

TR 11-83-88

15. SITE INVESTIGATION, VICTORIA BRIDGE, DEVONPORT

by W. R. Moore

ABSTRACT

This investigation of the bed of the Mersey River at Devonport shows a sequence of sand and gravel overlying unweathered dolerite or clay derived from the weathering of dolerite. The surface between the clay and the unweathered dolerite extends irregularly across the river.

5 cm

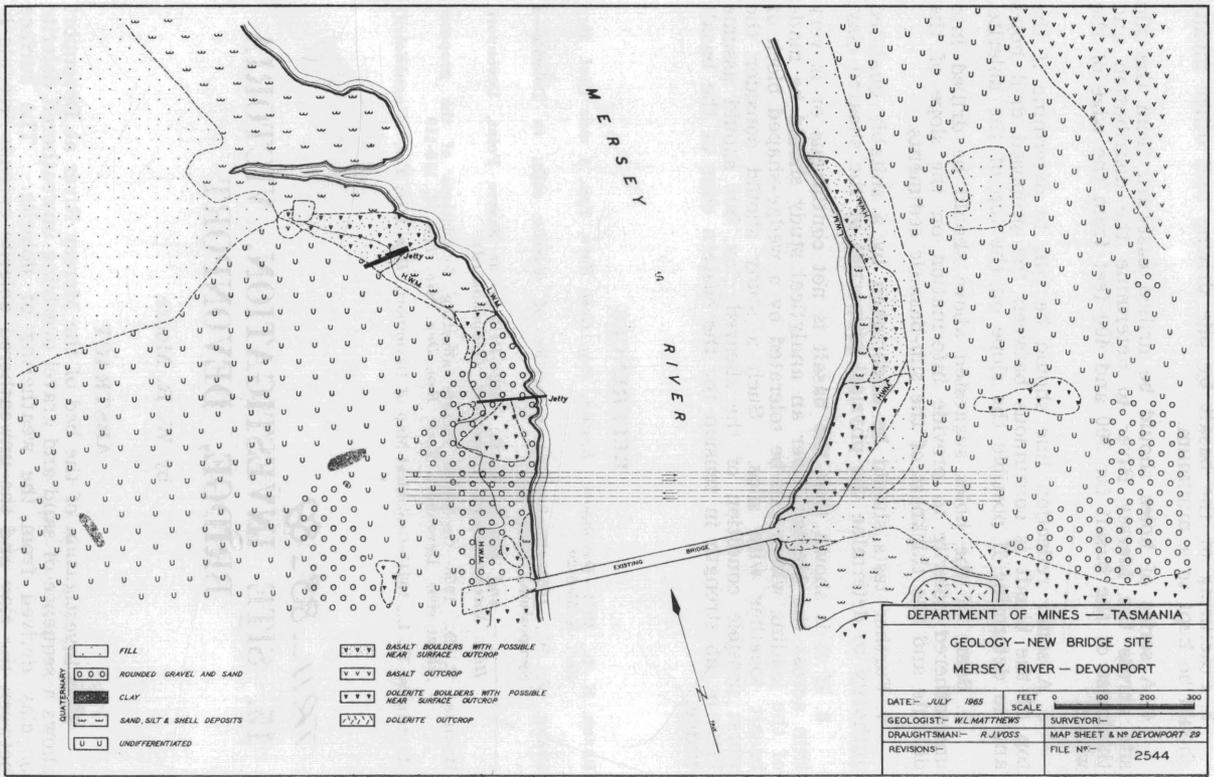


FIGURE 28

LOCATION

The proposed site for new twin bridges is approximately 100 feet downstream from the present Victoria Bridge across the Mersey River at Devonport.

SITE INVESTIGATION PROGRAMME

The investigation occurred in 4 stages:—

1. Geological mapping of the site.
2. Geophysical sonar reflection traverse across the river.
3. Drilling of a series of holes across the river.
4. Detailed mapping of the river bottom below the position of Pier No. 1.

