

## ITEM 12

### BITUMINOUS PLANT MIX PAVEMENTS (GENERAL)

#### 12.01 DESCRIPTION

These Specifications include general requirements that are applicable to all types of bituminous pavements of the plant mix type, irrespective of gradation of aggregate, kind and amount of bituminous material, or pavement use. Deviations from these general requirements will be indicated in the specific requirements for each type.

This work shall consist of one or more courses of bituminous mixture constructed on the prepared foundation in accordance with these Specifications and the specific requirements of the type under contract, and in reasonably close conformity with the lines, grades, typical cross-sections and rate of application or thickness shown on the Plans or established by the Engineer.

#### MATERIALS

#### 12.02 MATERIALS

The individual materials shall meet the applicable requirements of the following Items of these Specifications:

Material	Section
Aggregates	73
Mineral Filler	73
Bituminous Materials	67
Chemical Additive	74

The mineral aggregate will be accepted for quality in the stockpile at the paving plant site. The aggregate will be accepted for gradation immediately preceding addition of bituminous material at the pugmill. This acceptance will be based on periodic samples of the various sizes of aggregate taken as they are weighed from the bins, of the combined aggregate as it is fed to the pugmill, or of batches to which the bituminous material has not been added.

The bituminous material may be conditionally accepted at the source. The plant mixed material will be accepted after blending and mixing at the plant.

#### 12.03 COMPOSITION OF MIXTURES

The bituminous plant mix shall be composed of a mixture of aggregate, filler if required, and bituminous material. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the job-mix formula.

The Contractor shall submit for the Engineer's approval a job-mix formula for each mixture to be supplied for the project. The job-mix formula shall establish a single percentage of aggregate passing each required sieve size, a single percentage of bituminous material to be added to the aggregate, and a single temperature at which the mixture is to be discharged from the plant. The job-mix formula with the allowable tolerances shall be within the master range specified for the particular type of bituminous mixture. Once approved, the job-mix formula shall be in effect until modified in writing by the Engineer.

After the job-mix formula is established, all mixtures furnished for the project shall conform thereto within the following tolerance ranges:

Aggregate passing 3/8-inch sieve and larger	+/- 7 percent
Aggregate passing No. 4 sieve	+/- 5 percent
Aggregate passing No. 8 to No. 50 sieves inclusive	+/- 4 percent
Aggregate passing No. 100 and No. 200 sieve	+/- 2 percent
Bitumen	+/- 0.4 percent
Temperature of mixture	+/- 20 degrees F

Should a change in source of materials be made, a new job-mix formula shall be established before the new material is used. When unsatisfactory results or other conditions make it necessary, the job-mix formula shall be adjusted to the satisfaction of the Engineer.

## **EQUIPMENT**

### **12.04 BITUMINOUS MIXING PLANT**

Sufficient storage space shall be provided for each size of aggregate. The different sizes shall be kept separated until they have been delivered to the cold elevator or belt feeding the dryer. The storage yard shall be maintained neat and orderly, and the separate stockpiles shall be readily accessible for sampling.

Plants used for the preparation of bituminous mixtures shall conform to all requirements under (a). In addition, batch mixing plants shall conform to the requirements under (b), and continuous mixing plants shall conform to the requirements under (c).

#### **(a) Requirements for All Plants**

Mixing plants shall be of sufficient capacity and so coordinated to adequately handle the proposed bituminous construction.

(1) Equipment for preparation of bituminous material.

Tanks for the storage of bituminous materials shall be equipped to heat and hold the material at the required temperatures. The heating shall be accomplished by approved means so that no flame shall be in contact with the tank. The circulating system for the bituminous material shall be designed to assure proper and continuous circulation during the operating period. Provisions shall be made for measuring and sampling the contents of storage tanks.

(2) Feeders for dryer.

Separate feeders shall be provided for each size aggregate, and each size shall be fed onto the belt going to the dryer by mechanical feeders with separate adjustable gates. The feeders shall be capable of delivering the separate aggregates onto the belt in proper proportions and shall be provided with adjustment for total feed and proportional feed and be capable of being locked.

