoming, North Platte.....	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, conduit, spillway, and core walls.	Pounds.....	250,000	\$0.01	\$0.011	\$0.01
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STEEL, STRUCTURAL, HANDLING AND PLACING.

Montana, Milk River.....	May 21, 1912	209	Dodson North Canal, schedule 6	Pounds.....	7,000	\$0.01	\$0.015	\$0.02
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STRIPPING.

Montana, Flathead.....	Aug. 25, 1911	192	Pablo dams and canals, North Pablo Dam	Cubic yards....	3,000	\$0.16	\$0.17	\$0.17
Do.....	do.....	192	Pablo dams and canals, Middle Pablo Dam .....	.....do.....	400	.16	.17	.17
Do.....	do.....	192	Pablo dams and canals, South Pablo Dam .....	.....do.....	5,000	.16	.17	.17
Nebraska-Wyoming, North Platte.....	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, borrow pits .....	.....do.....	25,000	.15	.16	.26

1 All bids rejected.

Unit bids and contract prices on formal specifications—Continued.

TRENCH EXCAVATION, CLASS A, EARTH.

State and project.	Date.	Specifi- cation number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Nebraska-Wyoming, North Platte	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, cut-off trench.	Cubic yards.	104,000	\$0.28	\$0.30	1 \$0.35
Do.	.....do.....	203	Dam No. 3, Lake Minatare, drainage trench.	.....do.....	5,000	.50	.60	2 .60

TRENCH EXCAVATION, CLASS B, BRULE CLAY.

Nebraska-Wyoming, North Platte	Apr. 22, 1912	203	Dam No. 3, Lake Minatare, cut-off trench.	Cubic yards.	2,000	\$0.60	\$1.00	3 \$1.00
Do.	.....do.....	203	Dam No. 3, Lake Minatare, drainage trench.	.....do.....	100	.75	1.00	4 1.00

TUNNEL.

Colorado, Uncompahgre Valley	Jan. 23, 1912	201	West Canal, schedule 5, 6 by 7 feet, excavation class 1, timbered.	Linear feet.	1,350	\$8.00	\$9.25	\$8.00
Do.	.....do.....	201	West Canal, schedule 5, 6 by 7 feet, excavation class 2, not timbered.	.....do.....	400	9.00	10.00	9.00
Do.	.....do.....	201	West Canal, schedule 5, 6 by 7 feet, timbering in place.	M feet B. M....	32	5.50	12.00	15.00

WELLS.

Nebraska-Wyoming, North Platte	Apr. 22, 1912	203	Dam No. 3 (Lake Minatare), 12-inch diameter casing furnished by United States.	Linear feet.	600	\$0.75	\$1.00	\$0.75
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1 2 cents additional for each cubic yard-foot in excess of 10-foot depth.

2 2 cents additional for each cubic yard-foot in excess of 8-foot depth.

3 3 cents additional for each cubic yard-foot in excess of 10-foot depth.

4 3 cents additional for each cubic yard-foot in excess of 8-foot depth.

SUMMARY OF RESULTS.

