

STABLIZED BASE COURSE ITEMS

ITEM P-315 EMULSIFIED ASPHALT TREATED BASE COURSE

DESCRIPTION

315-1.1 Construct an emulsified asphalt treated base (EATB) course on a prepared foundation to the lines, grades, and depths shown on the plans.

MATERIALS

315-2.1 Use materials that conform to the following:

- a. **Aggregate.** Section P-209, D-1
- b. **Emulsified Asphalt Cement.** Meet AASHTO M 140.
- c. **Anti-Strip.** As required by the approved job mix design.
- d. **Portland Cement.** Meet AASHTO M 85, Type I, including the low-alkali cement requirement shown in Table 2 of AASHTO M 85.

315-2.2 COMPOSITION OF MIXES. At least 15 days in advance of the production of EATB material, provide a representative 300-pound sample of the base aggregate proposed for the project, and a representative 3-gallon sample of the emulsified asphalt cement.

The Engineer will determine the job mix design. Changes in aggregate gradation or aggregate sources will require a new job mix design. Submit samples in the same manner as the original submittal.

Use anti-strip agents in the proportions determined by ATM 414 and included in the approved job mix design. At least 70% of the aggregate must remain coated when tested by ATM 414.

CONSTRUCTION REQUIREMENTS

315-3.1 PULVERIZING AND MIXING. Add a base course aggregate as required prior to pulverizing. Pulverize and mix the existing material on the initial pass with the reclaimer. In separate passes, introduce the portland cement, followed by the emulsified asphalt cement.

Add portland cement at the rate of 11.7 lbs/yd² for a compacted depth of 12 inches. Add emulsified asphalt cement at the rate of 4.2 gals/yd² for a compacted depth of 12 inches.

In any segment of the project, mix the cement and introduce the emulsion all in the same day. Ensure that the total fluids (emulsion plus water) of the mixture is 7 percent maximum and 4 percent minimum as determined by nuclear methods. To achieve optimum compaction, the Engineer may direct the Contractor to adjust the moisture content of the mixture.

Cover the completed emulsified asphalt treated base with an asphalt surface treatment or asphalt pavement, within 48 hours.

315-3.2 WEATHER LIMITATIONS. Do not mix or place EATB until the aggregate temperature is above 40°F and the air temperature as measured in the shade and away from any heat source is 45°F and rising. Do not place the EATB on a wet or frozen surface, or when weather conditions will prevent proper handling, compacting, finishing, or curing of the mixture.

315-3.3 OPERATIONAL LIMITATIONS. Coordinate the various portions of the work to conform to traffic control requirements.

Place EATB only on an accepted subgrade. Ensure that the subgrade surface is substantially true to line and grade, firm and reasonably smooth, and free of loose or objectionable material, before placement of EATB.

315-3.4 EQUIPMENT.

- a. **Cement Distributor.** Use a cement distributor designed to spread a uniform coverage of Portland cement at a specified rate integrated with the speed of travel to maintain a uniform coverage.
- b. **Reclaimer.** Provide a reclaimer with the following features and capabilities:
 - (1) 600 horsepower minimum.
 - (2) Capability to pulverize to the size specified, mix and recycle material to the depth shown on the plans.
 - (3) Ability to increase the effective volume of the mixing chamber in relation to depth of cut.
 - (4) Two microprocessor controlled systems, complete with two independent pumping systems and spray bars, to regulate the application of emulsified asphalt cement, separate from water that is used to increase the moisture content of the mixed material. Both systems must perform in relation to the forward speed of the reclaimer and the mass of the material being processed.
 - (5) Two spray bars, one for emulsified asphalt cement and one for compaction moisture, each fitted with self-cleaning nozzles at a maximum spacing of one nozzle for each 6-inch width of the mixing chamber. Provide a way to monitor the flow rate at each nozzle to verify that all nozzles are producing foamed asphalt at the same rate.
 - (6) System with operator cabin to verify the emulsified asphalt cement is being evenly distributed across the full width of the spray bar at the rate specified. Demonstrate to the engineer capability to spray evenly.
 - (7) Single asphalt cement feed pipe installed between the recycler and the supply tanker. Do not use circulating systems that incorporate a return pipe to the supply tanker.
 - (8) Ability to print out emulsified cement quantities used during production.
- c. **Roller.** Provide the following rollers:
 - (1) Self-propelled vibratory pad foot roller having a minimum dynamic force of 60,000 pounds.
 - (2) Pneumatic tired roller.
 - (3) Vibratory steel drum roller.
- d. **Motor Grader.** Provide a grader equipped with an automatic grade and cross slope control system. AGTEK Blade Control system or approved equal.

