PURPOSE: To Establish Uniform Procedures For The Sampling, Testing, Inspection, And Reporting Results Of Tests Of All Aggregates.

1. GENERAL:

The sources of certain aggregates are required to be approved prior to shipping of the aggregates to a project. After approval of the source, these aggregates; as well as others not requiring source approval, are accepted, or rejected, on the basis of sampling, testing, and inspection procedures described in this S.O.P. for the particular type of aggregate.

1.1. Approval of Source: When required by the specifications or this S.O.P., the proposed source of an aggregate is inspected by a representative of the MDOT Central Laboratory. The deposit is analyzed for determination of: the geological formation; the extent of the deposit; whether or not the material to be obtained therefrom will be borderline; uniformity of material; and the presence of strata of undesirable material, if any. If considered necessary, a petrographic analysis is made of the deposit. The extent of the deposit shall be described in the report of the inspection.

Samples of the material are obtained by either the MDOT Central Laboratory or MDOT District personnel. These samples are tested by the MDOT Central Laboratory for all quality requirements before approval of the source. In addition, the plant facilities are inspected by either the MDOT Central or District Laboratory for adequacy and ability to produce quality materials.

In the case of Contractor-furnished materials involving local material sources, it shall be the responsibility of the Contractor to arrange for such sampling and testing necessary for source approval and to bear all related costs incurred by such testing and sampling.

Upon approval of the source by the MDOT Materials Engineer, materials may be produced for projects subject to job control sampling, testing, and inspection.

Before any aggregates are produced from any source, it is the responsibility of the County/LSBP Engineer to ascertain that the source has been approved.

Any time the dredging or mining operations of an approved source are moved to a new location (beyond the limits of the deposit as described in the report of inspection for approval), the MDOT Central Laboratory shall be notified. A final determination as to whether the new location shall be treated as a new source will be made by the MDOT Materials Engineer.

1.2. Quality Check Tests: Semi-annual, annual, or biannual samples, as determined by the MDOT Materials Engineer and the MDOT District Materials Engineer, will be obtained by the District from each active aggregate source in the district. An active source is defined as one which has produced materials for highway work within the preceding twelve (12) months or which has impending orders for aggregates to be furnished for highway work. Determination of frequency of quality check tests from any source shall be based on the history of the source, including past test results.

In order that samples will be tested within a reasonable period of time after being obtained, the MDOT Central Laboratory will advise the District when samples from any source could be obtained. The MDOT Central Laboratory and a representative of the District at this time will take the samples for quality tests. The Central Laboratory and each District should maintain records to insure that each source is sampled for quality check tests at the frequency established.

The MDOT Central Laboratory will perform required tests on each sample. Results of these tests will be shown on job control and record sample gradation tests reported by the Central Laboratory.

1.3. Inspection of Aggregates: Generally, materials produced at out-of-state aggregate plants are inspected by representatives of the MDOT Central Laboratory. Aggregate inspection at sources within the state (and out-of-state if the source is adjacent to district headquarters) is the responsibility of the MDOT District in which or near which the source is located. Such inspection is termed "plant inspection". If the materials are sampled and inspected at the job site, this is termed "on-site inspection".

Whether an aggregate is sampled and inspected for job control at the aggregate source or after delivery to the project is stated hereinafter under the specific material. It should be kept in mind that pre-inspected aggregates should be inspected after delivery; the extent of this inspection and the amount of sampling and testing after delivery depend upon uniformity and other factors. It is the ultimate responsibility of the County/LSBP Engineer that only aggregates complying with the specifications be incorporated in the work. Any deficiencies noted or discovered in pretested aggregates should be reported to the MDOT Central Laboratory, MDOT District Laboratory, or the Aggregate Plant Inspector.

1.4. Independent Assurance Samples: Independent Assurance samples will be obtained on non-exempt projects by representatives of the MDOT Central Laboratory and tested by the MDOT Central Laboratory. The frequencies for sampling are listed in S.O.P. No. SA II-3-6.

