

**PINELLAS COUNTY, FLORIDA  
DEPARTMENT OF ENVIRONMENT  
AND INFRASTRUCTURE (D.E.I.)**

**SPECIFICATIONS FOR HOT  
BITUMINOUS MIXTURES, PLANT  
METHODS, EQUIPMENT, AND  
CONSTRUCTION METHODS**

**APRIL, 2013**

# INDEX

## SECTION ONE - MATERIALS

	<u>PAGE</u>
1-1 <b>Coarse Aggregate</b>	
1-1-1    General	1
1-1-2    Gravel	1
1-1-3    Stone	2
1-1-4    Slag	2
1-1-5    Mixing different materials	2
1-2 <b>Fine Aggregate</b>	2
1-2-1    Composition	2
1-2-2    Source of material	2
1-2-3    Gradation requirements	3
1-2-4    Limerock screenings	3
1-3 <b>Mineral Filler</b>	3
1-3-1    Composition	3
1-3-2    Gradation	3
1-4 <b>Asphalt Cement</b>	3
1-5 <b>Reclaimed Asphalt Pavement (RAP)</b>	3
1-5-1    Mix Design	3
1-5-2    Percentage RAP Allowed	4
1-5-3    Processing RAP	4
1-5-4    Stockpiles	4
1-5-5    Nominal Aggregate Size	4
1-5-6    Miscellaneous	4
1-6 <b>Acceptance of Materials</b>	4
1-6-1    Preliminary Material Acceptance	4
1-6-2    Acceptance Sampling and testing	4
1-7 <b>Control of Materials and Work</b>	5
1-7-1    General	5
1-7-2    Contractor Scheduling and Notification to COUNTY	5
1-7-3    Contractor Quality Control System	6
1-7-4    Responsibility	6
1-7-5    Verification System	6
1-7-6    Authority of the Engineer	7
1-7-7    Suspension of the Work	7

## SECTION TWO - HOT BITUMINOUS MIXTURES - PLANT METHODS & EQUIPMENT

2-1 <b>General</b>	8
2-2 <b>Requirements for all plants</b>	8
2-2-1    The overall plant	8
2-2-2    Scale requirements	8
2-2-3    Equipment for preparation of bituminous mixtures	8
2-2-4    Cold feed	9
2-2-5    Dryer	9
2-2-6    Gradation Unit	9
2-2-7    Hot bins	8
2-2-8    Bituminous Control unit	9

	<b><u>PAGE</u></b>
2-2-9 Pugmills	9
2-2-10 Sampling of hot aggregate	9
2-2-11 Hot storage or surge bins	10
<b>2-3 Paving equipment - mechanical spreading &amp; screening equipment</b>	<b>10</b>
2-3-1 General	10
2-3-2 Automatic Screed Control	10
2-3-3 Inflation of tires	10
2-3-4 Screed width	10
 <b><u>SECTION 3 - HOT BITUMINOUS MIXTURES GENERAL CONSTRUCTION REQUIREMENTS</u></b> 	
<b>3-1 Description</b>	<b>11</b>
<b>3-2 Weather limitations</b>	<b>11</b>
3-2-1 Limitations of laying operations	11
3-2-2 Temperature	11
3-2-3 Wind	11
<b>3-3 Preparation of asphalt cement</b>	<b>11</b>
<b>3-4 Preparation of aggregates</b>	<b>11</b>
3-4-1 Stockpiles	11
3-4-2 Prevention of segregation	12
3-4-3 Blending of aggregates	12
3-4-4 Mineral filler	12
<b>3-5 Preparation of mixtures</b>	<b>12</b>
3-5-1 Aggregates	12
3-5-2 Bitumen	12
3-5-3 Mixing time	12
3-5-4 Continuous mixing	12
3-5-5 Drum mixing	12
3-5-6 Mixing temperature	13
3-5-7 Contractor's responsibility for mixture requirements	13
<b>3-6 Transportation of the mixture</b>	<b>13</b>
<b>3-7 Coating materials</b>	<b>14</b>
3-7-1 Prime coat	14
3-7-2 Tack coat	14
3-7-3 Tack coat required	16
3-7-4 Tack coat at the Engineer's option	16
<b>3-8 Preparation of Application surfaces</b>	<b>17</b>
3-8-1 Cleaning	17
3-8-2 Patching and leveling courses	17
3-8-3 Application over surface treatment	17
3-8-4 Coating surfaces of connecting structures	17
<b>3-9 Placing mixture</b>	<b>17</b>
3-9-1 Requirements applicable to all types	17
3-9-1.1 Alignment of edges	17
3-9-1.2 Temperature of spreading	17
3-9-1.3 Rain and surface conditions	17
3-9-1.4 Speed of spreader	18
3-9-1.5 Number of crews required	18

	<b><u>PAGE</u></b>
3-9-1.6 Checking depth of layer	18
3-9-1.7 Hand spreading	18
3-9-1.8 Motor Grader spreading	18
3-9-1.9 Straightedging and back-patching	18
3-9-2 Requirements applicable only to surface courses	18
3-9-2.1 Spreading and finishing	18
3-9-2.2 Thickness of layers	19
3-9-2.3 Laying width	19
3-9-2.4 Correcting defects	19
3-9-3 Requirements applicable only to leveling courses	19
3-9-3.1 Patching depressions	19
3-9-3.2 Work adjacent to bridge ends	19
3-9-3.3 Spreading leveling course	19
3-9-3.4 Rate of application	19
3-9-3.5 Placing leveling over existing concrete pavement	19
3-9-3.6 Removal of excess joint material	19
<b>3-10 Mix Segregation</b>	<b>20</b>
3-10-1 Definitions	20
3-10-1.1 Segregation	20
3-10-1.2 End-Of-Load Segregation	20
3-10-1.3 Longitudinal Segregation	20
3-10-1.4 Severity of Segregation	20
3-10-2 Quality Control By The Contractor	20
3-10-3 Corrective Action By The Contractor	20
<b>3-11 Compacting mixture</b>	<b>21</b>
3-11-1 Provisions applicable to all types	21
3-11-1.1 Equipment	21
3-11-2 Rolling procedures	22
3-11-2.1 Number of pneumatic-tired rollers required	23
3-11-2.2 Compaction of areas inaccessible to rollers	23
3-11-2.3 Rolling patching and leveling courses	23
3-11-2.4 Correcting defects	23
3-11-2.5 Provisions applicable to shoulder pavement only	24
3-11-3 Density control and determination for asphaltic concrete pavement	24
3-11-3.1 Cores - Cutting	24
3-11-3.2 Cores - Scheduling	25
3-11-3.3 Cores - Backfilling	25
3-11-3.4 Cores - Number & Location	25
3-11-3.5 Density - General Construction	25
3-11-3.6 Density - Overlay Construction	25
3-11-3.7 Lot Definition - Overlay Construction	26
3-11-4 Prohibitions	26
3-11-4.1 Authorization To Core	26
3-11-4.2 Final Density Determination	26
3-11-4.3 Authorization To Pave Final Lift	26

	<b><u>PAGE</u></b>
<b>3-12 Joints</b>	26
3-12-1 Transverse joints	26
3-12-2 Longitudinal joints	26
3-12-3 General	26
<b>3-13 Surface Requirements</b>	27
3-13-1 Contractor Responsibility	27
3-13-2 Texture of Finished Surface	27
3-13-3 Acceptance Testing For Surface Tolerance	27
3-13-3.1 General	27
3-13-3.2 Test Method	27
3-13-3.3 Acceptance Criteria for Final Surface	27
3-13-4 Correcting Unacceptable Pavement	28
<b>3-14 Protection of Finished Surface</b>	29
<b>3-15 Correcting Deficient Thickness</b>	29
 <b><u>SECTION 4 - ASPHALTIC CONCRETE - GENERAL</u></b>	
<b>4-1 Description</b>	31
<b>4-2 Materials</b>	31
4-2-1 Specific Requirements	31
4-2-1.1 Laboratory compacted density	31
4-2-1.2 Change in sources or supply for materials	31
4-2-1.3 Sampling of the mixture in use	31
<b>4-3 Certification</b>	32
4-3-1 Contractor Quality Control Test Reports	32
<b>4-4 In-Place Density Specifications</b>	32
4-4-1 General Construction	32
4-4-2 Overlay Construction	32
<b>4-5 Adjusted Payment</b>	33
<b>4-6 Structural Asphalt Base Course</b>	33
4-6-1 Description	33
4-6-2 Construction Requirements	33
4-6-2.1 Stabilized subgrade	33
4-6-2.2 Subgrade not stabilized	33
4-6-2.3 Spreading the HMA	33
4-6-3 In-Place Density Requirements	34
4-6-3.1 First Lift Requirements	34
4-6-3.2 Second Lift Requirements	34
4-6-3.3 Third and Subsequent Lift Requirements	34
4-6-3 TABLE - Structural Base Asphalt In-Place Density Lot Adjustment	35
<b>4-7 Adjustment to Bid Unit Price for Asphaltic Material</b>	36

<b><u>SECTION 5 - SUPERPAVE ASPHALTIC CONCRETE</u></b>	<b><u>PAGE</u></b>
<b>5-1 Description</b>	37
5-1-1 General	37
5-1.2 Traffic Levels	37
5-1.3 Layer Thicknesses	37
5-1.3.1 Fine Mixes	37
5-1.3.2 Coarse Mixes	38
<b>5-2 Materials</b>	38
5-2.1 General Requirements	38
5-2.2 Gradation Requirements	38
5-2.3 Restricted Zone	38
5-2.4 Aggregate Consensus Properties	39
5-2.4.1 Coarse Aggregate Angularity	39
5-2.4.2 Fine Aggregate Angularity	39
5-2.4.3 Flat and Elongated Particles	40
5-2.4.4 Clay Content	40
5-2.5 Specific Requirements	40
5-2.5.1 Condition of Aggregate	40
5-2.5.2 Fine Aggregate and Mineral Filler	40
5-2.5.3 Screenings	40
5-2.5.4 Use of Reclaimed Asphalt Pavement	40
5-2.5.4.1 General Requirements	40
5-2.5.5 Binder for Mixes with RAP	41
<b>5-3 Permissible Variation for the Coarse Aggregate</b>	42
<b>5-4 General Composition of Mixture</b>	42
5-4.1 General	42
5-4.2 Mix Design	42
5-4.2.1 General	42
5-4.2.2 Grading Requirements	42
5-4.2.3 Gyratory Compaction	42
5-4.2.4 Volumetric Criteria	43
5-4.2.5 VMA Criteria	43
5-4.2.6 VFA Criteria	43
5-4.2.7 Dust Proportion	44
5-4.2.8 Moisture Susceptibility	44
5-4.2.9 Water Permeability	44
5-4.2.10 Additional Information	44
5-4.3 Revision of Mix Design	44
5-4.4 Contractor's Quality Control	45
5-4.4.1 Extraction Gradation Analysis	45
5-4.4.2 Volumetric Control	46
5-4.4.3 Viscosity of Asphalt Binder in Mixes Containing Reclaimed Asphalt Pavement	46
<b><u>SECTION 6 - APPENDICES</u></b>	
<b>6-1 Selecting Core Sampling Locations At Pavement Site</b>	47
TABLE 6 - 1 Random Numbers For General Sampling Procedure	50
<b>6-2 Asphalt Plant Mix Characteristics - Acceptance Determination</b>	
TABLE 6-2 Plant Mix Acceptance Schedule of Payments	51
<b>6-3 Density Acceptance Determination</b>	
TABLE 6-3 In-Place Density Lot Adjustment Table	52
<b><u>Section 7 – Warm Mix Asphalt</u></b>	
<b>7-1 Warm Mix Asphalt</b>	54

# DEFINITIONS

Whenever the following terms, or pronouns used in place of them, are used in this document, they shall have the meanings given below:

- (1) "COUNTY or Owner" -- The project is owned by Pinellas County, a political subdivision of the State of Florida.
- (2) "Board of County Commissioners" -- Governing body of Pinellas County, hereinafter referred to as the Board.
- (3) "Contractor" -- shall refer to the General Contractor, the Individual, Partnership or Corporation agreeing to do the work for the Owner as Prime Contractor.
- (4) "Standard Specifications" -- Florida Department of Transportation "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", (latest edition) and all Supplemental Specifications thereto.
- (5) "Engineer" -- The Director of D.E.I. or his duly authorized representative, acting on behalf of the COUNTY.
- (6) "Inspector" -- An authorized representative of the Engineer, assigned to make any or all necessary inspections of the work performed and materials furnished by the Contractor.
- (7) "Testing Laboratory" -- An authorized representative of the Engineer, assigned to perform any or all necessary sampling and testing of the work performed and materials furnished by the Contractor.
- (8) "Overlay Construction" -- One or more courses of hot mix asphalt construction on an existing pavement surface.
- (9) "General Construction" -- One or more courses of new hot mix asphalt construction on all surfaces other than an existing pavement surface  
.
- (10) "Retest" -- A test taken by the COUNTY'S authorized test laboratory adjacent to an initial acceptance test to substantiate the original test data.

# PINELLAS COUNTY, FLORIDA - SPECIFICATION FOR HOT BITUMINOUS MIXTURES, PLANT METHODS

**April, 2013**

## **SECTION 1 - MATERIALS**

### **1-1 - COARSE AGGREGATE**

#### **1-1-1 General:**

Coarse aggregates shall meet the requirement of Standard Specifications, Division III, Section 901, except as amended herein. Coarse aggregates shall consist of gravel, stone or slag, as specified. All coarse aggregate shall be washed and shall be free from disintegrated pieces, salt, alkali, organic matter, adherent coatings, and other substances not defined which may possess undesirable characteristics. The weight of deleterious substances shall not exceed the following percentages:

Coal and lignite . . . . .	1.00
Coal Lumps . . . . .	0.05
Soft fragments . . . . .	1.00
Cinders and clinkers . . . . .	0.50
Free Shells . . . . .	1.00
Sticks (wet) . . . . .	0.03
Material passing the No. 200 sieve .	1.75

In addition, the sum of the percentages of all substances listed above shall not exceed ten.

Condition of Aggregate: The aggregate shall be clean and shall contain no deleterious substances. Coarse or fine aggregate containing any appreciable amount of phosphate shall not be used.

#### **1-1-2 Gravel:**

Gravel shall be composed of clean, tough, durable quartz. The loss when the material is subjected to the Los Angeles Abrasion Test AASHTO T 96, shall not exceed 45 percent.

The dry-rodded weight per cubic foot of the gravel, tested according to AASHTO T 19, shall be not less than 95 pounds.



### **1-1-3 Stone:**

Stone shall be composed of clean, durable rock. The loss, when the stone is subjected to the Los Angeles Abrasion Test, shall not exceed 45 percent.

The stone shall also comply with the soundness requirements as set out in FM 1-T 104; however, the test for soundness shall be made at the option of the Engineer.

The following additional limitation shall apply for stone used as aggregate in all asphaltic concrete used as wearing course.

Pre-Cenozoic limestones and dolomites shall not be used as crushed-stone aggregates, either coarse or fine. This specifically includes materials from the Ketona Dolomite (Cambrian), Newala Limestone (Lower Ordovician), Bangor Limestone (Mississippian), and other formations of similar composition and origin occurring in central and northern Alabama and Georgia.

### **1-1-4 Slag:**

Slag shall be clean, tough and durable. It may be either air-cooled blast-furnace slag or phosphate slag. It shall be reasonably uniform in density and quality, and free from deleterious substances other than as permitted under 1-1-1. It shall contain not more than 1.5 percent of sulphur. The dry-rodded weight shall be not less than 70 pounds per cubic foot. The loss, when the slag is subjected to the Los Angeles Abrasion Test, shall not exceed 45 percent. Glassy particles content shall not exceed ten percent.

### **1-1-5 Mixing Different Materials:**

Unless written permission is obtained coarse aggregates of different types shall not be mixed, nor be used alternately in sections of less than one mile for bituminous mixtures.

## **1-2 - FINE AGGREGATE**

### **1-2-1 Composition:**

This fine aggregate shall consist of natural silica sand, stone screenings, slag screenings, or a combination thereof, composed of clean, tough, angular grains, free from clay, loam and other foreign matter. As delivered to the mixer it shall be free from clayey lumps or loosely bonded aggregations and the individual particles shall be free from adhering dust. Stone or slag screenings shall be produced from material complying with the abrasion requirements specified for coarse aggregate in Section 1-1.

Fine Aggregate and Mineral Filler: In laboratory tests, and for the purpose of proportioning the paving mixture, all material passing the No. 10 sieve and retained on the No. 200 sieve shall be considered as fine aggregate, and the material passing the No. 200 sieve shall be considered as mineral filler.

The following additional limitation shall apply for stone used as aggregate in all asphaltic concrete used as a wearing course.

Pre-Cenozoic limestones and dolomites shall not be used as crushed-stone aggregates, either coarse or fine, for wearing courses of asphaltic concrete surface courses. This specifically includes materials from the Ketona Dolomite (Cambrian), Newala Limestone (Lower Ordovician), Bangor Limestone (Mississippian), and other formations of similar composition and origin in central and northern Alabama and Georgia.

### **1-2-2 Source of Material:**

The areas or other sources for obtaining this fine aggregate shall be furnished by the Contractor.