315-3.5 SHAPING AND GRADING. Develop finish grade by shaping the material to produce the planned cross slopes (crowns or superelevations) by means of the automatic cross slope control system. Base longitudinal grade control on either string line or the existing roadway surface, depending on the performance of the grading operation, as determined by the Engineer. If required, install and maintain the string line.

315-3.6 COMPACTION. The Engineer will use ATM 412 to determine the density standard. Make each control strip at least 12 feet by 300 feet. Compact the remainder of the project to not less than 98% of the density standard, in accordance with ATM 411. The Engineer will designate the location of test strips.

Immediately upon completion of the mixing operations, use the vibratory pad foot roller to achieve initial compaction by compacting the EATB to within 3 inches of the final surface. Achieve finish compaction with the pneumatic tired roller and the vibratory steel drum roller.

315-3.7 SURFACE TEST. After rolling has been completed, the surface will be tested for smoothness and accuracy of grade, crown, superelevation, and width.

Limit surface deviations to 3/8 inch, as measured from the testing edge of a 12-foot straightedge between two contacts with the surface parallel with, and at right angles to, the centerline.

315-3.8 THICKNESS REQUIREMENTS. Limit deviations in thickness to 1/2 inch.

METHOD OF MEASUREMENT

315-4.1 This work will be measured according to GCP Section 90 and the following:

- a. **Emulsified Asphalt Treated Base.** No deduction will be made for the weight of emulsified asphalt cement or for water added to provide optimum moisture content in the mix.
- b. **Emulsified Asphalt Cement.** By supplier's invoice quantity minus waste, diversion and remnant.

BASIS OF PAYMENT

315-5.1 When Pay Item P315.020.0000 does not appear in the bid schedule, emulsified asphalt cement is subsidiary.

Payment will be made under:

Item P315.010.0000	Emulsified Asphalt Treated Base – per ton
Item P315.020.0000	Emulsified Asphalt Cement, Type HFMS-2S – per ton
Item P315.030.0002	Emulsified Asphalt Treated Base, 2-inch depth - per square yard
Item P315.040.0000	Portland Cement - per ton

TESTING REQUIREMENTS

ATM 412	Relative Standard Density of Treated Mixes by the Control Strip Method
ATM 411	FOP for AASHTO T 355 In-Place Density of Asphalt Mixtures By Nuclear Method
ATM 414	Anti-Strip Requirements of Hot Mix Asphalt

MATERIAL REQUIREMENTS

AASHTO M 85	Portland Cement
AASHTO M 140	Emulsified Asphalt

ITEM P-318 FOAMED ASPHALT STABILIZED BASE COURSE

DESCRIPTION

318-1.1 Construct a foamed asphalt stabilized base course by uniformly mixing together asphalt binder, water, Portland cement, recycled aggregate and imported aggregate. Spread, shape, and compact the mixed material in conformity to the dimensions and typical cross section shown on the Plans. Build runway, taxiway, or aprons in a series of parallel lanes using a plan of processing that reduces longitudinal and transverse joints to a minimum.

