

Tennessee Department of Transportation Division of Materials and Tests

Aggregate Approval Process (SOP 2-1)

Purpose- The purpose of this document is to establish a formal process for evaluating, testing, and approving aggregate sources to be used for general TDOT Construction and bituminous surface course mixtures.

Background- Aggregates must exhibit certain physical and chemical properties that reflect their ultimate quality and durability. The TDOT Standard Specifications have several aggregate properties specified, including abrasion resistance, freeze-thaw durability, gradation, particle shape, deleterious materials, and others. Aggregates used for bituminous surface courses must demonstrate additional properties that would indicate the aggregates ability to satisfactorily provide a skid-resistant pavement. These properties would include silica dioxide content, insoluble residue content, calcium carbonate content, British pendulum numbers, and others.

1. ALL AGGREGATES

A new aggregate source shall complete the following procedure to be considered for use in TDOT work. In addition, an aggregate facility must provide a Type A laboratory as specified in subsection 106.06 of the TDOT Standard Specifications.

1.1. Procedure: Step 1- The aggregate producer/supplier shall submit test results from an accredited independent laboratory indicating the sources ability to meet current TDOT Standard Specifications.

Step 2- A representative from the TDOT Materials and Test Division will visit and inspect the site to determine geological formations, and obtain samples for TDOT testing.

Step 3- The TDOT results will be provided to the Producer. If the test results indicate that the material meets the required specifications, then the material will be added to the official Producer/Supplier List maintained by HQ Materials and Tests. If a sample that has been submitted and tested fails to meet any of the approval criteria, then a second “referee” sample of the same material shall be obtained for testing. When two subsequent samples fail approval testing, a representative from the Producer, Regional Materials and Tests, and Headquarters Materials and Tests will hold a conference to discuss the acceptance of newly produced material. The producer must wait a minimum of three months before re-applying for approval status. Once it has been demonstrated that the material meets TDOT aggregate approval specifications as indicated by the results of two consecutive samples, HQ Materials and Tests shall notify both regional TDOT personnel and the producer. It will be the producer’s decision to continue processing aggregate for final use.

Step 4- Acceptance of the aggregate for use in a TDOT project will be based on the chemical and physical properties of the processed material for its intended use. (i.e. base stone, concrete coarse aggregate, etc...) All sampling and testing will be in accordance with the TDOT Standard Specifications, TDOT Materials and Tests Circular Letters, and AASHTO/ASTM Testing procedures.

Step 5- The Producer must prepare a written quality control plan. The plan may be generic, but must be site specific. The plan must indicate in detail how the Producer proposes to control the equipment, materials, and production methods to insure that the specified products are obtained. The plan must list the personnel responsible for production

and quality control at the site and include information on how to contact each person. The following specific information must also be included in the plan:

- Identification of the physical location of the source, to include a description of the property site and reference to the nearest identifiable points such as highways and towns.
- A description of the signs used to identify each stockpile as intended for TDOT usage. Stockpile signs must be legible from the cab of a truck fifty feet from the identified pile.
- A loading and shipping control plan which includes a description of the methods by which the products are to be loaded and shipped for use by TDOT, including safeguards against loading improper aggregate, contamination, degradation, and segregation of the aggregate. The plan must also include methods of insuring that all products are accurately identified and that all shipping units are clean.
- A plan for dealing with quality control sample failures. This plan must include how the Producer plans to initiate an immediate investigation and how the Producer will implement corrective action to remedy the cause of the problem.

Two copies of the Producer's written quality control plan must be submitted with the original request for plant approval. QC Plans must be submitted to HQ Materials and Tests annually and should be updated with any changes made to the mining operation, the aggregate production facility, aggregate production process, any key personnel, or a change in ownership.

Aggregate sources will be continuously sampled and tested for quality (chemical and physical properties) by the TDOT. Aggregate that does not meet TDOT specifications will not be used in TDOT work.

1.2. Quality Monitoring :

An aggregate's approval is contingent based on continuous, satisfactory field performance as well as periodic laboratory evaluation of sampled material. In addition to the quality monitoring outlined below, an aggregate's approval may also be rescinded if there is any concern for safety that may be related to the approved material as determined by a visual inspection.

- At a minimum of once every six months, a sample of the approved material shall be obtained from the source stockpile by Regional Materials and Tests personnel and submitted to the headquarters materials testing laboratory for a verification of the standard aggregate quality properties.
- If a sample that has been submitted and tested fails to meet any of the approval criteria, then a second "referee" sample of the same material shall be obtained for testing. When two subsequent samples fail quality testing, the aggregate source's approval for use shall be immediately rescinded and mix production utilizing the failing material shall cease.
- The producer shall be notified of the failing test results as soon as possible; at which time a representative from the producer, Regional Materials and Tests, and Headquarters Materials and Tests will hold a conference to identify the location/distribution of the failing material and to develop a plan for both the utilization of any existing material and the acceptance of newly produced material.
- Once a new stockpile of material is produced, a sample of the material shall be tested for aggregate approval by a private testing laboratory at the producer's expense.
- If the material tested by an independent laboratory meets the specifications for an approved aggregate, then a sample of the same material shall be obtained by Regional Materials and Tests personnel and submitted to the Headquarters Materials and Tests laboratory for a complete verification of aggregate properties. If the test results from the initial sample meet the requirements for aggregate approval, then a second sample of the material shall be obtained and tested for consistency.
- Once it has been demonstrated that the material meets TDOT aggregate specifications as indicated by the results of two consecutive samples, Headquarters Materials and Tests shall notify both regional TDOT personnel and the Producer.