### **1-2-3 Gradation Requirements:**

Any screenings used in the combination of aggregate shall contain not more than 15 percent of material passing the No. 200 sieve and, if necessary to meet this requirement, they shall be washed.

Any natural sand portion of the fine aggregate other than screenings shall be siliceous and shall contain not more than ten percent of material passing the No. 200 sieve.

### **1-2-4 Limerock Screenings:**

Limerock screenings used in the mix shall not contain more than 15 percent passing the No. 200 sieve, and shall be produced from material complying with the abrasion requirements specified for coarse aggregate in Section 1-1-1. When two screenings are blended to produce the screening component of the aggregate, one of such screenings may contain up to 18 percent of material passing the No. 200 sieve, as long as the combination of the two does not contain over 15 percent material passing the No. 200 sieve. Screenings may be washed to meet these requirements.

## **1-3 - MINERAL FILLER**

### **1-3-1 Composition:**

Mineral filler shall consist, in general, of limerock dust, Portland cement, slag dust, hydrated lime, or any other inert mineral matter from sources approved by the Engineer. The mineral filler shall be thoroughly dry and free from lumps consisting of aggregations of fine particles. Ground phosphate will not be allowed as a mineral filler.

### **1-3-2 Gradation:**

The mineral filler shall meet the following gradation requirements:

Sieve Number	No. 30	No. 80	No. 200
Percent Passing	100	≥ 95	≥ 65

## **1-4 - ASPHALT CEMENT**

The asphalt cement grade utilized shall be PG 64-22, PG 67-22, and PG 76-22, and shall conform to the Florida Department of Transportation Specifications Sec. 916, Bituminous Materials. The Engineer may approve the alternate use of AC-20 or AC-30 in some instances.

## **1-5 - RECLAIMED ASPHALT PLANT MIX PAVEMENT (RAP)**

Reclaimed asphalt pavement may be used as a component material of the bituminous mixture subject to the following:

### **1-5-1 Mix Design:**

The Contractor shall be solely responsible for the design of asphalt mixes which incorporate reclaimed asphalt pavement as a component part.

### **1-5-2 Percentage RAP Allowed:**

Reclaimed asphalt pavement (RAP) shall meet the requirements of Section 5-2-5.4.

### **1-5-3 Processing RAP:**

A grizzly or grid with openings of a sufficient size to prevent clogging of the cold feed shall be mounted over the reclaimed asphalt pavement (RAP) cold bin. A grizzly or grid over the RAP cold bin, in-line roller crusher, screen, or other suitable means shall be used to prevent oversized RAP material from showing up in the completed recycled mixture. In the event that oversized RAP material appears in the completed recycled plant mix, plant operations shall cease and the appropriate corrective action shall be taken.

### **1-5-4 Stockpiles:**

The reclaimed asphalt pavement material as stockpiled shall be reasonably uniform in characteristics and shall not contain aggregate particles that are soft or conglomerates of fines. Each stockpile shall be processed to produce a uniform gradation and AC content in the RAP prior to use in the recycled mix. All reclaimed asphalt pavement material incorporated into the completed mixture shall come from a processed stockpile tested, identified, and approved by the FDOT Materials Office.

### **1-5-5 Nominal Aggregate Size:**

The nominal aggregate size of the RAP stockpile shall not be larger than the nominal aggregate size of the completed blended mixture.

### **1-5-6: Miscellaneous:**

Recycled asphalt roofing shingles shall not be used as an additive in any mixtures.

## **1-6 - ACCEPTANCE OF MATERIALS**

### **1-6-1 Preliminary Material Acceptance:**

Prior to delivery of materials to the jobsite, the Contractor shall submit certified test reports to the COUNTY for the following materials: Coarse Aggregate (Percent of Wear (LA Abrasion, FM 1-T 096), Soundness (Sodium Sulfate, FM 1-T 104), and Unit Weight) and Fine Aggregate (Liquid Limit and Plastic Index). The Contractor shall be responsible for assuring that the mineral aggregate meets all requirements and, when processed, is fully capable of providing asphaltic concrete which meets all the requirements of these specifications.

### **1-6-2 Acceptance Sampling and Testing:**

All acceptance testing necessary to determine conformance with the requirements of the contract will be performed by the COUNTY at no cost to the Contractor, except that all retests shall be paid for by the Contractor. If the retests taken, when combined with the original tests, indicate that the material meets specifications, the COUNTY shall pay for the costs of the retests. The Contractor shall provide for samples of materials to be taken for testing by the COUNTY at no cost to the COUNTY. Plant-produced mix shall be tested for stability, flow, asphalt content, air voids, maximum specific gravity, and gradation on a **lot** basis. Sampling of the loose mix shall be from material deposited into trucks at the asphalt plant, from trucks at the job site, from paver hoppers, or other sampling methods approved by the Engineer.

A **lot** is that amount of material which is evaluated for pay purposes. Each **lot** is evaluated as a separate project based on results from a specified number of random samples, and each day's production will be divided into lots. The standard size of a **lot** will consist of five thousand (5000) feet

of any pass on each separate lift made by the paving train regardless of the width of the pass or the thickness of the course.

The size of any given lot may vary according to that day's production based on the following:

- (1) If the day's production is less than or equal to seven thousand (7000) feet, the entire day's production will be considered **one lot**.
- (2) If the day's production is greater than seven thousand (7000) feet, the first five thousand (5000) feet shall be considered **one lot**, and the remaining production (up to an additional 7000') will be considered a **second lot**.
- (3) If the day's production is greater than twelve thousand (12,000) feet, the first five thousand (5000) feet shall be considered **one lot**, the second five thousand (5000) feet shall be considered a **second lot**, and the remaining production (up to an additional 7000') will be considered a **third lot**.

Whether due to miscommunication, plant breakdown, extreme weather, or other events beyond control, there may be instances when only one sample of the plant produced mix may be obtained on a day's production that exceeds more than one lot. When this occurs, the test data from that sample will be used for all lots on that day. If the mix design or type is changed during the day's production, a new **lot** will be established.

In most cases, all lots are to be closed out at the end of each day. However, in some instances, at the direction of the Engineer, it may be necessary or practical to take two small lots produced on consecutive days, and combine them into one lot.

## **1-7 - CONTROL OF MATERIALS AND WORK**

The Contractor shall obtain for the Engineer, within one (1) business day of the Engineer's submission of request in writing to the Contractor, the right to enter upon the premises of any of the material manufacturers, suppliers, plants, laboratories, or equipment for purposes pertaining to the work, to carry out such inspection, sampling, and testing as specified or as requested by the Engineer.

Materials samples will be taken by a qualified representative of the Contractor, under the direction or supervision of the COUNTY. The County may elect, at any time, to obtain samples by a qualified and duly authorized representative of the COUNTY. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request. No tests, approvals or inspections by the COUNTY, Architect/Engineer (A/E), Construction Manager (CM), or their representatives shall relieve the Contractor of its responsibility for conformance to the requirements of the contract.

### **1-7-2 Scheduling the Work and Notification to COUNTY:**

The Contractor shall be responsible for providing the COUNTY Inspector a minimum of twenty-four (24) hours advance **written** notice prior to the application of any asphalt paving. This advance notice shall be received by the main office of the Construction Administration Division and shall include in the notice the time and date that the work is scheduled for. This advance notice is a requirement for any asphalt paving application in order to allow the COUNTY to provide the necessary scheduling of testing laboratory services as well as any additional inspection personnel that may be required for the work. Any asphalt mixture placed without the required **written** notification will be removed and replaced at the cost of the Contractor, accepted at no cost to the COUNTY, or accepted at a reduced rate as determined by the Engineer.

If the scheduled asphalt paving application is canceled or postponed within fifteen (15) hours prior to the scheduled date and time, the Contractor shall be assessed a minimum sum equal to five (5) hours

of stand-by time based on the current contract rate for “stand-by time” of the COUNTY’S annual Bituminous Testing Services contract. If the actual stand-by time is greater than five hours, the Contractor shall be assessed the actual time. Payment to the COUNTY of such sums as may become payable under the provisions of this article shall be made by identifying the said sums as a credit item on the Contractor’s final pay estimate.

### **1-7-3 Contractor Quality Control System:**

All materials incorporated into the work shall conform to the requirements and conditions of FDOT Standard Specifications, Division II, 330-2, except as amended herein.

The Contractor shall provide the necessary quality control personnel, and employ a Quality Control Technician who is certified by the FDOT – CTQP and possesses a valid certificate of qualification. When it becomes evident to the County that the Quality Control Technician cannot perform as required by the position, the County will require replacement with another certified technician. The County reserves the right to run any test at any time for informational purposes and for determining the effectiveness of the Contractor’s quality control.

The Contractor shall conduct field verification of the mix at each plant whenever producing more than eighty (80) tons per day of each mix for any County projects. Mix verification tests will be conducted per Section 5-4-4.1.

### **1-7-4 Responsibility:**

The COUNTY will be responsible for determining the acceptability of the construction and the material. Unless otherwise specified, the COUNTY will be responsible for all acceptance testing. The Contractor is responsible for the control and quality of the construction and the material. The Contractor shall also be responsible for sampling the loose hot mix asphalt. The sample shall be obtained by the Contractor’s FDOT CTQP Qualified Asphalt Paving Level II Technician or his duly authorized and qualified representative. The HMA sample shall be obtained immediately upon arrival of the COUNTY’S testing laboratory technician at the project site, under the direction of the COUNTY or its authorized test laboratory technician. The loose HMA sample shall be obtained from the paver hopper or from a delivery truck on the project site, and be immediately placed in an insulated container provided by the COUNTY. The COUNTY shall observe the Contractor’s acceptance sampling. If a suspected deviation from specified sampling or testing procedure is observed, the deviation shall be described to the Contractor by the Engineer immediately and confirmed in writing within twenty-four (24) hours. The individual responsible for the sampling deviation shall be instructed as to what the deviation was, and shall comply with proper methods on all future sampling occasions or be subsequently removed from the project.

### **1-7-5 Verification System:**

When sampling the plant-produced loose mix, the COUNTY or its authorized representative shall obtain enough material to perform two separate Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor (ASTM 6925) and Quantitative Determination of Asphalt Content from Asphalt Paving Mixtures by the Ignition Method (FM 5-563), Mechanical Analysis of Extracted Aggregate (FM 1-T030), and Maximum Specific Gravity of Bituminous Paving Mixtures (FM 1-T209). When the initial test results on samples of the plant-produced loose mix indicate nonconformance with the project specifications, the verification sample shall be tested, with the average of the two samples utilized for acceptance purposes. The Engineer shall have the authority to waive the testing of the verification sample, in which case, the results of the initial tests will be used for acceptance of the lot.

In lots where the cores taken after final compaction for density control indicate nonconformance with the project specifications, each lot shall be retested **before the area is open to vehicular traffic** in areas adjacent to the initial cores with the same number of cores originally taken. The average of both

sets of cores shall be utilized for acceptance purposes. The Engineer shall have the authority to waive the testing of the verification core samples, in which case, the results of the initial tests will be used for acceptance of the lot. If the area has been opened to vehicular traffic before the verification cores can be obtained, the initial set of cores will be used for acceptance purposes. The Engineer will make the final determination and disposition of the acceptance test results.

#### **1- 7- 6      Authority of the Engineer:**

All work shall be done under the supervision of the Engineer and performed to his satisfaction. The Engineer may appoint such assistants and representatives as he desires. They shall be authorized to inspect all work done and all materials furnished. Such inspection may extend to all or any part of the work and to the manufacture, preparation or fabrication of the materials to be used. Such assistants shall

not be authorized to revoke, alter or waive any requirement of the specifications. They shall be authorized to call to the attention of the Contractor any failure of the work or materials to conform to the specifications and contract, and shall have the authority to reject materials or suspend the work until any questions at issue can be referred to and decided by the Engineer. The Contractor shall be immediately notified in writing of any such suspension of the work and such notice shall state in detail the reasons for the suspension. The presence of the Inspector or other assistant shall in no way lessen the responsibility of the Contractor.

Nothing in these Specifications or in the contract documents requires the Engineer to provide the Contractor with direction or advice on how to do the work. If the Engineer approves or recommends any method or manner for doing the work or producing materials, the approval or recommendation shall not:

- (1) Guarantee that following the method or manner will result in compliance with the contract,
- (2) Relieve the Contractor of any risks or obligations under the contract, or
- (3) Create any Contracting Agency liability.

#### **1 - 7 - 7      Suspension of the Work:**

At the Contractor's risk, the Engineer may suspend all or part of the work if:

- (1) The Contractor fails to fulfill contract terms, to carry out the Engineer's orders, or correct unsafe conditions of any nature.
- (2) The weather or other conditions are unsuitable; or,
- (3) It is in the public interest.

## **SECTION TWO - HOT BITUMINOUS MIXTURES PLANT METHODS AND EQUIPMENT**

### **2-1 GENERAL**

This Section specifies the plant and methods of operation for preparing all plant-mixed hot bituminous mixtures for surface courses and bases, and the requirements for the equipment to be used in the construction of the pavements and bases. The Engineer may inspect the production of material at the source of supply. During periods when hot bituminous mixtures are being produced for incorporation into Pinellas County projects, all areas of the asphalt plant operations shall be made accessible at all times to the Engineer and any of his duly authorized representatives. The Engineer or his duly authorized representatives shall have free entry at all times to such parts of the plant as concerns the manufacture or production of the materials. The Engineer or his duly authorized representatives shall have free entry to the plant testing laboratory to observe the Contractor's quality control testing procedures and equipment. The Engineer or his duly authorized representatives shall have available for use the Contractor's laboratory equipment for quality assurance testing on hot bituminous mixtures which are being produced for incorporation into Pinellas County projects. The County assumes no obligation to inspect materials at the source of supply.

### **2-2 REQUIREMENTS FOR ALL PLANTS**

#### **2-2-1 The Overall Plant:**

The asphalt plant shall be designed, manufactured, coordinated and operated in a manner that will consistently produce a mixture within the job mix tolerances and temperatures specified.

#### **2-2-2 Scale Requirements:**

Plant-mixed hot bituminous mixture, whether from drum, batch or continuous mix plants and regardless of the method of measurement for payment, shall be weighed on truck scales furnished by the Contractor.

The scales shall be of the type which indicates directly the total weight of the loaded truck. The scales shall meet the requirements for accuracy, condition, etc. of the Bureau of Weights and Measures of the Florida Department of Agriculture and such fact shall be re-certified every six (6) months, either by the Bureau of Weights and Measures or by a registered scale technician.

#### **2-2-3 Equipment for Preparation of Bituminous Material:**

Tanks for the storage of bituminous material shall be equipped for heating the liquid asphalt, under effective and positive control, to the temperatures required for the various mixtures. Heating shall be accomplished by hot-oil, steam, electricity or other means whereby no flame comes in contact with the tank. The circulating system shall be of adequate size to insure proper and continuous circulation during the entire operating period. All pipe lines and fittings shall be steam or hot-oil-jacketed, to prevent heat loss. A thermometer, reading from 200° to 400°F, shall be located either in the storage tank or in the bituminous feed line. Prior to using bituminous storage tanks, written evidence of calibration shall be provided to the COUNTY.

#### **2-2-4 Cold Feed:**

A separate cold bin shall be provided for each component of the fine and coarse aggregates required by the design mix. The cold bins shall be equipped with accurate mechanical means for feeding the aggregates uniformly into the dryer in the proportions required for the finished mix, so that uniform production and temperature will be maintained and the proper proportion (in dry weight) will be charged to the plant. Each cold feeder shall be capable of being easily and accurately calibrated to assure full control of the mix gradation.

#### **2-2-5 Dryer:**

A dryer of any satisfactory design for heating and drying the mineral aggregates shall be provided. The dryer shall be capable of heating the aggregates to within the specified temperature range for any mix and shall be equipped with an electric pyrometer placed at the discharge chute, to automatically register the temperature of the heated aggregates.

#### **2-2-6 Gradation Unit:**

Batch plant screens capable of separating the fine and coarse aggregates, and of further separating the coarse aggregate into specific sizes, shall be provided. (The coarse aggregate shall be defined as the aggregate retained on the No. 10 screen.) In addition, the gradation unit shall be equipped with a scalping screen to restrict the maximum size of the aggregates.

#### **2-2-7 Hot Bins:**

Batch plants shall include storage bins of sufficient capacity to supply the mixer when it is operating at full capacity. The hot bins shall be divided into compartments to insure separate and adequate storage of the appropriate fractions of the aggregate. Each compartment shall have an overflow chute of suitable size and location to prevent any backing up of material into other bins. Multiple bin pulls will not be allowed unless specifically approved by the COUNTY. Screening efficiency will be tested for compliance throughout the contract.

#### **2-2-8 Bituminous Control Unit:**

Satisfactory means, either by weighing, metering or volumetric measurement, shall be provided to obtain the proper amount of bituminous material in the mix, within the tolerance specified for the job mix. Suitable means shall be provided for either steam or hot-oil jacketing for maintaining the bituminous material at the specified temperature in the pipe lines, meters, weigh buckets, spray bars and other containers or flow lines.

