RESOLUTION

of the

ORANGE COUNTY BOARD OF COUNTY COMMISSIONERS

regarding

A RESOLUTION AMENDING RESOLUTION NO. 2000-M-14 RELATING TO ORANGE COUNTY ROAD CONSTRUCTION SPECIFICATIONS; AND PROVIDING AN EFFECTIVE DATE

Resolution No. 2010-M-21

WHEREAS, on April 11, 2000, the Board of County Commissioners of Orange County ("Board"), in response to recommendations from the County Engineer and the Orange County Road Construction Advisory Board concerning specifications and standards for road and highway construction, adopted Orange County Road Construction Specifications pursuant to Resolution No. 2000-M-14;

WHEREAS, Article 10 of the Orange County Road Construction Specifications deals with and addresses “Asphaltic Concrete Surface Course” for road pavements;

WHEREAS, Article 10 is based on the “Marshall Mix” method, which prior to 2000 was the County’s and the State of Florida Department of Transportation’s (“FDOT’s”) standard mix used for asphaltic concrete pavements;

WHEREAS, in 2004, the FDOT converted to the “Super Pave Mix” method, and presently it no longer certifies the Marshall Mix method;

WHEREAS, furthermore, today, Marshall Mix is produced by special order only, and suppliers and contractors have been producing and utilizing the Super Pave Mix instead;

WHEREAS, a consultant hired by Orange County Public Works has developed Super Pave Mix specifications that meet Orange County’s needs;
WHEREAS, the Public Works Advisory Board has reviewed and approved those Super Pave Mix specifications for capital improvement projects and land development projects; and

WHEREAS, upon recommendation from the Director of the Orange County Public Works Department, the Board finds that it is now desirable, appropriate and necessary to repeal Article 10 and adopt a new Article 10.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ORANGE COUNTY:

Section 1. Amendment of Resolution No. 2000-M-14. Resolution No. 2000-M-14, which adopted the Orange County Road Construction Specifications attached thereto and incorporated therein, is hereby amended by repealing Article 10 of those Orange County Road Construction Specifications, and adopting in its place a new Article 10, and revising the Table of Contents as necessary. A copy of the newly adopted Article 10 is attached hereto and incorporated herein as Appendix "A."

Section 2. Effective date. This Resolution shall take effect on the date of its adoption.

ADOPTED this 6th day of APRIL, 2010.

ORANGE COUNTY, FLORIDA
By: Board of County Commissioners
By: Richard T. Crotty
Orange County Mayor

ATTEST: Martha O. Haynie, County Comptroller
As Clerk of the Board of County Commissioners

By: Deputy Clerk
Print Name: Vanan P. Hampton

Printed Ordinance Resolution-Road-Construction-Specifications-03-12-10-rf

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ARTICLE 10

ASPHALTIC CONCRETE PAVEMENT

10.0 - GENERAL

The work specified in this Article consists of the application of Asphaltic Concrete structural courses and friction courses properly produced and laid upon a prepared and accepted base in accordance with these specifications and in conformity with the lines, grades, thicknesses and cross-sections shown on the approved plans. The types of Asphaltic Concrete that may be used are the Florida Department of Transportation (FDOT) Superpave Asphaltic Concrete and Marshall Mix Asphaltic Concrete. The work shall include the conditioning of the existing surface or base course.

Section 10.0.01 - SELECTION OF ASPHALTIC CONCRETE OPTIONS

The plans will include typical cross sections indicating the type and thickness of asphaltic concrete structural courses and friction courses to be used. The requirements for preparing all plant-mixed hot bituminous mixtures and construction of asphaltic concrete surface courses, friction courses and base courses for both Superpave and Marshall Mix Asphaltic Concrete are presented in the following sections:

Superpave Asphaltic Concrete Surface Course - Section 10.1
Superpave Asphaltic Concrete Friction Courses – Section 10.1.05
Marshall Mix Design Asphaltic Concrete Surface Course – Section 10.2

Where Marshall Mix Asphaltic Concrete (Type S) is specified in the approved plans, the following equivalent mixes may be used, if approved by the County Engineer:

Marshall Mix .......................................................... Superpave Asphaltic
Asphaltic Concrete ................................................. Concrete Equivalent
Type S-I ................................................................. Type SP-12.5
Type S-II ................................................................. Type SP-19.0
Type S-III ............................................................... Type SP-9.5

10.1 - SUPERPAVE ASPHALTIC CONCRETE PAVING

Section 10.1.01 - GENERAL

All test methods designated as FM refer to the FDOT Florida Sampling and Testing Methods. All references to the County shall mean the Orange County Public Works Department - Development Engineering Division. The County Engineer will have the right
to disapprove of any material or process that does not conform to these specifications. Any references to FDOT Specification Sections shall mean the latest FDOT Standard Specifications for Road and Bridge Construction, including supplements. Any incorrect references to FDOT specifications, test methods, or standards shall be brought to the attention of the County Engineer for clarification. Document all QC procedures, Process Control, inspection, and all test results and make them available for review by the County Engineer throughout the life of the project.

Section 10.1.02 - CONTRACTOR QUALITY CONTROL REQUIREMENTS

10.1.02.1 - GENERAL: The responsible Developer or Contractor must provide the proper certifications and the necessary quality control processes for all materials and workmanship incorporated into the project per these specifications. If an independent Geotechnical Engineering firm is utilized, proper certifications and prequalification credentials must be provided prior to any services performed. All acceptance testing results and data provided by the Geotechnical Engineer shall be certified in writing that all testing methods and documentation are in compliance with these specifications.

10.1.02.2 - PERSONNEL: Provide personnel qualified and certified in all activities related to asphalt mix production at the plant and placement on the roadway, especially for the sampling, testing and inspection of materials and construction activities. Ensure that qualifications are maintained during the project duration. Provide proof of certifications and qualifications to the County prior to construction operations commencing.

10.1.02.3 - TESTING LABORATORY: Furnish or have furnished a fully equipped asphalt laboratory (permanent or portable) at the production site. Provide documentation to the County Engineer that the Laboratory is FDOT qualified.

10.1.02.4 - EQUIPMENT: Provide equipment and methods conforming to Section 320 of the FDOT Standard Specifications for Road and Bridge Construction.

10.1.02.5 - MINIMUM QUALITY CONTROL REQUIREMENTS: Perform the following activities necessary to maintain quality and process control and meet specification requirements:

Stockpiles: Ensure each aggregate component is placed in an individual stockpile, and separated from adjacent stockpiles, either by space or by a system of bulkheads. Prevent the intermingling of different materials in stockpiles. Form and maintain stockpiles in a manner that will prevent separation, contamination, segregation, etc. Identify each individual stockpile, including RAP, as shown on the mix design.

Incoming Aggregate: Obtain gradations and bulk specific gravity (Gsb) values from aggregate supplier for reference; determine the gradation of all component materials;
routinely compare gradations and Gsb values to mix design.

**Cold Bins:** Calibrate the cold gate/feeder belt for each material; determine cold gate/feeder belt settings; observe operation of cold feeder for uniformity.

**Dryer:** Observe pyrometer for aggregate temperature control; observe efficiency of the burner.

**For Batch Plants:** Determine percent used and weight to be pulled from each bin to assure compliance with Mix Design, check mixing time, and check operations of weigh bucket and scales.

**For Drum Mixer Plants:** Determine aggregate moisture content, and calibrate the weigh bridge on the charging conveyor.

**Control Charts:** Plot and keep charts updated daily for all Quality Control Sampling and Testing and post in the asphalt lab where they can be seen. Maintain the following charts:

1. Sample test results for the following: No. 8 sieve, No. 200 sieve, asphalt binder content, air voids, and density.

2. Gradation of incoming aggregate.

3. Gradation and asphalt content of RAP.

4. Any other test result or material characteristic (as determined by the Contractor) necessary for process control.

The above listed minimum activities are to be considered normal activities necessary to control the production of hot mix asphalt at an acceptable quality level. It is recognized, however, that depending on the type of process or materials, some of the activities listed may not be necessary and in other cases, additional activities may be required. The frequency of these activities will also vary with the process and the materials. When the process varies from the defined process average and variability targets, the frequency of these activities will be increased until the proper conditions have been restored.

