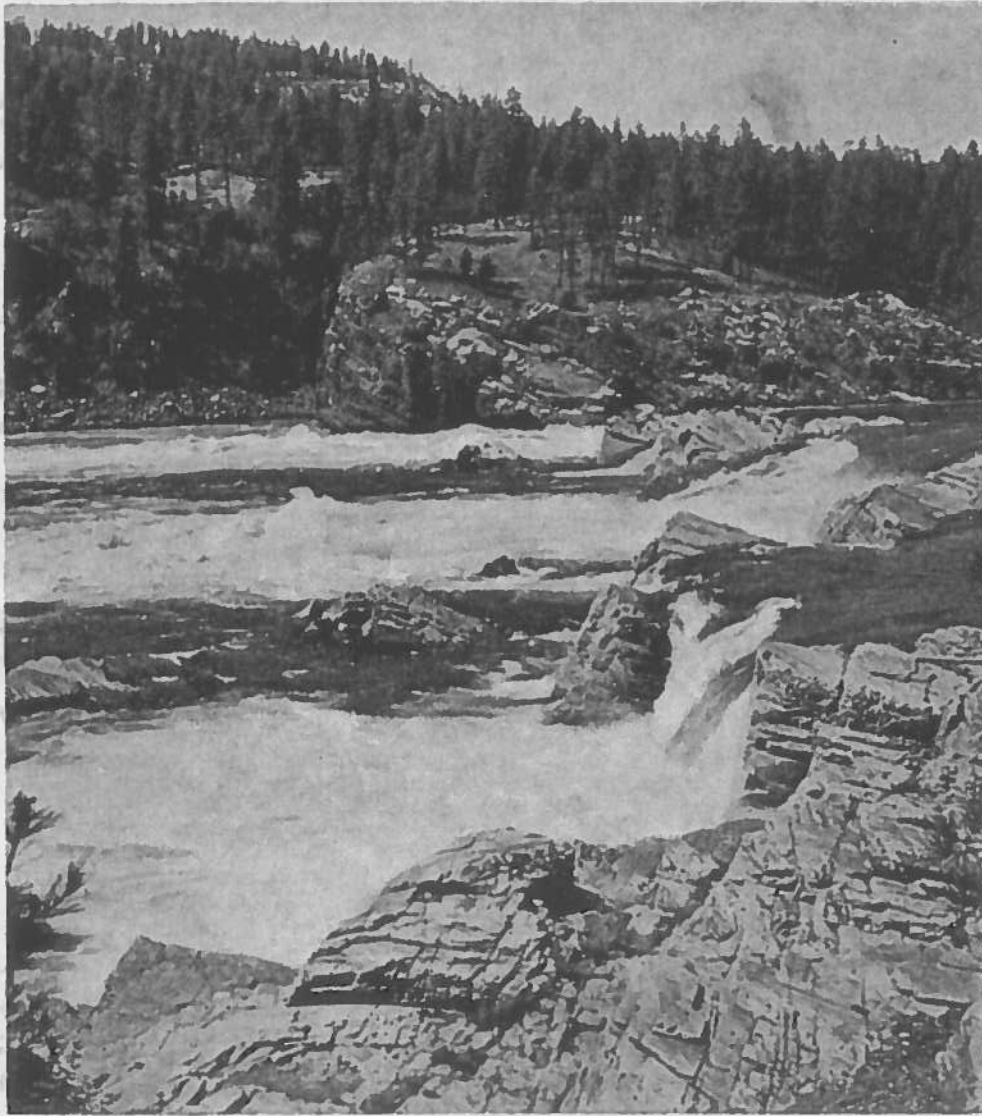


THE
COLUMBIA BASIN
GRAND COULEE
PROJECT



The mighty Columbia sweeps out of the north on its twelve hundred mile journey to the sea.

A Remarkable National Resource that will contribute perpetually to the country's wealth, prosperity, and well-being

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West Needs More Agricultural Lands

Area largely taken up by Public Domain, forests, desert, mountains

THE WIDE-OPEN SPACES OF THE WEST—through the years the phrase has become a by-word carrying with it perhaps a mistaken idea of many and far-reaching ranches and farms, until one confronts facts and figures with surprise. The eleven western states, those west of the 100th meridian, including Arizona, New Mexico, Utah, Nevada, California, Wyoming, Colorado, Montana, Idaho, Oregon and Washington, are the home of somewhat more than 9% of the population of the United States, but they contain only 4.5% of the farmed and cropped area.

These eleven states can never be agriculturally self-sustaining. Their towering mountain ranges, the plateaus and sweeps of sagebrush wastes and deserts, the vast stands of forest timber leave only 54,300,000 acres of the states' total land area of 760,400,000 acres that can be cultivated. This is only slightly larger than the State of Nebraska.

Of this arable area of 54,300,000 acres, nearly one-half, or about 24,000,000 acres, is non-irrigable. Of the remaining, 10,000,000 acres, according to estimate of the United States Bureau of Reclamation, are classified as land that will justify the cost of irrigation and for which there is a dependable and sufficient water supply.

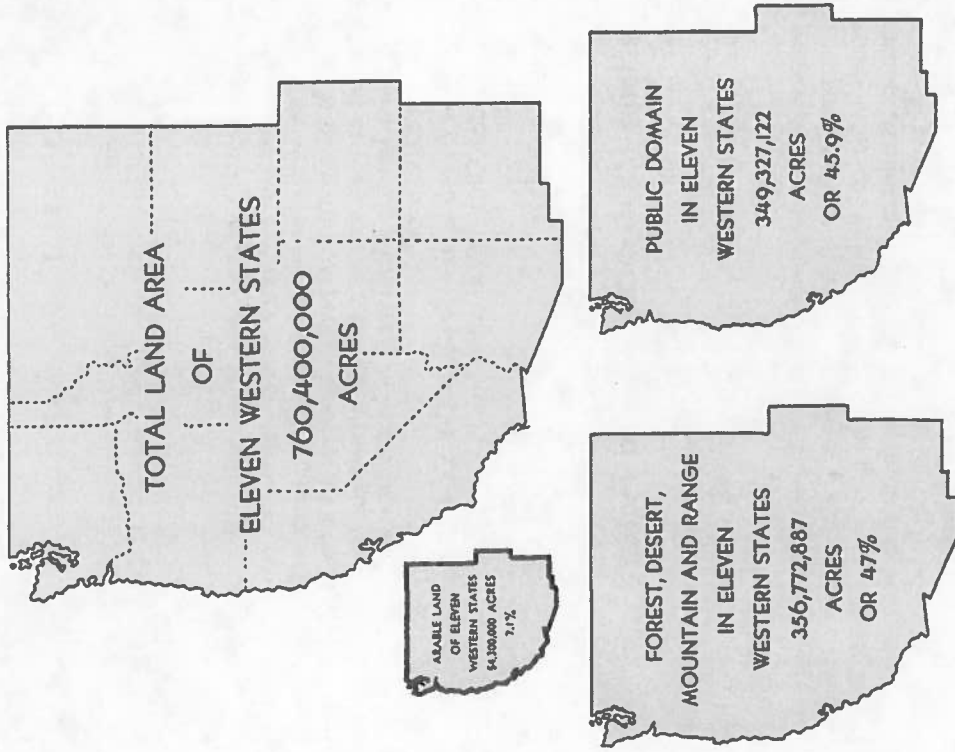
Much of the non-irrigable acreage receives only enough rainfall to make it suitable for production of wheat by dry-farming methods. A considerable portion is sub-marginal.

Continuing any appraisal of western lands, another figure quickly challenges attention, a figure much greater than the 7.1% potentially or actually agricultural—in fact nearly seven times as great.

Forty-five and nine-tenths per cent of all the West (or 349,327,122 acres) is public domain.

In other words, whereas throughout the eastern states practically all of the land passed into private ownership and became taxable assets for the various states and communities, in the West conditions

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**RELATIVE PROPORTION OF
LAND AREA OF ELEVEN WESTERN STATES—
IN THE PUBLIC DOMAIN—IN FOREST, DESERT,
MOUNTAIN AND RANGE—COMPARED WITH THE
AREA AVAILABLE FOR CULTIVATION**

[3]

were radically different. Nearly one-half of the total land area was locked up permanently in national reservations.

Timber, oil, coal, minerals, national parks, monuments, and water power became the objects of special reservations, along with several million acres dedicated to the original owners, the Indians.

Add to this nearly as much again (47%) or 356,772,887 acres, which, while privately owned, fall in the non-agricultural category of forest, desert, mountain and range, and it will be seen that the actual acreage left to support western agriculture is pitifully small.

