334 SUPERPAVE ASPHALT CONCRETE.
(REV 2-5-02) (FA 2-21-02) (1-03)

SECTION 334 (Pages 283-304) is deleted and the following substituted:

SECTION 334
SUPERPAVE ASPHALT CONCRETE

334-1 Description.

334-1.1 General: Construct a Superpave Asphalt Concrete course, (using the QC 2000 acceptance system as defined in these Specifications), for the type of mixture specified in the Contract, or when offered as alternates, as selected. Superpave mixes are identified as Type SP-9.5, Type SP-12.5 or Type SP-19.0.

Meet the requirements of Section 320 for plant and equipment. Meet the general construction requirements of Section 330, including the provisions for Quality Control Plans and Quality Control Systems as specified in6-8.

The Engineer will accept the work on a LOT-to-LOT basis in accordance with the applicable requirements of this Specification. The size of the LOT will be as specified in 334-4.2 for the asphalt mixture produced at the plant and as specified in 334-5.1 for the material placed on the roadway.

334-1.2 Traffic Levels: The requirements for Type SP Asphalt Concrete mixtures are based on the design traffic level of the project, expressed in 18,000 pound [80-kN] Equivalent Single Axle Loads (ESAL's). The five traffic levels are as shown in Table 334-1.

Table 334-1
Superpave Traffic Levels

Traffic Level	Traffic Level ($1x10^6$ ESAL's)
A	<0.3
B	0.3 to <3
C	3 to <10
D	10 to <30
E	≥30

The traffic level(s) for the project are as specified in the Contract. A Type SP mix one traffic level higher than the traffic level specified in the Contract may be substituted, at no cost to the Department (i.e. Traffic Level B may be substituted for Traffic Level A, etc.). Where Type S Asphalt Concrete is specified in the Contract, if approved by the Engineer, the equivalent fine Type SP Asphalt Concrete mixture (Traffic Level C) may be selected as an alternate at no additional cost to the Department. The equivalent mixes are as follows:

Type S-I ..... Type SP-12.5
Type S-II ..... Type SP-19.0
Type S-III ..... Type SP-9.5

The equivalent AASHTO nominal maximum aggregate sizes are as follows:

Type SP-9.5 ..... 9.5 mm
Type SP-12.5 ..... 12.5 mm
Type SP-19.0 ..... 19.0 mm

334-1.3 Layer Thicknesses: The Superpave mixes are categorized as either "coarse" or "fine", depending on the overall gradation of the mixture. Coarse mixes are defined as having a gradation that passes below the restricted zone, as defined in 334-2.3. Fine mixes are defined as having a gradation that passes above the restricted zone, as defined in 334-2.3.

334-1.3.1 Fine Mixes: The allowable structural layer thicknesses for fine Type SP Asphalt Concrete mixtures are as follows:

Type SP-9.5 .....3/4 – 1 1/4 inches [20 - 30 mm]
Type SP-12.5 .....1 1/4 – 2 1/2 inches [30 - 60 mm]
Type SP-19.0 ..... 2- 2 3/4 inches [50 - 70 mm]

In addition to the minimum and maximum thickness requirements, the following restrictions are placed on fine mixes when used as a structural course:

Type SP-9.5 - Limited to the final (top) structural layer, one layer only.

Type SP-12.5 - May not be used in the first layer of courses over 3 1/2 inches [90 mm] thick, nor in the first layer of courses over 2 3/4 inches [70 mm] thick on limited access facilities.

Type SP-19.0 - May not be used in the final (top) structural layer.

334-1.3.2 Coarse Mixes: The allowable structural layer thicknesses for coarse Type SP Asphalt Concrete mixtures are as follows:

Type SP-9.5 ..... 1 1/2 - 2 inches [40 - 50 mm]
Type SP-12.5 .....2 - 3 inches [50 - 80 mm]
Type SP-19.0 .....3 – 3 1/2 inches [80 - 90 mm]

In addition to the minimum and maximum thickness requirements, the following restrictions are placed on coarse mixes when used as a structural course:

Type SP-19.0 - May not be used in the final (top) structural layer.

334-1.3.3 Additional Requirements: The following requirements also apply to coarse and fine Type SP Asphalt Concrete mixtures:

1. A minimum 1 1/2 inch [40 mm] initial lift is required over an Asphalt Rubber Membrane Interlayer (ARMI).
2. When construction includes the paving of adjacent shoulders (≤5 feet [≤1.5 m] wide), the layer thickness for the upper pavement layer and shoulder must be the same and paved in a single pass, unless shown differently in the plans.
3. All overbuild layers must be fine graded Type SP Asphalt Concrete designed at the traffic level as stated in the Contract. Use the minimum and maximum layer thicknesses as specified in 334-1.3.1 unless shown differently in the plans. On variable thickness overbuild layers, the minimum allowable thickness may be reduced by 1/2 inch [13 mm], and the maximum allowable thickness may be increased 1/2 inch [13 mm], unless shown differently in the plans.

334-2 Materials.

334-2.1 General Requirements: Meet the material requirements specified in Division III. Specific references are as follows:

Superpave PG Asphalt Binder or Recycling Agent..... 916-1, 916-2
Coarse Aggregate, Stone, Slag or Crushed Gravel ..... Section 901
Mineral Filler 917-1, 917-2
Fine Aggregate..... Section 902

Crushed Reclaimed Portland Cement Concrete Pavement may be used as a coarse aggregate or screenings component subject to meeting all applicable specifications.

334-2.2 Gradation Requirements: Combine the coarse and fine aggregate in proportions that will produce an asphalt mixture meeting all of the requirements defined in this specification and conform to the gradation requirements at design as defined in AASHTO MP2-01, Table 3. Aggregates from various sources may be combined.

334-2.3 Restricted Zone: The gradation identified in 334-2.2 must not pass through the restricted zones specified in Table 4 of AASHTO MP2-01 (Note: The 0.300 mm boundary does not apply). For Traffic Levels D and E the design gradation must pass below the restricted zone, when plotted on an FHWA 0.45 Power Gradation Chart. Unless otherwise noted in the plans, for Traffic Levels A, B and C, the design gradation may pass either above or below the restricted zone, provided the lift thickness requirements specified in 334-1.3 are met.

334-2.4 Aggregate Consensus Properties: Meet the following consensus properties at design for the aggregate blend:

334-2.4.1 Coarse Aggregate Angularity: When tested in accordance with ASTM D 5821, meet the percentage of fractured faces requirements specified in Table 5 of AASHTO MP2-01.

