

OFFICE MEMORANDUM



MICHIGAN

DEPARTMENT OF STATE HIGHWAYS

March 21, 1977

To: L. T. Oehler
Engineer of Research

From: R. W. Muethel

Subject: Petrographic Analysis of Coarse Aggregate: Wallace Stone Co. Pit No. 32-4 (Testing Laboratory Sample No. 76 A-1708). Research Report No. R-1056.

On August 18, 1976, a sample of crushed stone coarse aggregate was received by the Department's Testing Laboratory at Ann Arbor. Information accompanying the sample stated that the material was obtained from the Wallace Stone Co. quarry, Pit No. 32-4, location southwest 1/4 of northeast 1/4 of Section 5, T16N-R10E, Huron County. The material was submitted to the laboratory to be tested for information. Petrographic analysis of a portion of the sample was requested by G. H. Gallup.

Summary

Petrographic analysis was completed on November 17, 1976. The sample was found to contain 100 percent sedimentary rock particles, predominantly dolomitic limestone, calcitic dolomite, sandstone, and shaley limestone. The sample also contained smaller amounts of cherty particles, limestone, arenaceous limestone, and limestone or dolomite interbedded with sandstone.

Detailed tabulations of petrographic composition are included in Table 1.

Detailed Petrography

Petrographic examination was conducted in general conformance with ASTM C295, "Petrographic Examination of Aggregates for Concrete." Representative portions--300 particles--of each sieve fraction of the sample were identified megascopically, along with acid testing and a scratch test for hardness, and microscopically by stereomicroscope. The following pages contain the rock type descriptions.

TESTING AND RESEARCH DIVISION

Robert W. Muethel

Geologist - Materials Research Unit

TABLE 1
 PETROGRAPHIC COMPOSITION
 Testing Laboratory Sample 76 A-1708

Rock Type	Sieve Fraction Analyzed				Computed Sample Composition
	1 to 3/4 in.	3/4 to 1/2 in.	1/2 to 3/8 in.	3/8 to No. 4	
Limestone	6.3	6.3	5.3	11.7	7.4
Laminated to Shaley Limestone	14.0	13.3	15.4	14.0	14.2
Arenaceous Limestone	0.3	0.7	1.0	--	0.5
Dolomitic Limestone and Calcitic Dolomite	34.0	39.3	41.7	38.3	38.3
Interbedded Limestone or Dolomite and Sandstone	10.7	12.3	7.0	5.7	8.9
Sandstone	24.0	22.0	20.4	21.3	21.9
Cherty Particles	10.7	6.0	9.3	9.0	8.8
Totals, percent	100.0	100.0	100.0	100.0	100.0

Note: Computed sample composition is based upon counts of 300 particles contained in each of the sieve fractions noted.

SEDIMENTARY ROCKS

Rock Type	Limestone	Laminated to Shaley Limestone	Arenaceous Limestone
Color	buff; dark brown; and mottled buff and brown	mottled buff and dark brown to black	buff to gray
Texture	very fine grained to micro-crystalline	very fine grained to micro-crystalline	fine grained to micro-crystalline
Luster	dull	dull	dull
Hardness	moderately hard: Mohs 3	moderately hard to soft: Mohs 3 to 2.5	hard to moderately hard: Mohs 7 to 3
Porosity	non-porous	non-porous to finely porous	non-porous to slightly porous
Particle Shape	angular	angular to tabular	angular
Particle Surface	fresh, rough to smooth, dented to ridged	fresh, rough to smooth, dented to ridged	fresh, rough
Remarks			Approximate quartz grain size range, 0.1 mm to 0.5 mm.

SEDIMENTARY ROCKS (Cont.)

Rock Type	Dolomitic Limestone and Calcitic Dolomite	Interbedded Limestone or Dolomite and Sandstone	Sandstone
Color	mottled buff and gray; buff; gray; and dark brown	mottled buff to brown and greenish gray	greenish gray; and buff
Texture	very fine grained to micro-crystalline	fine grained to micro-crystalline	fine to very fine grained
Luster	dull	dull	dull
Hardness	moderately hard: Mohs 3 to 4	hard to moderately hard: Mohs 7 to 3	hard to moderately hard: Mohs 7 to 3
Porosity	non-porous to slightly porous	non-porous to porous	slightly porous to porous
Particle Shape	angular	angular	angular
Particle Surface	fresh, rough, dented to ridged.	fresh, moderately smooth to rough, dented to ridged	fresh, rough, dented to ridged
Remarks		Particles contain irregular zones or thin seams of quartz grains.	Particles are composed of subangular to rounded quartz grains cemented with calcitic to dolomitic material.

SEDIMENTARY ROCKS (Cont.)

Rock Type	Cherty Particles
Color	mottled buff to white and gray to dark brown
Texture	very fine grained to micro-crystalline
Luster	dull to vitreous
Hardness	hard to moderately hard: Mohs 7 to 3
Porosity	non-porous to slightly porous
Particle Shape	angular
Particle Surface	fresh, rough to smooth, dented to ridged
Remarks	Cherty zones vary from white chalky seams to dark brown, dense, massive zones.