BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD

BMR Record 1981/25

ROAD GRAVEL INVESTIGATION, BLOCK 64,

TENNANT, ACT

by

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ABSTRACT

Investigation of gravel pit on Block 64, Tennent, ACT by means of trenching in described. The material - extremely weathered granodiorite - proved to be too highly plastic for use on unsealed roads. Earlier reports of alternative sources of non-plastic gravel in the district are listed.

INTRODUCTION

Late in 1980, the Department of Capital Territory requested BMR to investigate a disused gravel pit on Block 64, Tennent, ACT. The purpose of the investigation was to determine the suitability of the gravel for use on rural roads in the southern part of the ACT. About 1000 m^3 per annum is required. The pit is located 9 km from Tharwa, along the Naas Road and adjacent to the Gudgenby River, (Figs 1 and 2).

FIELD INVESTIGATION

Six backhoe trenches were excavated on 9 December 1980, and samples were collected from various depths within the trenches and the gravel pit. Twenty samples were collected, of which twelve were analysed. Trench profiles are shown in Appendix 1. The gravel consists of in-situ weathered granodiorite, moderately weathered to a depth of 2.5 - 3.0 m. The possible working area for a gravel pit is shown in Figure 2. The reserves of gravel in this area, using a working depth to 2.5 m, are 150, 000 m^3.

SAMPLE ANALYSIS

Testing of samples was undertaken in March 1981. Tests were carried out according to procedures set out in Australian Standard 1289. (Standards Association of Australia, 1977). These tests were Grain Size Analysis, Liquid Limit, Plasticity Index and Linear Shrinkage.

The results of these tests are shown in Figures 3 and 4, and Table 1 is a summary of the test data. Figure 3 shows graphs of the particle size of samples. All samples tested lie within the limits specified by the Department of Housing and Construction for unsealed pavements. All samples have a low degree of uniformity; samples 1,5, 6, 8 and 11 have

high plasticity, while samples 2, 3, 4, 7, 9, 10 and 12 have medium plasticity. (Table 1).

The Department of Housing and Construction's specifications for unsealed pavements are: Liquid Limit should not exceed 35%; Plasticity Index (P.I.) should be between 2% and 10%, and even a less exacting specification would require a P.I. between 10% and 16%. All the samples tested, except one, do not conform to these specifications. The one sample which does conform to even the less exacting specifications, no 7, had a slightly coarser grain size in the fine sand section.

The gravel, because of its high plasticity is unsuitable for use on unsealed pavements.

ALTERNATIVE SOURCES OF MATERIAL

There are two locations on the Naas Road just north of the investigated site, where reserves of non-plastic gravel have been proved in previous BMR investigations (Hansen, 1970; Bishop, 1973). These locations are: Grid Reference 6087-2084, Michelago 1:50 000 sheet, where there is about 100 000 m^3 of non-plastic granitic slopewash; and Grid Reference 6092-2088, Michelago 1:50 000 sheet, where there is about 26 000 m^3 of non-plastic, in-situ weathered granite.

