

ALABAMA DEPARTMENT OF TRANSPORTATION

(Revised June 16, 1999)

DATE: June 16, 1999

Special Provision No. 3347 R

SUBJECT: Test Section Bituminous Concrete Pavement,
Projects No. 99-700-000-000-901 and 99-700-000-000-902, Lee County.

Alabama Standard Specifications, 1992 Edition, are hereby amended by the addition of a NEW SECTION 412 as follows:

SECTION 412 TEST TRACK PAVEMENT TEST SECTIONS

412.01 Description.

The Contractor shall pave test sections of the National Center for Asphalt Technology (NCAT) test track in accordance with the requirements given in this Section and the requirements shown on the Plans. Several State Department of Transportation agencies will provide materials and paving mix designs to be used in the construction of test sections on the test track.

412.02 Materials.

The Contractor will be furnished with all materials (asphalt, aggregate, mineral filler, lime, fibers, etc.) for the paving of the test sections.

412.03 Asphalt Mixes.

(a) GENERAL.

The Contractor shall produce the mixes in accordance with the mix design requirements furnished with the asphalt mix materials.

(b) DESIGN MIXES.

The job mix formula (JMF) will be provided to the Contractor. The Contractor shall control the gradation and asphalt content within the allowable tolerances. The initial setting of the controls for all materials shall be those amounts shown on the job-mix formula. The Contractor shall make changes as necessary in order that the mixture will run as close as practical to the percentage designated on the job-mix formula. [See Subarticle 412.03 (e)].

(c) TRIAL MIXES.

The contractor shall produce at least twenty tons of trial mix for each test section. The trial mix shall be placed by spreader and compacted to construct a vehicle parking area in the vicinity of the plant as directed by the Engineer. The wasting of trial mixes will be paid for as Wasting Trial Mixes.

The Contractor shall make adjustments to the production mixes for the test sections based on the results obtained from the testing of the trial mixes.

(d) LAYOUT OF TEST SECTIONS

Each test section will be approximately four inches thick and shall be placed in two layers. Some test sections will be such that the bottom layer will be of a different job mix formula than the top layer. All test sections are to be approximately 200 feet in length, unless otherwise directed by the Engineer. The actual construction of each test section on the track surface shall be in a continuous manner with no breaks in laydown. **Once construction begins on the test sections, the contractor shall continuously and diligently pursue the completion of the work.**

(e) QUALITY ASSURANCE.

1. ACCEPTANCE PROCEDURES.

All materials will be evaluated for acceptance through the National Center for Asphalt Technology (NCAT). NCAT will participate in determining the acceptability of the construction and materials incorporated therein. NCAT will advise the Engineer of the point in production (the production time or tonnage) for sampling at the plant (for mixture testing) and the locations for sampling and testing on the roadway (for mat density testing).

a. TEST SECTION COMPRISED OF THE SAME MIX FOR THE BOTTOM AND TOP LAYERS

A LOT is defined as the production of the design job mix formula for an individual test section. Each lane of mix of each layer will be defined as a subplot, thus yielding a total of four sublots per LOT.

In-place density measurements will be taken at three sampling locations for each subplot. Each subplot of each LOT shall have an average compacted density of no less than ninety four percent of TMD (Theoretical Maximum Density). The mean absolute deviation of the density tests for each subplot shall not exceed 1.2 percent from 94 percent of TMD.

One sample of produced mix will be taken for each of the sublots and asphalt content and gradation determined. The mean absolute deviation of the asphalt content from the JMF for each LOT shall not be more than 0.3 percent based upon four samples per LOT (One random sample per each subplot).

The mean absolute deviation of the gradation for each of the coarse aggregate (aggregate retained on the Number 4 sieve and larger) from the JMF shall not be more than three percent based upon four samples per LOT (One random sample per each subplot).

The mean absolute deviation of the fine aggregate from the JMF shall not be more than two percent based upon four samples per LOT (One random sample per each subplot).

The mean absolute deviation of the filler (material passing the Number 200 sieve) from the JMF shall not be more than one percent based upon four samples per LOT (One random sample per each subplot).

b. TEST SECTION COMPRISED OF DIFFERENT MIXES IN THE BOTTOM AND TOP LAYERS

A LOT is defined as the production of the design job mix formula for each layer of the test section. The LOT will be divided into two sublots, with each subplot being one lane.

In-place density measurements will be taken at three sampling locations for each subplot. Each subplot of each lot shall have an average compacted density of no less than ninety four percent of TMD. The mean absolute deviation of the density tests for each subplot shall not exceed 1.2 percent from 94 percent of TMD.