Adequate means shall be provided to assure a constant and uniform flow of material from each bin.

The Contractor will not be permitted to blend or mix different aggregates or different sizes of the same aggregate with clam shells, bulldozers, high lifts or similar equipment.

The aggregate shall be fed uniformly into the dryer so that a uniform production and uniform temperature may be obtained.

(3) Dryer.

The plant shall include a dryer or dryers which agitate the aggregate continuously during the heating and drying process. It shall be capable of heating and drying all aggregates to the temperature required and shall be capable of supplying the mixing unit continuously at its operating capacity. Dryers shall be constructed and operated so that aggregates will not be contaminated with unburned fuel.

(4) Screens.

Plant screens, capable of screening all aggregates to the specified sizes and proportions and having normal capacities in excess of full capacity of the mixer, shall be provided.

A consistent carry-over, but not to exceed 30 percent, will be allowed on any screen. If any bin contains more than 20 percent of material which is undersized for that bin, the bin shall be drawn and correction of the cause for such condition shall be made.

(5) Bins

The plant shall include storage bins of sufficient capacity to supply the mixer when it is operating at full capacity. Bins shall be arranged to assure separate and adequate storage of appropriate fractions of the mineral aggregates. Each bin shall be provided with overflow pipes of such size and at such location as to prevent backing up of material into other compartments or bins. Each compartment shall be provided with an outlet gate constructed so that when closed, there shall be no leakage. The gates shall cut off quickly and completely. The bins shall be constructed to provide adequate and convenient approved facilities for obtaining representative samples of aggregate from the full flow of each compartment. When mineral filler is used, separate dry storage shall be provided, and the plant shall be equipped to feed the filler into the mixer.

(6) Bituminous Control Unit.

Satisfactory means, either by weighing or metering, shall be provided to obtain the proper amount of bituminous material in the mix within the tolerance specified. Means shall be provided for checking the quantity or rate of flow of bituminous material into the mixer.

(7) Thermometric Equipment.

An armored thermometer of adequate range in temperature reading shall be fixed in the bituminous feedline at a suitable location near the charging valve at the mixer unit. The plant shall also be equipped with an approved thermometric instrument so placed at the discharge chute of the dryer, as to register automatically or indicate the temperature of the heated aggregates.

If temperatures are not regulated satisfactorily, the Engineer may require the installation of an approved temperature recording and regulating apparatus for better control of the temperature of the aggregates.

(8) Dust Collector.

The plant shall be equipped with a dust collector constructed to waste or return uniformly to the hot elevator all or any part of the material collected, as directed.

(9) Safety Requirements.

Adequate and safe stairways to the mixer platform and sampling points shall be provided, and guarded ladders to other plant units shall be placed at all points where accessibility to plant operations is required. Accessibility to the top of truck bodies shall be provided by a platform or other suitable device to enable the Engineer to obtain samples and mixture temperature data. A hoist or pulley system shall be provided to raise scale calibration equipment, sampling equipment and other similar equipment from the ground to the mixer platform and return. All gears, pulleys, chains, sprockets, and other dangerous moving parts shall be thoroughly guarded and protected. Ample and unobstructed space shall be provided on the mixing platform. A clear and unobstructed passage shall be maintained at all times in and around the truck loading area. This area shall be kept free from drippings from the mixing platform.

**(b) Requirements for Batching Plants**

(1) Plant Scales.

Dial scales shall be provided for weighing of all aggregates and mineral filler, in the suspended weigh box. Dial scales shall be of a standard make and of sufficient size that the numerals on the dial can be read at a distance of 25 feet. The dials shall be of the compounding type having a full complement of index pointers. The value of the gradation of scales used in weighing amounts of aggregates of less than 5,000 pounds shall not be greater than five pounds; amounts of aggregates from 5,000 to 10,000 pounds, not greater than 10 pounds; amounts of aggregates in excess of 10,000 pounds, not greater than 0.1 percent of the capacity of the scales. Pointers which give excessive parallax errors shall not be used. All dial scales shall be so located that they will be in plain view of the operator at all times. When bituminous material is measured by weight, the asphalt weigh bucket shall be equipped with a separate dial scale with a minimum gradation not greater than two pounds. All dial scales shall be accurate within a tolerance of 0.5 percent. Vibration shall be eliminated by setting the scales on a separate foundation, if required. Each installation of scales shall be provided with 10 standard 50-pound weights meeting the requirements of the U.S. Bureau of Standards for calibrating and testing weighing equipment. Scales shall be inspected as often as the Engineer may deem necessary to assure their continued accuracy.

