

**CITY OF ABILENE****ITEM 302****AGGREGATES FOR SURFACE TREATMENTS****302.1 DESCRIPTION.**

This Item shall govern for aggregates and precoated aggregates used in the construction of surface treatments.

**302.2 MATERIALS.**

**(1) Aggregates.** Aggregates shall be composed of gravel, crushed gravel, or crushed stone. When specified on the Plans, other aggregate types may be permitted or required. Aggregate from each source shall meet the requirements specified herein. Source is defined as a geographical location of naturally occurring material that can be mined or quarried from the original in-situ deposit.

The aggregate shall not contain more than two (2) percent by weight of soft particles and other deleterious material as determined by Test Method Tex-217-F, Part I.

The aggregate shall not contain more than one (1) percent loss from fine dust, clay-like particles and/or silt when tested in accordance with Test Method Tex-217-F, Part II.

The flakiness index for the aggregate, as determined by Test Method Tex-224-F, shall not exceed 17 unless otherwise shown on the Plans.

The percent wear, as determined by Test Method Tex-410-A, for each of the materials shall not exceed 35 percent.

Crushed gravel shall have a minimum of 85 percent of the particles retained on the No. 4 sieve with two (2) or more mechanically induced crushed faces, as determined by Test Method Tex-460-A, Part I.

The aggregate will be subjected to five (5) cycles of magnesium sulfate soundness testing in accordance with Test Method Tex-411-A. The loss shall not exceed 25 percent, unless otherwise shown on the Plans.

The polish value for the aggregate used in the surface or finish course shall not be less than the value shown on the Plans, when tested in accordance with Test Method Tex-438-A. Unless otherwise shown on the Plans, the polish-value requirement will apply only to aggregate used on travel lanes. When aggregates requiring polish value are supplied from a source that is rated by the Materials and Tests Division, the Rated Source Polish Value (RSPV) for that source will be used to meet this requirement. When aggregates are supplied from a source that is not rated, the aggregate will be sampled and tested prior to use. The procedures will be in accordance with Test Methods Tex-400-A and Tex-438-A, Part I.

Blending of aggregates to achieve polish value will not be permitted, unless otherwise shown on the Plans. If blending is allowed, Test Method Tex-438-A, Part II, Method B will be used to determine the required blend percentages. However, a minimum of 50% by volume of non-polishing aggregate is required.

**(2) Precoated Aggregate.** Precoated aggregate shall be aggregate of the type and grade specified, coated with .5 to 1.5 percent, by weight, of residual bitumen from a precoating material.

When limestone rock asphalt is used, it shall be fluxed with .5 to 1.5 percent by weight of fluxing material.

The grade of aggregate specified shall meet all requirements of Articles 302.2 and 302.4 prior to the application of the precoat of fluxing material.

The materials may be mixed on the job or at a central mixing plant and shipped ready for use. Mixes that do not maintain flow qualities such that the precoated aggregate may be satisfactorily spread by approved mechanical spreading devices will not be acceptable.

Materials that are not uniformly and/or properly coated, in the opinion of the Engineer, will not be accepted for use.

**(3) Asphaltic Material.** The precoating or fluxing material shall meet the requirements of Item 300 "Asphalts, Oils and Emulsions". Unless otherwise shown on the Plans, any of the types and grades shown in Item 300, "Asphalt, Oils and Emulsions" may be used.

**(4) Water.** Water in the amount not to exceed three (3) percent by weight of the mixture may be used in precoating aggregate or fluxing limestone rock asphalt aggregate.