One sample of produced mix will be taken for each of the sublots and asphalt content and gradation determined. The mean absolute deviation of the asphalt content from the JMF for each LOT shall not be more than 0.3 percent based upon two samples per LOT (One random sample per each subplot).

The mean absolute deviation of the gradation for each of the coarse aggregate (aggregate retained on the Number 4 sieve and larger) from the JMF shall not be more than three percent based upon two samples per LOT (One random sample per each subplot).

The mean absolute deviation of the fine aggregate from the JMF shall not be more than two percent based upon two samples per LOT (One random sample per each subplot).

The mean absolute deviation of the filler (material passing the Number 200 sieve) from the JMF shall not be more than one percent based upon two samples per LOT (One random sample per each subplot).

2. ACCEPTANCE OR REJECTION.

The decision of the Engineer will be final as to the acceptance or rejection of each subplot. Rejected subplots shall be removed at no cost to the Department and replaced at the contract unit bid price.

412.04 Construction Requirements.

(a) GENERAL

In general, the choice of equipment will be left to the Contractor and it shall be his responsibility to provide proper sized and amounts of equipment that will produce, deliver to the roadbed, spread, and compact the plant mixed material in sufficient quantities for the continuous movement of the spreaders under normal operation conditions.

The mixing plant, hauling, spreading and compaction equipment shall meet the requirements listed below; however, other equipment that will produce equally satisfactory results, such as electronically or automatically controlled devices of proven performance, will be considered for use in lieu thereof.

The Contractor shall secure approval of all equipment prior to beginning work. Any equipment found unsatisfactory shall be promptly replaced or supplemented.

(b) SEQUENCE OF CONSTRUCTION.

The Contractor shall construct the test sections in accordance with the Sequence of Construction shown on the Plans. Low production rates should be expected due to testing, wasting trial mixes etc.

(c) MIXING PLANT.

1. GENERAL.

The Contractor shall provide a hot mix asphalt mixing plant on site for the production of the hot mix asphalt for this project. An area for the plant is shown on the Plans and has been cleared and leveled under a previous contract.

2. PLANT TYPE.

The mixing plant shall be either a drum mix or a batch type plant. Mixing plants shall comply with the requirements of AASHTO M 156 as modified by BMTP-324, Mixing Plant Requirements for Hot-Mixed, Hot-Laid Asphalt Paving Mixtures. The plant shall be capable of operating at a production rate as low as one hundred and fifty tons per hour and as high as required to successfully complete the work.

3. SCALES.

A digital recorder shall be installed as part of the platform truck scales. The recorder shall produce a printed digital record on a ticket of the gross and tare weights of the delivery trucks along with a time and date print for each ticket. Provisions shall be made so that scales may not be manually manipulated during the printing process, and so interlocked as to allow printing only when the scale has come to rest. The scales and recorder shall be of sufficient capacity and size to accurately weigh the heaviest loaded truck or tractor trailers that are used for the delivery of the hot mix asphalt from that plant.

In lieu of plant and truck scales, the Contractor may provide either (1) an approved automatic printer system which will print the weights of the material delivered (evidenced by a weight ticket for each load), provided the system is used in conjunction with an approved automatic batching and control system, or (2) an electronic load cell weigh system with associated computer hardware and automated printing system.

The Contractor may provide a "weigh batcher" system utilizing a weigh hopper equipped with load cells that determine the net amount of mix delivered from the weigh hopper. An automated weight printing system shall be provided to accurately print the weight of material delivered, the time and the date for each ticket.

All scales which weigh the mix for pay purposes shall meet the requirements of Subarticle 109.01(h).

4. PLANT CONFIGURATION AND STORAGE REQUIREMENTS.

The asphalt plant shall be capable of uniformly adding up to ten percent commercial mineral filler (in addition to the silo for hydrated lime) and up to 0.4 percent mineral or cellulose fiber. A silo capable of storing at least seventy five tons of hot mix asphalt shall be available.

The plant shall have the capability of metering and proportioning all or any part of the collected fines back into the mixture.

At least two asphalt binder storage tanks shall be provided. This may consist of one tank with two storage compartments.

The plant shall have at least five aggregate cold storage bins.

(d) HAULING EQUIPMENT

Trucks used for hauling hot mix asphalt mixtures shall have tight, clean, smooth metal beds which have been thinly coated with a minimum amount of paraffin oil, lime solution or other approved material to prevent the mixture from adhering to the beds. The use of gasoline, kerosene or other volatile material is prohibited. Each truck shall be equipped with a cover of canvas or other suitable material of such size as to protect the mixture from adverse conditions. Each truck shall have a hole in the side of the body, approximately 5/16" in diameter and suitably placed, to allow for temperature measurement of the asphalt mix. When the air temperature is below 60 °F, or hauling time exceeds 30 minutes, or threatening weather exists, no mixture shall leave the plant unless it is covered entirely and the cover securely fastened. Reference is made to Article 105.12 concerning load limitations on hauling equipment.