MATERIALS

318-2.1 ASPHALT BINDER. Conform to Table 318-1 Asphalt Binder when testing in accordance with AASHTO M 320. Binders shall be free of polymer modifiers and antistripping additives.

TABLE 318-1: ASPHALT BINDER

Property	Test Methods	Performance Grade Requirements
Performance Grading (Temp. range, Deg. C.)	AASHTO M 320	PG 52-28

The Contractor shall furnish vendor's certificate of compliance and certified test reports for each lot of asphalt binder shipped to the project. The vendor's certified test report for the asphalt binder can be used for acceptance or tested independently by the Engineer.

The following documents shall be furnished at delivery:

- a. Manufacturer's certificate of compliance
- b. Certified test reports for the lot.
- c. Lot number, storage tanks, and shipping containers (if applicable) used.
- d. Date and time of load out for delivery.
- e. Type, grade, temperature, and quality of asphalt binder loaded.

All excess asphalt binder shall remain the property of the Contractor. Removal of excess asphalt binder from the project area shall be incidental to the contract and no separate payment will be made.

318-2.2 PORTLAND CEMENT. Conform to the requirements of ASTM C150, Type I or II and include the low-alkali cement requirement shown in Table 2 of ASTM C150.

318-2.3 WATER. Use water that is clean and free from sewage, oil, acid, strong alkalies, or vegetable matter. Test water of questionable quality in accordance with the requirements of AASHTO T 26.

318-2.4 AGGREGATE. Aggregates recycled from existing materials shall consist of crushed stone or crushed gravel with or without sand or other inert finely divided mineral aggregate, as approved by the Engineer.

For Recycled Asphalt Pavement (RAP) aggregate, conform to Item P-161, Table 161-1 for RAP gradation.

For imported aggregate, conform to:

- a. **Item P-209.** See Table P-209-1 for D-1 gradation.
- b. **Item P-299.** See Table P-299-1 for E-1 gradation.

COMPOSITION

318-3.1 COMPOSITION OF MIXTURE. The foamed asphalt stabilized base course shall be composed of a mixture of asphalt binder, Portland cement, water, and aggregates. The resulting mixture shall meet the requirements of the Job Mix Design (JMD).

- a. **Sampling.** The Department will conduct laboratory tests of the material samples in accordance with ATM 301 for coarse and fine aggregate, and AASHTO T 127 for mineral filler. If testing fails, the Contractor must provide a full set of samples to retest. At least 15 days prior to the production of foamed asphalt stabilized base course, the Contractor shall furnish the proposed materials and documentation to SOA DOT&PF CR Materials, 5750 East Tudor Road, Anchorage, AK 99507, (907) 269-6200:
 - (1) 500-pound representative sample of existing subgrade material
 - (2) 500-pound representative sample of imported aggregates (D-1 or E-1)
 - (3) 200-pound representative sample of RAP
 - (4) 10 gallons of asphalt binder
 - (5) One 94-pound sack of Portland cement with appropriate certifications
 - (6) A statement describing anticipated field proportioning of submitted materials
- b. **Job Mix Design (JMD).** The Department will determine the JMD and provide the following:
 - (1) The percent of foamed asphalt binder to be added to the aggregate
 - (2) The optimum percent water to be added to the asphalt binder during the foaming process
 - (3) The minimum Foamed Asphalt Expansion Characteristics required
 - (4) The temperature of asphalt binder at the time of injection
 - (5) The percent by weight of Portland cement added to the aggregate
 - (6) The gradation of the in-place aggregate
 - (7) The optimum moisture content for proper compaction and dispersion of foamed asphalt binder
 - (8) Design dry indirect splitting tensile strength
 - (9) The JMD unit weight

When a change in source materials occurs, the Contractor must furnish samples according to subsection 318-3.1a. A new JMD will be determined before the new source materials can be used.

