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13. SITE INVESTIGATIONS, MEDICAL CENTRE, UNIVERSITY OF TASMANIA

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Six diamond drill holes labelled A to F on Figure 19 have been completed at this site. A summary of the results is given below:—

Bore "A"	Depth 49 feet 2 inches
0 - 4′ 2″	Weathered dolerite with travertine along joints.
4′ 2″-17′	Soil, boulders and some travertine.
17′ -49′ 2″	Weathered dolerite with some shear planes. Occasional unweathered "kernels".
Bore "B"	Depth 50 feet 3 inches
0 - 2′	Soil and dolerite boulders.
2′ - 9′ 3″	Weathered dolerite with travertine along joints.
9′ 3″-11′ 7″	Fresh dolerite.
11′ 7″-28′ 4″	Weathered dolerite with some "kernels" of fresh rock. Some shearing on joints.
28′ 4″-35′ 7″	Weathered dolerite—Intensive shearing for 1′8″ after 31′10″ and for 1′ after 29′1″.
35′ 7″-50′ 3″	Weathered dolerite with widespread shearing.
Bore "C"	Depth 48 feet 11 inches
0 - 7′	Soil and dolerite boulders.
7′ -21′ 9″	Weathered dolerite with some unweathered sections —a little travertine to 14′.
21′ 9″-35′ 2″	50% weathered and 50% fresh dolerite—Some shearing along joints.
35′ 2″-48′ 11″	Unweathered dolerite—closely jointed.
Bore "D"	Depth 30 feet 7 inches
0 - 2′ 10″	Soil and dolerite boulders.
2′10″- 5′ 5″	Broken dolerite.
5′ 5″-30′ 7″	Fresh dolerite—Weathered joint at 13′.
Bore "E"	Depth 50 feet 10 inches
0 - 1′ 6″	Soil and dolerite boulders.
1′ 6″-12′	Mainly weathered dolerite with travertine along joints.
12′ -50′ 10″	Weathered dolerite with "kernels" of fresh rock—strong shearing between 23′ and 23′6″.

Bore "F"	Depth 51 feet
0 -3′ 2″	Soil and weathered dolerite.
3′ 2″-13′ 8″	Weathered dolerite with travertine.
13′ 8″-51′	Weathered dolerite with occasional kernels of fresh rock—Sheared 25′10″-30′ and 38′-45′8″. Most joints show movement.

General Geology

The drilling together with a surface examination indicates that the site generally is underlain by dolerite. Below bore D the dolerite is weathered irregularly to depths mostly is excess of 50 feet. Generally a surface layer of soil and dolerite boulders from 2 to 7 feet thick is present. In bores A, B, E, and F this is underlain by a layer of weathered dolerite containing veins of soft powdery travertine, 9-17 feet thick. Below this, typical in situ weathered dolerite containing occasional "kernels" of fresh rock extends to more than 50 feet except in bores D & C. In bore D fresh dolerite was encountered at a few feet and in bore C from about 21 feet.

The core shows signs of intense shearing at about 31 feet in bore B and zones of shearing were also recorded in bores E and F. Other bores also show signs of movement along joints. As discussed in the report on the Life Science Centre nearby (page 77), a major fault occurs a few hundred feet to the E of this site. The shearing and movement along joints here is probably due to small scale faults which parallel the main movement zone. The abrupt transition from fresh dolerite at or near the surface in bore D and near bore C together with the shear zone located at 31 feet in bore B suggest that the boundary between fresh and weathered dolerite running roughly along grid line 29/40 is a small fault. Further small scale faulting roughly along grid line 28/30 is suggested by the shear zones located in bores E and F.

