

# Construction Academy 2022

## Asphalt Issues

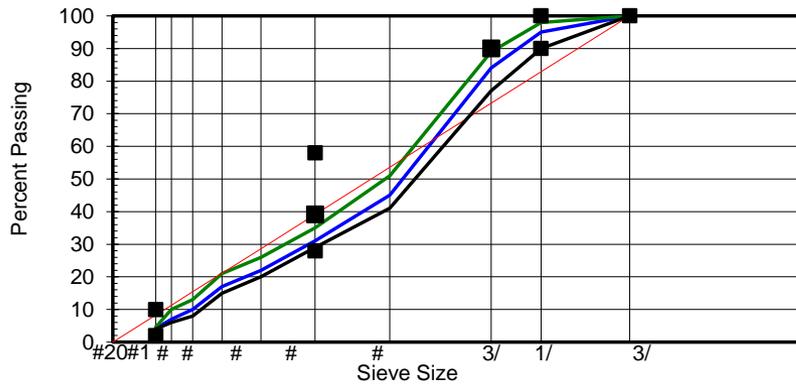
**Wayne A. Rilko, P.E.**  
**State Materials Office**  
**March 15, 2022**

# Asphalt ~~Issues~~ Topics

# Asphalt 101



12.5 mm Superpave Gradation Chart



Ground Tire Rubber



Styrene-Butadiene-Styrene (SBS)



# Materials

## Asphalt Binders

- “Binds” the aggregate together
- Provides...
  - the “glue”
  - lubrication for compaction
  - Durability (resistance to cracking)
- The most expensive part of an asphalt mix

## Aggregate

- Stability, constructability, and moisture resistance
  - Consensus properties (fine aggregate angularity, flat and elongated particles, and clay content)
  - Source properties (toughness, soundness, and deleterious materials)



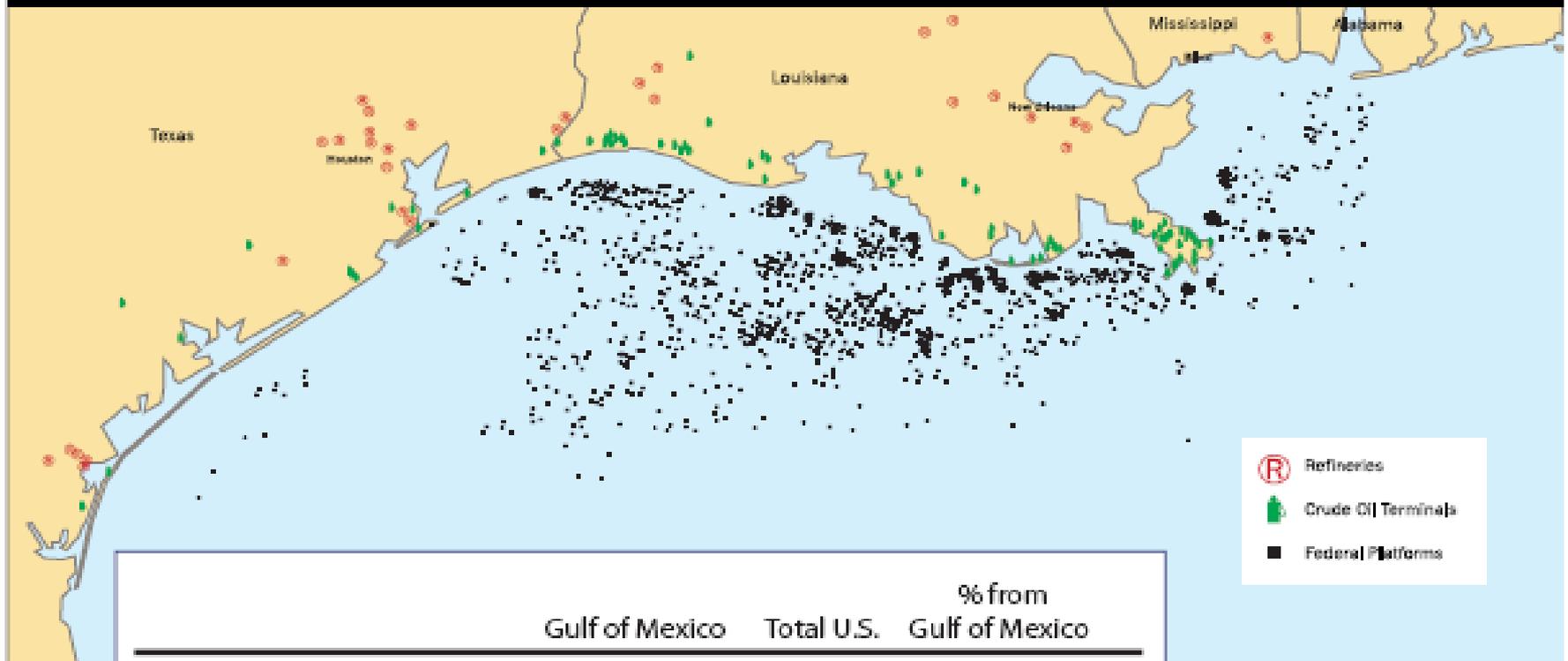
# Where Does Asphalt Come From?



