



OFFICE MEMORANDUM

DATE: January 15, 1982

TO: L. T. Oehler
Engineer of Research

FROM: R. W. Muethel

SUBJECT: Petrographic Analysis of Crushed Gravel Coarse Aggregate: Lindberg #3 Pit No. 52-9 and Co. Road Comm. #12 Pit No. 52-67 combined. (Testing Laboratory Sample No. 81 A-2457).
Research Project 78 TI-510. Research Report No. R-1186.

On December 17, 1981, a sample of crushed gravel coarse aggregate was received by the Department's Testing Laboratory Section. Information accompanying the sample stated that the material was obtained from a crushed gravel stockpile at the Lindberg #3 Pit No. 52-9, location SE of SE, Section 8, T47N, R25W, Marquette County. The material reportedly also contains crushed gravel from the County Road Commission #12 Pit No. 52-67, location NW of NE, Section 23, T46N, R24W.

The material was produced for use in a sprinkle coat treatment on Control Section FRR 55031, Job No. 17344A, M 35 in Menominee County. Petrographic analysis of a portion of the sample was requested by G. H. Gallup.

Summary

Rock Class	Condition of Particles	Percent of Sample
Igneous	Hard, fresh, and non-porous	26.8
Metamorphic	Hard to moderately hard, fresh, and non-porous to slightly porous	25.3
Sedimentary	Moderately hard to hard, fresh, and porous to non-porous	47.9

Approximately 42 percent of the sample was found to be composed of non-friable sandstone.

A detailed tabulation of petrographic composition is 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 the noted sieve fractions of the sample were identified megascopically

TABLE 1
 PETROGRAPHIC COMPOSITION
 Testing Laboratory Sample No. 81 A-2457

Rock Type	Sieve Fraction Analyzed			Computed Sample Composition
	3/4 to 1/2-in.	1/2 to 3/8-in.	3/8 to No. 4	
Granite	12.0	14.0	10.7	12.2
Gabbro	11.0	11.3	11.3	11.2
Basalt	2.7	2.7	1.3	2.2
Felsite	2.3	1.0	0.3	1.2
Quartzite	17.7	13.7	10.0	13.8
Metasediments	7.0	9.3	8.7	8.3
Schist & Slate	2.7	3.0	3.7	3.2
Limestone	--	--	0.7	0.2
Dolomite	7.3	6.7	3.3	5.8
Sandstone	37.3	38.3	49.7	41.8
Chert	--	--	0.3	0.1
Totals, percent	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.

Rock Type	Basalt	Felsite
Color	dark gray to black	pink, gray; and mottled pink and reddish brown
Texture	very fine grained to micro-crystalline	very fine grained to micro-crystalline
Luster	dull	dull
Hardness	Mohs 5-1/2 to 6	Mohs 6 to 7
Porosity	non-porous	non-porous
Particle Shape	angular	angular
Particle Surface	fresh, rough to moderately smooth, dented to ridged	fresh, rough to moderately smooth, dented to ridged

METAMORPHIC ROCKS

Rock Type	Quartzite	Metasediments
Color	white to buff; pink; and mottled white and pink to purple	gray; purple; and mottled gray and reddish brown
Texture	medium to fine grained, and massive	very fine grained to micro-crystalline
Luster	vitreous to dull	dull
Hardness	Mohs 7	Mohs 5-1/2 to 7
Porosity	non-porous	non-porous to finely porous
Particle Shape	angular	angular
Particle Surface	fresh, rough, dented to ridged	fresh, rough to smooth, dented to ridged

Rock Type	Schist and Slate
Color	greenish gray; reddish brown; and mottled gray and reddish brown
Texture	very fine grained to micro-crystalline
Luster	dull to silky
Hardness	Mohs 4 to 2-1/2
Porosity	non-porous to slightly porous
Particle Shape	angular to tabular
Particle Surface	fresh, rough to moderately smooth, dented to ridged
Remarks	Most particles are moderately hard.

Rock Type	Limestone	Dolomite
Color	tan	white; pink; and mottled white to pink and reddish brown or gray
Texture	very fine grained	fine grained to microcrystalline
Luster	dull	dull
Hardness	Mohs 3	Mohs 3-1/2 to 7
Porosity	finely porous	non-porous
Particle Shape	angular	angular
Particle Surface	fresh, moderately smooth, dented to ridged	fresh, rough, dented to ridged
Remarks		Some particles contain siliceous zones.

Rock Type	Sandstone	Chert
Color	pink to reddish brown; white to buff; and mottled pink and white	white
Texture	coarse to medium grained	microcrystalline
Luster	dull	dull
Hardness	Mohs 5 to 7	Mohs 7
Porosity	finely porous to porous	slightly porous
Particle Shape	angular to subrounded	angular
Particle Surface	fresh, rough, dented to ridged	fresh, moderately smooth, dented to ridged
Remarks	Particles are non-friable.	