The Contractor may provide an approved automatic printer system which will print the weights of the material delivered, provided the system is used in conjunction with an approved automatic batching and mixing control system. Such weights shall be evidenced by a weigh ticket for each load.

(2) Weigh Box or Hopper

The equipment shall include a means for accurately weighing each size of aggregate and mineral filler in a weigh box or hopper suspended on scales and of ample size to hold a full batch without hand raking or running over. The gate shall close tightly so that no material is allowed to leak into the mixer while a batch is being weighed.

### (3) Bituminous Control

The bituminous material bucket shall be a non-tilting type. The length of the discharge opening or spray bar shall be not less than three-fourths the length of the mixer. The bituminous material bucket, its discharge valve or valves, and spray bar shall be adequately heated. Steam jackets, if used, shall be efficiently drainable and all connections shall be so constructed that they will not interfere with the efficient operation of the bituminous scales. The capacity of the bituminous material bucket shall be at least 15 percent in excess of the weight of bituminous material required in any batch. The plant shall have an adequately heated quick-acting, non-drip, charging valve located directly over the bituminous material bucket. When the bituminous material is metered, the indicator dial shall have a capacity of at least 15 percent in excess of the quantity of bituminous material used in a batch. The meter indicator dial shall have a scale with divisions measuring in gallons equivalent to a weight sensitivity of 0.04 percent of the total batch weight. The meter shall be accurate within a tolerance of 0.5 percent. The controls shall be so constructed that they may be locked at any dial setting and will automatically reset to that reading after the addition of bituminous material to each batch. The dial shall be in full view of the mixer operator. The flow of bituminous material shall be automatically controlled so that it will begin when the dry-mixing period is over. All of the bituminous material required for one batch shall be discharged in not more than 15 seconds after the flow has started. The size and spacing of the spray bar openings shall provide a uniform application of bituminous material the full length of the mixer. The section of the bituminous line between the charging valve, and the spray bar shall be provided with a valve and outlet for checking the meter when a metering device is substituted for a bituminous material bucket.

### (4) Mixer

The batch mixer shall be an approved twin pugmill type, steam or hot oil jacketed, and shall be capable of producing a uniform mixture within the job-mix tolerances. The mixer shall be so constructed as to prevent leakage of its contents. It shall be equipped with a sufficient number of paddles or blades set in the "run around" order and operated at such speed as to produce a properly and uniformly mixed batch. The depth of the material in the pugmill shall not be above the tops of the paddles. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of dust.

The clearance of blades from all fixed and moving parts shall not exceed one inch unless the maximum diameter of the aggregate in the mix exceeds 1-1/4 inches, in which case the clearance shall not exceed 1-1/2 inches.

## (5) Control of Mixing Time

The mixer shall be equipped with an accurate time lock to control the operations of a complete mixing cycle. It shall lock the weigh box gate after the charging of the mixer until the closing of the mixer gate at the completion of the cycle. It shall lock the bituminous material bucket throughout the dry-mixing period and shall lock the mixer gate through the dry- and wet-mixing periods. The dry-mixing period is defined as the interval of time between the opening of the weigh box gate and the start of introduction of bituminous material. The wet-mixing period is the interval of time between the start of introduction of bituminous material and the opening of the mixer gate. The control of the timing shall be flexible and capable of being set at intervals of five seconds or less throughout a total cycle of up to three minutes. A mechanical batch counter shall be installed as a part of the timing device and shall be so designed as to register only batches that have been mixed for the full time interval. The setting of time intervals shall be performed in the presence of and at the direction of the Engineer, who shall then lock the case covering the timing device until such time as a change is to be made in the timing periods.

