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COMMONWEALTH OF AUSTRALIA

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RESOURCES, GEOLOGY  
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Record 1972/88



**SEISMIC REFRACTION SURVEY AT KINGS AVENUE -  
PARKES WAY INTERSECTION  
1972**

by

**F.J. Taylor**

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## ILLUSTRATIONS

Plate 1. Locality map

Plate 2. Seismic cross-sections

### SUMMARY

A seismic refraction survey was carried out at the intersection of Kings Avenue and Parkes Way in Canberra, A.C.T. The survey was undertaken to determine sub-surface conditions likely to affect excavations and foundations required for a proposed overpass at this major intersection.

The average depth to bedrock is about 18m and the seismic velocity of bedrock varies between 3500 m/s and 4400 m/s. The weathered zone (average velocity 1700 m/s) should be rippable. However, the highest velocity recorded for this zone, 2300 m/s, indicates that some light blasting may be required during excavation. Excavation will not extend to unweathered bedrock.

## INTRODUCTION

About 500 m of seismic refraction work was carried out at the intersection of Kings Avenue and Parkes Way, Russell Hill (Plate 1) to investigate sub-surface conditions likely to affect the building of a proposed overpass. The work was carried out in three days in April 1972 by a party comprising F.J. Taylor (party leader), I. Bishop (geophysicist), and one draftsman. The term bedrock used in this report refers to the deepest refractor detected and the term overburden refers to the soil, alluvium, and weathered rock above the refractor.

## GEOLOGY

The geology of this area is described in the detailed geological map of Canberra district and comprises Middle to Upper Silurian sediments of the Canberra Group as well as Lower Devonian sediments of the Ainslie Volcanics. The Canberra Group, which covers most of this area, consists of shale, calcareous shale, siltstone, sandstone, limestone, tuff, and rhyolite. The Ainslie Volcanics consist of rhyolite, dacite, tuff, and quartz porphyry.

## METHODS AND EQUIPMENT

The seismic work was carried out using 24-channel SIE PSU-19 refraction equipment with TIC 20 Hz geophones. The 'reciprocal geophone' method (Heiland, 1946) was used with a geophone spacing of 4 m. The layout of the traverses is shown in Plate 1. The traverse lines are situated very close to major traffic lanes and exceptional care had to be taken to avoid damage to passing vehicles. This was achieved by drilling shot-holes to a depth of 80 cm with a portable rock drill and using explosive charges of 100 gms or less.

## RESULTS

Four groups of velocities were observed:

300 m/s	-	surface soil
600 - 1000 m/s	-	clay (completely weathered rock)
1400 - 2300 m/s	-	moderately to highly weathered rock
3300 - 4400 m/s	-	fresh bedrock

The depth to bedrock does not vary to any great extent and the average is 18m. The second group of velocities listed above is not always recorded in the area, indicating that the completed weathered material may have been removed by erosion. The site is situated on a sloping ridge and hence some water and wind erosion must have occurred in the past. Hence moderately to highly weathered material can be expected to occur at shallow depths.

