### 1010-2 AGGREGATE FOR PLANT MIXED CEMENT TREATED BASE COURSE

Provide aggregate meeting Article 1010-1, except as modified herein. Sources of aggregate will not be approved unless the material has a percentage of wear of not greater than 65%.

# SECTION 1012
# AGGREGATE FOR ASPHALT PAVEMENTS AND SURFACE TREATMENTS

### 1012-1 AGGREGATE FOR ASPHALT PLANT MIXES

**(A) General**

Design the asphalt plant mix with coarse and fine aggregate that meet Section 1005, except as noted herein. Size, uniformly grade and combine the aggregate fractions in such proportions that the resulting mixture meets the grading and physical requirements of these Specifications for the specified mix type. Materials that will not produce a mixture within the design criteria required by these Specifications will be rejected, unless otherwise approved.

The consensus property criteria in Table 1012-1 apply to the design aggregate blend. Source property criteria apply to individual aggregate sources.

For all dense-graded surface course mixes, that are the top or final layer, limit the amount of coarse aggregate or fine aggregate produced from crystalline limestone, crystalline-dolomitic limestone or marble to no more than 50% of the total amount of coarse aggregate or fine aggregate in the asphalt mixture. For open-graded asphalt friction course and ultra-thin bonded wearing course, do not use aggregates produced from crystalline limestone, crystalline-dolomitic limestone or marble.

**(B) Coarse Aggregate**

(1) General

Use coarse aggregate consisting of crushed stone, crushed gravel, a mixture of uncrushed gravel with either crushed stone or crushed gravel or other inert material having similar characteristics. Provide coarse aggregate composed of clean, tough, durable fragments free from an excess of flat or elongated pieces and free of organic matter and deleterious substances.

Use coarse aggregate from sources participating in the Department's Aggregate QC/QA Program as described in Section 1006. A list of sources participating in the Department's Aggregate QC/QA Program in North Carolina and adjoining states is available from the Materials and Tests Unit in Raleigh.

(2) Gradation

Use standard size coarse aggregate meeting Table 1005-1 and these *Standard Specifications* unless otherwise approved.

(3) Coarse Aggregate Angularity (Fractured Faces)

Use coarse aggregate meeting Table 1012-1 for coarse aggregate angularity (fractured faces) when tested in accordance with ASTM D5821.

(4) Flat and Elongated Pieces

Use coarse aggregate meeting Table 1012-1 for flat and elongated pieces when tested in accordance with ASTM D4791 on the No. 4 sieve and larger with a 5:1 aspect ratio (maximum to minimum) for all pavement types, except there is no requirement for Types SF9.5A and S9.5B.

(5) Soundness

The maximum weighted average soundness loss of individual coarse aggregate sources when subjected to 5 cycles using sodium sulfate when tested in accordance with AASHTO T 104 is 15%.

**TABLE 1012-1**
**AGGREGATE CONSENSUS PROPERTIES[A]**

| Mix Type | Coarse Aggregate Angularity[B] % Minimum | Fine Aggregate Angularity % Minimum | Sand Equivalent % Minimum | Flat and Elongated 5 : 1 Ratio % Maximum |
|---|---|---|---|---|
| *Test Method* | *ASTM D5821* | *AASHTO T 304* | *AASHTO T 176* | *ASTM D4791* |
| SF9.5A; S9.5B | 75 / - | 40 | 40 | - |
| I19.0B; B25.0B | 75 / - | 40 | 40 | 10 |
| S9.5C; S12.5C; I19.0C; B25.0C | 95 / 90 | 45 | 45 | 10 |
| S9.5D; S12.5D; I19.0D | 100 / 100 | 45 | 50 | 10 |
| OGAFC | 100 / 100 | 45 | 45 | 10 |
| UBWC | 100 / 85 | 45 | 45 | 10 |

**A.** Requirements apply to the design aggregate blend.
**B.** 95/90 denotes that 95% of the coarse aggregate has one fractured face and 90% has 2 or more fractured faces.

(6) Toughness (Resistance to Abrasion)

The maximum allowable percentage of loss of each individual coarse aggregate source for all plant mix types except open-graded asphalt friction course, shall be 55% when tested in accordance with AASHTO T 96. The maximum percentage loss for aggregate used in OGAFC shall be 45%. The percentage loss for aggregate used in UBWC shall be no more than 35%.