## (c) Requirements for Continuous Mixing Plants

### (1) Aggregate proportioning

The plant shall include means for accurately proportioning each size of aggregate.

The plant shall have a feeder mounted under each compartment bin. Each compartment bin shall have an accurately controlled individual gate to form an orifice for measuring volumetrically the material drawn from each compartment. Bins shall be equipped with adequate tell-tale devices to indicate the position of the aggregates in the bins at the lower quarter points.

The feeding orifice shall be rectangular with one dimension adjustable by positive mechanical means provided with a lock. Indicators shall be provided for each gate to show the respective gate opening in inches.

Mineral filler shall be fed into the mixer continuously and uniformly in the proportion set out in the formula for the job-mix, and in a manner satisfactory to the Engineer.

### (2) Weight Calibration of Aggregate Feed

The plant shall be equipped with an approved revolution counter in satisfactory working condition. The plant shall include a means for calibration of gate openings by weighing test samples. Provision shall be made so that materials fed out of individual orifices may be bypassed to individual test boxes. The plants shall be equipped to handle conveniently individual test samples weighing not less than 200 pounds. Accurate scales shall be provided by the Contractor to weigh such test samples.

(3) Synchronization of Aggregate Feed and Bituminous Material Feed.

Satisfactory means shall be provided to afford positive interlocking control between the flow of aggregate from the bins and the flow of bituminous material from the meter or other proportioning device. This control shall be accomplished by interlocking mechanical means or by any other positive method satisfactory to the Engineer.

(4) Mixer

The plant shall include a continuous mixer of an approved twin pugmill type, adequately heated and capable of producing a uniform mixture within the job-mix tolerances. The paddles shall be adjustable for angular position on the shafts and reversible to retard the flow of the mix. The mixer shall have a manufacturer's plate giving the net volumetric contents of the mixer at the several heights inscribed on a permanent gauge. Charts shall be provided showing the rate of feed of aggregate per minute for the aggregate being used. Determination of the mixing time shall be by weight method, using the following formula (the weight shall be determined for the job by tests made by the Engineer):

$$\begin{array}{l} \text{Mixing time} \\ \text{in seconds} \end{array} = \frac{\text{Pugmill dead} \\ \text{capacity in pounds}}{\text{Pugmill output in} \\ \text{pounds per second}}$$

(5) Surge Hopper

The mixer shall be equipped with a discharge hopper with dump gates which will permit rapid and complete discharge of the mixture and of such size and design that no segregation of the mixture occurs.

(6) Platform Truck Scales

Platform truck scales shall have a standard brand of scales and shall have a manufacturer's rated capacity equal to or greater than the maximum gross load being weighed. The scale shall be accurate within a tolerance of 0.5 percent, and the value of the minimum gradation on the scale shall not be greater than 50 pounds. When weighing a truck and trailer combination on a scale with a platform not large enough to weigh the entire hauling unit at one time, the approaches at both ends of the scale shall have a level grade at the same elevation as the scale platform for a distance of not less than 50 feet on each end of the scale. The truck and trailer shall be weighed with no brakes set on any wheel. The scale shall be set on concrete or other approved foundations. The recording mechanism of the platform scale shall be housed in a suitable shelter that shall be furnished with adequate light and heat for the convenience of the weigh man. The scale shall be provided, maintained, and repaired at the Contractor's expense.

The Department Scale Inspector shall inspect the scales as often as necessary to insure their continued accuracy. Whenever the Department Scale Inspector is not immediately available for a check of the scale, the Engineer may give tentative approval, on check truckloads weighed on other scales that are approved by the Department or other State Agency.



## **12.05 HAULING EQUIPMENT**

Trucks used for hauling bituminous 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. Each truck shall have a cover of canvas or other suitable material of such size as to protect the mixture from the weather. When necessary, so that the mixture will be delivered on the road at the specified temperature, truck beds shall be insulated and covers shall be securely fastened.

## **12.06 BITUMINOUS PAVERS**

Bituminous pavers shall be self-contained, power-propelled units, provided with an activated screed or strike-off assembly, equipped to be heated, and capable of spreading and finishing courses of bituminous plant mix material in land widths applicable to the specified typical section and thicknesses shown on the Plans. Materials for shoulders and similar construction shall be placed by means of approved mechanical spreading equipment.