Crude Oil



# Gulf Coast Oil and Natural Gas Operations



- Ⓡ Refineries
- Crude Oil Terminals
- Federal Platforms

	Gulf of Mexico	Total U.S.	% from Gulf of Mexico
Oil production (million b/d)	1.5	5.5	27%
Natural Gas production (bcf/d)	10.6	52	20%
Refinery Capacity (million b/d)	8.1	17	48%
<i>of which in LA and MS</i>	<i>3.1</i>	<i>17</i>	<i>18%</i>
Crude Oil Imports (million b/d)	6.5	10.8	60%
<i>of which into LA and MS ports</i>	<i>2.5</i>	<i>10.8</i>	<i>23%</i>

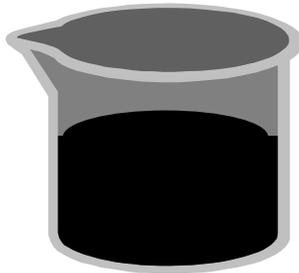
Source: U.S. Energy Information Administration

# Superpave Asphalt Binders

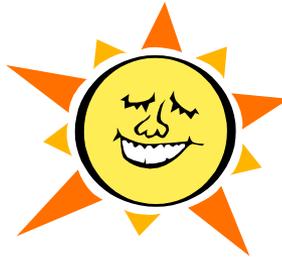
Grading system based on climate

## PG 67-22

Performance  
Grade



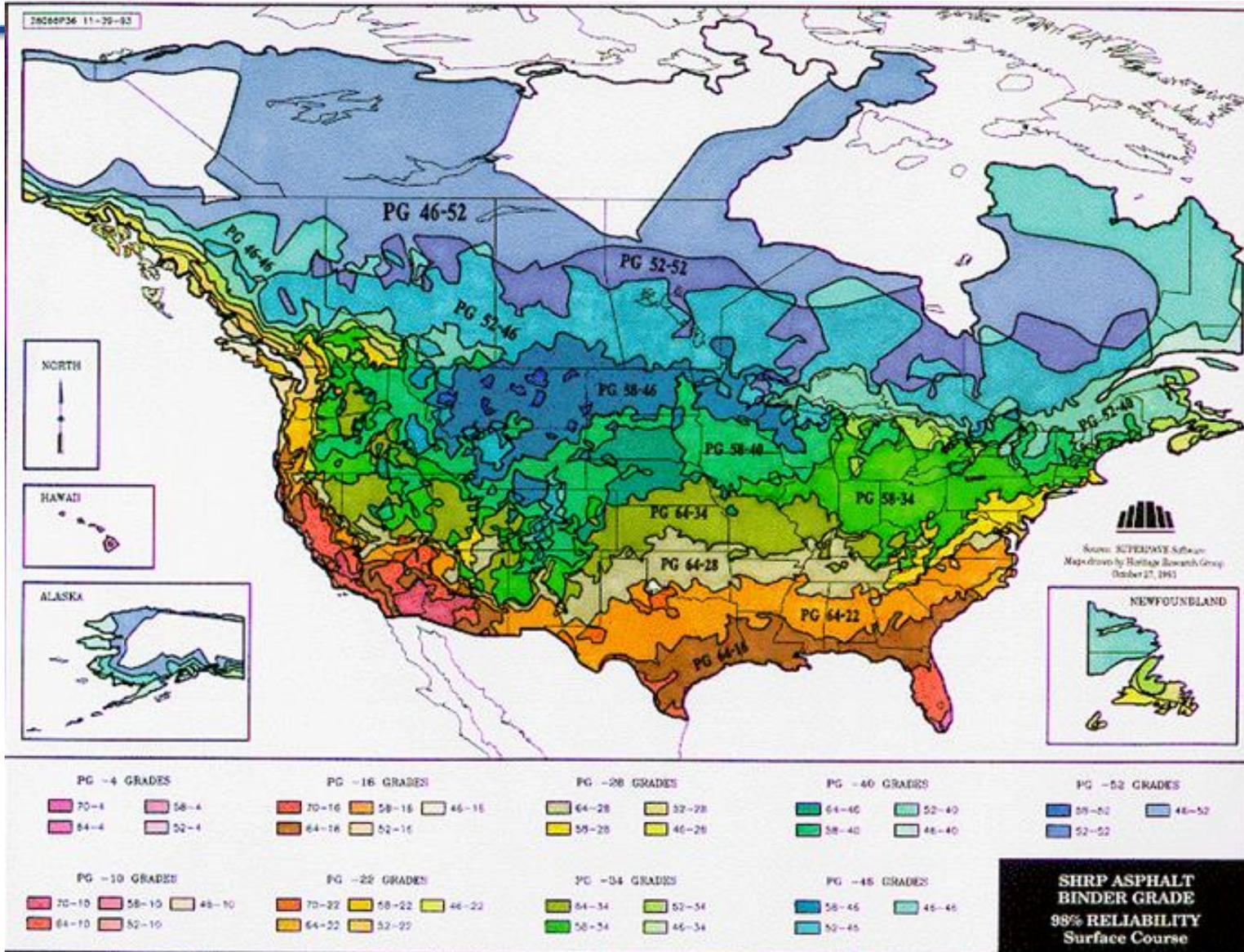
Average 7-day  
max pavement  
design temp



Min pavement  
design temp



# Examples of PG Grading System



# Neat Asphalt Binders

**Table 334-2  
Asphalt Binder Grade for Mixes Contains RAP**

<b>Percent RAP</b>	<b>Asphalt Binder Grade</b>
0 – 15	PG 67-22
16 – 30	PG 58-22
>30	PG 52-28

The bituminous material specification requirements are outlined in Section 916.

# Modified Asphalt Binders (916)

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- PG 76-22 (PMA)
  - PG 67-22 base asphalt
  - Polymer Modified Asphalt (SB or SBS Polymer)
- PG 76-22 (ARB)
  - PG 67-22 base asphalt
  - Minimum 7% ground tire rubber (GTR)
  - Polymer modification optional
- High Polymer (PMA)
  - PG 58-22 base asphalt
  - Polymer Modified Asphalt (SB or SBS Polymer)

A close-up, top-down view of a large quantity of light-colored, irregularly shaped limestone aggregate. The stones are densely packed and vary in size and shape, typical of crushed limestone used in construction or landscaping. The color ranges from a pale beige to a slightly darker tan. A black rectangular box is overlaid on the upper portion of the image, containing the text "South Florida Limestone" in white, sans-serif font.

