OFFICE MEMORANDUM

DATE: May 25, 1976

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 75 A-2500). Research Report No. R-1004.

On December 3, 1975, 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 a stockpile at the Wallace Stone Co. quarry, Pit No. 32-4, location SW of NE, Section 5, T16N-R10E, Huron County. The material identified as Bottom Rock, 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 February 12, 1976. The sample was found to contain 100 percent sedimentary rock particles, predominantly limestone, dolomite, and sandstone, displaying evidence of interbedding. The sample also contained smaller amounts of shaley to faintly laminated limestone, cherty particles, and massive calcite.

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 (exceptions noted)—of each sieve fraction of the sample were identified megascopically, along with acid testing and a scratch test for hardness; and microscopically with a stereomicroscope. The following pages contain the rock type descriptions.

TESTING AND RESEARCH DIVISION

R. W. Muethel

Geologist
Materials Research Unit

TABLE 1
PETROGRAPHIC COMPOSITION
Testing Laboratory Sample No. 75 A-2500

Rock Type	Sieve Fractions 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	20.0	22.3	22.6	21.0	21.5
Laminated to Shaley Limestone	8.7	10.5	7.5	7.0	8.4
Arenaceous Limestone	0.3	5.7	9.6	20.7	9.0
Dolomite	25.0	21.1	16.4	13.3	19.0
Interbedded Limestone or Dolomite and Sandstone	10.0	8.9	4.8	3.0	6.7
Sandstone	27.0	27.5	35.0	29.7	29.8
Cherty Particles	8.3	4.0	4.1	4.3	5.2
Massive Calcite	0.7	0.0	0.0	1.0	0.4
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, with the following exceptions: 3/4 to 1/2-in., 247 particles; 1/2 to 3/8-in., 146 particles.

SEDIMENTARY ROCKS

Rock Type	Limestone	Laminated to Shaley Limestone	Arenaceous Limestone
Color	buff; 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 microcrystalline
Luster	dull	dull	dull
Hardness	matrix moderately hard: Mohs 3; quartz grains hard: Mohs 7	matrix moderately hard to soft: Mohs 3 to 2-1/2; quartz grains hard: Mohs 7	matrix moderately hard: Mohs 3; quartz grains hard: Mohs 7
Porosity	non-porous to slightly porous	non-porous to slightly porous	non-porous to slightly porous
Particle Shape	angular	angular to tabular	angular to subangular
Particle Surface	fresh, rough, dented to ridged	fresh, rough to moderately smooth, dented to ridged	fresh, rough, dented to ridged
Remarks	A number of particles contain traces of shale or quartz grains. Size of quartz grains contained in rock particles of this sample vary from approximately 0.1 mm to 0.3 mm in diameter.	A few particles contain quartz grains. Particles vary from highly laminated to poorly laminated.	

SEDIMENTARY ROCKS (Cont.)

Rock Type	Dolomite	Interbedded Limestone or Dolomite and Sandstone	Sandstone
Color	buff; grayish brown; and mottled buff and gray to brown	mottled buff and gray to brown	greenish gray to buff
Texture	fine grained to microcrystalline	fine grained to microcrystalline	fine to very fine grained
Luster	dull	dull	dull
Hardness	matrix moderately hard: Mohs 3-1/2 to 4; quartz grains hard: Mohs 7	carbonate exposures moderately hard: Mohs 3 to 4; sandstone hard: Mohs 7	calcareous cementation moderately hard: Mohs 3; quartz grains hard: Mohs 7
Porosity	non-porous to finely porous	non-porous to slightly porous	finely porous
Particle Shape	angular to subangular	angular	angular to subrounded
Particle Surface	fresh, rough to smooth, dented to ridged.	fresh, rough to moderately smooth, dented to ridged	fresh, rough, dented to ridged
Remarks	A number of particles contain arenaceous zones. Many particles display small calcite or pyrite exposures. Some particles contain argillaceous zones.	Most particles are finely bedded with alternating carbonate and sandstone layers.	

SEDIMENTARY ROCKS (Cont.)

Rock Type	Cherty Particles	Massive Calcite
Color	mottled buff and white to light or dark gray	mottled white or transparent and brown
Texture	very fine grained to micro-crystalline	massive to finely crystalline
Luster	dull to vitreous	resinous to vitreous
Hardness	carbonate zones moderately hard: Mohs 3 to 4; chert zones hard: Mohs 7	moderately hard: Mohs 3
Porosity	non-porous to slightly porous	non-porous
Particle Shape	angular	angular
Particle Surface	fresh, rough to smooth, dented to ridged	fresh, rough to smooth, dented to ridged
Remarks	Chert exposures vary from massive chert to small lenses.	Particles are fragments of mineralized zones in the carbonate bedrock.