### 10.1.02.6 - MINIMUM PROCESS CONTROL TESTING REQUIREMENTS:

**Asphalt Plant**

1. Hot Mix Asphalt: Determine the asphalt binder content; mix gradation and volumetric properties at a minimum frequency of one per day. In the event that the daily production exceeds 500 tons, perform these tests a minimum of two times per day.
2. Aggregate (Including RAP): One sample per 1,000 tons of incoming material as it is stockpiled for gradation. The testing of RAP material shall include the determination of asphalt binder content and gradation of extracted aggregate.

3. Monitor the mix temperature for the first five loads and a minimum of 1 out of every 5 loads thereafter.

4. Aggregate moisture content from stockpiles or combined cold feed aggregate - one per day.

5. Other tests (as determined necessary by the Contractor or County Engineer) for process control.

Roadway

1. Monitor the pavement temperature with an infrared or other acceptable temperature measuring device. Monitor the roadway density with either 6 inch diameter roadway cores, a nuclear density gauge, or other density measuring device, at a minimum frequency of once per 300 feet of pavement and at least twice per street. Maintain daily records of the testing results and make them available for review by the County Engineer throughout the life of the project.

2. Monitor the mix temperature for the first five loads and a minimum of 1 out of every 5 loads thereafter.

3. Monitor the prime/tack spread rate as needed to control operations and ensure that it meets or exceeds the target spread rate.

4. Monitor the pavement cross slope at a frequency necessary to fulfill the requirements of the plans and 10.1.03.10.3 below, and identify a system to control the cross slope of each pavement layer during construction.

5. Monitor the mix spread rate at the beginning of each day’s production, and as needed to control the operations, at a minimum of once per 200 tons placed to ensure that the spread rate meets or exceeds the target spread rate. When determining the spread rate, use an average of five truckloads of mix.

6. Monitor mat placement thickness every 25 feet to ensure the minimum design thickness is met.

7. Monitor the pavement smoothness with a 15-foot rolling straightedge as required by 10.1.03.10.4 below.
Section 10.1.03  GENERAL CONSTRUCTION REQUIREMENTS

10.1.03.1 - DESCRIPTION
Construct plant-mixed hot bituminous pavements. Establish and maintain a quality control system in accordance with 10.1.02 above that provides assurance that all materials, products and completed construction submitted for acceptance meet plan requirements.

10.1.03.2 - LIMITATIONS OF OPERATIONS

10.1.03.2.1 - Weather Limitations: Do not transport asphalt mix from the plant to the roadway unless all weather conditions are suitable for the laying operations.

10.1.03.2.2 - Limitations of Laying Operations:

10.1.03.2.2.1 - General: Spread the mixture only when the surface upon which it is to be laid has been previously prepared, is intact, firm, and properly cured, and is substantially dry. Do not place friction course until the adjacent shoulder area has been dressed and grassed.

10.1.03.2.2.2 - Temperature: Spread the mixture only when the air temperature in the shade and away from artificial heat is at least 40°F and rising for layers greater than 1 inch in thickness and at least 45°F and rising for layers 1 inch or less in thickness (including leveling courses). The minimum temperature requirement for leveling courses with a spread rate of 50 lb/yd² or less is 50°F and rising.

10.1.03.2.2.3 - Wind: Do not spread the mixture 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.

10.1.03.2.2.4 - Night Paving: Provide sufficient lighting for night operations. Provide an acceptable lighting plan to the County 48 hours prior to beginning night work.

10.1.03.3 - ROADWAY SURFACE PREPARATION

10.1.03.3.1 - Cleaning: Prior to the laying of the mixture, clean the surface of the base or pavement to be covered of all loose and deleterious material by the use of power brooms, blowers or vacuum truck, supplemented by hand brooming where necessary.

10.1.03.3.2 - Patching and Leveling Courses: Where an asphalt mix is to be placed on an existing pavement or old base which is irregular, and wherever the plans indicate, bring the existing surface to proper grade and cross-section by the application of patching
or leveling courses. Wherever a patch is required for a paving operation, the width of the patch shall be taken out to the full width of each lane affected and the length shall extend far enough longitudinally to fully encompass the affected area. The existing pavement shall be milled as shown on the plans or as required by the County Engineer.

10.1.03.3.3 - Application Over Surface Treatment: Where an asphalt mix is to be placed over a newly constructed surface treatment, sweep and dispose of all loose material from the paving area.

10.1.03.3.4 - Coating Surfaces of Contacting Structures: Paint 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, with a uniform coating of asphalt cement to provide a closely bonded, watertight joint.

10.1.03.3.5 - Tack Coat:

10.1.03.3.5.1 - Tack Coat Required: Apply a tack coat, meeting the requirements of Section 300 in the FDOT Standard Specifications for Road and Bridge Construction, on existing pavement structures that are to be overlaid with an asphalt mix and between successive layers of all asphalt mixes. The use of Trackless Polymer Modified Asphalt Emulsion Tack Coat (MTSS-IHM) is not allowed unless approved by the County Engineer.

10.1.03.3.5.2 - Tack Coat at Engineer’s Option: Apply a tack coat on the following surfaces only when so directed by the County Engineer:

1. Freshly primed bases.

10.1.03.4 - ASPHALT PLANT PREPARATION

Ensure the following requirements are met at the asphalt plant:

**Asphalt Cement**
- Asphalt cement is delivered to the asphalt plant at a temperature not to exceed 370°F.
- Asphalt cement is maintained in storage within a range of 230 to 370°F in advance of mixing operations.
- Constant heating is maintained within these limits, and that high fluctuations in temperature during a day’s production, as determined by the County Engineer, is avoided.

**Aggregate Blending:**
- All aggregates to be blended or proportioned are placed in separate bins at the cold hopper.
• Proportioning is performed by means of securely positioned calibrated gates or other approved devices.

**Aggregate Cold Bins:**
• Bin compartments are constructed to prevent any spilling or leakage of aggregate from one bin to another.
• Bin compartments have the capacity and design to permit a uniform flow of aggregates.
• Bin compartments are mounted over a feeder of uniform speed, which will deliver the specified proportions of aggregate to the drier.
• Bins are equipped with vibrators to ensure a uniform flow of aggregate at all times.
• Each bin compartment is provided with a gate which is adjustable in the vertical direction.
• Gates can be held securely at any specified vertical opening.
• Gates are equipped with a measuring device for measuring the vertical opening of the gates from a horizontal plane level with the bottom of the feeder.

**Mineral Filler:**
Mineral filler (if required in the mix design) is fed or weighed in separately from the other aggregates.

**Aggregate Heating and Drying:**
• Aggregates are heated and dried before screening.
• The temperature of the aggregates is controlled so that the temperature of the completed mixture at the plant falls within the permissible range allowed by this Section.

**Aggregate Screening:**
• Oversized pieces of aggregate are removed by the use of a scalping screen.
• Oversized material is not returned to the stockpile for reuse unless it has been crushed and reprocessed into sizes that will pass the scalping screen.
• The quantity of aggregates being discharged onto the screens does not exceed the capacity of the screens to actually separate the aggregates into the required sizes.
• A maximum of 10% plus-10 material in the minus-10 bin is maintained.

10.1.03.5 - **MIXTURE PREPARATION**
Ensure the following requirements are met:

10.1.03.5.1 - **Batch Mixing:** The dried aggregates and mineral filler (if required), prepared as specified and proportioned to meet the verified mix design, shall be conveyed to the empty mixer. The accurately measured hot asphalt binder shall be introduced into the mixer simultaneously with, or after, the hot aggregates. The blended materials shall
be continuously mixed until thoroughly uniform with all particles fully coated. The mixing time begins when the measuring devices for both the asphalt and the aggregates indicate that all the material is in the mixer, and continues until the material begins to leave the mixing unit. In no case will the mixing time be less than 35 seconds.

10.1.03.5.2 - Continuous Mixing: The dried aggregates and mineral filler (if required), prepared as specified and proportioned to meet the verified mix design, shall be introduced into the mixer in synchronization with the accurate feeding of the hot asphalt cement. The blended materials shall be sufficiently mixed until thoroughly uniform with all particles fully coated.

10.1.03.5.3 - Mix Temperature: The ingredients of the mix shall be heated and combined in such a manner as to produce a mixture with a temperature, when discharged from the pugmill or surge bin, which is within the master range as defined below.

