COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record No. 1970/87

Seismic Refraction Survey of Sections 16 & 22, Barton, A.C.T. 1969

by

R.J. Whiteley

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SEISMIC REFRACTION SURVEY OF SECTIONS 16 AND 22, BARTON, AUSTRALIAN CAPITAL TERRITORY, 1969

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SUMMARY

A refraction seismic survey conducted over WCDC sites 16 and 22, Barton, indicates slightly weathered or unweathered bedrock at depths varying from about 30 to 70 feet. The slightly weathered bedrock is on site 16 and the northern region of site 22. In the southern region of site 22 the bedrock is deeper and unweathered. A possible lateral geological change is present on site 22.

1. INTRODUCTION

The National Capital Development Commission is considering the construction of buildings on Sites 16 and 22 Barton. As consultant to the National Capital Development Commission (N.C.D.C.) Bureau of Mineral Resources conducted a seismic survey to determine bedrock conditions at the sites.

The survey was done by a geophysical party consisting of R.J. Whiteley (Geophysicist), S. Hall (Field-Assistant) and two Field-Assistants provided by the Department of Works, in August 1969.

2. GEOLOGY

The geology is described in detail by Opik (1958). Camp Hill Sandstone forms the bedrock at the two sites. This is a very flaggy quartzose sandstone which weathers easily.

3. SEISMIC REFRACTION METHOD

A 24 channel S.I.E. (Dresser-S.I.E. Co.) seismograph and 20 c/s geophones were used. Geophones were spaced at 10-foot intervals along the traverses.

The location of the traverses is shown in Figure 1. The traverse positions could have been better located for adequate coverage of the sites, but as the area is densely populated, shot positions had to be carefully chosen for safety reasons.

4. RESULTS

Interpretation was by the reciprocal geophone method (Hawkins, 1961). Depths to the deepest refractor (referred to as bedrock) were calculated at each geophone position and depths to intermediate horizons were calculated at shot-points and interpolated between them.

The layers encountered can be conveniently grouped according to their seismic velocity:

Velocity (ft/s)	Rock Type
1000-2500	Soil
4000-5000	Saturated overburden or completely weathered bedrock
7000-13000	Slightly weathered to unweathered bedrock

The seismic results are shown in Figure 2.

On traverses A, D, and E weathered bedrock forms the deepest refractor. This layer is fairly deep (about 50 feet) on traverse D but shallows to about 30 feet on traverse E.

On traverses B and C bedrock is less weathered, deeper, and dips fairly steeply to the southeast. The weathered layer (about 8000 ft/s) is probably still present on these traverses, but because of its thickness and velocity relationship with other refractors it is not obvious.

In his tectonic map, Ö pik (loc. cit.) has indicated the presence of an unconformity in the vicinity of the seismic traverses.

The seismic evidence tends to support this with the feature occurring near the intersection of Traverses A and B, dipping steeply to the southeast and with the bedrock to the south more consolidated.