(e) MIX TRANSFER EQUIPMENT.

The asphalt mix shall be delivered to the spreader for the placement of the test sections by transfer equipment that is capable of remixing the material prior to the materials being placed in the spreader.

(f) SPREADERS.

At least two hot mix asphalt spreaders will be required during the construction of the test sections. One spreader will be required for the placement of the test sections and one will be required for the placement of the wasted trial mixes.

Hot mix asphalt spreaders shall be self-contained and of sufficient size, power and stability to receive, distribute, and strike off the asphalt material at rates and widths consistent with the specified typical section requirements and details shown on the plans.

All hot mix asphalt spreaders used for mainline paving, including shoulders and interchange ramps, shall be operated with a full width vibratory, or other compactive type, screed. The augers used to move the material across the width of the screed shall extend within one foot of the edge of the screed. It will be permissible to use a hydraulically extendable strikeoff for paving turnouts and short sections of pavement including variable width sections, and crossovers.

When laying mixtures, the spreader shall be capable of being operated at forward speeds consistent with satisfactory laying of the mixture, providing a finished surface of the required evenness and texture without tearing, gouging or shoving of the mixture.

All hot mix asphalt spreaders shall be operated with automatic grade and slope controls unless otherwise directed by the Engineer. Equipment operating together shall have the same type controls. The automatic controls may operate either from control grade wires or ski; however, when a ski is used the spreader shall have a ski of not less than 30 feet in length. Both grade and slope controls shall be in good working order at all times. In the event of a malfunction of the automatic control system, the spreading operation shall be discontinued after one hour until the equipment is repaired and restored to first class working order.

(g) **COMPACTION.**

At least three types of rollers shall be available for compaction. These rollers shall be a vibratory steel wheel roller, a rubber tire roller and a static steel wheel roller.

The vibratory steel wheel roller shall be in good condition and shall weigh at least ten tons.

The rubber tire roller shall be in good condition and shall weigh at least fifteen tons. The tires shall be capable of being inflated to at least 90 psi. All tires shall be in good condition.

The static steel wheel roller shall be in good condition and shall weigh at least eight tons.

All test sections shall be compacted to a density of ninety four percent of TMD. The mean absolute deviation shall not exceed 1.2 percent from 94 percent of the TMD as described in Subarticle 412.03(e).

412.05 Layer, Surface and Edge Requirements.

(a) **PREPARATION OF MIXTURES**

1. **LIQUID ASPHALT BINDER.**

The liquid asphalt binder material shall be heated in a manner that insures the even heating of the entire mass under efficient and positive control at all times. Any liquid asphalt binder material which, in the opinion of the Engineer, has been damaged shall be rejected.

2. **AGGREGATE.**

a. **Aggregate Used for Batch Mixing Operations.**

All aggregates shall be dried so that the moisture content of the hot mix asphalt at the point of sampling is less than 0.2 percent by weight in accordance with BMTP-130. The temperature of the aggregate at the dryer shall not exceed 600 °F.

When more than two ingredients enter into the composition of the mineral aggregate, they shall be combined as directed.

The aggregate, immediately after being heated, shall be screened into three or more sizes and conveyed into separate bins, ready for batching and mixing with liquid asphalt binder material. However, for mixes using aggregate of one-half inch maximum size, the number of bins may be reduced to two.

b. **Aggregates for Dryer Drum Mixing Operations.**

Maintenance of a uniform aggregate gradation is essential for a dryer drum operation, hence, caution and care shall be exercised in stockpiling of materials to avoid segregation.

3. **MIXING.**

a. **General.**

The temperature range of mixing shall not exceed the temperature shown on the approved job-mix formula.

b. **Batch Mixing.**

The dried mineral aggregate, and measured mineral filler when used, prepared as prescribed above, shall be combined in uniform batches by weighing and conveying into the mixer the proportionate amounts of each aggregate required to meet the job-mix formula. The largest size aggregate shall be introduced first, then smaller sizes progressively, with mineral filler last, or all mineral components may be added simultaneously. The mineral filler shall be added directly into the weigh hopper. The mineral components shall be thoroughly mixed. The required quantity of liquid asphalt binder material for each batch shall be measured by weight using scales or a liquid asphalt binder material metering device attached to the liquid asphalt binder material bucket.