The temperature of the completed mixture shall be determined using a quick-reading thermometer through a hole in the side of the loaded truck immediately after loading. A 1/4 inch hole on both sides of the truck body within the middle third of the length of the body, and at a distance from 6 to 10 inches above the surface supporting the mixture shall be provided.

The normal frequency for taking asphalt mix temperatures will be for each day, for each design mix on the first five loads and randomly thereafter. The temperature of the asphalt mix at the plant and at the roadway shall be taken at the normal frequency before the mix is placed. The temperature shall be recorded on the front of the respective delivery ticket. The County Engineer shall review the plant and roadway temperature readings and may take additional temperature measurements at any time.

The master range for all mix designs will be the established temperature from the mix design ±30°F. Reject for use on the project any load or portion of a load of asphalt mix at the plant or at the roadway with a temperature outside of this master range. The County Engineer will be immediately notified of the rejection.

If any single load at the plant or at the roadway is within the master range but differs from the established mix temperature by more than ±25°F or if the average difference of the temperature measurements from the established mix temperature for five loads exceeds ±15°F, the temperature of every load will be monitored until the temperature falls within the specified tolerance range in Table 10-1; at this time the normal frequency may be resumed.
10.1.03.5.4 - **Maximum Period of Storage:** The maximum time that any mix may be kept in a hot storage or surge bin shall be 72 hours.

10.1.03.5.5 - **Contractor’s Responsibility for Mixture Requirements:** Produce a homogeneous mixture, free from moisture and with no segregated materials, that meets all specification requirements. Also apply these requirements to all mixes produced by the drum mixer process and all mixes processed through a hot storage or surge bin, both before and after storage.

10.1.03.6 - **MIXTURE TRANSPORT**
Transport the mixture in tight vehicles previously cleaned of all foreign material. After cleaning, thinly coat the inside surface of the truck bodies with soapy water or an asphalt release agent as needed to prevent the mixture from adhering to the beds. Do not allow excess liquid to pond in the truck body. Do not use diesel fuel or any other hazardous or environmentally detrimental material as a coating for the inside surface of the truck body. Cover each load during cool and cloudy weather and at any time there is a probability of rain.

10.1.03.7 - **MIXTURE PLACEMENT**

10.1.03.7.1 - **Requirements Applicable to All Mixture Types:**

10.1.03.7.1.1 - **Alignment of Edges:** Lay all asphalt concrete mixtures, including leveling courses, other than the pavement edge just adjacent to curb and gutter or other true edges, by the stringline method to obtain an accurate, uniform alignment of the pavement edge. Control the unsupported pavement edge to ensure that it will not deviate more than ±1.5 inches from the stringline.

10.1.03.7.1.2 - **Temperature of Spreading:** Maintain the temperature of the mix at the time of spreading within the master range as defined in 10.1.03.5.3.
10.1.03.7.1.3 - Rain and Surface Conditions: Immediately cease transportation of asphalt mixtures from the plant when rain begins at the roadway. Do not place asphalt mixtures while rain is falling, or when there is standing water on the surface to be covered. Once the rain has stopped and water has been removed from the tacked surface to the satisfaction of the County Engineer and the temperature of the mixture caught in transit still meets the requirements as specified in 10.1.03.7.1.2, the Contractor may then place the mixture caught in transit.

10.1.03.7.1.4 - Speed of Paver: Establish the forward speed of the asphalt paver based on the rate of delivery of the mix to the roadway but not faster than the optimum speed needed to adequately compact the pavement.

10.1.03.7.1.5 - Number of Crews Required: For each paving machine operated, use a separate crew, each crew operating as a full unit. The technician who will be in charge of all paving operations shall be state approved and properly certified as deemed appropriate by the County Engineer. The Contractor’s technician in charge of the paving operations may be responsible for more than one crew but must be physically accessible to the County Engineer at all times when placing mix.

10.1.03.7.1.6 - Checking Depth of Layer: Check the depth of each layer at frequent intervals, and make adjustments when the thickness deviates from the design thickness. When making an adjustment, allow the paving machine to travel a minimum distance of 32 feet to stabilize before the second check is made to determine the effects of the adjustment.

10.1.03.7.1.7 - Hand Spreading: In limited areas where the use of the spreader is impossible or impracticable, the Contractor may spread and finish the mixture by hand.

10.1.03.7.1.8 - Straightedging and Back-patching: Straightedge and backpatch after obtaining initial compaction and while the material is still hot.

10.1.03.7.2 - Requirements Applicable to Courses Other Than Leveling:

10.1.03.7.2.1 - Spreading and Finishing: Upon arrival, dump the mixture in the approved self-contained, self-propelled, steerable mechanical spreader, having a minimum capacity of 5 cubic yards, and a conveyor distribution system to place the mixture uniformly in front of the screed. The paver shall also be equipped with a heated mechanical screed or strike-off assembly capable of adjustment to regulate the depth of material spread and of producing a finished surface of the required evenness and texture, without tearing, shoving or gouging the mixture. Immediately spread and strike-off the mixture to the full width required, and to such loose depth for each course that, when the work is completed, the required specified thickness is placed.
Carry a uniform amount of mixture ahead of the screed at all times. Power boxes will not be acceptable as bituminous pavers in County Rights-of-Way.

10.1.03.7.2.2 - Thickness of Layers: Construct each course of Type SP mixture in layers of thickness as shown in 10.1.04.1.3.

10.1.03.7.2.3 - Laying Width: For regular roadways, pave to the full lane width, except in areas where physically constrained. For other applications such as sidewalks, provide a spreader capable of placing and screeding to the plan width. If necessary due to the traffic requirements, lay the mixture in strips in such a manner as to provide for the passage of traffic. As an option, where the road is closed to traffic, lay the mixture to the full width with machines traveling in echelon. Plan longitudinal joints such that they are not placed where a permanent wheel path will occur.

10.1.03.7.2.4 - Correcting Defects: Before starting any rolling, check the surface. Correct any irregularities; remove all drippings, fat sandy accumulations from the screed, and fat spots from any source; and replace them with satisfactory material. Do not skin patch. When correcting a depression while the mixture is hot, scarify the surface and add fresh mixture.

10.1.03.7.3 - Requirements Applicable Only to Leveling Courses:

10.1.03.7.3.1 Patching Depressions: Before spreading any leveling course, fill all depressions in the existing surface more than 1 inch deep by spot patching with leveling course mixture, and then compact them thoroughly.

10.1.03.7.3.2 - Spreading Leveling Courses: The method of leveling shall be as approved by the County Engineer.

10.1.03.7.3.3 - Rate of Application: When using Type SP-9.5 (fine graded) for leveling, do not allow the average spread of a layer to be less than 50 lb/yd2 or more than 75 lb/yd2. The quantity of mix for leveling shown in the plans represents the average for the entire project.

10.1.03.8 - MIXTURE COMPACTION

10.1.03.8.1 - Equipment and Sequence: For each paving or leveling train in operation, furnish a separate set of rollers, with their operators.

Select equipment, sequence, and coverage of rolling to meet the specified mix design density. The coverage is the number of times the roller passes over a given area of pavement.

Regardless of the rolling procedure used, complete the final rolling before the surface
temperature of the pavement drops to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement.

**10.1.03.8.2 -Standard Rolling Procedure:** Meet the following equipment, sequence, and coverage requirements:

1. Seal Rolling: Provide two coverages with a tandem steel-wheeled roller, weighing 5 to 12 tons, following as close behind the spreader as possible without pick-up, undue displacement, or blistering of the material. Use static mode only for all compaction. No vibration will be allowed.

2. Intermediate rolling: Provide five coverages with a self-propelled pneumatic-tired roller, following as close behind the seal rolling operation as the mix will permit.

3. Final rolling: Provide one coverage with a tandem steel-wheeled roller (static mode only), weighing 5 to 12 tons, after completing the seal rolling and intermediate rolling, but before the surface pavement temperature drops to the extent that effective compaction may not be achieved or the rollers begin to damage the pavement.

Use a self-propelled pneumatic-tired roller to roll all patching and leveling courses and the first overbuild course. Use a self-propelled pneumatic-tired roller on the first structural layer placed on a milled surface.

The Contractor may use equipment, sequences, or coverages other than those specified in the standard rolling procedure if so authorized by the County Engineer.