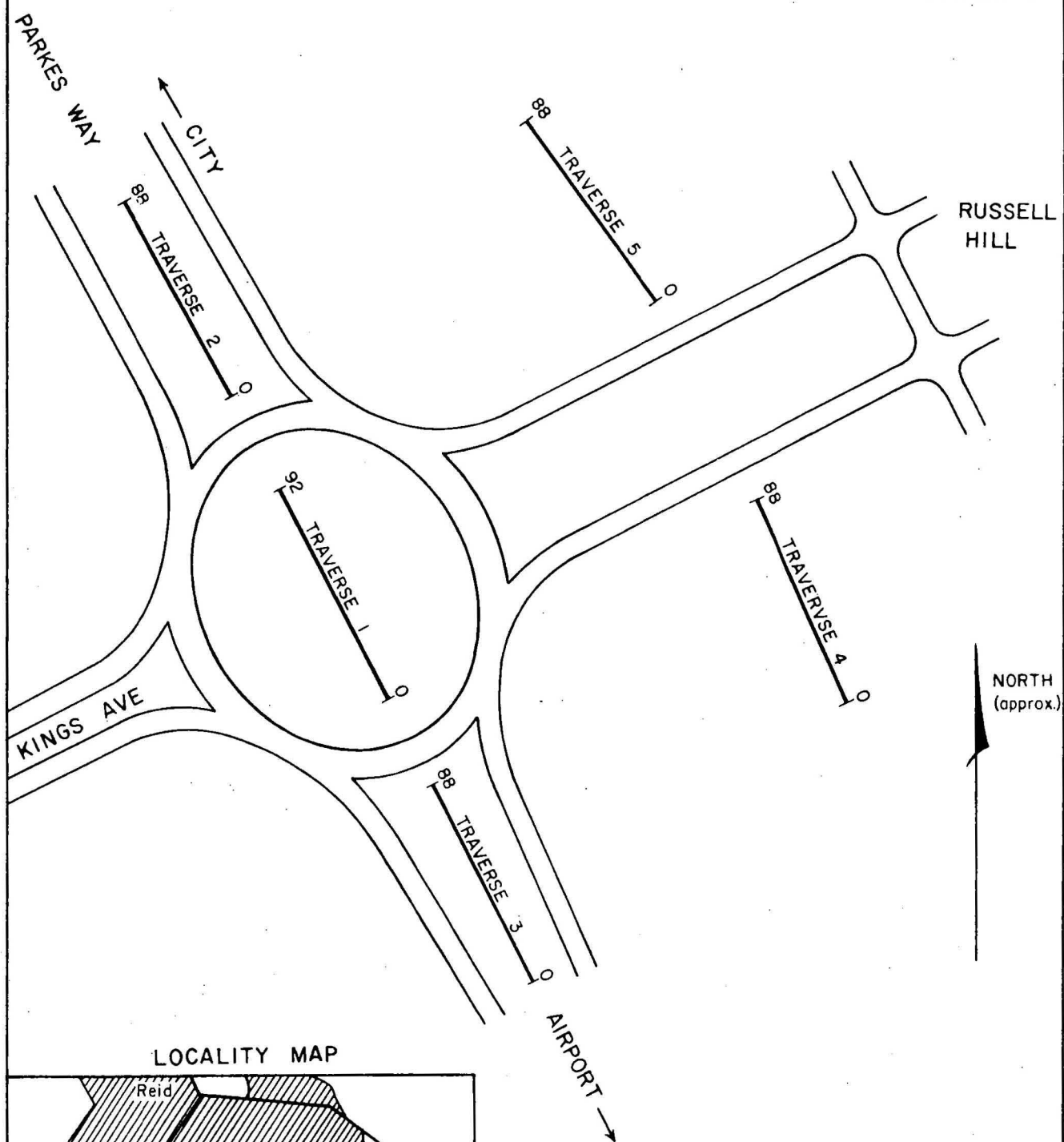
In excavating the site, some of the material of velocity between 1400 m/s to 2300 m/s will need to be removed. The ease with which this material can be ripped will depend on the rock type. Experience has shown that sedimentary rocks with velocities in this range can be ripped by heavy equipment. On the other hand igneous rocks with velocities near the upper limit of this group generally require blasting. It is therefore expected that the material will be rippable but light blasting may be required in some areas. Bedrock, velocity 3300-4400 m/s, will not be rippable but excavations are not expected to extend to this depth.