CONSTRUCTION REQUIREMENTS

318-4.1 FOAMED ASPHALT TECHNICIAN. The Contractor will provide a qualified Foamed Asphalt Technician on site during any foaming operations and as directed by the Engineer. Minimum qualifications include:

- a. **Qualified Person.** A person knowledgeable in the principles and practice of foamed asphalt stabilized base course paving, with required experience stated in subsection 318-4.1b, c, & d.
- b. **Work Experience.** 5 years experience with foamed asphalt stabilized base course
- c. **Supervisory Experience.** 5 successfully supervised foamed asphalt stabilized base course projects
- d. **JMD Experience.** Developed a foamed asphalt stabilized base course mix design, a processing plan, and a Quality Control (QC) plan

The Contractor may use a consultant or a manufacturer's representative to satisfy these requirements. At the Preconstruction Conference per GCP 80, provide a Foamed Asphalt Technician submittal that includes:

- e. **Technical Resume.** Include experience as specified in subsections 318-4.1 a-c.
- f. **List of Successful Projects:**
 - (1) Clients name and contact information (address and telephone number)
 - (2) Projects location
 - (3) Description of foamed asphalt binder equipment used on the projects
 - (4) Appropriate Certifications

318-4.2 PRE-FOAMING MEETING. Conduct a meeting at the job site with the Engineer and the Foamed Asphalt Technician a minimum of 5 days before initiating foaming operations, where following documents will be provided by the Contractor:

- a. **List and Configuration of Equipment**
- b. **Sequence of Operations**
- c. **Approved QC Plan**
- d. **Safety Plan**
- e. **Traffic Control Plan**
- f. **Public Notification Plan**

Safety Plan must include procedures to be implemented prior to and during foaming operations.

318-4.3 QUALITY CONTROL (QC) PLAN. The Contractor shall provide their QC plan to the Department for approval no less than 15 calendar days prior to the start of foaming operations. The QC plan must ensure operational activities shall provide finished material of acceptable quality.

The Contractor is required to furnish a project specific QC plan that includes, at a minimum, the following:

- a. **Description of the Contractor's QC Organization.** The number of full-time equivalent employees, an organizational line of authority, and reporting responsibilities.
- b. **QC Sampling, Testing, and Analysis Plan.** Methods that include a description of how random locations for sampling and testing are determined. Provide the sampling and testing frequency.
- c. **Protection from Excessive Moisture.** Procedures to protect foamed asphalt stabilized base course material from receiving excessive moisture from weather events and corrective actions when criteria are not met.
- d. **Contingency Plan.** Addressing but not limited to:

- (1) Inclement weather
- (2) Equipment breakdowns
- (3) Material that does not break or cure
- (4) Production modifications due to changes in ambient and/or material temperature
- (5) Material moisture changes
- (6) In-situ material changes
- (7) Material shortages

The Contractor shall provide the following:

- e. **Production Records.** Daily production records for each subplot, including the quantity of asphalt binder, Portland cement, and in-place compaction moisture content. Any other daily and average quantities displayed or transmitted by the recycler on which the above quantities are based.
- f. **Foaming Characteristics.** Measure and report expansion ratio and half-life of foamed asphalt binder for every 4 hours of production.
- g. **In-Place Field Density.** Monitor and report in-place field density of the foamed asphalt stabilized base course for each subplot.

318-4.4 CONTROL STRIP. A control strip shall be constructed prior to full production of each new mix design. At the Pre-Foaming Meeting, provide information on the location of the control strip demonstration site. Before full production, the Contractor shall use the equipment specified for the foamed asphalt stabilized base course operation and construct a control strip section at a location approved by the Engineer. Process material in the control strip, two passes wide and a minimum of 300 feet long, and to the depth shown on the Plans. The Foamed Asphalt Technician shall supervise this process. The control strip shall produce results specified in subsection 318-4.8. Additional control strips shall be required if there are changes in the material.