Results of reclamation work from June 30, 1902, to June 30, 1912.¹

Projects.	Irrigable lands.				reservoir present available capacity.	Canals (capacity in second-feet).				Tunnels.	
	Estimated total for com- pleted project.	Area for which the service can supply water, sea- son of 1912.	Area, season of 1912.			More than 800.	From 301 to 800.	From 50 to 300.	Less than 50 (including drains).	Number.	Total length.
			Under water right applica- tions.	Under rental contracts or other arrange- ments.							
Arizona: Salt River ²	<i>Acres.</i> 240,000	<i>Acres.</i> 170,000	<i>Acres.</i>	<i>Acres.</i> 170,000	<i>Acres-feet.</i> 1,284,000	<i>Mi.</i> 32	<i>Mi.</i> 64	<i>Mi.</i> 82	<i>Mi.</i> 433	23	<i>Feet.</i> 10,980
Arizona-California: Yuma.....	131,000	16,000	6,500	9,500	.....	17	5	38	106	1	930
California: Orland.....	14,200	14,200	.....	4,200	45,600	.....	.....	23	74	.....	.....
Colorado: Grand Valley.....	53,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Uncompahgre Valley.....	140,000	32,000	.....	28,000	.....	12	15	51	105	7	34,934
Idaho: Boise.....	243,000	200,000	.....	57,959	177,600	40	57	165	740	1	487
Minidoka.....	118,700	111,600	63,000	30,700	53,500	12	32	105	464	.....	.....
SNAKE RIVER storage unit.....	.....	.....	.....	.....	380,000	.....	.....	.....	.....	.....	.....
Kansas: Garden City.....	10,677	.....	.....	.....	.....	.....	.....	2	2	.....	.....
Montana: Blackfeet (Indian) Flathead (Indian) Fort Peck (Indian).....	122,500 152,000 152,000	10,800 32,000 7,000	8,920	.....	5,000 3,900	..... .....	..... .....	50 61 17	154 201 35	..... 1 3	..... 1,703 2,654
Huntley.....	32,405	28,805	23,744	.....	.....	.....	10	19	273	.....	.....
Milk River.....	219,557	7,800	.....	350	.....	8	.....	12	27	.....	.....
Sun River.....	216,346	16,346	10,913	.....	16,700	.....	.....	18	115	1	584
Montana-North Dakota: Lower Yellowstone.....	60,116	37,609	29,542	.....	.....	.....	49	19	160	.....	.....
Nebraska-Wyoming: North Platte.....	129,270	104,511	67,167	19,211	1,027,500	90	10	65	455	3	985
Nevada: Truckee-Carson.....	206,000	43,761	30,575	14,354	200,000	42	62	80	508	4	2,840
New Mexico: Carlsbad.....	20,277	20,277	20,249	.....	65,000	.....	13	12	126	2	200
Hondo.....	10,000	.....	1,150	.....	40,000	.....	3	2	45	.....	.....
New Mexico-Texas: Rio Grande.....	155,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leasburg unit.....	.....	25,000	.....	25,000	.....	.....	6	.....	.....	.....	.....
North Dakota: Missouri River Pumping.....	.....	.....	12,239	.....	.....	.....	.....	.....	.....	.....	.....
Buford-Trenton unit.....	15,035	4,060	.....	.....	.....	.....	.....	1	14	.....	.....
Williston unit.....	11,147	8,047	.....	.....	.....	.....	.....	3	43	.....	.....
Oregon: Umatilla.....	25,000	17,252	13,781	.....	50,000	.....	25	25	106	1	34
Oregon-California: Klamath.....	72,000	30,000	26,214	1,873	662,000	9	1	42	102	1	3,300
South Dakota: Belle Fourche.....	100,000	65,852	42,479	.....	203,770	7	43	85	325	1	1,306
Utah: Strawberry Valley.....	60,000	.....	.....	.....	.....	.....	5	3	.....	5	21,993
Washington: Okanogan.....	9,900	9,900	8,137	1,700	15,000	.....	.....	12	30	1	395
Yakima—Storage unit.....	.....	.....	.....	.....	146,000	.....	.....	.....	.....	.....	.....
Sunnyside unit.....	102,824	80,075	44,594	20,725	.....	31	19	33	439	.....	.....
Tieton unit.....	34,613	34,613	20,613	.....	.....	.....	12	32	194	6	10,963
Wyoming: Shoshone.....	164,122	41,322	22,158	.....	458,100	10	14	26	214	11	19,246
Total.....	3,020,689	1,168,530	452,132	383,572	4,833,111	310	454	1,083	5,490	72	113,534

¹ Figures to the nearest whole unit.² Including Gila Indian Reservation.³ 1911.

Results of reclamation work from June 30, 1902, to June 30, 1912¹—Continued.

Projects.	Storage dams, volume.	Diversion dams, volume.	Dikes, volume.	Canal structures, costing—			Bridges.		Buildings. ²		
				Over \$2,000.	From \$500 to \$2,000.	Less than \$500.	Number.	Length.	Offices.	Residences.	Barns, store-houses, etc.
	<i>Cu. yds.</i>	<i>Cu. yds.</i>	<i>Cu. yds.</i>	No.	No.	No.		<i>Feet.</i>	No.	No.	No.
Arizona: Salt River ³	342,000	48,000	52,062	32	225	697	177	4,346	1	18	32
Arizona-California: Yuma.....		41,732	2,818,154	13	26	681	42	1,573	1	1	7
California: Orland.....	12,200	550	4,000	3	10	1,099	168	1,130	1	1	4
Colorado:											
Grand Valley.....											1
Uncompahgre Valley.....		3,200	5,423	34	36	712	38	972	5	13	19
Idaho:											
Boise.....	2,749,500	21,749		56	100	9,443	871	12,840	11	28	41
Minidoka.....	242,562		3,472	25	50	3,328	101	3,974	3	8	18
Snake River storage unit.....	71,031								1	2	
Kansas: Garden City.....				1		3	3	60		1	26
Montana:											
Blackfeet (Indian).....				3	9	832	28	631	1	1	2
Flathead (Indian).....	64,756			17	15	657	110	2,009	5	21	12
Fort Peck (Indian).....	34,000	407		7	2	3	3	98	1	5	5
Huntley.....				24	30	2,380	135	2,040	1	11	12
Milk River.....	22,776	119,500		6	3	226	27	719		6	8
St. Mary storage unit.....							8	200	2	4	4
Sun River.....	201,465		4,600	6	6	624	20	682	5	15	11
Montana-North Dakota:											
Lower Yellowstone.....		12,807	138,276	44	62	853	172	3,260	4	15	18
Nebraska-Wyoming: North											
Platte.....	264,444	80,721	138,610	30	95	4,605	112	3,598	2	6	6
Nevada: Truckee-Carson.....		35,831	70,788	70	176	1,383	141	4,560	5	15	7
New Mexico:											
Carlsbad.....	149,600	175,073	103,650	3	6	287	1	225	1	4	10
Hondo.....	421,350	3,700			10	77	11	130		1	
New Mexico-Texas:											
Rio Grande.....			4,220				3	1,116	1	88	37
Leasburg unit.....		4,196	16,815	4	3		3	150		2	2
North Dakota:											
Missouri River pump- ing—											
Buford Trenton unit.....				2	1	8	4	68	1	3	4
Williston unit.....				8	11	22	15	256	2	6	9
Oregon: Umatilla.....	793,400	7,506	8,000	13	7	556	36	1,032	1	6	6
Oregon-California: Klamath	56,600	18,650	40,300	11	9	780	103	3,680	1	6	12
South-Dakota: Belle											
Fourche.....	1,546,000	18,189		26	120	1,813	231	3,386	3	9	9
Utah: Strawberry Valley...	122,094	1,561	1,350	6	2		20	410	1	3	2
Washington:											
Okanogan.....	336,000	891		1	2	455	3	100	1	5	3
Yakima—											
Storage unit.....	312,800						7	585		3	
Sunnyside unit.....		2,291	18,000	57	7	224	36	1,650	3	17	4
Tieton unit.....		2,980	584	35	85	413	173	3,548	2	13	3
Wyoming: Shoshone.....	75,544	10,151	5,200	31	34	1,237	106	2,165	4	32	12
Total.....	7,795,346	912,961	3,553,004	568	1,142	33,398	2,908	61,193	70	369	346