### **302.3 TYPES.**

Various aggregate types are identified as follows:

#### **(1) Uncoated Aggregate Types.**

**Type A.** Type A aggregate shall consist of gravel or crushed stone.

**Type B.** Type B aggregate shall consist of crushed gravel, or crushed stone.

**Type C.** Type C aggregate shall be as shown on the Plans.

**Type D.** Type D aggregate shall consist of crushed gravel, crushed slag or crushed stone.

**Type E.** Type E aggregate shall be as shown on the Plans.

#### **(2) Precoated Aggregate Types.**

**Type PA.** Type PA shall be precoated aggregate consisting of gravel or crushed stone.

**Type PB.** Type PB shall be precoated aggregate consisting of crushed gravel, or crushed stone.

**Type PC.** Type PE shall be precoated aggregate as shown on the Plans.

**302.4 GRADES.**

When tested by Test Method Tex-200-F, Part I, the gradation requirements shall be as follows:

		<b>Percent By Weight</b>
<b>Grade 1:</b>	Retained on 1" sieve	0
	Retained on 7/8" sieve	0 – 2
	Retained on 3/4" sieve	20 – 35
	Retained on 5/8" sieve	85 – 100
	Retained on 3/8" sieve	95 – 100
	Retained on No. 10 sieve	99 – 100
<b>Grade 2:</b>	Retained on 7/8" sieve	0
	Retained on 3/4" sieve	0 – 2
	Retained on 5/8" sieve	20 – 40
	Retained on 1/2" sieve	80 – 100
	Retained on 3/8" sieve	95 – 100
	Retained on No. 10 sieve	99 – 100
<b>Grade 3:</b>	Retained on 3/4" sieve	0
	Retained on 5/8" sieve	0 – 2
	Retained on 1/2" sieve	20 – 40
	Retained on 3/8" sieve	80 – 100
	Retained on 1/4" sieve	95 – 100
	Retained on No. 10 sieve	99 – 100
<b>Grade 4:</b>	Retained on 5/8" sieve	0
	Retained on 1/2" sieve	0 – 2
	Retained on 3/8" sieve	20 – 35
	Retained on No. 4 sieve	95 – 100
	Retained on No. 10 sieve	99 – 100
<b>Grade 5:</b>	Retained on 1/2" sieve	0
	Retained on 3/8" sieve	0 – 5
	Retained on No. 4 sieve	40 – 85
	Retained on No. 10 sieve	98 – 100
	Retained on No. 20 sieve	99 – 100

When shown on the Plans, the aggregate of the specified grade(s) shall have from 99.5 to 100 percent by weight retained on the No. 200 sieve.

**302.5 EQUIPMENT.**

**(1) Mixing Plants.** Mixing plants that will not continuously meet all the requirements of this specification shall be condemned.

Mixing plants may be either the weigh-batch type, the continuous mixing type or the drum mix type. All plants shall be equipped with satisfactory conveyors, power units, aggregate handling equipment, and bins.

If the Engineer approves the use of emulsion as a precoat material, he may also waive the requirement for a dryer, as specified below, if it is demonstrated that a satisfactory coating can be obtained without drying or heating the aggregate.

When using a low grade fuel oil or waste oil the plant shall meet the requirements of Item 340.4. (2).

(a) Weigh Batch Type.

**Cold Aggregate Bin and Proportioning Device.** The cold aggregate bins or aggregate stockpiles shall be of sufficient number and size to supply the amount of aggregate required to keep the plant in continuous operation. The proportioning device shall be such as will provide a uniform and continuous flow of aggregate in the desired proportion to the plant.

**Dryer.** The dryer shall continually agitate the aggregate during heating. The temperature shall be controlled so that the aggregate will not be damaged in the drying and heating operations.

The burner, or combination of burners, and type of fuel used shall be such that in the process of heating the aggregate to the desired or specified temperatures, no residue from the fuel shall adhere to the heated aggregate. A recording thermometer shall be provided which will record the temperature of the aggregate when it leaves the dryer. The dryer shall be of sufficient size to keep the plant in continuous operation. The dryer will not be required for precoating natural limestone rock asphalt.

**Screening and Proportioning.** The screening capacity and size of the bins shall be sufficient to screen and store the amount of aggregate required to properly operate the plant and keep the plant in continuous operation at full capacity. Proper provisions shall be made to enable inspection forces to have easy and safe access to the proper location on the mixing plant where accurate representative samples of aggregate may be taken from the bins for testing.