318-4.5 WEATHER LIMITATIONS. Do not mix foamed asphalt stabilized base course while the ambient air or surface temperature is below 40°F, when conditions indicate that the temperature may fall below 40°F within 24 hours, when the aggregate is above the optimum compaction moisture content, or when the aggregate or subgrade is frozen. Follow the recommendations made by the technician as approved by the Engineer regarding the acceptability of the weather conditions for the foaming operation.

318-4.6 EQUIPMENT. At the Preconstruction Conference, the Contractor must provide a submittal that verifies the equipment specifications meet the requirements of this section. The Engineer must approve the proposed equipment for use before construction of the foamed asphalt stabilized base course control strip.

- a. **Cold In-Place Recycler.** Use a recycler that has the following features and capabilities:
 - (1) A minimum power capability of 600 horsepower.
 - (2) The capability to pulverize to the size specified, excavate, mix and recycle material to the depth shown on the Plans.
 - (3) Ability to increase the effective volume of the mixing chamber in relation to depth of cut.
 - (4) Two microprocessor controlled systems, complete with independent pumping systems and spray bars, to regulate the application of foamed asphalt binder, separate from water that is

used to increase the moisture content of the mixed material. Both systems perform in relation to the forward speed of the recycler and the mass of the material being processed.

- (5) Two spray bars, one for foamed asphalt binder and one for compaction moisture, each fitted with self-cleaning nozzles at a maximum spacing of one nozzle for each 6-inch width of the mixing chamber. Monitor the flow rate at each nozzle to verify that all nozzles are producing foamed asphalt binder at the same rate.
 - (6) The foamed asphalt binder is produced at the spray bar in individual expansion chambers into which both hot asphalt binder and water are injected under pressure through individual and small orifices that promote atomization. The rate of addition of water into the hot asphalt binder is kept at a constant percentage by mass of asphalt binder by the same microprocessor.
 - (7) An inspection or test nozzle fitted at one end of the spray bar that produces a representative sample of foamed asphalt binder.
 - (8) An electrical heating system capable of maintaining the temperature of asphalt binder flow components above 300°F.
 - (9) A single asphalt binder feed pipe installed between the recycler and the supply tanker. Do not use circulating systems that incorporate a return pipe to the supply tanker.
 - (10) A system within the operator cabin to verify the foamed asphalt binder is being evenly distributed across the full width of the spray bar. Demonstrate the system to the Engineer to verify even spraying.
 - (11) The ability to display and/or transmit asphalt binder quantities used during production, at any point during the work shift and for the entire day's production.
 - (12) The teeth on the mandrel mixing head form a Chevron pattern.
 - (13) Emulsion injection system spray bar equipped with individual valves that can be turned off to minimize emulsion overlap on subsequent passes.
 - (14) Minimum of 4 different drum speeds for control of machine.
- b. Cold Recycling Mixing Plant.** Use a cold recycling mixing plant that has the following features and capabilities:
- (1) Plant specifically designed to produce cold mixes that operates independently of external power sources and can be transported to the job site.
 - (2) Minimum mixing capacity of 200 tons per hour.
 - (3) Capable of combining all stabilizing agents and aggregates up to 2-inch diameter.
 - (4) Two microprocessor controlled systems, complete with independent pumping systems and spray bars, to regulate the application of foamed asphalt binder, separate from water that is used to increase the moisture content of the mixed material. Both systems perform in relation to the mass of the material being processed.
 - (5) Two spray bars, one for foamed asphalt binder and one for compaction moisture, each fitted with self-cleaning nozzles at a maximum spacing of one nozzle for each 6-inch width of the mixing chamber. Monitor the flow rate at each nozzle to verify that all nozzles are producing foamed asphalt binder at the same rate.