¹ Figures to the nearest whole unit.² Permanent, costing over \$200.³ Including Gila Indian Reservation.

Results of reclamation work from June 30, 1902, to June 30, 1912¹—Continued.

Projects.	Roads.	Tele- phone lines.	Tele- phones in use.	Material excavated.			Riprap.	Paving.	Cement used.	Concrete.
				Class 1 (earth).	Class 2 (ind. mat'l).	Class 3 (rock).				
Arizona: Salt River ² .	157	168	82	<i>Cu. yds.</i> 3, 219, 507	<i>Cu. yds.</i> 1, 016, 261	<i>Cu. yds.</i> 589, 806	<i>Cu. yds.</i> 7, 000	<i>Sq. yds.</i> 4, 201	<i>Barrels.</i> ³ 411, 816	<i>Cu. yds.</i> 335, 141
Arizona - California:										
Yuma.....	25	141	60	7, 443, 494	370, 167	716, 019	59, 406	100, 163	103, 366	95, 558
California: Orland.....	.....	⁴ 50	7	348, 388	49, 124	2, 700	1, 200	1, 590	21, 205	19, 829
Colorado: Uncom- pahgre Valley.....	21	33	23	1, 112, 968	578, 458	363, 616	.....	.....	72, 290	78, 247
Idaho:										
Boise.....	28	210	130	9, 065, 131	1, 296, 794	346, 891	9, 680	3, 450	83, 543	59, 864
Minidoka.....	8	168	72	7, 709, 292	198, 528	413, 399	.....	88, 715	39, 692	35, 955
Snake River storage unit.....	36	70	7	116, 558	.....	6, 749	4, 037	11, 364	3, 182	3, 649
Kansas: Garden City	.....	5	4	66, 400	.....	.....	.....	.....	7, 571	5, 338
Montana:										
Blackfeet (In- dian).....	7	84	14	1, 097, 270	36, 326	68, 250	531	285	735	636
Flathead (In- dian).....	9	98	17	1, 509, 193	88, 447	21, 633	914	5, 213	4, 747	3, 746
Fort Peck (In- dian).....	.....	.....	.....	400, 000	.....	.....	.....	.....	913	936
Huntley.....	.....	23	9	1, 638, 795	22, 190	12, 600	880	220	16, 230	12, 175
Milk River.....	2	.....	6	921, 371	7, 438	4, 411	5, 707	1, 443	2, 253	1, 710
St. Mary storage unit.....	65	25	4	275, 441	4, 681	51, 078	.....	.....	.....	.....
Sun River.....	11	93	16	725, 328	23, 400	39, 711	7, 999	714	5, 239	4, 417
Montana-North Da- kota: Lower Yel- lowstone.....	11	79	29	6, 220, 243	182, 733	189, 111	18, 502	.....	27, 105	22, 055
Nebraska-Wyoming:										
North Platte.....	.....	⁴ 186	30	9, 170, 432	564, 251	200, 470	27, 592	46, 644	115, 460	93, 889
Nevada: Truckee- Carson.....	52	128	51	9, 099, 295	255, 332	462, 305	16, 555	43, 987	68, 064	50, 746
New Mexico:										
Carlsbad.....	25	.....	.....	529, 460	20, 880	78, 285	57, 090	.....	17, 345	17, 481
Hondo.....	.....	14	5	779, 990	3, 000	35, 590	86, 360	.....	2, 805	3, 810
New Mexico-Texas:										
Rio Grande.....	19	12	31	65, 321	41, 620	281, 313	.....	.....	10, 459	9, 441
Leasburg unit.....	6	6	2	302, 082	1, 300	570	520	.....	2, 960	2, 966
North Dakota:										
Missouri River pumping— B u f f o r d - Trenton unit	.....	29	2	69, 600	50	.....	.....	240	2, 599	1, 654
Williston unit.....	.....	4	5	219, 100	16	.....	.....	990	3, 329	2, 632
Oregon: Umatilla.....	7	.....	15	2, 250, 000	108, 000	42, 200	34, 500	4, 200	30, 000	19, 550
Oregon - California:										
Klamath.....	6	66	40	1, 991, 256	300, 594	104, 724	7, 894	5, 603	22, 550	17, 165
South Dakota: Belle Fourche.....	.....	71	29	6, 272, 200	133, 380	42, 120	1, 620	67, 690	67, 263	51, 743
Utah: Strawberry Valley.....	39	35	11	454, 000	34, 718	105, 000	7, 400	3, 171	32, 677	30, 536
Washington:										
Okanagan.....	2	25	15	636, 000	96, 750	50, 000	1, 050	925	3, 840	3, 332
Yakima— Storage unit.	46	52	16	658, 760	31, 360	706	12, 370	11, 784	13, 686	10, 024
Sunnyside unit.....	.....	124	40	2, 674, 540	48, 251	46, 767	.....	8, 230	18, 540	17, 690
Tieton unit.....	30	59	47	759, 636	470, 374	257, 570	5, 423	19, 087	36, 708	24, 562
Wyoming: Shoshone	47	60	19	1, 989, 763	52, 642	312, 808	3, 177	10, 031	141, 383	121, 039
Total.....	659	2, 118	838	79, 790, 814	6, 037, 065	4, 846, 402	377, 407	439, 940	1, 389, 555	1, 157, 507

