

ITEM 292

**ASPHALT TREATMENT (PLANT-MIXED)**

**292.1. Description.** Construct a base or foundation course composed of a compacted mixture of aggregate and asphalt binder mixed hot in a mixing plant.

**292.2. Materials.** Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications. Notify the Engineer of the proposed material sources and of changes to material sources. When a source change occurs, the Engineer will verify that the specification requirements are met and may require a new laboratory mixture design. Use Tex-100-E for material definitions.

**A. Aggregate.** Furnish natural aggregates or crushed concrete unless otherwise shown on the plans. When shown on the plans, other recycled materials, including reclaimed asphalt concrete pavement (RAP), are allowed up to the maximum percentage shown on the plans. Stockpile aggregates for each source and type separately. Do not add material to an approved stockpile unless approved by the Engineer.

Furnish aggregates that conform to the requirements shown in Table 1 and specified in this Section unless otherwise shown on the plans. Each source must meet the requirements of Table 1. The Engineer may allow testing of the proposed combined aggregates, rather than each source, to meet Table 1 requirements.

**Table 1  
Aggregate Quality Requirements**

<b>Property</b>	<b>Test Method</b>	<b>Specification Requirement</b>
Wet ball mill, % max	Tex-116-E	50
Max increase, % passing #40		20
Los Angeles abrasion <sup>1</sup> , % max	Tex-410-A	50
Liquid limit, max	Tex-104-E	40
Plasticity index, max	Tex-106-E	10
Sand equivalent, % min	Tex-203-F	40
Decantation <sup>2</sup> , % max	Tex-406-A	5.0
Crushed faces, % min	Tex-460-A	60

1. Use only when shown on the plans, instead of wet ball mill test.

2. Required only for RAP stockpiles and recycled aggregates when more than 30% RAP is allowed.

**B. Recycled Materials.** The use of recycled materials is allowed only when shown on the plans. Crushed concrete, RAP (except for Department furnished RAP), and other recycled materials must meet the requirements of this Article. Request approval to blend 2 or more sources of recycled materials.

**1. Limits on Percentage.** When RAP is allowed by the plans, use no more than 30% unless otherwise shown on the plans. The percentage limitations for other recycled materials will be as shown on the plans.

**2. Recycled Material (Including Crushed Concrete) Requirements.**

**a. Contractor Furnished Recycled Materials.** When the Contractor furnishes the recycled materials, including crushed concrete, the final product will be subject to the requirements of this Article and Table 2 for the grade specified. Certify compliance with DMS-11000, "Evaluating and Using Nonhazardous Recyclable Materials Guidelines," for Contractor-furnished recycled materials. In addition, recycled materials must be free from reinforcing steel and other objectionable material and have at most 1.5% deleterious material when tested in accordance with Tex-413-A. The unblended recycled materials (crushed concrete and RAP) must not exceed the decantation shown in Table 1. Test RAP without removing the asphalt. Do not use RAP that is contaminated by dirt or other objectionable material. Crushed

concrete must be managed in a way to provide for uniform quality. The Engineer may require separate dedicated stockpiles in order to verify compliance.

When more than 30% Contractor-owned recycled materials is allowed and used, the individual materials are subject to the requirements of Table 1.

**b. Department Furnished Required Recycled Materials.**

When the Department furnishes and requires the use of recycled materials, unless otherwise shown on the plans:

- Department required recycled material will not be subject to the requirements in Table 1,
- Contractor furnished materials are subject to the requirements in Table 1 and this Item, and
- the final product, blended or unblended, will be subject to the requirements in Table 2.

Crush Department-furnished RAP so that 100% passes the 2 in. sieve. The Contractor is responsible for uniformly blending to meet the percentage required.

**c. Department Furnished and Allowed Recycled Materials.**

When the Department furnishes and allows the use of recycled materials or allows the Contractor to furnish recycled materials, the final blended product is subject to the requirements of this Article, Table 2, and the plans.

