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NOTICE.

ANY WOMAN OR GIRL NEEDING help or advice, is invited to communicate, either in person or by letter, with Ensign L. Anderson, matron of the Salvation Army Women's Industrial Home, No. 1689 King street.

VISIT THE ZOO

A trip to the Zoo, at Kaimuki, is enjoyable to children and parents alike.

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NUUANU RESERVOIR MAY NEED TWO YEARS

Cost Will Be Double the Estimated Figures.

"If I am held to the specifications of my contract and compelled to move the one hundred thousand yards of dirt needed for the dam on the Waikiki end by sluicing, the reservoir can not be completed within two years," said Contractor L. M. Whitehouse, to an Advertiser representative yesterday at the site of the new number 4 reservoir in Nuuanu valley. "If I had fifteen or twenty cubic feet of water to work with I could do something, but this is all the water I have," and he pointed to the tiny stream which carried less than one cubic foot a second.

Sluicing is the cheapest way to move dirt but the economy in this case, to the mind of Mr. Whitehouse, would be dearly secured. To complete the earthwork of the dam by the aerial tramline in use on the Ewa end would exceed the cost of sluicing by \$40,000, but would complete the work eighteen months quicker, an item more than offsetting the increased cost.

PROGRESS OF THE WORK.

At present the work on the big reservoir dam is about one-fourth done, the earthwork on the Ewa end is about completed and the trenches for the core-walls have been dug past the bed of the Nuuanu stream. Nothing has been done on the Waikiki end of the work since the ground for the spillway was sluiced off some time ago and filled all the Honolulu taps with mud, except to survey for a few yards of railway line up to Lulumahu gulch for the transportation of rock for the riprap lining of the dam.

The earth for the Ewa end of the dam is being conveyed from the higher hillside by an aerial tramway with self-dumping buckets, acting through gravity. Each bucket brings down a third of a yard of red earth and scatters it along the embankment wherever desired. This tram is the idea of Mr. J. H. Moragne, engineer in charge for the contractor, and is now being patented. Another labor-saving device, not patented, is employed in pounding this earth into solidity, a herd of Shetland ponies being driven up and down over the loose dirt, tamping the whole firmly into place.

SEVERAL SPRINGS DEVELOPED.

The excavation for the core-wall in the gulch of Nuuanu stream has tapped a number of artesian springs, the water from which is delaying work considerably in putting in the cement core-wall, which is to strengthen the dam at the point of greatest pressure. The highest portion of the dam will be across this gulch and the core-wall is to be built up from thirty feet below the level of the stream, shutting off the flow from the uncovered springs. This concrete, which will be 156 feet long and four feet thick, will strengthen the wall so that a pressure ten times greater than a brimful reservoir can be withstood. At this point the dam is to be 400 feet thick at the bottom and forty across the top, while in other portions the thickness varies down to 100 feet.

DEVICES FOR SAFETY.

The big waste pipe, 36 inches in diameter, has been put together and the lowest effluent pipe above it is ready for the concrete which will bind these two together. Both pipes are of wooden staves and will be encased in concrete and reinforced with heavy expanded metal. It is around these pipes that the greatest danger will be found and elaborate safety devices will be used to prevent any possible leak. Along them, at intervals of thirty feet, concrete collars will be built, extending into the solid dam eighteen inches, thus shutting back any water which might percolate through.

The waste pipe is the lowest, and will be used to drain the reservoir when necessary and also to supplement the sixty-foot spillway on the Waikiki end of the dam in case of any possible cloudburst when the work might be threatened. Above this will be the three effluent pipes, at equal distances apart from the bottom to within fifteen feet of the surface. These supply the water for the water mains, which passes first through the gate chamber's screens. The gate chamber is a tower built within the dam from the bottom and protruding some twenty feet, in which the machinery for controlling the big 24 and 30 inch valves in the pipes are situated.

A foot of riprap on the inside will complete the dam, which will at high water be eight feet above the surface.