- (6) The foamed asphalt binder is produced at the spray bar in individual expansion chambers into which both hot asphalt binder and water are injected under pressure through individual and small orifices that promote atomization. The rate of addition to water into the hot asphalt binder is kept at a constant percentage by mass of asphalt binder by the same microprocessor.
 - (7) An inspection or test nozzle fitted at one end of the spray bar produces a representative sample of foamed asphalt binder.
 - (8) An electrical heating system capable of maintaining the temperature of asphalt binder flow components above 300°F.
 - (9) A single asphalt binder feed pipe installed between the recycler and the supply tanker. A circulating system that has a return pipe to the supply tank may be used.
 - (10) A system accessible by the operator to verify the foamed asphalt binder is being evenly distributed across the full width of the spray bar. Demonstrate the system to the Engineer to verify even spraying.
 - (11) The ability to display and/or transmit asphalt binder quantities used during production, at any point during the work shift and for the entire day's production.
- c. **Portland Cement Distributor.** Use a distributor that is designed to spread a uniform coverage of Portland cement at a specified rate.
 - d. **Roller.** Provide the following rollers:
 - (1) Self-propelled vibratory pad foot roller having a minimum dynamic force of 60,000 pounds;
 - (2) Pneumatic tired roller having a minimum operating weight of 50,000 pounds;
 - (3) Vibratory steel drum roller.
 - e. **Grader.** Provide a grader with calibrated automatic cross slope blade controls.

318-4.7 PREPARATION. The area to be stabilized with foamed asphalt binder may require pulverization, removal or addition of material, grading, scarifying, shaping, and compacting, as directed by the Engineer, to conform to the grades and typical section shown on the Plans.

The subgrade shall be firm and able to support, without yielding or subsequent settlement, the construction equipment and the compaction of the foamed asphalt material. Soft or yielding subgrade shall be corrected and made stable before construction proceeds.

318-4.8 PULVERIZATION AND MIXING. Pulverize the existing asphalt pavement and underlying materials to the depth as shown on the Plans so that 100% passes a 2-inch sieve, as determined by ATM 304. Multiple passes may be required to size the insitu material and to adjust moisture content before applying Portland cement and injecting foamed asphalt.

318-4.9 FOAMED ASPHALT BINDER AND PORTLAND CEMENT APPLICATION, MIXING, AND SPREADING. Accomplish the mixing of the foamed asphalt binder, Portland cement, water, and aggregates by the cold recycling methods. Ensure that the percentage of moisture in the aggregate, at the time of Portland cement application, does not exceed the quantity that will permit a uniform mixture during mixing operations, and that it does not exceed the specified optimum moisture content for the foamed asphalt stabilized base course mixture.

- a. **Cold In-Place Recycling.** Before cement is applied, scarification or pulverization may be required for grade control, as directed by the Engineer. Pulverize to the depth required while simultaneously injecting foamed asphalt binder and compaction water. Mixing shall continue until

the foamed asphalt binder, Portland cement and compaction water have been sufficiently blended with the aggregates.

- b. **Cold Recycling Mixing.** The foamed asphalt stabilized base course shall be placed in one lift. Material may be placed using either a paver or grader. Assure that there is sufficient material placed to meet the desired finish grade after compaction.

318-4.10 COMPACTION. Thoroughly compact the mixture. Accomplish the initial compaction with the vibratory pad foot roller. Accomplish intermediate compaction with the vibratory steel drum roller. Accomplish finish compaction with the pneumatic tire roller.

Field density of the compacted mixture shall be evaluated in accordance with subsection 318-5.5. The in-place field density will be determined by direct transmission in accordance with ATM 213, Method A. The moisture content of the mixture at the start of compaction shall not exceed the optimum moisture content as determined by the foamed asphalt stabilized base course mix design.

318-4.11 FINISHING. The completed foamed asphalt stabilized base course shall conform to the required lines, grades, and cross section as shown on the Plans. If necessary, scarify the surface to eliminate any deep imprints and re-compact the surface to the required density. Seal the surface with water and a pneumatic roller. Apply tack coat within 24 hours after completing finishing operations as specified in subsection P-603-3.3, using application rates in Table P-603-1.

