TR 10-75-78

13. SITE INVESTIGATIONS, LIFE SCIENCE CENTRE, UNIVERSITY OF TASMANIA

by I. B. Jennings and W. L. Matthews

Three diamond drill holes have been put in along the axis of the proposed extension to the Life Science Centre. A summary of the material encountered in each hole is given.

Whilst these bores give a reasonable picture of the kind of material present under the proposed building there is insufficient information available to demonstrate unambiguously the overall structure of the area. Since the design and construction programme is a matter of some urgency the results and an interpretation are presented at this stage in order to make the existing information available.

GENERAL GEOLOGY

No. 1 bore was sited approximately on the centre line of the proposed building at its western end, No. 2 on the centre line alongside the existing Life Science building and No. 3 at approximately the centre of the building. As shown in the attached descriptions all bores intersected a layer of clay and boulders in the top of the holes. This layer is about 20 feet thick in No. 1 bore, 17 feet 4 inches in No. 3 bore and 50 feet thick in No. 2 bore. Generally this material consists of dolerite and Permian siltstone boulders, some fresh and some weathered in an abundant matrix of clay. It is exposed in road cuttings along Churchill Avenue just east of the site investigated. A few shear planes are present but the intense shearing of the matrix in the underlying material is absent. The layer is possibly a solifluction deposit of Pleistocene age but no direct evidence is available to prove this.

The boulder clay layer is underlain in Hole No. 1 by weathered dolerite showing signs of movement, due to slippage, along some of the joints. In Holes Nos. 2 and 3 the boulder clay is underlain by a layer of gravel and boulders in a matrix of altered and completely decomposed dolerite which is thoroughly sheared. The pebbles and boulders are of dolerite and Permian siltstone but the unit is distinguished from the overlying material by the intense shearing and decomposition of the matrix. It is thought to be older than the surface layer, probably Tertiary, and has probably been formed by the accumulation of landslide debris and mud flows on the eroded face of the fault scarp. The shearing is either original shearing due to movement or is due to precompression or both of these processes.

Hole No. 2 was carried to 81 feet 6 inches in this material without encountering solid rock. At 55 feet 9 inches in Hole No. 3

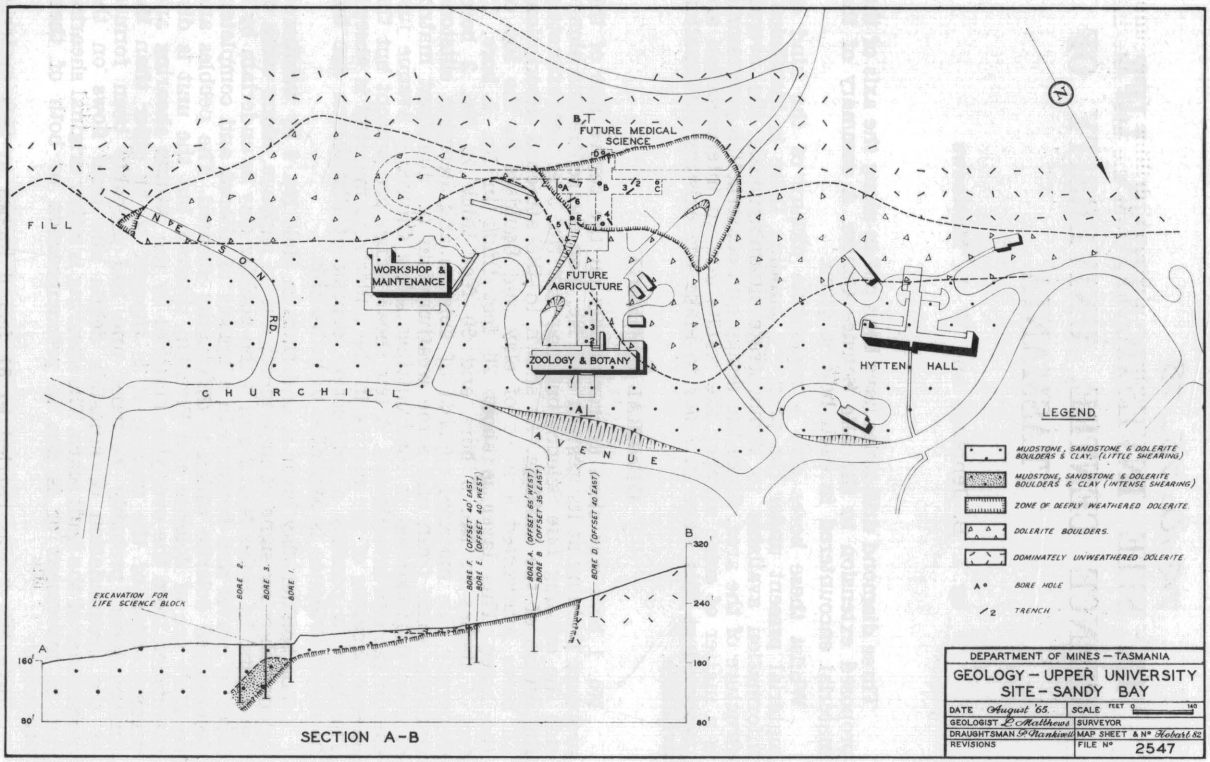
5 cm
FUTURE MEDICAL SCIENCE
FILL
WORKSHOP & MAINTENANCE
FUTURE AGRICULTURE
ZOOLOGY & BOTANY
HYTTEN HALL
CHURCHILL AVENUE
LEGEND
MUDSTONE, SANDSTONE & DOLERITE BOULDERS & CLAY. (LITTLE SHEARING)
MUDSTONE, SANDSTONE & DOLERITE BOULDERS & CLAY (INTENSE SHEARING)
ZONE OF DEEPLY WEATHERED DOLERITE
DOLERITE BOULDERS.
DOMINATELY UNWEATHERED DOLERITE
BORE HOLE
TRENCH
EXCAVATION FOR LIFE SCIENCE BLOCK
BORE 2.
BORE 3.
BORE 1.
BORE E (OFFSET 40' EAST)
BORE C (OFFSET 40 WEST)
BORE A (OFFSET 65' WEST)
BORE B (OFFSET 35 EAST)
BORE D (OFFSET 40 EAST)
SECTION A-B
DEPARTMENT OF MINES — TASMANIA
GEOLOGY — UPPER UNIVERSITY SITE — SANDY BAY
DATE August '65.
SCALE FEET 0 160
GEOLOGIST L. Matthews
SURVEYOR
DRAUGHTSMAN P. Rankin
MAP SHEET & N° Hobart 82
REVISIONS
FILE N° 2547

