EXHIBIT 37

Letter of Transmittal to W.S. Post, Director of Irrigation,
Bureau of Indian Affairs, from W.F. Gettelman

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UNITED STATES
DEPARTMENT OF THE INTERIOR
INDIAN IRRIGATION SERVICE
SUPERVISING ENGINEER

Atlas Building
Salt Lake City, Utah
December 1, 1931

Major W. S. Post, Director of Irrigation
Bureau of Indian Affairs
Department of the Interior
Washington, D. C.

Through: L. M. Holt, Supervising Engineer
H. V. Clotts, Assistant Director

Dear Sir:

In accordance with orders received from H. V. Clotts, Assistant Director of Irrigation, the writer proceeded to the Walker River Indian Irrigation Project at Schurz, Nevada, for the purpose of outlining the necessary work to complete the project along the lines advised by Ralph S. Bristol, the representative of the Extension Division of the Indian Service, providing continuance of the project was found to be feasible or desirable.

The results of the study and the conclusions reached are herewith submitted.

Respectfully,

W. F. Gettelman

W. F. Gettelman
Assistant Engineer.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF INDIAN AFFAIRS
FIELD SERVICE

423 Clift Bldg.,
Salt Lake City, Utah
December 1, 1931

Major W. S. Post,
Director of Irrigation,
Department of the Interior,
Bureau of Indian Affairs,
Washington, D. C.

Sir:

In accordance with instructions received from Mr. A. C. Cooley, Director of Extension and Industry, upon the request of Major W. S. Post, Director of Irrigation, the writer proceeded to the Walker River Indian Irrigation Project, at Schurz, Nevada, for the purpose of making a study of the economic and crop production possibilities of this Project. This study was made in cooperation with Mr. W. F. Gettelman, Assistant Engineer of the U. S. Indian Irrigation Service.

This portion of the report is a compilation of data as secured through the Superintendent and Resident Engineer of the Walker River Indian Reservation, by personal visits with Indians and the observations of the writer.

The results of the study and the conclusions that were reached are herewith respectfully submitted.

Very truly yours,

R. S. Bristol

R. S. Bristol
Associate Extension Agronomist

C- Comm'r.

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Walker River Reservation

JOINT RECOMMENDATIONS AND SUGGESTIONS

After a careful study of all available information regarding the Walker River Reservation and Irrigation Projects, we wish to submit the following recommendations and suggestions:

1. That the suit for the adjudication of the water rights on the Walker River be pushed to a conclusion as speedily as possible.

2. If the decision is unfavorable to the Indians of the Walker River project, it appears that the most advisable procedure would be to abandon the project and realize what is possible by the sale of the lands.

3. In the event of a favorable court decision, we feel justified to recommend that, because of the lower ultimate cost per acre, the Weber Dam and Equalizer, or a project of similar cost is advisable.

4. With the completion of the Weber Equalizer and other construction, we recommend that funds be made available for the construction of a community pasture on the shores of Walker Lake, as outlined in the body of this report.

5. If the above recommended construction is decided upon, that immediate steps be taken to clear up the status of the lands that are in heirship at the present time, and arrangements be made to finance other Indians to purchase this land.

6. That sufficient money be made available for careful and thorough control work on the noxious weeds present on this reservation. The present area is so small and the danger of spreading so menacing that immediate action is urged.

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Respectfully submitted.

W. F. Gettelman

W. F. Gettelman
Assistant Engineer

R. S. Bristol

R. S. Bristol
Associate Extension Agronomist

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WALKER RIVER INDIAN RESERVATION

Total number of Indians carried on rolls	535
Number of families represented (estimated)	160
*Number of Indian families actually farming in 1931	68 62
Number of Whites on reservation (not including Government employees, traders and state employees)	0
Number of white farmers	0

* Note - The balance of the families are living in the colony at Yerington, or scattered in other localities. Includes 7 patent in fee Indian owners -

ALLOCATION OF LANDS ON RESERVATION

Alloted lands	9,934 Acres
Patent in Fee (6) White owned (2)	146 "
Agency and school	80 "
Cemetery	40 "
Timber or Forest Reserve	3,360 "
Grazing land	125,880 " 140,524
Total area of Reservation	139,420 " 154,084
Land classified as farmed in 1931	1,425 "
Land actually farmed and productive in 1931	986 "
Average number acres per farmer	20.9 "
Total allotments that have been made (20 acres each 504 or	10,080 "
Total area that has been farmed at some time (estimate only)	2,000 "
Largest number acres farmed in any one season	1,860 "

(A brief history of the project and its location is contained in the engineering report prepared by Mr. Gettelman.)

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LIVESTOCK INVENTORY

	Number	Value per head	Total
Beef cattle	158	30.00	$4,740.00
Dairy cattle	76	125.00 110.00	9,500.00 8360.00
Sheep	None		
Swine	46 16	10.00 16.00	460.00 256.00
Chickens	1000 656	.75 .90	750.00 600.00
Turkeys	2341 x 3000	3.00 3.30	7,023.00 9,900.00
Horses	145 x	60.00	8,700.00
			$31,173.00 32,556.00

FARM EQUIPMENT INVENTORY

The average Indian farmer has one walking plow, one mowing machine, one hay rake, one wagon with box and hay rack, one spike tooth harrow and one set of work harness. In addition there are 17 cultivators and a few fresno scrapers owned by individual Indians. Through tribal funds, a grain drill, binder, thresher, tractor and power hay baler have been purchased and belong to the Indians at large. The Agency owns 3 spring tooth harrows and 2 disc harrows which are loaned to Indians when not in use on the Agency farm.

Most of the Indian families are living in small frame houses. Some outbuildings, which often consist of mere sheds, are included in home equipment. No attempt was made to evaluate or list buildings or personal property including automobiles. Some kind of an automobile is owned by practically all of the families living on the Reservation.

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Crops AND FINANCIAL STATEMENT - Average year

	Area Acres	Total Yield	Yield per A	Unit Value	Acre Value	Inventory Total Value
Alfalfa	798	1851 Tons	2.3 Tons	10.00	23.00	$18,510.00
Grains Wheat Barley	445	6250 bu.	14 bu.	.75	10.50	4,687.00
Potatoes	17	55000#	3200#	1.87-cwt.	59.84	1,000.00
Gardens	23				100.00	2,300.00
Orchards	2.75					375.00
Tame grass Pastures	141				2.00	282.00
Total Crops Inventory						$27,154.00

Estimated Cash Income

Crops	$12,000.00		
Outside Labor	3,937.00	$ 3,937.00	
Pine Nuts	1,000.00	1,000.00	
Basketry	3,250.00	3,250.00	
Beef cattle	2,000.00	4,740.00	
Dairy cattle	2,000.00	9,500.00	8360.00
Swine		460.00	256.00
Chickens		750.00	600.00
Turkeys	6,000.00	7,023.00	9900.00
Horses		8,700.00	
Total Inventory		$66,514.00	67897.00
Estimated Cash Income	$30,187.00		

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Total Inventory (brought forward)		$66,514.00 67,897.
Estimated Cash Income " "	$30,187.00	

Estimated 272 people dependent on above amounts

Estimated cash income per individual	$110.98
Estimated cash income per family	443.92
Estimated cash income per acre	21.25

This does not include value of food produced and consumed on farms or feed used by livestock.

Note - The above figures are necessarily estimates, but are felt to be indicative of conditions on the Walker River Reservation, and represent a fair average for the past 3 years. It is impossible to arrive at figures showing the sales of different products and it was necessary to estimate the amount of hay and grain fed and thus arrive at a figure representing the cash income, from crops produced. Sales of livestock also had to be estimated.