(7) Deleterious Materials

The maximum allowable percentage by weight of clay lumps and friable particles in individual aggregate sources shall be 0.3% when tested in accordance with AASHTO T 112.

(8) Durability (Micro-Deval test)

The maximum allowable abrasion loss for aggregate used in UBWC shall be 18% when tested in accordance with AASHTO T 327.

**(C) Fine Aggregate**

(1) General

Use fine aggregate that is consistently graded from coarse to fine and consists of natural sand, stone screenings, or a blend of natural sand and stone screenings. Use aggregate composed of rough surfaced and angular grains of quartz or other hard durable rock.

Use fine aggregate from sources participating in the Department's Aggregate QC/QA Program as described in Section 1006. A list of sources participating in the Department's QC/QA Program in North Carolina and adjoining states is available from the Department's Materials and Tests Unit in Raleigh. If a natural sand source is owned by the same owner as the asphalt plant where the material is used, participation in the Aggregate QC/QA Program is not required.

Furnish sand from approved sources. Do not use sources contaminated by industrial waste. A sufficient number of samples of fine aggregate, but in no case less than 3, will be taken to indicate any variation within any stockpile or source of supply.

Do not use fine aggregate containing sticks, roots, trash, visible lumps of clay, or other unsatisfactory material unless all undesirable material is removed to the satisfaction of the Engineer before the aggregate is used in the asphalt mixture.

Use natural sand that is non-plastic when tested in accordance with AASHTO T 90.

Produce stone screenings from stone that has a maximum percentage of wear of 55% when tested in accordance with AASHTO T 96 using test grading A.

(2) Gradation

Use stone screenings that are consistently graded with not more than 20% by weight passing the No. 200 sieve when tested by dry sieving in accordance with AASHTO T 27. Use natural sand that is consistently graded.

(3) Clay Content (Sand Equivalent)

Use a fine aggregate blend that has a minimum sand equivalent percentage as indicated in Table 1012-1 when tested in accordance with AASHTO T 176.

(4) Soundness

The maximum weighted average soundness loss of individual fine aggregate sources when subjected to 5 cycles using sodium sulfate shall be 15% when tested in accordance with AASHTO T 104.

Natural sand that contains grains of questionable hardness will be subjected to 5 cycles of the soundness test. The weighted average loss shall be not more than 15%. The soundness test will be performed before establishing the mix design.

(5) Deleterious Materials

The maximum percentage by weight of clay lumps and friable particles in individual fine aggregate sources shall be 0.3% when tested in accordance with AASHTO T 112.

(6) Fine Aggregate Angularity

Use a fine aggregate blend that has a minimum fine aggregate angularity as indicated in Table 1012-1 when tested in accordance with AASHTO T 304, Method A.

**(D) Mineral Filler**

Use mineral filler consisting of limestone dust, dolomite dust, Portland cement, or other inert mineral matter that conforms to AASHTO M 17.

**(E) Reclaimed Asphalt Shingles (RAS)**

For use in asphalt mix, Reclaimed Asphalt Shingles (RAS) can be either manufacturer-waste shingles or post-consumer shingles that have been processed into a product that meets the requirements of this section.

Manufacturer-waste RAS (MRAS) are processed shingle materials discarded from the manufacturing of new asphalt shingles. It may include asphalt shingles or shingle tabs that have been rejected by the shingle manufacturer.

Post-consumer RAS (PRAS) are processed shingle materials recovered from mixed roofing material scrap removed from existing structures. Tear-off shingle scrap must be sorted and other roofing debris, including nails, plastic, metal, wood, coal tar epoxy, rubber materials, or other undesirable components, shall be removed. This sorting of the scrap must be done prior to grinding of the PRAS for use in asphalt production.

Sample and test PRAS for asbestos and provide results demonstrating that the bulk samples contain less than one percent of asbestos containing material in accordance with Federal, State of North Carolina, and Local regulations. Use NC-accredited Asbestos Inspectors or Roofing Supervisors to sample the PRAS to meet the above criteria. Maintain records on-site indicating shingle source(s), asbestos operation plan approved by Division of Public Health's Health Hazards Control Unit, and all asbestos analytical reports. All documentation will be subject to review by the Department.

Process RAS by ambient grinding or granulating methods such that 100% of the particles will pass the 9.50 mm (3/8") sieve when tested in accordance with AASHTO T27. Perform sieve analysis on processed asphalt shingles prior to ignition or solvent extraction testing.