334-2.4.2 Fine Aggregate Angularity: When tested in accordance with AASHTO T-304, Method A, meet the uncompacted void content of fine aggregate specified in Table 5 of AASHTO MP2-01.

334-2.4.3 Flat and Elongated Particles: When tested in accordance with ASTM D 4791, (with the exception that the material passing the 3/8 inch [9.5 mm] sieve and retained on the No. 4 [4.75 mm] sieve shall be included), meet the requirements specified in Table 5 of AASHTO MP2-01. Measure the aggregate using the ratio of 5:1, comparing the length (longest dimension) to the thickness (shortest dimension) of the aggregate particles.

334-2.4.4 Sand Equivalent: When tested in accordance with AASHTO T 176, meet the sand equivalent requirements specified in Table 5 of AASHTO MP2-01.

334-2.5 Use of Reclaimed Asphalt Pavement (RAP) Material:

334-2.5.1 General requirements: Subject to certain requirements, RAP material may be used as a component material of the asphalt mixture. Where the material is recovered from a FDOT project, the Composition of Existing Pavement may be available on the Department's web site. The URL for obtaining this information, if available, is: www11.myflorida.com/statematerialsoffice/Bituminous/CentralBitLab/AsphaltCompositions/Compositions.htm

RAP may be used as a component material of the asphalt mixture subject to the following conditions:

1. The Contractor assumes full responsibility for the design and construction of asphalt mixes which incorporate RAP as a component material.
2. For design purposes, the Contractor assumes responsibility for establishing accurate specific gravity values for the RAP material. This may be accomplished by one of the following methods:

a) Calculation of the bulk specific gravity value based upon the effective specific gravity of the RAP, determined on the basis of the asphalt binder content and maximum specific gravity. The Engineer will approve the estimated asphalt binder absorption value used in the calculation.

b) Testing of the extracted aggregate obtained through a vacuum extraction or ignition oven extraction.

3. For projects with Traffic Levels D and E, do not permit the amount of RAP material used in the mix to exceed 30% by weight of total aggregate. For projects with Traffic Levels A, B and C, do not permit the amount of RAP material used in the mix to exceed 50% by weight

of total aggregate. When using a PG 76-22 Asphalt Binder, limit the amount of RAP material used in the mix to a maximum of 15%.

4. Use a grizzly or grid over the RAP cold bin, in-line roller crusher, screen, or other suitable means to prevent oversized RAP material from showing up in the completed recycled mixture.

If oversized RAP material appears in the completed recycled mix, take the appropriate corrective action immediately. If the appropriate corrective actions are not immediately taken, stop plant operations.

5. Provide stockpiled RAP material that is reasonably consistent in characteristics and contains no aggregate particles which are soft or conglomerates of fines.

6. Provide RAP having a minimum average asphalt content of 4.0% by weight of total mix. The Engineer may sample the stockpile to verify that this requirement is met.

334-2.5.2 Requirements For RAP Milled From Projects: When material milled from the project is used as a component of the asphalt mixture and a Composition of Existing Pavement is available, use the following procedures for obtaining representative samples for the mix design:

1. Cut a minimum number of cores to be representative of the pavement. Fill the core holes prior to opening to traffic. Assume responsibility for accounting for the degradation that will occur during the milling operation.

2. Representative samples may also be obtained by milling the existing pavement to the full depth shown on the plans for pavement removal for a length of approximately 200 feet [60 m]. If required to maintain traffic, immediately replace the pavement removed with the mix specified in the Contract. This mix will be paid for at the Contract unit price.

In the event that a Composition of Existing Pavement is not available, assume responsibility for determining the characteristics (gradation, binder content, and binder viscosity) of the RAP material either by coring the roadway or by sampling the milled material as it is stockpiled.

334-2.5.3 Requirements For RAP Stockpiled From a Previous FDOT Project: When the RAP to be used as a component in a mix design is stockpiled from a previous FDOT project and the Composition of Existing Pavement is known, design the mix based either on the composition or on representative samples obtained from the stockpiled RAP.

334-2.5.4 Requirements For Stockpiled RAP With Unknown Characteristics: When the composition of stockpiled RAP to be used as a component in a mix design is not known, use the following procedures for design:

1. Assume responsibility for determining the binder content, binder viscosity, gradation, and aggregate bulk specific gravity of the RAP material. Take representative samples at random locations around the stockpile.

2. Request the Engineer to make a visual inspection of the stockpile(s) of RAP. Based on visual inspection, the Engineer will determine the suitability of the stockpiled materials. Once the RAP stockpile has been approved, do not add additional material without prior approval of the Engineer.

3. Submit the data required above when submitting the proposed mix design to the Engineer for approval.

334-2.5.5 Binder for Mixes with RAP: Select the appropriate binder based on Table 334-2. The Engineer reserves the right to change binder type and grade at design based on the characteristics of the RAP binder, and reserves the right to make changes during production. Maintain the viscosity of the recycled mixture within the range of 4,000 to 12,000 poises [400 to 1,200 PaAs]. Obtain a sample of the mixture for the Engineer within the first 1,000 tons [1,000 metric tons] and at a frequency of approximately one per 4,000 tons [4,000 metric tons] of mix.

Table 334-2 Binder Grade for Mixes Containing RAP

Asphalt Binder Grade	% RAP
PG 67-22	<20
PG 64-22	20 - 29
Recycling Agent	≥ 30

Note: When a PG 76-22 Asphalt Binder is called for in the Contract, limit the amount of RAP material used in the mix to a maximum of 15%.

334-2.6 Use of Recycled Crushed Glass: Recycled crushed glass may be used as a component of the bituminous mixture subject to the following:

1. Consider the recycled crushed glass a local material and meet all requirements specified in 902-6.
2. Limit the amount of recycled crushed glass in any bituminous mixture to a maximum of 15% of the total aggregate weight.
3. Use an asphalt binder that contains a minimum of 0.5% anti-stripping agent from the Department's Qualified Products List. The addition of the specified amount of anti-stripping agent must be certified by the supplier.
4. Do not use recycled crushed glass in friction course mixtures or in structural course mixtures, which are to be used as the final wearing course.

334-3 General Composition of Mixture.

334-3.1 General: Compose the asphalt mixture using a combination of aggregate (coarse, fine or mixtures thereof), mineral filler, if required, and asphalt binder material. Size, grade and combine the aggregate fractions to meet the grading and physical properties of the mix design. Aggregates from various sources may be combined.

