



SOURCE APPROVALS FOR AGGREGATES

GENERAL

All aggregate material shall be produced from approved sources. Only those sources, which can provide aggregates consistently compliant with the applicable specification, shall be approved. The ledges shall contain no more than 5% noncompliant materials within the approved bedding planes. At least 95% of carbonate coarse aggregate particles produced by crushing rock shall be derived from ledges in which the rock complies with the requirements for the durability class for which it is being produced.

For proportioned aggregates, aggregate sources shall not be blended to produce a single stockpile. An aggregate source is defined by an individual A-number.

AGGREGATES FOR USE IN PCC

- A. Written source approval shall be required.
1. A producer request for source approval shall be made, in writing, to the appropriate District Materials Engineer with a copy to the Office of Materials in Ames, Iowa.
 2. The District Materials Engineer will respond to the Materials Engineer with supportive evidence and recommendations to:
 - a. Approve the source
 - b. Not approve the source, or
 - c. Request that specific additional information is obtained as a basis for a final decision.
 3. After review with the District Materials Engineer, the Geologist will prepare an appropriate letter of approval or rejection. Upon the signature of the Materials Engineer, the letter will be issued to the aggregate producer.
 4. The distribution of aggregate source approvals, or changes, will include the producer, the appropriate District Materials Engineer, and the Pavement Design Engineer.
- B. Source approvals shall describe, in detail, any physical limitations of the subject source and any special production methods, or restrictions required to produce specification material.
- C. Preliminary source approvals may be issued whenever sufficient quality information is available. This will expedite the development of new sources or ledges by establishing the primary quality level without requiring production material to be available. A final source approval will follow only after adequate amounts of compliant material have been produced. Aggregate producers may quote from ledges with preliminary approvals assuming full responsibility for the timely delivery of compliant materials to the projects in question.

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- D. A new or updated source approval will be required if the aggregate durability of a quarry ledge changes or a new bed grouping is approved. The source approval remains with the source. Any changes in management of the source may be documented by letter and will be recorded in [IM T203](#), with a copy maintained in the District source files and Geology Section of the Materials Laboratory. Changes to production restrictions, resulting from joint producer/District quality control discussions, may also be documented by letter, which will be signed by the producer and the District Materials Engineer. A copy of this letter will be maintained in the District source file and Geology Section of the Materials Laboratory.
- E. When processing coarse aggregate for PCC no material larger than the gradation topsize may be removed from the product unless allowed by the source approval. When processing multiple PCC products simultaneously, crush to 1.5" nominal before fractionating. Removal of other products may be allowed by the District Materials Engineer if the PCC durability meets or exceeds the original full-face Durability Class and the production method is documented in an amended source approval.
- F. Limestone and Dolomite sources greater than 100 miles from the nearest Iowa DOT District Materials Office or area inspection laboratory, may not be allowed to furnish aggregate to Iowa DOT projects. These may be considered too distant to provide source monitoring by Department employees as required in Materials [IM 209](#).

APPROVAL PROCEDURES FOR AGGREGATES USED IN PCC

The basis of approval shall be by one of three methods or combination of methods:

1. Service History
2. Geologic Correlation
3. Testing

A. Approval by Service History

1. Aggregate will be considered durable when it does not contribute to the premature deterioration in concrete. Durability classes will be assigned on the basis of qualifying performance in air-entrained concrete pavements of appropriate age.
2. Meet the durability requirements of [Article 4115.01](#).

B. Approvals by Geologic Correlation

1. Sources may be approved based on geologic correlation to a source with an established service history.
2. Sources may be approved if there is a satisfactory similarity to any approved source with no aggregate-related deterioration as determined by the Department through pavement coring and petrographic examination.

C. Approvals by Chemical & Physical Testing

Aggregate sources without qualifying performance records or satisfactory similarity to any approved source can be provisionally assigned to a Durability Class based on physical and chemical tests meeting the following requirements:

| DURABILITY CLASS | QUALITY | TEST LIMITS | TEST METHOD |
|-------------------------|-----------------------------|--------------------|--------------------|
| Class 2 | Salt susceptibility quality | Max. 4.5 | Iowa 223 |
| | Secondary Pore Index | Max. 30 | Iowa 219 |
| | Durability Factor | Min. 85 | ASTM 666 |
| Class 3 | Salt susceptibility quality | Max. 1.5 | Iowa 223 |
| | Secondary Pore Index | Max. 25 | Iowa 219 |
| | Durability Factor | Min. 90 | ASTM 666 |
| Class 3i | Salt susceptibility quality | Max. 1.0 | Iowa 223 |
| | Secondary Pore Index | Max. 20 | Iowa 219 |
| | Durability Factor | Min. 95 | ASTM 666 |

NOTE: For Source Approval by Testing, coarse aggregate must pass the Salt Susceptibility Quality Number and must pass either the Secondary Pore Index or Durability Factor for compliance.