¹ Figures to the nearest whole unit.² Including Gila Indian Reservation.³ Includes 338,452 barrels manufactured by United States at Roosevelt Dam.⁴ Leased lines.

Summary of operation and maintenance results for the year 1911.¹

Projects.	Area irrigated.		Farms irrigated.	Water-right applications. ²	Area for which the service was prepared to supply water.	Canals operated.	Cost of operation.	
	Under water-right applications.	Under rental contracts, etc.					Total.	Per acre of land irrigated.
	<i>Acres.</i>	<i>Acres.</i>	<i>No.</i>	<i>No.</i>	<i>Acres.</i>	<i>Miles.</i>		
Arizona: Salt River.....	115,514		2,310		160,000	534	\$87,160	\$0.75
Arizona-California: Yuma.....	1,720	6,850	447	173	16,500	92	37,187	4.33
California: Orland.....		2,663	188		14,000	64	4,050	1.52
Colorado: Uncompahgre Valley.....		25,350	508		30,000	131	9,538	.45
Idaho:								
Boise.....		45,575	1,223		120,000	624	30,164	.66
Minidoka.....	48,615	22,220	1,406	1,022	115,000	315	42,865	.60
Montana:								
Flathead.....		2,370	40		19,000	46	3,000	1.27
Huntley.....	12,000		415	498	28,805	175	5,062	.42
Milk River.....		2,070	29		7,800	30	2,521	1.21
Sun River.....	6,831	61	171	194	16,346	177	4,463	.65
Montana-North Dakota: Lower Yellowstone.....	15,443		230	163	37,609	195	9,115	.59
Nebraska-Wyoming: North Platte.....	43,578	5,833	820	881	96,898	579	52,767	1.07
Nevada: Truckee-Carson.....	29,712	427	469	467	90,703	292	18,565	.61
New Mexico:								
Carlsbad.....	14,803		336	495	20,267	45	8,524	.58
Hondo.....		1,135	20			12	2,779	2.45
New Mexico-Texas: Rio Grande, Leasburg unit.....		22,265	885			6	5,303	3.20
North Dakota, Missouri River Pumping:								
Burlford-Trenton unit.....	1,163		21	27	4,050	13	10,935	9.40
Williston unit.....	2,426		77	142	8,189	37	20,280	8.34
Oregon: Umatilla.....	3,404	111	242	452	17,252	112	12,331	3.52
Oregon-California: Klamath.....	23,869		366	424	30,000	132	7,956	.33
South Dakota: Belle Fourche.....	19,786	24	350	436	47,542	295	15,530	.79
Washington:								
Okanogan.....	6,218	249	339	414	9,501	41	7,856	1.21
Yakima—								
Sunnyside unit.....	17,560	41,440	2,221	2,945	71,756	500	26,530	.45
Tieton unit.....	7,115	65	273	438	19,378	166	12,660	1.76
Wyoming: Shoshone.....	16,216		322	357	34,898	240	12,417	.76
Total.....	270,459	294,222	13,708	9,528	1,015,494	4,853	449,558	4.80

Projects.	Cost of maintenance.		Estimated value of crops.			Population on farms.	Water delivered to land.		Years operated by service.
	Total.	Per acre of land irrigated.	Total.	Per acre of land irrigated.	Per acre of land cropped.		Total.	Per acre of land irrigated.	
							<i>Acres-ft.</i>	<i>Acres-ft.</i>	<i>No.</i>
Arizona: Salt River.....	\$115,514	\$1.00	\$2,775,000	\$24		18,250	551,313	4.8	5
Arizona-California:									
Yuma.....	38,388	4.47	444,684	52	\$59	3,000	54,347	6.3	4
California: Orland.....	2,797	1.05	60,220	23	25	482	10,355	3.9	2
Colorado: Uncompahgre Valley.....	37,509	1.79	1,360,910	65		2,032	98,822	4.7	4
Idaho:									
Boise.....	32,521	.71	729,200	16	20	5,000	81,738	1.8	5
Minidoka.....	37,586	.53	640,995	9	13	5,800	327,090	4.6	5
Montana:									
Flathead.....	1,720	.73	34,783	15		188	4,710	2.0	2
Huntley.....	27,263	2.27	316,758	26		1,353	22,550	1.9	4
Milk River.....	4,751	2.29	26,067	13		84	2,853	1.4	1
Sun River.....	3,593	.52	102,816	15		732	11,380	1.7	3

¹ See text for additional data or explanations.² Accepted under public notices.³ Operation and maintenance 6-mile canal only.⁴ Average.