334-3.2 Mix Design:

334-3.2.1 General: Design the asphalt mixture in accordance with AASHTO PP28-01, except as noted herein. All mix designs will be developed by individuals who are qualified as a Mix Designer in the Department's Construction Training and Qualification Program (CTQP). Prior to the production of any asphalt mixture, submit the proposed mix design with supporting test data indicating compliance with all mix design criteria to the Engineer. Include representative samples of all component materials, including asphalt binder. Allow the State Materials Engineer a maximum of four weeks to either conditionally verify or reject the mix as designed. Final verification of the mix design will occur when the requirements of 334-4.3 have been met. Do not use more than three mix designs per nominal maximum aggregate size per traffic level per contract year. Exceeding this limitation will result in a maximum Composite Pay Factor of 1.00 for all designs used beyond this limit.

At the sole option of the Engineer, the initial production requirements of 334-4.3 may be waived for Type SP asphalt mixes based on evidence of final verification and satisfactory performance in previous production for that particular mix.

The Engineer will consider any marked variations from original test data for a mix design or any evidence of inadequate field performance of a mix design as sufficient evidence that the properties of the mix design have changed, and the Engineer will no longer allow the use of the mix design.

334-3.2.2 Gyratory Compaction: Compact the design mixture in accordance with AASHTO TP4-00. Use the number of gyrations as defined in Table 1 of AASHTO PP28-01.

334-3.2.3 Design Criteria: Meet the requirements for nominal maximum aggregate size as defined in AASHTO MP2-01, as well as for relative density, VMA, VFA, and dust-to-binder ratio as specified in Table 6 of AASHTO MP2-01. Use a dust-to-binder ratio of 0.8 to 1.6 for coarse mixes.

334-3.2.4 Moisture Susceptibility: Test the specimens in accordance with FM 1-T 283. Provide a mixture (4 inch [100 mm] specimens) having a retained tensile strength ratio of at least 0.80 and a minimum tensile strength (dry and unconditioned) of 100 psi [690 kPa]. If necessary, add a liquid anti-

stripping agent, which is on the Department's Qualified Products List or hydrated lime (meeting the requirements of 337-10.2) in order to meet these criteria.

334-3.2.5 Additional Information: In addition to the requirements listed above, provide the following information with each proposed mix design submitted for verification:

1. The design traffic level and the design number of gyrations (N_{design}).
2. The source and description of the materials to be used.
3. The DOT source number and the DOT product code of the aggregate components furnished from a DOT approved source.
4. The gradation and proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use. Compensate for any change in aggregate gradation in handling and processing as necessary.
5. A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly -No. 200 [-75 µm]) should be accounted for and identified for the applicable sieves.
6. The bulk specific gravity value for each individual aggregate (and RAP) component, as identified in the Department's aggregate control program.
7. A single percentage of asphalt binder by weight of total mix intended to be incorporated in the completed mixture, shown to the nearest 0.1%.
8. A target temperature at which the mixture is to be discharged from the plant and a target roadway temperature (per 330-6.3). Do not exceed a target temperature of 340ºF [170ºC] for modified asphalts and 315ºF [157ºC] for unmodified asphalts.
9. Evidence that the completed mixture conforms to all specified physical requirements.
10. The name of the CTQP Qualified Mix Designer.
11. The ignition oven calibration factor(s).

334-3.3 Revision of Mix Design: During production, the Contractor may request a target value revision to a mix design, subject to: (1) the target change falls within the limits defined in Table 334-3, (2) appropriate data exists demonstrating that the mix complies with production air voids specification criteria, and (3) the mixture gradation meets the basic gradation requirements defined in 334-2.2 and 334-2.3.

Table 334-3
Limits for Potential Adjustments to Mix Design Target Values

Characteristic	Limit from Original Mix Design
No. 8 sieve [2.36 mm] and Coarser	± 5.0%
No. 16 sieve [1.18 mm]	± 4.0%
No. 30 sieve [600µm]	± 4.0%
No. 50 sieve [300µm]	± 3.0%
No. 100 sieve [150µm]	± 3.0%
No. 200 sieve [75 µm]	± 1.0%
Asphalt Binder Content (1)	± 0.3%

(1) Reductions to the asphalt binder content will not be permitted if the VMA during production is lower than 1.0% below the design criteria.

Submit all requests for revisions to mix designs, along with supporting documentation, to the Engineer. In order to expedite the revision process, the request for revision or discussions on the possibility of a revision may be made verbally, but must be followed up by a written request. The verified mix design will remain in effect until the Engineer authorizes a change. In no case may the effective date

of the revision be established earlier than the date of the first communication between the Contractor and the Engineer regarding the revision.

A new design mix will be required if aggregate sources change, or for any substitution of an aggregate product with a different aggregate code, unless approved by the Engineer.

334-4 Acceptance of the Mixture At the Plant.

334-4.1 General: The bituminous mixture will be accepted at the plant with respect to gradation (P_{-8} and P_{-200}), asphalt content (P_b), and volumetrics (volumetrics is defined as air voids at N_{design}). Acceptance will be on a LOT-by-LOT basis (for each mix design) based on tests of random samples obtained within each sublot taken at a frequency of one sample per sublot that is tested for each property. Acceptance of the mixture will be based on Contractor Quality Control test results that have been verified by the Department. The bituminous mixture will be sampled in accordance with FM 1-T 168. The asphalt content of the mixture will be determined in accordance with FM 5-563. The gradation of the recovered aggregate will be determined in accordance with FM 1-T 030. Testing for acceptance includes AASHTO TP4-00, FM 1-T 209, FM 5-563 and FM 1-T 030. Prior to testing samples in accordance with AASHTO TP4-00 and FM 1-T 209, condition the test-sized sample for one hour at the compaction temperature in a covered container. In the event the FM 5-563 ignition oven goes out of service during production, the Contractor may elect to use a replacement oven at another location for no more than 72 hours while the oven is being repaired.

334-4.2 LOT Sizes: The Initial Production LOT of all mix designs used on a project shall consist of 2,000 tons [2,000 metric tons], subdivided into four equal sublots of 500 tons [500 metric tons] each. Following the Initial Production LOT, each remaining LOT will be defined (as selected by the Contractor prior to the start of the LOT) as either (1) 2,000 tons [2,000 metric tons], with each LOT subdivided into four equal sublots of 500 tons each, or (2) 4,000 tons [4,000 metric tons], with each LOT subdivided into four equal sublots of 1,000 tons [1,000 metric tons] each. Before the beginning of any LOT, the Engineer will develop a random sampling plan for each sublot and direct the Contractor on sample points, based on tonnage, for each sublot during construction.