CONCLUSIONS

1. The material from the investigated pit is too highly plastic for the proposed use on unsealed roads.

2. There are alternative sources of non-plastic gravel in the area.

Fig. 1 LOCALITY MAP

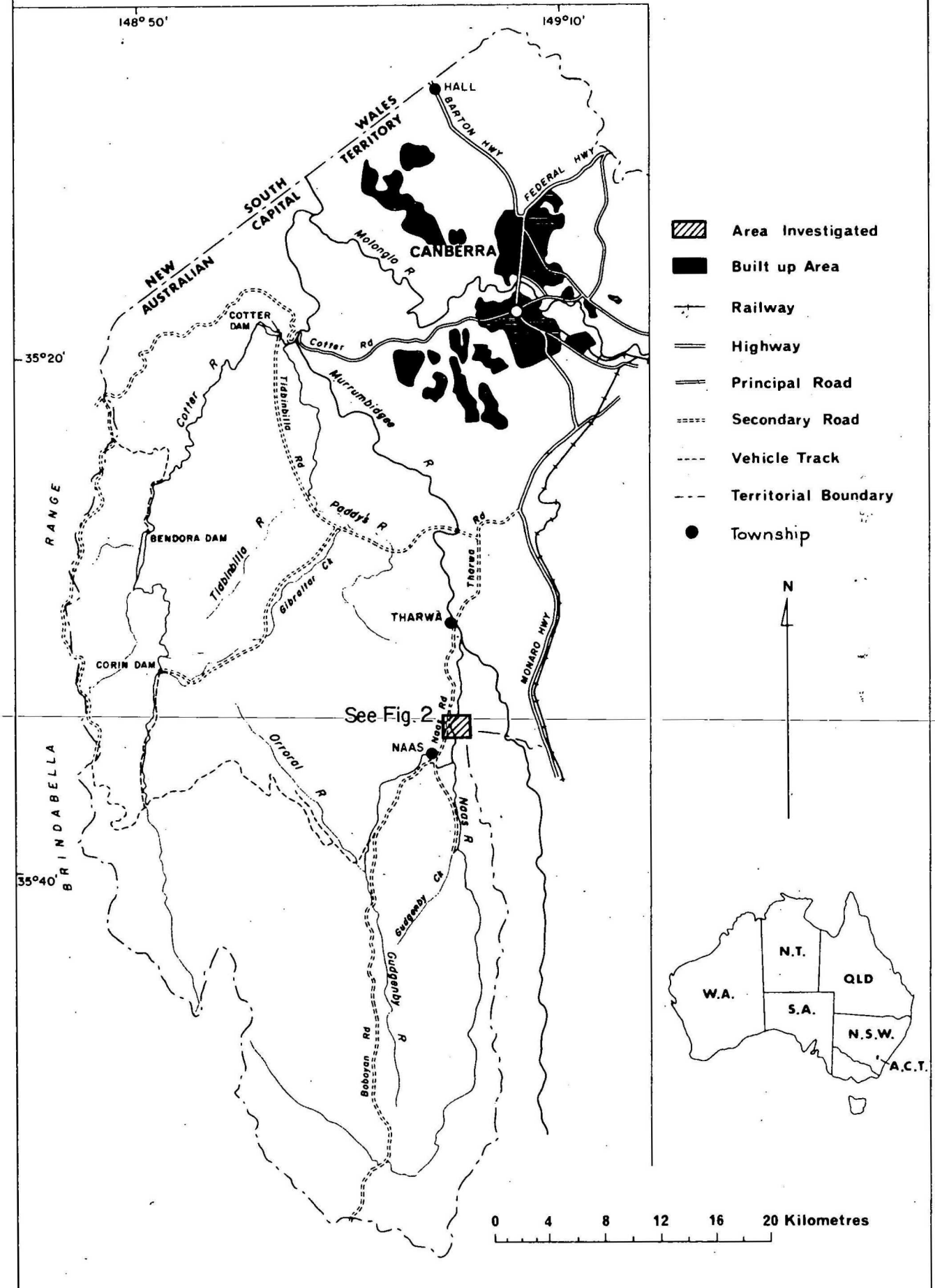

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Figure 2 Location of gravel pit and backhoe trenches