**Weighing and Measuring Equipment.** The weighing and measuring equipment shall be of sufficient capacity and of adequate design for proper batching. The following equipment, conforming to the requirements of TxDOT Item 520, "Weighing and Measuring Equipment", shall be furnished:

1. Aggregate weigh box and batching scales.
2. Bucket and scales for precoat material or fluxing material.

A pressure type flow meter may be used to measure the precoat material or fluxing material for each batch.

If a pressure type flow meter is used to measure the asphaltic material, the requirements of TxDOT Item 520, "Weighing and Measuring Equipment" shall apply.

Provisions of a permanent nature shall be made for checking the accuracy of the asphaltic material-measuring device. The line to the measuring device shall be protected with a jacket of hot oil or other approved means to maintain the temperature of the line near the temperature specified for the precoating material.

**Mixer.** The mixer shall be of the pugmill type, and shall have a capacity of not less than 3000 pounds in a single batch. Any mixer that has a tendency to segregate the aggregate or fails to secure a thorough and uniform mixing with the precoat material or fluxing material shall not be used. All mixers shall be provided with an automatic time lock that will lock the discharge doors of the mixer for the required mixing period. The dump door or doors and the shaft seals of the mixer shall be tight enough to prevent the spilling of aggregate or mixture from the pugmill.

(b) Modified Weigh-Batch Type.

**General.** This plant is similar to the weigh-batch type plant. The hot bin screens shall be removed and the aggregate control is placed at the cold feeds. The cold feed bins will be the same as those required for the drum-mix type plant.

**Cold-Aggregate Bin Unit and Feed System.** The number of bins in the cold-aggregate bin unit shall be equal to or greater than the number of stockpiles of individual materials to be used. The bins shall be of sufficient size to store the amount of aggregate required to keep the plant in continuous operation.

When blending materials, the bin unit shall be of proper design to prevent overflow of material from one bin to another. There shall be vertical partitions meeting the requirements of Item 340-4(2). The feed system shall provide a uniform and continuous flow of aggregate in the desired proportion to the dryer. The Contractor shall furnish a chart indicating the calibration of each cold bin in accordance with Construction Bulletin C-14, or other methods of cold bin calibration acceptable to the Engineer.

**Scalping Screen.** A scalping screen shall be required after the cold feeds and ahead of the hot aggregate surge bins.

**Dryer.** The dryer shall continually agitate the aggregate during heating. The temperature shall be controlled so that the aggregate will not be damaged in the drying and heating operations. The dryer shall be of sufficient size to keep the plant in continuous operation.

**Screening and proportioning.** The hot aggregate shall not be separated into sizes after being dried. There shall be one or more surge bins provided between the dryer and the weigh hopper. Surge bins shall be of sufficient size to hold enough combined aggregate for one complete batch of mixture.

**Aggregate Weigh Box and Batching Scale.** The aggregate weigh box and batching scales shall be of sufficient capacity to hold and weigh a complete batch of aggregate. The weigh box and scales shall conform to the requirements of TxDOT Item 520, "Weighing and Measuring Equipment".

**Asphaltic Material Measuring System.** If an asphaltic material bucket and scales are used, they shall be of sufficient capacity to hold and weigh the necessary asphaltic material for one batch. The bucket and scales shall conform to the requirements of TxDOT Item 520, "Weighing and Measuring Equipment".

If a pressure type flow meter is used to measure the asphaltic material, the requirements of TxDOT Item 520, "Weighing and Measuring Equipment", shall apply. This system shall include an automatic temperature compensation device to insure a constant percent by weight of asphaltic material in the mixture.

Provisions of a permanent nature shall be made for checking the accuracy of the asphaltic material-measuring device. The asphalt line to the measuring device shall be protected with a jacket of hot oil or other approved means to maintain the temperature of the line near the temperature specified for the asphaltic material.

**Mixer.** The mixer shall be of the pugmill type and shall have a capacity of not less than 3,000 pounds (of natural-aggregate mixture) in a single batch, unless otherwise shown on the Plans. Any mixer that has a tendency to segregate the aggregate or fails to secure a thorough and uniform mixing with the precoat material or fluxing material shall not be used. All mixers shall be provided with an automatic timer that will lock the discharge doors of the mixer for the required mixing period. The dump door or doors and the shaft seals of the mixer shall be tight enough to prevent spilling of aggregate or mixture from the pugmill.