#### **2-2-9 Pugmills:**

For all pugmills, the clearance between the paddle tips and the lining of the pugmill shall not exceed one inch. For pugmills with both long and short paddle arms, this requirement shall apply to the long arms only. When any paddle is worn more than 3/4 inch from its original dimensions, it shall be replaced or restored to its original dimensions. The pugmills shall be operated in the manner recommended by the manufacturer.

#### **2-2-10 Sampling of Hot Aggregates:**

Convenient and accurate means shall be provided for obtaining samples of hot aggregates from each bin before the material enters the pugmill.



## **2-2-11 Hot Storage or Surge Bins:**

The use of hot storage or surge bins will be permitted with the approval of the Engineer.

## **2-3 PAVING EQUIPMENT** **MECHANICAL SPREADING & SCREEDING EQUIPMENT**

### **2-3-1 General:**

The mechanical spreading and screeding equipment shall be of an approved type that is self-propelled and can be steered. It shall be equipped with a receiving and disbursing hopper and a mechanical screed. The screed shall be capable of adjustment to regulate the depth of material spread and to produce the desired cross section.

### **2-3-2 Automatic Screed Control:**

For use on all asphaltic concrete surfaces and final leveling courses, in widths of 20 feet or greater, the paving machine shall be equipped with automatic screed controls of either the skid type or the traveling stringline type. (The wire type automatic screed control will not be permitted.) The length of the skid or the traveling stringline shall be at least 25 feet. For pavements less than 20 feet in width, the automatic screed control will not be required. When a pass is being made adjacent to a previously placed mat, the joint matcher may be used in lieu of the skid or string-line type control.

Equipment other than specified will not be permitted without prior approval of Engineer.

### **2-3-3 Inflation of Tires:**

When the paving machine is equipped with pneumatic tires, the Engineer may require that the tires be ballasted.

### **2-3-4 Screed Width:**

Paving machines used on main roadway shall have a screed width greater than eight feet. On widening strips, cross-overs, ramps, etc., paving machines having a screed width of eight feet or less may be used.

## SECTION 3 - HOT BITUMINOUS MIXTURES GENERAL CONSTRUCTION REQUIREMENTS

### **3-1 DESCRIPTION**

This Section specifies the general construction requirements for all plant-mixed hot bituminous pavements and bases.

### **3-2 WEATHER LIMITATIONS**

Plant operations shall not begin unless all weather conditions are suitable for the laying operations.

#### **3-2-1 Limitations of Laying Operations**

General: The mixture shall be spread only when the surface upon which it is to be laid has been previously prepared, is intact, firm and properly cured, and is dry. Unless otherwise approved by the Engineer, no mixture shall be spread that cannot be finished and compacted during daylight hours.

#### **3-2-2 Temperature:**

The mixture shall be spread only when there is no evidence of frozen base and the air temperature (the temperature in the shade away from artificial heat) is above 40°F for layers greater than one (1) inch in thickness and above 45°F for layers one (1) inch or less in thickness.

#### **3-2-3 Wind:**

The mixture shall not be spread when the wind is blowing to such an extent that proper and adequate compaction cannot be maintained or when sand, dust, etc. are being deposited on the surface being paved, to the extent that the bond between layers will be diminished.

### **3-3 PREPARATION OF ASPHALT CEMENT**

The asphalt cement shall be heated in advance of the mixing operations, to within a range of 230°F to 350°F. Heating within these limits shall be constant and wide fluctuations of temperature during a day's production will not be permitted.

### **3-4 PREPARATION OF AGGREGATES**

#### **3-4-1 Stockpiles:**

Prior to production of the mix, aggregates shall be stockpiled for a sufficient period of time to facilitate the drainage of free moisture. Each aggregate component shall be placed in an individual stockpile, which shall be separated from the adjacent stockpiles, either by space or by a system of bulkheads.

The intermingling of different materials in stockpiles shall be prevented at all times.

### **3-4-2 Prevention of Segregation:**

Stockpiles shall be formed and maintained in a manner that will prevent segregation. If the stockpile is determined to have excessive segregation, the Engineer will disapprove the material for use on the project until the appropriate action has been taken to correct the problem.

### **3-4-3 Blending of Aggregates:**

Blending or proportioning from railroad cars will not be permitted. All aggregates shall be stockpiled prior to blending or placing in the cold hoppers. All aggregates to be blended or proportioned shall be placed in separate bins at the hopper and proportioned by means of securely positioned calibrated gates or other approved devices.

### **3-4-4 Mineral Filler:**

If mineral filler is required in the mix, it shall be fed or weighed-in separately from the other aggregates.

## **3-5 PREPARATION OF MIXTURES**

### **3-5-1 Aggregates:**

The dried aggregates and mineral filler (if required), prepared in the manner previously described, and combined in batches to meet the job mix formula by weighing each separate bin size, shall be conveyed to the empty mixer.

### **3-5-2 Bitumen:**

The hot asphalt cement, accurately measured, shall be introduced into the mixer simultaneously with, or after, the hot aggregates. Mixing shall continue until the mixture is thoroughly uniform, with all particles fully coated.

### **3-5-3 Mixing Time:**

The mixing time shall begin when the measuring devices for both the asphalt and the aggregates indicate that all the material is in the mixer, and shall continue until the material begins to leave the mixing unit. The mixing time will vary in relation to the nature of the aggregates and the capacity of the mixer and shall be as designated by the Engineer but in no case shall it be less than 35 seconds.

### **3-5-4 Continuous Mixing:**

The dried aggregates and mineral filler (if required), prepared as specified and proportioned to meet the job mix formula by volumetric measurements, shall be introduced into the mixer in synchronization with the accurate feeding of the hot asphalt cement. The rate of flow of material to the pugmill shall be such that the maintained depth of the mix will not exceed the tips of the paddles when in the upright position. Mixing shall be sufficient to produce a thoroughly and uniformly coated mixture.

### **3-5-5 Drum Mixing:**

The aggregates and mineral filler, if required prepared or specified and proportioned to meet the job mix formula shall be introduced into the drum mixer with the accurate feeding of asphalt cement. The rate of flow of material to the drum shall be such that the manufacturers mixing capacity shall not be exceeded. Mixing shall be sufficient to produce a thoroughly and uniformly coated mixture.

### **3-5-6 Mixing Temperature:**

The ingredients of the mix shall be heated and combined in such a manner as to produce a mixture which shall be at a temperature, when discharged from the pugmill or hot storage (surge) bin, within 25°F of the temperature set by the Engineer (Mix Design), and within the master temperature limits of 250°F to 330°F. The mix temperature will be taken at the plant and the roadway for each day for each design mix on the first five loads and an average of once every five loads thereafter. The temperature measurements at the plant shall be taken and recorded by the Contractor's personnel for review by the COUNTY. The temperature measurements at the roadway will be taken by the COUNTY's Inspector and recorded on the backside of the delivery ticket. The temperature tolerance for any single measurement is  $\pm 25^{\circ}\text{F}$  from the job mix formula and  $\pm 15^{\circ}\text{F}$  from the job mix formula for the average of any five (5) consecutive measurements. If the temperature exceeds the specified tolerance, the Contractor will be required to take immediate corrective action.

### **3-5-7 Contractor's Responsibility for Mixture Requirements:**

The responsibility for producing a homogeneous mixture, free from excess moisture and with no segregated materials, and meeting all requirements of the specifications for the mixture, including compliance with the design limits, shall lie entirely with the Contractor. These requirements shall also apply to all mixes used from a hot storage or surge bin, both before and after storage.

**No mix shall be stored overnight.**

## **3-6 TRANSPORTATION OF THE MIXTURE**

The mixture shall be transported in tight vehicles previously cleaned of all foreign material and each load shall be fully covered with a canvas or other suitable material. All covers shall be so constructed and secured as to prevent the entrance of moisture and the rapid loss of temperature. The inside surface of the truck bodies shall be thinly coated with soapy water or an approved emulsion containing not over 5% oil, but no excess of either shall be used. Kerosene, gasoline or similar products shall not be used. After the truck bodies are coated and before any mixture is placed therein, they shall be raised so that all excess liquids will be drained out. A 3/8 inch diameter hole shall be provided on each side of the vehicle body near the center and six inches above the vehicle bed for the purpose of inserting a thermometer.

The final mixture shall not be crusted over, contain lumps, or be contaminated with deleterious agents such as unburned fuel, objectionable fuel residue, or any other material not inherent to the job-mix formula. In cases of rejected material, the entire load shall be rejected unless otherwise approved by the Engineer.

The use of petroleum distillates to clean the paver or other equipment will not be allowed on any paved surface. The cleaning of hand tools will be allowed inside of containers firmly attached to the paver, which have a sufficient volume to prevent spilling of petroleum distillates on to the surface to be paved. Any spillage on to the surface to be paved will be promptly cleaned up utilizing absorbent material and if necessary the surface will be retacked. If in the opinion of the Engineer, the container attached to the paver is insufficient in any way, it will be removed and hand tools will be cleaned beyond the paving limits until a suitable container is provided. Petroleum distillates in sprayers or buckets will not be allowed within the boundaries of the area to be paved.

Deliveries shall be scheduled so that placing and compacting of the mixture is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

## **3-7 COATING MATERIALS**

### **3-7-1 Prime Coat:**

Shall meet the requirements of FDOT Spec Section 300 except as amended herein. The material used for prime coat shall be cut-back Asphalt, Grade RC-70 or RC-250, meeting the requirements of AASHTO M81-751, Emulsified Asphalt Grade RS-2, meeting the requirements of AASHTO M140-70 or other types and grades of bituminous material which may be called for in the plans or Special Provisions. The Contractor may select any of the specified bituminous materials for use, unless the plans or Special Provisions indicate use of a specific material. Types and grades of bituminous material other than those specified above may be allowed if it can be shown that the alternate material will properly perform the function of prime coat material.

All distributors used for applying prime coats shall be calibrated prior to use. Calibrations may be performed by the FDOT State Materials Office or by a reliable and recognized firm engaged in calibrating tanks. All calibrations shall be reviewed and approved by the FDOT State Materials Office. The FDOT approved calibration chart shall be presented to the COUNTY Inspector at the project site prior to any application of prime materials.

### **3-7-2 Tack Coat:**

The work under this Section shall cover the furnishing and placing of a bituminous tack coat on an existing surface which is to be covered by a hot bituminous plant mix material. The work shall include the cleaning of the existing surface prior to application of the tack coat. The area of treatment and the rate of application of a tack coat shall be based on the plans and specifications after evaluating the actual surface condition on which the plant mix overlay is to be placed.

#### **Materials**

The material shall be an anionic emulsion (NTSS-1HM) blended to meet the following minimum requirements:

TEST ON EMULSIFIED ASPHALT			
PARAMETER	TEST METHOD	MIN	MAX
VISCOSITY, SF @ 77° F, SEC	AASHTO T 59	25	500
STORAGE STABILITY 1 DAY	AASHTO T 59	----	1.0 %
STORAGE STABILITY 5 DAY	AASHTO T 59	----	5.0 %
RESIDUE BY EVAPORATION	AASHTO T 59	50	-----
RESIDUE BY DISTILLATION	AASHTO T 59	50	-----
NAPHTA CONTENT	AASHTO T 59	----	1.0 %
SIEVE TEST	AASHTO T 59	*	*

\* The Sieve result is tested for reporting purpose only. Sieve test may be waived if no application problems are present in the field.

TEST ON RESIDUE FROM DISTILLATION OF EMULSION			
PARAMETER	TEST METHOD	MIN	MAX
PENETRATION @ 77° F	AASHTO T 49	5	20
SOFTENING POINT	AASHTO T 53	65° C	-----
ORIGNAL DSR @ 86° C	AASHTO T 315	1.0	-----

#### Construction Requirements

- (a) **EQUIPMENT.** It shall be the Contractor's responsibility to select the proper size and amount of equipment to provide the desired results.
- (b) **WEATHER AND TEMPERATURE LIMITATIONS.**  
The bituminous tack material shall be applied in conformity with the following:
1. **WEATHER** - Tack material shall not be applied on an extremely wet surface or when weather conditions are determined not suitable by the Engineer.
  2. **TEMPERATURE** - The atmospheric temperature should be 40° F and rising. This tack material shall not be used for cold applied Asphalt pavements. This tack can be used with warm mix asphalt with lay down temperatures over 200F.
- (c) **PREPARATION OF EXISTING SURFACE.**  
Loose material, dust, dirt, and all foreign matter shall be removed from the surface to be treated. Approval of the surface before application of the tack material is required.
- (d) **APPLICATION.**  
Tack coat material shall be applied in an amount from 0.04 gallons per square yard up to a maximum of 0.08 gallons per square yard for emulsified asphalt unless altered by the Engineer. Application temperature is 150° F to 180° F. An asphalt distributor shall be provided for use on all accessible areas; inaccessible areas such as around manholes, etc. may be coated by other approved methods. When applying tack coat, it shall be applied to all contact surfaces of curbs, gutters, manholes, and adjacent pavement edges, whenever and to the extent directed. Adjacent surfaces, such as gutters and the like, that is not to be in contact with the mix, shall be adequately protected from the spray, by means of heavy paper securely fastened in place or other satisfactory means. Any such surface soiled by tack coat material shall be cleaned and restored to its previous condition without additional compensation. Tack coat material shall be spread only far enough in advance to permit the construction to progress consistently, uniformly, and continuously after the curing period. Tack coat shall be fully cured not showing wet surface prior to placement of hot mix. Tack coat that has been damaged or worn off shall be replaced without extra compensation.

The Contractor shall use a distributor designed, equipped, calibrated, maintained, and operated so material may be applied uniformly, on variable widths of surface up to 15 feet, at readily determined and controlled rates, as specified, capable of uniform distributing pressure, and with an allowable variation from any specified rate not exceeding 0.02 gallon per square yard. The Contractor shall satisfactorily correct uncoated and lightly coated areas with an application of additional bituminous material. The emulsified asphalt tack coat shall be applied at a rate approved by the Engineer which will leave a uniform asphalt residue from 0.02 to 0.08 gallon per square yard on the treated surface.

The Contractor shall submit a certificate to the Engineer indicating the asphalt residue content of the material being used. All distributors used for applying tack coats shall be calibrated prior to use. Calibrations may be performed by the FDOT State Materials Office or by a reliable and recognized firm engaged in calibrating tanks. All calibrations shall be reviewed and approved by the FDOT State Materials Office. The FDOT approved calibration chart shall be presented to the COUNTY Inspector at the project site prior to any application of tack materials.

The Engineer will inform the Contractor of the target application rate for each project site. Application rates will be verified by the Engineer during installation, and, if necessary, adjustments made to the application rate as the work progresses. After adjustments during installation are made, and the rate of tack applied is not within eighty (80) to one hundred twenty (120) percent of the target application rate established by the Engineer, the work shall be considered non-complying. If the application of the tack material is deemed by the Engineer to be non-uniform or if the tack does not adhere to the existing surface after application due to improper preparation of the surface, the work shall be considered non-complying. Any lots deemed non-complying by the Engineer due to non-specified tack application, payment for those lots shall be reduced by ten (10) percent of the contract price of the affected lot.

<u>Existing Pavement Condition</u>	<u>Recommended Application Rate (gal/yd<sup>2</sup>)***</u>		
	<u>Residual</u>	<u>Undiluted*</u>	<u>Diluted (1:1)</u>
New Asphalt	0.03 to 0.04	0.05 to 0.07	0.10 to 0.13
Oxidized Asphalt	0.04 to 0.06	0.07 to 0.10	0.13 to 0.20
Milled Asphalt	0.06 to 0.08	0.10 to 0.13	0.20 to 0.27
Milled PCCP	0.06 to 0.08	0.10 to 0.13	0.20 to 0.27
Portland Cement Concrete (PCCP)	0.04 to 0.06	0.07 to 0.10	0.13 to 0.20
Vertical Face	**	**	**
*Rates shown are for slow setting emulsions (SS-1h, SS1) containing approximately 60% bituminous material. **Longitudinal construction joints should be treated using a rate that will thoroughly coat the vertical face without running off. ***Use the undiluted or diluted rate appropriate to obtain the desired residual rate.			

A tack coat meeting the requirements of FDOT Section 300 may be used at the Engineer's option.

### 3-7-3 Tack Coat Required:

A tack coat, as specified in 3-7-2, will be required on these surfaces:

- (1) Between successive surface courses.
- (2) Between successive leveling courses.
- (3) Between successive asphalt base courses
- (4) Between the leveling and surface courses.
- (5) On old pavements to be patched, leveled, or resurfaced.
- (6) On milled pavements to be patched, leveled, or resurfaced.

### 3-7-4 Tack Coat at Engineer's Option:

A tack coat will be required on the following surfaces only when so directed by the Engineer.

- (1) Freshly primed bases.
- (2) Surface treatment.

**Trickle tacking or priming will not be allowed**, and work may be suspended until corrective action is taken, if the Contractor does not meet the requirements of the above specification.

## **3-8 PREPARATION OF APPLICATION SURFACES**

### **3-8-1 Cleaning:**

Prior to the laying of the mixture, the surface of the base or pavement to be covered shall be cleaned of all loose and deleterious material by the use of power brooms or blowers, supplemented by hand brooming where necessary. The cleaned surface of the base or pavement to be covered shall be approved by the Engineer prior to any placement of asphalt.

