

2006 NCAT Pavement Test Track Reconstruction Plant Production of Experimental Mixes

Alabama Department of Transportation Standard Specifications, 2002 Edition, will generally apply to the work described herein with amendment by the deletion of the contents of Article 106.09 and by the addition of a NEW SECTION 412 as follows:

SECTION 412 TEST TRACK PAVEMENT TEST SECTIONS

412.01 Description.

The Contractor shall produce mix for placement on experimental sections on the National Center for Asphalt Technology (NCAT) test track in accordance with the requirements given in this Section. Several State Department of Transportation agencies (referred to hereafter as sponsors) will provide materials and paving mix designs to be used in the construction of test sections on the test track. The anticipated scope of work will involve approximately 17 unique mixes, 25 trial mix runs, 25 production mix runs, 5 grades of asphalt binder and 40 different stockpiles.

412.02 Materials.

The Contractor will be furnished with all solid mix blend components (aggregate, mineral filler, lime, fibers, etc.) for the paving of the test sections, but is expected to cooperate with NCAT personnel in ensuring these materials are available at the plant site at times that will best suit construction logistics. If adequate storage is available in the vicinity of the plant, aggregate stockpiles will be deposited directly at the plant and hauling from the test track will not be necessary. If adequate storage is not available at the plant site, the contractor will be responsible for hauling stockpiles from the track to the plant site in a manner that accommodates planned mix production.

412.03 Asphalt Mixes.

(a) GENERAL.

The Contractor shall produce the mixes in accordance with the mix design requirements furnished by NCAT. All materials shall be incorporated into the mix supplied exactly as stated on sponsors' mix designs unless substitutions are authorized beforehand by NCAT's track manager.

(b) DESIGN MIXES.

The job mix formula (JMF) will be provided to the Contractor. The Contractor is expected to 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, unless changes are authorized beforehand by NCAT at the sponsor's request. The Contractor shall make changes as necessary in cooperation with NCAT in order that the mixture will run as close as practical to the percentage designated on the job-mix formula. Changes to the target JMF may be authorized by NCAT on a case-by-case basis based upon trial mix runs, sponsors' research needs, etc.

(c) TRIAL MIXES.

The contractor shall produce at least twenty tons of uniform trial mix for each experimental mix, which shall be dumped in the bed of a single haul truck to facilitate representative quality control sampling. The Contractor shall waste both coated and uncoated material on either side of uniform trial mix at the direction of NCAT to achieve the desired quality. The trial mix shall be delivered to the test track so that it may be placed by spreader and compacted in the vicinity of the track.

The Contractor shall make adjustments to the production mixes in cooperation with NCAT for the test sections based on the results obtained from the testing of the trial mixes. All adjustments shall be authorized by NCAT prior to implementation.

(d) QUALITY ASSURANCE.

1. ACCEPTANCE PROCEDURES.

All materials will be evaluated for acceptance through NCAT. NCAT will participate in determining the acceptability of the construction and materials incorporated therein. NCAT will determine the point in production (the production time or tonnage) for sampling at the plant (for mixture testing). The Contractor shall provide a Level I certified Asphalt Technician at the plant site to assist in the evaluation of mix quality and recommend corrective action.

a. TEST SECTION COMPRISED OF MULTIPLE LAYERS.

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

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 up to three 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 for each sieve based upon up to three samples per LOT (One random sample per each subplot).

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

b. TEST SECTION COMPRISED OF A SINGLE LAYER.

A LOT is defined as the production of the design job mix formula for each test section.

At least one sample of produced mix will be taken for each LOT 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 one or more samples per LOT.

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

The mean absolute deviation of the gradation of the fine aggregate from the JMF shall not be more than two percent for each sieve based upon one or more samples per LOT.

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 one or more samples per LOT.

2. ACCEPTANCE OR REJECTION.

The decision of the Engineer will be final as to the acceptance or rejection of each subplot and/or lot. Rejected sublots and/or lots shall be removed and replaced. If NCAT deems it necessary to remove and replace new sections as a result of undesirable laboratory volumetrics or mix placement problems that are not the result of errors on the part of the mix production Contractor, the extra work will be paid for at the unit bid price. If it is determined the unsatisfactory work is the result of error by the contractor, additional compensation will not be made for the production of replacement mix.

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 properly sized and amounts of equipment that will produce and deliver to the roadbed plant mixed material in sufficient quantities for placement in experimental sections

The mixing plant and hauling 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. All tools necessary for equipment maintenance and effective construction practices shall be considered incidental to the work and provided by the Contractor.

The plant must have experience producing ALDOT 420, 423 and 424 mixes (or comparable mixes in other jurisdictions). In order to qualify for bidding, interested vendors must register for Auburn University's online vendor system prior to the time the bids are opened. A resume must be submitted with the bid package so that NCAT can verify the Contractor's qualifications.