With the agricultural area of the West thus so strictly limited and with so large a portion of western lands set aside for public use, it is a matter of national necessity that this remaining available land should be placed in line for development by irrigation at a rate commensurate with prospective need.

The best crop insurance is controlled, ample water supply—ready when needed. Only irrigation can give this.

Reclaim 1,200,000 Wasted Acres

Capture fraction of Columbia's swift flowing waters for irrigation

EXAMINE A RELIEF MAP of the State of Washington. A feature anyone will remark is the sinuous course of the Columbia River as it winds its age-old valley down across the middle of the state. In one immense convolution it sweeps around to the westward to skirt a high plateau. This semi-encircled plateau is known as the Big Bend country. It is the southern and lower portion of this plateau, hemmed in by a fold of the great river, which bears the name Columbia Basin.

A hundred miles to the west rise in grandeur the lofty Cascade mountains, raking from the ocean-born winds all the precious moisture which otherwise would come inland. The Columbia Basin is, therefore, an area of meager rainfall. The normal precipitation, 10 inches or less a year, is insufficient to grow wheat or any other crop,

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even under most approved dry-farming methods. Decades ago, abortive attempts were made to settle this region. The plain is still dotted with abandoned farmsteads—dead orchards, rusting farm machinery, tumble-down houses—a solemn tribute to the courageous but misguided efforts of pioneers. They strove to establish their families on



The mighty Columbia drains an immense watershed.

homesteads which at first held bright promise, but in the end their reward was bitter disappointment—utter failure. Ironically enough, one or two crops were harvested, but these drank up what stored moisture the soil contained.

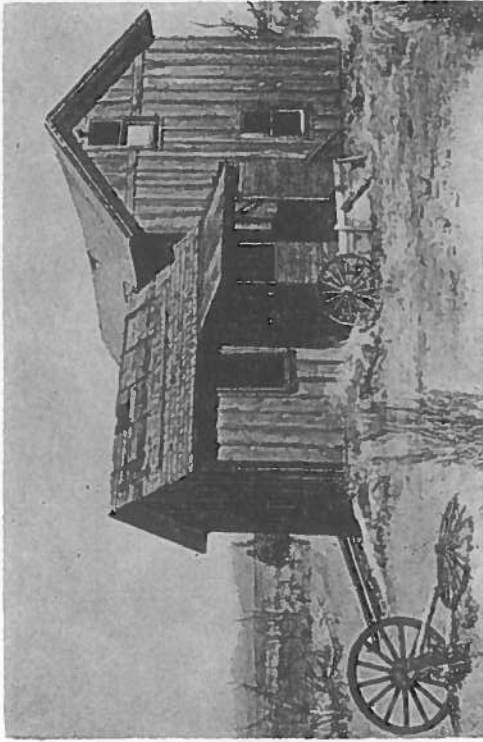
It is this soil—deep, and charged with the richness of decomposed lava, but now veritable desert—that it is planned to reclaim by irrigation.

The program of development is not recently conceived. It is the consummation of a quarter-century of ceaseless effort culminating in engineering and economic surveys of wide scope. This period was preceded by an era when the idea had its inception in the dream-stuff from which all such colossal enterprises grow. The plan now calls for watering the land by diverting a tenth of the flow of the perpetually flowing Columbia—mightiest of streams on the Pacific watershed.

It has long been recognized as an economic waste to allow this dependable water supply to rush unchecked and unused to the ocean

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while close by lies an area the size of Connecticut awaiting only the touch of moisture to transform it into productive farm land. Water is indeed the most precious resource of the West. In recent years people living in the favored farm belts of the nation, where ordinarily natural moisture is ample to produce bumper crops, have felt the



A typical abandoned farm in the Columbia Basin.

searing clutch of drought, and realized their dependence upon supply of moisture. Without water millions of western acres are no more than desolate desert—but with water they blossom forth, sustaining man and beast and supporting thriving cities. Dr. Israh Bowman, president of Johns Hopkins University, characterizes the waste of water in the United States, and attendant evils, as “worse than war”.

Only the problem of financing such a development has held back actual commencement of the project. Now, through a plan calling for power generation as well as diversion of water for irrigation, it has been possible to place the development on a self-liquidating basis. These two uses—water for irrigation and water for generation of tremendous electrical energy—have become complementary objec-

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tives in the final plan. These combine with the benefits of flood control and improved navigation to justify one of the soundest, yet most ingenious, projects conceived by the mind of man. The immediate and lasting benefits to the West and to the Nation as a result of this project now under construction are worthy of study by every American citizen. The harnessing of the Columbia through the construction of the gigantic Grand Coulee Dam is the first essential stage in this conservation project.

The Greatest River of the West

Fed by glaciers and melting snows, its discharge is continuous through year

TO GRASP THE SIGNIFICANCE of this development, an understanding of the important part which the Columbia River holds in Pacific Northwest geography is necessary.

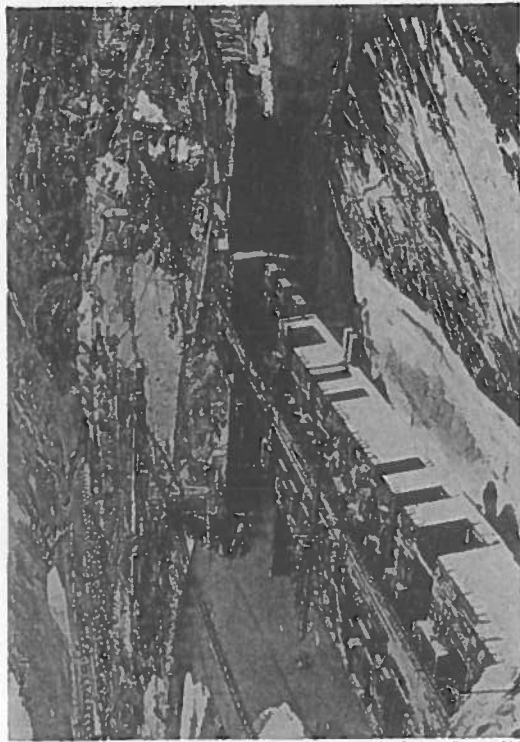
The Columbia River proper is about 1,210 miles long. It rises in Columbia Lake in British Columbia at an elevation of 2,650 feet and empties into the Pacific at Astoria. Because its source is high in a region of glaciers and melting snows, its discharge is more continuous throughout the entire year than any other river in the land. In 1934 it carried more water than all the streams of the arid region combined. Including its tributaries, of which the Snake and Pend Oreille rivers are the most important, the Columbia drains a watershed of 259,000 square miles, which roughly speaking comprises an area equal to New York, Pennsylvania, Ohio, Virginia, West Virginia, Delaware, Kentucky and Maryland.

Crossing the International boundary into the state of Washington near its northeast corner, the Columbia flows for 750 miles through Washington and along its southern border to the Pacific, falling in this distance 1,300 feet. Of this 1,300-foot drop, 975 feet occur between the Canadian boundary and the confluence of the Columbia with the Snake. Thus in the upper Columbia, nature has provided a water

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course that possesses striking potentialities for the development of irrigation and power.

Compare the Columbia with the Colorado River, made famous by the construction of Boulder Dam: the Columbia at Grand Coulee



Block by Block the goliath dam takes form.

has a maximum flow of 725,000 second-feet. The Colorado River at Boulder Dam has a maximum flow of 300,000 second-feet. The minimum flow of the Columbia at Grand Coulee is 17,000 second-feet. The minimum flow of the Colorado at Boulder is but 2,300 second-feet. The average annual runoff of the Columbia at Grand Coulee is 79,000,000 acre feet—which is more than five times the runoff of the Colorado at Boulder.

Moreover, the Columbia is unique of all streams in the country in that its peak flow comes at the height of the growing season when the demand for irrigation water is heaviest.