CONCLUSIONS

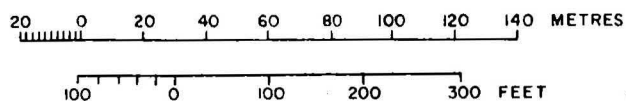
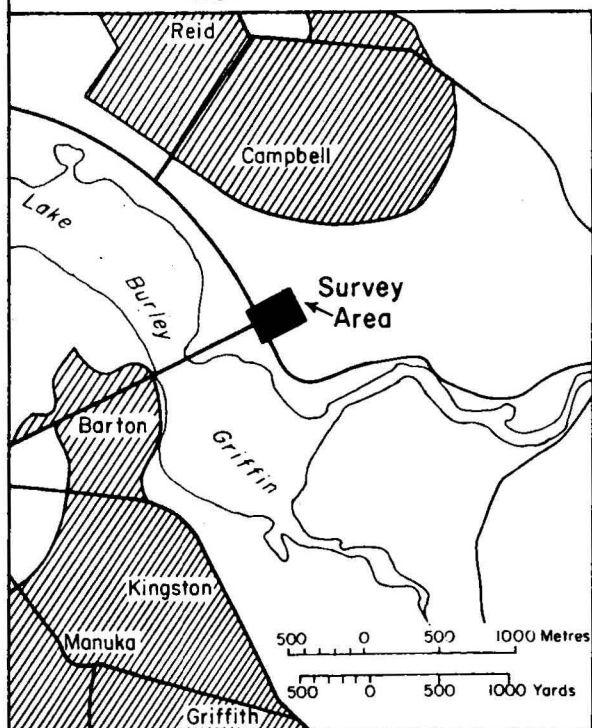
The depth to bedrock is uniform over the area and overburden velocities indicate that some light blasting may be required for excavations. The results of the survey do not indicate any unusual conditions likely to affect the design of foundations.

REFERENCES

HEILAND, C.A., 1946 - GEOPHYSICAL PROSPECTING, N.Y., Prentice Hall.