**10.1.03.8.3 - Compaction at Crossovers, Intersections, etc.:** When using a separate paving machine to pave the crossovers, compact the crossovers with one, 8 to 12 ton tandem steel roller (static mode only). If placing crossovers, intersections, and acceleration and deceleration lanes with the main run of paving, also use a traffic roller to compact these areas.

**10.1.03.8.4 - Rolling Procedures:** Ensure that the initial rolling is longitudinal.

Where the lane being placed is adjacent to a previously placed lane, pinch or roll the center joint prior to the rolling of the rest of the lane.

Roll across the mat, overlapping the adjacent pass by at least 6 inches. Roll slowly enough to avoid displacement of the mixture, and correct any displacement at once by the use of rakes and the addition of fresh mixture if required.

Continue final rolling to eliminate all roller marks.

**10.1.03.8.5 - Number of Pneumatic-tired Rollers Required:** Use a sufficient number of self-propelled pneumatic-tired rollers to ensure that the rolling of the surface for the required number of passes does not delay any other phase of the laying operation and
does not result in excessive cooling of the mixture before completing the rolling. In the event that the rolling falls behind, discontinue the laying operation until the rolling operations are sufficiently caught up.

10.1.03.8.6 - Compaction of Areas Inaccessible to Rollers: Use hand tamps or other satisfactory means to compact areas which are inaccessible to a roller, such as areas adjacent to curbs, headers, gutters, bridges, manholes, etc.

10.1.03.8.7 - Correcting Defects: Do not allow the rollers to deposit gasoline, oil, or grease onto the pavement. Remove and replace any areas damaged by such deposits as directed by the County Engineer. While rolling is in progress, test the surface continuously, and correct all discrepancies to comply with the surface requirements.

Remove and replace all drippings, fat or lean areas, and defective construction of any description. Remedy depressions that develop before completing the rolling by loosening the mixture and adding new mixture to bring the depressions to a true surface. Should any depression remain after obtaining the final compaction, remove the full depth of the mixture, and replace it with sufficient new mixture to form a true and even surface.

Correct all high spots, high joints, and honeycombing as directed by the County Engineer.

Remove and replace any mixture remaining unbonded after rolling. Correct all defects prior to laying the subsequent course.

10.1.03.9 - JOINTS

10.1.03.9.1 - General: When laying fresh mixture against the exposed edges of joints (trimmed or formed as provided below), place it in close contact with the exposed edge to produce an even, well-compacted joint after rolling.

10.1.03.9.2 - Transverse Joints: Place the mixture as continuously as possible. Do not pass the roller over the unprotected end of the freshly laid mixture except when discontinuing the laying operation long enough to permit the mixture to become chilled.

When thus interrupting the laying operation, construct a transverse joint by cutting back on the previous run to expose the full depth of the mat.

10.1.03.9.3 - Longitudinal Joints: For all layers of pavement except the leveling course, place each layer so that longitudinal construction joints are offset 6 to 12 inches laterally between successive layers. The County Engineer may waive this requirement where offsetting is not feasible due to the sequence of construction.

10.1.03.9.4 - Transitions to Existing Pavement: The transitions to existing pavement at the ends of overlays and friction courses shall be keyed into the existing pavement to provide a smooth, well compacted transition that matches the grades of the existing pavement. To accomplish this, the full width of the lanes shall be milled at a rate of one
(1) inch per 20 longitudinal feet to create a transverse joint with a depth equal to the thickness of the overlay or friction course being installed. Place the fresh mixture of asphaltic concrete against the exposed edge to produce an even well-compacted joint after rolling.

10.1.03.10 - SURFACE REQUIREMENTS

10.1.03.10.1 - General: Construct a smooth pavement with good surface texture and the proper cross-slope.

10.1.03.10.2 - Texture of the Finished Surface of Paving Layers: Produce a finished surface of uniform texture and compaction with no pulled, torn, raveled, crushed or loosened portions and free of segregation, bleeding, flushing, sand streaks, sand spots, or ripples. Correct any area of the surface that does not meet the foregoing requirements in accordance with 10.1.03.10.5.

Do not use asphalt concrete mixtures containing aggregates that cause a different color appearance in the final wearing surface in sections less than 1 mile in length and across the full width of the roadway unless approved by the County Engineer.

10.1.03.10.3 - Cross Slope: Construct a pavement surface with cross slopes in compliance with the requirements of the Approved plans. Furnish a level with a minimum length of 4 feet or a digital measuring device approved by the County Engineer for the control of cross slope. Make this level or measuring device available at the jobsite at all times during paving operations. Utilize electronic transverse screed controls on the paving machine (unless directed otherwise by the County Engineer) to obtain an accurate transverse slope of the pavement surface.

10.1.03.10.3.1 - Quality Control Checks: Measure the cross slope of the pavement surface by placing the measuring device perpendicular to the roadway centerline. Report the cross slope to the nearest 0.1%. Record all the measurements on an approved form and submit to the County Engineer for documentation.

Measure the cross slope at a minimum frequency of one measurement every 100 feet during paving operations to ensure that the cross slope is uniform and in compliance with the design cross slope. When the difference between the measured cross slope and the design cross slope exceeds ±0.2% for travel lanes (including turn lanes) or ±0.5% for shoulders, make all corrections immediately to bring the cross slope into the acceptable range.

When the cross slope is consistently within the acceptable range, upon the approval of the County Engineer, the frequency of the cross slope measurements can be reduced to one measurement every 250 feet during paving operations.

For intersections, tapers, crossovers, transitions at beginning and end of project and similar areas, adjust the cross slope to match the actual site conditions or as directed by the County Engineer.
10.1.03.10.4 - Pavement Smoothness: Construct a smooth pavement meeting the requirements of this Specification. The County will provide a representative to be present when smoothness testing is performed.

10.1.03.10.4.1 - General: Furnish a 15 foot manual and a 15 foot rolling straightedge meeting the requirements of FM 5-509. Make them available at the job site at all times during paving operations. Obtain a smooth surface on all pavement courses placed, and then straightedge all final structural and friction course layers in accordance with 10.1.03.10.4.5.

10.1.03.10.4.2 - Test Method: Perform all straightedge testing in accordance with FM 5-509 with one pass of the rolling straightedge operated along the outside wheel path of each lane being tested. The County Engineer may require additional testing at other locations within the lane.

10.1.03.10.4.3 - Traffic Control: Provide traffic control in accordance with the FDOT Design Standard Indices (600 series as applicable) during all testing. When traffic control cannot be provided in accordance with the applicable indices, submit an alternative Traffic Control Plan.

10.1.03.10.4.5 - Quality Control Checks:

10.1.03.10.4.5.1 - General: Straightedge the final Type SP structural layer and friction course layer with a rolling straightedge. Test all pavement lanes and ramps where the width is constant using a rolling straightedge and document all deficiencies on a form approved by the County Engineer. Notify the County Engineer of the location and time of all straightedge checks a minimum of 48 hours before beginning.

10.1.03.10.4.5.2 - Rolling Straightedge Exceptions: Testing with the rolling straightedge will not be required in the following areas: intersections, tapers, crossovers, parking lots and similar areas. In addition, testing with the rolling straightedge will not be performed on the following areas when they are less than 50 feet in length: turn lanes, acceleration/deceleration lanes and side streets. However, correct any individual surface irregularity in these areas that deviates from the plan grade in excess of 1/16 inch as determined by a 15 foot manual straightedge, and that the County Engineer deems to be objectionable, in accordance with 10.1.03.10.5.

In addition, the County Engineer may also waive the straightedging requirements on ramps and superelevated sections where the geometrical orientation of the pavement results in an inaccurate measurement with the rolling straightedge.
10.1.03.10.4.5.3 - **Intermediate Layers:** Straightedge all intermediate Type SP layers (structural and overbuild) as necessary to construct a smooth pavement.

On roadways with a design speed 50 miles per hour or greater, when an intermediate Type SP layer will be opened to traffic, straightedge the pavement with a rolling straightedge and correct all deficiencies in excess of 1/4 inch within 72 hours of placement, unless directed otherwise by the County Engineer. Correct all deficiencies in accordance with 10.1.03.10.5.

10.1.03.10.4.5.4 - **Final Type SP Structural Layer:** Straightedge the final Type SP structural layer with a rolling straightedge, either behind the final roller of the paving train or as a separate operation. The County Engineer will verify the straightedge testing by observing the Quality Control straightedging operations. Correct all deficiencies in excess of 3/16 inch in accordance with 10.1.03.10.5, and retest the corrected areas prior to placing the friction course.