5. CONCLUSIONS

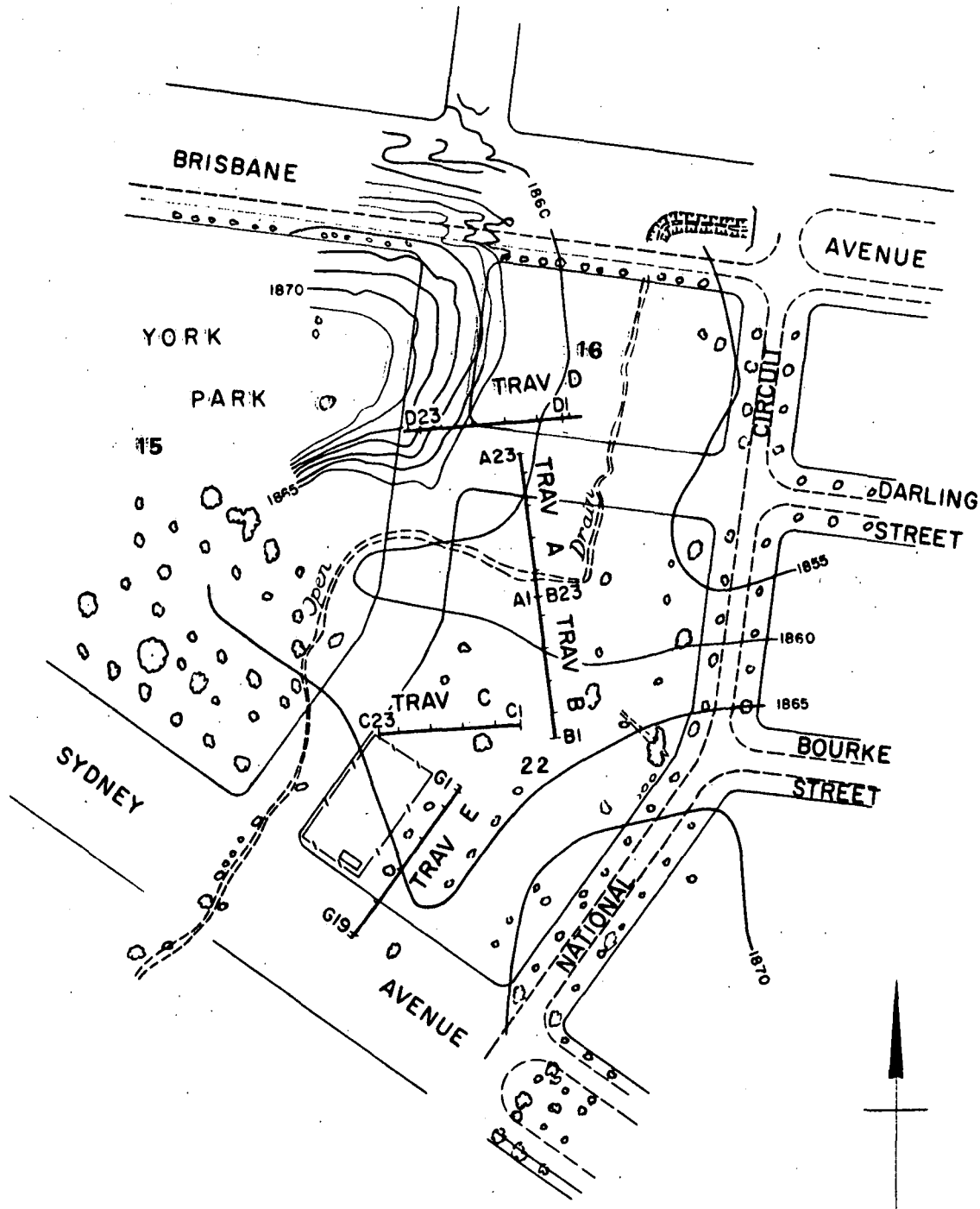
The seismic velocities of the deepest refractors encountered indicate that the bedrock is either slightly weathered (8000 ft/s) or unweathered (13000 ft/s). A lateral geological change in the vicinity of the intersection of traverse A and B is also indicated.

REFERENCES

HAWKINS, L.V., 1961 - The reciprocal method of routine shallow seismic refraction investigations. Geophysics, 26(6), 806-19.

ÖPIK, A.A., 1958 - The geology of the Canberra City district. Bur. Miner. Resour. Aust. Bull 32.