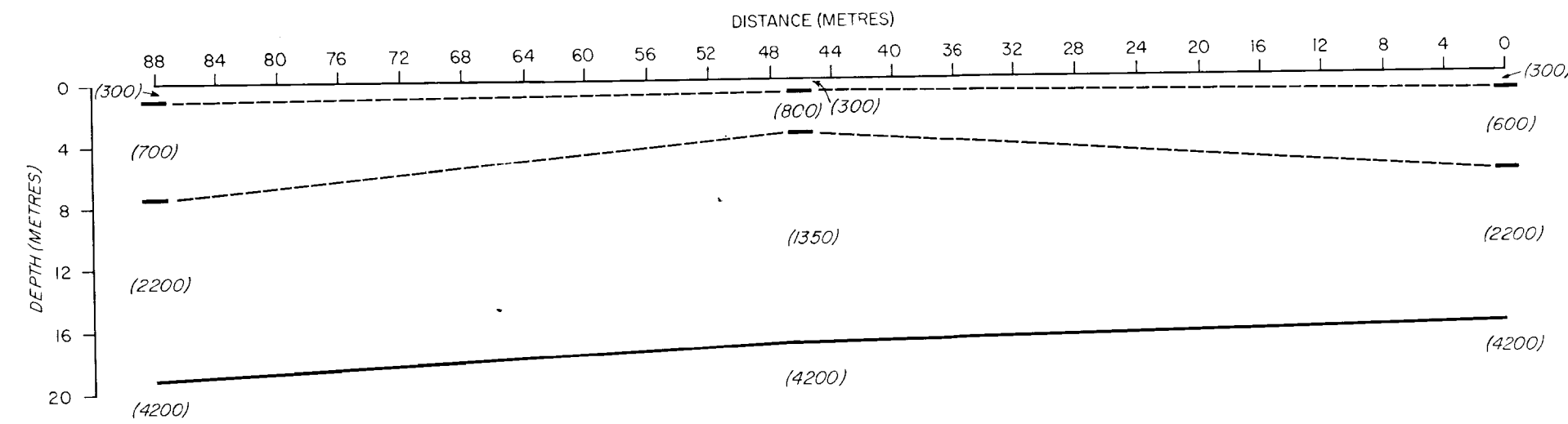


LOCALITY MAP



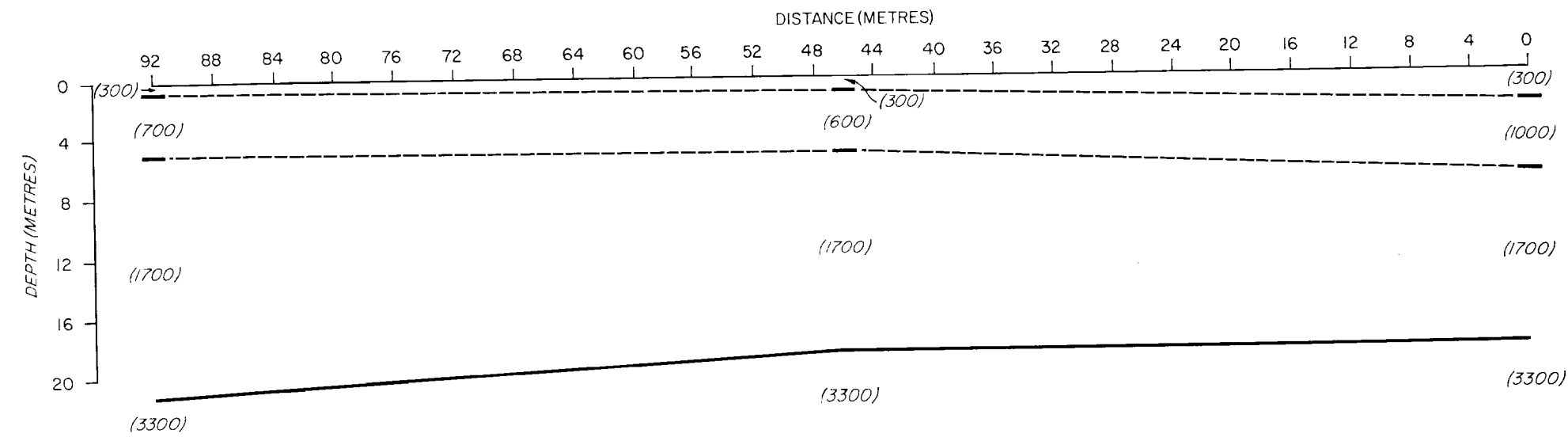
RUSSELL HILL SEISMIC SURVEY,  
A.C.T. 1972  
LOCALITY MAP AND LAYOUT OF TRAVERSES