1.5. Testing Procedures:

1.5.1. An inspector who is well qualified in testing procedures is permitted to take certain discretionary measures; i.e., if tests indicate a material to be well and uniformly within the specifications on certain sieves or for certain qualities, he may omit testing on such sieve or for such qualities to the extent indicated below.

EXAMPLE 1: If several initial tests indicate that a concrete gravel is uniformly well within the specifications for the 1-in., ¾-in., and ½ -in. sieves but borderline on other required sieves, the routine tests could be made on only the borderline sieve sizes.

EXAMPLE 2: If several initial tests and visual inspections indicate that a granular material (Group C) is friable, then Atterberg Limits tests may be waived in routine tests. Such action should be noted on the mechanical analysis report.

The above permissible "shortcuts" must be used with judgment and discretion. Approximately every tenth (10th) sample should be tested on all required sieves and for all required field tests.

2. CONCRETE AGGREGATES:

2.1. Source Approval: Each source must be approved by the MDOT Materials Engineer prior to delivery of aggregate for use in highway work. Each will be assigned a Plant Number, upon approval of the source, and a base Fineness Modulus will be established. The base F.M. may be subsequently changed by the MDOT Materials Engineer if it is determined that an adjustment is required.

The MDOT Central Laboratory will maintain a current statewide list of approved sources. Each County/LSBP Engineer should maintain a current list of approved sources within their county(ies) and of out-of-state sources adjacent to their county(ies).

2.2. Inspection of Aggregate Shipped Directly to Project:

2.2.1. Aggregate Plant Inspection: The aggregate plant inspector will obtain and test samples (each to represent not more than 300 c.y. of each aggregate shipped) during shipment. These samples shall be obtained from the trucks or railroad cars, from the conveyor belt loading the aggregates, or from completed stockpiles in accordance with standard accepted methods of sampling.

If it is determined that the aggregates from a specific source, or for a specific project, should be tested after delivery, the minimum frequency of 300 c.y. shall be followed. In these cases, the production of concrete should be delayed pending satisfactory test results.

An initial sample of each type of aggregate shall be submitted to the MDOT Central Laboratory for complete tests when shipment is begun to a project. This sample will be obtained by the Plant Inspector from the stockpile proposed for use on the project, or from the conveyor belt used in forming the stockpile, or from the conveyor belt used in loading the trucks or railroad cars. Whichever point is sampled, it is essential that the sample be representative of the aggregate being shipped since the mix design for the concrete to be produced is usually based on test results of this sample.

Aggregates inspected as described above shall be reported to the project(s) on MDOT Form TMD-602 or Form TMD-603, as appropriate. Charges to projects shall be based on the cubic yards of aggregate shown on these reports and shall be reported on MDOT Form TMD-122 by the aggregate Plant Inspector.

2.2.2. Inspection of Pretested Aggregates at Structural Concrete Plant: It shall be the responsibility of the County/LSBP Engineer to have an inspection made of the aggregate stockpiles at each concrete plant at least once each week during production of concrete for highway work. This inspection shall be made by a qualified employee assigned by the MDOT District Laboratory or one selected by the County/LSBP Engineer. The inspector should observe handling of the aggregates, the condition as to cleanness, segregation, etc. He also should visually check the gradation and if there is a question concerning cleanness or gradation, he shall obtain a sample(s) for submission to either the MDOT District Lab, Central Lab or an approved laboratory. Each inspection should be made a matter of record.

Insofar as practicable, samples at concrete plants should be obtained from the conveyor belts feeding the hopper bins or from the bins in order that they will represent as nearly as possible the aggregate actually being used in the concrete. If the samples are obtained from stockpiles, particular care shall be exercised to obtain representative samples. Portions should be obtained from various locations in the perimeter of the stockpile and at various elevations; these should then be combined and quartered. The testing of samples may be performed at the plant, district lab or approved laboratory as determined by County/LSBP Engineer.

