



*Florida Department of Transportation*

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SECRETARY

September 8, 2023

Khoa Nguyen  
Director, Office of Technical Services  
Federal Highway Administration  
3500 Financial Plaza, Suite 400  
Tallahassee, Florida 32312

Re: State Specifications Office  
Section: **337**  
Proposed Specification: **3370302 Asphalt Concrete Friction Course**

Dear Mr. Nguyen:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes were proposed by Greg Sholar to improve and support the future integration of alternatives, such as aggregate source, and type.

Please review and transmit your comments, if any, within two weeks (10 business days). Comments should be sent via email [daniel.strickland@dot.state.fl.us](mailto:daniel.strickland@dot.state.fl.us).

If you have any questions relating to this specification change, please call me at (850) 414-4130.

Sincerely,

Daniel Strickland, P.E.  
State Specifications Engineer

DS/mep  
Attachment  
cc: Florida Transportation Builders' Assoc.  
State Construction Engineer

**ASPHALT CONCRETE FRICTION COURSES  
(REV 4-20-23)**

SUBARTICLE 337-3.2.1.1 is deleted and the following substituted:

**337-3.2.1.1 Aggregates:** Use an aggregate blend which consists of either 100% ~~crushed granite and/or granitic gneiss~~ Class A friction aggregate or 100% ~~crushed limestone and/or crushed shell rock~~ Class B and/or C aggregates in accordance with Table 337-1. Do not blend ~~granite and/or granitic gneiss with limestone and/or shell rock~~ Class A aggregate with Class B or C aggregate for FC-5 mixtures.

A list of aggregates approved for use in friction course may be available on the Department's website. The URL for obtaining this information, if available, is: <https://mac.fdot.gov/>.

SUBARTICLE 337-3.2.1.3 is deleted and the following substituted:

**337-3.2.1.3 Hydrated Lime:** Add ~~hydrated~~ the lime at a dosage rate of ~~1.0% by weight of the total dry aggregate to mixes containing granite or granitic gneiss from Georgia or Alabama. Add the lime at a dosage of 1.5% by weight of the total dry aggregate to mixes containing any amount of granite from Nova Scotia~~ in accordance with Table 337-1.

SUBARTICLE 337-3.2.2.1 is deleted and the following substituted:

**337-3.2.2.1: Aggregates:** Use an aggregate blend of approved friction course aggregates ~~that consists of crushed granite, crushed granitic gneiss, crushed limestone, crushed shell rock, or a combination of the above~~ in accordance with Table 337-1. ~~As an exception, mixes that contain a minimum of 60% of approved friction course aggregates of crushed granite and/or crushed granitic gneiss may either contain: up to 40% fine aggregate from other sources of aggregate not approved for friction courses or a combination of~~ For classifications that allow non-friction aggregate, up ~~up~~ to 20% RAP and the remaining fine aggregate from other sources of aggregate not approved for friction courses may be used. Mixtures utilizing High Polymer (HP) binder are not allowed to contain RAP.

A list of aggregates approved for use in friction course may be available on the Department's website. The URL for obtaining this information, if available, is: <https://mac.fdot.gov/>.

SUBARTICLE 337-3.2.2.2 is deleted and the following substituted:

**337-3.2.2.2: Asphalt Binder:** Use an asphalt binder as called for in the Contract Documents meeting the requirements of Section 916. High polymer binder may be substituted in a mixture with PG 76-22 binder at no additional cost to the Department.

<u>Table 337-1</u> <u>Friction Aggregate Classification</u>			
<u>Classification</u>	<u>Minimum percentage of approved friction course aggregates for FC-5 mixtures</u>	<u>Minimum percentage of approved friction course aggregates for FC-9.5 and FC-12.5 mixtures</u>	<u>Percentage of hydrated lime required in FC-5 mixtures</u>
<u>A</u>	<u>100</u>	<u>100</u>	<u>0</u>
<u>B</u>	<u>100</u>	<u>60</u>	<u>1.0</u>
<u>C</u>	<u>100</u>	<u>60</u>	<u>1.5</u>

SUBARTICLE 337-3.3.1 FC-5 is deleted and the following substituted:

**337-3.3.1 FC-5:** Use a mixture having a gradation at design within the ranges shown in Table 337-~~4~~2.

<u>Table 337-<del>4</del><u>2</u></u> <u>FC-5 Gradation Design Range</u>									
3/4 inch	1/2 inch	3/8 inch	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
100	85-100	60-75	15-25	5-10	--	--	--	--	2-5

SUBARTICLE 337-4.1 FC-5 is deleted and the following substituted:

**337-4.1 FC-5:** The Department will design the FC-5 mixtures. Furnish the materials and all appropriate information (source, gradation, etc.) as specified in 334-3.2.7. The Department will have three weeks to design the mix.