STONE FOR REVETMENT

- A. Source approvals, written by the appropriate District Materials Engineer, shall be required for limestone, dolomite, and quartzite materials. The source approvals shall identify the ledges and the types of revetment for which they are approved.
- B. The basis of approval shall be by one of the three methods stipulated in [4130.01](#):
 - 1. Service History
 - 2. Test Plot Performance
 - 3. Testing
- C. All revetment stone from ledges containing conglomerate or breccia, where the performance history has not been established shall be evaluated using a two-year wet test plot before approval. Conglomerate and breccia shall be defined as any rock that contains clasts (i.e., fragments or pieces) of a pre-existing material.
- D. The distribution of approvals will include the producer and the Materials Engineer.
- E. When subsequent performance indicates the source approval to be in error it shall be modified or rescinded as necessary.

APPROVAL PROCEDURES

A. Approvals by Service History

1. The source approvals shall document the location, age, and sources of all usage forming the basis of the approvals.
2. The historical usage must conform to the revetment class approved.

B. Approvals by Test Plot Performance

1. Test plots may be of any size that incorporates all beds of the ledge under evaluation.
2. For Class A, B, D, and E revetment, the test plots must be constructed in an environment of wetting and drying cycles combined with seasonal freezing and thawing cycles that meet with the approval of the District Materials Engineer.
3. The test plots will be evaluated after two years and shall have no more than 25% of the stones showing cracks or fractures.

C. Approvals by Testing.

1. A record of Alumina Content (Iowa DOT Test Method 222) or freeze and thaw tests (Test Method 211, Method A) and Iowa Pore Index Tests (Test Method 219) should exist such that the District Materials Engineer is assured of reasonable conformance to the specifications. When no record exists, test results may be secured from production samples; ledge samples (blockstoning), or samples from rock cores.
2. When the source test plot or service history is not available, the virgin stone shall meet the following requirements on stone crushed to 3/4 inch to 1 1/2 inch (19 mm to 37.5 mm) nominal maximum sizes:

| REVETMENT TYPE | REVETMENT QUALITY | TEST LIMITS | TEST METHOD |
|--|--|-----------------|--|
| Primary projects; Class A & B revetment All projects; Class E revetment | Alumina A Freeze Secondary Pore Index | 0.7 10 25 | Iowa 222 Iowa 211, Method A Iowa 219 |
| Non-Primary projects; Class A & B revetment | C Freeze | 5 | Iowa 211, Method C |
| All projects; Class D revetment | C Freeze | 10 | Iowa 211, Method C |
| Erosion Stone | C Freeze | 15 | Iowa 211, Method C |

NOTE: Revetment may pass either Alumina or A-Freeze for compliance.

The abrasion loss for all revetment and erosion stone shall not exceed 50% when tested in accordance with AASHTO T96.

FINE AGGREGATE APPROVAL

- A. For fine aggregate for Portland Cement Concrete (4110, 4117), mortar compressive strength must meet or exceed 6000 psi using Iowa Test Method 212 (AASHTO T 106). For glacial sands, sampling for approval should be a minimum of three samples taken at a frequency of one per 2,000 tons or one per week once the working depth has been established. A target fineness modulus will be established for each source at the time of approval.

- B. For Class L fine aggregate for Portland Cement Concrete (4111), mortar compressive strength must meet or exceed 5200 psi using Iowa Test Method 212 (AASHTO T 106).

CONTINUED FINE AGGREGATE APPROVAL

- A. Variation of the target fineness modulus in excess of 0.1 from the established base line should be investigated. A drop of 0.2 will require an annual mortar compressive strength test in excess of 6000 psi for continued approval.

- B. If a target fineness modulus has not been established, and the fineness modulus is less than 2.75 using [Materials I.M. 302](#) (AASHTO T 27), an annual mortar compressive strength test result of 6000 psi or greater may be required for continued approval, as directed by the Engineer. Variability in fineness may be grounds for loss of source approval.

- C. Class L sands require an annual mortar compressive strength test which must meet or exceed 5200 psi and there are no fineness modulus requirements.

OTHER AGGREGATES

- A. When appropriate, and after review and concurrence of the Geologist, the District Materials Engineer may establish source approval procedures, including production restrictions.

- B. A copy of such source approvals, and any subsequent changes to them, shall be provided to the Geologist in the Office of Materials.

- C. The District aggregate source files should retain all documentation of materials approved for production, including production equipment, production methods, restrictions, etc.