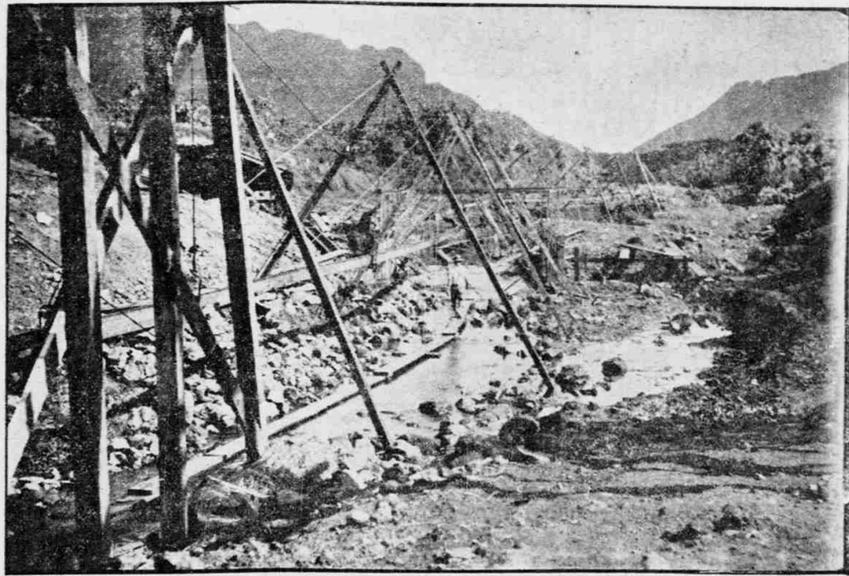
THE STORAGE CAPACITY.

When full there will be 400,000,000 gallons of water in the 70-acre reservoir, drained from 1225-acres of catchment area. The water from the Lulumahu gulch, now the principal source of the city supply, will be turned back up Nuuanu valley and emptied into the reservoir just above the spillway. From the Ewa side an 18-inch pipe pierces the dam, through which the water from Mahulu will eventually pour into the big lake. For four thousand feet the big lake, for four thousand feet the water will be piled up, in some places sixty feet deep. This water will be purer than that now supplied to Honolulu, chemical tests taken at the source showing the entire absence of animal pollution and a much smaller proportion of organic matter than in the present reservoirs Nos. 1, 2 and 3.

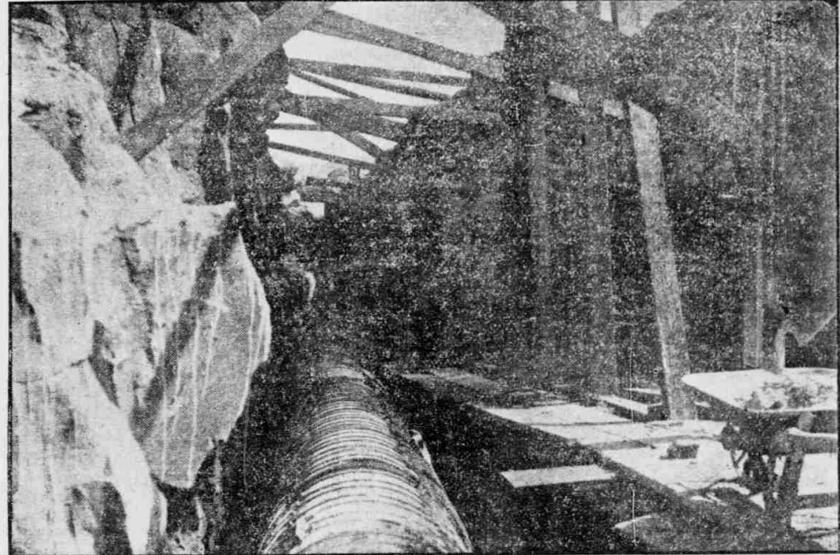
The city supply will not be taken directly from this reservoir, which will empty into the present reservoir No. 1 at the electric light power house, but the water will be saved from pollution by reason of piping in comparison with the present open, shallow flow, while reservoirs Nos. 2 and 3 will be done away with.

SANITARY PRECAUTIONS.