FIGURE 19.

dolerite was encountered and the bore is proceeding for a few feet in case this is simply a boulder. The possibility of the dolerite in Holes Nos. 1 and 3 being large coherent slip masses of dolerite from the scarp cannot be discounted without additional drilling. The simplest explanation for the structure of this site from the available information is given below.

The main fault is situated either beneath Hole No. 2 or E of it under the present Life Science building. Subsequent to this faulting an extensive scarp was left which appears to have had a trend roughly parallel to the existing building. As soon as the scarp commenced to form erosion commenced, wearing back the scarp in a similar fashion to that occurring at present along the face of the Western Tier. Deep chemical weathering of the dolerite along the scarp occurred and landslides, mud flows and talus accumulated along the front of it.

If the dolerite encountered in Holes Nos. 1 and 3 is in place and represents the eroded face of the old fault scarp then it slopes E at about 45°. To summarize, then, the site is underlain by an eroded fault scarp composed of dolerite, in places deeply weathered and sloping under the existing Life Science building at about 45°. This is overlain by a variable thickness of sheared clay containing pebbles and boulders on the lower portion of the site. Finally at the surface is a layer of clay and boulders, weathered but relatively unsheared, between 17 and 50 feet thick. The permanent water table appears to lie at between 45 and 50 feet below the collars of the bore holes. The main fault line lies somewhere to the E of Hole No. 2.

Engineering Geology

Movements could occur on the site due to several reasons.

Renewed movement along the fault

(a) A major movement of the fault would have a catastrophic effect which would involve a very large area and could probably not be designed against economically. A large part of Hobart is subject to similar risk.

(b) Very small movement on the fault may initiate landslides or slumps in the unconsolidated material overlying it.

Landslides due to construction

Loading, excavations and disruption of drainage in the area could initiate landslides or small earth movements sufficient to damage buildings. Care should be taken to ensure that adequate drainage of the site is provided, if the building is proceeded with.

Settlement

The surface material is somewhat heterogeneous and settlement and differential movement is possible unless adequate design precautions are taken. For this reason it would be advisable that no physical connection between the proposed and existing buildings is made. Care should be taken that settlement does not disrupt service mains and drains entering the proposed and existing buildings.

Drilling has commenced on the Medical Science Centre site and the first hole, situated at the Eastern end of the building encountered weathered dolerite from 2'8". This appears to indicate that site conditions in this area are unlikely to present the same problem as the Life Science building. However, additional drilling is necessary in order to establish uniform conditions over the whole building site.

Results of drilling at the University to 4th June

LIFE SCIENCE BLOCK

Hole 1 (completed)

0 - 6′ 8″	Light grey-brown clay.
6′ 8″-20′ 3″	Mudstone, sandstone, dolerite boulders and clay. Some shearing on joints.
20′ 3″-40′ 4″	Weathered brown coarse-grained dolerite. Some joints show shearing.
40′ 4″-50′	Less weathered friable green dolerite. Final 8″ unweathered.

Hole 2 (completed)

0 -34′	Clay, mudstone, sandstone fragments and boulders (some fossiliferous), dolerite boulders.
34′ -50′	Sandstone, hard mudstone fragments and boulders (some fossiliferous), weathered dolerite boulders. Some shear planes.
50′ -58′ 6″	Green intensely sheared clay with mudstone fragments and 6″ dolerite boulder.
58′ 6″-81′ 6″	Sheared, green clay containing fragments of mudstone and boulders of siltstone, sandstone and mudstone (some appear baked).

Hole 3 (Hole continuing)

0 - 6′	Fossiliferous mudstone, sandy mudstone, baked mudstone with some clay.
6′ -17′ 4″	Mudstone, sandy mudstone, weathered dolerite boulders, clay. Some shearing developed.
17′ 4″-36′ 8″	Intensely sheared brownish green clay containing small siltstone fragments alternating with dolerite boulders.
36′ 8″-55′ 9″	Boulders and fragments of mudstone, sandy mudstone, baked mudstone, gritty sandstone, weathered dolerite. Sheared clay occurs at intervals throughout—colour changes from brown to green at 42′6″.
55′ 9″-59′ 1″	Green sheared coarse-grained dolerite.

MEDICAL SCIENCE BLOCK

Hole 4 (Hole continuing)

0 - 2′ 8″	Soil and brown clay.
2′ 8″-10′ 7″	Brown weathered dolerite with abundant travertine.
10′ 7″-21′ 6″	Weathered dolerite with traces of travertine. Occasional shear planes.