Stage No. 1, geological mapping (fig. 28) was carried out by W. L. Matthews.

Stage No. 2 was carried out by the Geophysical Branch of the Bureau of Mineral Resources. These results confirm the geological interpretation derived from drilling (fig. 29).

Stage No. 3 was originally planned to consist of 6 holes, using a cable-tool drill. This type of drill was unsatisfactory due to difficulty in obtaining satisfactory samples and penetrating the river gravels. The number of holes was increased to 22 but the results were still not satisfactory (fig. 49).

In the second half of the programme a diamond drill was used in conjunction with the cable-tool. Four diamond drill holes and 4 extra cable-tool holes were drilled, mainly on the sites of the bridge abutments (fig. 49).

Stage No. 4 became necessary when the Devonport Marine Board diver reported a rock ledge with a vertical face 6-8 feet high in the vicinity of Pier No. 1, where a steep slope had been plotted from a detailed sounding of the river bottom. A technique of underwater mapping in muddy water was worked out and is described at the end of this report. The existence of a shelf of dolerite with a nearly vertical face 6-8 feet high was confirmed. Its top and bottom are obscured by boulders of dolerite, often quite large (fig. 30).

GEOLOGY

Jurassic Dolerite

The bedrock below the river channel is composed of either unweathered dolerite or dolerite weathered *in situ*. The surface of the solid rock is irregular (fig. 30). There is a rapid change from clay to deeply weathered "rotten" dolerite with concentric weathering surrounding cores of solid dolerite and then to fresh dolerite. In diamond drill hole No. 4 such a zone of rotten dolerite and clay was encountered below 25 feet of unweathered dolerite, and it is considered likely that other such zones might have been found in the other holes if they had been drilled deeper. Grey-green or green-brown clay overlying unweathered dolerite was encountered in most holes (fig. 29). This shows no sign of having been transported and can be regarded as dolerite completely weathered *in situ*. Small nodules of rotten dolerite enclosed in it retain the dolerite texture. The greatest thickness of such clay encountered was in Hole No. 4a below Pier No. 3 in the middle of the river, where 37 feet of clay was penetrated without reaching solid dolerite.

Quaternary Sand and Gravel

From the very few samples of gravel obtained, the pebbles appear to be mainly dolerite and quartzite. The latter are well-rounded and oval in shape; the former have rounded corners but are irregular and angular in shape. The average size is 2-4 inches but cobbles greater than 6 inches were recovered and large dolerite boulders are present between Pier No. 1 and the E bank. The matrix varies from mud and clay to coarse sand.

The greatest thickness of gravel penetrated was 25 feet in Hole No. 2, but several holes ended in gravel so that greater thicknesses are possible. Towards the W bank the gravel becomes more mixed with clay and finally wedges out (fig. 29).

The uppermost deposit is fine, well-sorted, quartz sand with abundant shells and shell fragments and lenses of coarser sand and silt. The greatest thickness occurs in the middle of the river where 30 feet of sand overlies gravel. Sand is absent between Pier No. 1 and the E bank where the tidal currents scour the river bed.

