



OFFICE MEMORANDUM

DATE: November 3, 1982

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. 82 A-2196). Research Project 78 TI-510, Research Report No. R-1207

On October 21, 1982, a sample of crushed stone coarse aggregate was received by the Testing Laboratory Section. Information accompanying the sample stated that the material was obtained from a stockpile at the project site for B03 of 73112, 12787A on I 75 over the Saginaw River at Zilwaukee. The material was reportedly produced at the Wallace Stone Co. quarry, Pit No. 32-4, location SW of NE, Section 5, T16N, R10E, Huron County, for use as 17A Modified coarse aggregate (1979 MDOT Standard Specifications) for use in precast concrete segments for the subject structure. The material was submitted to the Testing Laboratory to be tested for information. Petrographic analysis of a portion of the sample was requested by G. H. Gallup.

Summary

| Rock Class | Condition of Particles | Percent of Sample |
|-------------|---|-------------------|
| Sedimentary | moderately hard, fresh, and non-porous to slightly porous | 100.0 |

Approximately 99 percent of the sample was found to be comprised of limestone and sandy limestone having absorptions ranging from 1.24 to 1.71 percent.

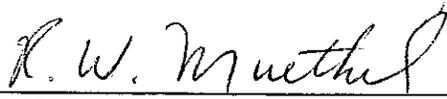
Detailed tabulations of petrographic composition, specific gravity, and absorption are included in Tables 1 and 2.

Detailed Petrography

Petrographic examination was conducted in general conformance with ASTM C295, "Petrographic Examination of Aggregate for Concrete." Representative portions—300 particles—of the noted sieve fractions of the sample were identified megascopically along with acid testing and a scratch test for hardness, and microscopically with a

stereomicroscope. Specific gravity and absorption determinations were performed in general accordance with ASTM C127, "Specific Gravity and Absorption of Coarse Aggregate." Determinations included all material of the rock types analyzed. Descriptions of the rock types are contained in the following pages.

TESTING AND RESEARCH DIVISION


Geologist - Materials Research Unit

RWM:bt

Attachments

cc: K. A. Allemeier
M. L. O'Toole
D. F. Malott
G. H. Gallup
J. W. Burge
M. G. Brown
R. H. Vogler

TABLE 1
 PETROGRAPHIC COMPOSITION
 Testing Laboratory Sample No. 82 A-2196

| 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 | |
| Limestone | 39.7 | 42.0 | 41.0 | 40.9 |
| Sandy Limestone | 60.0 | 57.7 | 58.0 | 58.6 |
| Shale | 0.0 | 0.0 | 0.7 | 0.2 |
| Cherty Particles | 0.3 | 0.3 | 0.3 | 0.3 |
| 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 noted.

TABLE 2
 SPECIFIC GRAVITY AND ABSORPTION DATA
 Testing Laboratory Sample No. 82 A-2196

| Rock Type | Specific Gravity | | | Absorption, percent | Composition, percent by weight |
|------------------|------------------|-----------|----------|---------------------|--------------------------------|
| | Bulk, dry | Bulk, ssd | Apparent | | |
| Limestone | 2.62 | 2.65 | 2.70 | 1.24 | 40.6 |
| Sandy Limestone | 2.57 | 2.61 | 2.69 | 1.71 | 59.1 |
| Shale | 2.46 | 2.55 | 2.70 | 3.55 | 0.1 |
| Cherty Particles | 2.62 | 2.64 | 2.67 | 0.66 | 0.2 |
| Total Sample | 2.59 | 2.63 | 2.69 | 1.52 | 100.0 |

NOTE: Values are computed from determinations made on all sample material contained in the categories noted.

SEDIMENTARY ROCKS

| | | |
|------------------|--|---|
| Rock Type | Limestone | Sandy Limestone |
| Color | buff to gray; and mottled dark brown and buff | buff to gray; and mottled buff or gray and dark brown |
| Texture | fine grained to microcrystalline | fine grained to microcrystalline |
| Luster | dull | dull |
| Hardness | groundmass, Mohs 3; quartz grains, Mohs 7 | groundmass, Mohs 3; quartz grains, Mohs 7 |
| Porosity | non-porous to slightly porous | non-porous to slightly porous |
| Particle Shape | angular | angular |
| Particle Surface | fresh, rough to moderately smooth, dented to ridged | fresh, rough, dented to ridged |
| Remarks | Some particles contain scattered quartz grains or shaley traces. A few particles are dark brown with buff mottled zones. | Particles are moderately to highly sandy with rounded to sub-angular quartz grains. Many particles contain irregular traces of dark brown shaley seams. |

| | | |
|------------------|--|--|
| Rock Type | Shale | Cherty Particles |
| Color | dark brown to black | mottled buff or brown, and gray to white |
| Texture | very fine grained to microcrystalline | very fine grained to microcrystalline |
| Luster | dull | dull |
| Hardness | Mohs 2-1/2 | Mohs 3 to 7 |
| Porosity | finely porous | non-porous to slightly porous |
| Particle Shape | angular to tabular | angular |
| Particle Surface | fresh, moderately smooth, dented to ridged | fresh, rough to moderately smooth, dented to ridged |
| Remarks | Some particles contain quartz grains. | Particles are composed of limestone with exposures of silicified fossils or chert. |