For bicycle paths, straightedge the final structural layer with a rolling straightedge, either behind the final roller of the paving train or as a separate operation. Correct all deficiencies in excess of 5/16 inch in accordance with 10.1.03.10.5. Retest all corrected areas. If the County Engineer determines that the deficiencies on the bicycle path are due to field geometrical conditions, the County Engineer will waive corrections.

10.1.03.10.4.5.5 - **Friction Course Layer:** Acceptance for pavement smoothness will be based on verified Quality Control measurements using the rolling straightedge. The County Engineer will verify the straightedge testing by observing the Quality Control straightedging operations.

At the completion of all paving operations, straightedge the friction course as a separate operation. As an exception, if approved by the County Engineer, straightedge the friction course behind the final roller of the paving train. Correct all deficiencies in excess of 3/16 inch in accordance with 10.1.03.10.5. Recheck all corrected areas.

10.1.03.10.5 - **Correcting Unacceptable Pavement:** Correct all areas of unacceptable pavement at no cost to the County. Correct deficiencies in the Type SP structural layers or in the friction course by removing and replacing the full depth of the layer, extending a minimum of 50 feet on each side of the defective area, for the full width of the paving lane. Alternately, if the finished pavement surface is not a friction course and does not abut concrete curbs, the County Engineer may approve correcting deficiencies by overlaying. Overlays shall cover the full width of the roadway and the length of the defective area. The overlay transitions to the existing pavement shall be in accordance with section 10.1.03.9.4, Transitions to existing pavements. The County Engineer may also approve correction of minor straightedge deficiencies by other methods on a case by case basis.
10.1.03.11 - FINISHED SURFACE PROTECTION
Keep sections of newly compacted asphalt concrete, which are to be covered by additional
courses, clean until the successive course is laid.
Do not dump embankment or base material directly on the pavement. Dress shoulders
before placing the friction course on adjacent pavement.
Equip blade graders operating adjacent to the pavement during shoulder construction
with a 2 by 8 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.
To prevent rutting or other distortion, protect sections of newly finished dense graded
friction course and the last structural layer prior to the friction course from traffic until the
surface temperature has cooled below 160°F.
The Contractor may use artificial methods to cool the pavement to expedite paving
operations. The County may direct the Contractor to use artificial cooling methods when
maintenance of traffic requires opening the pavement to traffic at the earliest possible time.

10.1.03.12 - STRIPING
Following final cooling and compaction of the mat and prior to opening to traffic, place
temporary painted traffic stripes in accordance with TP-710 and Standard Specification 710
on each paved surface that will receive traffic, including intermediate structural courses, final
structural courses that will serve as the surface course, and friction courses. The County
Engineer, on a case by case basis, may approve the use of reinforced removable tape (foil
back tape is not acceptable) or other acceptable material for temporary traffic striping for
periods of up to 30 days. Following thirty (30) days after placement of the final surface
course, structural or friction, place thermoplastic striping in accordance with TP-711 and
Standard Specification 711 and place raised reflective pavement markers. Final pavement
markings are subject to a 180 day observation period under normal traffic. The observation
period shall begin with the satisfactory completion and acceptance of the work. The
pavement markings shall show no signs of failure due to blistering, excessive cracking,
chipping, discoloration, poor adhesion to the pavement, loss of reflectivity or vehicular
damage. The County reserves the right to check the color and retroreflectivity within 30 days
prior to the end of the observation period. Replace, at no additional expense to the County,
any pavement markings that do not perform satisfactorily under traffic during the 180 day
observation period.

Section 10.1.04 - SUPERPAVE ASPHALTIC CONCRETE
10.1.04.1 - DESCRIPTION

10.1.04.1.1 - General: Construct a Superpave Asphaltic Concrete pavement using the type of mixture specified in the approved plans on a properly prepared and accepted base. Superpave mixes are identified as Type SP-9.S, Type SP-12.5 or Type SP-19.0.

Meet the requirements of 10.1.02 for personnel, plant, methods and equipment. Meet the general construction requirements of 10.1.03.

10.1.04.1.2 - Traffic Levels: The requirements for Type SP Asphaltic Concrete mixtures are based on the design traffic level of the project, expressed in 18-Kip Equivalent Single Axle Loads (ESAL’s). The traffic levels applicable for this specification are as shown in Table 10-2.

<table>
<thead>
<tr>
<th>Traffic Level</th>
<th>Million ESAL’s</th>
<th>Typical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&lt;0.3</td>
<td>Local roads, county roads, and city streets where truck traffic is light or prohibited</td>
</tr>
<tr>
<td>B</td>
<td>0.3 to &lt;3</td>
<td>Collector roads, access streets, medium duty city streets and the majority of county roadways</td>
</tr>
<tr>
<td>C</td>
<td>3 to &lt; 10</td>
<td></td>
</tr>
</tbody>
</table>

The traffic level(s) for the project are as specified in the approved plans. A Type SP mix one traffic level higher than the traffic level specified in the approved plans, up to a Traffic Level C mix, may be substituted at no cost to the County. In situations where the design traffic level is not specified in the approved plans, a Traffic Level C mix shall be used. Where Type S Asphaltic Concrete is specified in the approved plans, the following equivalent mixes may be used, if approved by the County Engineer:

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

10.1.04.1.3 - Layers: Use only fine graded Superpave mixes.

10.1.04.1.3.1 - Layer Thickness: The allowable structural layer thicknesses for fine Type SP Asphaltic Concrete mixtures are as follows:

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

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

Type SP-9.5 - Limited to the top two structural layers, two layers maximum.
Type SP-12.5 - May not be used in the first layer of courses over 3 1/2 inches thick, nor in the first layer of courses over 2 3/4 inches thick on limited access facilities.
Type SP-19.0 - May not be used in the final (top) structural layer.

10.1.04.1.3.2 - Additional Requirements: The following requirements also apply to fine Type SP Asphaltic Concrete mixtures:

10.1.04.1.3.2.1 When construction includes the paving of adjacent shoulders (≤5 feet wide), the layer thickness for the upper pavement layer and shoulder shall be the same and paved in a single pass, unless called for differently in the approved plans.

10.1.04.1.3.2.2 All overbuild layers shall be Type SP Asphalt Concrete designed at the traffic level as approved by the County Engineer. Use the minimum and maximum layer thicknesses as specified above unless called for differently in the approved construction plans. On variable thickness overbuild layers, the minimum allowable thickness may be reduced by 1/4 inch, and the maximum allowable thickness may be increased 1/2 inch, unless called for differently in the approved construction plans.

10.1.04.2 - MIX COMPOSITION

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

10.1.04.2.2 - Mix Design: Submit to the County Engineer the proposed mix design and proof that this mix design is on the FDOT accepted list. The County Engineer will verify that the mix is on the approved list. No mix design revisions will be allowed. A new design mix will be required for any substitution of an aggregate product, binder, or other design component unless approved by the County Engineer. The County Engineer will consider any marked variations from mix design parameters 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 County Engineer will no longer allow the use of that mix design.

10.1.04.2.3 - Additional Information: Provide the following information to the County Engineer with each FDOT approved mix design submitted for use:

- The approved FDOT Mix Design Number.
- The design traffic level and the design number of gyrations \(N_{\text{design}}\).
- The source and description of the materials to be used.
- The FDOT source number product code of the aggregate components furnished from an FDOT approved source.
- The gradation and proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use. Compensate for any change in aggregate gradation in handling and processing as necessary.
- A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly -No. 200 [-75 μm]) should be accounted for and identified for the applicable sieves.
- The bulk specific gravity value for each individual aggregate (and RAP) component, as identified in the FDOT aggregate control program.
- 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%.
- A target temperature at which the mixture is to be discharged from the plant and a target roadway temperature. Do not exceed a target temperature of 340°F for modified asphalts and 315°F for unmodified asphalts.
- The physical properties achieved at four different asphalt binder contents, one of which shall be at the optimum asphalt content, and must conform to all specified physical requirements.
- The ignition oven calibration factor.

