

1977/50. Seismic Survey to establish the rippability of rock at Holloway's quarry at Round Hill, Burnie.

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In 1976 the Round Hill Quarry Committee closed all the quarries on Round Hill, Burnie [DQ122533], with the exception of Holloway's quarry, where limited operations were permitted to continue under the direction of the Department of Mines. The committee recognised that Holloway's quarry had potentially the most dangerous face of all the quarries on Round Hill; the face immediately above the crusher (plate 1) is badly cracked, unstable and potentially dangerous (Moore 1976). The high steep face over which the material from the existing benches is currently pushed is up to 33 m high, with an average slope of  $80^{\circ}$  (plate 2). Although this face is considered stable south of the fault. (Moore 1976), to leave this face in its present condition by stopping quarrying now would create an unnecessary and dangerous public hazard.

With no funds available to deal with these two problems, the committee had little alternative but to allow Holloway to continue quarrying with the expectation that through using the Department's quarrying regulations, these two faces could be lowered and left in a safer condition than exists at present. The scheme as visualised involves the lowering and widening of the existing benches and the cutting of at least two extra benches (plate 2). In time, these benches would extend and connect to the existing benches on the next lease to the east.

The unstable face above the crusher appears more difficult to lower without moving the crusher, the cost of which would probably result in the closure of the quarry. It may be feasible to cut a low bench above the crusher face and extending towards the fault, removing much of the unstable material.

If such a scheme is to be feasible, Holloway's operations will have to remain profitable over a considerable period of time. This will mean the continuation of existing quarry practices at Round Hill, with most of the material being removed by machinery, explosives only being used as small secondary charges.

#### SEISMIC SURVEY

In order to provide a guide to the rippability of the rock a seismic survey was conducted on the existing two main benches of Holloway's quarry. The instruments used were the Bison hammer seismograph, with two geophones and the Texas GTIB, using twelve geophones at 5 m spacings.

Seismic velocities obtained from the floor of the quarry and on the foreshore in the previous survey (Moore 1976) indicated that only the talus and weathered zone could be ripped. These layers had velocities of 610-910 m/s and 1 300-1 700 m/s respectively. The unweathered rock in the quarry floor gave velocities of 3 000-3 600 m/s with 4 000 m/s being recorded on the wave cut platform. With such high velocities, it was anticipated that the unweathered rock could not be ripped by machinery.

From discussion with L. Holloway, it was known that the existing benches had been cut by a bulldozer, with a little ripping, but that no explosives had been used. Mudstone appears to be more dominant than quartzite in the bench area compared with the floor of the quarry (Moore 1976). The rocks appear to be of a comparable hardness and similar velocities would be anti-

culated in the unweathered rock at both locations. Therefore if the velocities present in the  $V_2$  layer on the quarry floor existed on the benches, these benches should be close to or at their limit of rippability depth.

The seismic spreads conducted on the benches gave comparable velocities of 610-910 m/s and 1 800 m/s for the talus and weathered zone, but the thickness was limited to less than one metre. The commonest velocity below this surface layer averaged 2 100 m/s but ranging down to 1 800 m/s and up to 2 400 m/s. It was not possible to obtain any higher velocities, even by extending the shots to the limit of the benches. The 3 000-3 600 m/s velocity layer seen on the floor of quarry in the previous survey (Moore 1976) was not recorded, as the calculated depth reached by the bench survey was only 17-20 metres. The survey was limited in depth penetration because the shotpoints could not be extended beyond the existing benches on Holloway's lease area and the charges used in the shots had to be kept small because of the amount of fly rock occurring. These limitations stopped the higher velocity refraction layer on the quarry floor being reached.

The seismic results show that the unweathered quarry face has a lower velocity than the quarry floor. The average velocity of 2 100 m/s indicates that this material is likely to be rippable down to the existing quarry floor level. The limit of rippability is possibly the low level bench that exists above the crusher and storage bins at Holloway's quarry and on which Red Knoll stands in Brambles Quarry to the east (Moore 1976).