One sample of each kind of aggregate shall be taken at the point of use for each 750 c.y. of aggregate used and at least one per project except, when the quantity of concrete required on a project is less than 30 c.y., a sample will not be required for testing unless directed by the County/LSBP Engineer.

Should a sample fail to meet the specifications, check tests shall be performed in sufficient number to verify or to disprove the failure; the number of tests required would be dependent on the size of the stockpile, the history of previous tests at the plant, and the reliability of the sampling procedure. If the average of the original failing test and all check tests is within the specification range, the aggregate may be considered as acceptable.

If the above tests indicate that the aggregate is not within reasonable compliance with the specifications, the plant will not be permitted to produce concrete for highway projects until the stockpile (in which the failure occurs) is removed or reprocessed to the satisfaction of the MDOT District Materials Engineer or County/LSBP Engineer. In addition, the plant shall take necessary steps to correct the causes of the failure prior to resuming production of concrete for highway work.

If the above noncompliance occurs during a pour, the County/LSBP Engineer shall determine whether the work shall be suspended or the pour should be completed before suspension. This decision shall be based on the extent of the failure, the amount of concrete involved, and the effect of suspension of the work.

The concrete plant inspector should be instructed to continually observe the aggregates for cleanness, segregation, etc., and to report any unsatisfactory aggregates or conditions.

2.2.3. Inspection of Aggregates at Concrete Paving Plant: The concrete Plant Inspector shall obtain and test for gradation at least one (1) sample of each kind of aggregate during each day's operation, or fraction of a day's operation. On any day during which more than 600 c.y. of concrete are produced, he shall obtain at least two (2) samples of each type of aggregate and test same for gradation. Variations in gradations from the specifications shall be reported immediately to the County/LSBP Engineer.

Handling of aggregates, cleanness, and segregation tendencies should be observed continuously. Any improper handling which may result in contamination or segregation should be corrected immediately.

Reimbursement for inspection and testing of the aggregates may be based either on the unit cost per sample or on a per day basis, as shown in the SCHEDULE OF UNIT COSTS, S.O.P. No. SA II-3-4, and shall be reported in the same manner as other project expense.

2.3. Inspection of Aggregates Shipped to Ready-Mix Plants:

2.3.1. Ready-Mixed Concrete Plants Maintaining Separate Stockpiles: Aggregates shipped to ready-mix plants which maintain separate stockpiles shall be inspected at the aggregate plant and at the concrete plant as described in Subsection 2.2 above.

When aggregates are shipped to a ready-mix plant in one MDOT district from a source in another MDOT district, the latter district will furnish the former with plant inspector's test reports for distribution to the project(s) for which concrete is being produced. When the ready-mix plant produces concrete for projects in more than one district, each of the districts will be furnished test reports.

Projects receiving concrete from these ready-mix plants will bear the cost of testing and inspection of aggregates used in the concrete.

The County/LSBP Engineer will advise the MDOT District Materials Engineer of the district in which the aggregate is produced the number of cubic yards of concrete obtained from the ready-mix plant. The District Materials Engineer will charge the State-Aid project on MDOT Form TMD-122.

The ready-mix plant will furnish a notarized certificate to the MDOT Materials Engineer at the time of each semi-annual inspection worded as follows:

"This certifies that the aggregate stored in the stockpiles designated for highway construction has been pre-tested by the Mississippi Department Of Transportation as indicated by the plant inspector's report, (Form TMD-602 or TMD-603), copies of which are or will be on file; that no other material has been added thereto; and that the aggregates from such designated stockpiles are used only in concrete produced for highway construction".

2.3.2. Ready-Mixed Concrete Plants Which Do Not Maintain Separate Stockpiles: The ready-mix plant shall furnish a certificate at the time of each semiannual inspection, stating that all aggregates used by the plant are obtained from an aggregate source which is on the current list of sources approved by the Mississippi Department Of Transportation.

This certificate, signed by an authorized official, shall be furnished the MDOT Materials Engineer and the District Materials Engineer in whose district the plant is located.