### **3-8-2 Patching and Leveling Courses:**

Where a surface course is constructed on an existing pavement or old base which is irregular, and wherever so indicated in the plans, the existing surface shall be brought to proper grade and cross section by the application of patching or leveling courses.

### **3-8-3 Application Over Surface Treatment:**

Where a surface course is to be placed over a existing or newly constructed surface treatment, all loose material shall be swept from the paving area and disposed of by the Contractor.

### **3-8-4 Coating Surfaces of Contacting Structures:**

All structures which will be in actual contact with the asphalt mixture, with the exception of the vertical faces of existing pavements and curbs or curb and gutter, shall be painted with a uniform coating of asphalt cement to provide a closely bonded, watertight joint.

## **3-9 PLACING MIXTURE**

### **3-9-1 Requirements Applicable to All Types:**

3-9-1.1 Alignment of Edges: All asphaltic concrete mixtures (including leveling courses), other than adjacent to curb and gutter or other true edges, shall be laid by the stringline method, to assure the obtaining of an accurate, uniform alignment of the pavement edge.

3-9-1.2 Temperature of Spreading: The temperature of the mixture at the time of spreading shall be maintained within  $\pm 25^{\circ}\text{F}$  of the established, approved mix design temperature, which temperature shall be between  $250^{\circ}\text{F}$  to  $330^{\circ}\text{F}$ , or as directed by the Engineer. If the temperature fails to fall within the specified tolerance, the Contractor shall take immediate corrective action to bring the temperature of subsequently produced loads to within the specified tolerance. Unless specifically authorized by the Engineer, no mix shall be incorporated into the work at the time of spreading which has a temperature higher than  $335^{\circ}\text{F}$  or lower than  $230^{\circ}\text{F}$ . When the mix temperature upon delivery to the site or upon placement into the paver hopper is found to be outside this range, the Contractor will be notified that this non-conforming material and any subsequent non-conforming loads produced in that lot shall be rejected for use on the project.

3-9-1.3 Rain and Surface Conditions: Transportation of asphalt mixtures shall immediately cease from the plant when rain begins at the roadway. Asphalt mixtures shall not be placed while rain is falling, or when there is water on the surface to be covered. As an exception, mixture caught in transit may be placed at the Contractor's risk if the only option is to waste this mixture, and provided the surface has been tacked (as required) prior to the rain and the surface broomed in front of the spreading operation and all standing water removed. Such mixture will be evaluated separately and if it should prove unsatisfactory in any way, in the



opinion of the Engineer, it shall be removed and replaced with satisfactory mixture at the Contractor's expense.

3-9-1.4 Speed of Spreader: The forward speed of the asphalt spreader shall be as established by the Engineer. Coordination of the paving operation and the loading operation shall be adjusted to maintain an adequate amount of asphalt mixture in the paver hopper and to minimize, to the greatest extent possible, the stopping and starting of the asphalt spreader. The paver hopper shall not be allowed to become empty between loads. Asphalt mix that clings to the sides of the hopper shall be continually loosened and pushed into the active mix. The amount of material carried ahead of the screed should be kept uniform in height. Should unevenness of texture, tearing, segregation, or shoving occur during the paving operation due to unsatisfactory methods

or equipment, the Contractor shall immediately take such action as may be necessary to correct such unsatisfactory work. Throwing back excessive material on the pavement mat to correct tearing and surface segregation irregularities will not be permitted.

3-9-1.5 Number of Crews Required: For each paving machine being operated, the Contractor will be required to use a separate crew; each crew operating as a full unit. The Contractor shall provide a Florida Department of Transportation (FDOT) CTQP Qualified Asphalt Paving Level II Technician and competent workmen capable of performing the work as specified to each paving crew. At the Pre-Construction or Pre-Paving Conference, the Contractor shall submit to the COUNTY, the name of the FDOT CTQP Qualified Asphalt Paving Level II Technician assigned to each crew and proof of current certification. The Contractor's FDOT CTQP Qualified Asphalt Paving Level II Technician in charge of the paving operations may be responsible for more than one crew but must be physically accessible to the Engineer and project personnel at all times when mix is being placed. If the Contractor's FDOT CTQP Qualified Asphalt Paving Level II Technician is not physically accessible to the Engineer when mix is being placed, paving operations shall be immediately suspended and not resumed until the FDOT CTQP Qualified Asphalt Paving Level II Technician is present at the paving site.

3-9-1.6 Checking Depth of Layer: The depth of each layer shall be checked at frequent intervals, and adjustments shall be made when the thickness exceeds the allowable tolerance. When an adjustment is made, the paving machine shall be allowed to travel a minimum distance of 30 feet to stabilize before the second check is made to determine the effects of the adjustment.

3-9-1.7 Hand Spreading: In limited areas where the use of the spreader is impossible or impracticable, the mixture may be spread and finished by hand. The asphaltic concrete shall be distributed immediately into place by suitable tools and spread in a uniformly loose layer.

3-9-1.8 Motor Grader Spreading: Unless specifically approved by the Engineer, spreading of the hot mix asphalt with a motor grader will not be allowed.

3-9-1.9 Straightedging and Back-patching: Straightedging and back-patching shall be done after initial compaction has been obtained and while the material is still hot.

3-9-1.10

## **3-9-2 Requirements Applicable Only to Surface Courses:**

3-9-2.1 Spreading and Finishing: Upon arrival, the mixture shall be dumped into the approved mechanical spreader and immediately spread and struck-off to the full width required and to such loose depth for each course that, when the work is completed, the required weight of mixture per square yard, or the specified thickness, will be secured. An excess amount of mixture shall be carried ahead of the screed at all times and shall be kept uniform in height. Hand raking done behind the machine shall be kept to an absolute minimum and done only when required. Loose or surplus hot-mix shall not routinely be cast across the mat surface.

**3-9-2.2 Thickness of Layers:** The allowable layer thicknesses for fine Type SP Asphalt Concrete mixtures are as follows unless otherwise approved by the Engineer:

Type SP-9.5.....3/4 to 1.5 inches  
Type SP-12.5.....1-1/4 to 2-1/2 inches  
Type SP-19.0.....2 to 2-3/4 inches

Each layer shall be thoroughly compacted and shall conform to the requirements of these specifications before an additional layer is placed.

**3-9-2.3 Laying Width:** If necessary due to the traffic requirements, the mixture shall be laid in strips in such manner as to provide for the passage of traffic. Where the road is closed to traffic, the mixture may be laid to the full width, by machines traveling in echelon.

**3-9-2.4 Correcting Defects:** Before any rolling is started the surface shall be checked, any irregularities adjusted, and all drippings, fat sandy accumulations from the screed, and fat spots from any source shall be removed and replaced with satisfactory material. No skin patching shall be done. When a depression is to be corrected while the mixture is hot, the surface shall be well scarified before the addition of fresh mixture.

### **3-9-3 Requirements Applicable Only to Leveling Courses:**

**3-9-3.1 Patching Depressions:** Before any leveling course is spread, all depressions in the existing surface more than one inch deep shall be filled by spot patching with leveling course mixture and then thoroughly compacted.

**3-9-3.2 Work Adjacent to Bridge Ends:** On resurfacing projects where the roadway joins an existing bridge and where necessary to insure that a bump will not be created by the overlay, before any surfacing is placed adjacent to the bridge, a portion of the existing pavement shall be bladed off, in order that a smooth transition between the new surfacing and the bridge end may be effected.

**3-9-3.3 Spreading Leveling Courses:** The leveling shall be placed by the use of a paving machine meeting the requirements of Section 2-3. Other types of leveling devices may be used, provided they are specifically approved by the Engineer prior to use.

**3-9-3.4 Rate of Application:** When the total amount of leveling course material to be applied exceeds 50 pounds per square yard, it shall be applied in separate courses, with the average spread not to exceed 50 lbs. per square yard. As an exception, the average spread for each course of Type SP12.5 Asphaltic Concrete leveling shall not exceed 75 lbs. per square yard. Unless otherwise indicated the quantity shown in the plans for leveling represents an average for the entire job. The rate of application of leveling may be increased or decreased, as necessary, at locations designated by the Engineer. Where widening construction is specified in connection with leveling, the Engineer may require that approximately fifty percent of the leveling be placed prior to the widening operation.

**3-9-3.5 Placing Leveling Over Existing Concrete Pavement:** For leveling course to be applied over broken existing concrete pavement (with or without old asphaltic surface), the first course of the leveling shall be placed as soon after the cracking and reseating of the concrete as is practicable, but not later than two days after the cracking operations on any section. The remainder of the surfacing shall follow in the normal sequence of operations.

**3-9-3.6 Removal of Excess Joint Material:** Where leveling is placed over concrete pavement or concrete deck-slab bridges, all excess joint filler at the cracks and joints shall be removed flush with the existing concrete prior to placing the leveling course.

## **3-10 MIX SEGREGATION**

### **3-10-1 Definitions:**

3-10-1.1 Segregation: Areas of non-uniform distribution of coarse and fine aggregate particles in a bituminous pavement.

3-10-1.2 End-of-Load Segregation: A systematic form of segregation typically identified by chevron-shaped segregated areas at either side of a lane corresponding with the beginning and end of truck loads.

3-10-1.3 Longitudinal Segregation: A linear pattern of segregation that usually corresponds to a specific area of the paver.

3-10-1.4 Severity of Segregation:

(A) LOW: A pattern of segregation where the mastic is in place between the aggregate particles; however, there is slightly more coarse aggregate in comparison with the surrounding acceptable mat.

(B) MEDIUM: A pattern of segregation that has significantly more coarse aggregate in comparison with the surrounding acceptable mat and which exhibits some lack of mastic.

(C) HIGH: A pattern of segregation that has significantly more coarse aggregate in comparison with the surrounding acceptable mat and which contains little mastic

### **3-10-2 Quality Control By The Contractor:**

The Contractor and the Engineer will evaluate the in-place mat daily for segregation. The Contractor's FDOT CTQP Qualified Asphalt Paving Level II Technician will be the individual responsible for monitoring segregation avoidance. The Contractor shall conduct the paving operation and the handling of asphaltic concrete at all times such as to prevent medium or high segregation and to minimize low segregation.

The Contractor shall continually monitor the plant operations, hauling of the mix, paver operations, and the compacted mat for segregation.

### **3-10-3 Corrective Action By The Contractor:**

When medium or high segregation of the mixture is identified by the Contractor, the Engineer, or the daily evaluation, the following specific actions shall be taken:

(A) End-Of-Load Segregation: If medium or high end-of-load segregation is identified, the following actions, as a minimum, shall be taken:

- (1) Trucks transporting the mixture shall be loaded in multiple dumps; the first against the front wall of the truck bed and then one against the tailgate in a manner which prevents the coarse aggregate from migrating to those locations.
- (2) The paver shall be operated so the hopper is never below 30 percent capacity between truck exchanges.

- (3) The "Head of Material" in the auger area shall be controlled to keep a constant level, one (1) inch tolerance.
- (B) Longitudinal Segregation: If medium or high longitudinal segregation is identified, the Contractor shall make the necessary adjustment to the slats, augers, or screeds to eliminate the segregation.

The Contractor shall implement the corrective actions as soon as possible and report them to the Engineer before the next day's paving proceeds. If the corrective actions initiated by the Contractor are insufficient in controlling medium or high segregation, the Contractor and the Engineer will investigate to determine the cause of the segregation. When an investigation indicates additional corrective action is warranted, the Contractor shall implement operational changes necessary to correct the segregation problems. As determined by the Engineer, any asphaltic concrete which displays segregation shall be removed and replaced. All costs associated with the correction of pavement mix segregation problems shall be borne by the Contractor.

### **3-11 COMPACTING MIXTURE**

#### **3-11-1 Provisions Applicable to All Types:**

**3-11-1.1 Equipment:** Immediately after the asphalt mixture has been spread, struck off, and surface and edge irregularities adjusted, it shall be thoroughly and uniformly compacted. The surface shall be compacted as soon as possible when the mixture has attained sufficient stability so that the rolling does not cause undue displacement, cracking, or shoving. The Contractor shall use suitable rollers, combinations of rollers, and rolling patterns to compact the mixture to the required density. Rollers and/or rolling patterns which result in crushing of the aggregate will not be allowed. The sequence of rolling operations and the types of rollers used shall be at the discretion of the Contractor with the exception of the vibratory roller restrictions below.

Steel wheel tandem vibratory rollers which have been specifically designed for the compaction of asphalt pavements may be used, except that operation in the vibratory mode will be permitted only during the breakdown (initial) rolling phase on all surfaces greater than one (1) inch in thickness. At the sole discretion of the Engineer, operation in the vibratory mode may not be permitted during any finish rolling or when the layer thickness is one (1) inch or less.

Vibratory rollers shall have variable frequency and amplitude capability. The rollers shall be equipped with controls which automatically disengage the vibration mechanism before the roller stops when being used in the vibratory mode.

The Engineer may prohibit or restrict the use of vibratory rollers where damages to the underlying pavement structure, drainage structures, utilities, or other components is likely to occur, or is evident.

Rollers used to compact the mixture shall be in good condition, capable of reversing without backlash. The rollers shall be operated with the drive wheel nearest the paver and when the mixture is in the proper condition and when rolling will not cause undue displacement, cracking, or shoving. Steel wheel rollers shall be equipped with wetting devices in operational condition to prevent the mixture from sticking to the rollers wheels. Lateral or cross-rolling will be required at all butt or construction joints.

**The use of equipment and methods which results in excessive crushing of the aggregate or excessive displacement of the mixture will not be permitted.**

### **3-11-2 Rolling Procedures:**

Rollers shall move at a uniform speed with the drive roller or wheels nearest the paver. Rolling shall begin at the sides and proceed longitudinally parallel to the road centerline, each trip overlapping one half the roller width, gradually progressing to the crown of the road. When paving in echelon or abutting a previously placed lane, the longitudinal joint shall be rolled first followed by the regular rolling procedure. Where practical the longitudinal lane joints will be "pinched" by rolling from the existing portion of roadway and lapping over into the newly placed asphaltic material so as to tightly bond and compact the new asphalt to the existing asphalt.

On superelevated curves the rolling shall begin at the low side and progress to the high side by overlapping of longitudinal trips parallel to the centerline. Alternate trips of the roller shall be terminated in

steps to prevent the formation of surface irregularities. The alternate stops shall be spaced in such manner that any excess water will drain quickly. Lateral or diagonal rolling may be permitted to remove high spots, provided the rolling is done in such manner and at such time that shoving or cracking will not result. Rolling shall be continued until all roller marks are eliminated.

Any displacement occurring as a result of starting, stopping, or changing direction of a roller, or from other causes, shall be avoided. Areas of displacement shall be corrected at once by the use of rakes and addition of fresh mixture when required. Care shall be exercised in rolling not to displace the line and grade of the edges of the asphaltic concrete. If necessary to prevent adhesion of the mixture to the rollers, the wheels and rollers shall be kept properly moistened with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted.

Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh, hot mixture, which shall be compacted to conform with the surrounding area. Any area showing an excess or deficiency of asphalt cement shall be removed and replaced.

Rolling shall be continued until all roller marks are eliminated and before the un-modified mixture cools to 185° F (85° C) or the modified mixture cools to 200° F (93° C), except as otherwise specified.

If equipment breaks down or rolling does not keep up with the spreader, the Engineer may require that the paver be stopped until such time that the rollers have caught up to the laydown operations..

RECOMMENDED MAXIMUM ROLLER SPEEDS			
ROLLER TYPE	BREAKDOWN N (mi/hr)	INTERMEDIATE (mi/hr)	FINISH (mi/hr)
Steel-Tired Static-Weight Rollers	2	3	3*
Pneumatic-Tired Rollers	3	3	5
Vibratory Rollers	2½ - 3	2½ - 3	-----
*Also vibratory rollers in static mode.			

**3-11-2.1 Number of Pneumatic-tired Rollers Required:** A sufficient number of self-propelled pneumatic-tired rollers shall be used to assure that the rolling of the surface for the required number of passes will not delay any other phase of the laying operation nor result in excessive cooling of the mixture before the rolling is complete. **In the event that the rolling falls behind, the laying operation shall be discontinued until the rolling operations are sufficiently caught up.**

**3-11-2.2 Compaction of Areas Inaccessible to Rollers:** Areas which are inaccessible to a roller (such as areas adjacent to curbs, headers, gutters, bridges, manholes, etc.) shall be compacted by the use of hand tamps, hand operated mechanical tampers, or other satisfactory means. Along forms, curbs, inlet sumps, headers, walls and other places not accessible to the rollers, the

mixture shall be thoroughly compacted with hot hand tampers, smoothing irons, or with mechanical tampers. A trench roller shall be used on depressed areas inaccessible to regular width equipment. A one-ton roller or hand roller will be required to adequately compact tapered pavement edges.

**3-11-2.3 Rolling Patching and Leveling Courses:** Self-propelled pneumatic-tired rollers shall be used for the rolling of all patching and leveling courses.