(c) Continuous Mixing Type.

**Cold Aggregate Bin and Proportioning Device.** Same as for weigh-batch type of plant.

**Dryer.** Same as for weigh-batch type of plant.

**Screening and Proportioning.** Same as for weigh-batch type of plant. These requirements shall also apply to materials that are stockpiled and that are proposed for direct use by a continuous mixing plant without the use of plant bins.

**Aggregate Proportioning Device.** The aggregate proportioning device shall be so designed that when properly operated a uniform and continuous flow of aggregate into the mixer will be maintained.

**Spray Bar for Precoat Material and Fluxing Material.** The spray bar for the precoat material or fluxing material shall be so designed that the material will spray uniformly and continuously into the mixer.

**Meter for Precoat Material or Fluxing Material.** An accurate recording meter for precoat material or fluxing material shall be placed in the line leading to the spray bar so that the accumulative amount of precoat material or fluxing material being used can be accurately determined. Provisions of a permanent nature shall be made for checking the accuracy of the meter output.

**Mixer.** The mixer shall be of the continuous type and shall have a capacity of not less than 40 tons of mixture per hour. Any mixer that has a tendency to segregate the aggregate or fails to secure a thorough and uniform mixing of the aggregate with the precoat material or fluxing material shall not be used.

(d) Drum Mix Plant

**General.** The plant shall be adequately designed and constructed for the process of mixing aggregates and precoat material. The plant shall be equipped with satisfactory conveyors, power units, aggregate-handling equipment and feed controls.

**Cold Aggregate Bin and Feed System.** The number of bins in the cold aggregate bin unit shall be equal to or greater than the number of stockpiles of individual materials to be used. The bin unit shall be of sufficient size to store the amount of aggregate required to keep the plant in continuous operation.

When blending materials, the bin unit shall be of proper design to prevent overflow of material from one bin to another. There shall be vertical partitions meeting the requirements of Item 340.4(2). The feed system shall provide a uniform and continuous flow of aggregate in the desired proportion to the dryer. The Contractor shall furnish a chart indicating the calibration of each cold bin in accordance with Construction Bulletin C-14 or other methods acceptable to the Engineer.

The system shall provide positive weight measurement of the combined cold aggregate feed by use of belt scales. Provisions of a permanent nature shall be made for checking the accuracy of the measuring device as required by TxDOT Item 520, "Weighing and Measuring Equipment". When a belt scale is used, mixture production shall be maintained so that the scale is used, mixture production shall be maintained so that the scale normally operates between 50 and 100 percent of its rated capacity. Belt scale operation below 50 percent of the rated capacity may be allowed by the Engineer if

accuracy checks show the scale to meet the requirements of TxDOT Item 520, "Weighing and Measuring Equipment", at the selected rate and it can be satisfactorily demonstrated to the Engineer that mixture uniformity and quality have not been adversely affected.

**Scalping Screen.** A scalping screen shall be required, after the cold feeds and ahead of the combined aggregate belt scale.

**Precoat Material Measuring System.** An asphaltic material measuring device meeting the requirements of TxDOT Item 520, "Weighing and Measuring Equipment", shall be placed in the line leading to the mixer so that the cumulative amount of precoat material used can be accurately determined. Provisions of a permanent nature shall be made for checking the accuracy of the measuring device output. The line to the measuring device shall be protected with a jacket of hot oil or other approved means to maintain the temperature of the line near the temperature specified for the precoat material. The measuring system shall include an automatic temperature compensation device to maintain a constant percent by weight of precoating material in the mixture.

**Synchronization Equipment for Feed-Control Systems.** The precoat material feed-control shall be coupled with the total aggregate weight-measuring device to automatically vary the precoat material feed rate to maintain the required proportion.

**Mix System.** The mix system shall control the temperature so that aggregate and asphalt will not be damaged in the drying, heating and mixing operations. A continuously recording thermometer shall be provided which will indicate the temperature of the mixture as it leaves the mixer.