The Contractor on each project receiving concrete from the ready-mix plant shall furnish a certificate stating that all aggregates used in the concrete comply in all respects with the specification requirements. This certificate shall be furnished to the County/LSBP Engineer, to the District Materials Engineer of the district in which the project is located, and to the MDOT Materials Engineer.

The plant or the Contractor shall notify the County/LSBP Engineer when the plant plans to produce concrete for a project. This notice shall be given as far in advance as possible.

County/LSBP Engineer or MDOT district personnel will sample and test the aggregate materials at the plant prior to the start of production of concrete; except that, if the quantity of concrete to be produced is less than 5 c.y., the sampling prior to production will not be required provided the aggregate stockpile has been sampled within a reasonable period of time with satisfactory test results. During production, the aggregates shall be sampled and tested as often as is considered necessary, with each sample representing not more than 100 cy of aggregate used.

2.4. Frequencies: The frequencies of sampling and testing of aggregates outlined above, and as required by S.O.P. No. SA II-3-5 may be increased at the discretion of the County/LSBP Engineer. Increased frequencies may be necessary or desirable due to non-uniformity, borderline materials, substandard methods of production, or for other reasons. The frequencies may be decreased by the County/LSBP Engineer, with the concurrence of the State Aid Engineer; such decreases shall be applicable only to specific cases. Reasons for such decreases may be extremely large production, uniformity of materials, tests indicating the material well within the limits of the specifications, modern and efficient methods of production or other reasons.

2.5. County/LSBP Engineer Responsibilities:

2.5.1. Make sure that all aggregates are being purchased from currently approved sources.

2.5.2. Arrange for the transfer of an approved mix design for each class of concrete to be used or arrange for the development of new mix designs as may be required. (See S.O.P. SA II-3-20)

2.5.3. Make necessary arrangements for aggregate testing as required by S.O.P. SA II-3-5.

2.5.4. Submit monthly Form TMD-684-SA (Monthly Report of Ready-mix concrete placed on project) to MDOT District Materials Engineer performing source testing on aggregates being used.

3. MASONRY SAND:

Masonry sand is usually sampled at the job site after delivery; the sample is submitted to the MDOT Central Laboratory or other approved Lab for testing if the quantity involved justifies the cost of sampling and testing.

4. AGGREGATES FOR BITUMINOUS MIXES:

Normally, aggregates for bituminous mixes are obtained from sources approved as outlined in the GENERAL section of this S.O.P. Aggregates obtained from local sources are sampled at the source and tested prior to being approved for use. If the source has not been tested for abrasion and soundness as specified in Subsection 1.2 within the preceding twelve (12) months, samples shall be submitted for these tests.

Samples of each aggregate are obtained from the stockpiles of the Contractor and these samples are submitted to the MDOT Central Laboratory or other approved Lab for the determination of proper aggregate gradation. If at any time during the progress of the work the requirements for the mix are not being obtained or if at any time the aggregate materials change in characteristics due to a new source or other causes, additional samples shall be submitted for determination of a revised job mix formula. During the progress of the work, the aggregates should be checked for gradation when it is apparent, or it is indicated, that there has been a change in the gradations. Such samples should be obtained from the cold bins and tested by the plant laboratory personnel.

S.O.P. No. SA II-3-5 sets out the frequency for checking the characteristics of the mixture.

5. GRANULAR MATERIALS:

5.1. General: Granular materials are those materials used in sub-base and bases (whether later chemically or mechanically stabilized or not), and in some cases are used as temporary gravel-surface course material.

5.2. Testing and Inspection:

5.2.1. Source Inspection: In the case of Contractor-furnished granular materials, it normally will be the Contractor's responsibility to make such investigation necessary to establish to the County/LSBP Engineer's satisfaction that the proposed source(s) will furnish satisfactory material. The County/LSBP Engineer may in some cases, and at his discretion, make additional tests to substantiate the information furnished by the Contractor.