- 3. Recycled Material Sources.** Department-owned recycled material is available to the Contractor only when shown on the plans. The location, approximate asphalt content, and approximate gradation will be shown on the plans for Department-owned RAP sources in a stockpile condition prior to Contract Execution. Assume that required Department-owned RAP meets Table 1 requirements. Return unused Department-owned recycled materials to the Department stockpile location designated by the Engineer unless otherwise shown on the plans.

The use of Contractor-owned recycled materials is allowed when shown on the plans. Contractor-owned surplus recycled materials remain the property of the Contractor. Remove Contractor-owned recycled materials from the project and dispose of it in accordance with federal, state, and local regulations before project acceptance. Do not intermingle Contractor-owned recycled material with Department-owned recycled material unless approved by the Engineer.

**C. Asphalt Material.** Furnish the type and grade of asphalt binder specified on the plans. Provide asphalt binder that meets requirements of Item 300, "Asphalts, Oils and Emulsions." When more than 30% RAP is allowed and used, ensure that the new binder and recovered binder from the RAP, when blended proportionally, meet the PG binder designation shown on the plans.

**D. Tack Coat.** Unless otherwise shown on the plans or approved, furnish CSS-1H, SS-1H, or a PG binder with a minimum high temperature grade of PG 58 for tack coat binder in accordance with Item 300, "Asphalts, Oils, and Emulsions."

Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use. If required, verify that emulsified asphalt proposed for use meets the minimum residual asphalt percentage specified in Item 300, "Asphalts, Oils, and Emulsions."

The Engineer will obtain at least 1 sample of the tack coat binder per project and test to verify compliance with Item 300. The Engineer will obtain the sample from the asphalt distributor immediately before use.

**E. Additives.** When shown on the plans, use the type and rate of additive specified. Other additives that facilitate mixing or improve the quality of the mix may be allowed when approved.

If lime or a liquid antistripping agent is used, add in accordance with Item 301, "Asphalt Antistripping Agents." Do not add lime directly into the mixing drum of any plant where lime is removed through the exhaust stream unless the plant has a baghouse or dust collection system that reintroduces the fines back into the drum.

**292.3. Equipment.** Provide machinery, tools, and equipment in accordance with Item 320, "Equipment for Production, Hauling, and Placement of Hot-Mixed Asphalt Materials."

**292.4. Construction.** Produce, haul, place, and compact the specified mixture in accordance with the requirements of this Item.

**A. Mixture Design.** Using Tex-126-E and the materials proposed for the project, the Engineer will determine the target asphalt content required to produce a mixture meeting the requirements in Table 2 for the grade shown on the plans. The gradation of the combined aggregates will be determined in accordance with Tex-200-F, Part I. The Engineer may accept a design from the Contractor that is performed in accordance with Tex-126-E. Reimburse the Department for subsequent mixture designs or partial designs necessitated by changes in the material or requests by the Contractor.

**Table 2  
Mix Requirements**

<b>Master Gradation Bands Tex-200-F, Part I, % Passing by Weight</b>				
<b>Sieve Size</b>	<b>Grade 1</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Grade 4</b>
1-3/4"		100	100	As shown on the plans
1-1/2"	100	90-100		
1"	90-100			
3/8"	45-70			
#4	30-55	25-55		
#40	15-30	15-40	15-40	
<b>Strength Requirements</b>				
Slow strength, psi, min. <sup>1</sup>	50	40	30	30 <sup>2</sup>

1. At optimum asphalt content.

2. Unless a higher minimum strength is shown on the plans.

The mixture must contain between 3.0% and 9.0% asphalt when designed in accordance with Tex-126-E. The Engineer will evaluate the mixture for moisture susceptibility in accordance with Tex-530-C unless otherwise shown on the plans. A maximum of 10% stripping is allowed unless otherwise shown on the plans. The test sample will be retained and used to establish a baseline for comparison to production results. The Engineer may waive this test if a similar design using the same materials has proven satisfactory.

Produce a trial batch using the proposed project materials and equipment in a large enough quantity to ensure that the mixture is representative of the mixture design. The Department will verify the strength requirement in Table 2 is met. The Engineer may waive trial mixtures if similar designs have proven satisfactory.