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Soils and Soil Conditions

Several years ago Mr. A. T. Strahorne made a soil survey of the lower part of the Walker River Indian Irrigation project, including roughly 7,000 or 8,000 acres of land. The upper part of the project, known as Campbell Valley, which is located directly below the Rio Vista Reservoir site has had nothing done in the line of a soil survey, except a check on the alkali content which shows no injurious amounts of alkali.

The soils on this project are known as the Walker Lake series and generally vary from a black adobe to sandy loam and in some places a "blow" or beach sand. Some of the project is included in the Walker River flood plain and therefore the soils are alluvial in nature. Very little of the black adobe is near or on the surface, as it generally underlies the sandy loam or sand. Test borings have been made to 70 feet and generally the same type of soil exists to this depth. There is a very small amount of impervious sub-soil, but it appears that there will be no difficulty in farming any of the land containing this impervious layer. It therefore appears that the soils in general are adapted for general farming and will not require the extreme care which is necessary with the heavier types.

The water table, according to the best available information, ranges from 6 feet to 26 feet in depth and has been stationery for some years. If there is any change it has lowered in recent years, owing to extremely dry climatic conditions and a limited amount of irrigation water. There seems to be no land damage due to black or white alkali and there is no damage by waterlogging or seepage. There might be a very limited area (200 or 300 acres) which could give some trouble at a future date, owing to poor drainage. This land, however, is not developed at the present time and it is impossible to say whether such trouble would result though

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seems likely owing to its location near the present lake shore.

There is a rather limited supply of humus in the soil and the land needs considerable building up in this regard before maximum crops can be produced. Some 1800 acres which is not being farmed at present and is listed as irrigable, carries a fairly dense growth of cottonwood trees, which seem to have absorbed most of the humus from the soil. When this type of land is cleared, considerable manure, or other humus forming material is necessary to put the soil in good condition. At the present time it is felt that 6 years of alfalfa and 2 years of other crops constitutes the proper rotation to keep the soil in condition for maximum production.

Attention should be called to the fact that under present farming conditions the Indians are adding very little manure to the soil, which accounts to a considerable extent for the lack of humus present.

In conclusion it appears that the soil and drainage conditions on the Walker River Indian Irrigation project are more than satisfactory from a farming standpoint and good farming practices only are necessary, combined with an adequate supply of irrigation water, to make this project highly productive.

It was found that preparation of raw land for farming costs from $30.00 to $60.00 per acre, depending upon the individual, equipment available and the care with which the preparation work is done. In the area contiguous to the Walker River, which is covered with cottonwood trees, as stated above, the clearing and preparation costs would of course run higher. On the brush land the operations for preparing land for farming consist of railing the sage brush, levelling, building of borders and farm ditches. The levelling work should always be outlined by a competent engineer.

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Market values of the lands were quoted as follows:

A. For poorly improved farms with paid up water right $100.00 to $125.00 per acre.

B. Well improved farms, with paid up water right $200.00 to $275.00 per acres. (These of course are estimates and no land is selling at present.)

C. Pasture land (irrigated) about $30.00 per acre.

D. Unimproved land within the project classified as first class, $10.00 per acre.

E. Unimproved land within the project classified as second class $5.00 per acre.

F. Grazing land on the project, but not irrigated $2.50 per acre.

G. Grazing land not irrigated outside of the project $1.25 per acre.

These last four values were secured from the Nevada Tax Commission.

Climatological Data

Length of growing season	(for tender vegetables)	130 days
Average date last killing frost in spring	" "	May 10
Average date first killing frost in fall	" "	Sept. 20

Wheat flourishes after February first.

Growing season for alfalfa - March 1 to November 15.

Maximum temperature	109° F
Average maximum temperature	100° F
Minimum temperature	-17° F
Average minimum temperature	0° F

Elevation of farming land - 4000 to 4200 feet above sea level.

Average precipitation	5.25 inches
Average rainfall during growing season	3.60 inches.

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It is evident therefore, that crop yields are almost entirely dependent upon the supply of irrigation water, and fertility of the soil. The seasons are long enough to mature excellent corn and other fairly long-season crops. Cantaloupes could be grown to good advantage and the acreage of gardens could be put on a commercial basis if the Indians were so disposed.

Irrigation Data

Kind of Crop	Average number of irrigations required to make satisfactory crop.
Grains (wheat, oats, barley)	3
Alfalfa	4 for 3 crops
Wild hay and pasture	1
Corn	5 light applications
Potatoes	7 " "
Beets (sugar)	7 or 8 light applications
Vegetables	2 to 7

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Total number acres listed as irrigable in project	10,000 *
Largest number acres farmed in any season	1,860
Number of acres farmed in 1930	1,425
Number of acres actually irrigated in 1931	986

1425 acres should have been farmed in 1931, but part of the acreage was abandoned and balance summer fallowed, owing to short water supply. The type of irrigation used is the border check method.

* The acreage which can be classed as irrigable is increasing, owing to the recession of Walker Lake.

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The outstanding thing about the irrigation on this project is the poor preparation of the land for proper irrigation practices. When ample water is available the Indians are inclined to use large and often excessive amounts of water. This is due partly to the fact that the land has never been properly levelled. Considerable educational work with fair results has been done in the past few years by Mr. Kronquist, the general foreman in charge of the irrigation district, and the farmer at Schurz in teaching the Indians to level their land and put in satisfactory borders so that the maximum amount of land can be irrigated, with a minimum amount of water. The need of a great deal more education of this kind is indicated by the rough condition of many of the farms.

In the year of 1927 an ample supply of irrigation water was available, but since that time each season has seen a decreasing amount. The Indians planned to farm some 1425 acres during the season of 1931, but it was necessary to reduce this acreage to 986, owing to the indicated short water supply.

Before this project can be developed to any further extent it will be necessary to secure an adequate, dependable supply of irrigation water. This feature will be discussed in another portion of this report.

Weeds

Some data was gathered regarding the infestation with noxious perennial types of weeds. It was found that whitetop, wild morning glory and dodder are the only serious weeds known at the present time. Of these the whitetop is by far the most serious. It is estimated that there is approximately two acres present on the reservation at this time. This amount of whitetop is scattered over several of the farms, including the agency farm and some control work has been done during the past season.

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Owing to limited funds it was possible to spray with chlorates, only the outer edges of the patches to prevent spreading, and a light application was made to the entire patch to prevent the formation of seed. This weed has proven most serious and detrimental to many of the irrigation projects in the west and it is necessary that money be made available to control this extremely noxious weed before it spreads over a wide area of the reservation.

Pasture Opportunities

At the present time the Walker River Indians have practically no pasture or range for their livestock and it seems highly desirable that arrangements for pasture or range should be made if they are to progress in livestock raising. Such an opportunity seems to present itself on the shores of Walker Lake. The recession of the water in this lake is exposing new land every year. This new land is not suitable for farming, for several years, owing to the fact that the surplus water contained in the soil must have the opportunity to drain out, but if supplied with a minimum amount of moisture the native grasses seed themselves and a large amount of excellent pastureage is produced. The soil, of course, is sandy and after two or three years with no moisture, is inclined to commence to "blow". Many instances were noted where the water had been standing three or four years previous and now it is badly "blown" into sand dunes and great holes have been cut out by the wind. If this land is ever prepared for farming, the expenses for levelling will be extremely high, and this expense can be greatly reduced by securing a stand of grass.

