4-ft. o-in. pipe by a Y. Additional pipes can be taken from the 4-ft. o-in. pipe when required.

Location.—The location of the 25-in. pipe line for the first seven miles from the lake, follows the mountain side, parallel in most cases with the Coquitlam River, until Westminster Junction is reached. This line runs through a virgin British Columbia forest, composed mostly of large Douglas fir, cedar and hemlock. (See Fig. 9.

From Westminster Junction to Queen's Park Reservoir in the city limits, the line follows mainly the trunk road, except where it deviates on to its own right-of-way.

The Trenches.—The contract for laying and hauling the main was commenced in September, 1910. The work

Fig. 9.—Type of Country Through Which the Pipe was Laid.

was pursued all through the winter and was completed in January, 1912.

Digging the trenches was not done without much difficulty. For the first few miles the trenches were on a side hill, and considerable trouble was experienced with slides during the rainy reason, and during the thawing period after a heavy frost. Nests of large glacial boulders were frequently encountered; blasting operations had to be resorted to, and these were attended by an additional danger of the close proximity of a high-tension electric power line, at that time recently erected for the use of the Vancouver Power Co. in connection with their operations at the dam. Frequently a piece of rock flying from a boulder being blasted would cut a wire, cause the brush to catch on fire, stopping all work in the vicinity until repaired. The one and only narrow road or trail constructed for the laying of the pipe lines, was much used during the period of construction, as all the supplies for the 800 workmen at the dam had to be hauled over this road. A continual stream of four-horse and mule teams were hauling camp supplies and machinery all day. The contractors experienced considerable trouble in keeping this narrow mountain road open to traffic.

Hauling Pipes.—The pipes were manufactured in New Westminster, and as soon as they were ready were loaded on to flat railway cars and taken by rail to Westminster Junction, seven miles from New Westminster, where they were unloaded and hauled by road. Trolleys drawn by four horses were used to haul the pipes, the maximum haul being seven miles from this point.

Laying Pipes.—Special precaution had to be taken to see that no pipes were laid on the sharp edges of rock which had been blasted. Water in trenches gave considerable trouble and after the pipes were laid difficulty was experienced in preventing the pipes from floating. This was overcome by placing a layer of soft earth on the pipe and on top of this a layer of boulders. The pipe was laid giving minimum cover of 3 ft. o in. In deep ravines the pipe was carried across upon concrete piers. It will be noticed from the profile (see Fig. 10) that the line is exceedingly undulating, necessitating in some cases the use of vertical bends.

The Pipes.—It was decided to call for tenders for steel pipes of ¼ in. and 3/16 in. in thickness, and 24 ins. in diameter for a smooth pipe. It was found that a smooth pipe 24 ins. in diameter at lake level 442 ft. elevation would discharge 6,164,654 Imperial gallons per 24 hours; it was decided to adopt that diameter, and that riveted pipe, if quoted, should have such a diameter as would give a discharge equal to the 24-in. diameter smooth pipe. The lowest prices received for lap-welded pipes, 24 ins. in diameter, were as follows:—

Thickness of plate ¼ in. ..... $2.83 per foot.
Thickness of plate 3/16 in. ..... 2.74 per foot.

This gave the cost as $207,761 for 74,600 feet, which, with $13,428 for joints, made a total of $221,189.

The lowest price for double-riveted pipe, 25 ins. in diameter, was:—

Thickness of plate ¼ in. ..... $2.67½ per foot.
Thickness of plate 3/16 in. ..... 2.33½ per foot.

This gave the cost as $186,873 for the 74,600 feet which, with $17,804 for joints, made a total of $204,677 for 25-in. diameter pipe. This pipe gave an increased discharge of 205,346 gallons per day over the 24-in. smooth pipe. Although the writer was much opposed to the use of riveted pipe owing to the multitudinous rivet holes, the city decided that as a saving of $16,504 would be made and a slight increase in discharge would accrue, this tender should be accepted, provided the pipes were manufactured in the city.

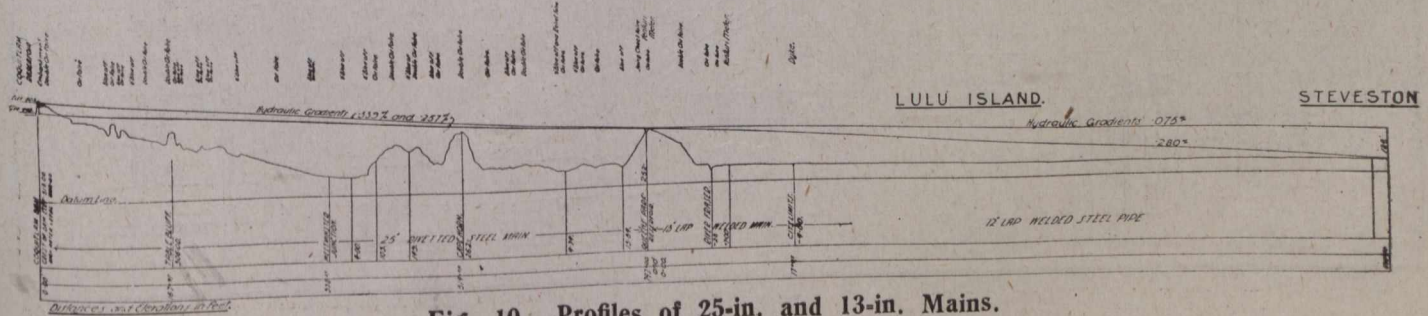

Fig. 10.—Profiles of 25-in. and 13-in. Mains.