10.1.04.3 - MATERIALS

10.1.04.3.1 - General Requirements: Meet the material requirements specified in Division III of the FDOT Standard Specifications for Road and Bridge Construction. Specific references are as follows:

Coarse Aggregate: Stone, Slag, Crushed Gravel, Crushed Reclaimed Portland Cement Concrete Pavement, Crushed Glass..................................................Section 901
Fine Aggregate........................................................................................................Section 902
Superpave PG Asphalt Binder ..........................................................Section 916-1

Asphaltic Concrete Pavement
Road Construction Specifications
10.1.04.3.2 - Superpave Asphalt Binder: Unless specified otherwise in the approved plans or by County Engineer approval, use a PG 67-22 asphalt binder, including when Reclaimed Asphalt Pavement (RAP) material is used in the mix, unless the use of a different binder or recycling agent has been approved by the Florida Department of Transportation for a particular mix design.

10.1.04.3.3 - Use of Reclaimed Asphalt Pavement (RAP) Material:

10.1.04.3.3.1 - General Requirements: Reclaimed Asphalt Pavement (RAP) may be used as a component material of the asphalt mixture, with the exception of Friction Course mixes, subject to the following requirements:

- Assume responsibility for the production and placement of asphalt mixes which incorporate RAP as a component material.
- Use only RAP that has been approved by the FDOT. Provide documentation of the FDOT approval.
- Limit the amount of RAP material used in the mix to a maximum 30% by weight of total aggregate, unless otherwise approved by the County Engineer.
- Use any suitable means to prevent oversized RAP material from showing up in the completed recycled mixture. Take immediate corrective action if oversized RAP material appears in the completed recycled mix.
- Provide stockpiled RAP material that is reasonably consistent in characteristics and contains no aggregate particles which are soft or conglomerates of fines.
- Provide RAP having a minimum average asphalt content of 4.0% by weight. The County Engineer may sample the stockpile to verify that this requirement is met.

10.1.04.4 - ACCEPTANCE

10.1.04.4.1 - General: The asphalt mixture will be accepted based on one of the following methods as determined by the County Engineer and/or the Approved plans:

1) Acceptance Testing by the County Engineer

2) Other method(s) as determined by the County Engineer.

10.1.04.4.2 - Acceptance Testing: The County Engineer will require the use of an Independent Geotechnical Engineering firm and/or Laboratory, licensed or registered in the State of Florida, to perform acceptance testing.

Take one core, six (6") inches in diameter for every 300 feet of pavement placed per day for determining thickness and density. Locations of cores shall be staggered left and
right of the centerline. A minimum of two cores will be taken per roadway. Acceptance will be based on the following:

10.1.04.4.2.1 - Density: The minimum acceptable density for each course of asphaltic concrete placed shall be ninety-two (92%) percent of the design unit weight \( (G_{mm}) \) of the job mix, with no test lower than ninety and eight tenths (90.8%) percent or higher than ninety-five (95%) percent.

10.1.04.4.2.2 - Thickness: The minimum design thickness on all cores shall be met. When a deficiency in thickness is found, the County Engineer may require additional cores to be taken to determine the extent of the thickness deficiency. For any thickness that is less than the design thickness, remove and replace the full depth of the layer, extending a minimum of 50 feet on either side of the defective area for the full width of the paving lane. For any thickness that is greater than the design thickness, the County Engineer will make a determination about acceptance.

10.1.04.4.2.3 - Surface Tolerance: The asphalt mixture will be accepted on the roadway with respect to surface tolerance in accordance with the applicable requirements of 10.1.03.10.

10.1.04.4.2.4 - Certification by the Geotechnical Engineer: All acceptance testing results and data provided by the Geotechnical Engineer shall be certified in writing that all testing methods and documentation are in compliance with these specifications.

10.1.04.4.2.5 - Additional Tests: 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 and process control.

Section 10.1.05 - SUPERPAVE ASPHALTIC CONCRETE FRICTION COURSES

10.1.05.1 - DESCRIPTION

10.1.05.1.1 - General: Construct a Superpave Asphaltic Concrete Friction Course pavement using the type of mixture specified in the Contract. Superpave Friction Course mixes are identified as Type FC-5, FC-9.5 and FC-12.5. Meet the requirements of 10.1.02 for personnel, plant, methods and equipment. Meet the general construction requirements of 10.1.03.

10.1.05.1.2 - Thickness: The thickness of the friction course layer will be the plan thickness as shown in the plans per mix type. FC-9.5 will be 1”, FC-12.5 will be 1-1/2”, and FC-5 will be 3/4”.

Asphaltic Concrete Pavement
Road Construction Specifications
10.1.05.1.3 - Contractor's Process Control: Provide the necessary quality and process control of the friction course mix production and placement in accordance with the applicable provisions of 10.1.02 and 10.1.03. The contractor will monitor the spread rate periodically to ensure uniform thickness. Provide quality control procedures for daily monitoring and control of spread rate. If the spread rate drops below the target value, immediately make all corrections necessary to bring the spread rate into the acceptable range.

10.1.05.2 - MIX COMPOSITION

10.1.05.2.1 - General: Compose the asphalt mixture using a combination of aggregates (coarse, fine, or a mixture thereof) and asphalt binder. Some mixtures may require fibers and/or hydrated lime. Size, grade and combine the aggregate proportions to meet the grading and physical properties of the approved mix design and the requirements of this Section.

10.1.05.2.2 - Mix Design: Any submitted mix design must be pre-approved by the FDOT. Submit to the County Engineer the proposed mix design and proof that the mix design is on the FDOT District 5 accepted list. No mix design revisions will be allowed. A new design mix will be required for any substitution of an aggregate product, aggregate gradation, binder, or other design component unless approved by the County Engineer. The County Engineer will consider any marked variations from mix design parameters 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 County Engineer will no longer allow the use of that mix design. Provide certification from the plant (either in a statement on the delivery ticket or on a separate sheet) that the mix provided is in conformance with the design mix.

10.1.05.2.3 - Asphalt Binder: Meet the requirements of Article 336 of the FDOT Standard Specifications for Road and Bridge Construction. Use PG 76-22 asphalt binder meeting the requirements of Article 916-1 of the FDOT Standard Specifications for Road and Bridge Construction. ARB-5 and ARB-12 shall not be used as the asphalt rubber binder unless otherwise approved by the County Engineer.

10.1.05.2.4 - Additional Information: Provide the following information to the County Engineer with each FDOT approved mix design submitted for use:

- The approved FDOT Mix Design Number.
- The design traffic level and the design number of gyrations ($N_{design}$).
- The source and description of the materials to be used.
- The FDOT source number product code of the aggregate components furnished from an FDOT approved source.
• The gradation and proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use. Compensate for any change in aggregate gradation in handling and processing as necessary.
• A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly -No. 200 [-75 μm]) should be accounted for and identified for the applicable sieves.
• The bulk specific gravity value for each individual aggregate (and RAP) component, as identified in the FDOT aggregate control program.
• 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%.
• A target temperature at which the mixture is to be discharged from the plant and a target roadway temperature. Do not exceed a target temperature of 340°F for modified asphalts and 315°F for unmodified asphalts.
• The physical properties achieved at four different asphalt binder contents, one of which shall be at the optimum asphalt content, and must conform to all specified physical requirements.
• The ignition oven calibration factor.

10.1.05.3 - SPECIAL CONSTRUCTION REQUIREMENTS

10.1.05.3.1 - FC-9.5 and FC-12.5:

10.1.05.3.1.1 - Temperature:

10.1.05.3.1.1.1 - Air Temperature at Laydown: Spread the mixture only when the air temperature (the temperature in the shade away from artificial heat) is at 45°F and rising.

10.1.05.3.1.1.2 - Temperature of the mix: Heat and combine the asphalt binder and aggregate in a manner to produce a mix having a temperature, when discharged from the plant and at the time of spreading on the roadway, meeting the requirements of 10.1.03.5.3.

10.1.05.3.1.2 - Prevention of Adhesion: To minimize adhesion to the drum during the rolling operations, the Contractor may add a small amount of liquid detergent to the water in the roller.

At intersections and in other areas where the pavement may be subjected to cross-traffic before it has cooled, spray the approaches with water to wet the tires of the approaching vehicles before they cross the pavement.

10.1.05.3.1.3 - Transportation Requirements of Friction Course Mixtures: Cover all loads of friction course mixtures with a tarpaulin.
10.1.05.3.2 - FC-5:

10.1.05.3.2.1 - Hot Storage: When using surge or storage bins in the normal production of FC-5, do not leave the mixture in the surge or storage bin for more than one hour.