All LOTs with three or more sublots will be accepted based on the standard deviation and percent within specification limits as defined in 334-8.2.

In the event that less than three sublots are produced for a LOT, these sublots will be included in the previous LOT. If there is no previous LOT, or the LOT is terminated per 334-7, these sublots will be considered as one LOT, with payment based on small quantities as defined in 334-8.1.

334-4.2.1 Partial LOTs: A partial LOT is defined as a LOT size that is less than a full lot. A partial LOT may occur due to the following:

l. The completion of a given mix type or mix design on a project.

2. A LOT termination due to a 60 day or greater delay in production. (Time periods other than 60 days may be used if agreed to by both Engineer and Contractor.)

If the partial LOT contains one or two sublots with their appropriate test results, then the previous LOT (including initial production LOTs) will be redefined to include this partial LOT and the evaluation of the LOT will be based on either five or six sublot results. If the partial LOT contains three or four sublots with their appropriate test results, the partial LOT will be considered a whole LOT, and will be evaluated based on either three or four tests, as appropriate.

Partial LOTs that occur due to a LOT termination as defined in 334-7, are not to be combined with other LOTs and are to be evaluated separately. In no case shall a LOT be terminated based on a test by the Engineer.

334-4.3 Initial Production Requirements: The Initial Production LOT of all mix designs shall be established at 2,000 tons [2,000 metric tons]. During this period demonstrate the capability to produce and place the mixture as specified unless waived by the Engineer in 334-3.2.1. If necessary, during this time, the Contractor may make adjustments to the mix design, as defined in 334-3.3. Any target value adjustments to the mix design will result in the LOT being terminated and evaluated per 334-8. Do not

begin 4,000 ton [4,000 metric ton] LOT sizes until a 2,000 ton [2,000 metric ton] initial production LOT (for each mix design) has been successfully completed, or is waived by the Engineer.

334-4.3.1 Plant Testing Requirements: Obtain one random sample of mix for testing per 500 ton [500 metric ton] sublot as directed by the Engineer. Split the sample into three parts. Test the Quality Control split sample for gradation, asphalt content and volumetrics in accordance with 334-4.1. All testing by the Contractor must be completed within one working day from the time the samples were obtained.

334-4.3.2 Roadway Testing Requirements: For density determination, obtain a minimum of five 6-inch [150 mm] diameter roadway cores within 24 hours of placement at random locations as directed by the Engineer within each sublot. Test these Quality Control samples for density in accordance with 334-5. The G_{mm} used for the density evaluation will be based on the Quality Control test result for the sublot.

On coarse mixes when the average density for the Initial Production LOT is less than 93.5% of G_{mm}, cut five 6 inch [150 mm] diameter roadway cores at locations determined by the Engineer for evaluation of permeability by the Department. The Department will have a maximum of three working days from the date the cores are obtained to complete the permeability evaluation.

334-4.3.3 Verification of Initial Production LOT: For Verification purposes the Engineer will test a minimum of one split sample (including density per 334-5) from the Initial Production LOT at the completion of the LOT. Results of the testing and analysis for the LOT must be available to the Contractor within one working day from when the LOT is completed.

The Verification test results will be compared with the Quality Control test results based on the between-laboratory precision values shown in Table 334-4.

If all of the specified mix characteristics compare favorably, then the LOT will be accepted, with payment based on the Quality Control results for the LOT.

If any of the results do not compare favorably, the remaining Verification samples from the LOT will be tested (for the property or properties in question) by the Engineer. A comparison will then be made between all of the Quality Control test results and all of the corresponding Verification results using the tolerances specified in Table 334-4. If no more than one Quality Control test result for an individual property for the Initial Production LOT has an unfavorable comparison with the Verification result, then the LOT will be accepted and payment will be based on the Quality Control results for the LOT. If two or more of the Quality Control test results for an individual property have an unfavorable comparison, then the split Resolution samples from the LOT will be sent to the Resolution laboratory for testing, as described in 334-4.5.1.

334-4.3.4 Criteria for Initiation of 4,000 Ton [4,000 Metric Ton] LOTs: At the completion of the Initial Production LOT, the quality of the as-produced material will be evaluated by the Engineer. Begin the option of 4,000 ton [4,000 metric ton] LOT sizes only when authorized by the Engineer based upon the Quality Control test results for the Initial Production LOT meeting the following:

1. A minimum Pay Factor of 0.90 for each asphalt quality characteristic as defined in 334-8.

2. A favorable comparison with the Verification test results. Comparisons between the Quality Control and Verification test results will be based on between-laboratory precision values shown in Table 334-4.

3. An average coefficient of permeability of less than 125×10^{-5} cm/s as determined in accordance with FM 5-565. Permeability criteria applies only to coarse mixes when the average density for the LOT is less than 93.0% of G_{mm}.

In the event that the Initial Production LOT does not meet these criteria, limit production LOT sizes to 2,000 tons [2,000 metric tons] with 500 ton [500 metric ton] sublots until these criteria are met.

334-4.3.5 Acceptance of Initial Production LOT: The Initial Production LOT shall be considered a single LOT and will receive a Composite Pay Factor as determined in 334-8, based on results of the verified Quality Control tests, or as determined by the Resolution System.

334-4.4 Quality Control Sampling and Testing – Obtain all samples randomly as directed by the Engineer. The samples must be of a sufficient quantity to be split into three samples. The split sample for Quality Control (QC), which will be used by the Engineer in the acceptance decision for payment, must be conditioned and tested as described in 334-4.1. The split samples for Verification testing and Resolution testing shall each consist of three boxes for a total sample size of approximately 35 pounds. The approximate size of the box must be 12" x8" x4". Label and safely store these boxes in a manner agreed upon by the Engineer for future testing. The Contractor can retain additional split samples at their option.

Should the Engineer determine that the Quality Control requirements are not being met or that unsatisfactory results are being obtained, or should any instances of falsification of test data occur, approval of the Contractor's Quality Control Plan would be rescinded and production will be stopped.