**B. Production Operations.** Produce a new trial batch when the plant or plant location is changed. Take corrective action and receive approval to proceed after any production suspension for non-compliance to the specification.

**1. Storage and Heating of Materials.** Do not heat the asphalt binder above the temperature specified in Item 300, "Asphalts, Oils and Emulsions," or outside the manufacturer's recommended values. On a daily basis, provide the Engineer with the records of asphalt binder and hot mix asphalt discharge temperatures in accordance with Item 320, "Equipment for Hot-Mix Asphalt Materials." Unless otherwise approved, do not store hot mix for more than 12 hr. or for a time period less than 12 hr. that affects the quality of the mixture.

2. **Mixing and Discharge of Materials.** Notify the Engineer of the target discharge temperature and produce the mixture within 25°F of the target. When ordinary compaction is used, the Engineer will select a target discharge temperature between 225°F and 350°F. Produce the mixture within 25°F of the target. Monitor the temperature of the material in the truck before shipping to ensure that it does not exceed 350°F. The Department will not pay for or allow placement of any mixture produced at more than 350°F.

Control the mixing time and temperature so that substantially all moisture is removed from the mixture before discharging from the plant. The Engineer may perform Tex-212-F, Part II, to verify that the mixture contains no more than 0.2% moisture by weight. The sample will be taken immediately after the mixture is discharged into the truck and tested promptly.

- C. **Hauling Operations.** Before use, clean all truck beds to ensure that the mixture will not become contaminated. When a release agent is necessary, use a release agent on the approved list maintained by the Construction Division to coat the truck bed.
- D. **Placement Operations.** Prepare the surface by removing objectionable material such as moisture, dirt, sand, leaves and other loose impediments before placing the mixture. Coordinate mixture delivery and paver speed to ensure a continuous placement operation. Suspend placement operations when, in the opinion of the Engineer, a continuous paving operation is not maintained. Place the mixture to produce a smooth, finished surface with a uniform appearance and texture that meet typical section requirements. Offset longitudinal joints of successive courses of stabilized base by at least 6 in. Place the mix adjacent to gutters and structures so that the pavement will drain properly.
  1. **Weather Conditions.** Tack coat and mixture may be placed only when the roadway surface temperature is 60°F or higher unless otherwise approved. Measure the roadway surface temperature with a handheld infrared thermometer. Place tack coat or mixtures only when the Engineer determines that general weather conditions and moisture conditions of the roadway surface are suitable. The Engineer may waive placement temperature requirements.
  2. **Tack Coat.** Clean the surface before placing the tack coat. Unless otherwise approved, apply tack coat uniformly at a rate between 0.04 and 0.10 gal. of residual asphalt per square yard of surface area. Apply a thin uniform tack coat to all contact surfaces of curbs, structures, and joints. Prevent splattering of tack coat when placed adjacent to curbs, gutters, and structures. Roll the tack coat

with a pneumatic tire roller unless otherwise directed. The Engineer may use Tex-243-F to verify that the tack coat has adequate adhesive properties. The Engineer may suspend paving operations until there is adequate adhesion. The Engineer may waive the requirement to place tack coat.

- 3. Lay-Down Operations.** Dump and spread the asphalt mixture on the approved prepared surface with a spreading and finishing machine. Place the material without tearing, shoving, gouging, or segregating the mixture.

Do not jar or bounce the finishing machine when loading it. Obtain the required lines and grades without hand finishing. The Engineer may authorize hand finishing when the mixture is:

- placed in a narrow strip along the edge of existing pavement,
- used to level small areas, or
- placed in small irregular areas where the use of a finishing machine is not practical.

Leveling courses and other areas may be spread with a motor grader when shown on the plans or approved.

When hot mix is placed in windrows, operate windrow pick-up equipment so that substantially all the mixture deposited on the roadbed is picked up and loaded into the spreading and finishing machine.

Adjust the hopper flow gates of the spreading and finishing machine to provide an adequate and consistent flow of material. Operate the augers at least 85% of the time. Keep the augers one-half to three-quarters full of mixture. Maintain an adequate flow of material to the center of the paver for the full width of the mat.