2. **SURFACE AGGREGATES:**

An aggregate that is to be tested for use in a bituminous surface course must not only meet the requirements of the TDOT Standard Specifications, but also demonstrate satisfactory field performance. To become an approved bituminous surface course aggregate the source must, in addition to steps 1-5 listed in section 1.1 above:

Step 6- Based on the chemical and physical properties, the Producer must identify the TYPE of aggregate for which he requests approval. Current TYPE requirements and limitations are listed in TABLE 1.

TABLE 1. BITUMINOUS SURFACE AGGREGATE REQUIREMENTS (Subsection 903.11(c))

	Type I	Type II	Type III	Type IV
Traffic use	All roads	All roads	15,000 ADT max.	5,000 ADT max.
Silica Dioxide (ASTM C-25)	40% min.	30% min.	20% min.	10% min.
Acid Insoluble Residue (ASTM D 3042)	50% min.	35% min.	25% min.	
BPN 9 (AASHTO T-278, T-279)	30 min.	30 min.	25 min.	22 min.
TTTCM (TTU method)				42.5 min.
Calcium Carbonate	32 % max.			
Test Section for Approval		20,000 ADT min. for 2 years, OR 7.3 million vehicle passes per test lane for min. 2 years (4-lane rural interstate, max. ADT 35,000 allowable)	20,000 ADT min. for 2 years, OR 7.3 million vehicle passes per test lane for min. 2 years (non-interstate)	10,000 ADT min. for 2 years, OR 3.65 million vehicle passes per test lane for min. 2 years (non-interstate)

Step 7- Material which has been laboratory tested and conforms to the chemical and physical properties of TABLE 1 and Subsection 903.11(a) of the Standard Specifications must then demonstrate satisfactory field performance.

Step 8- The aggregate Producer, with TDOT assistance, will be responsible for identifying an existing or proposed project for a test strip location. The test strip shall be with-in the traffic range identified in TABLE 1 for the TYPE of aggregate which approval is being requested. Traffic ranges shown are for two lane roadways. Since it may be difficult to identify two lane roads with ADT volumes shown, the outside lanes of rural 4-lane roadways will be considered, provided the minimum number of vehicle passes are obtained in that lane. The number of vehicle passes will be calculated by assuming the outside lane will receive 30% of the ADT.

Step 9- The aggregate Producer will be responsible for coordinating the test section with the prime contractor. No additional payment will be made for the test section or other costs associated with the Test Section. Coordination will include the submittal of a bituminous mixture design by a TDOT certified technician, and appropriate contract Supplemental Agreements or change orders.

Step 10- Once the bituminous mixture design is approved the test strip may be constructed in accordance with TDOT Standard Specifications and Contract requirements. The test section shall be 0.5-0.6 mile in length in each direction.

After the test strip is completed, the TDOT will conduct periodic friction tests to determine the actual in place performance. If the test section demonstrates a frictional value greater than 40* after a minimum two year test period, that source material will be considered acceptable. When the total number of vehicle passes must be met, a test strip may need to be in place for more than 2 years.

(* Tested in accordance with AASHTO T-242, a test will be performed each 0.1 mile (minimum 5 per direction) with no individual test below 40)

EXAMPLE: A Type III aggregate is to be tested on a 4 lane rural roadway with an ADT of 18,000.

- 7.3 Million vehicle passes are required. (from TABLE 1)
- 18,000 ADT x 0.30 for outside lane = 5400 ADT in the outside lane
- 7,300,000 vehicle passes ÷ 5400 vehicles per day = 1352 days = 3.70 years = ~ 3 years and 8 months

2.1. Quality Monitoring :

An aggregate's approval is contingent based on continuous, satisfactory field performance as well as periodic laboratory evaluation of sampled material. In addition to the quality monitoring outlined below, an aggregate's approval may also be rescinded if there is any concern for safety that may be related to the approved material as determined by a visual inspection.

- At a minimum of once every six months, a sample of the approved material shall be obtained from the source stockpile by Regional Materials and Tests personnel and submitted to the Headquarters Materials and Tests laboratory for both a complete verification of both the approved surface aggregate properties and the standard aggregate quality properties.
- If a sample that has been submitted and tested fails to meet any of the approval criteria, then a second "referee" sample of the same material shall be obtained for testing. When two subsequent samples fail quality testing, the aggregate source's approval for use shall be immediately rescinded and mix production utilizing the failing material shall cease.
- The Producer shall be notified of the failing test results as soon as possible; at which time the Producer, Regional Materials and Tests, and Headquarters Materials and Tests will hold a conference to identify the location/distribution of the failing material and to develop a plan for both the utilization of any existing material and the acceptance of newly produced material.
- Once a new stockpile of material is produced, a sample of the material shall be tested for surface aggregate approval by an accredited independent testing laboratory at the Producer's expense.
- If the material tested by the accredited independent testing laboratory meets the specifications for an approved surface aggregate, then a sample of the same material shall be obtained by Regional Materials and Tests personnel and submitted to the Headquarters Materials and Tests laboratory for a complete verification of surface aggregate properties. If the test results from the initial sample meet the requirements for surface aggregate approval, then a second sample of the material shall be obtained and tested for consistency.
- Once it has been demonstrated that the material meets TDOT surface aggregate approval specifications as indicated by the results of two consecutive samples, Headquarters Materials and Tests shall notify both regional TDOT personnel and the Producer.