# South Florida Limestone

Granite



# RAP Usage (2021)



FRAP_Course	RAP	FRAP_Fine	MM	RAS	Total Recycled Material Tonnage
29,474.31	766,068.57	33,703.48	94,952.08	-	924,198.44 tons

# Asphalt Mix Tonnage (2021)

Calendar Year 2021	
Mix type	Tonnage
FC-12.5	560,165.60
FC-5	491,630.47
FC-9.5	194,036.63
SP-12.5	3,192,895.50
SP-19.0	53,893.04
SP-9.5	72,709.13
<b>Grand Total</b>	<b>4,565,330.37</b>

Friction			Structural			Grand Total
FC-5	FC-9.5	FC-12.5	SP-9.5	SP-12.5	SP-19.0	
491,630.47	194,036.63	560,165.60	72,709.13	3,192,895.50	53,893.04	4,565,330.37



# Approved Asphalt Binder Terminals

Gulf of Mexico

Mississippi Delta

Louisiana

Mississippi

Alabama

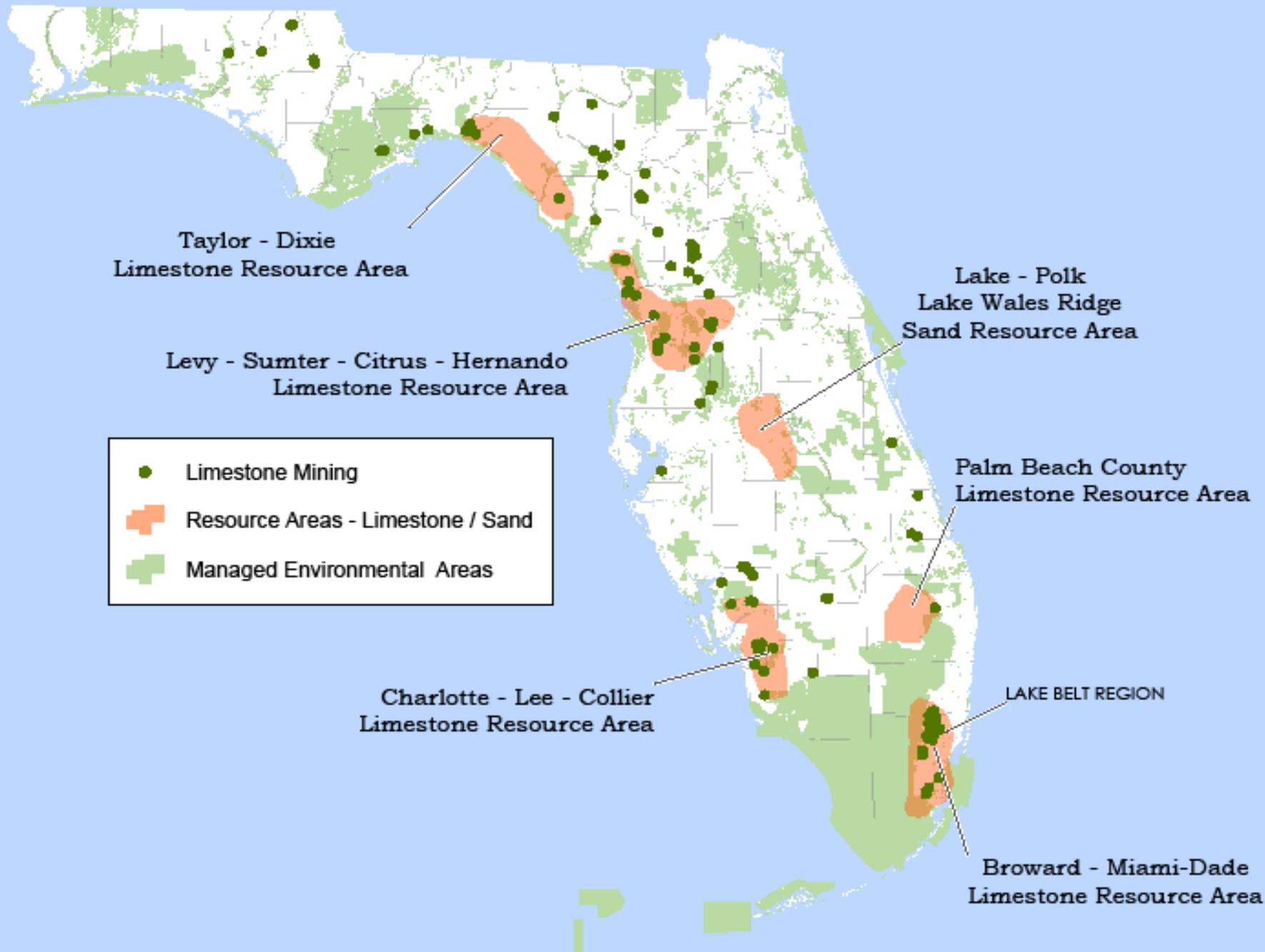
Georgia

South Carolina

Florida

T

# LIMESTONE AND SAND RESOURCE AREAS



# Aggregate Sources Used in Asphalt

- Aggregate mines
- Aggregate terminals



Alabama

Georgia

Florida

# Approved Asphalt Plants



# Florida Asphalt Mixtures

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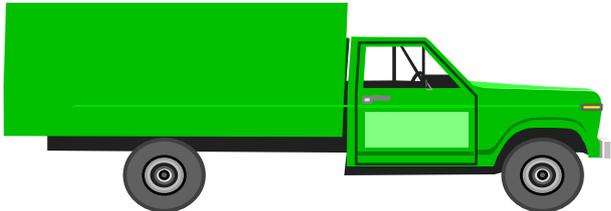
- Superpave Asphalt Concrete (334)
  - Structural asphalt mixtures
  - SP-9.5, SP-12.5, SP-19.0
- Asphalt Concrete Friction Courses (337)
  - FC-9.5, FC-12.5, FC-5 (OGFC)