Some years ago, Mr. E. W. Kronquist, general foreman in charge of irrigation work at Schurz, surveyed two or three temporary laterals on some of this lake land and proceeded to do a rough job of irrigation

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with surplus irrigation water. Some 160 acres have been handled in this manner and at the time of the writer's visit (November 7, 1931) an extremely heavy growth of grass was in evidence.

(Pictures below show growth of grass on this date)

Mr. Kronquist stated that no irrigation water had been applied to this pasture during the entire season of 1931; the grass growth being entirely due to irrigation water that was applied during the season of 1930. It was estimated that the 160 acres handled in this manner had supported from 125 to 150 head of livestock during the entire season of 1931, with no irrigation water. The stock were noted to be in very excellent condition; the grasses growing in the pastures evidently being nutritious.

At the present time there is probably from 2000 to 2500 acres of this exposed lake bottom of which would be available to put into pasture and it seems that such a move is entirely advisable, both from the standpoint of supplying cheap and good pasture to the Indian farmers and preventing the blowing of the soil which is certain to ensue, if no growth of vegetation is encouraged on this land.

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It was roughly estimated that from $500.00 to $2000.00 would be required to build a sufficient system of ditches and canals to irrigate this pasture land in the rough manner which is necessary. The larger figure is probably the most desirable, economically, owing to the fact that it would be possible to put in permanent structures which would not wash out and the irrigation could be arranged so it would be more or less automatic. If such a pasture unit is to be formed it will be necessary, of course, to fence it in order to keep livestock from straying and to prevent encroachment by other stock. A rough estimate showed that the cost for material and building would range from $150.00 to $200.00 per mile, and about 8 miles of fence would be required, as the lake itself would furnish a fence on one side. The maximum cost for fencing, therefore, would be roughly $1600.00. Thus an outside figure of $4000.00 would put into use some 2000 to 2500 acres of excellent pasture land, which would be capable of carrying from 1200 to 1500 head of livestock through the entire summer season, (about 8 months) providing a very minimum supply of irrigation water (during flood times) were available.

The above proposition would furnish pasture, providing it were handled properly, for at least 7 or 8 months during the year. There is available some 80,000 acres of sand grass, winter pasture on the east part of the reservation which is at the present time being leased to white stockmen. It has been over-grazed in the past, but if it were held for use by Indian livestock and proper grazing methods pursued, this land would handle, for winter pasture, as much livestock as could be grazed on the lake pasture during the summer. Some small amounts of money would necessarily need to be spent to develop two or three wells for stock watering during the pasture season, on this grazing land. $2000.00 or $3000.00 probably would take care of this water development. At the

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upper, or north end of the Walker River Reservation, including what is known as Campbell Valley, there is available another strip of approximately 20,000 acres of pasture land, which could be utilized to good advantage by the Indians, if properly supervised. Some of this land would need to be leased from allottees. At the present time this land is being grazed very closely by some cattle and a large number of wild horses. For the past few seasons the Indians have been destroying these wild horses and the range is showing noticeable improvement. It might be possible to fence this 20,000 acres including the Campbell Valley and by proper rotation in the grazing program provide for livestock pasture during the entire year, using it as an early spring pasture, the irrigated lake pasture for summer and fall and the East part, or 80,000 acres for winter range.

A large acreage of summer pasture land has been developed on the Carson Sinks near Fallon, Nevada, by the Irrigation Service and the white farmers and is being used in a manner similar to that outlined for the Walker Lake lands. A charge of 50¢ per head, per month, is made to cover the cost of irrigation, fencing, salting, fence riding, and other maintenance costs. With the Walker Lake proposition it would probably not be necessary to charge this much, but doubtless it could be arranged to be handled as an Indian livestock grazing association and a charge made which would pay out the cost of the above outlined development.

The writer feels that providing steps are taken to insure some adequate water supply for the Indians on the Walker River Reservation, that this pasture development is vitally necessary if they are to be encouraged to go ahead with a livestock program, for it seems to be an established fact that Indians are primarily interested in this type of farming.

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Economic Factors

There are several economic factors on this reservation which give the Indian families an advantage over most farmers on many irrigation projects. When the railroad was built through the Walker River Reservation by the Carson and California Railroad Company (narrow gauge) a treaty was perfected with the Indians by which they would be transported over the entire length of this railroad free of charge and any freight which they desired to ship would also be transported over its lines without cost. This railroad is now owned by the Southern Pacific Railroad Company and the same agreement holds true over the length of the old Carson and California lines. Produce can, therefore, be shipped to several of the large mining centers such as Tonopah, with very little, or no cost for transportation. This, of course, is a distinct advantage to the Indian farmers.

In the statements previously made regarding crops and prices, it has probably been noted that market prices were extremely high. This is due largely to the lack of freight charges to many market centers and the situation of the Walker River Reservation with regard to several large markets. It is felt that a large economic development would have to be made on the Walker River Reservation before the price advantages which the Indians are now enjoying would be curtailed. In other words, present markets for their products are being supplied from more distant sources.

The following towns are resultant markets and available, as follows: Yerington 25 miles, Fallon 38 miles, Tonopah 140 miles, Reno 105 miles, Los Angeles 432 miles by highway and 500 miles by rail; San Francisco and Bay cities 354 miles by rail and somewhat closer by auto. A government munitions plant is located at Hawthorne 35 miles distant and several hundred people are employed there with the prospect

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of it being enlarged and a resultant increase in population. A state highway traverses the reservation north and south from Carson City to Tonopah and on to Los Angeles and an excellent highway is also available from Schurz to Fallon.

As on many other Indian reservations, a large percentage of the allotments are in heirship status, on account of the death of many of the original allottees. In these cases from 2 to 6 heirs often own the original 20 acre allotments and it can be readily seen that it is utterly impossible for families to be supported on such small parcels of land. It is roughly estimated that at least 50% of the allotments on the Walker River Indian Reservation are in this status at the present time and some arrangements should be made whereby these allotments could be sold or transferred into large enough tracts so that it would be economically feasible to farm them and support a family. It was noted that several hundred acres of the original allotments were located on land that is too high to put irrigation water on it, without considerable expense. It consists mainly of "blow" sand, and owing to wind action has been piled up into dunes and is so rough that the cost for levelling would be prohibitive. As has been stated before, owing to recession of the lake there is plenty of land available which would be easy to level and irrigate and it would be a comparatively simple matter to transfer such allotments from the present poor type of land to a more desirable locality.

At the present time the Indians are paying no water charges and it is felt that if it were necessary for them to pay a small charge each year, more care would be exercised in the use of irrigation water. The best method would probably be to charge on a basis of acre feet of water, delivered, rather than on a flat seasonal charge.

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There are probably from 15 to 25 Indian families who have the equipment and are capable to handle larger units of land than the original 20 acre allotments. Several of these men do not have allotments of any kind, or their allotments consist of from 3 to 5 or 6 acres, and some arrangements should be made to allow these men to purchase more land. Such arrangements would give them an opportunity to make use of their talents and would be an example to other Indian families.

The turkeys raised on this reservation have been commanding a premium on all markets, owing to favorable climatic conditions, the excellent foundation stock, and the good practices followed by Indian farmers. They are marketed through the Northwest Turkey Growers Association (cooperative) and are considered as being the best quality handled by this organization. This enterprise should be enlarged so that it would be possible to ship an entire carload at a time, for at present it is necessary to haul these turkeys 35 miles to Fallon, with some resultant damage.

Enlarging of the livestock enterprises, especially with reference to beef cattle, would also enable the Indians to ship in carlots with the resultant more favorable marketing conditions. The pasture enterprise, as outlined in another part of this report, should at least be as economical and feasible as the present Indian Cattlemen's Association at Fort Hall, Idaho.