334-4.5 Split Sample Verification Testing – In order to determine the validity of the Contractor's Quality Control test results prior to their use in the Acceptance decision, the Engineer will run verification tests. At the completion of each LOT, the Engineer will test a minimum of one verification split sample randomly from the LOT. Results of the testing and analysis for the LOT must be available to the Contractor within one working day from the time the LOT is completed. Verification samples shall be reheated in a 300°F [150°C] oven until the material becomes workable, reduced to the appropriate testing size, and conditioned as described in 334-4.1, prior to testing.

The Verification test results will be compared with the Quality Control test results based on the between-laboratory precision values shown in Table 334-4.

Table 334-4
Between-Laboratory Precision Values

Property	Maximum Difference
G_{mm}	0.019
G_{mb}	0.022
P_b	0.44%
P_{-200}	FM 1-T 030 (Figure 2)
P_{-8}	FM 1-T 030 (Figure 2)

If all of the specified mix characteristics compare favorably, then the LOT will be accepted, with payment based on the Contractor's Quality Control test data for the LOT.

If any of the results do not compare favorably, the remaining Verification split samples from the LOT will be tested (for only the property or properties in question) by the Engineer. A comparison will then be made between all of the Quality Control test results and all of the corresponding Verification results using the tolerances specified in Table 334-4. If no more than one Quality Control test result for the LOT has an unfavorable comparison for an individual property with the Verification result, then acceptance and payment will be based on the Quality Control results for the LOT. If two or more of the Quality Control test results for an individual property have an unfavorable comparison, then the resolution samples from the LOT will be sent to the Resolution laboratory for testing, as described in 334-4.5.1.

334-4.5.1 Resolution System: In the event of an unfavorable comparison between two or more of the Contractor's Quality Control test results and the Engineer's Verification test results on any of the properties identified in Table 334-4, the Resolution laboratory identified by the Engineer will test all of the split samples from the LOT for only the property or properties in question. Resolution samples shall be reheated in a 300°F [150°C] oven for 1-1/2 hours, combined and rolled, reduced to the appropriate testing size, and conditioned as described in 334-4.1, prior to testing.

If the Resolution laboratory results compare favorably (for the property or properties in question) with all of the Quality Control results, then acceptance and payment for the LOT will be based on the Quality Control results, and the Department will bear the costs associated with Resolution testing. No additional compensation, either monetary or time, will be made for the impacts of any such testing.

If the Resolution laboratory results do not compare favorably (for the property in question) with all of the Quality Control results, then acceptance and payment for the LOT will be based on the Resolution test data for the LOT, and the costs of the Resolution testing will be deducted from monthly estimates. No additional time will be granted for the impacts of any such testing.

In the event of an unfavorable comparison between the Resolution test results and Quality Control test results, make the necessary adjustments to assure that future comparisons are favorable. Repeated unfavorable comparisons may result in the loss of the approved Quality Control Plan.

334-4.5.2 Lost or Missing Verification/Resolution Samples: In the event that any of the Verification and/or Resolution samples that are in the custody of the Contractor are lost, damaged, destroyed, or are otherwise unavailable for testing, the minimum possible pay factor for each quality characteristic as described in 334-8 will be applied to the entire LOT in question. Specifically, if the LOT in question has more than two sublots, the pay factor for each quality characteristic will be 0.55. If the LOT has two or less sublots, the pay factor for each quality characteristic will be 0.80. In either event, the material in question will also be evaluated in accordance with 334-9.4.

If any of the Verification and/or Resolution samples that are in the custody of the Department are lost, damaged, destroyed or are otherwise unavailable for testing, the corresponding Quality Control test result will be considered verified, and payment will be based upon the Contractor's data.

334-4.6 Independent Sample Verification Testing: Take samples as directed by the Engineer for Independent Sample Verification testing at a minimum frequency of two per 12,000 tons [12,000 metric tons] of produced mix for the purpose of monitoring the effectiveness of the Contractor's Quality Control Program. These samples may be obtained from the same load as the Quality Control samples or from other loads. Test the samples either at the asphalt plant or at a qualified laboratory as determined by the Engineer. If any of the results do not meet the requirements of Table 334-5, for asphalt binder content, gradation, or air voids, cease production of the asphalt mixture until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Evaluate any material represented by the failing test results in accordance with 334-9.4.

Table 334-5
Master Production Range

Characteristic	Tolerance (1)
Asphalt Binder Content (%)	Target ± 0.55
Passing No. 8 [2.36 mm] Sieve (%)	Target ± 5.50
Passing No. 200 [75 µm] Sieve (%)	Target ± 1.50
Air Voids (%)	4.00 ± 1.50
Density, $\%G_{mm}$ (2)	
Coarse Graded (minimum)	93.00
Fine Graded	N/A

(1) Tolerances for sample size of n = 1 from the verified mix design
(2) Based on an average of 5 randomly located cores

334-4.7 Comparison Testing for Independent Assurance: At the start of the project (unless waived by the Engineer) and at other times as determined necessary by the Engineer, provide split samples for comparison testing with the Engineer. The purpose of these tests is to verify that the testing

equipment is functioning properly and that the testing procedures are being performed correctly. In the event that the Engineer determines that there is a problem with the Contractor's testing equipment and/or testing procedures, the Contractor will be given the opportunity to immediately correct the problem to the Engineer's satisfaction. In the event that the Contractor cannot immediately correct the problem, the Contractor will be required to cease production of the asphalt mixture until the problem is adequately resolved to the satisfaction of the Engineer. If so agreed to by both the Contractor and the Engineer, the split sample used for comparison testing may also be used for the Quality Control sample. The split sample used for comparison testing will also meet the requirements for Independent Sample Verification Testing described in 334-4.6.

334-5 Acceptance of the Mixture On the Roadway.

334-5.1 General: The bituminous mixture will be accepted at the roadway with respect to density. Acceptance of the mixture on the roadway will be based on Contractor Quality Control test results that have been verified by the Department. The in-place density of each layer of asphalt mix will be evaluated by the use of 6 inches [150 mm] diameter roadway cores randomly located by the Engineer. The roadway cores will be sampled in accordance with FM 1-T 168 and tested in accordance with FM 1-T 166 (Non-Destructive method only). The required average density of a completed course will be based on a percent of the maximum specific gravity (G_{mm}) of the as-produced mix. Retain all roadway density cores, as directed by the Engineer, for Verification or Resolution testing until the LOT is accepted. A roadway LOT and the plant production LOT shall be the same.

