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27. Site investigation at Wrest Point, Sandy Bay

P. C. STEVENSON

The site of the proposed new development at the Wrest Point property of Federal Hotels Ltd was examined at the request of Messrs Gutteridge, Haskins & Davey, Consulting Engineers of Hobart.

Investigation began on 17 April 1969 and was completed by 30 April. The work consisted of an examination of the surface geology supplemented by shallow power auger drilling, followed by a magnetometer survey of the whole peninsula and a seismic survey of the vicinity of the proposed buildings.

GEOLOGY

The peninsula of Wrest Point projects about 500 ft NE from the southern shore of the Derwent Estuary. It consists of a low ridge rising about 25 ft a.s.l. the area of which has been increased by the construction of concrete or brick sea walls and the filling of the enclosed areas (frontispiece).

Outcrops of dolerite are to be seen round the seaward end of the point and particularly on the northern side, and may also be found on either side of the central ridge as for instance the large mass near the squash court. The dolerite occurs mainly as large rounded weathered masses resembling boulders, but are probably rounded by spheroidal weathering processes rather than attrition during transport. The nature of the dolerite is complicated by the obvious use of dolerite blocks as fill during the reclamation of parts of the point and as a defence against erosion by the sea.

Tertiary sediments, either soft coarse brown bedded clay-cemented grit or fine greenish mudstone, clay and silt are found towards the landward end of the point and outcrop in the bay on the N side near the tennis court with a gentle dip to the S.

Regional mapping shows that the Tertiary sediments are contained within a down-faulted block whose limiting faults run NW-SE through Battery Point on the N and through the University site on the S. Wrest Point would be expected to lie near the centre line of this fault block and the presence of dolerite is therefore anomalous.

The natural outcrops on Wrest Point were supplemented by 4-inch holes drilled to about 6 ft by a Stihl hand-held power auger. The positions of these holes are shown on the aerial photograph (frontispiece, AH1-AH11).

These showed that the boundary between the sediments and the dolerite passes under the South Wing between AH9 and AH10, it is possibly seen between AH5 and AH6 and is seen to pass between AH7 and AH8 before appearing on the foreshore of the Tennis Court Bay. The boundary is sinuous and nowhere is its attitude apparent, that is to say, nowhere is it possible to decide whether the dolerite dips beneath the sediments or vice versa.

MAGNETOMETER SURVEY

Dolerite is a rock having a higher magnetic susceptibility than the Tertiary sediments. Its presence causes local intensity and usually large variations in the earth's magnetic field and these may be detected by a magnetometer. For this survey an Elsec proton precession instrument was used.

The aim of the survey was to use the magnetic property to determine the extent of the dolerite and consequently the complementing extent of the sediments. The presence of ferrous objects such as irrigation pipes and concrete reinforcement rendered such efforts ineffectual on the land of the peninsula, for the magnetic variations due to these materials far exceeded those due to the dolerite.

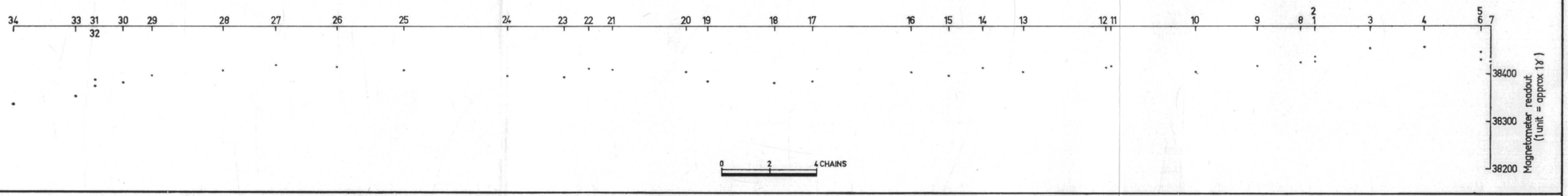
A traverse was made round the peninsula by boat and readings were taken at approximately 40-foot intervals at a constant distance of 100 ft from the shore. The station positions are shown on the photo-map (frontispiece) and the resultant magnetometer readings are plotted on Figure 35. No correction has been made for diurnal or other changes as the whole traverse was completed within about two hours. Further traverses were made on lines out into the Derwent Estuary and these gave the results as plotted.

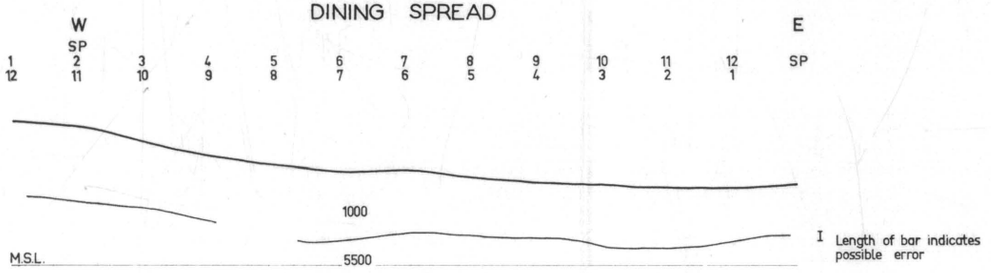
The results of both these traverses were remarkably smooth and lacking in variation, and this, as has been mentioned, is quite uncharacteristic of dolerite bodies. In particular the readings at stations 11, 12 and 13, although close to dolerite outcrop, are not significantly different from readings at stations 1 to 7 and 32 to 35 which are known to be on Tertiary sediments. Some abrupt variations are seen, but they appear to be due to drain pipes, moorings or boats and may be ignored for our purpose.