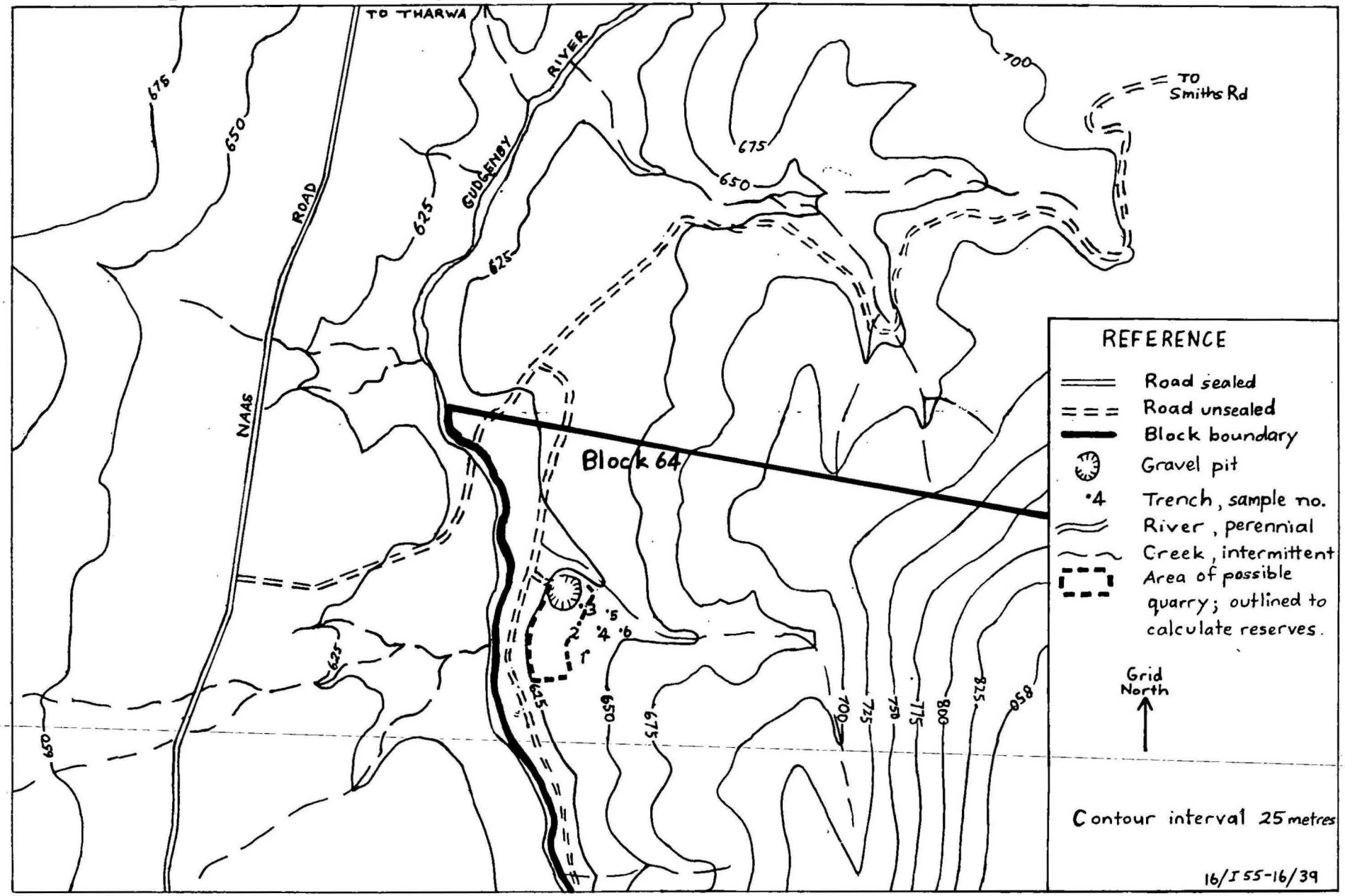
