UR1976_26

1976/26. Investigation of uses for waste materials from the Cleveland Mine

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Crushed mullock and float material from the Cleveland Mine treatment plant has been examined at the Public Works Department laboratory to determine its suitability for further use. The results of this investigation are given in Table 1 and Figures 1 and 2. Grain size distribution and Atterburg limits were almost identical and mean values were plotted in Figures 1 and 2.

SUITABILITY FOR ROAD MAKING MATERIAL

The mean grading curve conforms to NAASRA specifications for base coarse material for road making, but the ratio of coarse to fine aggregate of 6.4 is excessive. It should be noted that the coarse/fine boundary line shown in Table 1 refers to concrete aggregate specification which states that coarse aggregate is all material retained on a 4.75 mm screen whereas in road material specifications the limit is stated by NAASRA to be 2.36 mm.

For easy maintenance and good wear resistance of roads, aggregates should contain approximately 30% coarse and 70% fine whereas this material contains 86.5% of coarse aggregate (+2.36 mm). An admixture of sand would therefore be required to improve the compacting qualities of the material if it is to be used in road making.

SUITABILITY FOR CONCRETE AGGREGATE

To assess its suitability for concrete aggregate to specification A77 it is necessary to examine the grading curves of the coarse aggregate (+4.75 mm) and the fine aggregate (-4.75 mm) separately. The coarse aggregate as tested was satisfactory but the fine aggregate contained excessive fines. The coarse: fine ratio was 77.5:22.5 whereas "all in" concrete aggregate should have a ratio of 2:1. An addition of 16% medium-fine non-plastic sand would improve both the grading and the coarse:fine ratio to satisfactory standards.

OTHER FACTORS

Atterburg tests gave results within prescribed limits for road making material and for concrete aggregate.

The particles appeared to be composed of durable materials (mainly siliceous) and the shape of particles was also satisfactory, being mainly of massive and irregular fragments. It would be necessary to ensure that no non-durable, shaly and platy material were included if it was intended to use these tailings for either purpose.

CONCLUSIONS

It is likely that only a local use could be found for these tailings as concrete materials due to the long haulages from main centres. The material could be of use to the Public Works Department and the Waratah Municipality as a road making material.

[24 May 1976]

Table 1. SIZING ANALYSIS OF WASTE MATERIAL FROM CLEVELAND MINE

	Material	Crushed Mullock % Passing	Crushed Mullock % Mass retained	HMS Float % Passing	HMS Float % Mass retained	Mean % Mass retained	
	Aperture						
coarse aggregate	26.5 mm	100	*0*	100	*0*	*0*	
coarse aggregate	19 mm	97	*3*	96	*4*	*3.5*	
coarse aggregate	13.2 mm	74	*23*	69	*27*	*25*	*(77.5)*
coarse aggregate	9.5 mm	45	*29*	43	*26*	*27.5*	
coarse aggregate	6.7 mm	31	*14*	28	*15*	*14.5*	
coarse aggregate	4.75 mm	22	*7*	21	*7*	*7*	
fine aggregate	2.36 mm	14	*10*	13	*8*	*9*	
fine aggregate	1.18 mm	9	*5*	8	*5*	*5*	
fine aggregate	600 µm	6	*3*	5	*3*	*3*	*(22.5)*
fine aggregate	425 µm	4	*2*	4	*1*	*1.5*	
fine aggregate	300 µm	4	*0*	3	*1*	*0.5*	
fine aggregate	150 µm	2	*2*	2	*1*	*1.5*	
fine aggregate	75 µm	2	*0*	2	*0*	*0*	
	L.L.*	15		17			
	P.I.*	0		0			
	L.S.*	0.5		1.5			

*Test method: A.S. A89-1966, Tests 2A, 3, 4 and 5.
Preparation: Dry sieved.
Condition: Oven dried 50°C.

Figures in italics calculated values derived from PWD results.