After the mineral components have been mixed, the liquid asphalt binder material shall be added and the mixing continued for a period of at least 45 seconds, or longer if necessary to produce a homogeneous mixture. However, if a check by ASTM D 2489 (Ross Method) shows that 95 % plus coating is obtained, a shorter mixing time will suffice. The Engineer may then give written

permission for a change. Each batch must be kept separate throughout the weighing and mixing operations.

The mixture shall be uniform in composition, free from lumps or balls of material containing an excess quantity of asphalt, or from pockets deficient in asphalt.

c. Dryer-Drum Mixing.

Components shall be proportioned by weight as noted hereinbefore in Item 410.03(a)1 for this method of mixing. Amounts of aggregate and liquid asphalt binder material entering the mixer, and the rate of travel through the mixer, shall be so coordinated that a uniform mixture of specified gradation and liquid asphalt binder content will be produced. An anti-stripping agent may be required to insure adequate coating of the aggregates if so directed by the Engineer.

4. MINERAL OR CELLULOSE FIBER

Mineral or cellulose fiber shall be added to the mix in a manner that insures complete blending of the fiber with the aggregates and liquid asphalt binder.

a. Batch Plant

In a batch plant, the fiber shall be added into the weigh hopper simultaneously with the hot aggregates. Dry mixing time shall be increased at least 5 seconds to insure adequate blending. Wet mixing time will be increased at least 5 seconds for cellulose fibers and up to 5 seconds for mineral fibers.

b. Drum Plant

In a drum plant, a separate fiber feeding system shall be used to accurately and uniformly meter the fiber into the mix. If there is any evidence of fiber in the bag-house or wet-washer fines, the liquid asphalt binder line and/or the fiber line shall be relocated so that the fiber is captured by the liquid asphalt binder spray and incorporated into the mix. If there is any evidence of clumps of fibers or pellets at the discharge chute, the contractor shall increase the mixing time and/or intensity. This may entail extending the liquid asphalt binder and fiber feeding line further into the drum.

(b) PLACEMENT OF THE MIXTURES

1. SPREADING.

a. General.

Spreading of the hot mix asphalt mixture shall be performed by equipment meeting the requirements of Subarticle 412.04(f), except as noted hereinafter in this Item. Approved specialized equipment may be employed to spread the hot mix asphalt material where standard full scale equipment is impractical due to size and irregularity of the area to be paved.

For hot mix asphalt pavement test track layers, spreading operations shall be so correlated with plant and hauling equipment that the spreading operation, once begun, shall proceed at a speed as uniform and continuous as practical. The continual forward movement of the spreader requires the use of hauling vehicles capable of supplying the spreader with hot mix asphalt material while the spreader is in motion. Repetitive interruptions or stopping of the spreader shall be cause for the Engineer to stop the work until the Contractor evaluates the cause of the stoppage and has provided a definite action plan for correction of the interruptions. Any interruption will require the thorough check of the area immediately under the spreader and any variances shall be corrected immediately or the material removed and replaced, as directed, without additional compensation.

Material placed in the spreader shall be immediately spread and screeded to such uniform depth that the average weight of the mixture required per square yard is secured. Alignment of the outside edges of the pavement shall be controlled by preset control lines, and shall be finished in conformity with these controls.

Any spreading operation which cannot produce acceptable joints within the surface tolerances and density requirements shall be cause for requiring the Contractor to modify his operations to include additional spreading equipment.

2. COMPACTION

As soon as the mixture has been spread and has set sufficiently to prevent undue cracking or shoving, rolling shall begin. A delay in the initial rolling will not be tolerated and the initial or breakdown rolling should in general be performed by rolling longitudinally, beginning at the sides and proceeding toward the center of the surface.

When paving abuts a previously placed lane, the longitudinal joint shall be rolled in the first pass. On superelevated curves rolling shall begin at the low side and progress toward the high side. The roller shall not compact within six inches of the edge of the surface where an adjacent lane is to follow, while the surface is still hot.

If any displacement occurs during rolling, it shall be corrected at once. To prevent adhesion of surface mixture to the rollers, the wheels shall be kept adequately moistened with water and a non-foaming detergent, but an excess of water will not be permitted.

Adequate precaution shall be taken to prevent dropping of gasoline or oil on the pavement. In places inaccessible to a roller, compaction shall be obtained with hand or mechanical tampers of adequate weight to produce required density.

3. JOINTS.

a. GENERAL.