**Surge-Storage System.** A surge-storage system shall be required to minimize the production interruptions during the normal day's operations. A device such as a gob hopper or other similar devices approved by the Engineer to prevent segregation in the surge-storage bin shall be required.

**(2) Heating Equipment for Precoat Material and Fluxing Material.** Heating equipment for precoat material and fluxing material shall be adequate to heat the required amount of material to the desired temperature. The material may be heated by steam coils, which shall be absolutely tight. Direct fire heating will be permitted, provided the heating system used is manufactured by a reputable concern and there is positive circulation of the liquid throughout the heater. Agitation with steam or air will not be permitted. The heating apparatus shall be equipped with a recording thermometer with a 24-hour chart that will record the temperature of the precoat material or fluxing material where it is at the point of highest temperature.

## 302.6 STORAGE, PROPORTIONS, AND MIXING.

**(1) Aggregate Storage.** If the aggregates are stored or stockpiled, they shall be handled in such a manner as to prevent segregation, the mixing of the various materials or sizes, and the contamination with foreign materials. The grading of aggregates proposed for use and as supplied to the mixing plant shall be uniform. When required by the Engineer, additional material shall not be added to stockpiles that have been samples for approval.

When asphalt cement is the precoating material, stockpile height shall be limited to approximately three feet immediately after production to limit the build up of heat. These stockpiles may be consolidated after cooling adequately, in the opinion of the Engineer.

The use of limestone rock asphalt aggregate containing moisture in excess of the saturated surface-dry condition will not be permitted. Excess moisture will be evidenced by the visual surface moisture on the aggregate or any unusual quantities of fines clinging to the aggregate.

**(2) Storage and Heating of Precoating Material or Fluxing Material.** The precoating or fluxing material storage shall be ample to meet the requirements of the plant. The precoating material shall not be heated in storage above the maximum temperature set forth in Item 300, "Asphalts, Oils and Emulsions". All equipment used in the storage and handling of precoat material or fluxing material shall be kept in a clean condition at all times and shall be operated in such manner that there will be no contamination with foreign matter.

**(3) Feeding and Drying of Aggregate.** The feeding of various sizes of aggregate, other than natural limestone rock asphalt, to the dryer or drum mixer shall be done through the cold aggregate bin and proportioning device in such a manner that a uniform and constant flow of material in the required proportions will be maintained. The aggregate shall be heated to the temperature necessary to produce a mixture meeting the requirements of Item 302.2(3).

**(4) Proportioning.** The proportioning of the various materials entering into the mixture shall be as directed by the Engineer and in accordance with these specifications. Aggregate shall be proportioned by weight using the weigh box and batching scales herein specified when the weigh-batch type of plant is used and by volume using the aggregate proportioning device when the modified weigh-batch type, the continuous mixer type or drum mix plant is used. The precoat material or fluxing material shall be proportioned by weight or by volume based on weight using the specified equipment.

**(5) Mixing.**

**(a) Weigh-Batch Type and Modified Weigh-Batch Type Mixer.** In the charging of the weigh box and in the charging of the mixer from the weigh box, such methods or devices shall be used as are necessary to secure a uniform mixture. In introducing the batch into the mixer, the aggregate shall be introduced first; shall be mixed thoroughly, as directed, to uniformly distribute the various sizes throughout the batch before the precoat material or fluxing material is added; the precoat material or fluxing material shall then be added and the mixing continued until such time that the aggregate is properly coated. This mixing period may be varied, if, in the opinion of the Engineer, the mixture is not uniform.

**(b) Continuous or Drum Mix Type Mixer.** The amount of aggregate and precoat material or fluxing material entering the mixer and the rate of travel through the mixer shall be so coordinated that a uniform mixture of the specified grading and percent by weight of precoat material or fluxing material will be produced.

### **302.7 MEASUREMENT AND PAYMENT.**

Aggregates provided in accordance with this specification will be measured and paid for in accordance with the governing specifications for the items of construction in which these materials are used.