Engineering Geology

Most of the building will be situated on in situ weathered dolerite. Evans (1958) gave bearing pressures for this material and discussed its properties. Due to the inherited texture of the parent rock the in situ weathered material is a "sensitive soil" and care must be taken not to exceed acceptable loads as the ultimate bearing capacity of the remoulded soil is only about half of that of the undisturbed soil. Evans recommended that for a strip footing 2 feet wide 2 feet below the surface the maximum loading to ensure non-overstressing in the undisturbed soil would be 4.7 tons/foot run, which includes a factor of safety of 3.7. In view of the proximity of the buried fault scarp and the zones of shearing picked up in the drill holes it is recommended that loadings be kept to a maximum of 2 tons per square foot.

Weathering in dolerite usually proceeds irregularly and it is common to find "soft" spots often at the intersection of main joint systems. With column footings it is therefore necessary to drill every footing in order to make an adequate investigation of the site. It is therefore recommended that strip footings be used in preference.

Excavations

Above approximate grid line 29/40 excavations will encounter fresh dolerite at shallow depths. Elsewhere the excavations will be in weathered dolerite, the upper 12 to 17 feet containing irregular seams of travertine. If possible the foundations should be excavated below the travertine-bearing horizon as this is expected to have low bearing capacity and is irregularly distributed.

Theoretically, weathered dolerite should stand on a batter of 60°. In practice, embankments at this slope frequently fail. This is due to the fact that failure occurs along inherited in situ joint planes instead of along the theoretical failure plane. In designing batters, therefore, it would be advisable to study the joint system after the area is opened up to determine the relation of the joint planes to the proposed excavation.

Failure of in situ weathered dolerite cuttings also occurs due to progressive failures related to groundwater moving along joint planes and from saturation due to improper drainage around slopes. It is therefore desirable to include provision for a drainage scheme around the head of the proposed cuttings.

It is proposed to excavate test pits in the area to obtain undisturbed samples of the dolerite clay for testing. These test pits should be examined geologically to determine the frequency and orientation of the joint systems.

Test Pits at the Medical Science Block Site

1. *About J3, 30 (University site grid)*

The south wall is composed of slightly weathered, jointed dolerite but the northern wall is of very weathered dolerite with abundant travertine.

On the south wall:—

0 - 2′	Soil, dolerite boulders, weathered dolerite
2′ - 6′	Slightly weathered dolerite joints:—

Strike	Dip
200	84E
220	60NW
290	28S
200	90
300	14S
215	71NW
230	65NW
280	65–75°N*

*series dipping in this direction along face of cut.

2. *About K2. 2940*

0 - 2′	Dark clay soil
2′ - 5′	Weathered dolerite, some travertine
5′ - 8′10″	Large quantity of travertine in weathered dolerite. Joint 290 strike 75 NE.

3. *About K*1.5 2915

0 - 2′	Soil and boulders of dolerite
2′ - 7′	Coarse grained weathered dolerite with some less weathered kernels, joints—

Strike	Dip
90	75S*
20	90
120	42N
230	34SE

*(2 parallel)

4. *About K*0.1 2836

0 - 2′	Dark brown to black clay soil, some dolerite boulders
2′ - 3′9″	Granular weathered coarse grained dolerite. Occasional unweathered centres.

5. *About J*0.1 2820

0 - 2′	Dark clay soil and dolerite boulders.
2′ - 7′ 6″	Weathered coarse grained dolerite with travertine. 5′6″-7′6″ is less weathered and jointed.

Joints	Strike	Dip
	285	40S
	245	90
	320	50S
	220	82NW
	270	90
	200	44SE

6. *About J* 2885

0 - 3′	Soil and boulders of dolerite.
3′ - 9′	Weathered dolerite with many centres of travertine, some of which is quite hard and compact.

7. *About J* 2930

0 - 2′ 6″	Soil, boulders of dolerite.
2′ 6″- 7′ 6″	Weathered dolerite with travertine. In the final 3′ travertine becomes very abundant.

Reference

EVANS, J. W., 1958—Engineering properties of dolerite soils; *in* Dolerite—A Symposium *Univ. Tas. Geol. Dep.*