Placing of hot mix asphalt paving layers shall be as continuous as possible. All joints shall be made in a careful manner in such a way as to provide a smooth, well bonded and sealed joint meeting the density and surface requirements given in this Section. Failure to meet requirements noted above shall be cause for ordering the removal and reconstruction of the joint without extra compensation.

The contact surface shall be treated with a thin coat of liquid asphalt binder material, tack material or the liquid asphalt binder material used in the mix, prior to construction of the joint. When directed by the Engineer, the same treatment noted above shall be used on cold asphalt joints.

b. LONGITUDINAL.

Longitudinal joints in the wearing surface shall conform with the edges of proposed traffic lanes insofar as practical. Any necessary longitudinal joints in underlying layers shall be offset so as to be at least 6 inches from the joint in the next overlying layer.

c. TRANSVERSE.

Transverse joints shall be carefully constructed. Rollers shall not pass over the unprotected edge of the freshly laid mixture unless laying operations are to be discontinued. To facilitate the expeditious removal of the plant mix joint when laying operations are resumed, the Contractor shall place a heavy wrapping paper on the underlying surface across the joint and place plant mix on top of the paper.

Upon resumption of the work a neat joint shall be formed by sawing back vertically into the previously laid material to expose the full depth of the layer. The fresh mixture shall be raked and tamped to provide a well-bonded and sealed joint meeting surface and density requirements.

(c) LAYER THICKNESS.

Each test section will be approximately four inches thick and shall be placed in two layers. Any test section that does not result in a placement rate within the required limits shall be removed by milling and shall be replaced at no cost to the Department.

(d) SURFACE SMOOTHNESS.

1. GENERAL.

Surface smoothness and roadway section will be checked by the use of string, Engineer's level and straight edge.

The Contractor shall furnish string, straightedges and the necessary personnel to handle them under the supervision of the Engineer.

Surface smoothness tests shall be made continuously during and immediately after rolling so that irregularities may be eliminated to the extent possible by rolling while the material is still workable, otherwise deficiencies shall be corrected as provided in Article 410.06.

2. REQUIREMENTS FOR ALL SURFACES.

The finished surface of all base, binder, and wearing surface layers shall not vary more than 1/4 inch from the required section measured at right angles to the pavement centerline. The finished surface shall not vary more than 3/8 inch in any 25 foot section from a taut string applied parallel to the surface and roadbed centerline at the following locations: one foot inside of the edges of pavement, at the centerline, and at other points as designated. The variance from the designated grade shall not increase or decrease more than 1/2 inch in 100 feet.

The surface shall not vary more than 1/4 inch from a 16 foot straightedge placed parallel to the centerline at points directed. A 16 foot rolling straightedge, equipped with marking capability, may be used in lieu of the fixed straightedge if approved by the Engineer.

(e) EDGE REQUIREMENTS.

Surface, binder and leveling pavement edges not confined by curbing or other structures shall be lightly tamped, generally with a lute immediately behind the placement operation, to form an approximately 1:1 slope as a preventative measure against cracking and bulging during the rolling process. This procedure shall also be required on the initial edge of a longitudinal cold joint. These edges shall be neatly shaped to line behind the breakdown roller and shall be trimmed as necessary after final rolling, to an accurately lined string or wire providing a maximum tolerance of 2 inches outside the theoretical edge of pavement, with a maximum variation from a true line of 1/2 inch in 10 feet and a slope not flatter than 1:1. Edges that are distorted by rolling shall be corrected promptly.

(f) RIDEABILITY REQUIREMENTS.

The rideability of the constructed sections shall meet the requirements of Subarticle 410.05(c)

412.06 Defective or Deficient Areas.

Areas of the test sections that are determined to be defective due to the operations of the Contractor shall be removed and replaced at no cost to the Department.

412.07 Method of Measurement.

The asphalt mix for the test track test sections and the trial mixes will be measured in tons.

412.08 Basis of Payment.

(a) UNIT PRICE COVERAGE.

The asphalt plant mix for the test track test sections will be paid for at the contract unit price bid per ton of plant mix placed on the track. This shall be full compensation for all materials (except materials furnished to the Contractor), equipment, tools and labor required to construct the test track test sections. **No payment will be made for excess mix produced.**

The wasting of trial mixes will be paid for at the contract unit price bid per ton of plant mix wasted. This shall be full compensation for all materials (except materials furnished to the Contractor), equipment, tools and labor required **for the production of trial mixes for testing and for subsequent placement on the plant parking area.**

(b) PAYMENT WILL BE MADE UNDER ITEM NUMBER:

412-A Test Section Bituminous Concrete Pavement - per ton

412-B Wasting Trial Mixes - per ton