The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed.

The screed or strike-off assembly shall produce effectively a finished surface of the required evenness and texture without tearing, shoving or gouging the mixture. The paver shall be equipped with adjustable hydraulic screed extensions.

When laying mixtures, the paver shall be capable of being operated at forward speeds consistent with satisfactory laying of the mixture.

All asphalt paving machines shall be equipped with automatic grade and slope controls. Both the grade and slope controls shall be in working order at all times, except that in the event of mechanical failure of the automatic controls, the Contractor will be permitted to finish the day's work using manual controls but will not be allowed to resume work the following day until both the grade and slope controls are in first class working order.

## **12.07 ROLLERS**

Rollers shall be of self-propelled steel-wheel and pneumatic-tire types and shall be in good condition, capable of reversing without backlash, and shall be operated at speeds slow enough to avoid displacement of the bituminous mixture. The rollers shall be of the number and weights required to compact the mixture to the specified density while it is still in a workable condition. The use of equipment which results in excessive crushing of the aggregate will not be permitted.

## 12.08 SMALL TOOLS

The Contractor shall provide all necessary small tools and suitable means for keeping them clean and free from accumulations of bituminous materials.

### CONSTRUCTION REQUIREMENTS

## 12.09 WEATHER LIMITATIONS

1. The subgrade and the surface upon which the bituminous plant mix is placed shall be free of excessive moisture.
2. The bituminous plant mix shall be placed in accordance with the temperature limitations of the following table and only when weather conditions otherwise permit the pavement to be properly placed, compacted, and finished.

### TEMPERATURE LIMITATIONS

<b>Course Type</b>	<b>Minimum Placement Temperature Air or Surface Whichever is less</b>
<b>Leveling Surface</b>	<b>40° F and rising 50° F and rising</b>

Mixtures shall be placed only between March First and December First, unless otherwise permitted by the Engineer.

## 12.10 CONDITIONING OF EXISTING SURFACE

Conditioning of an existing surface shall consist of minor grading, clipping edges of roadways, and other minor incidental construction, not itemized in these Specifications, and not involving hauling of excavated materials for the purpose of bringing the roadway to a uniform width and cross-section and blending the new pavement to the existing surface as directed by the Engineer.

## 12.11 PREPARATION OF BITUMINOUS MATERIAL

The bituminous material for hot mixes shall be heated to a temperature between 275° F and 325° F, in a manner that will avoid local overheating and provide a continuous supply of the bituminous material to the mixer at a uniform temperature at all times.

## **12.12 PREPARATION OF AGGREGATES**

The aggregates for hot mixes shall be dried and heated to a uniform temperature between 225° F and 325° F. Flames used for drying and heating shall be properly adjusted to avoid damage to the aggregate and to avoid soot on the aggregate.

Immediately after heating and drying, the aggregates shall be screened into two or more fractions as specified and conveyed into separate compartments ready for batching and mixing with bituminous material.

## **12.13 MIXING**

The dried aggregates shall be combined within the mixer in the amount of each fraction of aggregates required to meet the job-mix formula. The bituminous material shall be measured or gauged and introduced into the mixer in the amount specified by the job-mix formula.

After the required amounts of aggregate and bituminous material have been introduced into the mixer, the materials shall be mixed until a complete and uniform coating of the particles and a thorough distribution of the bituminous material throughout the aggregate is secured. Wet-mixing time shall be determined by the Engineer for each plant and for each type of aggregate used, but in no case shall the wet-mixing time be less than 25 seconds for batch type plants and 40 seconds for continuous mix plants.

For hot-mix bituminous pavement, the temperature of the completed mixture, shall be not less than 275° F, except that the temperature of mixtures made with aggregates containing absorbed moisture which causes foaming or boiling in the completed mixtures at these higher temperatures shall be not less than 225° F.

The bituminous material aggregate shall be introduced into the mixer within the specified temperature range and shall be within 25° F of each other, except as herein specified regarding aggregates containing sufficient absorbed moisture to cause foaming or boiling.