RAS shall contain no more than 0.5% by total cumulative weight of deleterious materials. These materials include, but are not limited to, excessive dirt, debris, concrete, metals, glass, paper, rubber, wood, plastic, soil, brick, tars, or other contaminating substances.

Blend RAS with fine aggregate or RAP, meeting the requirements of this Section, if needed to keep the processed material workable.

MRAS and PRAS shall not be blended together for the production of hot mix asphalt.

(1) Mix Design RAS

Incorporate RAS from stockpiles that have been tested for uniformity of gradation and binder content prior to use in an asphalt mix design.

(2) Mix Production RAS

New Source RAS is defined as acceptable material which was not included in the stockpile when samples were taken for mix design purposes. Process new source RAS so that all materials will meet the gradation requirements prior to introduction into the plant mixer unit.

After a stockpile of processed RAS has been sampled and mix designs made from these samples, do not add new source RAS to the original stockpile without prior field testing to insure gradation and binder uniformity. Sample and test new source RAS before blending with the existing stockpile.

Store new source RAS in a separate stockpile until the material can be sampled and tested for comparison with the original recycled mix design data. New source RAS may also be placed against the existing stockpile in a linear manner provided it is sampled for mix design conformity prior to its use in the recycled mix. Store RAS materials in such a manner as to prevent contamination.

Field approval of new source RAS will be based on the table below and volumetric mix properties on the mix with the new source RAS included. Provided these tolerances are met, volumetric properties of the new mix will then be performed. If all volumetric mix properties meet the mix design criteria for that mix type, the new source RAS may continue to be used.

If the gradation, binder content, or any of the volumetric mix properties are not within the allowable tolerances of the table below, do not use the new source RAS unless approved by the Engineer. The Contractor may elect to either not use the stockpile, to request an adjustment to the JMF, or to redesign the mix.

**TABLE 1012-2**
**NEW SOURCE RAS BINDER AND GRADATION TOLERANCES**
**(Apply Tolerances to Mix Design Data)**

| **$P_b$ %** | **± 2.5** |
|---|---|
| *Sieve Size, mm* | *Tolerance* |
| 4.75 | ± 5 |
| 2.36 | ± 4 |
| 1.18 | ± 4 |
| 0.300 | ± 4 |
| 0.150 | ± 4 |
| 0.075 | ± 2.0 |

**(F) Reclaimed Asphalt Pavement (RAP)**

(1) Mix Design RAP

Incorporate RAP from stockpiles or other sources tested for uniformity of gradation and binder content before use in an asphalt mix design. Use RAP that meets all requirements specified for the following classifications.

(a) Millings

Existing RAP that is removed from its original location by a milling process as specified in Section 607. Millings should be such that it has a uniform gradation and binder content and all materials will pass a 2" sieve before introduction into the plant mixer unit.

(b) Processed RAP

RAP that is processed in some manner (possibly by crushing and/or use of a blending method) to produce a uniform gradation and binder content in the RAP before use in a recycled mix. Process RAP so all materials have a uniform gradation and binder content and will pass a 1" sieve before introduction into the plant mixer unit.

(c) Fractionated RAP

Fractionated RAP is defined as having 2 or more RAP stockpiles, where the RAP is divided into coarse and fine fractions. Grade RAP so all materials will pass a 1" sieve. The coarse RAP stockpile shall only contain material retained on a 3/8" screen, unless otherwise approved. The fine RAP stockpile shall only contain material passing the 3/8" screen, unless otherwise approved. The Engineer may allow the Contractor to use an alternate to the 3/8" screen to fractionate the RAP. The maximum percentages of fractionated RAP may be comprised of coarse, fine, or the combination of both. Use a separate cold feed bin for each stockpile of fractionated RAP introduced into the mix.

(d) Approved Stockpiled RAP

Approved Stockpiled RAP is defined as fractionated RAP which has been isolated and tested for asphalt content, gradation and asphalt binder characteristics with the intent to be used in mix designs with greater than 30% RAP materials. Fractionate the RAP in accordance with Subsection 1012-1(F)(1)(c). Use a separate cold feed bin for each approved stockpile of RAP used.

