

Item 292

Asphalt Treatment (Plant-Mixed)



1. DESCRIPTION

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

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.

- 2.1. **Aggregate.** 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. Stockpile aggregates for each source and type separately. Do not add material to an approved stockpile unless approved by the Engineer. The Engineer may allow testing of the proposed combined aggregates, rather than each source, to meet Table 1 requirements.

Table 1
Aggregate Quality Requirements

Property	Test Method	Specification Requirement
Wet ball mill, % Max	Tex-116-E	50
Max increase, % passing #40		20
Los Angeles abrasion, ¹ % 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, ² % 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 reclaimed asphalt pavement (RAP) stockpiles and recycled aggregates when more than 30% RAP is allowed.

- 2.2. **Recycled Materials.** Use of RAP and RAS is permitted unless otherwise shown on the plans. Do not exceed the maximum allowable percentages of RAP and RAS shown in Table 2. Determine asphalt content and gradation of the RAP and RAS stockpiles for mixture design purposes in accordance with [Tex-236-F](#). The Engineer may verify the asphalt content of the stockpiles at any time during production. Perform other tests on RAP and RAS when shown on the plans. Asphalt binder from RAP and RAS is designated as recycled asphalt binder. When RAP or RAS is used, calculate and ensure that the ratio of the recycled asphalt binder to total binder does not exceed the percentages shown in Table 2 during mixture design and production. During production, use a separate cold feed bin for each stockpile of RAP and RAS.

- 2.2.1. **RAP.** RAP is salvaged, milled, pulverized, broken, or crushed asphalt pavement. Crush or break RAP so that 100% of the particles pass the 2 in. sieve.

Use of Contractor-owned RAP including HMA plant waste is permitted unless otherwise shown on the plans. Department-owned RAP stockpiles are available for the Contractor's use when the stockpile locations are shown on the plans. If Department-owned RAP is available for the Contractor's use, the Contractor may use Contractor-owned fractionated RAP and replace it with an equal quantity of Department-owned RAP. Department-owned RAP generated through required work on the Contract is available for the Contractor's use when shown on the plans. Perform any necessary tests to ensure Contractor- or Department-owned RAP is appropriate for use. The Department will not perform any tests or assume any liability for the quality of the Department-owned RAP unless otherwise shown on the plans. The Contractor will retain ownership of RAP generated on the project when shown on the plans.

Fractionated RAP is defined as having 2 or more RAP stockpiles, divided into coarse and fine fractions. The coarse RAP stockpile will contain only material retained by processing over a 3/8 in. screen or 1/2 in. screen unless otherwise approved. The fine RAP stockpile will contain only material passing the 3/8 in. screen or 1/2 in. screen unless otherwise approved. The Engineer may allow the Contractor to use an alternate to the 3/8 in. screen or 1/2 in. screen to fractionate the RAP. The maximum percentages of fractionated RAP may be comprised of coarse or fine fractionated RAP or the combination of both coarse and fine fractionated RAP.

Do not use Department- or Contractor-owned RAP contaminated with dirt or other objectionable materials. Do not use Department- or Contractor-owned RAP if the decantation value exceeds 5% and the plasticity index is greater than 8. Test the stockpiled RAP for decantation in accordance with [Tex-406-A](#), Part I. Determine the plasticity index in accordance with [Tex-106-E](#) if the decantation value exceeds 5%. The decantation and plasticity index requirements do not apply to RAP samples with asphalt removed by extraction or ignition.

Do not intermingle Contractor-owned RAP stockpiles with Department-owned RAP stockpiles. Remove unused Contractor-owned RAP material from the project site upon completion of the project. Return unused Department-owned RAP to the designated stockpile location.

2.2.2.

RAS. Use of post-manufactured RAS or post-consumer RAS (tear-offs) is permitted unless otherwise shown on the plans. RAS is defined as processed asphalt shingle material from manufacturing of asphalt roofing shingles or from re-roofing residential structures. Post-manufactured RAS is processed manufacturer's shingle scrap by-product. Post-consumer RAS is processed shingle scrap removed from residential structures. Comply with all regulatory requirements stipulated for RAS by the TCEQ. RAS may be used separately or in conjunction with RAP.

Process the RAS by ambient grinding or granulating such that 100% of the particles pass the 3/8 in. sieve when tested in accordance with [Tex-200-F](#), Part I. Perform a sieve analysis on processed RAS material before extraction (or ignition) of the asphalt.

Add sand meeting the requirements of Table 3 and having a maximum linear shrinkage of 3.0% when tested in accordance with [Tex-107-E](#), or fine RAP, to RAS stockpiles if needed to keep the processed material workable. For any stockpile that contains RAS, the entire stockpile will be considered a RAS stockpile and be limited to no more than 3.0% of the mixture in accordance with Table 2.