Density testing for acceptance will not be performed on shoulders with a width of 5 ft. [1.5 m] or less, open-graded friction courses, variable thickness overbuild courses, leveling courses, first lift of asphalt base course placed on subgrade, or any course with a specified thickness less than 1 inch [25 mm] or a specified spread rate less than 105 lb/yd^2 [57 kg/m^2]. In addition, density testing for acceptance will not be performed on the following areas when they are less than 1,000 feet [300 m] in length: crossovers, intersections, turning lanes, acceleration lanes, deceleration lanes, or ramps. Compact these courses (with the exception of open-graded friction courses) in accordance with the rolling procedure (equipment and pattern) submitted as part of the Quality Control Plan and as approved by the Engineer. In the event that the rolling procedure deviates from the approved procedure, placement of the mix shall be stopped.

The pay factor for LOTs where there are areas not requiring density testing for acceptance will be prorated based on a pay factor of 1.00 for the quantity (tonnage) of material in areas not requiring density testing for acceptance and the actual pay factor for the tonnage of material in areas requiring density.

334-5.2 Quality Control Sampling and Testing: Obtain five cores randomly from each sublot within 24 hours of placement as directed by the Engineer for all Quality Control tests used in the acceptance decision. Do not obtain cores any closer than 12 inches [300 mm] from an unsupported edge. Maintain traffic during the coring operation; core the roadway, patch the core holes (within three days of coring); and trim the cores to the proper thickness prior to density testing.

Density for the sublot shall be based on the average value for the five cores with the target density based on the maximum specific gravity (G_{mm}) of the sublot. Once the average density of a sublot has been determined, do not retest the samples unless approved by the Engineer. Ensure proper handling and storage of all cores until the LOT in question has been accepted.

334-5.3 Same-Sample Verification Testing: In order to determine the validity of the Contractor's Quality Control test results prior to their use in the Acceptance decision, the Engineer will run verification tests. At the completion of each LOT, the Engineer will determine the density of each core (previously tested by Quality Control) from one randomly selected sublot from the LOT. Results of the testing and analysis for the LOT will be available to the Contractor within one working day from the time the LOT is completed. In lieu of determining the density of the roadway cores for Verification, the Engineer may also observe the Quality Control testing of all of the roadway cores in the LOT.

Individual Verification test results will be compared with individual Quality Control test results by the Engineer based on the between-laboratory precision values given in Table 334-4 for G_{mb}.

If each of the core test results compare favorably, then the LOT will be accepted with respect to density, with payment based on the Contractor's Quality Control test data for the LOT.

If any of the results do not compare favorably, the Engineer will test the remaining roadway cores from the LOT. A comparison will be made between all of the Quality Control test results and all of the corresponding Verification results using the tolerance specified in Table 334-4. If no more than one Quality Control test result for the LOT has an unfavorable comparison with the Verification result, then acceptance and payment will be based on the Quality Control results for the LOT. If two or more of the Quality Control test results have an unfavorable comparison, then the core samples from the LOT will be sent to the Resolution laboratory for testing as specified in 334-5.3.1.

334-5.3.1 Resolution System: In the event of an unfavorable comparison between two or more of the Contractor's Quality Control test data and the Engineer's Verification test data on the density results, the Resolution laboratory, identified by the Engineer, will test all of the cores from the LOT. Any damaged roadway cores will not be included in the evaluation.

If the Resolution laboratory results compare favorably with all of the Quality Control results, then acceptance and payment for the LOT will be based on the Quality Control data, and the Department will bear the costs associated with Resolution testing. No additional compensation, either monetary or time, will be made for the impacts of any such testing.

If the Resolution laboratory results do not compare favorably with all of the Quality Control results, then acceptance and payment for the LOT will be based on the Resolution test data, and the costs of the Resolution testing will be deducted from monthly estimates. No additional time will be granted for the impacts of any such testing.

In the event of an unfavorable comparison between the Resolution test results and Quality Control test results, make the necessary adjustments to assure that future comparisons are favorable. Repeated unfavorable comparisons may result in the loss of the approved Quality Control Plan.

334-5.3.2 Lost or Missing Verification/Resolution Samples: In the event that any of the Verification and/or Resolution samples that are in the custody of the Contractor are lost, damaged, destroyed, or are otherwise unavailable for testing, the minimum possible pay factor for each quality characteristic as described in 334-8 will be applied to the entire LOT in question. Specifically, if the LOT in question has more than two sublots, the pay factor for each quality characteristic will be 0.55. If the LOT has two or less sublots, the pay factor for each quality characteristic will be 0.80. In either event, the material in question will also be evaluated in accordance with 334-9.4.

If any of the Verification and/or Resolution samples that are in the custody of the Department are lost, damaged, destroyed or are otherwise unavailable for testing the corresponding Quality Control test result will be considered verified, and payment will be based upon the Contractor's data.

334-5.4 Independent Sample Verification Testing: Obtain five additional roadway cores as directed by the Engineer for Independent Sample Verification testing. These independent cores will be obtained from the same LOTs and sublots as the Independent Verification Plant samples in 334-4.6. Test the samples either at the asphalt plant or at a qualified laboratory as determined by the Engineer. If the average of the results for the sublot do not meet the requirements of Table 334-5 for density, cease production of the asphalt mixture until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Evaluate any material represented by the failing test results in accordance with 334-9.4.

334-5.5 Surface Tolerance: The bituminous mixture will be accepted on the roadway with respect to surface tolerance in accordance with the applicable requirements of 330-12.

334-6 Contractor Process Control.

In addition to the Quality Control tests defined above, the Contractor may run any additional tests at any frequency at the plant and roadway for process control purposes. The Engineer will not use these tests in the acceptance payment decision.

334-7 Individual Test Tolerances for Quality Control Testing.

In the event that an individual Quality Control test result of a sublot for air voids, or the average sublot density for coarse graded mixes does not meet the requirements of Table 334-5, the LOT will be automatically terminated and production of the mixture stopped until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Evaluate any material represented by the failing test result in accordance with 334-9.4.

In the event that an individual Quality Control test result of a sublot for gradation (P_{-8} or P_{-200}), or asphalt binder content does not meet the requirements of Table 334-5, take steps to correct the situation and report actions to the Engineer.

In the event that two consecutive individual Quality Control test results for gradation (P_{-8} and P_{-200}) or asphalt binder content do not meet the requirements of Table 334-5, the LOT will be automatically terminated and production of the mixture stopped until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Evaluate any material represented by the failing test result in accordance with 334-9.4.

334-8 Compensation.