Immediately take appropriate corrective action if surface irregularities including but not limited to segregation, rutting, raveling, flushing, fat spots, mat slippage, color, texture, roller marks, tears, gouges, or streaks are detected. Continue placement for no more than 1 day of production while appropriate action is taken. If no appropriate corrective action is taken or if the problem still exists after 1 day, suspend paving until the Engineer approves further production.

- E. Compaction.** Uniformly compact the pavement to the density requirements of this Item. Use the procedure described in Tex-207-F, Part IV, to establish the rolling pattern. Do not use pneumatic tire rollers if excessive pickup of fines by roller tires occurs.

When using three-wheel, tandem, or vibratory rollers, first roll the joint with the adjacent pavement. Continue rolling longitudinally at the

sides, proceeding toward the center of the pavement, and overlap successive trips by at least one foot unless otherwise directed. Make alternate trips of the roller slightly different in length. Begin rolling of super-elevated curves at the low side and proceed toward the high side, unless otherwise directed.

When operating vibratory rollers:

- do not operate in vibrating mode when stationary;
- do not operate in vibrating mode when changing directions;
- do not operate in vibrating mode on mats with a plan depth of less than 1-1/2 in.;
- do not allow the roller to stand on pavement that has not been fully compacted;
- do not operate when in contact with the compacted, finished pavement structure layer;
- in case of over-vibration resulting in disruption of the compacted material, rework and recompact or replace the damaged material at the Contractor's expense;
- roll at a speed producing at least 10 blows per foot unless otherwise directed;
- keep the drums moist with water without using excess water; and
- do not drop diesel, gasoline, oil, grease, or other foreign matter on the pavement.

Where specific air void requirements are waived, furnish and operate compaction equipment as approved. Use lightly oiled tamps to thoroughly compact the edges of the pavement along curbs, headers, and similar structures and in locations that will not permit thorough compaction with rollers. The Engineer may require rolling with a trench roller on widened areas, in trenches, and in other limited areas.

In-place compaction control is required for all mixtures. Complete all rolling for compaction before the mixture temperature drops below 175°F. Unless otherwise shown on the plans, use density control.

- 1. Density Control.** Determine the number and type of rollers needed to obtain the required density. Operate the rollers in accordance with the requirements of this specification and as approved.

Place and compact material to the minimum density required as determined by Tex-126-E or as shown on the plans. The Engineer will determine laboratory-molded density in accordance with Tex-126-E from material sampled at the plant. Actual in-place density will be determined in accordance with Tex-126-E unless otherwise directed. Unless otherwise shown on the plans, obtain required roadway specimens as directed. The Engineer will measure air voids in accordance with Tex-207-F. When a

satisfactory correlation to results obtained in accordance with Tex-126-E is shown, other methods of determining in-place compaction may be used.

If in-place density is more than 1.0 percentage point below minimum density, cease production immediately. If in-place density is between 0.1 and 1.0 percentage points below minimum density, investigate the causes and make the necessary corrections. If minimum density is not obtained within one full day of operation, cease production.

Resume production after placing a test section of one lane width and a maximum 0.2 miles long that demonstrates that minimum density can be obtained. Repeat this procedure until producing a test section that meets minimum density requirements. Place no more than 2 test sections per day. Increasing the asphalt content of the mixture to increase in-place density is allowed by approval only.

2. **Ordinary Compaction** When ordinary compaction is required by the plans, furnish one three-wheel roller, one pneumatic tire roller, and one tandem roller, as directed, for each compaction operation. The Engineer may waive the use of the tandem roller when the surface is adequately smooth and further steel wheel rolling is shown to be ineffective. The Engineer may allow a vibratory roller to be substituted for the three-wheel roller, the tandem roller, or both. Use at least one pneumatic tire roller. Pneumatic tire rollers will provide a minimum of 80 psi ground contact pressure when used for compaction and a minimum of 55 psi ground contact pressure when used for kneading and sealing the surface. Provide additional rollers as directed.