Summary of operation and maintenance results for the year 1911—Continued.

Projects.	Cost of main-tenance.		Estimated value of crops.			Popu-lation on farms.	Water delivered to land.		Year oper-ated by serv-ice.
	Total.	Per acre of land irri-gated.	Total.	Per acre of land irri-gated.	Per acre of land cropped.		Total.	Per acre of land irri-gated.	
Montana - North Dakota: Lower Yellow-stone.....	55,096	3.57	178,067	12	14	2,000	<i>Acre-ft.</i> 21,799	<i>Acre-ft.</i> 1.4	<i>No.</i> 3
Nebraska-Wyoming: North Platte.....	66,944	1.35	446,900	9	13	2,400	232,139	4.7	6
Nevada: Truckee-Carson.....	20,375	.68	470,827	16	23	1,591	143,746	4.5	6
New Mexico: Carlsbad.....	16,172	1.09	257,754	17	21	900	38,180	2.6	6
Hondo.....	2,723	2.40	15,872	14	.....	65	1,050	0.9	4
New Mexico-Texas: Rio Grande, Leasburg unit.....	1 1,407	1.05½	721,550	28	.....	2 2,600	3 152,626	3 5.9	4
North Dakota, Missouri River Pumping: Buford-Trenton unit.....	767	.66	16,236	14	16	25	1,472	1.3	4
Williston Unit.....	3,314	1.36	35,000	14	16	136	2,952	1.2	4
Oregon: Umatilla.....	18,207	5.20	58,795	17	21	575	34,100	9.7	4
Oregon-California: Klamath.....	13,025	.55	338,212	14	18	1,175	29,449	1.2	5
South Dakota: Belle Fourche.....	28,033	1.41	161,955	8	9	1,800	32,400	1.6	4
Washington: Okanogan.....	9,750	1.50	59,871	9	25	1,050	6,119	0.9	45
Yakima—Sunnyside unit.....	58,528	.99	3,537,258	60	88	16,000	168,324	2.8	46
Tieton unit.....	4,496	.63	206,519	29	41	1,000	13,733	1.9	43
Wyoming: Shoshone.....	8,201	.50	124,975	8	12	1,400	35,786	2.2	4
Total.....	608,680	5 1.08	13,121,224	5 23	28	60,638	2,079,033	5 3.7	.....

¹ Operation and maintenance 6-mile canal only.

² Estimated.

³ At lateral head gates.

⁴ Includes years during which water was served on rental basis.

⁵ Average.

RECLAMATION ORGANIZATION.

GENERAL OFFICERS.

Hon. Walter Lowrie Fisher, Secretary of the Interior.

Brig. Gen. William L. Marshall, United States Army, retired, consulting engineer to the Secretary of the Interior.

Frederick Haynes Newell, Director of the Reclamation Service, Washington, D. C.

Arthur Powell Davis, chief engineer, Washington, D. C.

Philip P. Wells, chief law officer, Washington, D. C.

Morris Bien, supervising engineer, in charge of land and legal division, Washington, D. C.

O. H. Ensign, chief electrical engineer, 605 Federal Building, Los Angeles, Cal.

D. W. Murphy, engineer in charge of drainage, 602 Federal Building, Los Angeles, Cal.

D. C. Henny, consulting engineer, 1005 Spalding Building, Portland, Oreg.

A. J. Wiley, consulting engineer, Boise, Idaho.

W. H. Sanders, consulting engineer, 915 Grand View Avenue, Los Angeles, Cal.

J. H. Quinton, consulting engineer, 605 Wright and Callender Building, Los Angeles, Cal.

W. W. Follett, consulting engineer, International (Water) Boundary Commission, consultation on Rio Grande, El Paso, Tex.

S. W. Dick, transportation agent, 777 Federal Building, Chicago, Ill.

C. J. Blanchard, statistician, Washington, D. C.

E. C. Bebb, engineer, Washington, D. C.

J. Y. Jewett, cement expert, 408 Commonwealth Building, Denver, Colo.

E. G. Paul, chief clerk, Washington, D. C.

V. G. Croissant, accountant, Washington, D. C.

C. G. Duganne, fiscal agent, Washington, D. C.

SOUTHERN DIVISION.

ARIZONA, NEW MEXICO, TEXAS, UTAH, CALIFORNIA.

L. C. Hill, supervising engineer, 307 Wright & Callender Building, Los Angeles, Cal.; C. S. Witbeck, examiner; L. M. Lawson, assistant engineer; S. B. Taggart, chief clerk.