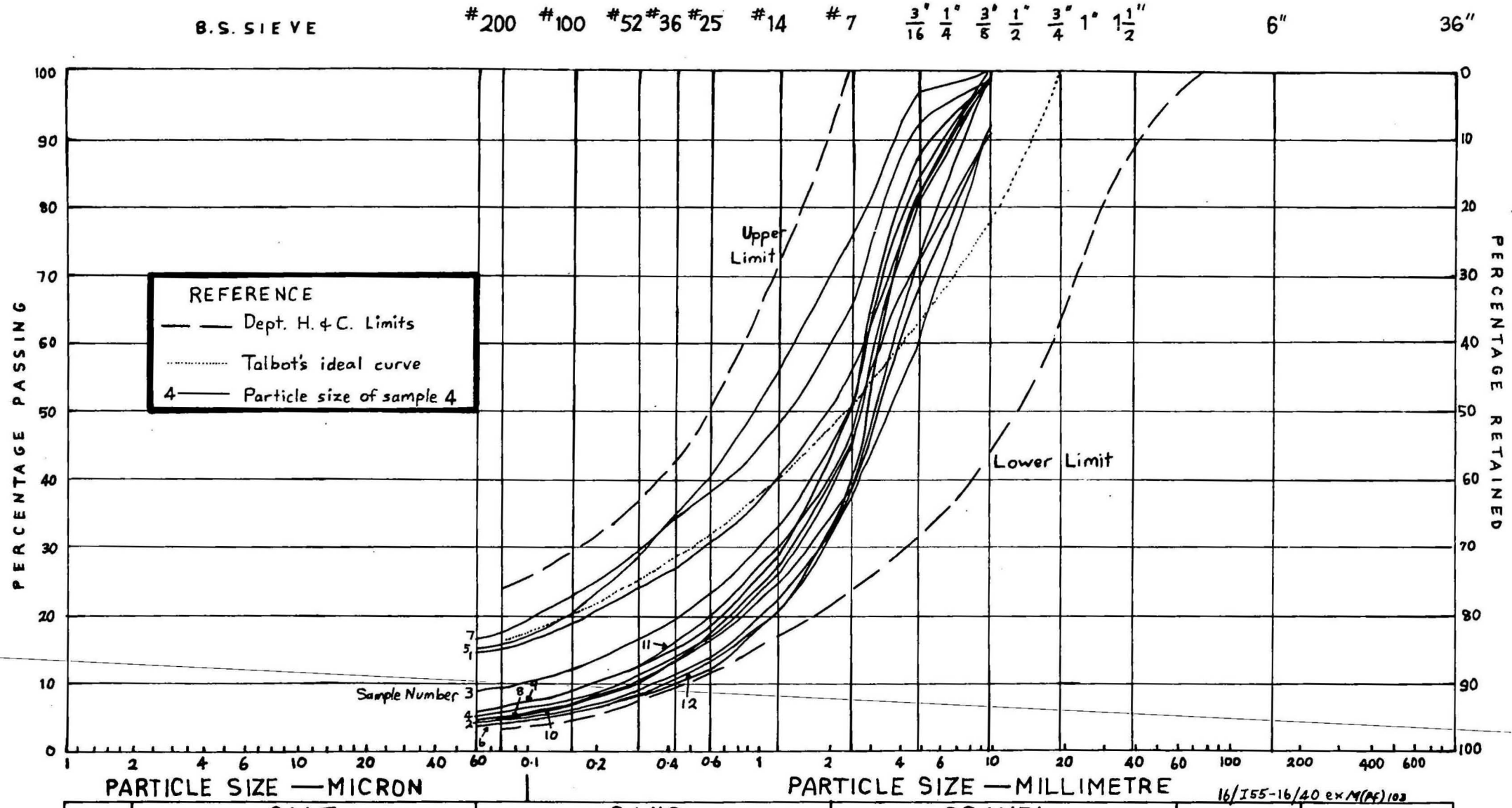