Perform extraction tests at a rate of one per 1,000 tons of RAP, with at least 5 tests per stockpile to determine the asphalt content and gradation. Separate stockpiles of RAP material by fine and coarse fractions. Erect and maintain a sign satisfactory to the Engineer on each stockpile to identify the material. Assure that no deleterious material is allowed to contaminate any stockpile. The Engineer may reject by visual inspection any stockpiles that are not kept clean, separated and free of foreign materials.

Submit requests for RAP stockpile approval to the Engineer with the following information at the time of the request:

(i) Approximate tons of materials in stockpile,

(ii) Name or Identification number for the stockpile,

(iii) Asphalt binder content and gradation test results, and

(iv) Asphalt characteristics of the stockpile.

For the Stockpiled RAP to be considered for approval, the gradation and asphalt content shall be uniform. Individual test results, when compared to the target, will be accepted if within the tolerances listed in Table 1012-3.

**TABLE 1012-3**
**APPROVED STOCKPILED RAP GRADATION AND BINDER TOLERANCES[A]**
**(Apply Tolerances to Mix Design Data)**

| **$P_b$ %** | **± 0.3%** |
|---|---|
| *Sieve Size, mm* | *Tolerance* |
| 25.0 | ± 5% |
| 19.0 | ± 5% |
| 12.5 | ± 5% |
| 9.50 | ± 5% |
| 4.75 | ± 5% |
| 2.36 | ± 4% |
| 1.18 | ± 4% |
| 0.300 | ± 4% |
| 0.150 | ± 4% |
| 0.075 | ± 1.5% |

**A.** If more than 20% of the individual sieves are out of the gradation tolerances, or if more than 20% of the asphalt binder content test results fall outside the appropriate tolerances, the RAP shall not be used in HMA unless the RAP representing the failing tests is removed from the stockpile.

Do not add additional material to any approved RAP stockpile, unless otherwise approved by the Engineer.

Maintain a record system for all approved RAP stockpiles at the plant site. Include at a minimum the following: Stockpile identification and a sketch of all stockpile areas at the plant site; all RAP test results (including asphalt content, gradation and asphalt binder characteristics).

(2) Mix Production RAP

During mix production, use RAP that meets the criteria for one of the following categories:

(a) Mix Design RAP

RAP contained in the mix design stockpiles as described above may be used in all applicable JMFs. These stockpiles have been pretested: however, they are subject to required QC/QA testing in accordance with the *HMA/QMS Manual*.

(b) New Source RAP

Define "new source RAP" as any acceptable material that was not included in the stockpile or other source when samples were taken for mix design purposes. Process new source RAP so all materials have a uniform gradation and binder content and will pass a 2" sieve before introduction into the plant mixer unit.

**TABLE 1012-4**
**NEW SOURCE RAP GRADATION AND BINDER TOLERANCES**
**(Apply Tolerances To Mix Design Data)**

| | 0 - 20% RAP | | | 20 - 30 % RAP | | | > 30 % RAP | | |
|---|---|---|---|---|---|---|---|---|---|
| Pb, % | ± 0.7% | | | ± 0.4% | | | ± 0.3% | | |
| **Sieve Size, mm** | **Mix Type** | | | **Mix Type** | | | **Mix Type** | | |
| | **Base** | **Inter.** | **Surf.** | **Base** | **Inter.** | **Surf.** | **Base** | **Inter.** | **Surf.** |
| 25.0 | ±10 | - | - | ±7 | - | - | ±5 | - | - |
| 19.0 | ±10 | ±10 | - | ±7 | ±7 | - | ±5 | ±5 | - |
| 12.5 | - | ±10 | ±6 | - | ±7 | ±3 | - | ±5 | ±2 |
| 9.50 | - | - | ±8 | - | - | ±5 | - | - | ±4 |
| 4.75 | ±10 | - | ±10 | ±7 | - | ±7 | ±5 | - | ±5 |
| 2.36 | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| 1.18 | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| 0.300 | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| 0.150 | - | - | ±8 | - | - | ±5 | - | - | ±4 |
| 0.075 | ±4 | ±4 | ±4 | ±2 | ±2 | ±2 | ±1.5 | ±1.5 | ±1.5 |

After a stockpile of millings, processed RAP or fractionated RAP has been sampled and mix designs made from these samples, do not add new source RAP to the original stockpile without prior field testing to insure gradation and binder uniformity. Sample and test new source RAP before blending with the existing stockpile.

