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20. GEOLOGICAL REPORT ON DRILLING IN THE FORTH RIVER

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A boring programme has recently been completed on behalf of the Public Works Department to investigate site conditions for a road bridge over the Forth River.

GEOLOGY

The following geological sequence has been disclosed by the drilling programme.

Period	Lithology	Thickness
Recent	Sand, silt and river gravel	?
Pleistocene	Interbedded river gravel, silt and sandy clay	12 to 41+
Tertiary	Basalt	17 to 25+
	Interbedded micaceous sand and silt with pebbly bands and clay layers	50+

Recent Deposits

A variable and unknown thickness of unconsolidated sand, clay, silt and gravel occurs along the banks and bed of the Forth River. These materials have been derived from the reworking of the Pleistocene river gravel which underlies them.

Pleistocene Deposits

Well bedded and moderately compacted beds of gravel and sandy clay are exposed in the vicinity of the eastern abutment of the Forth railway bridge. The pebbles in the gravel beds consist of sub-rounded fragments of quartz, quartzite, basalt and a variety of Cambrian rocks. Much of this material appears to have originated from outwash of glacial deposits in the upper Forth Valley. They are presumably of Pleistocene age.

No cores of this material are available due to the difficulties in coring deposits containing gravel bands. However, the experience at the railway bridge together with a study of the available exposures suggests that this deposit has adequate bearing capacity for the purposes required. Care will be necessary to ensure that footings are placed deep enough so as not to be affected by scouring. No positive evidence as to the likely depths of scouring is available but the suggestion of 6 to 8 feet appears reasonable.

Tertiary Basalt

Fresh vesicular basalt was encountered between 36 feet and the bottom of Hole No. 9 at 51 feet 10 inches. In other holes the basalt was completely decomposed. However, the resulting stiff clay retains all the structure of the original rock. It is expected to have adequate strength to carry any loads transmitted from the overlying Quaternary deposits.

As may be expected, the upper and lower surfaces of the basalt layer are uneven but no large scale irregularities have been detected. However, the possibility exists of a buried river channel in the vicinity of piers 1 and 2.

Sub-Basaltic Tertiary Deposits

These consist of highly micaceous silt and sand containing quartz pebbles and occasional bands of stiff red clay. In Hole No. 3 the contact of these sediments and the overlying basalt was intersected. It consists of baked red claystone, sand, grit and conglomerate which have been irregularly cemented with iron oxides forming a tough compact rock at least 2 feet thick.

This deposit proved difficult to sample effectively by drilling on account of the presence of waterlogged sand and pebbly bands. However, a few sections of good core were obtained in the bands of stiff clay. The deposit appears to be made up mainly of the weathering products of Precambrian quartzite and phyllite which occur in this vicinity, the micaceous silt and clay being derived from the phyllite and the coarse sand and pebbles from the quartzite. The clay bands are well compacted, thinly bedded and firm but the samples of the remaining large portion of the deposit were inadequate for any opinion to be formed as to their original nature.