Figure 3 PARTICLE SIZE DISTRIBUTION CHART



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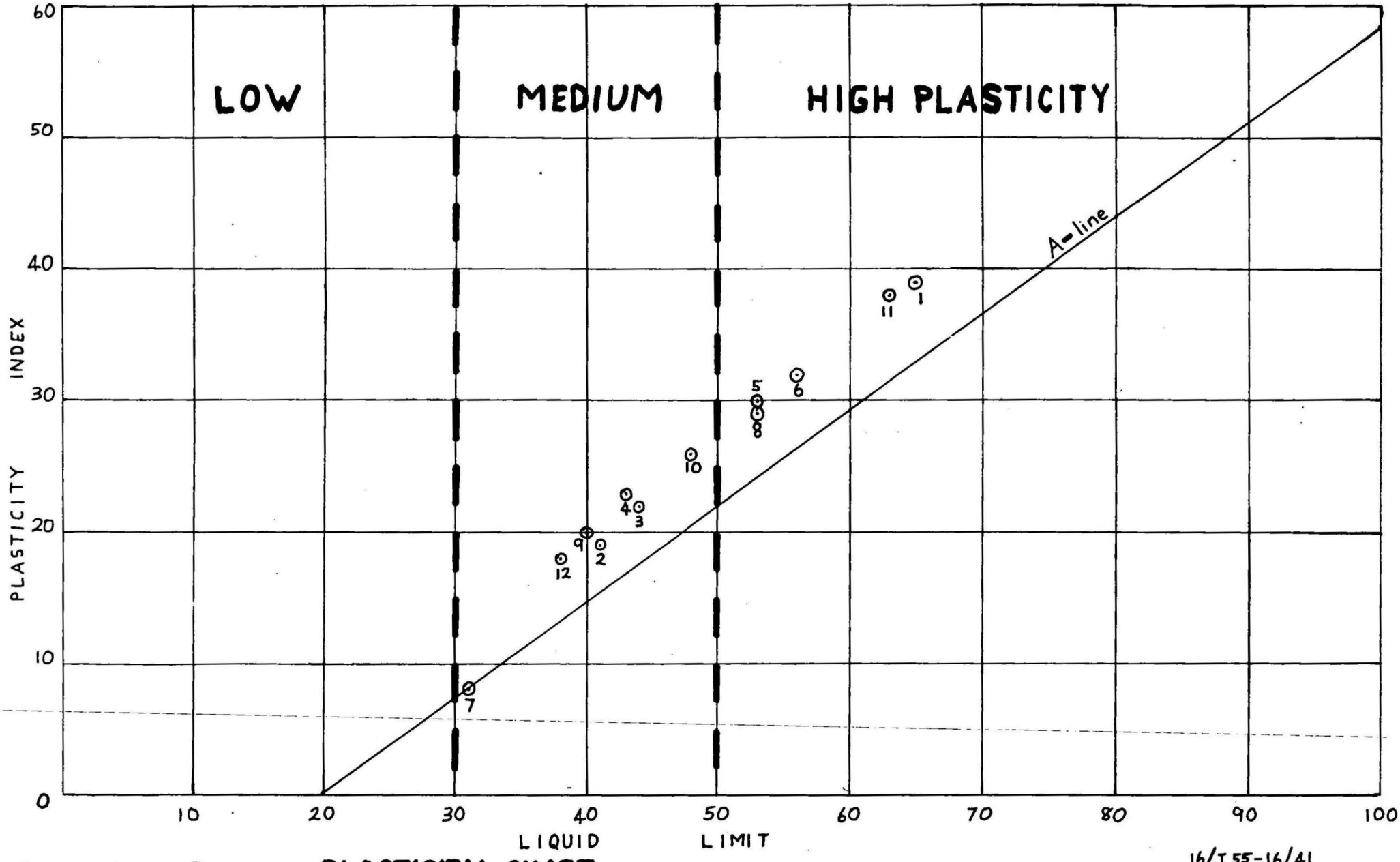

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Figure 4 **PLASTICITY CHART**

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REFERENCES

BISHOP, I.D., 1973 - Gravel for rural roads - seismic refraction surveys near Tharwa and Williamsdale, A.C.T. Bureau of Mineral Resources, Australia - Record 1973/40.