Store new source RAP in a separate stockpile until the material can be sampled and tested for comparison with the original recycled mix design data. New source RAP may also be placed against the existing stockpile in a linear manner provided it is sampled for mix design conformity before its use in the recycled mix.

Unprocessed RAP is asphalt material that was not milled and/or has not been processed to obtain a uniform gradation and binder content and is not representative of the RAP used during the applicable mix design. Unprocessed RAP shall not be incorporated into any JMFs before processing. Different sources of unprocessed RAP may be stockpiled together provided it is generally free of contamination and will be processed before use in a recycled mix. RAP contamination in the form of excessive dirt, debris, clean stone, concrete, etc. will not be allowed. Incidental amounts of dirt, concrete and clean stone may be acceptable. Unprocessed RAP may be processed and then classified as a new source RAP as described above.

Field approval of new source RAP will be based on Table 1012-4 and volumetric mix properties on the mix with the new source RAP included. Provided the Table 1012-4 tolerances are met, volumetric properties of the new mix will then be performed. If all volumetric mix properties meet the mix design criteria for that mix type, the new source RAP may continue to be used.

If the gradation, binder content, or any of the volumetric mix properties are not within the allowable tolerances of Table 1012-4, do not use the new source RAP unless approved by the Engineer. The Contractor may elect to either not use the stockpile, to request an adjustment to the JMF, or to redesign the mix.

**(G) Anti-Strip Additives**

Anti-strip additives may either be hydrated lime or a chemical additive or a combination of both. Use an anti-strip additive capable of preventing the separation of the asphalt binder from the aggregate and achieving the required tensile strength ratio (TSR) on the asphalt mix when tested in accordance with AASHTO T 283 as modified by the Department.

Use hydrated lime conforming to AASHTO M 303. Add hydrated lime used of anti-strip purposes at a rate of not less than 1.0% by weight of the total dry aggregate.

Add chemical anti-strip additives to the asphalt binder before introduction into the mix. Do not use any chemical additive or particular concentration of chemical additive found to be harmful to the asphalt material or which causes the performance grading of the original asphalt binder to be out of specifications for the grade required.

**(H) Silicone**

Silicone additives shall be pre-approved by the Materials and Tests Unit.

**(I) Fiber Stabilizing Additives**

Use fiber stabilizing additives that are capable of stabilizing the asphalt film surrounding the aggregate particles to reduce drain-down of the asphalt binder. A fiber stabilizer such as mineral fiber or cellulose may be used. The selected fiber shall meet the properties described below. Dosage rates given are typical ranges but the actual dosage rate used will be approved by the Engineer.

(1) Mineral Fibers

Mineral fibers shall be made from virgin basalt, diabase or slag treated with a cationic sizing agent to enhance disbursement of the fiber as well as increase adhesion of the fiber surface to the asphalt binder. Mineral fibers shall be in accordance with Table 1012-5. Add the fiber at a dosage rate between 0.2% and 0.4% by weight of total mix, as approved.

**TABLE 1012-5**
**MINERAL FIBER PROPERTIES**

| Property | Requirement | Test Method |
|---|---|---|
| Average Fiber length | 0.25" maximum | - |
| Average Fiber thickness | 0.0002" maximum | - |
| Shot Content Passing No. 60 sieve | 90 - 100% | ASTM C612 |
| Shot Content Passing No. 230 sieve | 65 - 100% | ASTM C612 |
| Degradation | 30% maximum | GDT-124/McNett Fractionation |

(2) Cellulose Fibers

Add cellulose fibers at a dosage rate between 0.2% and 0.4% by weight of total mix as approved. Fiber properties shall be in accordance with Table 1012-6.

**TABLE 1012-6**
**CELLULOSE FIBER PROPERTIES**

| Property | Requirement |
|---|---|
| Average Fiber Length | 0.25" maximum |
| Alpine Sieve Method Passing No. 100 Sieve | 60 - 80% |
| Ro-Tap Sieve Method Passing No. 20 Sieve | 80 - 95% |
| Ro-Tap Sieve Method Passing No. 40 Sieve | 45 - 85% |
| Ro-Tap Sieve Method Passing No. 100 Sieve | 5 - 40% |
| Ash Content | 18% ± 5% non-volatiles |
| pH | 7.5 ± 1 |
| Oil Absorption | 5.0 ± 1 (times fiber weight) |
| Moisture Content | 5.0 maximum |

(3) Cellulose Pellets

Cellulose pellets consist of a 50/50 blend of cellulose fiber and asphalt binder. Use cellulose that complies with Subarticle 1012-1(I)(2) and Table 1012-7. Add the cellulose pellets at a dosage rate between 0.4% and 0.8% by weight of total mix, as approved.