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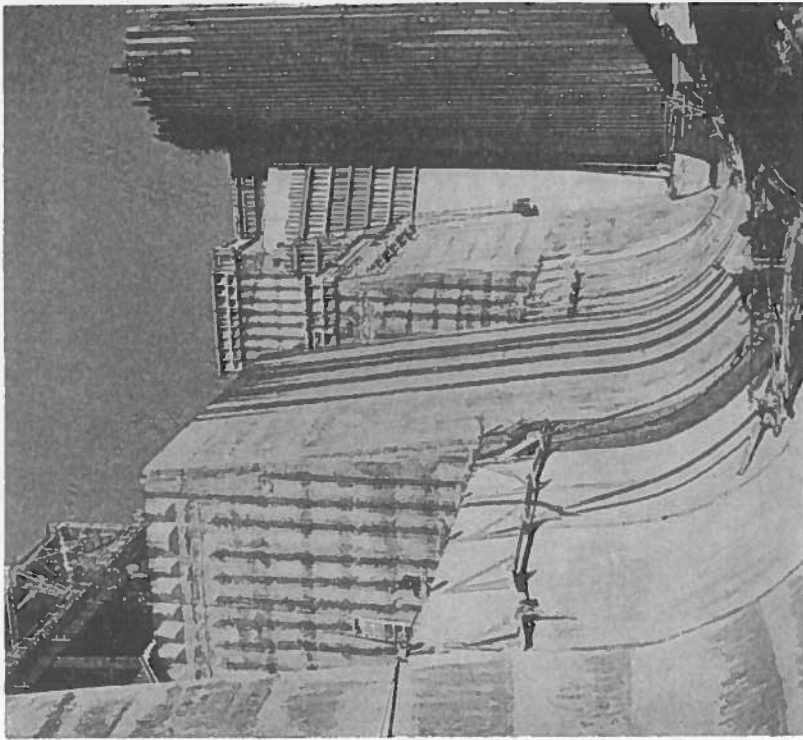
On Matching Scale With Nature

Construction of Grand Coulee challenges American engineering

IN ORDER TO HALT and hold the mighty surge of the Columbia, the engineering staff of the United States Bureau of Reclamation had to design a massive structure unequalled in size in all previous construction history. Two features make the building of the dam a construction feat without peer: first, the enormous size of the dam required to withstand the pressure of water 350 feet deep across a width of 4,300 feet; and second, the problem of controlling such a mighty river as the Columbia during the building of the dam. For sheer proportions this dam exceeds in bulk those of any single structure ever built, surpassing the Great Pyramid four times over. Its 23,000,000-ton mass will choke the river valley, impounding in the artificial lake above it 9,500,000 acre-feet of water.

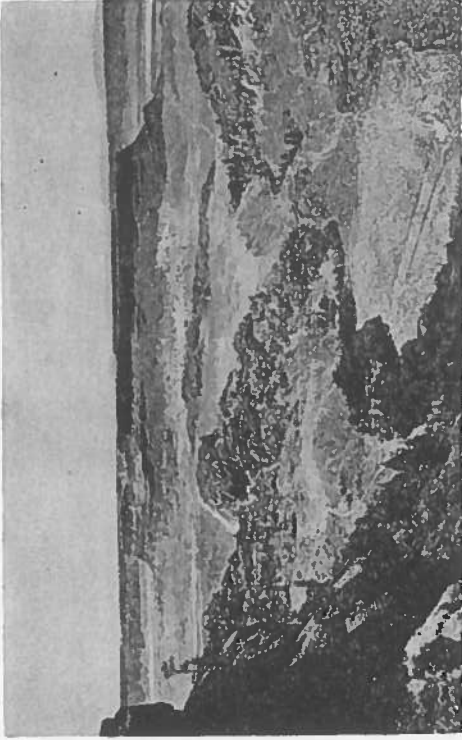
Designing and construction of the dam has presented problems never before attempted, problems for which only new type machinery and the ingenious exercise of engineering skill have provided solution. Never before has a river the magnitude of the Columbia, 700 feet across, 70 feet deep, flowing as fast as fourteen miles an hour, been wrested from its ancient channel and made to flow through a man-made by-pass while dam foundations were being constructed. Never before has a steel cofferdam 3,000 feet long been sunk to bedrock and made to hold out from such a large area the swirling waters of a flood-maddened torrent. That has been done, successfully, at Grand Coulee. Never before has a mountainside of earth—15,000,000 cubic yards of earth and rock—been transported so far by means of an endless belt conveyor as here, where such a system extended more than a mile and in addition raised the burden a vertical distance of 600 feet. Never before has a wet mass of greasy earth of a million tons been frozen into place to prevent its slippage into the excavation area. These feats and many others continue to amaze visitors to the dam and to win the acclaim of the engineering world. Then too, there is the ingenious network of belt conveyors which transmit the prepared aggregates—sand, gravel and cobblestone—to the mixing plant. This plant is in

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An "Eighth Wonder of the World" rises at the Grand Coulee.

itself a miracle of modern mechanics, and deserves its title, "The House of Magic". In it giant machinery weighs and mixes the ingredients of the concrete in exact proportions, and delivers 8,000 cubic yards of the material each day. Then there is the gravel processing plant, a mile removed from the damsite, where specially designed machinery sorts and washes many thousands of tons of sand and gravel daily. So successful have been these features and many others, that the initial contract will be completed far ahead of schedule.



In the storage reservoir, Steamboat Rock will again become an island.

Nature Provides Ready-Made Canal

Grand Coulee to be converted into huge canal and secondary reservoir

SPECTACULAR AS THE GRAND COULEE DAM will be, there was an even greater dam at this spot centuries ago. It was a barrier of glacial ice which pushed with crushing force from out of the North, choking the ancient river and holding back its flood in a mammoth glacial lake. At this time, too, were deposited the extensive beds of gravel which today are being used in concrete for the dam. Eventually as the waters of this glacial lake expanded and were added to by the stagnation of the glacier itself a mighty flood was created. The towering walls of the Columbia plateau ceased to confine it. In place after place the flood broke over, roaring south across the gently sloping tableland and grinding out great gorges. Such a gorge, now dry, is the Grand Coulee, the phenomenon from which the dam takes its name. It is

dry because the great ice mass which had confined the river eventually melted away, allowing the river to resume its age-old course. Had the erosion continued, possibly the Grand Coulee might have been etched to a depth equal to that of the old river bed and the stream would even now be taking this short-cut across the Big Bend country. But today it is dry and its frowning escarpments rise on either side a vertical distance of 800 feet, awe inspiring, weird—mute testimony to that flood which transected the land in Pleistocene time. And now, through the agency of the dam, water will again be made to course down this ancient waterway, this time to irrigate 1,200,000 acres which have long been desert.

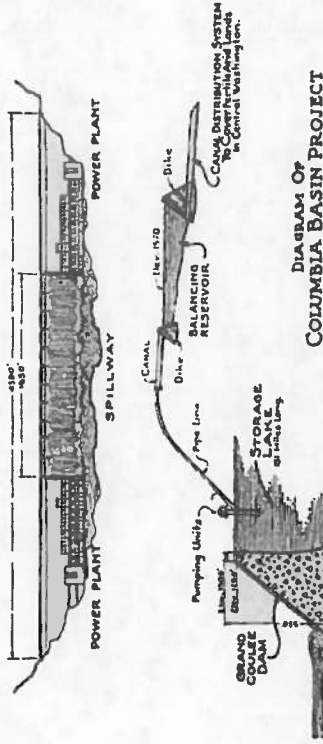
Thus the dependence of the project upon the but-little-understood schemes of Nature is obvious. Nature made the great canal for the project, 56 miles long, 800 feet deep, 2 to 5 miles wide. Nature left at the junction of the river with the coulee a perfect damsite, carved in hard, white granite whose known depth exceeds 800 feet. Nature left for use an endless quantity of perfect-type gravel on the bank of the valley. Now comes the mind of man to combine these perfect features into a perfect whole, the consummate project!

Project Authorized By U. S. Congress

Pumping system and gravity flow lands convey water to thirsty basin lands

THE ENTIRE PROJECT WAS AUTHORIZED by Congress in the passage of the Rivers and Harbors Bill, approved August 30, 1935, providing for the construction, operation, and maintenance of the Grand Coulee Dam and necessary canals and other incidental works. But funds are only appropriated annually as needed in carrying out the program. The government allocated the sum of \$63,000,000 for construction of the initial unit, preliminary work under the direction of the United States Bureau of Reclamation getting underway late in the year 1933. It is anticipated that the initial contract will be completed by December, 1937, or early in 1938, the contractors, Mason-

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Showing how water will be captured and delivered for irrigation.

Walsh-Atkinson-Kier Company, being already months ahead of schedule. Further appropriations must be secured annually in order that the project proceed without interruption. Probably about four more years will be required for completion of the great dam.

The procedure for taking water from the river and delivering it on the Columbia Basin lands, briefly, is as follows:

A straight, gravity-type dam, of concrete, is under construction across the Columbia River. Its height will be 550 feet above bedrock (height of the Washington monument). Its length will be 4,300 feet (length of fourteen ordinary city blocks). Its thickness will be 500 feet at the base, tapering to a thickness of 30 feet at the top.