(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. No more than five production runs are allowed in any single day, and no more than three production runs of mix to be paved on the Track are permitted (e.g., the fourth and fifth runs can be Trial Mix). Additionally, no more than two production runs of unique "research sample" mix are allowed in a single day. For the purpose of this specification, "research sample" mix is defined as the last time a unique mix is placed on the Track in its uppermost layer. Track mixes can only be

produced on weekdays between the hours of 6:00 AM and 6:00 PM (Central Time) unless special permission is obtained from the Engineer.

(c) MIXING PLANT.

1. GENERAL.

The Contractor shall provide a hot mix asphalt mixing plant for the production of the hot mix asphalt for this project. If an offsite plant is to be used to produce track mixes, it must be previously approved by NCAT during the pre-bid process. Bidders will be qualified based on a maximum temperature loss between production and delivery to the jobsite of 30°F, but in no case can mix be delivered below 290°F. It will be acceptable for the contractor to run waste mix through the plant in order to heat equipment and avoid energy loss during the production of experimental mixes. NCAT will establish production temperatures between 320°F and 350°F as a function of binder grade. Alternatively, the Contractor may choose to temporarily install a portable plant onsite within a prepared area adjacent to the track. In this case, a portable power supply shall be provided to avoid the need for excessive high voltage electrical power. If the Contractor chooses to install an onsite plant on University property, it can only be used to produce mix for Track purposes. The area for the plant 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 ALDOT-324, "Plant Requirements for Plants Producing Hot-Mixed, Hot-Laid Bituminous 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 material from or to 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, and 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 10 percent commercial mineral filler (in addition to the silo for hydrated lime) and up to 0.5 percent mineral or cellulose fiber.

At least two asphalt binder storage tanks shall be provided. This may consist of one tank with multiple storage compartments. In several cases, it will also be necessary to produce mix while pumping from a tanker. Binder grade will be verified by rotational viscometer testing conducted at and interpreted by NCAT.

The plant shall have at least five aggregate cold storage bins. Additionally, a RAP feeding system and a controlled feed fiber blowing system shall also be provided. The RAP feeding system may serve as one of the five cold storage bins with NCAT approval.

(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 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. The asphalt mix shall be delivered to the spreader for the placement of the test sections by transfer equipment.

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. Unless special arrangements are made beforehand, liquid asphalt binder will be provided by NCAT. Any liquid asphalt binder material which, in the opinion of the Engineer, has been damaged due to mishandling at the plant shall be rejected and replaced at the contractor's expense.

2. AGGREGATE.

a. Aggregate Source.

Unless special arrangements are made beforehand, aggregates will be donated by section sponsors and shall be delivered by NCAT to the track. If the Contractor does not have room for simultaneous storage of the large number of stockpiles, the cost to transport aggregate stockpiles from the track to the plant site on an as-needed basis will be considered incidental to completing the work. No additional compensation will be provided to reimburse for the cost of transporting aggregate stockpiles from the track to the plant site due to the contractor's space limitations.

b. 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 ALDOT-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 one or more sizes and conveyed into bins, ready for batching and mixing with liquid asphalt binder material.

c. 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 be established by NCAT, and in no case shall the temperature of coated materials discharged from the mixer exceed 350 °F.

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 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.

a. General.

Mineral or cellulose fiber shall be added to the mix as specified in the job mix formula or as directed by the Engineer in a manner that insures complete blending of the fiber with the aggregates and liquid asphalt binder. Cellulose fiber will be furnished by NCAT.

b. 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 five seconds to insure adequate blending. Wet mixing time shall be increased at least five seconds for cellulose fibers and up to five seconds for mineral fibers.

c. 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.

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 replaced at no cost to NCAT. If NCAT deems it necessary to remove and replace new sections as a result of undesirable quality that is not the result of errors on the part of the Contractor, the extra work will be paid for at the unit bid price.

412.07 Method of Measurement.

Mix production will be measured by the run for trial mixes and by the completed section for production mixes.

412.08 Basis of Payment.

(a) GENERAL.

Items of work will be paid for at the contract unit price. This price shall be full compensation for all materials (except materials furnished to the Contractor), equipment, tools and labor required to complete the work. All-or-none conditional bidding will be accepted in accordance with ALDOT 102.08 for plant production and mix placement. No additional compensation will be provided if the Contractor must haul stockpile materials from the track on an as-needed basis due to space limitations.

(b) MIX PRODUCTION.

The contract unit price shall include all work associated with the production and delivery of the required paving mixes.

(c) PAYMENT WILL BE MADE UNDER ITEM NUMBER:

412A Producing Trial Mixes – per run (Est. 25 runs)

412B Producing Mix for Mix Sections – per section (Est. 11 sections)

412C Producing Mix for Structural Sections (Est. 5 sections)

The anticipated mix production plan is attached for informational purposes.