HANSEN, R.J., 1970 - Gravel for rural roads, Naas Road, Tharwa area. Bureau of Mineral Resources, Australia - unpublished report.

STANDARDS ASSOCIATION OF AUSTRALIA, 1977 - Methods of testing soils for engineering purposes. Australian Standard 1289.

TABLE 1. Summary Of Test Data

Sample No.		1	2	3	4	5	6	7	8	9	10	11	12
Location (Q, Quarry Wall; T, Trench)		Q	Q	T6	T6	T4	T4	T3	T3	T3	T2	T2	T2
Depth (m)		0.7	1.5	0.5	1.4	0.5	1.4	0.2	0.6	1.1	0.3	0.6	1.3
Passing 3/8 INCH Sieve	%	99	99	100	99	100	99	99	100	99	92	90	92
3/16 " "	%	82	72	84	80	97	82	92	81	88	69	73	60
Passing BSS No 7 (2.41 mm)	%	56	38	51	45	76	40	65	45	51	39	46	37
14 (1.20 mm)	%	41	22	32	26	56	21	48	27	29	25	30	20
25 (.60 mm)	%	31	14	22	16	41	12	38	17	18	16	20	13
36 (.42 mm)	%	27	11	19	13	35	10	34	13	15	13	16	10
52 (.29 mm)	%	24	9	16	11	29	8	29	10	12	10	13	8
100 (.15 mm)	%	19	6	12	8	21	6	23	6	9	7	8	6
200 (.076mm)	%	15	4	10	5	16	4	17	4	6	5	6	4
-200	%	15	4	9	5	15	4	16	4	6	5	6	4
Uniformity Coefficient ($U=d60/d10$)		-	11	30	12	-	8	-	12	15	14	17	12
Passing No 36 BSS Material													
Liquid Limit	%	65	41	44	43	53	56	31	53	40	48	63	38
Plastic Limit	%	26	22	22	20	23	24	23	24	20	22	25	20
Plasticity Index	%	39	19	22	23	30	32	8	29	20	26	38	18
Linear Shrinkage	%	14	11	12	12	12	13	4	11	10	12	12	9

APPENDIX 1

Backhoe trench profiles (depths in metres)

Trench 1

0 - 0.3	Topsoil
0.3 - 0.4	Brown silty sand
0.4 - 0.5	Brown-yellow mottled silt
0.5 - 1.3	HW to MW granodiorite
1.3 -	MW granodiorite

Trench 2

0 - 0.15	Topsoil
0.15 - 0.4	Light brown gravelly sand
0.4 - 0.65	Dark brown-yellow silty clay
0.65 - 1.4	HW granodiorite
1.4 -	MW granodiorite

Trench 3

0 - 0.2	Sandy topsoil
0.2 - 0.4	Silty gravel
0.4 - 0.8	EW granodiorite
0.8 - 1.5	HW granodiorite
1.5 -	MW granodiorite

Trench 4

0 - 0.1	Topsoil
0.1 - 0.25	Sandy silt
0.25 - 0.8	EW granodiorite
0.8 - 1.4	HW granodiorite
1.4 -	MW granodiorite

Trench 5

0 - 0.2	Sandy topsoil
0.2 - 0.35	Silty gravel
0.35 - 1.0	EW granodiorite
1.0 - 1.5	HW granodiorite
1.5 -	MW granodiorite

Trench 6

0 - 0.15	Sandy topsoil
0.15 - 0.4	Silty gravel
0.4 - 0.6	EW granodiorite
0.6 - 1.4	HW granodiorite
1.4 -	MW granodiorite

Reference

MW = Moderately Weathered: rock is discoloured and noticeably weakened; N-size drill core generally cannot be broken by hand across the rock fabr
HW = Highly Weathered: rock is discoloured and weakened; N-size drill core can generally be broken by hand across the rock fabric.
EW = Extremely Weathered: rock is decomposed to a soil, but the original rock fabric is mostly preserved.