TECHNIQUE USED FOR UNDERWATER MAPPING

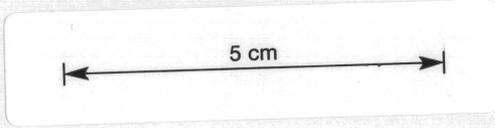
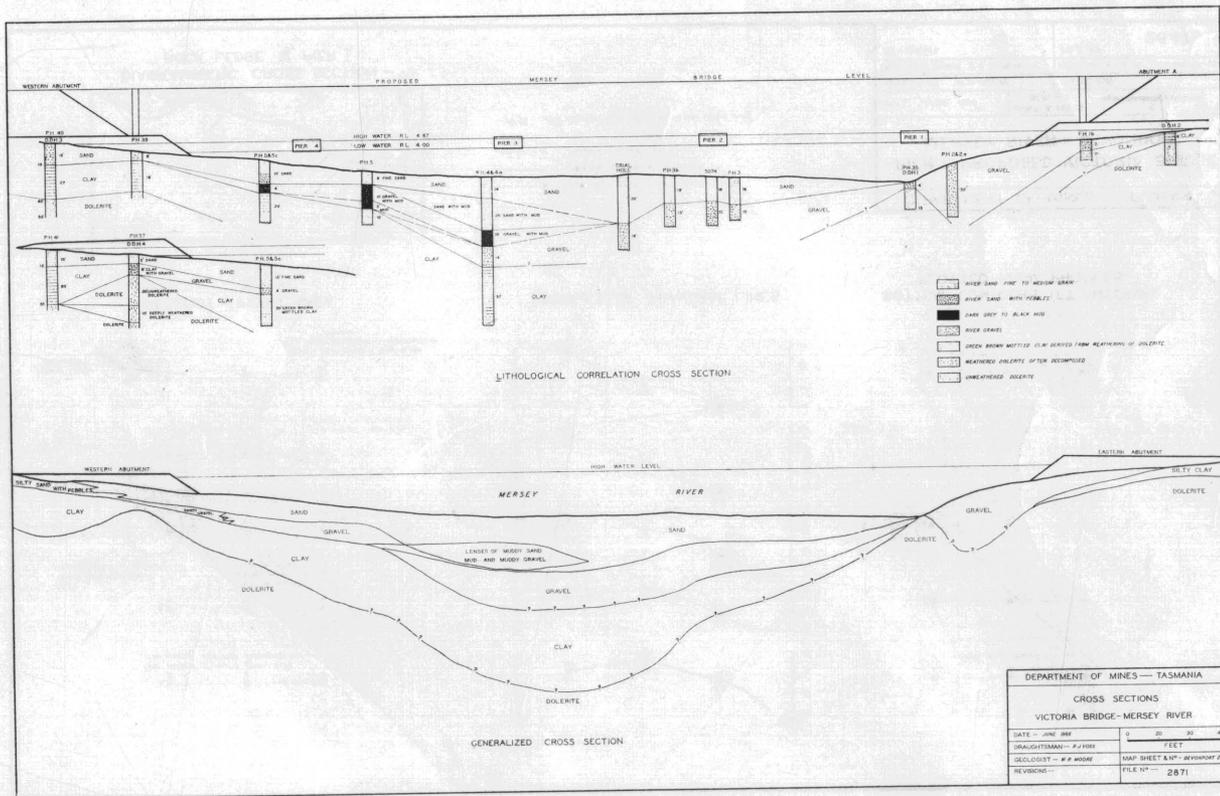
Visibility was limited to 6 feet at most on the bed of the river and this was decreased by the necessity of removing a layer of muddy slime from each surface examined. Because of swift currents at the bridge site, investigation was restricted to periods of slack water, two hours at high tide and one at low tide. The shorter period at low tide was due to a blanket of suspended mud carried upstream from a bucket dredge by the turn of the tide.

A preliminary reconnaissance map was made with the aid of 30 feet of rope attached to a ring embedded in a large weight which was lowered to the river bed at the centre point of the position of Pier No. 1. The rope was marked at 5 feet intervals with different coloured cloth. A sketch map was produced by swimming to the end of the rope in different approximate compass directions.

A more detailed map was based on a series of traverse lines laid down on the river bed by dropping white-painted numbered plumb bobs tied together with fine white nylon line (fig. 30). The beginning of each traverse line was marked with a plastic bottle marker buoy tied to a weight similar to the one used for the reconnaissance map. The traverse lines were placed in position at low tide slack water. At the following high tide slack water the positions of the plumb bobs on the river bed were checked quickly and the mapping completed within two hours, before the current became too swift for work.