- Superpave Asphalt Base (234)
  - B-12.5
- Asphalt Treated Permeable Base (ATPB) (287)
  - Used under PCC pavements

# Superpave – Structural (334)

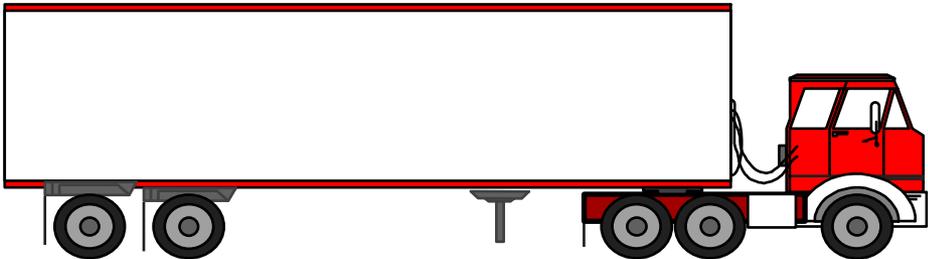
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- Purpose: Load carrying portion of pavement
  - Superpave Mix Design
- Three mixes based on maximum aggregate sizes
  - 9.5 mm (SP-9.5)
  - 12.5 mm (SP-12.5)
  - 19.0 mm (SP-19.0)
- Five Traffic Levels (A-E)
  - Based on 18,000 lb. Equivalent Single Axle Loads (ESAL's)
  - Low traffic = A, High traffic = E

# ESAL Examples



$$\begin{array}{r} 15,000 \text{ lb} \\ 0.48 \text{ ESAL} \end{array} + \begin{array}{r} 6,000 \text{ lb} \\ 0.01 \text{ ESAL} \end{array} = 0.49 \text{ ESALs}$$



$$\begin{array}{r} 34,000 \text{ lb} \\ 1.10 \end{array} + \begin{array}{r} 34,000 \text{ lb} \\ 1.10 \end{array} + \begin{array}{r} 12,000 \text{ lb} \\ 0.20 \end{array} = 2.40 \text{ ESALs}$$

# Mix Design Traffic Levels

Traffic Levels  
are found in the  
Contract

ESALS come  
from  
planning

Traffic Level	ESAL's
A	< 300,000 ESAL's
B	300,000 < 3 million ESAL's
C	3 million < 10 million ESAL's
D	10 million < 30 million ESAL's
E	≥ 30 million ESAL's