Each end of the dam will be modified to include an enormous power house each containing nine generators. Between the two 800-foot long power houses will extend a spillway of 1,000,000 second-foot capacity to care for flood waters. The eighteen generators will produce over 2,500,000 horsepower of electricity, a portion of which will be taken to operate a large pumping plant.

The pumping plant, a tremendous thing in itself, will be located just above the dam and flanking the forebay. Twelve mighty units, each driven by a 65,000 horsepower direct-connected motor will boost water from the new level of the lake back of the dam up a vertical distance of 280 feet and into the Grand Coulee canal. Each pump will handle 1,600 second-feet of water, forcing it upward through

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pipes of 11-foot diameter and delivering it into the Coulee at a point 1.7 miles distant, from which point gravity moves it away to the south. Probably at no other place on earth is such a pumping plant practicable, but here the quantity of flood water which happily comes at growing season is such that only secondary (extra) power need be used for its operation. Little if any of the firm (year around) power has to be taken for this purpose.

The north half of the Grand Coulee, 30 miles long, is ideally suited for this secondary reservoir. By constructing earth-filled dikes across it, one near the damsite and the other 23 miles away near Coulee City, a perfect reservoir will be made, having all the advantages of a canal at much less expense than such a huge canal would cost, and at the same time providing temporary storage and the balancing effect of a secondary reservoir.

Into this 340,000 acre-feet reservoir will pour water being pumped from the river. From the south end of the reservoir water will flow by gravity into a man-made canal eleven miles long and thence into smaller and smaller branches until some 981,000 acres will have been irrigated; all this by gravity flow. By eventual utilization of the fall of water in the main canals, supplemental and seasonal power will be generated to lift part of the water an average height of 70 feet, watering an additional 219,000 acres.

Development Will Be Self-Liquidating

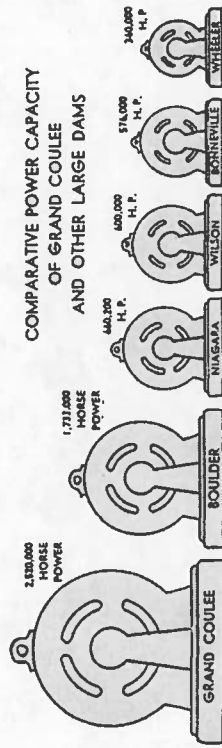
Irrigation and power revenue will repay investment to Government

THE FULL COST OF THE COMPLETED development is estimated at \$376,631,000 of which \$178,790,000 is for construction of Grand Coulee Dam, and \$197,841,000 for the irrigation features. But the maximum investment in the project is figured at \$260,000,000 since power and irrigation revenues will be credited.

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The power installation will amount to 1,980,000 K.W. which is larger than any existing development in the world today, of which 800,000 K.W. will be for the generation of continuous firm power, and the balance secondary power for irrigation pumping and standby service.

While the Columbia Basin project is primarily an irrigation development, conceived as a means of transforming a desolate and wasted



land into an area of fruitfulness and opportunity, the generation of electric power is nonetheless an essential, though secondary element. The plan for the production of electrical energy as an incidental function to the larger scheme of reclamation cleared the way in the first place for the inauguration of the enterprise, as anticipated revenues from the sale of power, together with repayments by settlers, classified the program as self-liquidating with the entire cost of the project to be repaid to the government.

Based on the current rate of increase in the use of electric power in the region, which over the past decade jumped an average of 9.5 per cent per year, compounded annually, and the predictable trend for the future, and based on the further assumption that Grand Coulee Dam will absorb only one-half of this increase after its completion, leaving the other half to new and additional developments, the entire power output of the dam available for sale will be absorbed by the market in 15 years. This market is the area within a radius of 300 miles of the dam, embracing all of the State of Washington, the northern part of Oregon, the northern part of Idaho and western Montana.

The consensus of estimate is that firm, continuous power can be produced at Grand Coulee Dam for 1.2 mills per kilowatt-hour at the

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The contractors' and engineers' towns facing each other across the Columbia.

busbar. If this commercial power can be sold at $2\frac{1}{4}$ mills, which is considered sufficiently attractive to induce large scale purchasers, the entire cost, including interest, of the Grand Coulee Dam and power plant can be liquidated in 50 years, with an accumulated surplus of \$144,500,000 available for the partial repayment of the cost of irrigation canals. After the fiftieth year the annual surplus would amount to \$15,000,000.

That this assumption is logical is indicated by conditions in the power market tributary to the Grand Coulee at this time. Both Portland and western Montana are calling for power from Spokane, which is responding to the extent of its ability, while Tacoma is feeding into Seattle all the power that its inter-connecting systems will handle.

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Already the Pacific Northwest has a much higher per capita consumption of electricity than other parts of the country. Moreover, it is expected that low power rates will attract new industries requiring large blocks of power, including chemical and metallurgical industries utilizing electrical processes. State and regional planning bodies, in cooperation with the U. S. Geological Survey, the War Department, the Bureau of Mines, and State mining bureaus, are conducting studies into the mineral and metal resources with which this region is richly endowed, while the testing laboratories of the various higher educational institutions of the States are busy searching and developing processes to prepare for such industrial advancement. It is believed by many experts that a large volume of Grand Coulee power will be needed for metallurgy alone.

Farm And Industry Will Absorb Power

Demand from basin settlers and industrial users will create market

SOY BEANS! It would seem that they would have little to do with the consideration of great power projects, but the relationship is close. It springs from the chemical wizardry that is increasingly making use of agricultural and forest products in industry. Soy beans under chemical treatment and through the use of great quantities of electric power are being manufactured and molded into many kinds of materials that have to stand a greater strain than wood.

Through the studies and investigations of the Farm Chemurgic Council, it is predicted that the industrial demand for farm products, with soy beans only one of many, will exceed the human demand in the not too distant future.

According to this organization, "50,000,000 acres of farm land could immediately be used for making industrial products"—an assertion which indicates the unlimited possibilities of American agriculture. However, great quantities of electric power are required in the processing of such products for industrial uses.

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A large amount of Grand Coulee power will also be utilized on the farms which will spring up when water is made available to irrigate the 1,200,000 acres of arid land in the Columbia Basin.

If the farms are electrified, a spokesman for the Reclamation Bureau said, there will be little or no surplus power problem. Markets will appear in the towns and cities which will come into being in connection with the settlement of an area capable of sustaining 1,000,000 persons.



From the air a graphic view of the glacial carved coulee is obtained.

Experiments in successful electrical heating of houses are being conducted at Mason City, construction city of the project. By the time the dam is completed and water available for the land, advances in the use of this form of heating units will have been made which will make electricity a logical heating plan for homes, it was predicted. Scientists of Washington State College are working on designs and insulation planned to give the greatest efficiency for electrical heating.

J. D. Ross, general manager of the Seattle, Washington, Municipal Light system, and a member of the Federal Securities and Exchange Commission, speaking recently before the Public Ownership League of America, pictured every home—rural or urban—lighted, heated, cooled, and air-conditioned by electricity, at less cost.