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CONCLUSIONS

Any final action looking toward a satisfactory adjustment of conditions on the Walker River Indian Irrigation project, depends entirely upon the outcome of the suit now in court for the adjudication of the water of Walker River. The status of this suit is considered at length inthe engineering portion of this report and does not need to be repeated. It therefore appears that the following conclusions seem justified:

(1) If the outcome of the suit is unfavorable to the Indians and no rights to water from the Walker River are decreed to this project, it seems that the most feasible thing to do would be to abandon the project and realize what is possible from the sale of the lands. It seems that it would not be advisable to continue with the project under present conditions with no assurance of irrigation water except return flow from the projects above and flood water that is allowed to pass.

(2) If sufficient water is decreed to the project the following proposition is offered:

Cost to date	$145,235.16
Build Rio Vista Reservoir	282,000.00
Extension of present system	50,000.00
Build system for Campbell Valley	45,000.00
Total cost	$522,235.16
Cost per acre, for 10,000 acres	52.22

The estimated 160 families on the reservation rolls at present with the present system of 20 acre allotments would use only 3200 acres.

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If a selected group of Indians, say 25, were aided to purchase larger farms, averaging 60 acres, they would use 1500 acres

The remaining 135 families with 20 acre farms would use 2700 "

Community pasture 2000 "

Total land in use if all Indians on the Reservation were actually farming. 6200 "

The remaining 3800 acres might be disposed of in one of the following ways:

a. More Indians might be brought onto Reservation and sold land. 190 more families would be needed with 20 acre holdings.

b. The land (3800 acres) could be sold or leased to white farmers. Some 50 white farmers would be needed with an average of about 80 acres each.

Judging from past experience on other irrigation projects, it would be difficult to persuade the entire group of Indians on the Reservation to move onto the farms. Some other allottees might be persuaded to return. Leasing or selling to white farmers is not too satisfactory and is attended by many difficulties. The cost of water under such a proposition ($52.22 per acre) added to land preparation costs of from $30.00 to $60.00 per acre, plus buildings, fencing, etc., would make the total cost per acre uneconomically high.

(3) With a satisfactory water right decreed, another proposition is offered:

Cost to date	$145,235.16
Extension of system, canals, etc	50,000.00
Build Weber Equalizer Reservoir	65,000.00
Total Cost	$260,000.16
Cost per acre (for 7800 acres)	33.30

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As with proposition No. 2, the present Indian population would use only 3200 acres. If in the same manner some 25 were allowed to purchase larger holdings 1500 acres

Remaining 135 families would use	3700 "
Pasture land would include	2000 "
Total	6200 "

A balance of only 1600 acres would need to be disposed of instead of 3800 acres as under plan No. 2. With a per acre cost of $33.30 instead of $52.22 as outlined under No. 2, it should be much easier to dispose of the surplus land; and the chances of success in paying out the construction costs would be greater.

Deceased Allotments

Mr. Ray R. Parrett, Superintendent of the Walker River Reservation, was consulted in regard to securing additional people to settle the irrigation project, providing one of the above plans is adopted. He feels that there are Indians available in other localities who could be moved to this reservation, if they are willing and were assisted in buying up the additional land, provided the original allottees and their heirs do not care to make use of this land. How about Owens Valley Indians for this? No

According to best information a large percentage of the allotments on this reservation are owned by the heirs of the original allottees and no use is being made of them. As was stated before, many of the 20 acre parcels of land are owned by as many as five or six heirs and it is almost impossible to even lease this land and of course it is not economical for these heirs to farm such small pieces. Arrangements should be made to

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clear up the status of these lands and sell the allotments that are so sub-divided in order that they may be combined in such a manner that it will be economically feasible to farm the land. It is impossible for anyone to make a satisfactory living for himself and his family on less than 20 acres of irrigated land, following a scheme of general farming. The only possible way to make a living on tracts of less than 20 acres is to farm them on a very intensive scale (such as truck gardens or orchards) and the Indian seems to be unfitted for such a type of farming.

If arrangements are made to sell these heirship allotments, a system of financing will necessarily be part of the scheme and funds will have to be advanced through the use of reimbursable money, or in some other manner. Such arrangement for funds seem to be vitally necessary if this project is to be put on a sound basis.

Our estimated net income of $21.25 per acre would seem to justify the continuation of the project when consideration is taken of the fact that this amount was secured with prevailing low prices and unfavorable farming conditions. The water situation since 1927, although it has taught the Indian farmers to conserve, has been more than discouraging. The acreage of alfalfa has been steadily declining for the past few years as it is impossible to secure a stand without irrigation water throughout the season. Soil fertility has consequently decreased.

The average crop yields are low, of course, but are as good as could be expected under the conditions. The Indians on this Reservation, having been on their own resources for many years, are more industrious and better farmers than many, and with a dependable supply of water, good markets and proper leadership should be able to put themselves on a self-supporting basis.

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Market value of the land, as estimated in this report, is about equal to the cost of water, plus land preparation and cost of buildings, fencing and other equipment. However, with better farming conditions in general and the natural advantages of this project, development as outlined herewith should increase its value to a considerable extent.

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INTRODUCTION

Walker River Preface

Pursuant to orders contained in letter of October 13, 1931, from H. V. Clotts, Assistant Director, to L. M. Holt, Supervising Engineer, and further explained by letter from Mr. Holt dated November 4, the writer, W. F. Gettelman, Assistant Engineer, in company with Ralph S. Bristol of the Extension Division of the U. S. Indian Service, as directed by A. C. Cooley, Director, visited the Walker River Indian Irrigation Project to study the same from an economic standpoint.

This report concerns the engineering phases of the project and an outline of the necessary work to complete the same along the lines advocated by the Extension Division, provided the continuance of the project is found to be desirable or feasible. The purpose being, within reasonable limits, to work for the interests of the Indian, the problem is considered with a view to developing the interests of the Indian, insofar as consistent with sound engineering and business principles and the proper use and economy of public funds.

The material for this report was obtained while on the project from November 6 to 12, 1931, by personal inspection and information furnished by E. W. Kronquist,

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General Foreman, and Ray Parrett, Indian Superintendent at Schurz, together with material obtained from the files and personnel of the District office at Salt Lake City.

In accordance with instructions all available data, obtained as above described, has been utilized to avoid any new field work not absolutely necessary.

Statistics

Total number of Indians in Walker River Valley on rolls	536
Number of families represented estimated	160
Number of Indian families actually farming 1931	68 62
Number of whites on jurisdiction (not including Government employees, traders and state employees)	0
Number of white farmers	0

Land Statement

Allotted lands	9,934 acres
Fee patent (6) White owned (2)	146 "
Agency and school	80 "
Cemetery	40 "
Timber allotments	3,360 "
Grazing land	125,880 " 140,524
Total area	139,420 acres 154,084
Land actually farmed and productive in 1931	986 "
Land classified as farmed in 1931	1,425 " 1451

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Average number acres per farmer	20.9 acres
Total allotments that have been made (20 acres each) 504 or	10,080 "
Total area that has been farmed at some time (estimate only)	2,000 "
Largest number acres farmed in any season	1,860 "
Altitude of irrigable area	4050 to 4250 feet
Average date last destructive frost, spring	May 10
Average date first destructive frost, fall	Sept. 20
Average season between destructive frosts	143 days
Maximum temperature	106 degrees
Average annual precipitation (Includes 1.5 inches as snow from Nov. to March)	5 inches

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WALKER RIVER INDIAN RESERVATION

IRRIGATION PROJECT

The Walker River Project is located in Townships 12 to 15 North, Ranges 26 to 29 East, Mount Diablo Meridian, Mineral County, Nevada. The project consists of an area of approximately 10,280 acres of river bottom lands, 10,080 acres of which have been allotted to the Paiute Indians in 20-acre irrigable allotments. The land lies along both sides of the Walker River and varies in width from one-half to four miles, extending in a northwesterly direction from Walker Lake approximately 24 miles up the river.