Concept: Put the right mix on the right road  
Higher traffic level is not necessarily better

# Traffic Levels 2021

Traffic Level	Tonnage	Percentage
A	0.00	0.00%
B	735.62	0.02%
C	2,211,538.65	48.40%
D	1,432,213.97	31.34%
E	429,211.66	9.39%
NA	495,878.46	10.85%
<b>Grand Total</b>	<b>4,569,578.36</b>	<b>100.00%</b>



A  
<300,000 ESAL's



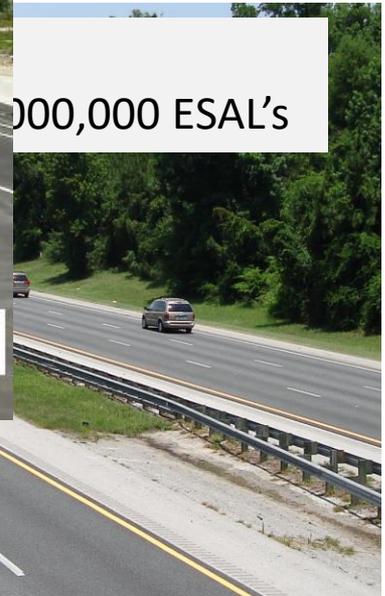
B  
300,000 to 3,000,000 ESAL's



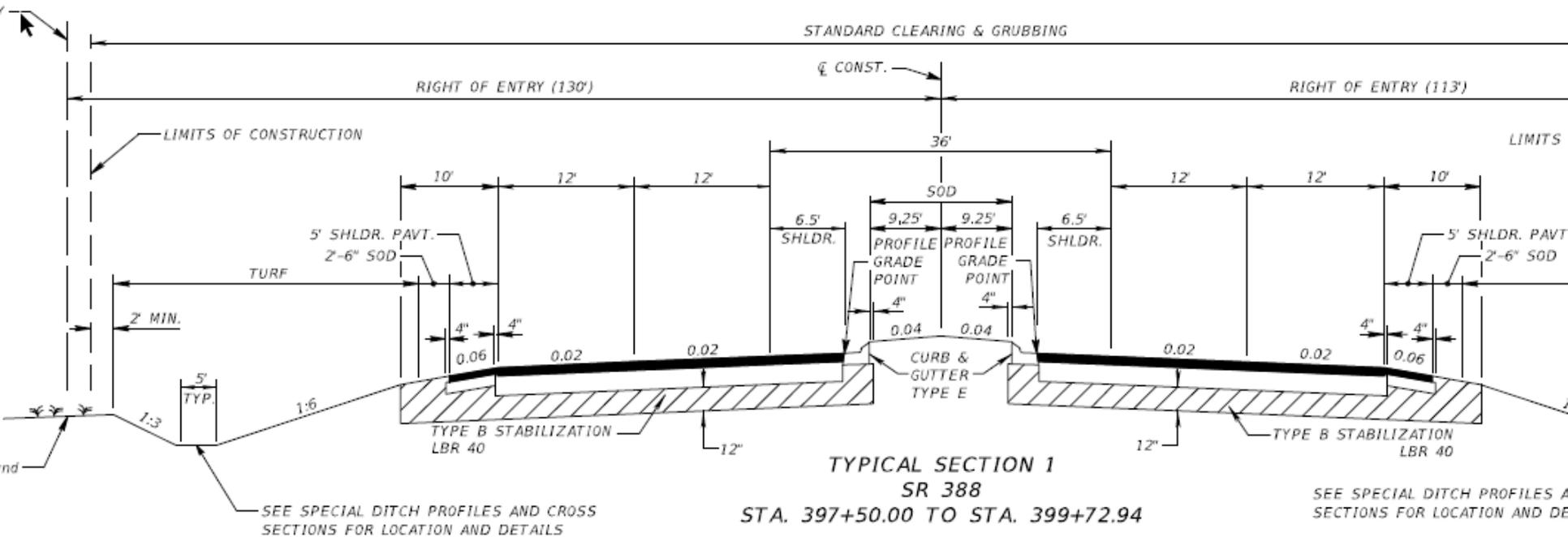
E  
>30,000,000 ESAL's



3,000,000 to 10,000,000 ESAL's



10,000,000 ESAL's



**NEW CONSTRUCTION**

OPTIONAL BASE GROUP 9 WITH  
TYPE SP STRUCTURAL COURSE (TRAFFIC C) ( $3\frac{1}{2}$ " (PG 76-22)  
AND FRICTION COURSE FC-5 ( $\frac{3}{4}$ " (PG 76-22)

**SHOULDER PAVEMENT**

OPTIONAL BASE GROUP 1 WITH  
TYPE SP, STRUCTURAL COURSE (TRAFFIC C) ( $1\frac{1}{2}$ " (PG 76-22)  
AND FRICTION COURSE FC-5 ( $\frac{3}{4}$ " (PG 76-22)

**TRAFFIC DATA**

CURRENT YEAR = 2014 AADT = 4,500  
ESTIMATED OPENING YEAR = 2020 AADT = 10,500  
ESTIMATED DESIGN YEAR = 2040 AADT = 20,600  
K = 9.0% D = 55.8% T = 11.7% (24 HOUR)  
DESIGN HOUR T = 5.85%

CLEAR ZONE = 24' (50 MPH)  
NOTE: DESIGN CLEAR ZONE DOES NOT APPLY  
TO CLEAR ZONE WIDTHS FOR WORK ZONES.

# Traffic Level and Binder Type Shown on Plans

## *NEW CONSTRUCTION*

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*OPTIONAL BASE GROUP 9 WITH  
TYPE SP STRUCTURAL COURSE (TRAFFIC C) (3½") (PG 76-22)  
AND FRICTION COURSE FC-5 (¾") (PG 76-22)*

## *SHOULDER PAVEMENT*

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*OPTIONAL BASE GROUP 1 WITH  