Take 30 Years To Examine Project

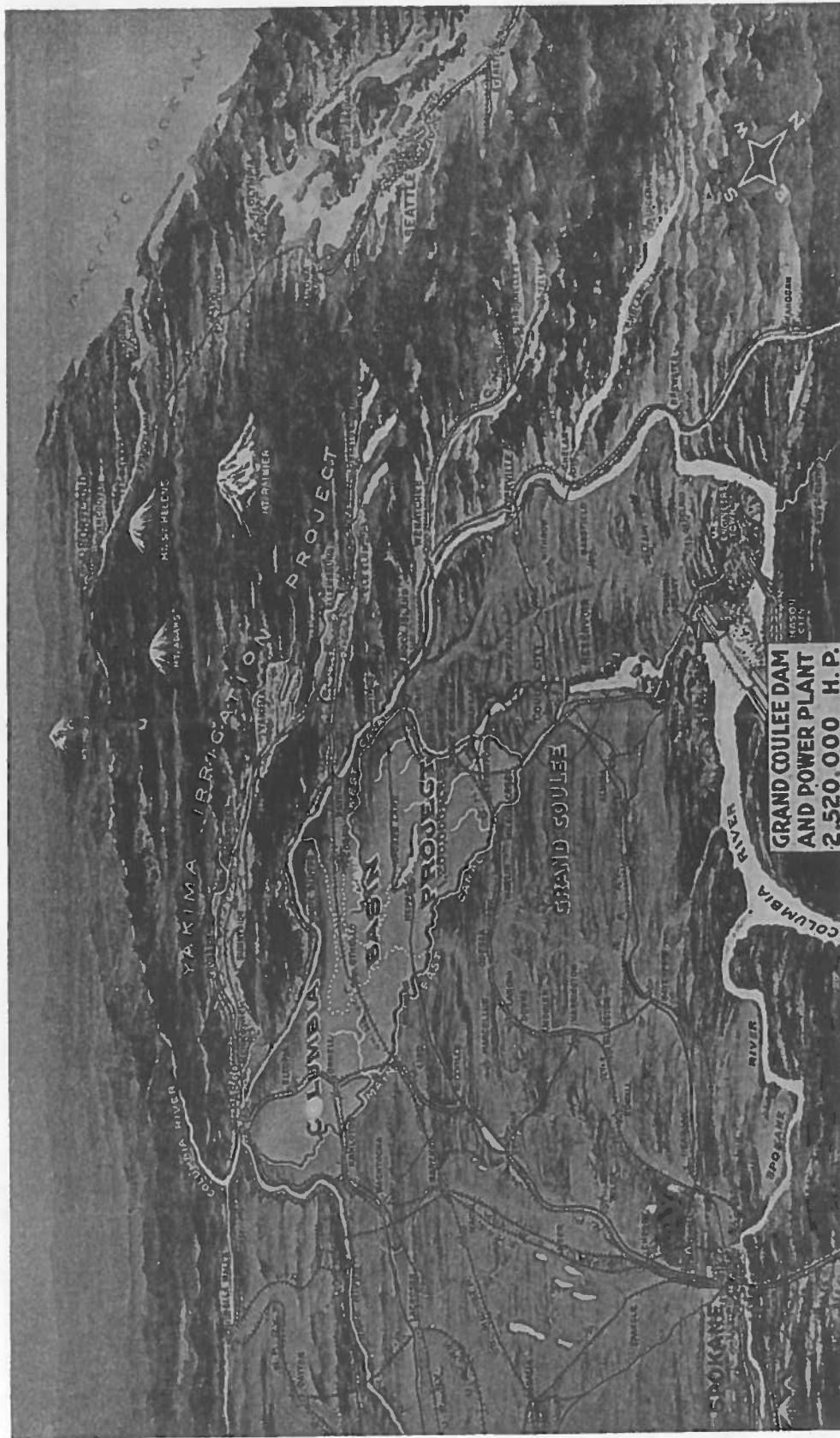
Total cost of investigations, studies, surveys, more than \$1,000,000

THE MOVEMENT TO USE THE WATERS of the Columbia to reclaim this fertile area, which would otherwise stand a perpetual liability, is not a recent one. Probably the first man to comprehend the merits of such a development was Isaac Stevens, first governor of the Territory of Washington, who in 1853 wrote to one of his lieutenants—"I suggest that you examine the great Grand Coulee".

The possibilities of irrigating the area were examined by the Bureau of Reclamation as early as 1903. Further investigations were made by the Bureau of Reclamation in 1914 and 1915. The Columbia Basin Commission conducted field work on the project in 1919. The report based on this work, published in 1920, was reviewed during the same year by the board of engineers of the Bureau of Reclamation. In 1921 the State of Washington diamond drilled the damsite and conducted further inquiries. Also in 1921, General George W. Goethals, builder of the Panama Canal, was commissioned by the State of Washington to make extensive investigations. His report found the project both feasible and practicable—"A greater national asset than the Panama Canal".

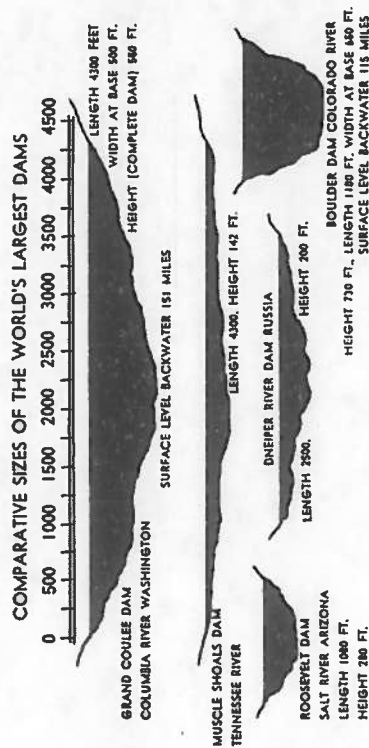
A board of engineers, drawn from the federal government and from the States of Washington, Idaho and Montana, in 1923, made a report to the Federal Power Commission that characterized the prosecution of the project at Grand Coulee the most important program in connection with the utilization of the Columbia River above the mouth of the Snake River.

PANORAMIC PERSPECTIVE OF THE COLUMBIA BASIN — GRAND COULEE AREA



Showing the Pacific Ocean; the high range of the Cascades; the Columbia River as it winds its way through central Washington; the Columbia River plateau; the site of Grand Coulee Dam; the location of the Columbia Basin project, (embracing 1,200,000 acres), which will develop a rich agricultural empire through irrigation and provide farm homes for 30,000 farmers under comfortable American living standards. The relation of the Columbia Basin project to the Yakima Valley irrigation project is shown and the excellent facilities in the way of highways and railways are indicated.

This plan, which came to be known as the Columbia River project, and later as the Columbia Basin project, was further investigated by the Bureau of Reclamation in 1923 and 1924, and a report was made for use of the committee on Irrigation and Reclamation of the United States Senate. In 1924 this report was reviewed and amended by a board of engineers of the Bureau of Reclamation, and in the same year a group of engineers and economists was appointed by the Columbia Basin Commission of the Department of the Interior to make a further study and to conduct independent investigations.



Studies of the water supply and power development problems of the Columbia Basin were continued from 1926 to 1930 by the United States Geological Survey with the collaboration of the State of Washington.

A comprehensive investigation of the Columbia and its tributaries above the mouth of the Snake River was made from 1928 to 1931 by the Corps of Engineers of the War Department. In addition to the army personnel, civilian specialists were employed to inquire into all phases of navigation, irrigation, flood control and power development. A report tendered in 1931 by Major John S. Butler, district engineer in charge of the work, contained a wealth of general and engineering data, and these were made the basis for a study of the proposed irrigation project. Cost estimates were submitted on seven distinct plans for putting water on the irrigable acreage adjacent to the Grand Coulee Dam site. The Butler report was reviewed and approved by

the Bureau of Reclamation, and the final plans for the Columbia Basin project were based largely upon it.

The Bureau of Reclamation alone expended \$350,000 for preliminary studies. Sizeable sums were also expended by the War Department and by the State of Washington. All told more than \$1,000,000 has gone into the investigations.

Without exception, all investigators have favored the systematic development of the Columbia's water resources. Presidents and cabinet members of all recent administrations have approved the movement.

From the foregoing, it will be seen the Columbia Basin project has been intensively studied, surveyed and investigated over a period of thirty years. No comparable development of recent times has been so exhaustively researched. And it was largely due to this preparation and the further fact that the Columbia Basin project was fully engineered and 'ready to go' that it was one of the first to qualify for governmental approval when public works funds became available for this purpose.

Basin Area Is Attractively Located

Readily accessible—well served with transportation facilities

THE COLUMBIA BASIN LANDS are embraced in a pear-shaped area, extending approximately sixty miles east and west, and eighty miles north and south.

They comprise parts of the counties of Adams, Grant and Franklin in Washington. The eastern fringe of the project is 70 miles by improved highway from Spokane.

The Columbia River defines the western border; the northern border touches at or about the lower end of the Grand Coulee at Soap Lake, while the southern boundary reaches to Pasco and Burbank at the mouth of the Snake River.

It is a section of beautifully lying land, at an elevation ranging from 300 to 1,400 feet above sea level, comprised of volcanic ash soil,



Potential garden acres—now sagebrush desert.

highly fertile and rich in mineral plant foods. The soil is of the same general character as the lower part of the famous Yakima Valley, which is separated from the Columbia Basin lands only by the Columbia River and the range of hills along the Columbia's banks. Natural vegetation consists of sage brush and bunch grass.

A considerable portion of the area has been plowed. Encouraged by the stored moisture in the soil, farmers reaped a crop or two, planted in vain, and finally moved on.

Averaging less than ten inches annually, most of the precipitation occurs during the winter months. A favorable agricultural climate, with two weeks longer growing season than the highly productive Yakima Valley, will be conducive to large yields and high quality of farm crops.