Certify compliance of the RAS with [DMS-11000](#), "Evaluating and Using Nonhazardous Recyclable Materials (NRM) Guidelines." If the RAS has not come into contact with any hazardous materials, treat it as an established NRM. Use RAS from shingle sources on the Department's MPL. Before use, remove substantially all materials that are not part of the shingle, such as wood, paper, metal, plastic, and felt paper. Determine the deleterious content of RAS material for mixture design purposes in accordance with [Tex-217-F](#), Part III. Do not use RAS if deleterious materials are more than 0.5% of the stockpiled RAS unless otherwise approved. Submit a sample for approval to the Engineer before submitting the mixture design. The Department will perform the testing for deleterious material of RAS to determine specification compliance.

Table 2
Maximum Allowable Amounts of Recycled Binder, RAP, and RAS

Mixture Description & Location	Maximum Ratio of Recycled Binder to Total Binder ¹ (%)	Maximum Allowable Recycled Material (%)		
		Unfractionated RAP ²	Fractionated RAP ³	RAS ⁴
Non-Surface	40.0	20.0	30.0	3.0

3. Combined recycled binder from fractionated RAP and RAS.
4. Do not use in combination with RAS or Fractionated RAP.
5. May replace up to 3.0% fractionated RAP with RAS.
6. May be used separately or as a replacement for no more than 3.0% of the allowable fractionated RAP.

Table 3
Gradation Requirements for Fine Aggregate

Sieve Size	% Passing by Weight or Volume
3/8"	100
#8	70–100
#200	0–30

- 2.3. **Asphalt Material.** Furnish PG64-22 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 PG64-22 requirements.

- 2.4. **Tack Coat.** Unless otherwise shown on the plans or as 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 one sample of the tack coat binder per project and test to verify compliance with Item 300, "Asphalts, Oils, and Emulsions." The Engineer will obtain the sample from the asphalt distributor immediately before use.

- 2.5. **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.

3. EQUIPMENT

Provide machinery, tools, and equipment in accordance with Item 320, "Equipment for Asphalt Concrete Pavement."

4. CONSTRUCTION

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

- 4.1. **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 4 for the grade shown on the plans. The gradation of the combined aggregates will be determined in accordance with

[Tex-200-F](#), Part I. Reimburse the Department for subsequent mixture designs or partial designs necessitated by changes in the material or requests by the Contractor. The Engineer may accept a design from the Contractor that is performed in accordance with [Tex-126-E](#) and is submitted on the Department-provided template. Obtain mixture design verification and approval before beginning production.

Table 4
Mix Requirements

Master Gradation Bands Tex-200-F , Part I, % Passing by Weight				
Sieve Size	Grade 1	Grade 2	Grade 3	Grade 4
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	
Asphalt Content, Min(Tex-236-F)				
	4.0%	4.0%	4.0%	4.0%
Strength Requirements (Tex-226-F)				
Indirect tensile strength,(dry) psi ¹	85-200	85-200	85-200	85-200

7. ¹ At optimum asphalt content.

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 equipment and materials in a large enough quantity to ensure that the mixture is representative of the mixture design. Within one full working day, the Engineer will sample and test the trial batch to ensure that the gradation, asphalt content and strength requirements in Table 4 are met. The Engineer may waive trial mixtures if similar designs have proven satisfactory.

4.2. **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.

4.2.1. **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 Asphalt Concrete Pavement." 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.

4.2.2. **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.

- 4.3. **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 Department's MPL to coat the truck bed.
- 4.4. **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.
- 4.4.1. **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.
- 4.4.2. **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.
- 4.4.3. **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 one day of production while appropriate action is taken. If no appropriate corrective action is taken or if the problem still exists after one day, suspend paving until the Engineer approves further production.

- 4.5. **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 superelevated 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.

- 4.5.1. **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 a minimum of 97.0% density 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% below minimum density, cease production immediately. If in-place density is between 0.1% and 1.0% 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.

- 4.5.2. **Ordinary Compaction.** Furnish the type, size and number of rollers required for compaction, as approved or directed. 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.

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.

4.6. **Sampling and Testing.**

4.6.1. **Production Sampling.**

4.6.1.1. **Mixture Sampling.** The Engineer will obtain mixture samples in accordance with [Tex-222-F](#).

4.6.1.2. **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.

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

4.6.2.1. **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% 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% from the design target.

4.6.2.2. **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 292.4.6.2.1., "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.

4.6.3. **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 one working day following placement operations unless otherwise approved.

4.6.3.1. **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 292.4.5.1., "Density Control," are met.

4.6.3.2. **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.

4.6.3.3. **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](#).

- 4.7. **Surface Finish.** Use Surface Test Type A in accordance with Item 585, "Ride Quality for Pavement Surfaces," unless otherwise shown on the plans.
- 4.8. **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.

5. MEASUREMENT

Asphalt-treated base will be measured by the ton as a composite mixture of asphalt, aggregate, RAP, and additives noted on the plans and approved. Measurement will be made using scales meeting the requirements of Item 520, "Weighing and Measuring Equipment."

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.