TYPE SP, STRUCTURAL COURSE (TRAFFIC C) (1½") (PG 76-22)  
AND FRICTION COURSE FC-5 (¾") (PG 76-22)*



# Asphalt Mix Design

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ASPHALT MIX DESIGN

SUBMIT TO THE DIRECTOR, OFFICE OF MATERIALS, CENTRAL ASPHALT LABORATORY, 5007 NE 39TH AVE, GAINESVILLE, FL 32609

Contractor ..... Address ..... District 2 .....

Phone No. .... Fax No. .... E-mail .....

Submitted By ..... Type Mix: Fine SP-12.5 Recycle Intended Use of Mix: Structural .....

Design Traffic Level: D Gyrations @ Ndur: 100 .....

Product Description	Product Code	Producer Name	Product Name	Plant/Pit Number	Terminal
1. Crushed R.A.P.	334-CR		1-18		
2. S1B Stone	C53		S1B		
3. S1B Stone	C52		S1B		
4. Screening	F21		Screening		
5. Sand	334-LS		Sand		
6.					
7. PG Binder	916-52		PG 52-28		

PERCENTAGE BY WEIGHT TOTAL AGGREGATE PASSING SIEVES

Blend	40%	24%	8%	23%	5%		JOB MIX FORMULA	CONTROL POINTS	PRIMARY CONTROL SIEVE
Number	1	2	3	4	5	6			
3/4" 19.0mm	100	100	100	100	100		100	100	
1/2" 12.5mm	99	94	100	100	100		98	90 - 100	
3/8" 9.5mm	95	63	98	100	100		89	- 89	
No. 4 4.75mm	80	17	32	100	100		67		
No. 10 2.0mm	62	4	5	80	100		50	40 - 58	39
No. 16 1.18mm	51	4	5	53	100		39	29 -	
No. 30 600µm	43	4	5	33	95		31	22 -	
No. 50 300µm	34	4	5	22	75		24	16 -	
No. 100 150µm	19	3	4	12	9		12		
No. 200 75µm	8.7	1.0	1.0	5.8	1.5		5.2	2 - 10	
G <sub>s</sub>	2.539	2.729	2.705	2.713	2.626		2.661		

The mix proportions of the Job Mix Formula have been conditionally verified, pending successful final verification during production at the assigned plant, the mix design is approved subject to F.D.O.T. specifications.