Salt River project.—C. H. Fitch, project engineer, Phoenix, Ariz.; Jay D. Stannard and W. A. Farish, engineers; H. S. Reed, engineer, operation and maintenance of canals; W. P. Marine, chief clerk; H. E. Edington, fiscal agent.

Yuma project.—F. L. Sellow, project engineer, Yuma, Ariz.; A. N. Kelley, chief clerk; F. S. Cundiff, fiscal agent.

New Mexico projects.—W. M. Reed, district engineer, El Paso, Tex.; P. W. Dent, examiner; W. H. Frankland, chief clerk.

Carlsbad project.—L. E. Foster, assistant engineer, in charge of operation and maintenance, Carlsbad, M. Mex.; Jay Brown, fiscal agent.

Hondo project.—C. A. May, junior clerk, in charge of operation and maintenance, Carlsbad, N. Mex.

Rio-Grande project.—H. J. Gault, construction engineer; L. D. Fauntleroy, superintendent of construction; John J. Buck, principal clerk; J. C. Gawler and D. K. Clint, fiscal agents, Elephant Butte, Sierra County, N. Mex.; Frank Teichman and J. A. French, engineers, El Paso, Tex.

Leasburg unit.—Earl Patterson, junior engineer, in charge of operation and maintenance, Selden, Dona Ana County, N. Mex.

Strauberry Valley project.—J. L. Lytle, project engineer, Provo, Utah; A. J. Hughes, chief clerk; J. L. Segall, fiscal agent.

PACIFIC DIVISION.

CALIFORNIA, OREGON, NEVADA.

E. G. Hopson, supervising engineer, 202 Central Building, Portland, Oreg.; L. W. Hall, engineer; O. P. Morton and E. S. Taylor, examiners.

Orland project.—A. N. Burch, irrigation manager, Orland, Cal.; C. H. Lillingston, chief clerk and fiscal agent.

Truckee-Carson project.—D. W. Cole, project engineer, Fallon, Nev.; H. W. Marean, superintendent of irrigation; J. R. Post, chief clerk; F. G. Hough and G. W. Brown, fiscal agents.

Lahontan Dam.—F. H. Tillinghast, assistant engineer, Hazen, Nev.; L. G. Maney, superintendent of construction; H. N. Bickel, principal clerk.

Umatilla project.—H. D. Newell, project engineer, Hermiston, Oreg.; J. M. Griffin, superintendent of irrigation; C. W. Kellogg, chief clerk and fiscal agent.

Klamath project.—W. W. Patch, project engineer, Klamath Falls, Oreg.; William Sargent, engineer; C. C. Hogue, chief clerk and fiscal agent.

NORTHERN DIVISION.

MONTANA, NORTH DAKOTA, WYOMING.

H. N. Savage, supervising engineer, Helena, Mont.; R. O. Hayt and George E. Stratton, engineers; W. J. Egleston, examiner; E. E. Roddis, assistant examiner.

Blackfeet project.—R. M. Snell, project engineer, Browning, Mont.; C. E. Frisbee, chief clerk; H. W. Bruen, fiscal agent.

Plathead project.—E. F. Tabor, project engineer, St. Ignatius, Mont.; C. J. Moody, Engineer; C. W. Donnelly, chief clerk; W. H. Meglsson and R. M. Reid, fiscal agents.

Fort Peck project.—Ralph M. Conner, project engineer, Ronan, Mont.; Frank Nivens, chief clerk and fiscal agent, Fort Shaw, Mont.

Huntley project.—R. H. Fifield, acting project engineer, Huntley, Mont.; E. B. LeClaire, chief clerk and fiscal agent.

Milk River project.—G. O. Sanford, project engineer, Malta, Mont.; E. G. Lee, chief clerk; W. S. Arthur, fiscal agent.

St. Marys storage unit.—Joseph Wright, engineer, Babb, Mont.; R. M. Snell, engineer, Browning, Mont.; C. E. Frisbee, chief clerk.

Sun River project.—Judson B. Bond, project engineer, Fort Shaw, Mont.; Frank Nivens, chief clerk and fiscal agent.

Missouri River pumping project.—L. E. Hill, acting project engineer, Williston, N. Dak.; W. S. Arthur, chief clerk and fiscal agent, Malta, Mont.

Lower Yellowstone project.—Lester H. Mitchell, acting project engineer, Savage, Mont.; F. J. Israel, chief clerk and fiscal agent.

Shoshone project.—C. P. Williams, project engineer, Powell, Wyo.; C. M. Jump, superintendent of irrigation; C. A. Peavy, chief clerk; T. W. Hause, fiscal agent.

Shoshone Dam.—V. W. Russell, assistant engineer, Cody, Wyo.

CENTRAL DIVISION.

COLORADO, KANSAS, OKLAHOMA, SOUTH DAKOTA, NEBRASKA, WYOMING.

R. F. Walter, supervising engineer, 519 Commonwealth Building, Denver, Colo.; Ernest McCulloch and W. H. Helleman, engineers; A. R. Honnold, examiner; J. A. Dolphin, chief clerk and fiscal agent.

Grand Valley project.—J. H. Miner, project engineer, Grand Junction, Colo.; E. R. Mills, chief clerk.