#### CONCLUSIONS

The lower velocity found on the quarry face when compared with the quarry floor is probably due to the relaxation and opening of joints in the quarry face. This would give the same stepped velocities of both locations but with lower upper velocities for the unweathered rock on the quarry face compared with the quarry floor and rock wave-cut platform along the shore line at Round Hill.

If this hypothesis is correct, it may be possible to bench Holloway's quarry as outlined (plate 2). The face will be steeper than is desirable for absolute long term stability (Moore 1976), but it would be far safer than the existing faces at Holloway's quarry. The other quarry faces at Round Hill could be similarly treated in the future by permitting limited but controlled quarrying to continue. These benches would retain the fine talus scree and vegetation would possibly return to the face quicker. Clearly the area will still have to be fenced when quarrying has ceased, but the face would not be as hazardous to nearby light industry as it is at present.

#### REFERENCE

MOORE, W.R. 1976. Engineering geology and slope stability analyses of the Round Hill quarries, Burnie. *Unpubl.Rep.Dep.Mines Tasm.* 1976/31.

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Plate 1. Quarry face above crusher.

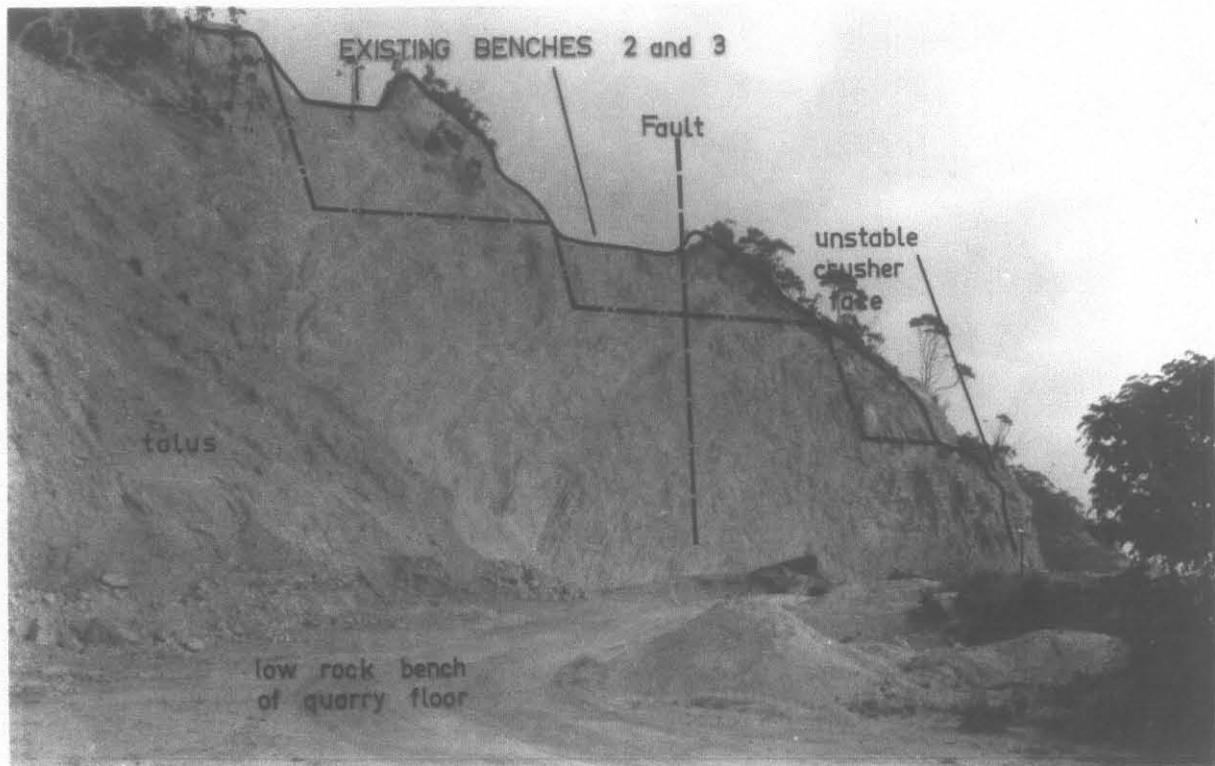


Plate 2. High face, Holloways quarry. Proposed benching on overlay.