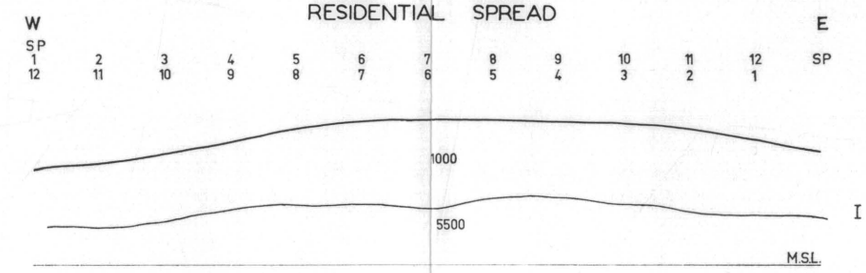
SEISMIC SURVEY

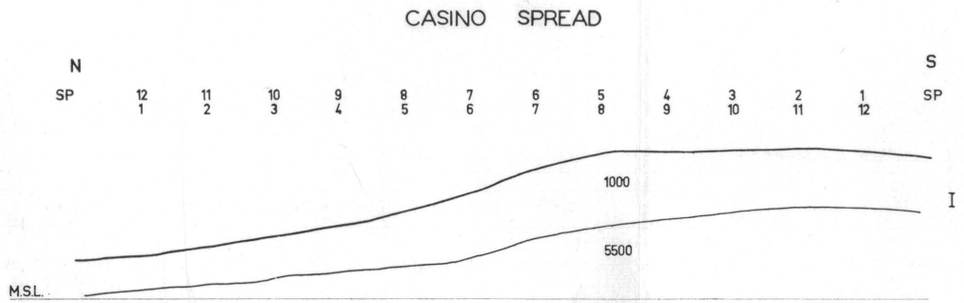
Three spreads, each of twelve geophones at 10 ft spacings were laid out along the centre lines of the proposed Dining, Residential and Casino Wings as shown in GH & D's Drawing 1110/01/1. The spreads were arranged to intersect at the base of the Tower. All spreads were fired from both ends and where possible were extended both ways, so that the maximum information was obtained. Spreads and shot points are shown on the aerial photograph (frontispiece). Six-ounce gelignite charges were used for short spreads and where extended 12- or 18-ounce charges were used. Except in the shot point close to the swimming pool, where the only 18-ounce charge was used, the general surface was not disturbed and the explosions were barely audible.

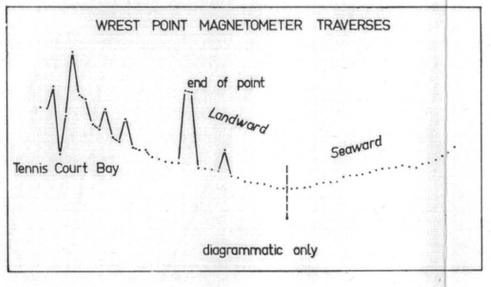
The interpretation of the seismic results (fig. 35) shows that only two layers were detected. The upper one of the order of 1,000 ft/sec varies from 5-12 ft thick and averages about 9 ft. Its slow velocity and the auger holes show it to consist of soil, loose subsoil and fill.











DEPARTMENT OF MINES — TASMANIA	
GEOPHYSICAL RESULTS WREST POINT	
DATE *MAY 1969*	SCALE OF FEET 0 10 20 30
GEOLOGIST *P. STEVENSON*	
DRAUGHTSMAN *T. R. BELLIS*	MAP SHEET & N° *HOBART 82*
REVISIONS	FILE N° 3248

5 cm

FIGURE 35

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The lower layer shows everywhere a velocity close to 5,500 ft/sec. This velocity is not diagnostic, and could represent either Tertiary sediments or deeply weathered dolerite, though it must be said that the velocity is low for the latter. In addition, although shot points were extended in three directions, in one to over 320 ft, no higher velocity layers at greater depths down to about 100 ft were detected.

CONCLUSIONS

The seismic results are in retrospect the most surprising and the most conclusive. They indicate that soft material having the nature of clay, sand or deeply weathered dolerite exists to a depth of over 100 ft everywhere within the area of the proposed building in spite of the dolerite outcrops seen nearby.

The magnetometer results, reinforce the conclusion that the dolerite although obvious, is not solid in depth and may be only a superficial spread of material overlying Tertiary sediments. The regional setting of the Wrest Point peninsula, as has been noted makes the presence of dolerite anomalous.

It must therefore be concluded that the dolerite is not *in situ* and if present in any depth will be deeply weathered. It could have been emplaced over the sediments by a rock slide in Tertiary times emanating from the fault line which passes through the University site. Dolerite blocks of great size may be scattered through the sediments and should not be mistaken in drilling for solid material.

The Tertiary sediments are not well consolidated as indicated by their low seismic velocity.

RECOMMENDATIONS

In the absence of any solid dolerite, the exploration drilling pattern must be dictated by the needs of the proposed buildings, and the apparent necessity of piling. The material under the site although possibly mixed dolerite and sediments is broadly uniform in velocity and therefore consolidation. Diamond drill cores to 100 ft or such depth as is dictated by the intended load will enable further geological analysis to be made and will provide material for soil mechanics. Deep auger holes are possible, but although cheap and rapid they do not usually enable other than a rough description to be made unless undisturbed cores can be obtained.