The Department will establish the design binder content for FC-5 within the following ranges based on aggregate type:

<u>Table 337-<del>2</del><u>3</u></u> <u>FC-5 Percent Binder Content</u>	
<u>Aggregate Type</u> <u>Classification</u>	<u>Percent Binder Content</u>
<del>Crushed Granite and/or Granitic Gneiss</del> <u>A</u>	6.5 – 8.0
<del>Crushed Limestone and/or Shell Rock</del> <u>B or C</u>	6.0 – 7.5

SUBARTICLE 337-4.3 is deleted and the following substituted:

**337-4.3 Revision of Mix Design:** For FC-5, FC-9.5 and FC-12.5, meet the requirements of 334-3.3. For FC-5, all revisions must fall within the gradation limits defined in Table 337-~~4~~2.

SUBARTICLE 337-6.2 FC-5 is deleted and the following substituted:

**337-6.2 FC-5:** Meet the requirements of 334-5 with the following exceptions:

1. The mixture will be accepted with respect to gradation (P-<sub>3/8</sub>, P-<sub>4</sub>, and P-<sub>8</sub>), and

asphalt binder content ( $P_b$ ) only.

2. Testing in accordance with AASHTO T 312 and FM 1-T 209 (and conditioning prior to testing) will not be required as part of 334-5.1.1.

3. The standard LOT size of FC-5 will be 2,000 tons, with each LOT subdivided into four equal sublots of 500 tons each.

4. The Between-Laboratory Precision Values described in Table 334-7 are modified to include ( $P_{-3/8}$ ,  $P_{-4}$ , and  $P_{-8}$ ) with a maximum difference per FM 1-T 030 (Figure 2).

5. Table 334-6 (Master Production Range) is replaced by Table 337-~~34~~.

6. The mixture will be accepted on the roadway with respect to surface tolerance in accordance with 334-5.8. No density testing will be required for these mixtures.

Table 337- <del>34</del> FC-5 Master Production Range	
Characteristic	Tolerance (1)
Asphalt Binder Content (%)	Target $\pm$ 0.60
Passing 3/8 inch Sieve (%)	Target $\pm$ 7.50
Passing No. 4 Sieve (%)	Target $\pm$ 6.00
Passing No. 8 Sieve (%)	Target $\pm$ 3.50
(1) Tolerances for sample size of $n = 1$ from the verified mix design	

**337-6.2.1 Individual Test Tolerances for FC-5 Production:** Terminate the LOT if any of the following Quality Control (QC) failures occur:

1. An individual test result of a subplot for asphalt binder content does not meet the requirements of Table 337-~~34~~,

2. Two consecutive test results within the same LOT for gradation on any of the following sieve sizes ( $P_{-3/8}$ ,  $P_{-4}$ , and  $P_{-8}$ ) do not meet the requirements of Table 337-~~43~~. The two consecutive failures must be on the same sieve.

When a LOT is terminated due to a QC failure, stop production of the mixture until the problem is resolved to the satisfaction of the QC Managers and/or Asphalt Plant Level II Technicians responsible for the decision to resume production after a QC failure, as identified in Section 105. In the event that it can be demonstrated that the problem can immediately be or already has been resolved, it will not be necessary to stop production. When a LOT is terminated, make all necessary changes to correct the problem. Do not resume production until appropriate corrections have been made. Inform the Engineer of the problem and corrections made to correct the problem. After resuming production, sample and test the material to verify that the changes have corrected the problem. Summarize this information and provide it to the Engineer prior to the end of the work shift when production resumes.