10.1.05.3.2.2 - Longitudinal Grade Controls for Open-Graded Friction Courses: Use either longitudinal grade control (skid, ski or traveling stringline) or a joint matcher.

10.1.05.3.2.3 - Temperature:

10.1.05.3.2.3.1 - Air Temperature at Laydown: Spread the mixture only when the air temperature (the temperature in the shade away from artificial heat) is at 65°F and rising. As an exception, place the mixture at temperatures lower than 65°F, only when approved by the County Engineer based on the Contractor’s demonstrated ability to achieve a satisfactory surface texture and appearance of the finished surface. In no case shall the mixture be placed at temperatures lower than 60°F.

10.1.05.3.2.3.2 - Temperature of the Mix: Heat and combine the asphalt binder and aggregate in a manner to produce a mix having a temperature, when discharged from the plant and at the time of spreading on the roadway, meeting the requirements of 10.1.03.5.3. The target mixing temperature shall be established at 320°F.

10.1.05.3.2.4 - Compaction: Provide two, static steel-wheeled rollers, with an effective compactive weight in the range of 135 to 200 PLI, determined as follows:

\[
\text{PLI} = \frac{\text{Total Weight of Roller (pounds)}}{\text{Total Width of Drums (inches)}}
\]

(Any variation of this equipment requirement must be approved by the County Engineer.) Establish an appropriate rolling pattern for the pavement in order to effectively seat the mixture without crushing the aggregate. In the event that the roller begins to crush the aggregate, reduce the number of coverages or the PLI of the rollers. If the rollers continue to crush the aggregate, use a tandem steel-wheel roller weighing not more than 135 lb/in (PLI) of drum width.
10.1.05.3.2.5 - Special Equipment

10.1.05.3.2.5.1 - Fiber Supply System: Use a separate feed system to accurately proportion the required quantity of mineral fibers into the mixture in such a manner that uniform distribution is obtained. Interlock the proportioning device with the aggregate feed or weigh system to maintain the correct proportions for all rates of production and batch sizes. Control the proportion of fibers to within plus or minus 10% of the amount of fibers required. Provide flow indicators or sensing devices for the fiber system, interlocked with plant controls so that the mixture production will be interrupted if introduction of the fiber fails.

When a batch plant is used, add the fiber to the aggregate in the weigh hopper or as approved and directed by the County Engineer. Increase the batch dry mixing time by 8 to 12 seconds, or as directed by the County Engineer, from the time the aggregate is completely emptied into the pugmill. Ensure that the fibers are uniformly distributed prior to the addition of asphalt binder into the pugmill.

When a drum-mix plant is used, add and uniformly disperse the fiber with the aggregate prior to the addition of the asphalt binder. Add the fiber in such a manner that it will not become entrained in the exhaust system of the drier or plant.

10.1.05.3.2.5.2 - Hydrated Lime Supply System: For FC-5 mixes containing granite, use a separate feed system to accurately proportion the required quantity of hydrated lime into the mixture in such a manner that uniform coating of the aggregate is obtained prior to the addition of the asphalt. Add the hydrated lime in such a manner that it will not become entrained in the exhaust system of the drier or plant. Interlock the proportioning device with the aggregate feed or weigh system to maintain the correct proportions for all rates of production and batch sizes and to ensure that all mixture produced is properly treated with hydrated lime. Control the proportion of hydrated lime to within plus or minus 10% of the amount of hydrated lime required. Provide and interlock flow indicators or sensing devices for the hydrated lime system with plant controls so that the mixture production will be interrupted if introduction of the hydrated lime fails.

The addition of the hydrated lime to the aggregate may be accomplished by Method (A) or (B) as follows:

10.1.05.3.2.5.2.1 - Method (A) - Dry Form: Add hydrated lime in a dry form to the mixture according to the type of asphalt plant being used.

When a batch plant is used, add the hydrated lime to the aggregate in the weigh hopper or as approved and directed by the County Engineer. Increase the batch dry mixing time by eight to twelve seconds, or as directed by the County Engineer, from the time the aggregate is completely emptied into the pugmill. Uniformly distribute the hydrated lime prior to the addition of asphalt binder into the pugmill.
When a drum-mix plant is used, add and uniformly disperse the hydrated lime to the aggregate prior to the addition of the asphalt. Add the hydrated lime in such a manner that it will not become entrained in the exhaust system of the drier or plant.

10.1.05.3.2.5.2.2 - Method (B) - Hydrated Lime/Water Slurry: Add the required quantity of hydrated lime (based on dry weight) in a hydrated lime/water slurry form to the aggregate. Provide a solution consisting of hydrated lime and water in concentrations as directed by the County Engineer. Use a plant equipped to blend and maintain the hydrated lime in suspension and to mix it with the aggregates uniformly in the proportions specified.

10.1.05.3.2.5.3 - Hydrated Lime Pretreatment: For FC-5 mixes containing granite, pretreat the aggregate with hydrated lime prior to incorporating the aggregate into the mixture. Use a feed system to accurately proportion the aggregate and required quantity of hydrated lime, and mix them in such a manner that uniform coating of the aggregate is obtained. Control the proportion of hydrated lime to within $\pm 10\%$ of the amount required. Aggregate pretreated with hydrated lime in this manner shall be incorporated into the asphalt mixture within 45 days of pretreatment.

10.1.05.3.2.5.3.1 - Hydrated Lime Pretreatment Methods: Pretreat the aggregate using one of the following two methods:

Pretreatment Method A - Dry Form: Add the required quantity of hydrated lime in a dry form to the aggregate. Assure that the aggregate at the time of pretreatment contains a minimum of 3% moisture over saturated surface dry (SSD) conditions. Utilize equipment to accurately proportion the aggregate and hydrated lime and mix them in such a manner as to provide a uniform coating.

Pretreatment Method B - Hydrated Lime/Water Slurry: Add the required quantity of hydrated lime (based on dry weight) in a hydrated lime/water slurry form to the aggregate. Provide a solution consisting of hydrated lime and water in a concentration to provide effective treatment. Use equipment to blend and maintain the hydrated lime in suspension, to accurately proportion the aggregate and hydrated lime/water slurry, and to mix them to provide a uniform coating.

10.1.05.3.2.5.3.2 - Blending Quality Control Records: Maintain adequate Quality Control records for the County Engineer’s review for all pretreatment activities. Include as a minimum the following information (for each batch or day’s run of pretreatment): pretreatment date, aggregate certification.
information, certified test results for the hydrated lime, aggregate moisture content prior to blending, as-blended quantities of aggregate and hydrated lime, project number, customer name, and shipping date.

**10.1.05.3.2.5.3.3 - Certification:** In addition to the aggregate certification, provide a certification with each load of material delivered to the HMA plant, that the material has been pretreated in conformance with these specifications. Include also the date the material was pretreated.

**10.1.05.4 - ACCEPTANCE**

10.1.05.4.1 FC-9.5 and FC-12.5: Meet the requirements of 10.1.04.4.

10.1.05.4.2 FC-5: Meet the requirements of 10.1.04.

**10.1.05.5 - FAILING MATERIAL**
Assume responsibility for removing and replacing all defective material placed on the project, at no cost to the County.

**10.2 - MARSHALL MIX ASPHALTIC CONCRETE**

**Section 10.2.01 - GENERAL**

All references to the County shall mean the Orange County Public Works Department – Development Engineering Division. The County Engineer will have the right to disapprove of any material or process that does not conform to these specifications. Any references to Florida Department of Transportation (FDOT) Specification Sections for Marshall Mix Design Asphaltic Concrete shall mean the 2000 edition of the FDOT Standard Specifications for Road and Bridge Construction, including supplements, as amended herein.

Any incorrect references to FDOT specifications, test methods, or standards shall be brought to the attention of the County Engineer for clarification. Document all QC procedures, Process Control, inspection, and all test results and make them available for review by the County Engineer throughout the life of the project.

All test methods designated as FM refer to the FDOT Florida Sampling and Testing Methods.

**Section 10.2.02 - ASPHALTIC CONCRETE MIXES**

Asphaltic Concrete Marshall Mixes shall conform with the requirements specified in the 2000 edition of the FDOT Standard Specifications for Road and Bridge Construction and as directed herein. Asphaltic Concrete Marshall Mixes shall be designed and certified by a
qualified Professional Engineer registered in the State of Florida. At least 30 days prior to the start of the paving operations, the Marshall Mix designs for the asphaltic concrete mixes to be used on the project shall be submitted to the County for review and approval.