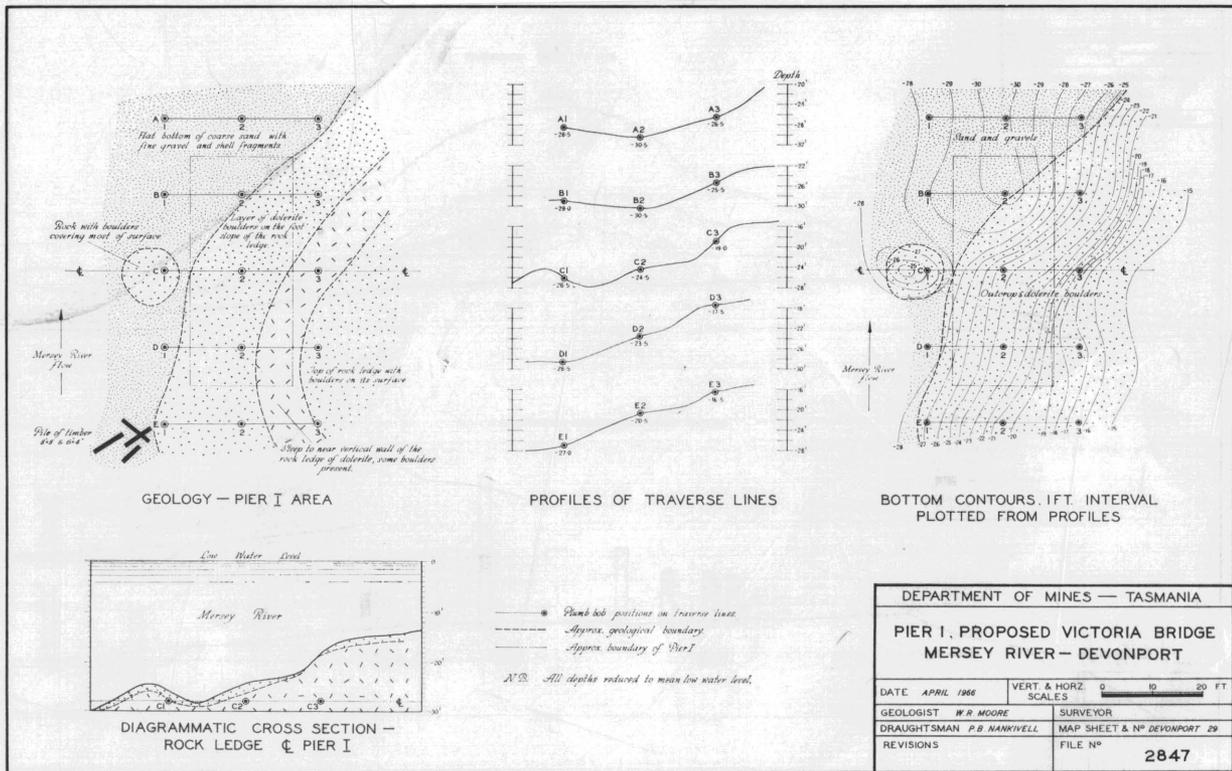
The equipment used was normal scuba diving gear except that the compressed air bottles carried on the diver's back were replaced by airlines to the diver and an air compressor and tank on the surface. This technique requires at least two attendants and is known as the hookah diving arrangement. It enables freedom of movement for long periods under water.