**3-11-2.4 Correcting Defects:** The rollers shall not be allowed to deposit gasoline, oil or grease onto the pavement, and any areas damaged by such deposits shall be removed and replaced as directed by the Engineer. While rolling is in progress, the surface shall be tested continuously and all discrepancies corrected to comply with the surface requirements. All drippings, fat or lean areas and defective construction of any description shall be removed and replaced. Depressions which develop before the completion of the rolling shall be remedied by loosening the mixture and adding new mixture to bring the depressions to a true surface. Should any depression remain after the final compaction has been obtained, the full depth of the mixture shall be removed and replaced with sufficient new mixture to form a true and even surface.

All high spots, high joints and honeycomb shall be corrected as directed by the Engineer. Any mixture remaining unbonded after rolling shall be removed and replaced. Any mixture which becomes loose or broken, mixed or coated with dirt or in any way defective, prior to

laying the wearing course shall be removed and replaced with fresh mixture which shall be immediately compacted to conform with the surrounding area. Areas of defective surface may be repaired by the use of indirect heat. No method of repair involving open-flame heaters shall be used.

3-11-2.5 Provisions Applicable to Shoulder Pavement Only: Shoulder pavements wider than 5 1/2 feet shall be compacted by the use of equipment of the type required for other asphaltic concrete pavements. Compaction of asphaltic concrete 5 1/2 feet or less in width, shall be done by the use of tandem steel rollers not exceeding 12 tons in weight. Other compaction in such restricted widths shall be by the use of any type of rubber-tired equipment the Contractor may elect to use, approved by the Engineer.

### **3-11-3 Density Control and Determination for Asphaltic Concrete Pavement:**

The average density of each lot shall be determined by randomly located core samples obtained by the Contractor under the supervision of the COUNTY'S Inspector or duly authorized representative at locations designated by the COUNTY. The COUNTY Inspector should be present to witness the Contractor's coring operation. *In no case shall the Contractor core the asphaltic concrete pavement unless specifically authorized by the Engineer or the County's Inspector.* If the pavement is cored by the Contractor without authorization from the Engineer, the Engineer shall either require that the lot section be removed and replaced at the cost of the Contractor, or accepted at no cost to the COUNTY, or accepted at a reduced rate as determined by the Engineer. The COUNTY may elect to obtain the core samples using their authorized testing laboratory. The lot size shall be the same as that indicated in paragraph 1-6-2 (page 5).

3-11-3.1 Cores - Cutting: Core samples shall be neatly cut with a core drill. The cutting edge of the core drill bit shall be of hardened steel or other suitable material with diamond chips embedded in the metal cutting edge. The standard diameter of the sample shall be four (4) inches, however, the Contractor shall have the coring bits on hand to be able to cut two (2), four (4) or six (6) inch cores, as may be directed by the Engineer, however, the standard core size for the County will be four (4) inches for density determination. The standard core size for thickness determination will be two (2) or four (4) inches. Care should be exercised while retrieving, transporting, or storing the core that the sample is not distorted, bent, cracked or in any way changed from its physical condition as it was before removal from the pavement. **Two (2) core samples taken approximately within one foot of each other and shall be obtained at each**

**designated location specifically marked in the field by the Engineer.** Under no circumstances will the Contractor be allowed to adjust the designated core locations based on non-destructive density readings taken prior to the cutting of the cores. No additional cores shall be cut by the Contractor, unless specifically authorized by the Engineer.

The Engineer may elect to obtain only one core per location at the initial sampling, and obtain the verification core only if needed at a later date. Samples that are clearly defective, as a result of sampling, shall be discarded and another sample immediately taken within approximately one (1) foot of the original location at the direction of the County. The Contractor shall furnish all tools, labor, materials, and traffic control for cutting samples and filling the cored pavement. The Contractor is required to cut as many cores as the Engineer deems necessary to evaluate the pavement lot for acceptance purposes. In certain instances, the Engineer may require the Contractor to cut a third core from each location in a lot for permeability testing. The Contractor shall furnish sample containers of sufficient strength to prevent cores from being damaged during transport and the core specimens shall be secured with masking tape. Once all the cores for a particular lot have been obtained, they shall be immediately transferred to the COUNTY Inspector.

3-11-3.2 Cores - Scheduling: Core samples shall be taken no later than the beginning of the next working day following the lot placement, unless otherwise permitted by the COUNTY, and shall be taken before the lot section is opened to vehicular traffic. The Contractor may elect to cool the pavement layers by artificial methods to allow cutting the core samples as quickly as possible. No compensation will be made for the costs of artificial cooling. If the Contractor fails to obtain core samples within twenty-four (24) hours of the lot placement, the COUNTY shall use its authorized testing laboratory to core the lot section, and the costs of this coring shall be borne by the Contractor. If the Contractor opens the lot section to vehicular traffic before the core samples are taken, the Engineer shall either require that the lot section be removed and replaced at the cost of the Contractor, or accepted at no cost to the COUNTY, or accepted at a reduced rate as determined by the Engineer. This requirement shall be waived for overlay construction.

As an exception to the above, when the Contractor paves on a Friday or Saturday, the core samples shall be taken the same day the paving occurs. The Contractor shall cool the pavement layers by artificial methods before cutting the cores. If the Contractor fails to obtain core samples on the same day of the lot placement, the COUNTY shall use its authorized testing laboratory to core the lot section, and the costs of this coring shall be borne by the Contractor.

3-11-3.3 Cores - Backfilling: Where core samples have been taken, the Contractor shall immediately backfill the holes in the following manner. The sample hole shall be cleaned, dried, and lightly coated with tack coat, and new material shall be immediately placed and compacted with a circular tamp or other similar device and sealed. In the sole discretion of the Engineer, the compaction process shall be conducted with the equipment, methods, and effort to produce a density equivalent to the required specification. The backfilled material shall be compacted to a final grade that is slightly higher than the adjacent pavement. The backfilled core location shall not hold any standing water. If the backfilling of the core location in the sole opinion of the Engineer is not performed as specified, the County shall use its authorized testing laboratory to backfill the holes, and the costs of this operation shall be borne by the Contractor. The material used to fill the core holes shall be approved by the COUNTY prior to installation, and shall be hot mix similar to the material cored, or a permanent cold patch proprietary material such as QPR 2000, Ready Road Repair Asphalt, or an approved equal. If the Contractor fails to backfill the core holes within twenty-four (24) hours of the core extraction, or if the Contractor fails to backfill the core holes with an approved material, or if the Contractor fails to backfill the core holes in the manner described above, the COUNTY shall use its authorized testing laboratory to backfill the holes, and the costs of this operation shall be borne by the Contractor.

3-11-3.4 Cores - Number & Location: The number and location of the cores for each lot shall be determined by the Random Sampling Plan in Section 9-1 - Table 9-1. Acceptance of the compacted pavement with respect to density will be based on the average of each lot's core samples tested in accordance with Florida Test Method FM 1-T 166.

3-11-3.5 Density Requirement - General Construction: After final compaction, the pavement shall have an average density equivalent to at least 92.0% of the Maximum Specific Gravity ( $G_{mm}$ ) of the paving mixture for that lot's production as determined by Florida Test Method FM 1-T209. If the average density is less than 92.0% of the Maximum Specific Gravity ( $G_{mm}$ ) then the mix will be accepted at a reduced price as determined by the Engineer in accordance with the requirements of Sections 4-6 and 9-3.

3-11-3.6 Density Requirement - Overlay Construction: After final compaction, the pavement shall have an average density equivalent to at least 90.5% of the Maximum Specific Gravity ( $G_{mm}$ ) of the paving mixture for that lot's production as determined by Florida Test Method FM 1-T209. If the average density is less than 90.5% of the Maximum Specific Gravity ( $G_{mm}$ )



then the mix will be accepted at a reduced price as determined by the Engineer in accordance with the requirements of Sections 4-6 and 9-3.

3-11-3.7 Lot Definition - Overlay Construction: As determined by the COUNTY and for overlay construction only, a lot may be separated into sublots exclusively for determination of average density for acceptance purposes.

### **3-11-4 Prohibitions:**

3-11-4.1 Authorization To Core: No cores shall be cut in the asphalt pavement unless previously authorized by the COUNTY. If the Contractor cuts cores from a lot without authorization from the COUNTY, the Engineer shall either require that the lot section be removed and replaced at the cost of the Contractor, or accepted at no cost to the COUNTY, or accepted at a reduced rate as determined by the Engineer.

3-11-4.2: Final Density Determination: Once the average density of a lot has been determined the Contractor will not be permitted to provide additional compaction to raise the average.

3-11-4.3: Authorization To Pave Final Lift: The Contractor shall not construct the final surface course of pavement until receipt of written authorization from the Engineer to proceed with paving. If the final surface course of pavement is installed without written authorization from the Engineer, the Engineer shall either require that the lot section be removed and replaced at the cost of the Contractor, or accepted at no cost to the COUNTY, or accepted at a reduced rate as determined by the Engineer.

## **3-12 JOINTS**

### **3-12-1 Transverse Joints:**

Placing of the mixture shall be as continuous as possible and the roller shall not pass over the unprotected end of the freshly laid mixture except when the laying operation is to be discontinued long enough to permit the mixture to become chilled. When the laying operation is thus interrupted, a transverse joint shall be constructed by cutting back on the previous run to expose the full depth of the mat.

### **3-12-2 Longitudinal Joints:**

For all layers of pavement except the leveling course, placing of each layer shall be accomplished to cause longitudinal construction joints to be offset 6 to 12 inches laterally between successive layers. The Engineer may waive this requirement where offsetting is not feasible due to the sequence of construction.

Where only a portion of the width of pavement is to be laid and opened to traffic, longitudinal joints shall be formed by rolling the exposed edge of the strip first laid. When the adjacent strip is constructed, the Engineer may require the edge of the mixture in place to be trimmed back to expose an unsealed or granular vertical surface. Where the strip first laid is closed to traffic, the edge shall not be sealed but shall be left vertical and the adjacent strip placed against it without trimming.

### **3-12-3 General:**

When fresh mixture is laid against the exposed edges of joints (trimmed or formed as provided above), it shall be placed in close contact with the exposed edge so that an even, well-compacted joint will be produced after rolling.

## **3-13 SURFACE REQUIREMENTS**

### **3-13-1 Contractor Responsibility:**

The Contractor shall be responsible for obtaining a smooth surface on all pavement courses placed and therefore should straightedge all intermediate courses with a 15 foot rolling straightedge. A 15 foot manual straightedge shall be furnished by the Contractor and shall be available at the job site at all times during the paving operation for checking joints and surface irregularities.

### **3-13-2 Texture of Finished Surface:**

The finished surface shall be of uniform texture and compaction. The surface shall have no pulled, torn or loosened portions, and shall be free of sand streaks, sand spots or ripples. (These requirements shall also apply to any areas where it is necessary to apply hand work.) Areas of segregation will not be permitted to remain in the finished surface. Layers shall be feathered out, by hand raking if necessary, in transitioning the depth of the surface to meet present grades at all connections to existing pavements or ends of projects, to provide a uniform, smooth riding surface free of irregularities and segregation.

### **3-13-3 Acceptance Testing For Surface Tolerance:**

3-13-3.1 General: Acceptance testing for surface tolerance will be applicable to pavement lanes and ramps, where the width is constant, and shall include all construction joints.

Intersections, tapers, crossovers, transitions at beginning and end of project, and similar areas will not be tested for surface tolerance with the rolling straightedge as provided below. Straightedging of paved shoulders will not be required unless so directed by the Engineer. However, any individual surface irregularity in these areas in excess of 3/8 inches as determined by a 15 foot straightedge, and deemed by the COUNTY to be objectionable, shall be corrected in accordance with Section 3-13-4.

When the COUNTY is ready to perform acceptance testing for surface tolerance, the Contractor shall provide the required traffic control in accordance with standard maintenance of traffic requirements specified in the contract. The cost of this traffic control shall be included in the contract bid price for the asphalt items. The Contractor shall also provide a representative to be present during the entire operation of straightedging for acceptance purposes.

3-13-3.2 Test Method: Acceptance testing shall consist of one pass of a standard 15 foot rolling straightedge operated along the centerline of each lane tested. This does not preclude acceptance testing at other locations within the lane being tested. The Engineer reserves the right to check the Contractor's rolling straightedge for proper calibration. If in the opinion of the Engineer, the device is not properly calibrated, the Contractor shall supply a properly calibrated rolling straightedge.

3-13-3.3 Acceptance Criteria for Final Surface: The final surface course of all pavements will be required to be checked by the rolling straightedge, in accordance with the following provisions. As soon as the rolling has been completed and the surface has hardened sufficiently to be walked on, the entire surface shall be checked with a rolling straightedge set to indicate any surface irregularities in excess of **3/16** inch. The rolling straightedge shall

have an effective length of 15 feet and its design shall meet the approval of the Engineer. The rolling straightedge, labor for its operation, and the required traffic control shall be supplied by the Contractor. The Contractor is also required to have on site a fifteen (15) foot manual straightedge during the rolling straightedge check. Straightedging shall be extended across all joints. Any irregularities in excess of **3/16** inch shall be corrected in accordance with Section 3-13-4.

The COUNTY may waive corrections specified in Section 3-13-4 below if an engineering determination indicates that the deficiencies are sufficiently separated so as not to significantly affect the ride quality of the pavement and the corrective action would unnecessarily mar the appearance of the finished pavement. The Engineer may also, at his sole discretion, waive or modify straightedging requirements if no milling, leveling, overbuild or underlying structural layer was placed on the project and the underlying layer was determined to be exceptionally irregular.

Where the COUNTY elects to waive correction, the appropriate pay quantity for Asphaltic Concrete shall be reduced as follows. For **each** variation in the surface coarse that exceeds the maximum permissible specified above, but is less than **3/4** inch, a deduction will be made from the appropriate pay item as follows:

PAY ITEM	Deduction
Pay Item in <i>Square Yards</i>	10 sq. Yds.
Pay Item in <i>Tons</i>	2 Tons

### 3-13-4 Correcting Unacceptable Pavement:

Any areas in which the surface does not meet the above requirements for texture, sand streaks, ripples, pulled or loosened portions, or for uniformity of compaction; or does not meet the straightedging requirements of 3-13-3, shall be corrected at the Contractor's expense. Such corrections may be made either by replacing the surface course (to full depth) or by overlaying with the type of asphaltic concrete mixture being placed. Within the longitudinal limits where such defective areas occur, such corrections shall be made for the full width of the roadway and for longitudinal distances in both directions beyond such defective areas in accordance with the following:

- (a) If the correction is made by replacing of the full thickness, it shall extend to at least 50 feet each side of the defective area.
- (b) If the Contractor elects to effect the correction by overlaying, the overlay shall consist of at least 100 pounds of mixture per square yard, at the defective section and shall taper uniformly down from the full thickness of such weight, to zero thickness (feather-edged) at the end of a minimum length of 50 feet more or less as directed by the Engineer each side of the defective area.
- (c) The transverse thickness at any section shall be such as to provide the design cross section.

### **3-14 PROTECTION OF FINISHED SURFACE**

Sections of newly compacted asphaltic concrete which are to be covered by additional courses shall be kept clean until the successive course is laid.

Upon completion of the finished pavement, no dumping of any material directly on the pavement will be permitted. When shoulders are constructed after completion of the final surface, blade graders operating adjacent to the pavement during shoulder construction shall have a two inch by eight inch (or larger) board (or other attachment providing essentially the same results) attached to their blades in such manner that it extends below the blade edge, in order to protect the pavement surface from damage by the grader blade.

Unless public safety is restricted, vehicular traffic or loads shall not be permitted on the newly compacted pavement until adequate stability and adhesion have been attained and the material has cooled to 140°F or less to allow the pavement to set sufficiently to prevent rutting or other distortion.

### **3 - 15 CORRECTING DEFICIENT THICKNESS**

1. For the purpose of thickness verification, the whole project shall be divided into *Thickness Lots* of one thousand (1000) feet in length and the entire width of the undivided roadway section. A divided roadway shall be evaluated as separate sections and *Thickness Lots*. A Roadway with one lane on each side of a Continuous Left Turn Lane shall also be defined as a divided Roadway similar to divided Roadways with medians both raised and grassed, and evaluated as separate sections and *Thickness Lots*. The width definition of each side of this facility shall be defined by the Engineer, usually as constructed in the field. For projects less than one thousand (1000) feet in length, the entire project shall represent one *Thickness Lot*. For non-roadway paving and in other situations where the Engineer determines the above section is inappropriate, the Engineer may establish a different *Thickness Lot* unit of work on which to calculate average thickness and price adjustments. In addition, cores will be taken at all locations where thickness measurements taken during the course of construction indicate a thickness deficiency sufficient to justify a deduction from the contract unit bid price, or at any other locations as may be determined by the Engineer. By definition, a *Thickness Lot* is for evaluation of pavement thickness only, and is to be considered separate and distinct from a standard Lot as defined in Section 1-6-2.
2. The thickness of pavement shall be determined from the thickness of cores, two (2) inches in diameter, taken at points on the cross section and along the roadway as determined by the Engineer. A minimum of three (3) cores shall be taken in each *Thickness Lot*. In an effort to reduce the number of core holes in the finished pavement, the same core samples taken for density may be used for thickness verification. The thickness core locations shall be selected to best provide a representative coverage of the *Thickness Lot*. The Engineer will determine core locations. The Contractor will provide the traffic control, coring equipment, approved backfill material, and a qualified operator to obtain all thickness cores.
3. The pavement lot will be evaluated for thickness based on the average thickness of the cores in the lot. The average thickness of each *Thickness Lot* shall be greater than or equal to ninety-two (92) percent of the specified thickness.

