REPORT ON THE RESERVOIR AT HIGH STREET, LAUNCESTON. 16

This is one of the more important of the subsidiary reservoirs of the City water-supply system. Its chief employment is to effect a nice balance of supply to users in the neighbourhood, and it is an essential unit of the system in that quarter. That being so, it is desired by the Council to retain this reservoir or to construct another nearby. The original brick-lined structure after years of service became defective. It was strengthened by means of a reinforced concrete lining which also in course of time showed signs of weakness. Both the floor and wall of the reservoir are fractured, and the loss of water by leakage is so serious as to expose the structure to permanent injury. In an endeavour to discover the cause of the injury and the best means of repairing it the Government Geologist was called into conference.

DESCRIPTION OF THE STRUCTURE.

The original structure consisted of an 18 inch brick-wall, eleven feet in height, with the upper edge flush with the surface. This was surrounded by an outer wall of diabase clay to serve as a seal to the brickwork. The floor of the reservoir consisted of uncemented bricks placed on end. In course of time the brick wall showed signs of strain, and an inner wall of reinforced concrete, 8 inches thick and a 6" floor covering of concrete were laid down to strengthen it. The inner concrete wall was at the same time carried 5 feet higher in order to add to the storage capacity of the reservoir.

THE NATURE OF THE INJURY.

The following particulars were furnished by the City Engineer: "Cracks appear in the floor, half way across the reservoir, along lines of diversion between the sections of concrete, and in the other segment generally at irregular intervals. All the cracks are parallel to one another, to the structural axis of the hill and to the construction lines of the concrete. Transverse cracks have not been detected. Cracks appear in the wall at 20 foot intervals on the sunny side and at 40 foot intervals on the shady side, the difference apparently being due to relative degree of expansion. The wall fractures occur at the points of overlap of the unlocked iron bar reinforcement. The wall now has a decided outward tilt due to the gradual collapse of the brick abutment. Pieces of brick taken from the original or outer wall were found to have undergone considerable change. Apparently the materials used in their manufacture were sandy clays of Tertiary age, which contain an appreciable proportion of sodium and magnesium salts. The dissolution of these salts made the brick easily pervious to water and brought about its rapid disintegration. The specimens examined could be crushed by pressure of the fingers. The tensional strain causing the cracks is due to peripheral subsidence occasioned by the weight of wall and water and the outward pressure of water. Central doming is the resultant effect of the outer subsidence.

GEOLOGIC RELATIONS OF THE FORMATIONS.

The reservoir is situated at the summit of a narrow ridge trending in a meridional direction parallel to the general structural features of the area. This ridge is occupied by Tertiary sediments consisting of yellowish brown sandy clays veined with ironstone or cemented by iron oxide infiltrations, and of more plastic greyish yellow clay, and thin loosely compacted sands.

The depth of the sediments at this point is not known, but the basal diabase is probably not more than 150 feet below and forms the core of the ridge. The sediments appear in folds the common axis of which coincides in direction with the axis of the ridge. Evidently the hill form is due to and is the reflection of the buried topography developed in the earlier diabase formation. From this it appears that the folding is due to the compaction of the incompetent sediments, resulting in a thinning of the sediments over the buried diabase ridges and a flattening of the sediments in the early valleys.

PHYSICAL PROPERTIES OF THE TERTIARY CLAYS.

The beds of clay, in which the reservoir is excavated, vary considerably in thickness and in the nature of the materials composing them. The upper clay is thickly bedded and consists of a mixture of iron stained, fine grained sands and completely decomposed felspar. It is a loosely compacted material, slightly plastic, and is easily pervious to water. The more sandy bands have been cemented by iron oxide.

GENERAL REMARKS.

From the foregoing it will be seen that the beds of clay are incompetent to withstand any great pressure and are made weaker by percolating water. On this infirm foundation the original brick-lined reservoir was built. When disintegration of the materials composing the brick set in the structure began to collapse and even the inner lining of concrete failed to arrest the movement. It appears that the only way to ensure the further use of this reservoir is to construct another wall and floor inside the old ones. If a new reservoir is constructed in the adjoining paddock its safety will be in jeopardy while the water escapes from the higher one.

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October, 29th, 1924.