Each source of granular material containing coarse aggregate must conform to the specification requirements for abrasion. It shall be the County/LSBP Engineer's responsibility to submit a source sample(s) to the MDOT Central Laboratory or other approved Lab for abrasion testing, and to insure that the source has been tested within the past 12 months, prior to use. The source shall be retested annually.

5.2.2. Job Control Acceptance Sampling and Testing: A minimum of one (1) random sample shall be obtained for each 1000 c.y. or 1300 tons of material placed for determining acceptance of the material for gradation, liquid limit, and plasticity index. The samples will be taken at the roadway. This frequency should be increased if the material is non-uniform, borderline or deficiencies have occurred.

When a roadway sample fails to meet the requirements of the specifications, additional samples will be taken along the roadway until the limit of the inferior material is located. The Contractor will be required to correct or remove and replace the deficient material at his own expense.

Extreme care must be taken in order to obtain samples representative of the material incorporated into the work. Roadway samples must be taken in such a manner as to avoid contamination with underlying or adjacent materials.

Occasionally, and when requested, a sample shall be submitted to the MDOT Central Laboratory or other approved Lab for check tests. Such samples should weigh approximately 100 pounds each and shall be accompanied by a Form TMD-320 showing the class and the group the material represents, in addition to the usual information.

6. AGGREGATE FOR STABILIZER:

6.1. Approval of Source: The source(s) of stabilizer aggregate will have been approved by the MDOT Materials Engineer. If the aggregate is to be obtained from a source not previously approved, samples of each type will be submitted to the MDOT Central Laboratory for testing. After testing of these samples and after investigation as necessary, the MDOT Materials Engineer will advise whether or not the source is approved.

6.2. Job Control: An initial sample of each type aggregate from each source will be submitted to an approved Laboratory by the County/LSBP Engineer from the materials proposed for use on the project. Job control sampling, testing, and inspection will generally be performed at the aggregate plant, however, because of economic or other factors, the County/LSBP Engineer, at his discretion, may provide for these functions to be performed at the project site after delivery of the materials. At least one (1) sample shall be obtained and tested for each 300 c.y. of each type delivered.

7. MECHANICALLY STABILIZED COURSE:

The granular materials in place prior to stabilizing with stabilizer aggregate will be sampled, tested, and evaluated as outlined above in Subsection 5.2.2.

The completed base after mechanical stabilization will be sampled, tested, and evaluated as outlined above in Subsection 5.2.2 except that the minimum frequency of sampling will be 1000 feet of roadway.

8. AGGREGATE FOR BITUMINOUS SURFACE TREATMENTS:

8.1. Approval of Source and Quality Tests: The source(s) of aggregates for bituminous surface treatment must be approved prior to use as described in Subsection 1.1. The quality of the material from the source(s) will be based on the quality tests described in Subsection 1.2. If the aggregate for a project is to be obtained from a source not previously approved, approval samples will be required, and the MDOT Central Laboratory will make any investigation necessary in order that the MDOT Materials Engineer may formally approve the source.

8.2. Job Control: The aggregate is to be sampled, tested and inspected, after delivery to the project. Each sample shall represent not more than 300 c.y. of each type of material delivered. These samples will be tested by the MDOT District Laboratory, County/LSBP Engineer Laboratory or approved laboratory.

9. MINERAL FILLER:

9.1. Approval of Source: The source(s) of mineral filler shall have been approved by the MDOT Materials Engineer prior to delivery to a project. If not previously approved, samples from a new source shall be submitted to the MDOT Central Laboratory, and any required investigation will be made in order that the MDOT Materials Engineer may approve the source.

9.2. Job Control: After delivery to the HMA plant, an initial sample shall be submitted to an approved Laboratory for testing. Thereafter, samples will be submitted whenever there is a change in the material, a change in source, or when there is a question as to whether or not the material complies with the specifications.

10. BEDDING, OR FILTER, MATERIAL:

The material will be tested and inspected by County/LSBP Engineer, MDOT District Laboratory personnel or other approved laboratory as required.