All Marshall Mix design formulas and materials to be used for the project shall have been pre-approved by the County within the last twelve months. The developer shall pay all of the costs to design, obtain County approval, testing to verify the mix design and certification of the Marshall Mix design formula, used on the project.

No mix design revisions will be allowed. A new design mix will be required for any substitution of an aggregate product, aggregate gradation, binder, or other design component unless approved by the County Engineer. The County Engineer will consider any marked variations from mix design parameters 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 County Engineer will no longer allow the use of that mix design. Provide certification from the plant (either in a statement on the delivery ticket or on a separate sheet) that the mix provided is in conformance with the design mix.

Section 10.2.03 - ASPHALTIC CONCRETE TESTING

During construction of the Marshall Mix Asphaltic Concrete pavement (surface courses, friction courses and base courses), the following tests must be completed and reports submitted to the County Engineer before acceptance can be given:

a. Extraction, stability and gradation of combined aggregate – one (1) test per 500 tons or part thereof, with a minimum of one per day. Bitumen content, stability, composition and gradation of aggregates to confirm the intent of the job mix formula.

b. Density and depth checks – one (1) test per three hundred lineal feet of roadway (minimum of two (2) tests per street). Minimum acceptable density for each course of asphaltic concrete material shall be ninety-three (93%) percent of the design unit weight of the job mix formula.

All tests and job mix formulas shall be certified by a geotechnical engineer or other qualified professional engineer. All certifications and reports shall be signed and sealed by a qualified professional engineer registered in the State of Florida.

When there is a deficiency in test results for stability, gradation or field density the area of unacceptable pavement shall be corrected at no cost to the County. Correct deficiencies in the structural layers or in the friction course by removing and replacing the full depth of the layer, extending a minimum of 50 feet on either side of the defective area for the full width of the paving lane. On a case by case basis, the County Engineer may require an extended warranty of acceptance in lieu of removal and replacement of the materials.
The following items may be required by the County Engineer:

a. Plant inspection and calibration check
b. Aggregate verification
c. Temperature control and verification
d. Test of asphalt cement content
e. Full-time construction monitoring

Section 10.2.04 - THICKNESS OF PAVEMENT

All thickness mentioned in the specifications and/or shown on the construction plans shall be and average thickness computed as follows:

The minimum thickness allowed shall be \( \frac{3}{4} \) inch less than the required average thickness. Thicknesses in excess of \( \frac{3}{4} \) inch of the required average thickness shall be computed as the design average thickness plus \( \frac{3}{4} \) inch in computing the average thickness.

The thickness of the pavement shall be determined from the length of cores, at least two (2) inches in diameter, taken at random points on the cross section and along the roadway. Each core shall represent a section no longer than three hundred feet, with a minimum of two (2) cores per street. The average thickness shall be determined from the measured thicknesses.

If the contractor believes that the number of cores taken is insufficient to properly indicate the thickness of the pavement section, he/she may request additional cores at locations designated by the County Engineer. All additional costs shall be borne the contractor.

When the deficiency in thickness is in excess of \( \frac{3}{4} \) inch, the contractor shall correct the deficiency either by replacing the full thickness of the asphaltic concrete course for a length of at least fifty (50) feet from each end of the deficient area, or (when permitted by the County Engineer) by overlaying. Normally an overlay will not be permitted in a concrete curb section.

Section 10.2.05 - MECHANICAL SPREADING AND SCREEDING EQUIPMENT

Bituminous pavers shall be self contained, self propelled and can be steered. It shall be equipped with a receiving and disbursing hopper capable of holding a minimum quantity of five (5) cubic yards of bituminous plant mix material, to permit a uniform spreading operation. The hopper shall be equipped with a conveyor distribution system to place the mixture uniformly in front of the screed.

The paver shall be also equipped with a heated mechanical screed or strike-off assembly. The screed or strike-off shall be capable of adjustment to regulate the depth of material
spread and produce a finished surface of the required evenness and texture, without tearing, shoving or gouging the mixture. Power boxes will not be acceptable as bituminous pavers in the County right-of-way.

Section 10.2.06 – CONSTRUCTION METHODS

The mixture shall be spread on the surface designated only when the surface previously prepared is intact, firm, properly cured and dried; and only when the air temperature in the shade and away from artificial heat is above forty (40) degrees Fahrenheit and rising.

The mixture shall be delivered on the road in ample time to permit the spreading, rolling and surface testing during working hours. The temperature of the mixture at the time of spreading shall be between two hundred sixty (260) and three hundred ten (310) degrees Fahrenheit and shall not exceed three hundred thirty-five (335) degrees Fahrenheit at the plant.

Material shall be delivered to the job site with sufficient frequency that the paving operation can continue without interruption.

Depressions which may develop after the initial rolling shall be remedied by removing the mixture laid and adding new material to bring such depressions to a true surface. Such portions of the completed course that are defective on surface planeness, compaction or composition, or that do not comply with the requirements of these specifications, shall be removed and replaced with a suitable mixture properly laid in accordance with these specifications.

Use a self-propelled pneumatic-tired roller to roll all patching and leveling courses and the first overbuild course. Use a self-propelled pneumatic-tired roller on the first structural layer placed on a milled surface.

Vertical joints shall be constructed prior to the commencement of the ongoing paving operation. All joints will be prepared according to the requirements in 10.2.07, Joints.

10.2.07 - JOINTS

General: When laying fresh mixture against the exposed edges of joints (trimmed or formed as provided below), place it in close contact with the exposed edge to produce an even, well-compacted joint after rolling.

Transverse Joints: Place the mixture as continuously as possible. Do not pass the roller over the unprotected end of the freshly laid mixture except when discontinuing the laying operation long enough to permit the mixture to become chilled.

When thus interrupting the laying operation, construct a transverse joint by cutting back
on the previous run to expose the full depth of the mat.

**Longitudinal Joints:** For all layers of pavement except the leveling course, place each layer so that longitudinal construction joints are offset 6 to 12 inches laterally between successive layers. The County Engineer may waive this requirement where offsetting is not feasible due to the sequence of construction.

**Transitions to Existing Pavement:** The transitions to existing pavement at the ends of overlays and friction courses shall be keyed into the existing pavement to provide a smooth, well compacted transition that matches the grades of the existing pavement. To accomplish this, the full width of the lanes shall be milled at a rate of one (1) inch per 20 longitudinal feet to create a transverse joint with a depth equal to the thickness of the overlay or friction course being installed. Place the fresh mixture of asphaltic concrete against the exposed edge to produce an even well-compacted joint after rolling.

**Section 10.2.08 – FINISHED SURFACE REQUIREMENTS**

For the purpose of testing the finished surface, the Contractor shall provide a fifteen (15) foot rolling straight edge and standard template cut to the true cross section of the road. These shall be available at all times during construction so that the County may check the finished surface. The Contractor shall provide and designate an employee whose duty is to use the straight edge and template in checking all rolled surface under the direction of the County. Vertical measurement from a string line between curbs to determined crown may be accepted as an alternate. The finished surface shall be such that it will not vary more than 3/16 inch from the fifteen (15) foot rolling straight edge applied parallel to the centerline of the pavement and shall be of uniform texture and compaction. The surface shall have no pulled, torn or loosened portions and shall be free from segregation, sand spots or ripples. Irregularities of the surface exceeding the above requirements shall be corrected by the Contractor who has the option of selecting one of the following methods:

a. Removing and Replacing – If correction is made by removing and replacing the pavement, the removal must be for the full depth of the course and extend at least fifty (50) feet on either side of the defective area, for the full width of the paving lane.

b. Overlaying – If correction is made by overlaying, the overlay shall cover the length of the defective area and extend a minimum distance of fifty (50) feet on each side of the defective area. The overlay shall extend the full width of the roadway. The overlay transitions to the existing pavement shall be in accordance with section 10.2.07, Transitions to existing pavements. Care shall be taken to maintain the specified cross slope. The mix used for the overlay may be adjusted as necessary for this purpose by the County Engineer. Overlaying will not be permitted when the finished pavement surface is a friction course or abuts concrete curbs.

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c. Other Methods – Correction of minor straight edge deficiencies by methods other than specified above must be approved by the County Engineer.