**TABLE 1012-7**
**CELLULOSE PELLET PROPERTIES**

| Property | Requirement |
|---|---|
| Pellet Size | 1/4 cu.in. maximum |
| Asphalt | 25 - 80 pen. |

## 1012-2 AGGREGATES FOR ASPHALT SURFACE TREATMENT

### (A) General

Use coarse aggregate consisting of crushed stone, crushed gravel, crushed slag, or other inert material having similar characteristics. Adequately wash coarse aggregate so it is free from clay, loam, dust and other adherent materials.

Adequately clean all fine aggregate so it is free from sticks, roots, visible lumps of clay or other unsatisfactory material before use.

### (B) Gradation

Use coarse aggregate for mat and seal coat and AST as required by Table 660-1, unless otherwise required by the contract. Use aggregate meeting the applicable gradation requirements of Table 1005-1.

Remix aggregate that has become segregated until it meets the applicable gradation requirements.

### (C) Fractured Faces

Use coarse aggregate that contains at least 75% by weight of crushed pieces having 2 or more fractured faces and at least 90% by weight of crushed pieces having one or more fractured faces on that portion retained on the No. 4 sieve.

### (D) Soundness

The maximum weighted average loss of either coarse or fine aggregate when subjected to 5 cycles using sodium sulfate when tested in accordance with AASHTO T 104 is 15%.

**(E) Toughness (Resistance to Abrasion)**

The maximum percentage loss of course aggregate for asphalt surface treatment when tested in accordance with AASHTO T 96 is 55%.

**(F) Blending of Aggregates**

Blending of 2 or more aggregates will not be permitted regardless of the origin of the aggregates if any one of the aggregates fails to meet the requirements for soundness or resistance to abrasion.

**(G) Weight of Slag**

The minimum weight of crushed slag is 70 lb/cf as determined in accordance with AASHTO T 19.

### 1012-3 BLOTTING SAND

Blotting sand is fine aggregate consisting of natural sand, commercial sand, manufactured sand, coarse screenings, or other inert material having similar characteristics. Subarticles 1012-2(D) and 1012-2(F) will be applicable to blotting sand. Adequately clean the fine aggregate so it is free from sticks, roots, visible lumps of clay or other unsatisfactory material before use.

### 1012-4 LIGHTWEIGHT AGGREGATE

Lightweight aggregates used in asphalt surface treatments shall be produced by the rotary kiln process and shall come from an approved Department source meeting applicable requirements of Section 1005 and 1006. The aggregate shall meet Table 1012-8 and AASHTO M 195 with the exception of Sections 3, 6, 8 and any other references to concrete samples or concrete strength.

**TABLE 1012-8**
**LIGHTWEIGHT AGGREGATE PHYSICAL PROPERTIES**

| Property | Specification (maximum limit) | Test Method |
|---|---|---|
| Sodium Sulfate Soundness | 5% | AASHTO T 104 |
| Los Angeles Abrasion | 45% | AASHTO T 96 (B grading) |
| Percent Absorption | 10% | AASHTO T 19 |
| Micro-Deval | 18% | AASHTO T 327 |

# SECTION 1014
# AGGREGATE FOR PORTLAND CEMENT CONCRETE

### 1014-1 FINE AGGREGATE

**(A) General**

Use fine aggregate from sources participating in the Department's Aggregate QC/QA Program as described in Section 1006. A list of sources participating in the Department's QC/QA Program in North Carolina and adjoining states is available from the Materials and Tests Unit.

Use fine aggregate consisting of natural sand or manufactured sand having clean, durable, hard, uncoated particles, or other inert materials having similar characteristics. Produce manufactured sand from fractured stone material. Use fine aggregate free from dirt, wood, paper, burlap and all other foreign material.

To permit excess water to drain and the moisture content to become uniform, stockpile the aggregates either at the producer's plant or at the batch plant site for at least 24 hours before use in the concrete. Build open stockpiles of fine aggregate at the batch plant on concrete surfaces. Do not add new material to the stockpile during the 24 hour period.