FIG 1



BARTON GEOPHYSICAL TRAVERSES
SECTIONS 16 & 22

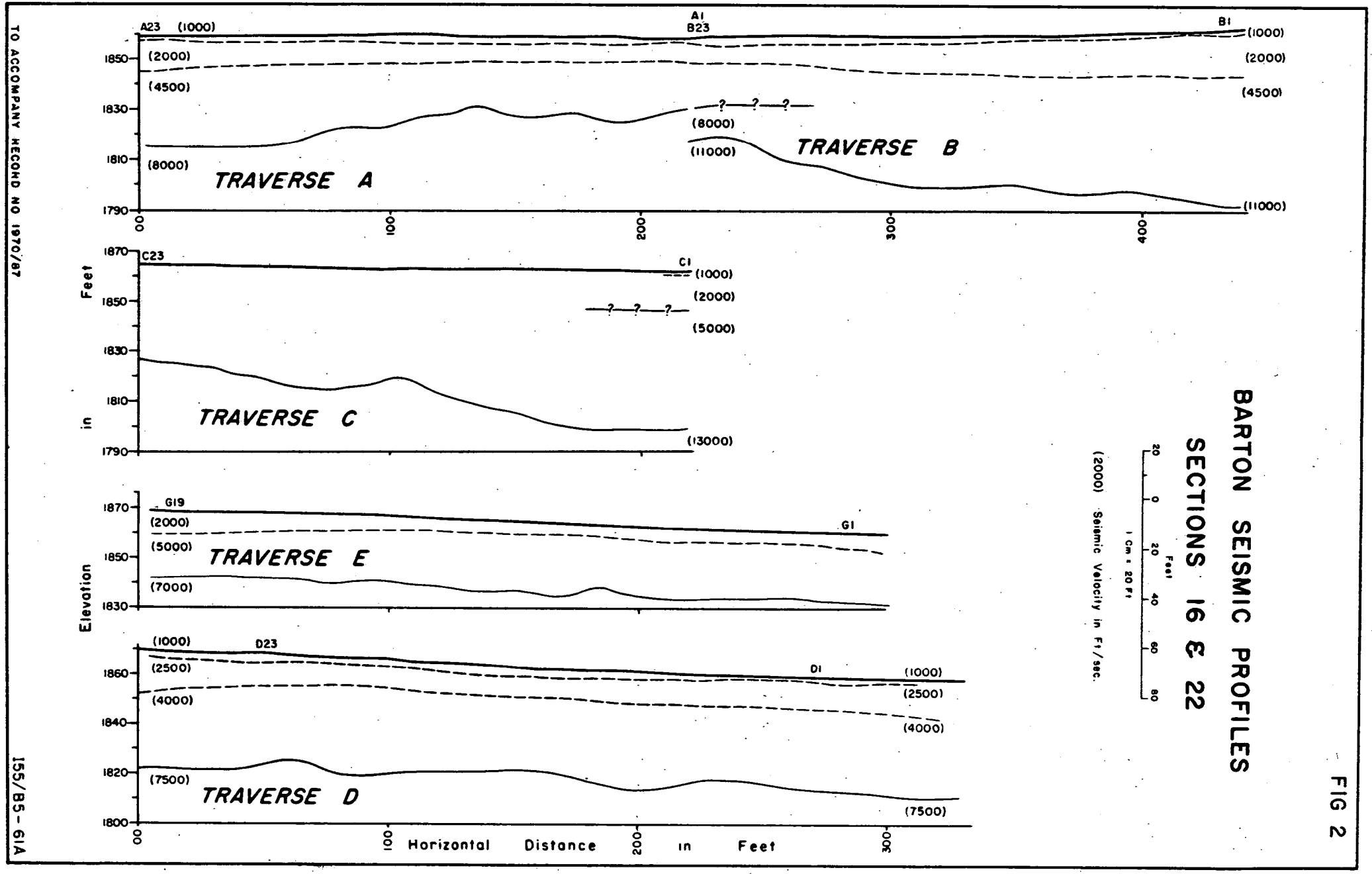
A1 A10 A20 Geophysical traverses and stations

SCALE IN FEET
100 0 100 200 300 400
1 Cm = 100 Ft

TO ACCOMPANY RECORD NO 1970/87

155/B5-60A

Barton Seismic. Canberra 9-10-69


TO ACCOMPANY RECOND NO 1970/87
A23 (1000)
A1
B23
B1 (1000)
(2000)
(4500)
(8000)
TRAVERSE A
(8000)
(11000)
TRAVERSE B
(11000)
1850
1830
1810
1790
0
100
200
300
400
Feet
in
C23
C1 (1000)
(2000)
(5000)
TRAVERSE C
(13000)
1870
1850
1830
1810
1790
Elevation
G19
(2000)
(5000)
TRAVERSE E
(7000)
G1
1870
1850
1830
(1000)
D23
(2500)
(4000)
D1 (1000)
(2500)
(4000)
(7500)
TRAVERSE D
(7500)
1860
1840
1820
1800
0
100
200
300
Horizontal Distance in Feet
BARTON SEISMIC PROFILES
SECTIONS 16 & 22
FIG 2
(2000) Seismic Velocity in Ft/sec.
1 Cm = 20 Ft
Feet
20
0
20
40
60
80
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