The active part of the project below the present diversion dam extends from the lake to the dam, which is approximately 10 miles upstream from the lake. This part of the project contains about 7800 acres of irrigable land in a gross area of 9115, of which 3660 can be irrigated under the present canal system without further construction.

The inactive part of the project is situated in what is known as Campbell Valley, consisting of approximately 2200 acres of irrigable land out of a gross area of 2630. It begins about three miles above the present diversion and extends nine miles upstream.

The active part of the project is irrigated by two main canals, Canal No. 1 on the west side serving about 1200

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acres and No. 2 on the east side about 2500 acres, the two together taking care of the present irrigable 3660. No. 1 extends but half way down the area and part of the land below it on the west side is being irrigated by water from No. 2 carried across the river by flume. The system with its laterals will be shown on maps to accompany this report.

The problem of the water supply, its uncertainty and the need for storage, have been discussed at length in other reports of previous dates. At the present time the question of the water rights of the Indian lands is dependent upon the outcome of the case now before the U. S. Court for the District of Nevada. This case has been pending for the past seven or eight years. An interview with Judge Harwood of Reno, Nevada, the U. S. Attorney on the case, disclosed that the consideration of the evidence is now before the Master in Chancery and his opinion is expected about the first of the coming year. There has been much delay, among other things the death of a former presiding judge, the necessity of the succeeding judge to study the lengthy testimony, etc.

The Master in Chancery will advise the Court of his findings which will act as recommendations. The Court is not bound by them, but will probably be guided thereby. The counsel will then argue points of law and the judge will then make his decision. There is, of course, possibility of our opponents appealing, if the decision is adverse to them,

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even to the Supreme Court of the United States. Judge Harwood anticipates a favorable decision. The precedents are in our favor, including the well-known Winter's case decision.

Future of the Project

If the Indians do not win in the suit over water rights, and no guarantee as to water is received, the future of the project will be very uncertain. It could not be developed beyond its present stage, and from a purely business standpoint might better be abandoned.

It will be shown later how the project in its present shape could be continued, in event of an adverse court decision, by addition of an equalizing reservoir storage.

In the event of a favorable decision by the Court, whereby the Indians are granted prior rights, there are several courses which may be taken.

1. The present acreage under cultivation, 1400 acres, can be gradually enlarged until the entire 3660 acres now irrigable under the present system can be made productive. An equalizing reservoir of moderate capacity would probably be needed.

2. More land on the present active project could be brought into use by adding to the present irrigation system and building a storage reservoir. The total acreage would then be 7800 of which 6000 would be under real cultivation,

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the balance being pasture land.

3. In addition to the increase up to 7800, with large enough reservoir, the 2200 acres in Campbell Valley could be brought in through building of a separate distribution system for the same. Thus the entire project would be brought to the point of irrigating the equivalent of all the allotted lands or 10,000 acres.

The question arises as to who will farm these lands. Out of 160 families representing the 536 Indians on the rolls, only 68 families are farming. Some are farming on land they do not own. The tying up of deceased allotments, and the fact that numbers of Indians are confined to one 20-acre allotment by their heirship, together with the fact that not every Indian wants to be a farmer, makes it impossible of realization to expect the development of each allotment by its present allottee. Official action should be taken to permit transfer of allotments so that good farmers, on ground unsuitable to irrigation, may utilize good land now idle. Also that farmers without land might purchase deceased or inactive allotments. If all the 160 families each farm 20 acres, it will only account for 3200 of the 10,000. Other Indians can be brought in; parts can be developed by white settlers. It depends on the policy of the Department. This question is discussed at greater length by the Extension Division representative.

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Progress is being made in developi the Indian on the Walker River Project. Mr. E. W. Kronquist, in charge of the irrigation project, in cooperation with the Indian Superintendent and Farmer, has prevailed upon several of the better farmers to use improved methods in farming and avoiding wasteful and harmful use of water. One man raised a better crop on less water than the year before. Another saved water through instruction as to better location of his farm ditches. Even the shortage of water has in one way helped some. Compare the year 1927 with 100,000 acre feet of water available and 1930 with only 14,500, or 14½% as much. But the 1930 crop value of $16.20 per acre is 41% of the $39.66 for 1927. In 1928 with 46,900 acre feet, or 46.9% of the 1927 water, the crop value was $46.00, or 116% of the 1927 figure. Furthermore, the crop area for 1928 was 1434 acres as compared to 1822 acres for 1927.

If the Indian could be taught to level his land, at least to some extent, so as to prevent the drowning of certain areas to reach high spots, it would be a long step forward. Most of the land, being river bottom, has a natural slope. The use of buck scrapers, fresnos and floats, whether by horse or tractor could accomplish wonders.

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SUMMARY OF CANALS AND STRUCTURES

Kind	Number	Length	Capacity
Main Canals	2	15.75 miles	150 to 25 sec. ft.
Laterals	7	11.65 "	35 to 10 "
Sub-laterals	7	2.18 "	10 to 3 "
Drains	1	1.25 "	10 "
Totals	17	30.83 miles	

Structure	Concrete	Wood	Steel	Total	
Diversion Dam	1			1	Rockfill & concrete
Headgates	2			2	
Lateral Headgate	1	3		4	
Turnouts	30	12	5	47	
Combination*	20	1		21	*See below
Flumes			3	3	
Drops	6	4		10	
Checks	9	8		17	
Weirs (measuring)	1	4		5	
Pipe Chutes	3			3	
Bridges	2	17		19	
Culverts	6		4	10	
Total	81	49	12	142	

*Combinations consist mostly of check, drop and two turnouts.

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The present irrigation system is, barring some mistakes in original location which had to be carried through, in good shape. Particularly noticeable is the manner in which almost all wooden structures have been replaced by finely built concrete ones. Almost the entire area has been covered by Mr. Kronquist with topography and the plans for extension of present system are well defined. The very location of the land is in its favor. The slope to the river and the narrowness of the area make for drainage and prevent water logging and formation of alkali.

As mentioned previously future extension and design depend on the policy of the Department. We will consider the different plans from standpoint of cost and water supply.

The need of adequate storage to insure sufficient water for irrigation has been stressed in several previous reports. The monthly report for December 1930 states: "The Indians suffered from probably the poorest prices ever obtained which is not surprising considering the general depressed condition of farming. The loss from shortage of water was estimated at $17,000 and could have been prevented had a small reservoir of even 2000 acre feet capacity been available."

In 1931 only 1500 acre feet additional would probably have given a full crop. Furthermore, everyone wants to irrigate at once. It is also more economical both in

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labor and water to handle a larger quantity of water in shorter time. When the river flow is in excess of that needed on the land, the surplus can be stored and later used before reaching the lake. The flow in winter five months can be stored, then used for spring irrigation during April and May shortage. The reservoir can then be filled by the June floods and the storage thus gained used in July and August, usually the time of the greatest need. From September 30, 1930, to March 1, 1931, there was a flow of 6694 acre feet. With a reservoir this water could have been stored. Instead it wasted into the lake.

For April, May, June, 1931--2818 acre feet as registered at Parker Control (Wabuska) . But of this only 1991 reached diversion, a loss of 827 acre feet. There is not so much loss in winter flow, possibly even some gain.