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These factors, together with a minimum of rainfall during the growing season, will likewise facilitate harvest operations and minimize crop losses.

The growing season is characterized by long, bright, sunny days, with the temperature reaching 100 degrees Fahrenheit occasionally. However, the low humidity of the air is such that mid-day heat is not oppressive, while the nights are invariably cool. Winters are usually mild, mean temperatures for the winter months being around the freezing point. It is often possible for plowing and other soil tillage operations to be carried on throughout the winter.

Splendidly accessible as to location, the area is served from a transportation standpoint by four of the northern transcontinental rail systems—the Northern Pacific; Great Northern; Chicago, Milwaukee, St. Paul and Pacific; and the Union Pacific.

Federal highways—improved, hard-surfaced, dustless—traverse the area which, with connecting state arteries, afford exceptional transportation facilities by motor car to every part of the State and the leading markets of the Pacific Northwest.

The area is admirably adapted to the growing of alfalfa, vegetables, sugar beets, hops, potatoes, berries, grapes, soft fruits, apples, pears, poultry, turkeys, dairying, and to carrying on livestock husbandry—products non-competitive with mid-western agriculture.

Settlement Not To Start Before 1942

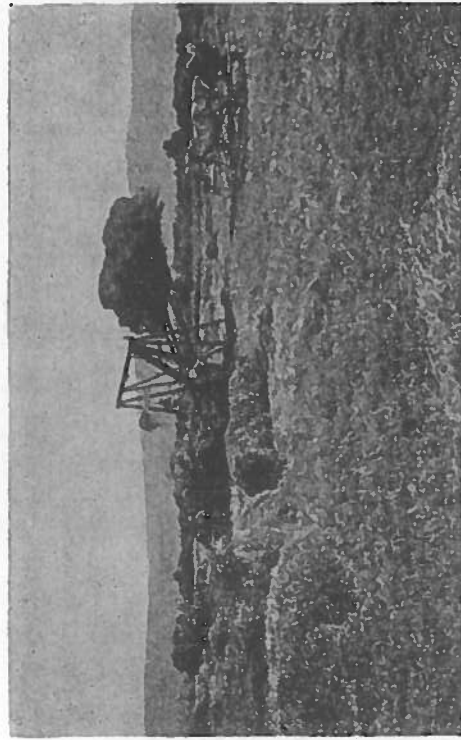
Land to be brought under irrigation gradually over period of 25 years

IT IS NOT PROPOSED that all of this land will be brought under irrigation at one time. The irrigation phase of the development will not start until the Grand Coulee Dam is completed, which if construction operations are carried through uninterruptedly, will be about four years from date. The best authorities are of the opinion it will require a period of twenty-five to forty years to irrigate and settle all of the Columbia Basin lands.

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Thus a long-time program is contemplated, bringing in units of 20,000 to 50,000 acres per year as conditions may justify—the same kind of program that has been worked out so successfully in the irrigated valleys of Wenatchee and Yakima, also in the State of Washington.

The present value of the lands ranges from \$1.25 to \$15.00 per acre, depending upon soil, location, and improvements. The present average value probably does not exceed \$7.50 per acre.



Fields of alfalfa, lush and green help provide independence to reclamation farmers.

Since the feasibility of the project depends, in part, upon the settler obtaining his land at its actual land value, both the State of Washington and the United States are taking measures to prevent speculation. It is expected that a special Commission, set up by the Federal Government and the State, will appraise the land. The basis of appraisal will be the desert land value, plus the character of the soil, location, improvements, drainage and necessary work to bring it under condition suitable for cultivation.

Probably 80 acres, 160 acres at the most, will be available to each settler on Columbia Basin lands. Of these lands, among the most fertile in the nation, this amount is deemed sufficient to provide decent living with proper electrification and home comforts.

If the original owner—or any owner—possessed more than the stipulated amount of land, he would be expected before any water is sold or delivered to sell through the Government, or others, land at the evaluated price.

In all possible ways the Government will cooperate in seeing that the settler is given full opportunity in making a success of his acreage.

The Government will also likely have a determination in establishing fair prices for the sale of town lots and other developments, aside from the strictly irrigation aspects of the project, so as to control speculation.

Guard Against Speculation In Lands

Adopt policies successfully used in other irrigation projects

THIS PROCEDURE WAS SUCCESSFULLY followed by the Government in connection with the construction and settlement of the Vale, Owyhee and Kittitas projects. The settlers on the Kittitas Project, the most recent development in the State of Washington, secured their lands at an average price of \$7.50 per acre and were not burdened with speculative land prices.

All speculative profits will be squeezed out in settlement of Columbia Basin lands under the strict provisions imposed by the Bureau of Reclamation. Furthermore, the prompt collection of annual installments for construction, maintenance and operation charges, through the taxing power of the irrigation districts to be formed, will destroy incentive to hold land for speculative purposes.

The present estimated cost to reclaim the land is set at from \$85 to \$100 per acre. For operation and maintenance, including cost of power for pumping, the figure is placed at \$2.60 per acre annually. Inasmuch as approximately one-half of the cost for installing the irrigation features of the project will be taken care of by surplus power revenues, settlers would be called upon to bear the balance under a schedule calling for \$2.00 per acre per year, beginning four years after settlement and continuing for four years, and then \$2.50 per acre for thirty-two years, without interest. Thus the total indicated payments by settlers, including construction and operation, would be \$4.60 per acre per year for four years and \$5.10 per acre per year for thirty-two years thereafter.

In anticipation of the opening of these new lands, the Bureau of Reclamation, concurrently with construction of Grand Coulee Dam, is carrying on an extensive and detailed economic survey of the Columbia Basin area, under a special allocation of funds made by the Congress.



Specialty crops will be chiefly raised on Columbia Basin lands.

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These studies will constitute a reconnaissance of the complete acreage in order to determine contours, soil texture, accessibility to canals, ownership and other important data necessary in engineering the irrigation phase of the undertaking.

They will also take into consideration the location of towns and market centers to be established on the project, the construction of roads, water supply, sewage disposal systems, drainage, and other factors essential to orderly planning and development.

No Competition With Rainfall Areas

Eastern shipments from the West restricted to specialty food products

WHILE THE ADDITION OF THE COLUMBIA BASIN acreage will benefit the West by expanding its now inadequate agriculture, it will not aggravate the crop surplus of the nation. Moreover, Federal reclamation does not and will not compete with mid-western and eastern agriculture. This is particularly true of projects in the Pacific Northwest and will be equally true of the Columbia Basin. In the Yakima Valley are produced only a negligible amount of the crops which normally offer troublesome national surpluses—corn, cotton, wheat and tobacco. The same is true of other irrigated sections of the West.

Two other crops, which show a surplus from time to time, are apples and potatoes. The apple surplus is believed to be more apparent than real, since the national production of apples has been steadily declining for forty years.

As to potatoes, the area planted to this crop fluctuates widely from year to year. This crop, being both bulky and perishable, could be

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restricted in its production on irrigated projects so as to supply only definite local market areas. This potato acreage could readily be absorbed by other crops to which the irrigated areas are especially adapted.

Another factor which serves as a constant deterrent against competition with mid-western agriculture is the isolation and remoteness of the far west from the balance of the country. The West is as remote from the middle west, the South and the East as are our foreign possessions.

The great plains belt, reaching from the Canadian to the Mexican borders and extending from the 100th meridian on the east to the Continental Divide, constitutes a 1,000-mile hurdle erected against the West, made all the more severe by the topography and high mountain ranges.

Necessarily, unavoidable transportation costs must be assessed against the interchange of products between the West and the industrial and agricultural East—a handicap which in effect acts as a high import and export duty.

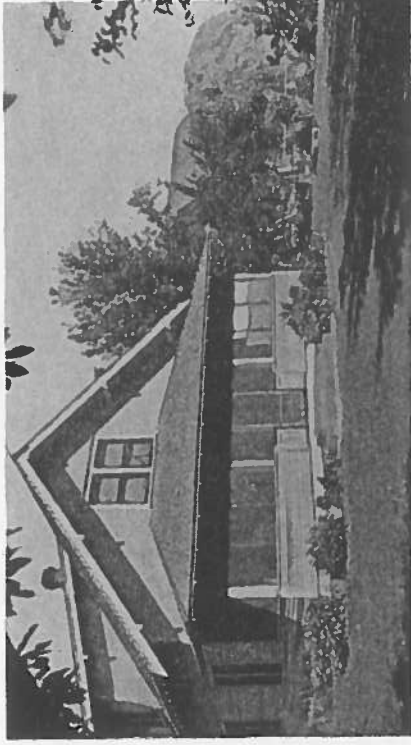
Accordingly, only products of high quality and of comparatively high value—specialty products, which cannot be produced seasonably or at low cost in the eastern rainfall areas, can surmount this distance hurdle.