TRAVERSE 2



KINGS AVE

TRAVERSE 1

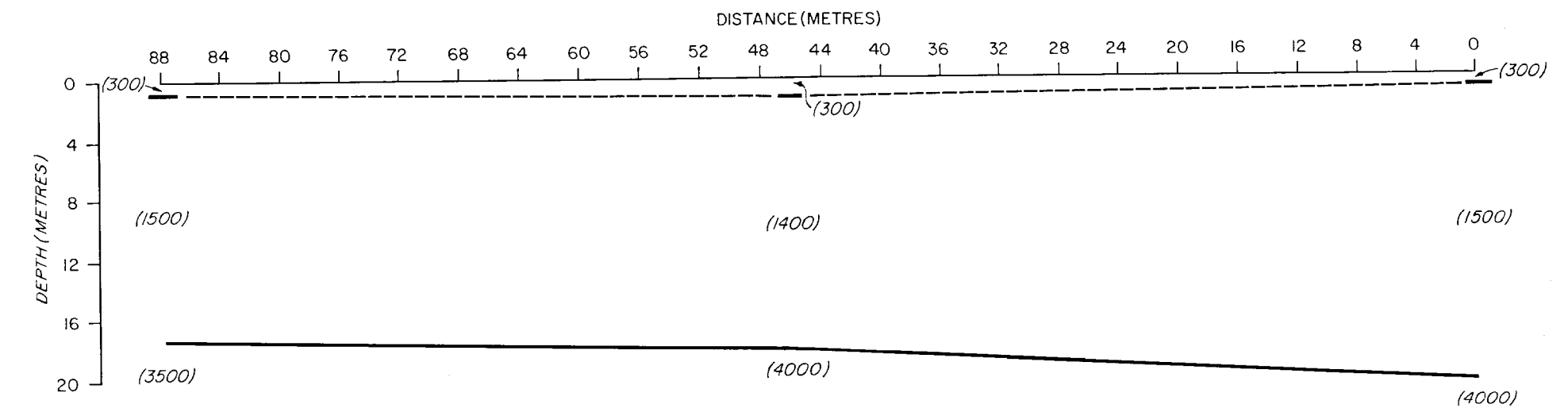


KINGS AVE

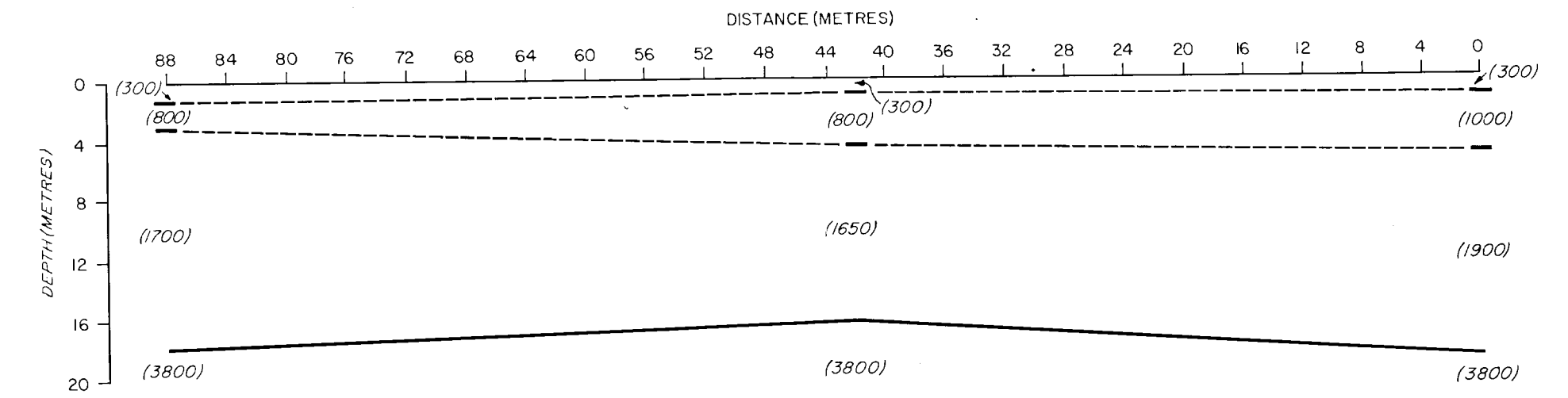
LEGEND

- Interpolated boundary
- (1500) Seismic velocity in formation (m/s)
- Bedrock

TRAVERSE 3

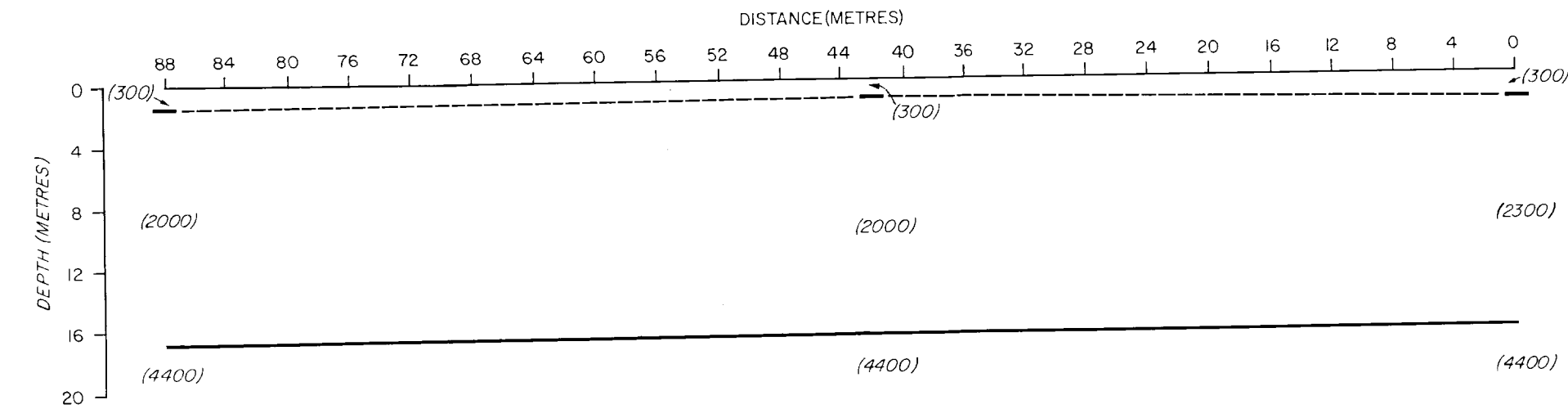


TRAVERSE 4



AIRPORT

TRAVERSE 5



CITY

SEISMIC CROSS-SECTIONS