4. When the pavement in any *Thickness Lot* is found to be deficient in thickness by less than the tolerance specified in Paragraph Three above, and the Engineer allows the pavement to remain in place, payment for that pavement will be made at an adjusted price determined from the following table.

Percent Deficiency In Thickness	Percent Reduction In Payment (Per Sq.Yd.)
0.0 to 8.0	No Reduction
8.1 to 13.0	1.0 times % Deficiency
13.1 to 20.0	1.5 times % Deficiency
20.1 to 35.0	2.0 times % Deficiency

5. When the average thickness of a *Thickness Lot* is greater than or equal to ninety-two (92) percent of the specified thickness, but one or more individual cores is less than eighty (80) percent of the specified thickness, payment for that pavement represented by the deficient core will be made at an adjusted price of 2.0 times % Deficiency. The deficient area represented by the core shall be the product of one-half of the longitudinal distance between acceptable cores multiplied by the entire roadway width.

The Contractor may elect to reduce the definition of the deficient area by additional cores in the following manner. Additional cores may be taken on either or both sides of the deficient core location equidistant from the deficient core and the acceptable core. This process may be repeated a second time by taking additional cores on either or both sides of the acceptable core. At this point, further reduction of the deficient area by additional coring will not be permitted, unless directed by the Engineer. The final deficient area shall be the product of the one-half of the longitudinal distance between acceptable cores multiplied by the entire roadway width.

6. In instances where the pavement section contains more than one pay item, each pay item shall be evaluated for thickness separately.
7. For any area of pavement found deficient in thickness by more than thirty - five (35) percent, at the Contractor's written request, the Engineer may allow the material to remain in place at no payment.
8. The thickness tolerances established above do not apply to leveling courses or overlay construction. No additional payment will be made for thicknesses that exceed the specified thickness.

## SECTION 4

### ASPHALTIC CONCRETE - GENERAL

#### **4-1 DESCRIPTION**

This Section specifies the materials, the composition for all Asphaltic Concrete pavement. The requirements for plant and equipment for this pavement are specified in Section 2. General construction requirements for all asphaltic concrete pavements (including provisions for determination of thickness of pavement to be paid for) are specified in Section 3.

#### **4-2 MATERIALS**

Meet the material requirements specified in FDOT Standard Specifications (Latest Edition) Division III. Specific references are as follows:

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

All materials shipped to the asphalt plant may be sampled at their destination.

##### **4-2-1 Specific Requirements:**

4-2-1.1 Laboratory-Compacted Density: The laboratory-compacted mixture shall have a density as specified in the properties for that type of Asphaltic Concrete. The Laboratory compacted mixture density will be compared to the calculated design density of a voidless mixture composed of the same materials in like proportions.

4-2-1.2 Change in Sources of Supply for Materials: No change in sources of supply for materials will be allowed without approval of the Engineer.

4-2-1.3 Sampling of the Mixture in Use: Samples of the mixture in use will be taken as many times daily as is necessary to determine compliance with specifications, and the mixture shall be maintained uniform throughout the project within the specified tolerances.

In no case will the application of the tolerance be allowed that will produce a gradation outside master range unless specifically approved by the Engineer.

### **4-3 CERTIFICATION**

The producer of the Asphalt Concrete shall furnish to the COUNTY, during the production of the mix, certification that the asphalt has been produced as per the design submitted and approved by the COUNTY. This certification shall be signed by the individual responsible for the Quality Control of the mixture during production.

#### **4-3-1 Contractor Quality Control Test Reports:**

The producer of the Asphalt Concrete shall furnish to the COUNTY weekly Quality Control Materials Testing Reports. The reports shall include all test results required by Section 1-7-3 of this document and those required by the supplier's Quality Control Sampling and Testing plan, and shall be e-mailed or faxed in a legible condition to the COUNTY ( D.E.I. Construction Section) by 5:00 pm of the following Tuesday. The Prime Contractor shall be assessed a sum of Four Hundred Dollars (\$400.00) each week that the reports are not received by the designated time and day. Payment to the COUNTY of such sums as may become payable under the provisions of this article shall be made by identifying the said sums as a credit item on the Contractor's final pay estimate.

### **4 - 4 IN-PLACE DENSITY SPECIFICATION**

#### **4-4-1 General Construction:**

After final compaction, the pavement shall have an average density equivalent to at least 92% of the Maximum Specific Gravity ( $G_{mm}$ ) of the paving mixture for that lot's production as determined by Florida Test Method FM 1-T209. Once the average density of a lot has been determined the Contractor will not be permitted to provide additional compaction to raise the average. If the average density is less than 92% of the Maximum Specific Gravity ( $G_{mm}$ ) then the mix will be accepted at a reduced price as determined by the Engineer in accordance with the requirements of Sections 4-6 and Table 6-3.

#### **4-4-2 Overlay Construction:**

The following specification is applicable only for overlay construction of existing pavement. After final compaction, the pavement shall have an average density equivalent to at least 90.5% of the Maximum Specific Gravity ( $G_{mm}$ ) of the paving mixture for that lot's production as determined by Florida Test Method FM 1-T209. Once the average density of a lot has been determined the Contractor will not be permitted to provide additional compaction to raise the average. If the average density is less than 90.5% of the Maximum Specific Gravity ( $G_{mm}$ ) then the mix will be accepted at a reduced price as determined by the Engineer in accordance with the requirements of Sections 4-6 and Table 6-3.

## **4 - 5 ADJUSTED PAYMENT**

With respect to the *Bitumen Content* ( $PF_{AC}$ ), the *Sieve Analysis* ( $PF_{SA}$ ), and the *In-Place Density* ( $PF_D$ ), the adjusted percentage of contract price to be paid per lot will be computed as follows:

$$L_P = C_P (.60 PF_D + .15 PF_{SA} + .25 PF_{AC})$$

Where,

$L_P$  = Lot Payment

$C_P$  = Contract Lot Price (Unit Price times Lot Quantity)

$PF_D$  = Payment Factor Percentage for Density

$PF_{SA}$  = Payment Factor for Sieve Analysis

$PF_{AC}$  = Payment Factor Percentage for Bitumen Content

Payment to the county of such sums as may become payable under the provisions of this article shall be made by identifying the said sums as a credit item on the Contractor's final pay estimate.

## **4 - 6 STRUCTURAL ASPHALT BASE COURSE**

### **4-6-1 Description**

The work under this section shall consist of constructing a base layer composed of an aggregate and bituminous material hot mixed in a central plant and hot laid on a prepared surface in accordance with these specifications and in close conformity with the lines, grades, typical section, mix and average rate as shown on the plans or directed.

### **4-6-2 Construction Requirements**

The construction requirements for the base layer shall be the same as prescribed for bituminous plant mix surface courses, Section Three, except as follows:

**4-6-2.1 Stabilized Subgrade:** Before the initial layer of base material is placed, the stabilized subgrade shall be prepared and compacted as specified in FDOT Standard Specifications, Section 160.

**4-6-2.2 Subgrade Not Stabilized:** Before the initial layer of base material is placed, the subgrade area (as defined in FDOT Standard Specification, Division I, Section 1-3) that is not stabilized shall be prepared to a firm and unyielding surface and compacted as specified in FDOT Standard Specifications (Latest Edition), Section 120-9.2.

**4-6-2.3 Spreading The HMA:** The Contractor may, with the prior approval of the Engineer, spread the first course of multiple course asphalt bases with a motor grader where the subgrade will not support the use of a mechanical spreader



## **4-6-3 In-Place Density Requirements**

4-6-2.1 First Lift Requirements: Construction of the first or bottom lift of the structural asphalt base course shall have a maximum compacted thickness of two and one-half (2.5") inches and shall have a minimum in-place density equal to or greater than ninety (90%) percent of the Maximum Specific Gravity ( $G_{mm}$ ) for that lot's production. With the specific approval of the Engineer on some Roadway sections, the Contractor may be allowed to install the first lift of the structural asphalt base course at a compacted thickness of three (3") inches. If the average density is less than 90.0% of the Maximum Specific Gravity ( $G_{mm}$ ) then the mix will be accepted at a reduced price as determined by the Engineer in accordance with the requirements of Sections 4-6 and Table 4-6-3.

4-6-2.2 Second Lift Requirements: Construction of the second lift of the structural asphalt base course shall have a maximum compacted thickness of two (2.0") inches and shall have a minimum in-place density equal to or greater than ninety-one (91%) percent of the Maximum Specific Gravity ( $G_{mm}$ ) for that lot's production. With the specific approval of the Engineer on some Roadway sections, the Contractor may be allowed to install the second lift of the structural asphalt base course at a compacted thickness of three (3") inches. If the average density is less than 91.0% of the Maximum Specific Gravity ( $G_{mm}$ ) then the mix will be accepted at a reduced price as determined by the Engineer in accordance with the requirements of Sections 4-6 and Table 4-6-3.

4-6-2.3 Third and Subsequent Lift Requirements: Construction of the remaining lifts of the structural asphalt base course shall have a maximum compacted thickness of two (2.0") inches and shall have a minimum in-place density equal to or greater than ninety-two (92%) percent of the Maximum Specific Gravity ( $G_{mm}$ ) for that lot's production. If the average density is less than 92.0% of the Maximum Specific Gravity ( $G_{mm}$ ) then the mix will be accepted at a reduced price as determined by the Engineer in accordance with the requirements of Sections 4-6 and 9-3.

The structural asphalt base shall be accepted with respect to compacted in-place density based on the following Table 4-6-3:

<b>Table 4-6-3</b>		
<b>IN-PLACE DENSITY LOT ADJUSTMENT TABLE (Structural Asphalt Base)</b>		
<b>First or Bottom Lift of the Structural Asphalt Base Course</b>		
<b>% AVE <math>G_{mm}</math></b>	<b>% Adjustment</b>	<b><math>PF_D</math></b>
$\geq 93.5$	102.5	104.17
90.0 to 93.4	100	100.00
89.0 to 89.9	95	91.67
88.0 to 88.9	90	83.33
87.0 to 87.9	85	75.00
Less than 87.0	80	66.67
<b>Second Lift of the Structural Asphalt Base Course</b>		
<b>% AVE <math>G_{mm}</math></b>	<b>% Adjustment</b>	<b><math>PF_D</math></b>
$\geq 93.5$	102.5	104.17
91.0 to 93.4	100	100.00
90.5 to 90.9	95	91.67
90.0 to 90.4	90	83.33
89.5 to 89.9	86	76.70
89.0 to 89.4	82	70.00
88.0 to 88.9	80	66.67
87.0 to 88.9	70	50.00
Less than 87.0	50 or R 'n R *	16.67
<b>Remaining Lifts of the Structural Asphalt Base Course Lot Adjustments Determined by Table 6-3</b>		

\* The engineer may require complete removal and replacement of the lot with specified material at the Contractor's expense. Where the finished work is determined to have a reduced value due to the installed deficiencies, but is capable to some degree of performing the intended purpose, as determined by the Engineer, the contractor will be permitted to leave the work in place at a reduced rate as outlined in the above table.

#### **4 - 7 ADJUSTMENT TO BID UNIT PRICE FOR ASPHALTIC MATERIAL**

The bid unit price for asphaltic concrete materials will be adjusted in accordance with the provisions and requirements of the Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, (latest edition), Division I, Section 9-2.1.2 and FDOT Road and Bridge Supplemental Specifications.

For the purposes of unit price adjustment determination, the following conditions shall be applicable:

- (1) The Bituminous Material, Asphalt Price Index (herein referenced API) published monthly by the FDOT shall be used for the adjustment of unit prices in accordance with FDOT Specification 9-2.1.2. The FDOT API in effect at the bid opening date will be used for initial determination of asphaltic material price.

- (2) The formula referenced in FDOT Section 9-2.1.2 shall be modified as follows:

$P_a = AC_q (I_d - 1.05 I_b)$  during a period of increasing prices

$P_a = AC_q (I_d - 0.95 I_b)$  during a period of decreasing prices

$P_a$  = Price adjustment for bituminous material, in dollars

$AC_q$  = Quantity of Asphalt Cement, in gallons

$I_b$  = API during the month in which bids were opened for this contract

$I_d$  = API during the month material is incorporated into the project

- (3) Asphaltic Concrete, for which the unit price is per square yard, shall be assumed to weigh one hundred (100) pounds per inch of thickness per square yard and asphaltic cement to weigh 8.58 pounds per gallon. With concurrence from the Contractor, in order to simplify calculations, the Engineer shall have the option of determining the Price Adjustment based on either Square Yards of actual installed material or Tons of actual installed material.
- (4) Calculation of  $AC_q$  = Quantity of Asphalt Cement shall be based on the Contractor's approved mix design Asphalt Content, percentage by weight of total mix.
- (5) No adjustment in bid prices will be made for either tack coats or prime coats.
- (6) Price adjustments shall be calculated and recorded as the bituminous material is incorporated into the project, however, the actual price adjustments will be processed on the contract's Final Change Order as a separate lump sum change order item.

# SECTION 5

## SUPERPAVE ASPHALTIC CONCRETE

### 5-1 DESCRIPTION.

**5-1-1 General:** Construct a Superpave Asphalt Concrete course using 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.

**5-1-2 Traffic Levels:** The requirements for Type SP Asphalt Concrete mixtures are based on the design traffic level of the project, expressed in 18-Kip [80-kN] Equivalent Single Axle Loads (ESAL.s). The five traffic levels are as shown in Table 5-1.

Table 5-1 --Superpave Traffic Levels	
Traffic Level	Traffic Level (1x10 <sup>6</sup> 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. The Contractor may substitute a Type SP mix one traffic level higher than the traffic level specified in the Contract, at no cost to the County (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 County. 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

**5-1-3 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, defined in 5-2.3, when plotted on an FHWA 0.45 Power Gradation Chart. Fine mixes are defined as having a gradation that passes above the restricted zone.

**5-1-3.1 Fine Mixes:** The allowable structural layer thicknesses for fine Type SP Asphalt Concrete mixtures are as follows:

Type SP-9.5.....	3/4 to 1.5 inches
Type SP-12.5.....	1-1/4 to 2-1/2 inches
Type SP-19.0.....	2 to 2-3/4 inches

**5-1-3.2 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  
 Type SP-12.5.....2 - 3 inches  
 Type SP-19.0.....3 . 3 1/2 inches

## 5-2 Materials

**5-2-1 General Requirements:** Meet the material requirements specified in FDOT Standard Specifications (Latest Edition) Division III.  
 Specific references are as follows:

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

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

**5-2-2 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 Table 5-2. Aggregates from various sources may be combined.

<b>Table 5-2 Aggregate Gradation Control Points (Gradation Design Ranges)</b>						
	Superpave Mixture (Percent Passing)					
	<b>SP-9.5</b>		<b>SP-12.5</b>		<b>SP-19.0</b>	
Sieve Size	Min.	Max.	Min.	Max.	Min.	Max.
1 inch [25.0 mm]					100	
3/4 inch [19.0 mm]			100		90	100
1/2 inch [12.5 mm]	100		90	100		90
3/8 inch [9.5 mm]	90	100		90		
No. 4 [4.75 mm]		90				
No. 8 [2.36 mm]	32	67	28	58	23	49
No. 200 [75 µm]	2	10	2	10	2	8

**5-2-3 Restricted Zone:** The gradation identified in 5-2-2 shall not pass through the restricted zones specified in Table 5-3. For Traffic Levels D and E the design gradation shall 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 5-1-3 are met.

**5-2-4 Aggregate Consensus Properties:** Meet the following consensus properties at design for the aggregate blend:

**5-2-4.1 Coarse Aggregate Angularity:** When tested in accordance with ASTM D 5821, meet the coarse aggregate angularity requirement defined in Table 5-4.

**5-2-4.2 Fine Aggregate Angularity:** When tested in accordance with AASHTO T-304, meet the fine aggregate angularity requirement defined in Table 5-5.

<b>Table 5-3 Aggregate Gradation Restricted Zone (Design Only)</b>						
Sieve Size Within Restricted Zone	Boundries of Restricted Zone - Superpave Mixture (Percent Passing)					
	<b>SP-9.5</b>		<b>SP-12.5</b>		<b>SP-19.0</b>	
	Min.	Max.	Min.	Max.	Min.	Max.
No. 4 [4.75 mm]						
No. 8 [2.36 mm]	47.2	47.2	39.1	39.1	34.6	34.6
No. 16 [1.18 mm]	31.6	37.6	25.6	31.6	22.3	28.3
No. 30 [600 µm]	23.5	27.5	19.1	23.1	16.7	20.7

<b>Table 5-4 Coarse Aggregate Angularity Criteria (Minimum Percent Fractured Faces)</b>				
Traffic	Depth of Top of Pavement Layer From Surface			
Level	≤4 inches [ ≤100 mm]		>4 inches [>100 mm]	
	1 or More Fractured Faces (%)	2 or More Fractured Faces (%)	1 or More Fractured Faces (%)	2 or More Fractured Faces (%)
A	55			
B	75		50	
C	85	80	60	
D	95	90	80	75
E	100	100	100	100

<b>Table 5-5 Fine Aggregate Angularity Criteria</b>		
Traffic	Depth of Top of Pavement Layer From Surface	
Level	≤4 inches [ ≤100 mm]	>4 inches [>100 mm]
	Minimum Uncompacted Void Content (%)	Minimum Uncompacted Void Content (%)
A		
B	40	40
C	45	40
D	45	40
E	45	45

**5-2-4.3 Flat and Elongated Particles:** When tested in accordance with ASTM D 4791, use a ratio of maximum to minimum dimensions of 5:1 and do not exceed 10% as the maximum amount of flat and elongated particles for the coarse aggregate blend for all projects with Traffic Levels B and higher.