Establish rolling patterns in accordance with Tex-207-F, Part IV, unless otherwise directed. Follow the selected rolling pattern unless changes in mixture or placement conditions that affect compaction occur. When changes occur, establish a new rolling pattern.

## F. Sampling and Testing.

### 1. Production Sampling.

- a. **Mixture Sampling.** The Engineer will obtain mixture samples in accordance with Tex-222-F.
- b. **Asphalt Binder Sampling.** The Engineer will obtain at least one 1-quart sample of the asphalt binder used during the project, labeled with date and time, sampled from a port located immediately upstream from the mixing drum or pug

mill. The sample will be taken in accordance with Tex-500-C, Part II.

**2. Production Testing.** The Engineer will perform production tests.

- a. Operational Tolerances.** The Engineer will determine compliance with operational tolerances. The gradation of the aggregate must be within the master grading limits for the specified grade except that a tolerance of 2 percentage points is allowed on the sieve size for each mixture grade that shows 100% passing in Table 2.

Ensure that the asphalt content does not vary by more than 0.5 percentage points from the design target.

- b. Individual Loads of Asphalt-Stabilized Base.** The Engineer retains the right to reject individual truckloads of asphalt-stabilized base when it is evident that the material quality is unacceptable. When a load is rejected for reasons other than temperature, the Contractor may request that the rejected load be tested. Make this request within 4 hours of rejection. If Department test results are within the operational tolerances listed in Section 292.4.F.2.a, "Operational Tolerances," payment will be made for the load. If Department test results are not within operational tolerances, no payment will be made for the load.

**3. Placement Sampling and Testing.** Obtain two 6-in-diameter cores side by side at locations selected by the Engineer. Provide the Engineer an opportunity to witness the coring operation and measure the core thickness. Mark the cores for identification. Immediately after obtaining the cores, dry the core holes and tack the sides and bottom. Fill the hole with the same type of mixture and properly compact the mixture. Other methods of repairing the core holes are allowed when approved.

Trim the cores, if necessary, and deliver them to the Engineer within 1 working day following placement operations unless otherwise approved.

- a. In-Place Air Voids.** The Engineer will measure in-place air voids in accordance with Tex-207-F and Tex-227-F to verify that in-place density requirements of Section 292.4.E.1, "Density Control," are met.
- b. Irregularities.** Remove and replace, at the expense of the Contractor and to the satisfaction of the Engineer, any mixture that does not bond to the existing pavement or has other surface irregularities identified by the Engineer.

**c. Production Binder Properties.** The Engineer may take cores or other production samples at random from the project to determine recovered asphalt properties. Asphalt binders with an aging ratio greater than 3.5 do not meet requirements for recovered asphalt properties and may be deemed defective when tested and evaluated by the Construction Division. The aging ratio, as determined in accordance with AASHTO T 315, is the DSR value of the extracted binder divided by the DSR value of the original unaged binder. The binder from RAP will be included proportionally as part of the original unaged binder. The Engineer may require the defective material be removed and replaced at the Contractor's expense. The asphalt binder will be recovered for testing from cores in accordance with Tex-211-F.

**G. Surface Finish.** Use Surface Test Type A in accordance with Item 585, "Ride Quality for Pavement Surfaces," unless otherwise shown on the plans.

**H. Opening to Traffic.** Open the completed course to traffic when permitted or directed. If the surface ravels, flushes, ruts, or deteriorates in any manner before final acceptance, correct it at the Contractor's expense and to the satisfaction of the Engineer.

**292.5. Measurement.** This Item will be measured by the ton of composite hot mix. The composite hot mix is defined as the asphalt, aggregate, RAP, and additives noted on the plans and approved by the Engineer. Measurement will be made using scales meeting the requirements of Item 520, "Weighing and Measuring Equipment."

**292.6. Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Asphalt Stabilized Base" of the grade and binder type specified. This price is full compensation for furnishing and disposing of materials, producing trial batches, loading, hauling, placing, compacting, sampling, testing, replacing defective material, furnishing scales and labor for weighing and measuring, and equipment, labor, tools, and incidentals. State-owned RAP from sources designated on the plans shown to be available will be provided to the Contractor at no cost.