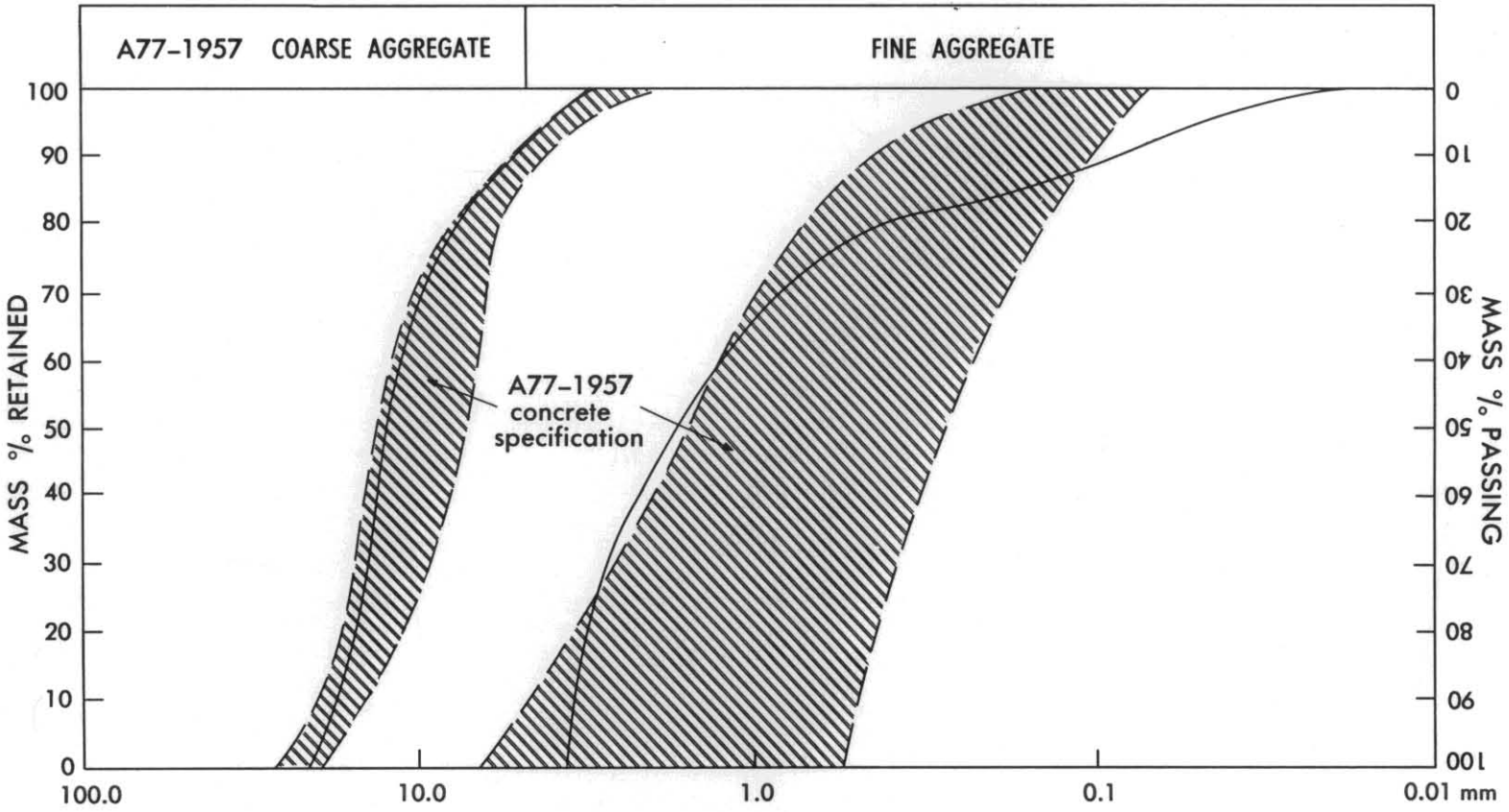
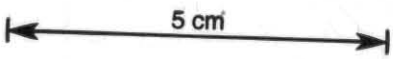