Uncompahgre Valley project.—C. T. Pease, project engineer, Montrose, Colo.; J. R. Alexander, examiner; J. M. Luney, chief clerk; E. R. Furstenfeld, fiscal agent.

North Platte project.—Andrew Weiss, project engineer, Mitchell, Nebr.; O. T. Reedy, engineer; Fred D. Pyle, irrigation manager; O. P. Burrows, chief clerk; Mike T. Murray and J. R. Ummel, fiscal agents.

Pathfinder Dam.—H. D. Comstock, assistant engineer, Alcova, Wyo.

Belle Fourche project.—F. C. Magruder, project engineer, Newell, S. Dak.; T. E. Jones, fiscal agent.

IDAHO DIVISION.

IDAHO, OREGON, WYOMING.

F. E. Weymouth, supervising engineer, Boise, Idaho; B. E. Stoutemyer examiner; F. L. Cavis, chief clerk; S. E. Hedden, fiscal agent.

Boise project.—G. H. Bliss, engineer, operation and maintenance, Boise, Idaho.

Boise River storage unit.—C. H. Paul, engineer, Boise, Idaho; F. T. Crowe, engineer; James Munn, superintendent of construction; R. R. Clawson, fiscal agent.

Minidoka project.—P. M. Fogg, project engineer, Rupert, Idaho; Barry Dibble, engineer; C. A. Lyman, chief clerk; N. K. Jensen, fiscal agent.

WASHINGTON DIVISION.

WASHINGTON.

C. H. Swigart, supervising engineer, North Yakima, Wash.; E. W. Burr and N. K. Buck, examiners.

Okanogan project.—Calvin Casteel, project manager, Okanogan, Wash.; H. A. Yates, chief clerk and fiscal agent.

Yakima project: Storage unit.—E. H. Baldwin, project engineer, Easton, Wash.; T. E. Brick, chief clerk; G. E. Ross, fiscal agent.

Yakima project: Sunnyside unit.—R. K. Tiffany, project manager, Sunnyside, Wash.; A. H. Gullickson, assistant manager; E. M. Philebaum, chief clerk and fiscal agent.

Yakima project: Tieton unit.—C. E. Crownover, project manager, Naches, Wash.; R. H. Cunningham, chief clerk and fiscal agent.

EMPLOYEES.

Force employed June, 1912.

Project.	Government employees.				Contractors' force.	Grand total.
	Classified.	Registered.	Others.	Total.		
Arizona, Salt River.....	20	85	594	699	-----	699
Arizona-California, Yuma.....	11	66	527	604	-----	604
California, Orland.....	5	8	9	22	-----	22
Colorado:						
Grand Valley.....	6	2	3	11	-----	11
Uncompaggre Valley.....	13	52	150	215	80	295
Idaho:						
Boise.....	42	241	458	741	150	891
Minidoka.....	14	119	306	439	-----	439
Montana:						
Blackfeet.....	8	22	625	655	-----	655
Flathead.....	10	19	41	70	80	150
Fort Peck.....			1	1	-----	1
Huntley.....	6	16	51	73	49	122
Milk River.....	16	19	51	86	7	93
Sun River.....	13	21	30	64	-----	64
Montana-North Dakota, Lower Yellowstone.....	5	20	51	76	-----	76
Nebraska-Wyoming, North Platte.....	19	105	125	249	95	344
Nevada, Truckee-Carson.....	15	51	244	310	-----	310
New Mexico:						
Carlsbad.....	4	9	50	63	-----	63
Hondo.....	1	-----	1	2	-----	2
New Mexico-Texas, Rio Grande.....	46	32	407	485	-----	485
North Dakota, Missouri River Pumping.....	2	28	9	39	-----	39
Oregon, Umatilla.....	6	21	35	62	-----	62
Oregon-California, Klamath.....	10	15	32	57	-----	57
South Dakota, Belle Fourche.....	4	36	80	120	10	130
Utah, Strawberry Valley.....	14	68	391	473	141	614
Washington:						
Okanogan.....	2	10	10	22	-----	22
Yakima storage unit.....	7	70	280	357	-----	357
Sunnyside unit.....	14	34	22	70	-----	70
Tieton unit.....	14	21	30	65	14	79
Wyoming, Shoshone.....	13	38	117	168	-----	168
Washington office.....	75	-----	5	80	-----	80
Chicago offices.....	15	-----	-----	15	-----	15
Denver offices.....	6	4	1	11	-----	11
Los Angeles offices.....	8	-----	3	11	-----	11
Other field offices.....	50	3	-----	53	-----	53
Total.....	494	1,235	4,739	6,468	626	7,094

INJURIES TO EMPLOYEES.

Injuries to employees of Reclamation Service.

	1908 ¹	1909	1910	1911
Total classified and unclassified employees (average).....	4,245	4,799	5,208	6,189
Number of injuries reported.....	62	173	202	328
Rate per 1,000 total employees.....	-----	36.0	38.8	52.9
Number of claims allowed.....	32	97	101	129
Per cent of total injuries.....	51.6	56.1	50.0	39.3
Rate per 1,000 total employees.....	-----	20.2	19.4	20.8
Compensation paid.....	\$9,711.39	\$19,587.98	\$22,570.40	\$15,861.39
Average compensation.....	\$303.48	\$201.94	\$223.55	\$122.96

¹ From May 30 to Dec. 31, 1908.