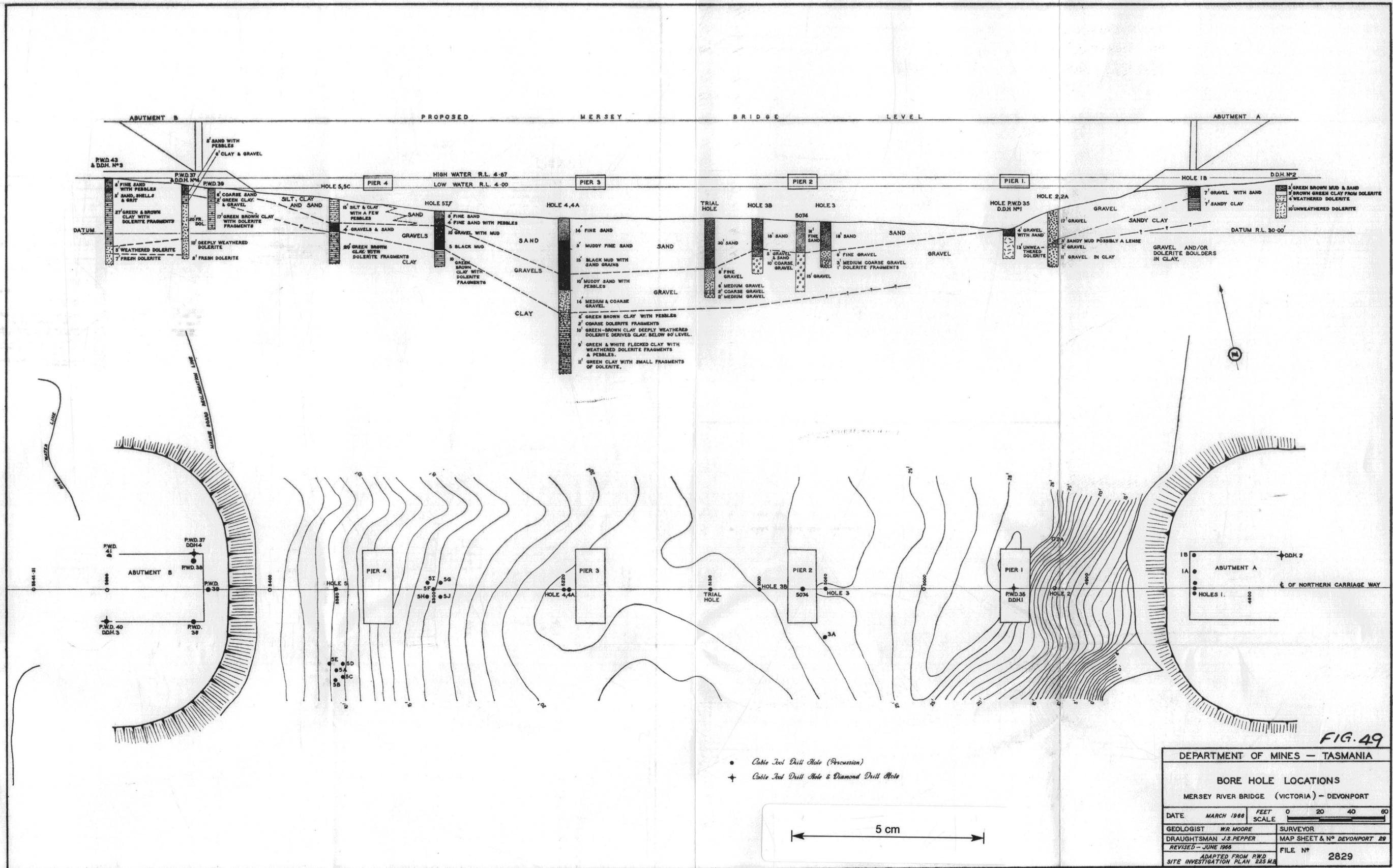
FIGURE 29



5 cm

FIGURE 30





- Cable Test Drill Hole (Discussion)
- + Cable Test Drill Hole & Diamond Drill Hole

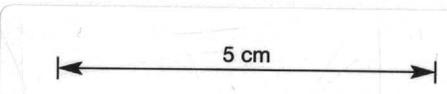


FIG. 49

DEPARTMENT OF MINES - TASMANIA	
BORE HOLE LOCATIONS	
MERSEY RIVER BRIDGE (VICTORIA) - DEVONPORT	
DATE	MARCH 1968
GEOLOGIST	W.R. MOORE
DRAUGHTSMAN	J.S. PEPPER
REVISED	JUNE 1968
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FEEET SCALE	0 20 40 60
SURVEYOR	
MAP SHEET & NO	DEVONPORT 29
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