

TR13-85-89

## Section 2 — Engineering Geology

11. SEISMIC SURVEY — EXTENSIONS TO  
STATE LIBRARY, HOBART

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## INTRODUCTION

As a buried cliff was indicated by diamond drilling at the site of the proposed State Library extensions a seismic survey was undertaken to determine its position.

## GEOLOGY

Previous drilling by the Hydro-Electric Commission and the Mines Department gave the geological succession as:—

	Depth (ft)
Recent—Fill-bricks, stones and clay .....	±5
Pleistocene—Clay with dolerite boulders	up to 26
Triassic—Sandstone and weathered shale	up to 18

The drilling also suggested a cliff up to 50 feet high in the sandstone bedrock, extending through the proposed site.

## GEOPHYSICS

### Method and Equipment

On all traverses the seismic equipment used was a portable 12 channel refractor seismograph type G.T. 2 manufactured by Geospace Corporation, Houston, Texas, and Hall Sears X2 Model K geophones with a natural frequency of 14 cycles/second.

As space was limited and shot points had to be positioned away from buildings and drains the geophone spreads were restricted in length and consequently depth penetration was limited.

Three traverses (A. B. C) (fig. 14) approximately 20 feet apart and aligned parallel to the long axis of the site were set out. Each traverse was composed of double spreads of 12 geophones 5.5 feet apart. Charges were detonated 5.5 feet from the end of each geophone spread and because of space limitations at 71.5 feet from one end only. In addition a further spread of 12 geophones also 5.5 feet apart was used to extend traverses A, B, C. This additional spread was fired from a single point 138.5 feet distant and extended each traverse by 4 geophones in a SE direction.

### Results

The table summarises the characteristic velocities of longitudinal seismic waves observed from the different layers.

Rock Type	Seismic velocity feet/sec.
Recent Fill	1,000-1,600
	1,500 assumed
Pleistocene?	2,500-3,000
Clay with dolerite boulders	2,750 assumed
Triassic sandstone and shale (weathered)	6,250
Triassic sandstone and shale (unweathered)	14,000

The seismic results are shown as profiles on cross sections A. B. C. and D. (fig. 15) and as bedrock contours on the site plan (fig. 14). All heights shown are based on state datum.

The N portion of the block is underlain by a ridge of sandstone, the top of which lies between 20 and 24 feet ASL. However S of a line between BH9 and 6 the bedrock falls rapidly to a depressed area lying between 2 and 6 feet ASL.

### CONCLUSIONS

With the exception of the depression extending ENE-WSW from B.H. No. 9 sound bedrock underlies the site at a depth of approximately 35 feet. As this depression may represent a fault zone it is suggested that further diamond drilling be undertaken to determine its nature.



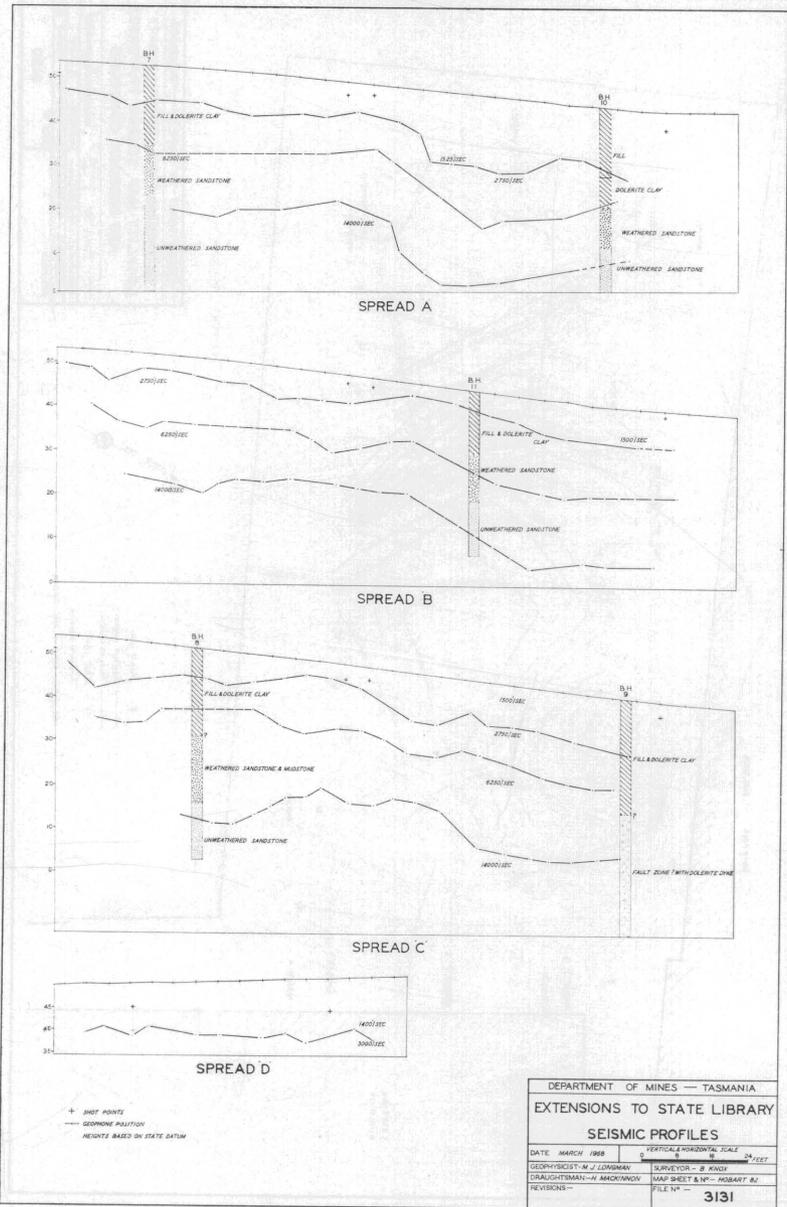
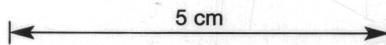


FIGURE 15.



## STATE LIBRARY EXTENSIONS — ADDITIONAL REPORT

Following seismic investigations at the site of the extensions to the State Library three angled diamond drill holes were completed to determine the existence and position of a suspected fault zone.

These diamond drill holes have been logged and show the main fault zone, which has been intruded by dolerite, to vary in width from 1.0' in BH 13 to 15.0' in BH 14. In addition another minor fault zone varying in width from 3" to 9" was also intersected (see plan).

Relogging of BH 9 has shown that this borehole occupies the main fault zone and this evidence indicates that BH 5 is in another fault zone. This zone has not been located by the additional drilling.

### CONCLUSIONS

The additional drilling confirmed the seismic investigation and shows that with the exception of the fault zone and the immediately adjacent rocks, solid sandstone underlies the site at a depth of approximately 28 feet in the NE corner and 22 feet in the SE corner.