Taking the winter flow of 6694 and storing 5000 and using the rest plus the 1991 set for summer, we would have 8685 for the season. With a gross duty of 4.5, this would have taken care of 1930 acres. There was only 1425 acres classed as farm land in 1931 and only 986 acres of this actually farmed. A small reservoir would have saved the crop. Without storage we had only the 1991 acre feet for 986 acres, or 2.02 acre feet per acre. This explains the partial crop failure.

The Indian land has been gradually losing out in the proportion of water it receives out of the combined flow

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of the East and West Walker Rivers, considering (1) the mean flow for 1903-1925

Mean flow of East Walker	154,120 acre feet.	
Less storage	10,420 " "	
	143,700 " "	
Plus water used in Bridgeport Valley Above gauge	20,000	163,700
Mean flow of West Walker		237,052
		400,752

During same time the mean flow below all white diversions and above Indian lands at Wabuska Station was 126,018. This represents 31.5% of the whole.

(2) For five years ending September 30, 1930

By same method, East Walker	80,880 acre feet
West Walker	148,800 " "
	229,680 " "

Flow at Wabuska equals 41,707, or 18.2%.

(3) For one year ending September 30, 1930

East Walker	63,180 acre feet
West Walker	133,000 " "
	196,180 " "

Wabuska recorded mean flow for the year of 14,500 acre feet, or only 7.4%, so it can be seen that the Indian loses out in greater degree during the shortest years.

What proportion does the Indian get when land cultivated is considered? In fairness these percentages must

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must be raised unless the white lands above are to stand for stream losses. Wabuska probably recorded only three-fourths of what was sent down, allowing for 25% loss in transit.

1903-1925, 31.5% then becomes 42%

1925-1930, 18. % 29%

1929-1930, 7.4% 10%

The maximum amount of land to be irrigated in Walker River Basin is:

Walker River Irrigation District	100,000	acres
Bridgeport Valley, including Huntoon Valley (Bridgeport Reservoir)	15,000	"
Antelope Valley, including Little Antelope	8,341	"
Bodie and Rough Creek, estimated	800	"
Desert Creek	1,500	"
Sweet Water Creek	1,500	"
Mono Basin Lands	200	"
Dogtown and minor streams, estimated	1,000	"
Walker River Indian Reservation	10,000	"
	138,341	acres

Of the total the Indian land is only 7.23%.

This shows that we must gain the Court's decision for a prior right. A share pro rata will not be enough for years of low flow. The situation would be further complicated if the Walker River Irrigation District attempted to complete their ultimate plan for 165,000 acres.

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The reader is here referred to House Document No. 767, 69th Congress, 2nd Session, the same being Report on Water Supply and Storage Investigations on Walker Indian Reservation by W. E. Blomgren, Engineer, December, 1926, for the following tables:

Table I, East Walker River, annual run-off by months in acre feet,	Page 13
Table II, West Walker River, "	Page 14
The same tables for the Walker River at a point below all white diversions and above Reservation	Page 42
Below Reservation, run-off into Walker Lake	Page 43

The above tables end with the year 1925. Following are the same tables, compiled by the writer from U. S. Geological Survey records for the years 1926-1930.

West Walker River near Coleville, Cal.

	1925-26	1926-27	1927-28	1928-29	1929-30
Oct.	3680	1730	2440	1880	1710
Nov.	3230	2700	5490	1920	1510
Dec.	2950	3940	3710	1770	1910
Jan.	2630	3710	3210	1970	1650
Feb.	2600	4580	3090	1780	2440
Mar.	5880	8060	7560	3610	4610
Apr.	28400	18900	14100	7440	16500
May	44100	56400	53900	38400	28300
June	24400	81500	31200	31500	52200
July	6210	40600	8850	13300	15300
Aug.	2460	10300	2620	3560	4530
Sept.	1780	3430	1790	1880	2360
Total	128,000	236,000	138,000	109,000	133,000
Mean Sec. Ft.	177	326	190	151	184

Mean of five years, 148,800 acre feet

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East Walker River near Bridgeport

	1925-26	1926-27	1927-28	1928-29	1929-30
Oct.	1870	1920	5060	1950	2040
Nov.	1430	678	232	119	1550
Dec.	1180	652	246	184	406
Jan.	301	123	246	184	953
Feb.	278	111	288	222	1200
Mar.	1300	1332	4880	1150	1690
Apr.	7200	4990	5360	3090	4150
May	14000	14600	13500	10500	5070
June	17000	17400	12300	8450	13200
July	15700	21000	17800	12400	10300
Aug.	7990	19700	17500	10800	9350
Sept.	4880	12100	6600	3200	3650
Total	73,100	93,600	84,000	52,200	53,600
Mean Sec. Ft.	101	129	116	72	74

Mean of five years, 71,300 acre feet

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Below all White Diversions and above Reservation

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926	2200	3300	1520	3030	4300	3190	2240	972	583	978	1930	4960	29,003
1927	3840	4010	2740	3070	6950	41300	20500	3910	6310	4140	5950	4770	107,490
1928	4760	4010	4570	3780	6270	3910	1840	2130	595	781	1060	1510	35,366
1929	1840	2150	1520	1600	2410	2100	2180	824	333	400	1060	1570	17,987
1930	1010	778	861	1030	2520	2340	1500	1090	333	1575*	2450*	3202*	18,689
Mean	2730	2850	2242	2502	4490	10568	5652	1815	1631	1575	2450	3202	41,707

*The actual figures were not available so the average for the previous four years was used.

Flow from September 30, 1930, to March 1, 1931	6694 second feet
April, May and June	2818 " "
July and August	none
Total	9512 second feet

Below Reservation Diversions, Run-off into Walker Lake

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926	2280	6050	1130	24	449	506	12	43	60	98	744	4140	15,536
1927	3570	3610	1310	446	2900	35800	17200	1560	3530	1930	4500	3380	79,736
1928	4110	4130	4040	1910	2550	2420	166	61	60	61	71	430	20,009
1929	1550	1700	344	149	240	220	148	123	125	123	119	1180	26,030
1930	873	411	111	143	1070	351	209	123	119				

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The size, location, design and cost of reservoirs have been very thoroughly gone into in previous reports by Mr. Engle and Mr. Blomgren. The smaller one, known as the Weber, is situated at the lower end of Campbell Valley. We will consider it as 5,000 acre-feet capacity. The larger one, the Rio Vista, is at the head of Campbell Valley and would also provide diversion works for that area. It has been designed for a capacity varying from 22,000 to 30,000 acre feet.

The Rio Vista, most favored in previous reports, has been very thoroughly investigated. It is closer to highway and railroad. There is an excellent rock spillway leading well away from the dam site to an old channel of the river. A plentiful supply of desirable construction material for an earth dam is found in the immediate vicinity. The approved designs have been estimated to cost $300,000 for the 30,000 acre feet and $282,000 for the 22,000 acre feet. The latter is ample.

The smaller Weber site was, some years back, the only one seriously considered, previous to discovery of the Rio Vista. It is not as close to highway and railroad, but offers about the same opportunities as to availability of construction material. So far as is known, there is no rock ledge spillway, but there is an earth dike, off to the right as you look downstream, which could be cut down

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to afford a sort of safety fuse. A very heavy flood flowing over it would cut its way through and it could be easily replaced later by teams. Ordinary floods would be handled by enough large taintor gates incorporated in the dam. This dam, as estimated by Beemer Report--Appendix C, and mentioned in Blomgren's 1926 report (House Document No. 767), was from $100,000 to $110,000 to store 9,600 acre feet. Consultation with Mr. Kronquist has developed that later calculations by himself and Mr. Beemer indicated a possibility of slightly lower costs. It is probable that a lower dam to store 5000 acre feet can be built for about $65,000 and Mr. Kronquist concurs in this belief.