## **12.14 SPREADING AND FINISHING**

Unless otherwise specified or permitted, bituminous mixtures shall be delivered and spread on the roadway in ample time to secure thorough compaction during daylight hours. Its temperature at the time of depositing in the pave hopper shall be not more than 25° F less than the temperature at which it is discharged from the mixer. The mixture shall be laid upon an approved surface, spread and struck off to the established line, grade and elevation by means of approved asphalt paving machines in echelon or by one paver equipped with an approved type joint heater. Echelon paving will not be permitted on two-lane projects where traffic is being maintained. Alignment of the outside edges of the pavement shall be controlled by present control string lines. Where multi-course pavements are placed, the longitudinal joint in one layer shall offset that in the layer immediately before by approximately one foot; however, the joint in the top layer shall be at the center line of the pavement if the roadway is more than two lanes in width.

Cloode reference systems for automatic screed controls may be either the string line or ski type on all work, except new or stage construction where the string line reference system shall be used on at least two courses or layers of multi-course pavements, exclusive of the surface course. Pavement lanes previously placed with automatic controls or to form grade may serve as longitudinal control reference for laying adjacent lanes by utilizing a ski or joint matching shoe.

The string line reference system shall consist of suitable wire or twine supported by approved devices which will be compatible with the type of automatic paver control systems used. The string line supports shall be capable of maintaining the line and grade designated by the Plans at the point of support while withstanding the tensioning necessary to prevent sag in excess of one-fourth inch between supports placed fifty feet apart. Additional supports shall then be installed to provide a minimum spacing of twenty-five feet, or less as directed by the Engineer, to remove the apparent deviation of the string line from theoretical grade.

The Department will furnish sufficient control reference stakes to enable the Contractor to establish the string line reference system. The Contractor shall furnish all materials, equipment, labor, and incidentals required to construct the string line reference system as described herein and shall maintain same until its use is no longer required.

The string line reference system shall be complete-in-place at least 300 feet in advance of the point where the pavement is being placed.

Automatic screed controls will not be required on sections of projects where service connections and other conditions interfere with their efficient operation.

The cost of erecting and maintaining the string line reference system shall be included in the unit price bid for other Items of Construction. The Contractor shall be required to utilize a string line reference system only as directed on Plans or ordered in writing by the City Engineer.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the mixture shall be taken from the hopper of the spreading machine or dumped on approved steel dump sheets outside of the area on which it is to be spread and shall be distributed immediately into place by means of suitable shovels and other tools and spread with rakes and lutes in a uniformly loose layer as such depth as will result in a completed course having the weight per square yard required.

Driveways, parking areas and other such facilities shall be blended to the new surface within the right-of-way as directed by the Engineer. The price per ton for asphalt plant mix will include this work. No extra payment will be made for blending said facilities to the new surface.

## 12.15 COMPACTION

After the bituminous mixture has been spread, struck off and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling.

The surface shall be rolled immediately when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking or shoving.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the road center-line, each trip overlapping one-half the roller width, gradually progressing to the crown of the road. When paving in echelon or abutting a previously placed lane, the longitudinal joint shall be rolled first, followed by the regular rolling procedure. On super-elevated curves or tilted pavements, the rolling shall begin at the low side and progress to the high side by overlapping of longitudinal trips parallel to the center-line.

Alternate trips of the roller shall be terminated in stops approximately two feet distant from any preceding stop. When paving in echelon, rollers shall not compact within six inches of an edge where an adjacent lane is to be placed.

Rollers shall move at a slow but uniform speed with the drive wheels nearest the paver and shall be kept as nearly as practicable in continuous operation. Rolling shall continue until all roller marks are eliminated and until each of the mixtures shown below has been compacted to the density indicated.

- (1) Bituminous Plant Mix Base, Item 26, Gradings "B" and "C" - 90 percent of maximum theoretical density.
- (2) Asphaltic Concrete Surface Course, Item 27, Gradings "D" and "E" - 95 percent of laboratory density as determined by the Marshall Method.
- (3) Asphaltic Surface Course, Item 27, Grading "F" and Sand Asphalt Surface Course, Item 27 - 92 percent of laboratory density as determined by the 2-inch Hubbard-Field Method. When these surface courses are placed at a rate of 60 pounds per square yard or less, the density requirements will be waived.

