

## 8. The evaluation of sources of roadstone rock in Hobart.

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The field and laboratory work described in this report was done in response to a request from the Public Works Department (P.W.D.)

The work has been to evaluate the sources of roadstone in Hobart to suggest alternative sources and to determine the criteria which control the excellence of the material.

The P.W.D. had previously obtained samples from Hobart sources and had tested them to determine the Polished Stone Value (PSV) with the following results:

Quarry	Rock Type	PSV
Hobart Quarries: Bridgewater	Basalt	39
Pioneer Quarries: Flagstaff Gully	Dolerite and hornfels	43
Pioneer Quarries: Flagstaff Gully	Hornfels	44
Glenorchy Quarries: Glenorchy	Dolerite (surface weathering)	45
Hobart Quarries: Lenah Valley	Dolerite	40

The samples supplied to the Department did not correspond exactly with this list but consisted of

Locality	Rock Type
Bridgewater	Basalt
Flagstaff Gully	Dolerite
Glenorchy (Jackson St)	Dolerite
Lenah Valley (Giblin St)	Dolerite

The PSV of calcined bauxite (a synthetic aggregate of superior qualities) had been recorded as 64-71 and a natural material of comparable qualities was sought in Hobart.

The PSV test has been the subject of much criticism because of lack of reproducibility (e.g. James, 1967; Hartley, 1974) but in the absence of any better the above figures were accepted.

The only rock suitable for road surfacing in the Hobart area is dolerite and the above figures bear out its superiority, so that the problem is narrowed into finding the best type of dolerite.

The petrological features which give good surfacing characteristics are still the subject of controversy, but for this study a coarse grain size, the rarity of grain cracking, the rarity of chemical alteration (weathering) and a low proportion of fine groundmass (mesostasis) were assumed to be features mainly desirable in a dolerite although this might not be true for other rock types. These criteria are supported by Hartley (1974) and recommend themselves on logical grounds. The maintenance of aggregate roughness which is important is achieved in dolerite by the different cleavage characteristics of the two main mineral groups (feldspars and ferromagnesian minerals) but as this is common to all the materials examined it has not been used as a criterion.

The four sample materials were first examined in their section for the above features and a score for each was recorded, a low score indicating relative excellence. Results are shown in Table 1.

Table 1. QUALITY SCORES ON ROADSTONE SAMPLES FOR WHICH POLISHED STONE VALUES (PSVs) ARE KNOWN.

Dept of Mines Specimen and Section No.	Locality and Rock type	Feldspars				Ferromagnesian Minerals				Mesostasis (%) ‡	Score	PSV
		Percentage	Maximum Grain size (mm) *	Cracking†	Alteration†	Percentage	Maximum Grain size (mm) *	Cracking†	Alteration†			
72-12	Bridgewater basalt	20	0.2	1	1	40	0.1-0.2	2	1	40	21	39
74-13	Flagstaff Gully dolerite	65	0.5-1	1	1	30	2	1	1	5	11	-
74-14	Glenorchy dolerite	60	1	2	2	30	1.8	3	3	10	18	45
74-15	Lenah Valley Dolerite	75	1.3	2	2	20	3.5	2	2	5	13	40

\* Grain size is recorded on a scale of >3 mm = 1 2-2.9 mm = 2 1-1.9 mm = 3 <1 mm = 4

† Cracking and alteration is recorded on a scale of 1 = slight, 2 = moderate, 3 = extensive, 4 = severe.

‡ Each 5% of mesostasis scores 1 e.g. 40% = 8

Table 2. QUALITY SCORES ON SELECTED SAMPLES OF DOLERITE IN THE HOBART AREA.

Dept of Mines Specimen and Slide No.	Locality and Grid Ref.*	Feldspars				Ferromagnesian Minerals				Mesostasis (%)	Score
		Percentage	Maximum Grain size (mm)	Cracking	Alteration	Percentage	Maximum Grain size (mm)	Cracking	Alteration		
74-467	Proctors Rd below Christ College 258497	60	0.2	1	1	30	2	2	1	10	15
74-468	Summerleas Rd 225455	65	0.5	1	3	20	2	2	3	15	17
74-469	Mt Wellington 178513	75	1	1	1	25	4	2	2	0	10
74-470	Proctors Rd Middle Quarry 254493	30	2	4	4	20	0.5	4	4	50	32
74-471	S Outlet Extension Leslie Rd saddle 201427	70	4	1	1	30	3	3	3	0	10
74-472	S Outlet N of 'The Lea' 253454	60	1	1	1	30	4	2	3	10	15
74-473	Summerleas Rd Quarry 222453	60	0.5	2	3	20	2	4	3	20	22
74-474	Domain above Clearys Gates 258543	60	1.5	2	3	40	3	3	3	0	15
74-475	S Outlet Extension Leslie Rd saddle 201427	40	0.5	1	1	50	2	2	1	10	13

Table 2. (continued)

Dept of Mines Specimen and Slide No.	Locality and Grid Ref.*	Feldspars				Ferromagnesian Minerals				Mesostasis (%)	Score
		Percentage	Maximum Grain size (mm)	Cracking	Alteration	Percentage	Maximum Grain size (mm)	Cracking	Alteration		
74-476	Proctors Rd Middle Quarry 254493	30	3	1	1	20	1	1	2	50	19
74-477	Mt Wellington 198510	60	1	2	2	20	4	4	2	20	18
74-478	Summerleas Rd Road bank 225460	70	0.5	1	3	30	4	2	3	0	14
74-479	Domain Rd NW of Hobart Radio 260543	60	0.3	1	2	30	1	2	2	10	16
74-480	Summerleas Rd Road bank 226456	60	1	1	1	30	2	2	3	30	18

\* All localities lie within 100 km grid square EN.

Method of scoring as for Table 1.

Because of the imperfect correspondence between the PSV test samples and those used for scoring no complete analysis of results is possible but the Flagstaff Gully dolerite appears to be the best and the worst score is shown by the basalt.

A set of 14 further samples was taken and subjected to the same scoring test. The results are given in Table 2.

The criteria used for scoring have a logical validity in themselves, quite apart from correlations against Polished Stone Values. Several low scoring, that is good, samples 74-469, 74-472, 74-478 come from the upper central part of dolerite bodies, which is often a coarse clean, well differentiated part of the rock mass.

It is therefore suggested that samples of this type of rock from the tested and other localities be subjected to polishing tests or preferably to testing in a road surface. If this were done then the inadequacies of the PSV test would be eliminated from the argument and a direct result obtained from the rock to the road surface.

#### REFERENCE

- HARTLEY, A. 1974. A review of the geological factors influencing the mechanical properties of road surface aggregates. *Q.J.engng Geol.* 7:69-100.
- JAMES, J.G. 1967. Calcined bauxite and other artificial polish-resistant roadstones. *Rep.Rd Res.Lab.* LR 84.

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