

POWER PLANT OF MOUNT HOOD COMPANY.

The power plant of the Mount Hood Railway and Power Company (now owned by the Portland Railway, Light and Power Co.) is one of a number of similar plants that have been built within the last few years to supply light and power to Portland and other near-by towns and cities in Western Oregon and to Vancouver and other towns in Washington. The following description of the plant, now nearing completion, is given by W. P. Brereton, chief engineer of construction:

A dam approximately 100 feet high in the middle and about 400 feet long is in course of construction across the Big Sandy River for the purpose of diverting water. The water thus diverted is carried for a distance of about 9,700 feet with about 18-foot fall through 800 feet of timber flume having a capacity of 700 second feet, 4,200 feet canal of trapezoidal section, and then through a tunnel approximately 4,700 feet long, about 11 feet by 11 feet cross section, driven through the hill, and discharges into the Little Sandy River.

About 200 feet below this point of discharge a diverting dam has been built about 14 feet high and about 115 feet long. The water thus diverted is carried for a distance of about three miles along the hillside with a 34-foot fall, through a timber flume, having a capacity of 800 second feet, discharging into a reservoir. This reservoir has an area of 180 acres with a total capacity of 138 million cubic feet, and is formed by constructing an earthen dyke about 40 feet high on three sides and using the hillside for the fourth side.

Located inside this reservoir is the intake for the three penstocks, and for this purpose the ground has been excavated down to the lowest point of the reservoir, and the intake and gatehouse for the three penstocks built up of concrete from this elevation to a height of about five feet above high water, or about 40 feet high. The forebay is about 300 feet wide, excavated down to the lowest elevation of the reservoir. A spillway is provided in this dyke for taking care of 800 second feet with a 2-foot 6-inch depth of water on the crest.

Suitable racks and stop logs are provided at the entrance of each of the three penstocks and the penstocks themselves are controlled by 10-foot butterfly valves operated by hand or electric motor controlled from the power house.

Two penstocks, each 9 feet in diameter, are being carried through tunnels from this intake for about 400 feet, where they emerge into the open, and at that point a suitable standpipe, 5 feet in diameter, and tank is provided for each penstock. These 9-foot penstocks continue down to the power house. A third 9-foot penstock is being laid from the intake for about 160 feet for future extension.

The general design of the pipe line is as follows: The pipes are carried at or near ground level, tunneling in places having to be resorted to owing to the nature of the ground, for a distance of 700 feet when each 9-foot pipe branches into two 78-inch pipes, thus forming four 78-inch pipes, two of which are connected to Platt turbines of 6,400 horse-power each, a third to a 6,400 horse-power, Wellman-Seaver-Morgan machine, and the fourth for the 6,400 horse-power Wellman-Seaver-Morgan turbine under option.

Total length of pipe line 9-foot diameter approximately 1,190 feet; total length of pipe line 78 inches diameter approximately 260 feet; total fall from pipe intake to power house, 280 feet.

Two 78-inch pipes terminate in 54-inch hydraulic valves and two 78-inch pipes in 60-inch hydraulic valves.

The dimensions of the 54-inch, hydraulically operated, straightway, wedge gate valves follow. These valves were built at the Bridgeport, Conn., works of the Crane Company.

Height, open, 23 feet 1 $\frac{7}{8}$ inches, centre of valve.
Height, closed, 18 feet 5 $\frac{7}{8}$ inches, to top of loop.
Face to face, 40 inches.
Diameter of cylinder, 40 inches.
Width over all, 37 inches by 73 $\frac{3}{4}$, bonnet flange.
Diameter of spindle, 4 $\frac{3}{4}$ inches.
Weight, 37,634 pounds.
Diameter of flanges on the run, 66 inches.
Thickness of flanges on the run, 3 inches.
Drilling, 48 $\frac{1}{2}$ -inch bolts on 62 $\frac{1}{2}$ -inch between centres.
Size of by-pass valve, 8 inches.
Working pressure, 140 pounds.
Test, 250 pounds for one hour.
Height over all from bottom of flange, closed, 21 feet 2 $\frac{3}{4}$ inches.

Each valve is located at the end of a steel penstock supplying water to turbines in the power plant near Bull Run River, Bull Run post office, about 27 miles from Portland, Oregon. The body, bonnet, disc, cylinder and piston are made of Ferrosteeel, and the piston is equipped with bronze rings. The guide ribs in the bonnet and body are bronze lined, and the discs are furnished with bronze rollers. The stems are steel, encased in bronze tubing.

Twenty-four-inch branch pipes are taken from one 78-inch pipe on each pipe line for the purpose of supplying the exciters, these branches being governed by 24-inch gate valves. The 78-inch pipe lines are safeguarded both by automatic relief valves on the turbines and also by bursting plates on the pipes themselves.

The power house is being built on the south bank of the Bull Run River, the turbine tail races discharging directly into the river. The building at present being constructed is of reinforced concrete 191 feet long by 47 feet wide; height to crane rail 30 feet, one end being made temporary. Below the floor proper and above the tail races is a basement 11 feet high suitable for small machine shop, repairs, etc.

On the power house floor proper is located the machinery.

The switchboard and control gallery are located on the back wall of this building 11 $\frac{1}{2}$ feet above the floor. Sufficient length of rails is laid into this building to enable a car to be brought in and unloaded by the crane, a 35-ton, three motor electric crane being provided for this purpose.

Immediately at the back of the power house is a small concrete building about 57 feet long by 33 feet wide in two floors, the lower floor, which is 12 feet high, being used for low tension switch room, and the upper floor, which is 12 feet high, being used for switches and bus structure. Direct access can be had from the control gallery in the power house with this latter room. The railroad track to the warehouse and depot are laid across the roof of this building.

Immediately behind this building, and on the same level as the roof of this switch room, is the transformer building, consisting of a room 18 feet wide by 53 feet long, equipped with a 40-ton, 3-motor electric crane for unloading the transformers from the cars, rails being laid right into the building for this purpose and also for repairs. Immediately behind this building and adjoining it is the transformer room proper in which will be installed seven transformers, each of 3,300 k.v.a. capacity. All the space above the transformer is taken up with the necessary bus structure for the outgoing high tension lines. All the necessary waste water and drainage is carried by pipes into the tail races.

In the water power plant are two 42-inch Type B Francis turbines manufactured by the Platt Iron Works, each of 6,400 horse-power complete with Lombard type N. S. oil