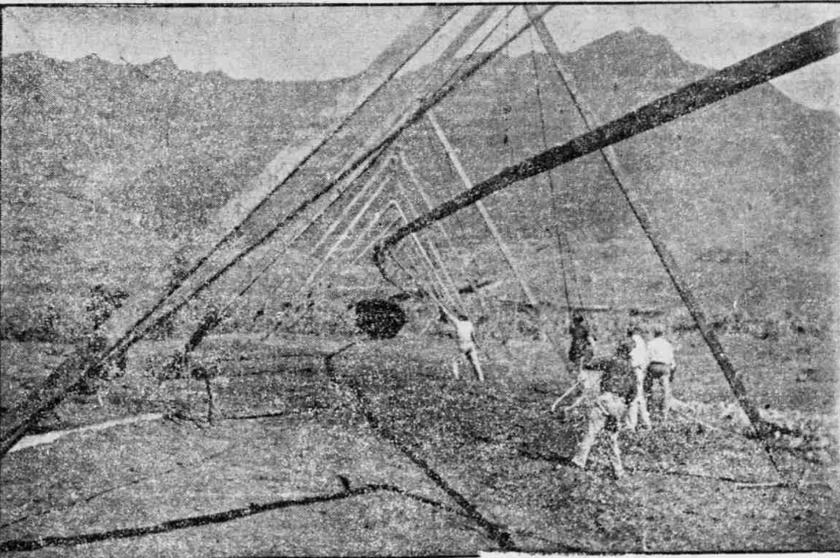
Around the works, where an average of 100 men are on the daily payroll, great care is being observed in pre-



NUUANU RESERVOIR—AT THE BOTTOM OF THE GULCH. [Advertiser Photo.]



NUUANU RESERVOIR—THE WASTE PIPE. [Advertiser Photo.]



NUUANU RESERVOIR—MOVING DIRT BY THE TROLLEY SYSTEM. [Advertiser Photo.]

venting any contamination of the present water supply, the muddied water from the core-wall trenches and the drainages from the buildings being carefully carried away in side-ditches. During the first few months of construction heavy rains interfered considerably with the work, at one time the Nuuanu stream carrying past and the contractor experienced considerable difficulty, too, in securing labor, while an abortive strike marred the harmony for one

day. A matter of congratulation to him, however, is the fact that although much of the work has been dangerous there has not been an accident beyond the most trivial among the men.

COST DOUBLE THE ESTIMATE.

The work is being carried on under the supervision of the Department of Public Works, Assistant Superintendent Howland being directly in charge. The original estimate of the cost was put at \$70,000, but the necessity of changing the plans as the work progressed and various difficulties were met with will probably run the cost up to double the estimate and will greatly delay the completion of the work past the specified contract time of October 1.

The undertaking is a big one. In the specifications provision is made for moving 150,000 yards of earth for the dam, for excavating 50,000 yards for the core-walls, of using 8000 cubic yards of stone in riprapping, putting up 9075 yards of masonry, 60 tons of iron and structural steel and putting together 12000 feet of wooden-stave piping.

AN OLD SCHEME.

The idea of constructing a main reservoir for the city water supply near the head of Nuuanu valley is not a new one. In the days of the monarchy it was proposed and during succeeding years many reports on the feasibility of the project have been piled up among the state papers. In 1850 W. W. Braner, of the Public Works Department, picked out a site for the work, his choice of location being approved of later by J. D. Schuyler, a recognized American authority

on dams, and by Engineer Allardt, of the Oahu Railroad & Land Co. The work, however, took definite shape a year ago, when S. G. Walker, C. E., presented an extended report to the Department, accompanied by working plans.

THE PER CAPITA SUPPLY.

The dam will store up the accumulated waters of Nuuanu, Lulumahu and Maole streams, giving an estimated per capita supply for Honolulu of 108 gallons daily, 28 gallons more than is used in San Francisco and nearly as much as the requirements of Oakland, Cal., where the rainfall is limited and the necessity for irrigation consequently greater. It will increase the available power at the county electric power house from 200 to 700 horse power and will be able, when additional pipes are laid, to fill any reservoir in the city, providing Honolulu with an entire gravity system.

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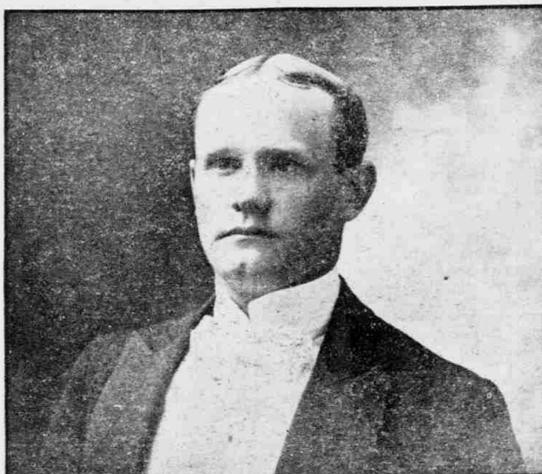
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