This criteria does not apply for Traffic Level A.

**5-2-4.4 Clay Content:** When tested in accordance with AASHTO T 176, meet the sand equivalent value for fine aggregate blend defined in Table 5-6.

Table 5-6 Clay Content	
Traffic Level	Sand Equivalent Minimum (%)
A	40
B	40
C	45
D	45
F	50

## 5-2-5 Specific Requirements:

**5-2-5.1 Condition of Aggregate:** Provide clean aggregate that contains no deleterious substances. Do not use coarse or fine aggregate containing more than 0.5% of phosphate.

**5-2-5.2 Fine Aggregate and Mineral Filler:** In laboratory tests, and for the purpose of proportioning the paving mixture, all material passing the No. 8 [2.36 mm] sieve and retained on the No. 200 [75 µm] sieve will be considered as fine aggregate, and the material passing the No. 200 [75 µm] sieve will be considered as mineral filler.

**5-2-5.3 Screenings:** Do not use any screenings in the combination of aggregates which contain more than 15% of material passing the No. 200 [75 µm] sieve. When blending two screenings to produce the screening component of the aggregate, one of the screenings may contain up to 18% of material passing the No. 200 [75 µm] sieve, provided the combination of the two does not contain over 15% material passing the No. 200 [75 µm] sieve. Screenings may be washed to meet these requirements.

### 5-2-5.4 Use of Reclaimed Asphalt Pavement:

**5-2-5.4.1 General Requirements:** Subject to certain requirements, Reclaimed Asphalt Pavement (RAP) may be used as a component material of the asphalt mixture subject to the following:

1. The Contractor assumes responsibility for the design 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 A, B, C, D and E, do not permit the amount of RAP material used in the mix to exceed 25% by weight of total aggregate.

4. When using a PG 76-22 Asphalt Binder, limit the amount of RAP material used in the mix to a maximum of 20 percent by weight of total aggregate.

5. 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.

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

7. 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.

5-2-5.5 Binder for Mixes with RAP: Use a PG 67-22 where RAP is less than 20% by weight of total aggregate; use a PG 64-22 where RAP is 20% or greater. The Contractor may incorporate an appropriate recycle agent where the physical properties of the recycled asphalt pavement dictate its use. 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 request reasonable changes during the production based on the requirements of 5-4-4.6.



### 5-3 PERMISSIBLE VARIATION FOR THE COARSE AGGREGATE.

Size and consistently grade or combine the aggregate or aggregates shipped to the job in such proportions that the resulting mixture meets the grading requirements of the mix design.

### 5-4 GENERAL COMPOSITION OF MIXTURE.

**5-4-1 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 approved mix design. Aggregates from various sources may be combined.

#### 5-4-2 Mix Design:

5-4-2.1 General: Design the Superpave asphalt mixture in accordance with AASHTO R 35, except as noted herein, to meet the requirements of this Specification. Prior to the production of any Superpave asphalt mixture, submit the proposed mix design with supporting test data indicating compliance with all Superpave mix design criteria, evidence of the mixture being on file with the FDOT State Materials office, the name of the Materials Director, and the effective and expiration dates of the mix design. Allow the Engineer a maximum of three weeks to either conditionally verify or reject the mix as designed and submitted. At the sole option of the Engineer, Type SP asphalt mixes may be used 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.

5-4-2.2 Grading Requirements: Meet the gradation design ranges of Table 5-2.

5-4-2.3 Gyratory Compaction: Compact the design mixture in accordance with AASHTO TP-4. (Note: AASHTO TP-4 now requires specimens be compacted to the design number of gyrations.). Use the number of gyrations as defined in Table 5-7.

Table 5-7 Superpave Design Gyratory Compactive Effort			
Traffic Level	N <sub>initial</sub>	N <sub>design</sub>	N <sub>maximum</sub>
A	6	50	--
B	7	65	--
C	7	75	115
D	8	100	160
E	9	100	160

**5-4-2.4 Volumetric Criteria:** Use an air void content of the mixture at design of 4.0% at the design number of gyrations (N<sub>design</sub>). Meet the requirements of Table 5-8.

<b>Table 5-8 Mixture Densification Criteria</b>			
Traffic Level	N <sub>initial</sub>	N <sub>design</sub>	N <sub>maximum</sub>
A	≤91.5	96.0	≤98.0
B	≤90.5	96.0	≤98.0
C	≤89.0	96.0	≤98.0
D	≤89.0	96.0	≤98.0
E	≤89.0	96.0	≤98.0

**5-4-2.5 VMA Criteria:** Meet the requirements of Table 5-9 for voids in the mineral aggregate (VMA) of the mixture at the design number of gyrations.

<b>Table 5-9 VMA Criteria</b>	
Type Mix	Minimum VMA
SP-9.5	15.0
SP-12.5	14.0
SP-19.0	13.0

**5-4-2.6 VFA Criteria:** Meet the requirements of Table 5-10 for voids filled with asphalt (VFA) of the mixture at the design number of gyrations.

<b>Table 5-10 VFA Criteria</b>	
Traffic Level	Design VFA (%)
A	70 - 80
B	65 - 78
C	65 - 75
D	65 - 75
F	65 - 75

Note: For Type SP-9.5 mixtures at Traffic Levels C, D & E, the specified VFA range shall be 73% to 76%.

**5-4-2.7 Dust Proportion:** Use a dust to effective asphalt binder content by weight between 0.6 to 1.2 for fine mixes and 0.6 to 1.6 for coarse mixes.

**5-4-2.8 Moisture Susceptibility:** Provide a mixture (4 inch [100 mm] specimens) having a retained tensile strength ratio of at least 80% when compacted to  $7 \pm 0.5\%$  air voids, and a minimum tensile strength (dry and unconditioned) of 120 psi [825 kPa]. Test the specimens in accordance with AASHTO T 283 with the following exceptions: saturate the specimens to a minimum saturation level of 90% and include one freeze-thaw cycle. If necessary, add an approved liquid anti-stripping agent in order to meet this criteria.

**5-4-2.9 Water Permeability:** Do not exceed a maximum coefficient of permeability (coarse mixes only) of the mixture of  $125 \times 10^{-5}$  cm/s when compacted to 6% air voids and tested in accordance with FM 5-565. Trim the compacted specimen at both ends to the minimum thickness in 5-1.3 prior to testing.

**5-4-2.10 Additional Information:** In addition to the requirements listed above, provide the following information with each proposed mix design submitted for verification:

1. The specific project on which the mixture will be used.
2. The design traffic level and the maximum number of gyrations ( $N_{\text{maximum}}$ ).
3. The source and description of the materials to be used.
4. The DOT source number and the DOT product code of the aggregate components furnished from a DOT approved source.
5. The gradation and approximate 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.
6. A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly -No. 200 [ $-75 \mu\text{m}$ ]) should be accounted for and identified for the applicable sieves.
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 single temperature at which the mixture is intended to be discharged from the plant and compacted at the roadway.
9. Evidence that the completed mixture will conform to all specified physical requirements.
10. The name of the individual responsible for the Quality Control of the mixture during production.
11. The ignition oven calibration factor.

**5-4-3 Revision of Mix Design:** Submit all revisions to verified mix designs, along with supporting documentation of approval by the FDOT State Materials Office, to the Engineer.

## 5-4-4 Contractor's Quality Control:

**5-4-4.1 Extraction Gradation Analysis:** Sample the asphalt mixture at the plant in accordance with FM 1-T 168. The percent asphalt binder content of the mixture will be determined in accordance with FM 5-563 (ignition oven). The gradation of the extracted mixture will be determined in accordance with FM 1-T 030. Perform the extraction and gradation analysis in accordance with FM 5-544 and 5-545, respectively, if the calibration factor for the mix exceeds 0.50%. All test results will be shown to the nearest 0.01. All calculations will be carried to the nearest 0.001 and rounded to the nearest 0.01. Run an extraction gradation analysis on the mixture at a minimum frequency of once per production day when the daily production is less than 500 tons. If the daily production exceeds 500 tons, perform the extraction gradation analysis of the mix a minimum of two times per production day.

During normal production, the Engineer will not require extraction gradation analysis on days when mix production is less than 80 tons. However, when mix production is less than 80 tons per day on successive days, run the test when the accumulative tonnage on such days exceeds 80 tons.

The target gradation and asphalt content will be as shown on the mix design. Any changes in target will require a change in the mix design in accordance with 5-4.3. If the percentage of asphalt binder deviates from the optimum asphalt binder content by more than 0.55%, or the percentage passing any sieve falls outside the limits in Table 5-11, immediately resample the mix and test to validate the previous test result, and if needed, make the necessary correction. If the results for two consecutive tests deviate from the optimum asphalt binder content by more than 0.55%, or exceed the limits in Table 5-11 for any sieve, notify the Engineer and take immediate steps to identify and correct the problem, then resample the mix. If the results from this test deviate from the optimum asphalt binder content by more than 0.55%, or exceed the limits in Table 5-11 for any sieve, stop the plant operation until the problem has been corrected.

<b>Table 5-11 Tolerances for Quality Control Tests (Extraction Gradation Analysis)</b>	
Size	Percent passing
1 inch [25.0 mm]	7.0
3/4 inch [19.0 mm]	7.0
1/2 inch [12.5 mm]	7.0
3/8 inch [9.5 mm]	7.0
No. 4 [4.75 mm]	7.0
No. 8 [2.36 mm]	5.5
No. 16 [1.18 mm]	5.0
No. 30 [600 µm]	4.5
No. 50 [300 µm]	4.5
No. 100 [150 µm]	3.0
No. 200 [75 µm]	2.0

Maintain control charts showing the results of the extraction gradation analysis (asphalt binder content and sieve analysis).

5-4-4.2 Volumetric Control: During production of the mix, monitor the volumetric properties of the Superpave mix with a FDOT approved Superpave Gyratory Compactor to determine the air voids, VMA, VFA, and dust-to-effective asphalt binder ratio (dust proportion) at N design.

For fine mixes, take appropriate corrective actions to maintain an air void content at N design between 3.0 and 5.0% during production. When the air void content at N design drops below 2.5 or exceeds 6.5% on any one test, or is less than 3.0% on two consecutive tests, stop plant operations until the appropriate corrective actions are made and the problem is resolved to the satisfaction of the Engineer.

Any material that is represented by air voids less than 2.5% at N design for mixes, will be evaluated by the Engineer to determine if removal and replacement is necessary. Remove and replace any material, if required, at no cost to the County.

Determine the volumetric properties of the mixture at a minimum frequency of once per production day when the daily production is less than 1,000 tons [900 metric tons]. If the daily production exceeds 1,000 tons [900 metric tons], monitor the volumetric properties two times per production day.

During normal production, volumetric properties of the mixture will not be required on days when mix production is less than 80 tons. However, when mix production is less than 80 tons per day on successive days, run the test when the accumulative tonnage on such days exceeds 80 tons.

Testing required for volumetric property determination includes AASHTO TP-4, FM 1-T 209, FM 5-563 and FM 1-T 030. Prior to testing samples in accordance with AASHTO TP-4 and FM 1-T 209, condition the test-sized sample for one hour at the compaction temperature in a covered container.

In addition to the requirements of 330-2.2, maintain control charts showing the results of the volumetric testing (air voids,  $G_{mm}$ ,  $G_{mb}$ ).

5-4.4.3 Viscosity of Asphalt Binder in Mixes Containing Reclaimed Asphalt

Pavement: When RAP is a component material, the viscosity of the asphalt binder material in the asphalt mixture, determined by the Materials Office in accordance with FM 1-T 202, will be within the range of 5,000 - 15,000 poises [500-1,500 Pa·s]. This determination will be made on samples obtained by the Engineer on a random basis at a frequency of approximately one per 2,000 tons [1,800 metric tons] of mix. If the viscosity determined by the Engineer is out of the specified range, adjust the binder formulation or blend or RAP in the mix to bring the viscosity within tolerance.

## SECTION SIX - APPENDICES

### **6 -1 SELECTING CORE SAMPLING LOCATIONS AT PAVEMENT SITE**

#### **EXAMPLE CASES**

There are several cases that can occur when determining the locations of the density tests. They are as follows:

1. The LOT is a standard size LOT (5,000 ft.). **Five** tests are required.
2. The LOT is less than 5,000 ft., but greater than 4,000 ft.. **Five** tests are required.
3. The LOT is less than or equal to 4,000 ft., but greater than 3,000 ft.. **Four** tests are required.
4. The LOT is greater than 2,000 ft., but less than or equal to 3,000 ft.. **Three** tests are required.
5. The LOT is greater than 5,000 ft. but less than or equal to 6,000 ft.. **Six** tests are required.
6. The LOT is greater than 6,000 ft., but less than or equal to 7,000 ft. **Seven** tests are required.
7. The LOT is 2,000 ft. or less. **Three** tests are required.

Determination of the density test locations for cases 1 - 7 is described below:

#### **Case #1 - (LOT = 5,000 ft):**

For a standard size LOT, the five test locations can be found by using the first five numbers of **any** of the Group/Column random number sets.

- Ex. LOT length = 5,000 ft.  
Arbitrarily choose any set of numbers; such as Group C/Column 4; the numbers are 713, 1883, 2452, 3112 and 4593 ft.

#### **Case #2 - (4,000 ft < LOT < 5,000 ft):**

Five test locations are required. First try to find a Group/Column number set that has five values that will work with the LOT length.

- Ex. LOT length = 4,500 ft.  
One Group/Column number set that will work is Group A/Column 2; the numbers are 807, 1208, 2213, 3188 and 4048 ft.

If the LOT length is only slightly greater than 4,000 ft. (Ex. 4025 ft.) There may not be a set of five numbers that will work. In this case a percentage method should be used. Take the LOT length and divide it by 5,000 ft. Take this number and multiply it by **any** Group/Column number set to get the five required locations.

- Ex. LOT length = 4,025 ft.  
Divide the LOT length by 5,000 ft.;  $4025/5000 = 0.805$  Now choose any Group/Column number set such as Group B/Column 1; the numbers are 310, 1260, 2208, 3787 and 4818 ft. Now multiply the ratio (0.805) times each of the numbers to get the test locations in feet (Ex.  $310 \text{ ft} \times 0.805 = 250 \text{ ft.}$ ). The final locations are 250, 1014, 1777, 3049 and 3878 ft.

**Case #3 - (3,000 ft < LOT ≤ 4,000 ft.):**

This case is similar to Case 2 except four test locations are required instead of five. First try to find a Group/Column number set that has four values that will work with the LOT length.

- Ex. LOT length = 3,400 ft.  
One Group/Column number set that will work is Group E/Column 6; the numbers are 97, 1232, 2567 and 3138 ft.

If the LOT length is only slightly greater than 3,000 ft (Ex. 3050 ft.), there may not be a set of four numbers that will work. In this case a percentage method should be used. Take the lot length and divide it by 4000. Take this number and multiply it by the first four numbers of **any** Group/Column number set to get the four required locations.

- Ex. LOT length = 3,050 ft.  
Divide the LOT length by 4,000 ft.;  $3050/4000 = 0.7625$  Now choose any Group/Column number set such as Group F/Column 7; the numbers are 673, 1765, 2263 and 3235 ft. Now multiply the ratio (0.7625) times each of the numbers to get the test locations in feet (Ex.  $673 \text{ ft.} \times 0.7625 = 513 \text{ ft.}$ ). The final locations are 513, 1346, 1726 and 2467 ft.

**Case #4 - (2,000 ft. < LOT ≤ 3,000 ft.):**

This case is similar to Cases 2 & 3, except three test locations are required instead of four or five. First try to find a Group/Column number set that has three values that will work with the LOT length.

- Ex. LOT length = 2,500 ft.  
One Group/Column number set that will work is Group A/Column 2; the numbers are 807, 1208 and 2213 ft.

If the LOT length is only slightly greater than 2,000 ft. (Ex. 2,050 ft.) There may not be a set of three numbers that will work. In this case a percentage method should be used. Take the LOT length and divide it by 3,000 ft. Take this number and multiply it by the first three numbers of **any** Group/Column number set to get the three required locations.

- Ex. LOT length = 2,050 ft.  
Divide the LOT length by 3,000 ft.;  $2050/3000 = 0.683$  Now choose any Group/Column number set such as Group C/Column 3; the numbers are 317, 1352 and 2323 ft. Now multiply the ratio (0.683) times each of the numbers to get the test locations in feet (Ex.  $317 \text{ ft.} \times 0.683 = 217 \text{ ft.}$ ). The final locations are 217, 923 and 1587 ft.