Figure 1. *Grading curves relative to A77-1957 concrete specification.*



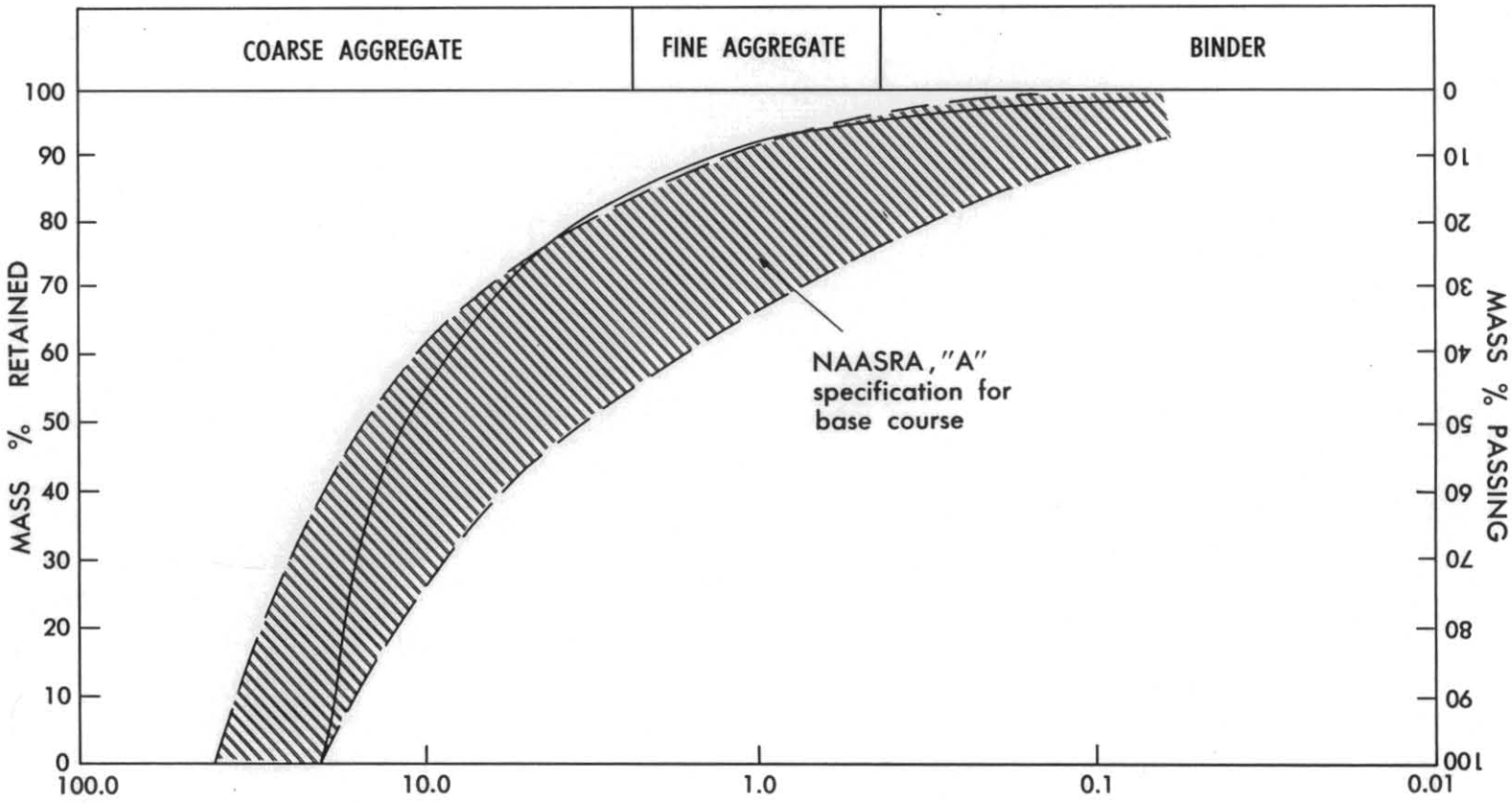


Figure 2. *Grading curves relative to NAASRA "A" specification for base course.*

5 cm