INJURIES.

Project.	Injuries reported.				Claims allowed.				Compensation paid.				
	1908 ¹	1909	1910	1911	1908	1909	1910	1911	1908	1909	1910	1911	Total.
Salt River.....	9	15	9	11	5	11	6	8	\$2,322.25	\$4,085.00	\$1,547.00	\$3,508.25	\$11,462.50
Yuma.....	18	7	43	46	9	4	20	27	2,180.80	191.38	1,843.34	2,142.68	6,358.20
Orland.....	1	1	1	0	1	0	0	0	613.00				613.00
Klamath.....	1	7	0	2	1	5	0	0	78.00	1,378.81			1,456.81
Uncompahgre.....	3	40	28	11	1	29	21	6	30.00	5,492.24	10,993.49	1,030.47	17,546.20
Minidoka.....	0	7	10	5	0	5	9	6		854.85	1,706.70	774.35	3,335.90
Boise.....	0	6	11	66	0	6	6	10		991.63	549.63	813.82	2,355.08
Snake River storage.....	0	1	11	16	0	1	9	4		859.50	638.62	1,187.94	2,686.06
Garden City.....	0	3	0	0	0	1	0	0		77.46			77.46
Blackfeet.....	0	5	3	3	0	2	1	2		282.50	56.00	579.15	917.65
Flathead.....	0	2	5	14	0	1	3	5		110.50	555.50	308.88	954.88
Fort Peck.....	0	0	0	2	0	0	0	0					
Huntley.....	0	2	0	0	0	0	0	0					
Milk River.....	0	6	6	0	0	5	3	0		730.10	643.39		1,373.49
St. Mary storage.....	0	0	0	2	0	0	1	0					
Sun River.....	0	1	1	0	0	1	1	0		209.44	399.28		608.72
Lower Yellowstone.....	2	20	3	0	2	8	1	0		1,277.91	733.00		3,077.35
North Platte.....	1	3	7	8	0	3	3	7		320.28	735.60		2,406.28
Truckee-Carson.....	0	0	0	7	0	0	0	3					48.00
Rio Grande.....	2	1	0	54	1	0	0	20		23.44			684.65
Missouri River Pumping.....	6	2	5	1	1	1	2	1		199.99	123.51		353.50
Belle Fourche.....	3	0	1	4	1	0	1	3		30.00	118.00		1,066.32
Strawberry Valley.....	3	15	14	33	0	1	4	12		1,090.50	566.79		2,379.29
Okanogan.....	1	3	0	0	1	2	0	0		270.00			360.75
Yakima.....	11	24	36	39	8	8	9	13		1,143.20	1,255.20		6,986.57
Shoshone.....	1	2	8	4	1	2	2	2		178.50	134.35		631.50
Total.....	62	173	202	328	32	97	101	129	9,711.39	19,587.98	22,579.40	15,861.39	67,740.16

¹ From May 30 to Dec. 31, 1908.

STORAGE.

Record of storage in reservoirs, January-June, 1912.

Project.	Reservoir.	Capacity (acre-feet).	Storage (acre-feet).		
			Jan. 1.	Apr. 1.	July 1.
Arizona, Salt River.....	Roosevelt.....	1,284,000	445,247	547,975	601,263
California, Orland.....	East Park.....	45,600	16,900	21,700	24,000
Idaho:					
Boise.....	Deer Flat.....	177,600	11,096	44,951	83,283
Minidoka.....	Jackson Lake.....	380,000			380,000
Do.....	Lake Walcott.....	150,000	108,000	108,000	125,000
Montana:					
Flathead.....	Ninepipe.....	15,100	1,200	1,300	2,710
Sun River.....	Willow Creek.....	¹ 16,700	5,500	5,500	11,000
Nebraska-Wyoming, North Platte.....	Pathfinder.....	1,025,000		57,000	974,000
Nevada, Truckee-Carson.....	Lake Tahoe.....	750,000	124,000	80,000	205,000
New Mexico, Carlsbad.....	McMillan.....	65,000	25,000	43,000	55,000
Do.....	Avalon.....	7,000	300	(²)	(²)
Oregon, Umatilla.....	Cold Springs.....	50,000	18,500	47,000	46,000
Oregon-California, Klamath.....	Upper Klamath Lake.....	200,000	71,500	117,000	91,000
Do.....	Clear Lake.....	462,000	219,100	239,400	247,000
South Dakota, Belle Fourche.....	Belle Fourche.....	203,770	38,000	80,000	69,000
Washington, Okanogan.....	Salmon Lake.....	2,000		500	1,750
Do.....	Conconully.....	13,000	1,200	2,050	7,375
Washington, Yakima.....	Bumping Lake.....	34,000	1,020	922	32,840
Do.....	Lake Kachess.....	210,000	92,000	69,950	106,480
Do.....	Lake Clealum.....	¹ 27,000	24,700	26,180	26,540
Do.....	Lake Keechelus.....	¹ 17,000	16,525	16,600	16,825
Wyoming, Shoshone.....	Shoshone.....	456,000			282,000

¹ Working capacity.² Repairs being made to spillway.

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