318-4.12 CONSTRUCTION LIMITATIONS. The operation of cement, bituminous application, mixing, spreading, compacting and finishing shall be continuous and completed within four hours from start of mixing. When any of the operations after the application of Portland cement are interrupted for more than 30 minutes or when the uncompacted mixture is wetted by rain so that the optimum moisture content is exceeded by 2%, the decision to reconstruct the portion affected shall be determined by the Engineer. In the event the uncompacted, rain-wetted mixture exceeds the specified moisture content tolerance, the Contractor shall reconstruct at the Contractor's expense the portion affected. Material along the longitudinal or transverse construction joints not properly compacted shall be reconstructed, at the Contractor's expense, with properly moistened and mixed foamed asphalt stabilized base course compacted to specified density.

318-4.13 SURFACE TESTS. The finished surface shall not vary more than 3/8-inch when tested with a 10-foot straightedge applied parallel with, or at right angles to, the longitudinal axis of the foamed surface. Correct any variations in excess of this tolerance at the Contractor's expense, and in a manner satisfactory to the Engineer.

318-4.14 THICKNESS. The Engineer will continually monitor thickness. Provide an average thickness of the base constructed during one day that is within 1/2-inch of the thickness shown on the plans, except that the thickness of any one point may be within 3/4-inch of that shown on the plans. Where the average thickness shown by the measurements made in one day's construction is not within the tolerance given, the Engineer may direct reconstruction at the Contractor's expense.

318-4.15 MAINTENANCE AND REPAIR. At the Contractor's expense, maintain the entire foamed asphalt stabilized base course surface within the limits of the Contract in a condition satisfactory to the Engineer from the time work starts until the work is completed. Maintenance includes immediate repairs of any defects that may occur either before or after the foamed asphalt stabilized base course has been constructed. Repeat maintenance as often as necessary to keep the area within specified limits at all times. Make repairs in a manner that will insure restoration of a uniform surface without compromising the durability of the part repaired. Reconstruct faulty work to the full depth as shown on the Plans. Reconstruct low areas by removing and replacing the material for the full depth of treatment rather than by adding a thin layer of foamed asphalt stabilized base course to the completed work. Traffic, with the exception of aircraft over 100,000 pounds, will be allowed to travel over the foamed asphalt stabilized base course layer for a maximum of 7 days prior to pavement operations, or as directed by the Engineer.

METHOD OF MEASUREMENT

318-5.1 FOAMED ASPHALT STABILIZED BASE COURSE. Foamed asphalt stabilized base course will be measured by the number of square yards of completed and accepted foamed asphalt stabilized base course, and in accordance with GCP subsection 90.

318-5.2 ASPHALT BINDER. Asphalt binder will be measured by the number of tons of asphalt binder used in the accepted foamed asphalt stabilized base course determined by one of the following methods:

- a. **Weighing.** The quantity of asphalt binder used will be determined by weighing containers on certified scales prior to and after use. All excess asphalt binder remains the Contractor's property and will not be measured for payment. The Contractor will provide supplier's invoices to the Engineer. As an alternative, Volume Method may be used as approved by the Engineer.
- b. **Supplier's Invoices.** The quantity of asphalt binder used will be determined by supplier's invoices minus waste, diversion and excess of left over. This method may be used on projects where deliveries are made in sealed tankers and the plan is producing material for one project only. Method b will be used to compute left over. Waste and diversion will be computed in a manner to be determined by the Engineer.
- c. **Volume Measure.** Volume measure (tank stickings) of actual daily uses. It is the Contractor's responsibility to notify the Engineer whenever material is to be added to the calibrated volume measure or whenever material from the volume measure is to be used for work other than that specified in this contract.

Whichever above method is selected, it must be used for the duration of the project. Another method may be used and computed as a check, but only one method will be used for payment computation.

318-5.3 PORTLAND CEMENT. Portland cement will be measured by the ton from supplier's invoices minus waste, diversion, and left over.