334-8.1 Pay Factors for Small Quantities: In the event that two or less sublot test results are available for a LOT, and there is no previous LOT to combine the results with, or if a LOT is terminated per 334-7, and there are only one or two test results available, Pay Factors (PF) will be determined based on Table 334-6, using the average of the accumulated deviations from the target value. (Deviations are absolute values with no plus or minus signs.) Pay Factors will be calculated for the following quality characteristics: density, air voids, asphalt binder content, percentage passing No. 200 [75 μm] sieve, and percentage passing No. 8 [2.36 mm] sieve. Use the 1-Test column when there is only one sublot and use the 2-Tests column when there are two sublots. Perform all calculations to the nearest 0.001 and round the final answer to the nearest 0.01.

Table 334-6
Small Quantity Pay Table

Pay Factor	1-Test Deviation	2-Test Average Deviation
	Asphalt Binder Content	
1.00	0.00-0.45	0.00-0.32
0.90	0.46-0.55	0.33-0.39
0.80	>0.55	>0.39
	No. 8 [2.36 mm] Sieve	
1.00	0.00-4.50	0.00-3.18
0.90	4.51-5.50	3.19-3.89
0.80	>5.50	>3.89
	No. 200 [75 :m] Sieve	
1.00	0.00-1.10	0.00-0.78
0.90	1.11-1.50	0.79-1.06
0.80	>1.50	>1.06
	Air Voids	
1.00	0.00-1.10	0.00-0.78
0.90	1.11-1.50	0.79-1.06

Table 334-6 Small Quantity Pay Table		
Pay Factor	1-Test Deviation	2-Test Average Deviation
0.80	>1.50	>1.06
	Density (Coarse Graded Mixtures) Note (1)	
1.00	∃ 93.50	∃ 93.50
0.95	93.00-93.49	93.00-93.49
0.90	Note (2)	Note (2)
	Density (Fine Graded Mixtures) Note (1)	
1.00	∃ 92.00	∃ 92.00
0.95	91.00-91.99	91.00-91.99
0.90	90.00-90.99	90.00-90.99
0.80	< 90.00 Note (3)	< 90.00 Note (3)

Notes:
(1) Each density test result is the average of five cores.
(2) In the event that the density of a LOT is less than 93.00% of G_{mm}, the department will assess the pavement's permeability in accordance with FM 5-565. If the coefficient of permeability is less than or equal to 125×10^{-5} cm/s, the Engineer may require removal and replacement at no cost or may accept the payment at 90% pay. The Contractor may remove and replace at no cost to the Department at any time.
(3) If approved by the Engineer, based on an engineering determination that the material is acceptable to remain in place, the Contractor may accept the indicated partial pay. Otherwise, the Department will require removal and replacement at no cost. The Contractor may remove and replace at no cost to the Department at any time.

334-8.2 Standard Deviation and Percent Within Specification Limits: When three or more sublot test results are available for a LOT, the variability-unknown, standard deviation method must be used to determine the estimated percentage of the LOT that is within specification limits. Pay Factors will be calculated for the following quality characteristics: density, air voids, asphalt binder content, percentage passing No. 200 [75 μm] sieve, and percentage passing No. 8 [2.36 mm] sieve. The number of significant figures used in the calculations shall be in accordance with requirements of AASHTO R-11, Absolute Method. All the calculations should be calculated using the Department's spreadsheet.

334-8.2.1 Percent Within Limits: Calculate the percent within limits (PWL) for the LOT as described below. Variables used in the calculations are as follows:

x = individual test value (sublot)
n = number of tests (sublots)
s = sample standard deviation
$\Sigma(x^2)$ = summation of squares of individual test values
$(\Sigma x)^2$ = summation of individual test values squared
Q_U = upper quality index
USL = upper specification limit (target value plus upper specification limit from Table 334-7)
Q_L = lower quality index
LSL = lower specification limit (target value minus lower specification limit from Table 334-7)
P_U = estimated percentage below the USL
P_L = estimated percentage above the LSL

(1) Calculate the arithmetic mean $\left(\overline{X}\right)$ of the test values:

$$\overline{X} = \frac{\sum x}{n}$$

(2) Calculate the sample standard deviation (s):

$$s = \sqrt{\frac{n\sum\left(x^2\right) - \left(\sum x\right)^2}{n(n-1)}}$$

(3) Calculate the upper quality index (Q_U):

$$Q_U = \frac{\text{USL - } \overline{\text{X}}}{\text{s}}$$

(4) Calculate the lower quality index (Q_L):

$$Q_L = \frac{\overline{X} - LSL}{s}$$

(5) From Table 334-8, determine the percentage of work below the USL (P_U).

(6) From Table 334-8, determine percentage of work above the LSL (P_L) Note: If USL or LSL is not specified; percentages within (USL or LSL) will be 100.

(7) If Q_U or Q_L is a negative number, then calculate the percent within limits for Q_U or Q_L as follows: enter Table 334-8 with the positive value of Q_U or Q_L and obtain the corresponding percent within limits for the proper sample size. Subtract this number from 100.00. The resulting number is the value to be used in the next step (Step 8) for the calculation of quality level.

(8) Calculate the percent within limits (PWL) = (P_U + P_L) – 100

(9) Calculate the Pay Factor (PF) for each quality characteristic using the equation given in 334-8.3.

Table 334-7
Specification Limits

Quality Characteristic	Specification Limits
Passing No. 8 [2.36 mm] sieve (%)	Target ± 3.1
Passing No. 200 [75 μm] sieve (%)	Target ± 1.0
Asphalt Content (%)	Target ± 0.40
Air Voids (%)	4.00 ± 1.40
Density (% of G_{mm}):	
Coarse Mixes	94.50 ± 1.30
Fine Mixes (1)	93.00 + 2.00, - 1.00

Note (1): If the Engineer (or Contract Documents) limits compaction to the static mode only, the specification limits are as follows: 92.00 + 2.00, -1.00

Table 334-8
Percent Within Limits

Quality Index	Percent within Limits for Selected Sample Size			
	n = 3	n = 4	n = 5	n = 6