One Million More Western Mouths To Feed

Consumption of staple foodstuffs increases—Western crop area decreases

BUT, WHEREAS THE DISTANCE-BARRIER controls the shipment of western agricultural products to the East, and confines it chiefly to food products of a speciality character, the Middle West will continue

to send its staple food-stuffs to a dependent western market. Each year the West's imported staples have increased in variety and quantity. The eleven western states are now the best customers of the Mississippi Valley corn and hog farmer.

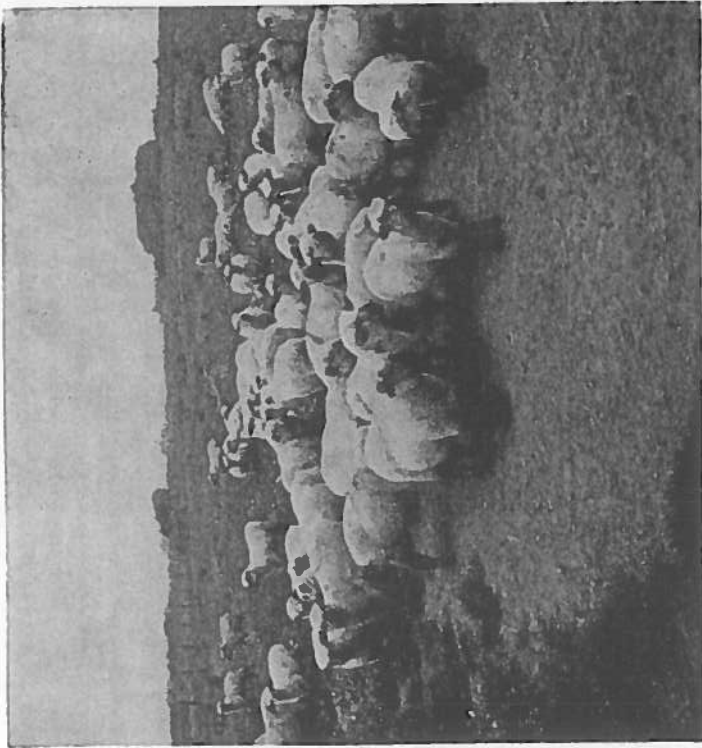


Homes, like this in the Yakima Valley, will provide comfortable living in the Columbia Basin.

No expanded irrigation development could alter this trend toward an increased western movement of agricultural products: pork products, corn, butter, dairy stock and other middle western farm products.

In other words, the land area available to western agriculture is inexorably restricted and, aside from the areas which are now irrigated and those additional areas to be brought under cultivation through the application of surplus stream-flow to arid land, agricultural expansion in the West is at a standstill. It seems practically certain that production will continue to decline on the dry-farm lands of the West because of soil and wind erosion and fertility depletion.

Soil erosion is taking out more land from the nation each year than has been reclaimed by the Federal Government since the inauguration of the irrigation work of the Bureau of Reclamation. Furthermore, with population growth in the West far out-stripping its land development, this condition will become more aggravated.



Irrigated lands are required to fatten sheep and livestock.

Figures from the 1935 census show that in the eleven western states, the agricultural area available for crop decreased by 4,016,034 acres.

In California, a typical state practicing irrigated agriculture, where as 14,684 new farms were carved out of the state's tillable acreage during the past five years, the actual acreage of land available for crop in the state showed an increase of but 165,688 acres.

Between 1920 and 1930 the population of the eleven western states increased 33.6%, from 8,902,972 to 11,896,222, or approximately 3,000,000. No data are available for the past five years, but it is estimated there are at least 1,000,000 more mouths to feed than five years ago.

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Therefore, if crop acreage in the West were merely to keep step with the demands of its own increasing population, there should now have been between 1,200,000 and 1,800,000 acres of additional land developed for crop production.

Essential To Mid-West Livestock

Irrigated lands needed for winter feeding of lambs and cattle

THE INTEREST OF THE LIVESTOCK INDUSTRY and a consideration of the use of a vast empire of land in the western states, suitable only for seasonable grazing of livestock, is closely allied with the question of reclamation of land by irrigation.

On the western ranges are produced 55% of our sheep and lambs, 33% of the cattle and calves, and 75% of the nation's wool and mohair. In the West are produced the unfinished lambs and unfinished cattle for the middle western farmer to fatten for market. The livestock business of the West is complementary to, not competitive with, the Middle West. Cattle and sheep, summered on rugged grazing lands high in the hills, are moved to fertile lower lands for wintering and fattening. This is the sound economical practice which has endured in many countries for many centuries. The ranges in the eleven western states could be put to but a limited use were it not for irrigated land in river bottoms within practical trailing or shipping distance. In nearly all these states there is a demand for irrigation of additional lands solely for the production of winter feed for breeding herds and flocks summered on nearby ranges.

The reclaimed acres of the Columbia Basin will be a notable addition to such lands, lying closely adjacent as it does to the famous grazing areas of the Okanogan and Nespelern country of North Central Washington.

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Immediate Benefits Of Construction

Distributed through nation in purchases of machinery, equipment and supplies

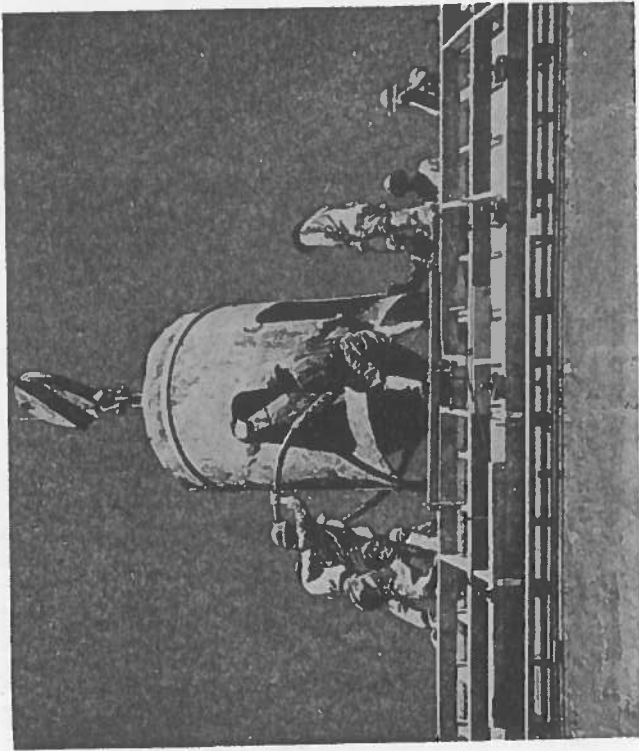
IN ADDITION TO THE FUTURE ADVANTAGES, what are the present benefits that are being obtained from the Grand Coulee Dam and Columbia Basin project? Employment is given to over 5,000 men who with their families constitute a population of 15,000 people living at the damsite. Thousands of others are working in cement mills, in lumber mills, in steel fabricating plants, in various other factories, for public utilities, on the farms, in production of food, and in marketing and transporting the material used in construction, clothing and other necessities for the workmen and their families.

A still greater army of workers are busy back east of the Mississippi where practically 50 per cent of the money so far spent has gone for steel sheet piling, rubber belt conveyors, power shovels, tractors, sand and gravel plant, concrete plant, trucks and "buggies", automobiles, tools and other untold items of plant and equipment materials and supplies. The transportation of these commodities has been, also, a huge item. Money has been directed into the regular established channels of industry and supplied work for thousands of persons at employment of their own choosing and at prevailing wages.

According to *Department of the Interior*, cash registers rang in 40 states and the District of Columbia as \$23,647,026 worth of equipment and materials was purchased.

"The remarkable spread of off-the-site work provided by Boulder Dam is equalled at this time in the construction of Grand Coulee Dam", the Secretary of the Interior stated in commenting on purchases made by the Bureau of Reclamation and the principal contractor (Mason-Walsh-Atkinson-Kier Company). "The thousands who have obtained employment at prevailing wages at Grand Coulee Dam these last three years have been only the advanced guard of an army of men spread in a great fan of factories, forests and mines, and on railroads, completely across the continent.

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An army of men, at the dam and in the line of supply, is at work.