318-5.4 FOAMED ASPHALT TECHNICIAN. The Foamed Asphalt Technician is subsidiary to Foamed Asphalt Stabilized Base Course and will not be measured for payment.

318-5.5 EVALUATION OF MATERIAL FOR ACCEPTANCE. The quantity of foamed asphalt stabilized base course produced will be divided into lots and the lots will be evaluated individually.

A lot will be 20,000 square yards. The lot will be divided into sublots of 5,000 square yards each. The Department shall randomly sample and test for density each subplot. Sublots shall be tested for density by taking a nuclear density readings, in accordance with ATM 213, Method A, from three random test sites selected by the Engineer within each subplot. Test sites shall not be located within 12 inches of the outside edge of the foamed asphalt stabilized base course panel.

The average of the subplot density measurements will be compared to the maximum density from the approved mix design to determine the acceptability of the lot. Once the average density of the lot has been determined, the Contractor will not be permitted to provide additional compaction to raise the average. The Department shall notify the Contractor of density results as soon as possible. If two consecutive sublots produce density results less than 98.0% of the target density, the Contractor shall institute corrective action as described in the QC Plan or as recommended by the Foamed Asphalt Technician. Payment will be made according to Table 318-2.

TABLE 318-2: PAYMENT SCHEDULE FOR LOT DENSITIES.

Percent of Maximum Density from Approved Mix Design	Percent of Payment
98.0 or greater	100
97.0 to less than 98.0	90
96.0 to less than 97.0	75
Less than 96.0	See below

If the lot density falls below 96.0%, the lot will be rejected and shall be removed, replaced, or reworked as directed by Engineer at the Contractor's expense.

When test results have failed to meet specifications, retest of acceptance tests for density may be requested provided the quality control requirements of Subsection 318-4.3 are met. Only one subplot retest per lot will be permitted. Deliver this request in writing to the Engineer, within 48 hours of receipt of the final test of the lot. The Engineer will mark the locations for the density retest within a 5-foot radius of the original density locations. The original average density result will be discarded and the retest result will be used in the payment schedule regardless of whether the result gives a higher or lower percent of payment.

BASIS OF PAYMENT

318-6.1 FOAMED ASPHALT STABILIZED BASE COURSE. At the contract unit price per square yard as full compensation for furnishing all materials, except asphalt binder or Portland cement, tack coat and for all preparation, delivering, placing, and mixing of these materials; and for all labor, equipment, tools and incidentals necessary to complete the item. Density adjustment for each lot per Table 318-2 under subsection 318-5.5.

318-6.2 ASPHALT BINDER. At the contract unit price per ton as full compensation for furnishing asphalt binder and for all delivery, placing, and incorporation of this material, and for all labor, equipment, tools, and incidentals necessary to complete the item. Removal of excess asphalt binder from the project area is subsidiary to the contract and no separate payment will be made.

318-6.3 PORTLAND CEMENT. At the contract unit price per ton as full compensation for furnishing Portland cement and for all delivery, placing, and incorporation of this material, and for all labor, equipment, tools, and incidentals necessary to complete the item.

318-6.4 FOAMED ASPHALT TECHNICIAN. Payment is subsidiary to Foamed Asphalt Stabilized Base Course.

Payment will be made under:

Item P318.020.0000	Foamed Asphalt Stabilized Base Course – per square yard
Item P318.040.0000	Asphalt Binder – per ton
Item P318.050.0000	Portland Cement – per ton

TEST REQUIREMENTS

ATM 213	In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods
ATM 304	Sieve Analysis of Fine and Coarse Aggregates and Materials finer than 75- μ m (No. 200) Sieve in Mineral Aggregate by Washing
AASHTO T 26	Quality of Water to be Used in Concrete

MATERIAL REQUIREMENTS

ASTM C150	Standard Specification for Portland Cement
AASHTO M 320	Performance-Graded Asphalt Binder