Table 334-8 Percent Within Limits				
Quality Index	Percent within Limits for Selected Sample Size			
	n = 3	n = 4	n = 5	n = 6
0.00	50.00	50.00	50.00	50.00
0.05	51.38	51.67	51.78	51.84
0.10	52.76	53.33	53.56	53.67
0.15	54.15	55.00	55.33	55.50
0.20	55.54	56.67	57.10	57.32
0.25	56.95	58.33	58.87	59.14
0.30	58.37	60.00	60.63	60.94
0.35	59.80	61.67	62.38	62.73
0.40	61.26	63.33	64.12	64.51
0.45	62.74	65.00	65.84	66.27
0.50	64.25	66.67	67.56	68.00
0.55	65.80	68.33	69.26	69.72
0.60	67.39	70.00	70.95	71.41
0.65	69.03	71.67	72.61	73.08
0.70	70.73	73.33	74.26	74.71
0.75	72.50	75.00	75.89	76.32
0.80	74.36	76.67	77.49	77.89
0.85	76.33	78.33	79.07	79.43
0.90	78.45	80.00	80.62	80.93
0.95	80.75	81.67	82.14	82.39
1.00	83.33	83.33	83.64	83.80
1.05	86.34	85.00	85.09	85.18
1.10	90.16	86.67	86.52	86.50
1.15	97.13	88.33	87.90	87.78
1.20	100.00	90.00	89.24	89.01
1.25	100.00	91.67	90.54	90.19
1.30	100.00	93.33	91.79	91.31
1.35	100.00	95.00	92.98	92.37
1.40	100.00	96.67	94.12	93.37
1.45	100.00	98.33	95.19	94.32
1.50	100.00	100.00	96.20	95.19
1.55	100.00	100.00	97.13	96.00
1.60	100.00	100.00	97.97	96.75
1.65	100.00	100.00	98.72	97.42
1.70	100.00	100.00	99.34	98.02
1.75	100.00	100.00	99.81	98.55
1.80	100.00	100.00	100.00	98.99
1.85	100.00	100.00	100.00	99.36

Table 334-8 Percent Within Limits				
Quality Index	Percent within Limits for Selected Sample Size			
	n = 3	n = 4	n = 5	n = 6
1.90	100.00	100.00	100.00	99.65
1.95	100.00	100.00	100.00	99.85
2.00	100.00	100.00	100.00	99.97
2.05	100.00	100.00	100.00	100.00
2.10	100.00	100.00	100.00	100.00
2.15	100.00	100.00	100.00	100.00
2.20	100.00	100.00	100.00	100.00
2.25	100.00	100.00	100.00	100.00
2.30	100.00	100.00	100.00	100.00
2.35	100.00	100.00	100.00	100.00
2.40	100.00	100.00	100.00	100.00
2.45	100.00	100.00	100.00	100.00
2.50	100.00	100.00	100.00	100.00
2.55	100.00	100.00	100.00	100.00
2.60	100.00	100.00	100.00	100.00
2.65	100.00	100.00	100.00	100.00

334-8.2.2 Pay Factors (PF): Pay Factors will be calculated for the following quality characteristics: density, air voids, asphalt binder content, percentage passing No. 200 [75 μm] sieve, and percentage passing No. 8 [2.36 mm] sieve by using the following equation:

Pay Factor = (55 + 0.5 x PWL) / 100

The PWL is determined from Step (8) of 334-8.2.1.

334-8.3 Composite Pay Factor (CPF): A Composite Pay Factor for the LOT will be calculated according to the following formula and the number after each multiplication shall be rounded to the nearest 0.01:

CPF = [(0.050 x PF No. 8 [2.36 mm]) + (0.100 x PF No. 200 [75μm]) + (0.250 x PF AC) + (0.250 x PF Air Voids) + (0.350 x PF Density)]

Where the Pay Factor (PF) for each quality characteristic is determined in either 334-8.1 or 334-8.2, depending on the number of sublot tests.

The pay adjustment shall be computed by multiplying the Composite Pay Factor for the number of tons [metric tons] included in the LOT by the bid price per ton [metric ton].

334-9 Low Pay Factor Material.

334-9.1 Pay Factors Below 0.90: In the event that an individual pay factor for any quality characteristic of a LOT falls below 0.90, take steps to correct the situation and report actions to the Engineer. In the event that two or more consecutive pay factors for any quality characteristic or if the composite pay factor for the LOT falls below 0.90, cease production of the asphalt mixture until the problem is adequately resolved (to the satisfaction of the Engineer), unless it can be demonstrated to the

satisfaction of the Engineer that the problem can immediately be (or already has been) resolved. Actions taken must be approved by the Engineer before production resumes.

334-9.2 Composite Pay Factors Less Than 0.80 and Greater Than or Equal to 0.75: If the composite pay factor for the LOT is less than 0.80 and greater than or equal to 0.75, or if the LOT is terminated due to a failure to meet the master production range defined in Table 334-5, evaluate the material in accordance with 334-9.4.

334-9.3 Composite Pay Factors Less Than 0.75: If the composite pay factor for the LOT is less than 0.75, the material will be removed and replaced at no cost to the Department, or as approved by the Engineer.

334-9.4 Evaluation of In-Place Low Pay Factor Material: Assume responsibility for evaluating all low pay factor material or other material represented by failing test results, placed on the project. Complete the evaluation in accordance with the following:

1. Remove and replace the material at no cost to the Department.
2. Obtain an engineering analysis, as directed by the Engineer, by an independent laboratory (as approved by the Engineer) to determine if the material can (a) remain in place, for this case the appropriate composite pay factor will be applied, or (b) be removed and replaced at no cost to the Department. The analysis will be a signed and sealed report by a Professional Engineer licensed in the State of Florida.

The Engineer may, at his sole option, perform an engineering evaluation to determine if the material is suitable to (a) remain in place with a composite pay factor as determined by 334-8.3 with an additional reduction of 0.05 or (b) be removed and replaced at no cost to the Department.

334-10 Method of Measurement.

For the work specified under this Section (including the pertinent provisions of Sections 320 and 330), the quantity to be paid for will be the weight of the mixture, in tons [metric tons].

The bid price for the asphalt mix will include the cost of the liquid asphalt or the asphalt recycling agent. There will be no separate payment or unit price adjustment for the asphalt binder material in the asphalt mix. For the calculation of unit price adjustments of bituminous material, the average asphalt content will be based on the percentage specified in 9-2.1.2. The weight will be determined as provided in 320-2 (including the provisions for the automatic recordation system).

334-11 Basis of Payment.

Price and payment will be full compensation for all the work specified under this Section (including the applicable requirements of Sections 320 and 330).

Payment will be made under:

Item No. 334- 1 -	Superpave Asphaltic Concrete - per ton.
Item No. 2334- 1 -	Superpave Asphaltic Concrete - per metric ton.