"This army has been sending up materials for use at the dam, and their employment to that extent has been given by the construction of Grand Coulee Dam just as surely as if they had strung the cable they made, or drove the steel piles they fabricated, at the site itself."

Of the total of \$37,941,995 expended as of December 31, 1936, it is estimated that over one-half has gone for off-the-site labor in producing the items purchased in the 40 states and the District of Columbia.

Of the amount paid for labor locally on the job, amounting to \$13,519,123, representing 17,793,244 man-hours, no determination can be made of the amount of money that finds its way to the Eastern manufacturer for food-stuff, clothing, etc.

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About half of the money which has gone for materials and supplies has been spent in states east of the Mississippi River. Expenditures of more than \$1,000,000 have been made in each of seven states—California \$1,805,223; Illinois \$1,855,986; Indiana \$1,078,575; New York \$1,525,769; Ohio \$1,884,538; Pennsylvania \$1,237,228; and Washington \$10,697,169. While the largest total appears for the State of Washington, in which the dam is being constructed, many of the purchases made there have been made through dealers, and much of this material is manufactured in other parts of the country. No attempt was made to trace these purchases beyond the dealer.

In addition, purchases were made of more than \$100,000 in each of ten states: Colorado \$145,187; Delaware \$158,020; Iowa \$169,601; Massachusetts \$118,212; Michigan \$151,687; Minnesota \$565,150; Missouri \$155,292; New Jersey \$797,447; Oregon \$645,880; and Wisconsin \$238,274. Other states where purchases large and small were made were Alabama, Arkansas, Connecticut, the District of Columbia, Florida, Georgia, Idaho, Kansas, Kentucky, Louisiana, Maine, Maryland, Montana, Nebraska, Nevada, New Hampshire, North Carolina, Rhode Island, South Carolina, Tennessee, Texas, Utah, Virginia and West Virginia.

New Exclusive Home Market

Will release wealth of purchasing power throughout the entire nation

RECLAMATION PROJECTS, SUCH AS WILL be brought about by the Columbia Basin development, add vitally to the life blood of purchasing power which supports American manufacturing and industry.

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Reclamation means intensive farming, which with the production of tree fruits, vegetables, sugar beets, poultry, dairy products and other specialty crops, involves large amounts of labor in cleaning, sorting, packing, processing, and related activities.

Based on a survey made by the Washington State Planning Council, the Yakima Valley—a "typical" western reclamation area—embracing private, cooperative, district and state, as well as federal projects, is shown to have a purchasing power considerably above the nation's average.

Furthermore, retail sales per capita in such irrigated sections, exceed in volume similar transactions in non-irrigated districts.

According to this survey, the average person living in the irrigated counties of Washington—Okanogan, Chelan, Kittitas, Yakima, Benton and Walla Walla, puts more money into retail channels than the average individual residing in any other county in the state.

Going a step farther, it is also shown that retail sales per capita in the three cities that are the central trading points for this irrigated area exceed similar transactions in fifteen other Washington cities with a population of 10,000 or more. Retail sales per capita, moreover, substantially exceed similar transactions even in the largest cities of the eastern United States.

More than fifty million dollars in new wealth is produced annually in the Yakima Valley, of which more than half is expended for the products of eastern industries.

Based on this, what would the development of the Columbia Basin mean to the rest of the nation?

This matter is dealt with concisely and forcibly in the Yakima Valley Survey, as follows:

"Although the natural resources of the Yakima Valley are not fully developed, with an irrigated acreage of approximately 350,000, it

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population should divide about equally between the rural and urban sections.

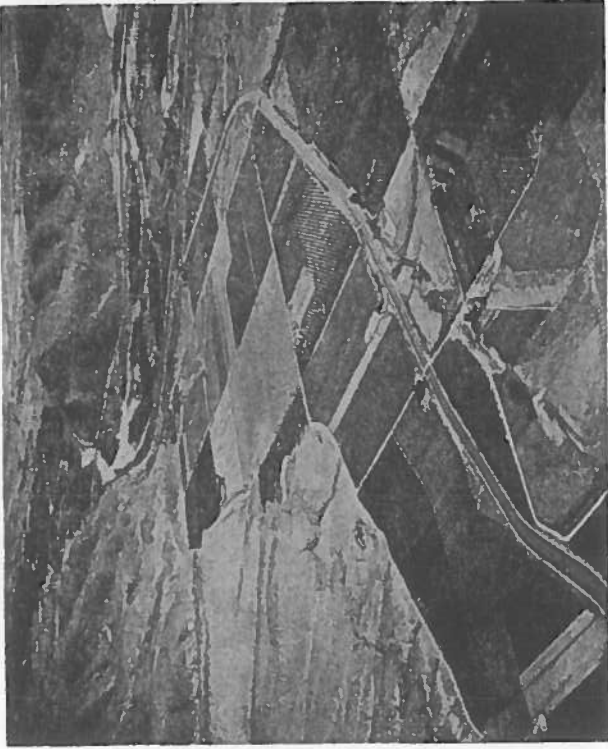
"On completion, the Columbia Basin Project would mean the establishment of 25,000 to 40,000 new farm homes, with a farm population of 100,000 to 200,000 people. In the gradual building and equipping of these homesteads, there will be a steady demand over a period of years for products of eastern industry, including such items as farm equipment, fencing, building hardware, stoves and furnaces, plumbing equipment, furniture and household wares, automobiles, motors, pumps, trucks, and tractors.

"With these farms would grow up thirty to fifty or more small communities, towns and cities, with a total population equaling that on the farms, or 100,000 to 200,000 persons. Besides the building of homes and business buildings, there would be required all the machinery, equipment and supplies incidental to the building of roads, schools, libraries, water and sewer systems, laundries, cold storage plants, warehouses and packing plants, canneries and evaporators, garage and service stations, machine shops, banks, post offices, telephone and telegraph systems, theaters, parks and recreation centers, and all of a thousand-and-one service activities of modern communities, each one of which spells business for the eastern manufacturer, wholesaler and jobber.

"The Columbia Basin area when fully developed may be expected to produce in agricultural and related products, annual wealth to the extent of \$150,000,000 or more—wealth that means purchasing power.

"And as water flows from the mountains to the sea, so will the greater portion of this wealth flow year after year to the centers of commerce and industry in the eastern United States, where are produced the necessities, conveniences and luxuries which have come to be a part of the American standard of living. Released in those centers this wealth will circulate through the channels of trade, stimulating all industry."

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The magic touch of water creates rich productivity out of arid waste.

now has a population of 110,000. When the development of its resources reaches the development achieved in the older agricultural regions of the United States, it is plain the Yakima Valley will contain, exclusive of any further industrial development, substantially larger population than at present.

"The Columbia Basin area, since it has three times the acreage of the Yakima, can be expected to have between 300,000 and 400,000 population when it has reached the Yakima Valley's present state of incomplete development of its natural resources. Substantially greater possibilities lie ahead of it, as is the case with the Yakima Valley, when its resources are fully developed. Likewise, in the light of the experience of the Yakima, Chelan and Okanogan irrigated regions, its

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Security And Happiness

Reclamation makes for better living under American standards

FARMING ON LAND UNDER IRRIGATION is rural living at its best. The growing season is characterized by long bright days—with plenty of moisture when needed. Irrigated acres are lush in alfalfa, green with vegetables, colorful with fruit. The agriculturist is freed from anxiety about the weather. There are no devastating floods to sweep away a lifetime's earnings. There are no droughts to shrivel the fields and mock the industrious farmer's efforts. There are no prolonged cold winters and intense cold is a rarity. Crop failures on properly irrigated land are practically unknown. Since diversified planting is possible, the richness of the soil is conserved and the farmer is able to plan his crops so as to profit by seasonable market demands. Certainly here is an environment congenial to man. The extent of its providence is limited only by the extent of the man's ambition and the scope of his aspiration.

Irrigation districts are closely knit communities. Comfortable homes, good cars, good clothing, the type of communities capable of supporting good schools, churches, marketing and shopping facilities. Men, women and children on irrigated farms can make an honest livelihood worthy of their efforts, meeting the American standard of living and maintaining the American standard of citizenship. It is evident, therefore, that the development of the country's physical resources through reclamation tends to preserve for the nation a far greater asset—tends to enrich the human values of its people.

In the use of western rivers now hurrying away to the sea and in the reclamation of fertile arid lands now baking in the sun, lies a goal of thrift in utilizing resources now dormant—lies the possibility of a self-contained nation—lies a better, more prosperous, rural life.