**Case #5 - (5,000 ft. < LOT ≤ 6,000 ft.):**

This case is similar to Case 2 except six test locations are required instead of five. First try to find a Group/ Column number set that has six values that will work with the LOT length.

- Ex. LOT length = 5,800 ft.  
One Group/Column number set that will work is Group A/Column 5; the numbers are 525, 1763, 2218, 3903, 4488 and 5434 ft.

If the LOT length is only slightly greater than 5,000 ft. There may not be a set of six numbers that will work. In this situation a percentage method should be used similar to the previous examples. Take the LOT length and divide it by 6,000 ft. Take this number and multiply it by the first six numbers of **any** Group/Column number set to get the six required locations.

**Case #6 - (6,000 ft. < LOT ≤ 7,000 ft.):**

This case is similar to Case 5 except seven test locations are required instead of six. First try to find a Group/Column number set that has seven values that will work with the LOT length.

- Ex. LOT length = 6,750 ft.  
One Group/Column number set that will work is Group D/Column 1; the numbers are 203, 1262, 2592, 3212, 4610, 5923 and 6179 ft.

If the LOT length is only slightly greater than 6,000 ft. There may not be a set of seven numbers that will work. In this situation a percentage method should be used similar to the previous examples. Take the LOT length and divide it by 7,000 ft. Take this number and multiply it by the first seven numbers of any Group/Column number set to get the seven required locations.

**Case #7 - (LOT ≤ 2,000 ft.):**

In this example, there will not be a set of three numbers that will work. In this case a percentage method should be used. Take the LOT length and divide it by 3,000 ft. Take this number and multiply it by the first three numbers of **any** Group/Column number set to get the three required locations.

- Ex. LOT length = 1,950 ft.  
Divide the LOT length by 3,000 ft.;  $1950/3000 = 0.65$  Now choose any Group/Column number set such as Group C/Column 3; the numbers are 317, 1352 and 2323 ft. Now multiply the ratio (0.65) times each of the numbers to get the test locations in feet (Ex.  $317 \text{ ft.} \times 0.65 = 206 \text{ ft.}$ ). The final locations are 206, 879 and 1510 ft.

**Lineal Feet Definition:**

The lot length of lineal feet used to define the lot is the lineal feet of any full pass made by the paving train, regardless of the pass width or the course thickness. The lot may consist of multiple lanes; when this is the case, the definition of the lot will be determined by the sequence of lane placement. On tapered lanes (storage, acceleration/deceleration), only the full lane width area will be included in the lot. Pavers traveling in echelon will be considered as two separate passes.

**Offset Locations:**

Using the "O/S" column in Table 8-1, the offset distance shall be determined by multiplying the pavement lane-width by the decimal adjacent to the core station, rounding that result to the nearest whole number, and measuring that distance from the left edge of the lane. In no case shall any core be taken less than one (1) foot from any unsupported pavement edge.

**Lane Identifiers:**

Standing on the centerline or median facing in the direction the stations run, number the lanes L-1, L-2, L-3, etc. for the left roadway, and R-1, R-2, R-3, etc. for the right roadway. Lane 1 will be at the centerline or median and the numbers will work up towards the outer pavement edge. Turn or accel/decel lanes will be identified as LT-1, LT-2, etc. and RT-1, RT-2, etc. in the same manner.



**Table 6-1 - Core Random Sampling**

	Column 1			Column 2			Column 3			Column 4			Column 5			Column 6			Column 7		
	No.	Loc.	O/S	No.	Loc.	O/S	No.	Loc.	O/S	No.	Loc.	O/S	No.	Loc.	O/S	No.	Loc.	O/S	No.	Loc.	O/S
<b>G R O U P  A</b>	1	408	.2	1	807	.3	1	175	.6	1	327	.3	1	525	.2	1	275	.6	1	867	.5
	2	1575	.6	2	1208	.1	2	1698	.1	2	1462	.9	2	1763	.4	2	1297	.9	2	1337	.3
	3	2945	.8	3	2213	.8	3	2493	.4	3	2748	.5	3	2218	.9	3	2992	.2	3	2122	.9
	4	3662	.7	4	3188	.5	4	3838	.7	4	3843	.7	4	3903	.5	4	3410	.1	4	3818	.7
	5	4778	.4	5	4048	.6	5	4977	.3	5	4422	.2	5	4488	.7	5	4352	.4	5	4853	.1
	6	5464	.5	6	5767	.7	6	5361	.9	6	5972	.4	6	5434	.1	6	5777	.7	6	5748	.4
	7	6256	.3	7	6554	.6	7	6323	.8	7	6742	.6	7	6240	.6	7	6730	.8	7	6756	.8
<b>G R O U P  B</b>	1	310	.5	1	105	.9	1	310	.1	1	487	.1	1	410	.8	1	277	.1	1	602	.7
	2	1260	.3	2	1245	.4	2	1128	.7	2	1708	.8	2	1167	.4	2	1803	.8	2	1780	.9
	3	2208	.1	3	2467	.6	3	2408	.4	3	2497	.5	3	2652	.1	3	2807	.5	3	2915	.3
	4	3787	.9	4	3473	.1	4	3973	.5	4	3708	.3	4	3912	.9	4	3388	.9	4	3562	.2
	5	4818	.7	5	4492	.7	5	4052	.2	5	4102	.9	5	4843	.3	5	4100	.4	5	4612	.5
	6	5985	.4	6	5663	.2	6	5117	.9	6	5514	.6	6	5433	.5	6	5279	.6	6	5325	.6
	7	6028	.6	7	6129	.5	7	6092	.8	7	6887	.7	7	6310	.2	7	6624	.7	7	6385	.1
<b>G R O U P  C</b>	1	202	.2	1	377	.5	1	317	.2	1	713	.8	1	282	.9	1	618	.6	1	287	.4
	2	1632	.8	2	1728	.1	2	1352	.9	2	1883	.9	2	1562	.2	2	1918	.2	2	1028	.1
	3	2507	.4	3	2498	.9	3	2323	.7	3	2452	.4	3	2395	.5	3	2487	.4	3	2178	.3
	4	3895	.1	4	3430	.4	4	3255	.3	4	3112	.1	4	3370	.4	4	3258	.9	4	3532	.6
	5	4033	.5	5	4248	.8	5	4903	.1	5	4593	.2	5	4438	.3	5	4515	.7	5	4393	.9
	6	5333	.9	6	5972	.6	6	5593	.6	6	5782	.6	6	5475	.8	6	5270	.3	6	5847	.2
	7	6215	.6	7	6206	.3	7	6553	.8	7	6436	.7	7	6403	.6	7	6598	.8	7	6434	.7
<b>G R O U P  D</b>	1	203	.2	1	753	.7	1	445	.8	1	952	.1	1	858	.3	1	712	.1	1	222	.2
	2	1262	.8	2	1073	.2	2	1625	.9	2	1692	.7	2	1023	.6	2	1370	.8	2	1837	.5
	3	2592	.3	3	2102	.5	3	2087	.2	3	2088	.3	3	2668	.7	3	2842	.3	3	2112	.9
	4	3212	.5	4	3512	.6	4	3702	.5	4	3285	.8	4	3975	.9	4	3778	.5	4	3437	.7
	5	4610	.1	5	4603	.9	5	4370	.1	5	4782	.5	5	4970	.1	5	4168	.4	5	4143	.3
	6	5923	.7	6	5066	.3	6	5086	.7	6	5301	.6	6	5010	.5	6	5969	.9	6	5090	.6
	7	6179	.9	7	6928	.1	7	6845	.6	7	6285	.2	7	6874	.4	7	6163	.7	7	6935	.8
<b>G R O U P  E</b>	1	102	.2	1	318	.2	1	13	.1	1	628	.3	1	472	.9	1	97	.5	1	753	.1
	2	1692	.4	2	1878	.8	2	1817	.7	2	1404	.9	2	1453	.2	2	1232	.3	2	1208	.5
	3	2128	.8	3	2592	.5	3	2198	.3	3	2720	.6	3	2803	.8	3	2567	.9	3	2738	.8
	4	3177	.3	4	3653	.3	4	3105	.5	4	3132	.1	4	3060	.5	4	3138	.7	4	3467	.4
	5	4272	.7	5	4938	.4	5	4062	.9	5	4503	.4	5	4828	.4	5	4472	.2	5	4978	.6
	6	5605	.1	6	5018	.1	6	5352	.4	6	5316	.7	6	5524	.1	6	5662	.4	6	5754	.7
	7	6774	.6	7	6153	.7	7	6368	.8	7	6849	.8	7	6592	.6	7	6899	.8	7	6399	.2
<b>G R O U P  F</b>	1	912	.1	1	187	.8	1	240	.2	1	830	.9	1	73	.6	1	312	.2	1	673	.5
	2	1652	.5	2	1438	.4	2	1543	.5	2	1620	.2	2	1935	.5	2	1615	.9	2	1765	.9
	3	2920	.8	3	2178	.6	3	2968	.8	3	2127	.3	3	2195	.1	3	2637	.5	3	2263	.1
	4	3233	.3	4	3262	.2	4	3062	.9	4	3927	.8	4	3263	.2	4	3133	.4	4	3235	.3
	5	4158	.4	5	4302	.1	5	4037	.4	5	4333	.5	5	4739	.9	5	4030	.8	5	4758	.7
	6	5467	.9	6	5572	.7	6	5650	.3	6	5890	.1	6	5292	.3	6	5542	.6	6	5038	.8
	7	6330	.6	7	6046	.6	7	6645	.6	7	6450	.6	7	6766	.8	7	6074	.7	7	6990	.4

TABLE 6 - 2

ACCEPTANCE SCHEDULE OF PAYMENT  
(Asphalt Plant Mix Characteristics)

**Deviations of the Acceptance Tests from the Job Mix Formula**

<b>PROPERTY</b>	<b>DEVIATION (JMF)</b>	<b>PAY FACTOR %(<math>PF_{AC}</math>)</b>
<b>ASPHALT CEMENT CONTENT</b>	0.00 - 0.55	100
	0.56 - 0.65	95
	0.66 - 0.75	90
	over 0.75	80*
<b>PROPERTY (Sieve Analysis)</b>	<b>DEVIATION (JMF)</b>	<b>PAY FACTOR %(<math>PF_{SA}</math>)</b>
<b>NO. 8 SIEVE**</b>	0.00 -5.50	100
	5.51 - 6.50	98
	6.51 - 7.50	95
	7.51 - 8.50	90
	over 8.50	80*
<b>NO. 200 SIEVE**</b>	0.00 - 2.00	100
	2.01 - 2.40	95
	2.41 - 2.80	90
	over 2.80	80*

\* If approved by the Construction 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 COUNTY will require removal and replacement at no cost. The Contractor has the option to remove and replace at no cost to the COUNTY at any time.

\*\* When there are two or more reduced payments for these items in one LOT of material, only the greatest reduction in payment will be applied. **N.B.:** This rule applies only to the two Sieve Analysis test results. Deviations are absolute values with no plus and minus signs.

TABLE 6-3 - IN-PLACE DENSITY LOT ADJUSTMENT TABLE

% AVE G <sub>mm</sub>	NEW CONSTRUCTION		OVERLAY CONSTRUCTION	
	% Adjustment	PF <sub>D</sub>	% Adjustment	PF <sub>D</sub>
≥94.0	103.5	105.83	103.5	105.83
93.1 to 93.9	102.5	104.17	102.5	104.17
92.0 to 93.0	100	100.00	100	100.00
91.9	95	91.67	100	100.00
91.8	95	91.67	100	100.00
91.7	95	91.67	100	100.00
91.6	93	88.34	100	100.00
91.5	92	86.68	100	100.00
91.4	90	83.33	100	100.00
91.3	90	83.33	100	100.00
91.2	90	83.33	100	100.00
91.1	90	83.33	100	100.00
91.0	90	83.33	100	100.00
90.9	88	80.00	100	100.00
90.8	88	80.00	100	100.00
90.7	86	76.70	100	100.00
90.6	86	76.70	100	100.00
90.5	85	75.00	100	100.00
90.4	82	70.00	98	96.66
90.3	79	65.00	97	95.00
90.2	76	60.00	96	93.33
90.1	73	55.00	95	91.67
90.0	70	50.00	93	88.33
89.9	68	46.66	91	85.00
89.8	66	43.33	89	80.00
89.7	64	40.00	87	78.33
89.6	62	36.66	85	75.00
89.5	60	33.33	83	71.66
89.4	50	16.67	81	70.00
89.3	50	16.67	79	65.00
89.2	50	16.67	77	63.33
89.1	50	16.67	75	60.00

**TABLE 6-3 - IN-PLACE DENSITY LOT ADJUSTMENT TABLE (Part Two)**

<b>% AVE G<sub>mm</sub></b>	<b>% Adjustment</b>	<b>PF<sub>D</sub></b>	<b>% Adjustment</b>	<b>PF<sub>D</sub></b>
89.0	50	16.67	73	55.00
88.9	47 or R 'n R *	11.67	71	50.00
88.8	43 or R 'n R *	5.00	69	46.66
88.7	40 or R 'n R *	0	66	40.00
88.6	40 or R 'n R *	0	63	36.66
88.5	40 or R 'n R *	0	60	33.33
88.4	38 or R 'n R *	-3.33	50	16.67
88.3	36 or R 'n R *	-6.67	50	16.67
88.2	34 or R 'n R *	-10.00	50	16.67
88.1	32 or R 'n R *	-13.33	50	16.67
88.0	30 or R 'n R *	-16.67	50	16.67
87.9	30 or R 'n R *	-16.67	48 or R 'n R *	13.33
87.8	30 or R 'n R *	-16.67	46 or R 'n R *	10.00
87.7	30 or R 'n R *	-16.67	44 or R 'n R *	6.67
87.6	30 or R 'n R *	-16.67	42 or R 'n R *	3.33
87.5	30 or R 'n R *	-16.67	40 or R 'n R *	0
87.4	R 'n R or NP **	---	40 or R 'n R *	0
87.3	R 'n R or NP **	---	40 or R 'n R *	0
87.2	R 'n R or NP **	---	40 or R 'n R *	0
87.1	R 'n R or NP **	---	38 or R 'n R *	-3.33
87.0	R 'n R or NP **	---	36 or R 'n R *	-6.67
86.9	R 'n R or NP **	---	34 or R 'n R *	-10.00
86.8	R 'n R or NP **	---	32 or R 'n R *	-13.3
86.7	R 'n R or NP **	---	30 or R 'n R *	-16.67
86.6	R 'n R or NP **	---	30 or R 'n R *	-16.67
86.5	R 'n R or NP **	---	30 or R 'n R *	-16.67
≤ 86.4	R 'n R or NP **	---	R ' R or NP **	---

\* The engineer may require complete removal and replacement of the lot with specified material at the Contractor's expense. Where the finished work is determined to have a reduced value due to the installed deficiencies, but is capable to some degree of performing the intended purpose, as determined by the Engineer, the contractor will be permitted to leave the work in place at a reduced rate as outlined in the above table.

\*\* The engineer may require complete removal and replacement of the lot with specified material at the Contractor's expense. At the Contractor's written request, the Engineer may allow the material to remain in place at no payment.

Under the conditions described above, the decision whether to accept the completed pavement or to require removal and replacement shall be vested entirely in the Engineer.

## 7 – 1 Warm Mix Asphalt (WMA) Requirements

Requirements to be included on the approved products/process list:

1. Be acknowledged by another state agency as an acceptable warm mix technology or be listed on the following website: <http://warmmixasphalt.com> with a successful project(s) constructed nationally or internationally.
2. Partner with a contractor and FDOT District Office and construct a demonstration section on a FDOT project.
3. Meet all Pinellas County construction specifications during construction of the WMA section.

The mixture shall be produced with a WMA technology from the approved list (<http://warmmixasphalt.com>) and in accordance with the WMA technology provider's guidelines for dosage rate, plant mixing temperature, and laboratory compaction temperature.

The WMA mix design submitted by the contractor shall include the name of the WMA technology, dosage rate, plant mixing temperature, and laboratory compaction temperature.

The antistripping-additive may be eliminated from the WMA mixture provided that:

The WMA additive contains active antistripping components as certified by the WMA technology provider.

The WMA mixture without an additional antistripping agent meets the standard HMA moisture damage test criteria.\

Plant operations for WMA production:

The burner shall be properly tuned to operate at the WMA mix temperature such that the fuel is entirely consumed in the combustion zone of the drier. Production shall immediately cease if evidence of unburned fuel is detected in the produced asphalt mixture or in the baghouse.

The plant discharge temperature of the WMA shall be within 20°F of the temperature designated on the WMA mix design.

The addition of WMA additives, including water, shall be controlled by a calibrated metering system interlocked with the plant's controls.

Chemical additives may be added at the asphalt terminal at the dosage rate recommended by the WMA technology provider. The dosage rate and additive name shall be printed on the Bill of Lading for the asphalt binder.

The approval for the use of Warm Mix Asphalt (WMA) will be at the sole discretion of the Engineer.