Compare the need and usability of these two reservoir capacities. The Rio Vista, 22,000 acre feet, of course, is large enough. In fact the entire flow of the year 1929, or 17,987 acre feet, or of 1930, 18,689 acre feet, would not have filled it. Of course, a prior right--shutting off of the land of the whites above would provide enough. In fact such a condition might even make a reservoir unnecessary, unless it be a smaller one as a regulator.

Consider the mean flows for the past five years, 1926-1930, Wabuska gauging, adding the mean flows of October to February, inclusive, total 12,807 acre feet storage; March to May, inclusive, gives a flow of 9,234 acre feet; June allows replenishment of Reservoir with 10,568 acre feet

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to help out the July, August and September total of 9,098 acre feet. The mean flow would undersupply the larger and oversupply the smaller reservoir. The total mean flow would be 41,707 acre feet. (Note that a small reservoir of perhaps 5000 acre feet could be used twice a year, filling during five winter months to irrigate in spring, refilling from June flood for summer need.)

Consider the year ending September 30, 1929, the flow was 18,300 acre feet. With a gross duty of 4.5 acre feet, this would irrigate 4070 acres. The year ending September 20, 1930, with 14,500 acre feet would handle 3230 acres.

The 1929 year would provide 7,341 acre feet and the 1930 year, 4,818 acre feet storage during five winter months. With no June floods the other seven months provided 10,967 and 9,674 acre feet respectively.

The building of the reservoir at the Weber site would not interfere with later building the Rio Vista, if desired. The smaller one could be worked in cooperation with the larger for purposes of regulation of flow.

Cost per Acre Comparisons

The cost to date and at present chargeable to the 3660 acres irrigable under the present system is:

Construction cost to Sept. 30, 1931	$145,235.16
Total O & M cost to Sept. 30, 1931	89,393.10

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In consideration of ultimate cost for completion of project it would be unfair to burden new acreage with part of this operation and maintenance cost. Furthermore, much, if not all, of it should be written off. For purposes of comparison we will consider only construction cost.

1. Construction cost for 3660 acres equals $145,235.16
   Construction cost for 1 acre equals 39.68
   If, with prior rights established, it is desired to continue the project slowly, even the mean flow of 1926-1930 of 41,707 acre feet with duty 4.5 would irrigate 9,250 acres. Of the approximate 10,000 acre total irrigable, 1800 acres is pasture and could be deprived of all or part of its water in case of necessity.
2. Extending system to increase from 3660 to 7800 acres, including the 1800 pasture.

Cost to date	$145,235.16
Extension of system, canals, etc.	50,000.00
Build Weber Equalizer Reservoir	65,000.00
Cost for 7800 acres	$260,235.16
Cost for one acre	33.30

This lowers the cost per acre. Under favorable conditions it might be possible to irrigate part of Camp-

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bell Valley, above this reservoir, by putting in a small diversion dam. The Weber Reservoir will flood about 500 acres of Indian land in Campbell Valley, which must be paid for and reduces that acreage from 2200 to 1700. But it would be more on the side of safety to leave out Campbell Valley, except under the big reservoir at Rio Vista, the building of which would cost:

3.	Cost to date	$145,235.16
	To extend present system	50,000.00
	Build system for Campbell Valley	45,000.00
	Build Rio Vista dam	282,000.00
	Cost for 10,000 acres	$522,235.16
	Cost for 1 acre	52.22

Reconsidering 2 and 3 taking out the pasture land of 1800 acres

2.	Cost for 6000 acres	$260,235.16
	Cost for 1 acre	43.37
3.	Cost for 8200 acres	$522,235.16
	Cost for 1 acre	63.69

Obviously we cannot throw the pasturage out of consideration in this manner, but it shows what would be the cost per acre, under the two plans, for the land actually under real cultivation. There is, as before, about $20.00 per acre difference.

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Going back to Plan 2 and consideration of 7800 acres, to find how much could be spent for a dam within the limits of the cost per acre of Plan 3.

7800 acres at $52.22	$407,316.00
Present cost of Plan 2	260,235.16
Financial range Plan 2 to Plan 3	147,080.84
Cost of dam under Plan 2	65,000.00
Limit of possible expenditure on dam for favorable consideration of Plan 2	$212,080.84

The Weber site (Plan 2) is discussed by W. E. Blomgren in his 1926 report (House Document No. 767). He quotes the Beemer report on a dam 42 feet high with a maximum storage of 9600 acre feet, at a cost of $100,000 to $120,000.

For 7800 acres with gross duty of 4.5 acre feet the total is 35,100 acre feet. 9,600 would give 27.4% storage filled once, or 54.7% if filled twice.

It is not believed that the project can be brought to the point of utilizing 7800 acres within the very immediate future. The present need, however, is great. A systematic progress in developing a compact and well contained project is desirable. In this connection the smaller reservoir, closer to the present active project, is more quickly and economically operated. The larger--farther away--will require more attendance. The dam at the lower site can be built to furnish enough storage for estimated

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needs, dependent upon policy adopted for expansion of the project, with a view to future increase of storage by raising the dam, if such be feasible.

Attention is again called to the fact that we can always build the larger reservoir at the Rio Vista site. The smaller one can still take care of its share of storage and act as an equalizer. The problems met and studied, in construction and operation of the smaller, can be applied in case the larger is built, and the knowledge obtained at a lesser cost. Of great importance is the silt problem. Further, it would certainly be better engineering and better business to gradually grow up to the capacity of the smaller than to never reach the point of full utilization of the larger reservoir, should the development of the land be retarded. Past experience shows how well laid plans may fail of completion, and the situation here is very indefinite for the future. Even with the favorable decision in regard to the water rights, there is the possibility of action by the whites, by legal means and otherwise, to deprive the Indians of sufficient water. As shown previously, much can be accomplished with the smaller reservoir and we can feel our way and learn as we go.

In spirit with the times it may not be inappropriate to mention the depression. Prices for farm products are low. It seems inadvisable to build too rapidly and

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plan a sudden expansion. Another financial consideration is the concerted effort for further economy in governmental appropriations and expenditures. It is probable that an appropriation might more readily be obtained for a smaller reservoir at lesser cost. It must be admitted, however, that once the smaller appropriation has been obtained, it may have a tendency to deny another and larger one later. The building of the smaller reservoir effects an economy both in amount of total outlay and in cost per acre. In addition to the higher ultimate cost per acre of the larger reservoir, consideration must be given to the fact that the same would be greatly increased if circumstances prevented a full development of the entire acreage within a reasonable period.

Dependent upon the value that is attached to the probable effect of rapid expansion upon the Indians themselves, certain questions arise for consideration. The Extension Division is vitally concerned with the welfare and advancement of the Indian. The writer urges the importance of considering the actual development of the Indian insofar as consistent with good engineering and sound business principles and in conformation to the Department policy.

In that regard, if it is not outside the scope of the engineering part of the report, we must consider the effect on the Indian of a sudden access to large quan-

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tities of stored water. Through much patient persuasion and forced economy, some of the Indians have been taught to get along without excessive and wasteful use of water. Thus the shortage has had some beneficial effects. There have been concrete examples of better crops raised by certain Indians than they had previously realized with more lavish use of water. With plenty of water stored they will be resentful if unable to obtain all they want.