In the event that a QC failure is not addressed as defined above, the Engineer's approval will be required prior to resuming production after any future QC failures.

Address any material represented by a failing test result in accordance with 334-5.9.5. Any LOT terminated under this Subarticle will be limited to a maximum Pay Factor of 1.00 (as defined in 337-12.3) for each quality characteristic.

SUBARTICLE 337-9.2 is deleted and the following substituted:

**337-9.2 Hydrated Lime Supply System:** For FC-5 mixes containing ~~granite~~, Class B or

**C aggregate.** 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 binder. 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 flow indicators or sensing devices for the hydrated lime system, interlocked with plant controls so that an alarm will be activated if introduction of the hydrated lime fails. Stop production of the asphalt mixture and resume production once the hydrated lime supply system is operating correctly. The addition of the hydrated lime to the aggregate may be accomplished by Method A or B as follows:

**337-9.2.1 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 Engineer. Increase the batch dry mixing time by eight to twelve seconds, or as directed by the 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 binder. Add the hydrated lime in such a manner that it will not become entrained in the exhaust system of the drier or plant.

**337-9.2.2 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 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.

SUBARTICLE 337-9.3 is deleted and the following substituted:

**337-9.3 Hydrated Lime Pretreatment:** For FC-5 mixes containing granite Class B or C aggregate, as an alternative to 337-9.2, 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,~~ lime and mix them in such a manner that uniform coating of the aggregate is obtained. Control the proportion of hydrated lime to within plus or minus 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.

**337-9.3.1 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.

**337-9.3.2 Blending QC Records:** Maintain adequate QC records for the 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.

**337-9.3.3 Certification:** In addition to the aggregate certification, provide a certification with each load of material delivered to the hot mix asphalt plant, that the material has been pretreated in conformance with these specifications. Include also the date the material was pretreated.

SUBARTICLE 337-10 is deleted and the following substituted:

**337-10 Failing Material.**

Meet the requirements of 334-5.9. For FC-5, use the Master Production Range defined in Table 337-~~3~~4 in lieu of Table 334-6.

SUBARTICLE 337-12.3 is deleted and the following substituted:

**337-12.3 FC-5:** Meet the requirements of 334-8 with the following exceptions:

1. Pay factors will be calculated for asphalt binder content and the percentages passing the 3/8 inch, the No. 4, and the No. 8 sieves only.
2. Table 337-~~4~~5 replaces Table 334-8.
3. Table 337-~~5~~6 replaces Table 334-9.
4. The Composite Pay Factor equation in 334-8.3 is replaced with the following:  

$$\text{CPF} = [(0.20 \times \text{PF } 3/8 \text{ inch}) + (0.30 \times \text{PF No. 4}) + (0.10 \times \text{PF No. 8}) + (0.40 \times \text{PF AC})]$$

Table 337-45 Small Quantity Pay Table for FC-5		
Pay Factor	1-Test Deviation	2-Test Average Deviation
Asphalt Binder Content (%)		
1.05	0.00-0.25	0.00-0.18
1.00	0.26-0.50	0.19-0.35
0.90	0.51-0.60	0.36-0.42
0.80	>0.60	>0.42
3/8 inch Sieve (%)		
1.05	0.00-3.25	0.00-2.30
1.00	3.26-6.50	2.31-4.60
0.90	6.51-7.50	4.61-5.30
0.80	>7.50	>5.30
No. 4 Sieve (%)		
1.05	0.00-2.50	0.00-1.77
1.00	2.51-5.00	1.78-3.54
0.90	5.01-6.00	3.55-4.24
0.80	>6.00	>4.24
No. 8 Sieve (%)		
1.05	0.00-1.50	0.00-1.06
1.00	1.51-3.00	1.07-2.12
0.90	3.01-3.50	2.13-2.47
0.80	>3.50	>2.47

Table 337-56 Specification Limits for FC-5	
Quality Characteristic	Specification Limits
Asphalt Binder Content (%)	Target $\pm$ 0.45
Passing 3/8 inch sieve (%)	Target $\pm$ 6.00
Passing No. 4 sieve (%)	Target $\pm$ 4.50
Passing No. 8 sieve (%)	Target $\pm$ 2.50