Any displacement occurring as the result of the reversing of the direction of a roller, or from other causes, shall be corrected at once by the use of rakes and addition of fresh mixture when required. Care shall be exercised in rolling so as not to displace the line and grade of the edges of the bituminous mixture.

To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted.

Along forms, curbs, headers, walls and other places not accessible to the rollers, the mixture shall be compacted thoroughly with hot hand tampers, smoothing irons or with mechanical tampers. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed areas.

Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh hot mixture, which shall be compacted to conform with the surrounding area. Any area showing an excess or deficiency of bituminous material shall be removed and replaced.

#### **12.16 JOINTS**

Placing of the bituminous paving shall be as continuous as possible. Rollers shall not pass over the unprotected end of a freshly laid mixture unless authorized by the Engineer. Transverse joints shall be formed by cutting back on the previous run to expose the full depth of the course. When directed by the Engineer, a brush coat of bituminous material shall be used on contact surfaces of transverse joints just before additional mixture is placed against the previously rolled material.

#### **12.17 PAVEMENT SAMPLES**

When directed, the Contractor shall cut samples from the compacted pavement for testing by the Engineer. Samples of the mixture shall be taken for the full depth of the course locations selected by the Engineer. The samples shall be cut with a power saw or core drill and shall have a top surface area of at least ten square inches.

Holes formed by taking samples shall be filled with the same type mixture that was used to construct the course sampled, and compacted to conform to the surrounding pavement. Cutting samples and repairing sample holes shall be at the Contractor's expense. Materials used to repair sample holes will be measured for payment in accordance with the provisions of the Tennessee Department of Transportation Standard Specifications, Item 407.19.

#### **12.18 SURFACE REQUIREMENTS**

The surface shall be tested with a 12-foot straight edge applied parallel to the center-line of the pavement. The deviation of the surface from the testing edge of the straight edge shall not exceed that specified for the respective types of bituminous construction under the applicable Subsection of these Specifications.

The transverse slope of tilted pavements shall be tested with a string line and string level applied at right angles to the center-line of the pavement, and the percent of slope, when computed for the full width of the pavement, shall not deviate more than five-tenths of one percentage point from that specified on the plans.

The crown in crowned pavements shall be tested with a string line applied at right angles to the center-line of the pavement, and the crown shall not deviate more than one-half inch from that specified on the Plans. Deviations greater than the specified tolerances shall be corrected by methods best suited for the purpose. Pavement that cannot be corrected to comply with the specified tolerances shall be removed and replaced at the Contractor's expense.

## **COMPENSATION**

### **12.19 METHOD OF MEASUREMENT (IF APPLICABLE)**

Asphalt concrete plant mixes shall be measured by the unit(s) specified in the bid schedule and shall be weighed on batch plant scales meeting the requirements of Item 12.04 (b) (1). The transporting vehicles shall be numbered, and a record shall be maintained showing the mixture accepted and used each day. This record shall also show: rejected mixture; mixture used otherwise than indicated or directed; mixture used to replace defective or condemned construction; and mixture wasted after having been weighed.

No allowance will be made for unaccepted material, for material furnished or used in excess of the amount indicated or directed, for materials used in replacing defective or condemned construction, or for materials wasted in handling, hauling, or otherwise.

No allowance will be made for the partial or total removal and replacement of shoulder material as may be deemed necessary during construction to facilitate temporary drainage, etc.

### **12.20 BASIS OF PAYMENT (IF APPLICABLE)**

Asphalt concrete plant mixes shall be paid for at the contract unit price specified in the bid schedule for the respective Items, complete-in-place, which price shall be full compensation for the construction of asphalt-concrete plant mixes including all aggregates, asphaltic cements, mineral fillers, chemical additives as directed, in accordance with the conditions, stipulations, provisions, and requirements contained herein; for completing all incidentals thereto; and for furnishing all materials, equipment, tools, labor and incidentals required to complete the item.

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