GRAVITY WATER SUPPLY SCHEME FOR CALGARY.

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(Continued from last week's issue.)

PROPOSED GRAVITY EXTENSION.

Elbow River Weir.—The location of the proposed new intake is approximately two miles upstream from the present intake. At this point the valley is 1,350 feet wide with a well-defined and wooded island in the centre of the valley dividing the river into a north and south channel, of which the south channel is only running during the higher flow stages of the river.

During the summer of 1915 three test holes located along the centre line of the proposed structure were drilled, showing alternate layers of clay, soft and hard sandstone overlaid with the usual river drift of gravel and boulders. Under the clay and sandstones is a glacial clay strata varying in thickness from 8 feet to 18 inches, followed by a hard sandstone strata, which was explored to depths from 3 to 6 feet without penetration.

In the drilling operations it was noticed that watertightness was found in the casing upon entering the clay strata, for which reason the upstream cut-off and the retaining wall has been sealed to this strata. As a further safeguard, the spillway section has been designed for uplift pressure assuming maximum at the heel, and zero at the toe, with drain holes provided at the latter point, and also through the downstream carpet.

The total length of the structure is 1,350 feet, consisting of 30 feet of intake and undersluice section, 360 feet of spillway section, and 960 feet of retaining wall with gravel backing.

The downstream face of the spillway section is that of a ogee curve conforming to the falling nappe of a discharge 6 feet over the crest, which is equal to a total discharge of 17,460 sec.-ft., which is nearly 30 per cent. in excess of the June flood in 1915.

A downstream carpet or apron has been provided, which is designed sufficiently wide to prevent any scour at the end of the structure. Although the writer is more in favor of a water cushion than an apron, some doubt was felt as to its suitability to meet winter conditions, as they exist in this part of the country.

The intake section consists chiefly of a forebay at the entrance to which provision has been made for racks and two sets of fine screens operated by a light hand-operated travelling crane, which pulls the screens up and carries them to the washing place where they can be played upon by means of a hose, which obtains its pressure from a tank on top of the cut bank. The tank is fed from a small hydraulic ram located in the basement of the intake house, where also room has been made for a furnace and coal storage, it being the intention to steam-heat the building during the winter time.

On the principal floor of the intake house is located a 30-inch Venturi meter, also a chlorinator.

At right angle to the entrance to the forebay, and incorporated in the spillway section is a 4-ft. o-in. x 6-ft. o-in. undersluice, the principal function of which is to remove all accumulation of silt, debris and ice particles, which would tend to block the racks and screens.

Suitable retaining walls along the cut bank in up and downstream directions form the north abutment of the spillway section. The balance and the longest part of the structure is the 960 feet of dyke formed by a reinforced cantilever wall supporting a gravel backing.

The whole of the structure has been designed as a diversion weir, and not as a storage reservoir, the impounded storage to crest level being less than 100 acre-feet.

Expansion joints have been provided throughout the entire structure at 30-ft. intervals.

Pipe Line.—The extension of the present wood-stave pipe line consists chiefly of the building of 11,650 feet 30inch wood-stave pipe, together with about 750 feet of 30-inch flanged steel pipe, which is used behind retaining walls and the river crossing, where it is particularly desirable to do away with any possibility of leakage.

In investigating the present pipe line it was found that for a distance of about two miles eastward from the old intake, it was necessary either to shift the bands to conform to the new spacing as required by the additional head, or just simply to double up on the bands. It was decided to adopt the latter method in view of the fact that trouble was anticipated in connection with removing the nuts and a subsequent rethreading of the bands.

Owing to the increase in head, approximately 70 feet, the discharge of the pipe line from the new intake has been increased by 5 million gallons, giving a total of 13 million gallons per 24 hours.

Five hundred and eighty feet of steel pipe is required for the pipe line from the connecting chamber to the inlet house of the proposed reservoir extension.

There are four standard culverts on the 3c-inch extension and a river crossing with retaining walls which carries the pipe line round a projecting cut-bank, and under a backwater immediately above the present intake.

Connecting Chamber.—At a point 570 feet west from the westerly end of the proposed reservoir extension is at present located a reducing piece (30-ins. to 20-in.). It is proposed to remove this special and build in its stead a connecting chamber from which will issue the 20-inch steel pipe leading to the reservoir extension. The chamber will be provided with a flash-board control, which will enable the operator to cut in or out on the 20-inch or the 26-inch pipe line. This arrangement will therefore allow for the following combinations :—

1. To operate present and proposed reservoir jointly.

2. To cut out proposed reservoir, as for cleaning purposes, and still draw from the present reservoir.

3. To cut out both reservoirs, and feed direct into distribution system.

Now to deal briefly with the question of sedimentation and turbidity, for which the reservoirs have been especially designed:—

We have samples drawn from the city hall main representing water from both Bow and Elbow Rivers during the turbid period of July, 1916.

Expressed in percent. of total solids :--

Precipitation after 1 hour sedimentation.. 57 per cent. Precipitation after 2 hours sedimentation.. 64 per cent. Precipitation after 3 hours sedimentation.. 68.3 per cent.

Leaving after 24 hours a slight opalescence, which should not be offensive, particularly if it is considered that the period of turbidity under the very worst conditions, probably does not aggregate three months during the year.

It is possible to further precipitate chemically, and the design admits of an installation for the purpose; it