To develop the entire 10,000 acres, even the addition of other Indians presents many problems. But the introduction of white farmers, while it may raise standards by the examples set if the better class of farmers come in, will present many problems. It will probably result in the project being gradually taken over by the whites, as to actual operation at least. This might make it more efficient, but the effect on the Indian may not be beneficial. Under present conditions, bad as they are, progress is being made by the more advanced Indians. It is certain that progress will continue under a gradual expansion and continued coaching for the Indian.

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Conclusions

It is not probable that, within the time for completion of construction on such a project, enough farmers would be brought in to develop the 10,000 acres. Even in the event of such development, only the economy of closing and disposing of other projects that are unsatisfactory or uneconomical for Indian farming would justify the expenditure of almost $400,000 to complete the Walker River Project when the lesser development can be effected at a lower ultimate cost per acre.

It is therefore advisable, in case of favorable court decision on the water rights, that the project be developed along the lines of Plan 2, building for a storage of 5,000 acre feet to begin with.

Legislation should be started to make available funds that can be utilized for this construction if and when the water rights are decided in the Indians' favor.

Steps should be taken to bring about the appointment of a fair and impartial water commissioner to supervise the distribution of the waters of the entire Walker River system as adjudicated.

Also contingent upon such favorable decision, the plans for development of pasture land and furnishing of instructional aid to the Indians, as outlined by the Extension Division, should be carried out to aid in develop-

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ment of the Indians' welfare.

Final recommendations as jointly arrived at by both the Extension Division representative and the writer are shown at the beginning of this combined report.

Respectfully submitted,

W. E. Gettelman
Assistant Engineer.

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Description of Maps attached to this Report

The following maps are required in accordance with instructions by Mr. Clotts, Assistant Director of Irrigation, in his letter of October 13, 1931:

1. Irrigable Area
2. Cultivated Area 1931
3. Kind and value of Crops Produced
4. Number of Indians Farming
5. Areas unproductive because of Alkali and Seeped Conditions
6. Irrigation Facilities Available.

The irrigable area is shown by the sum of the irrigated area for 1931 in green plus the irrigable but not irrigated in yellow.

The cultivated area for 1931 is shown as irrigated in green. The actual acreage is shown in statistics in the body of the report.

The kind and value of crops produced and the number of Indians farming are shown by statistics given in Mr. Bristol's portion of the report.

There are no areas affected by alkali or seeped conditions in the Walker River Project.

Irrigation facilities such as canals and laterals are shown on the map. Details as to structures, etc., are shown in tabular form in the body of the report.

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Maps on File in District Office at Salt Lake City

1. Maps of general information, Walker River, including:
   (All brought up to present date)
   WR 16 Walker River Basin
   WR 34 Walker River Irrigated Lands
   WR 52 Walker River Canals and Information
2. Rio Vista Damsite and Reservoir--many maps showing practically all information required thereto, including:
   WR 44 Rio Vista Reservoir
   WR 45 Rio Vista Damsite
3. Weber Damsite and Reservoir, maps WR 17-22 inclusive:
   WR 21 Weber Reservoir
   WR 22 Weber Damsite

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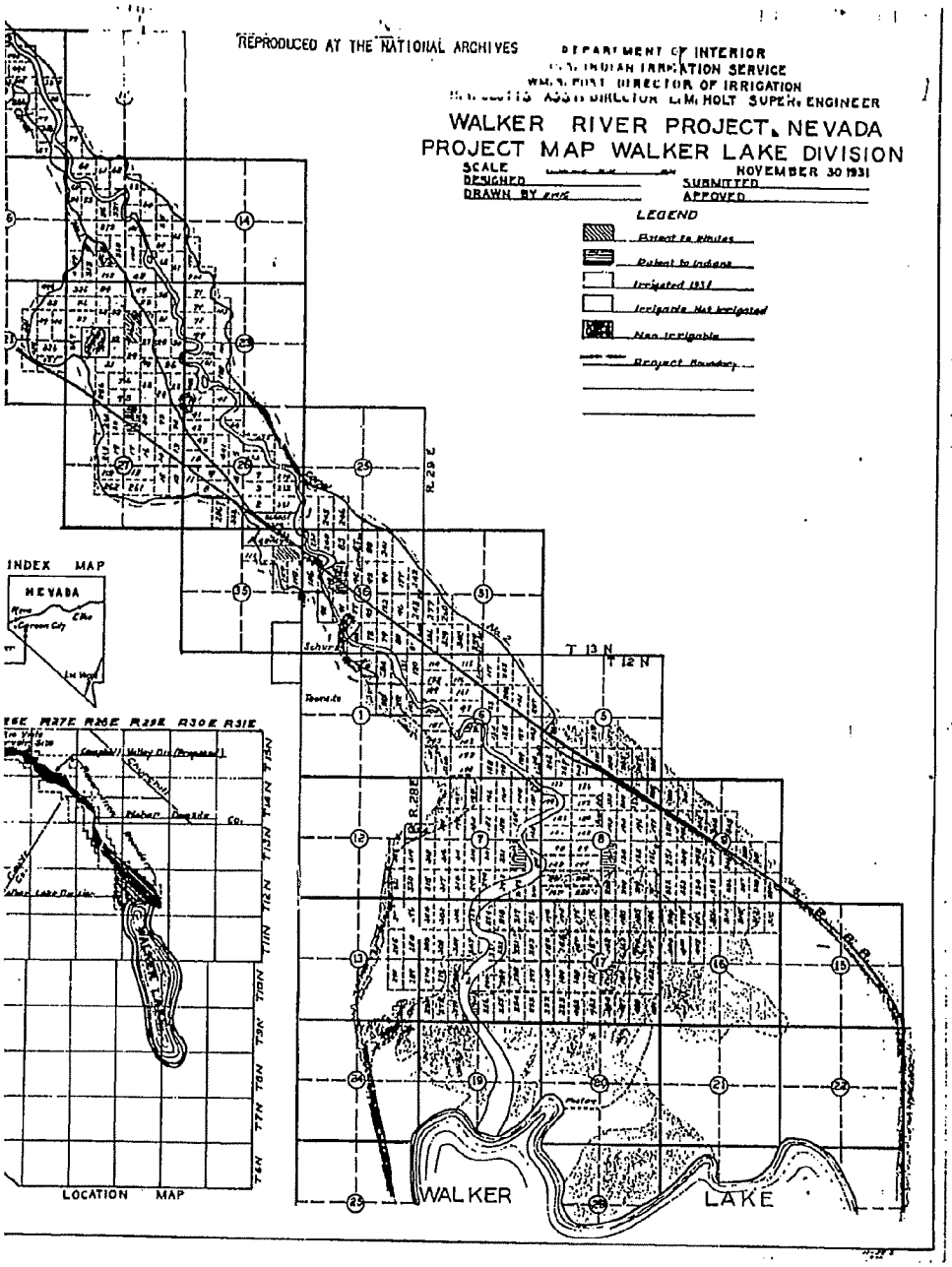
DEPARTMENT OF INTERIOR
U.S. INDIAN IRRIGATION SERVICE
WM. S. POST DIRECTOR OF IRRIGATION
ASST. DIRECTOR L.M. HOLT SUPER. ENGINEER

WALKER RIVER PROJECT, NEVADA
PROJECT MAP WALKER LAKE DIVISION

SCALE
DESIGNED
DRAWN BY
NOVEMBER 30 1931
SUBMITTED
APPROVED

LEGEND
- Patent to Whites
- Patent to Indians
- Irrigated 1931
- Irrigable Not Irrigated
- Non Irrigable
- Project Boundary