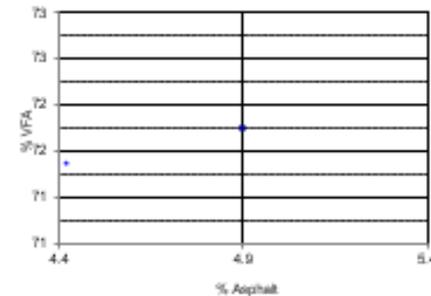
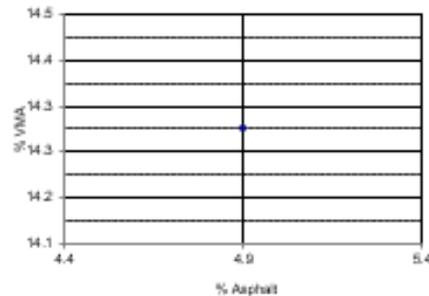
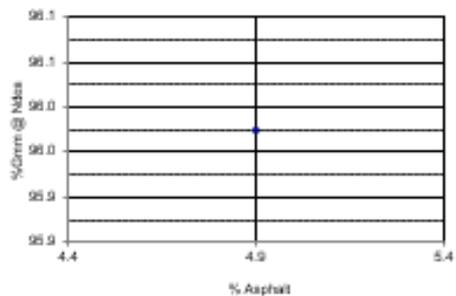
SP 19-18003A (TL-D)



# Asphalt Mix Design

SP 19-18008A (TL-D)

$P_b$	$G_{mm}@N_{b,mm}$	$G_{mm}$	$V_v$	VMA	VFA	$P_{b,1.18}$	$P_{b,1.18}/P_b$	$\%G_{mm}@N_{b,mm}$	$\%G_{mm}@N_{b,mm}$
4.9	2.399	2.499	4.0	14.3	72	4.4	12	89.8	



Total Binder Content 4.9 %

FAA 45.1 %

Mixing Temperature 300 F 149 C

Spread Rate @ 1" 108 lbs/ft<sup>2</sup>

$\%G_{mm}@N_{b,mm}$  96.0

Compaction Temperature 300 F 149 C

VMA 14.3 %

Ignition Oven -0.09

Additive: Antistrip See A.P.L. %

$G_{mm}$  Corr. Factor -0.004

Calibration Factor  
1-To Be Added/1-To Be Subtracted

Optimum Asphalt = 4.90%  
Asphalt using 40% Crushed R.A.P. @ 5.6% = 2.24%  
PG 52-28 to be added = 2.66%



# Asphalt Mix Design

Total Binder Content 5.2 %  
Ignition Oven Corr. Factor -0.04  
(+ To Be Added)/(- To Be Subtracted)

Gmm Corr. Factor 0.000  
Mixing Temp. 305 °F  
(Plant)

Compaction Temp. 300 °F  
(Roadway)

Spread Rate @ 1" 107 lb/yd<sup>2</sup>

Binder from Recycled Materials 1.12 %

PG 58-22 to be added

4.08 %

Gmb @ Ndes 2.378

Gmm 2.477

Va 4.0

VMA 15.0

VFA 73

P-200/Pbe 1.1

Additives

Effective Date 11/30/2017

Expiration Date 11/30/2020



# Dense-Graded Friction Courses (337 / 334)

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- Good microtexture
  - Function of the aggregate
- Superpave mixes:
  - FC-9.5
  - FC-12.5
- 100% approved south Florida limestone or 60% granite
  - If granite, then can contain 20% RAP, otherwise no RAP
- PG 76-22(ARB) or PG 76-22(PMA), contractor's option
- High Polymer binder when specified in the plans

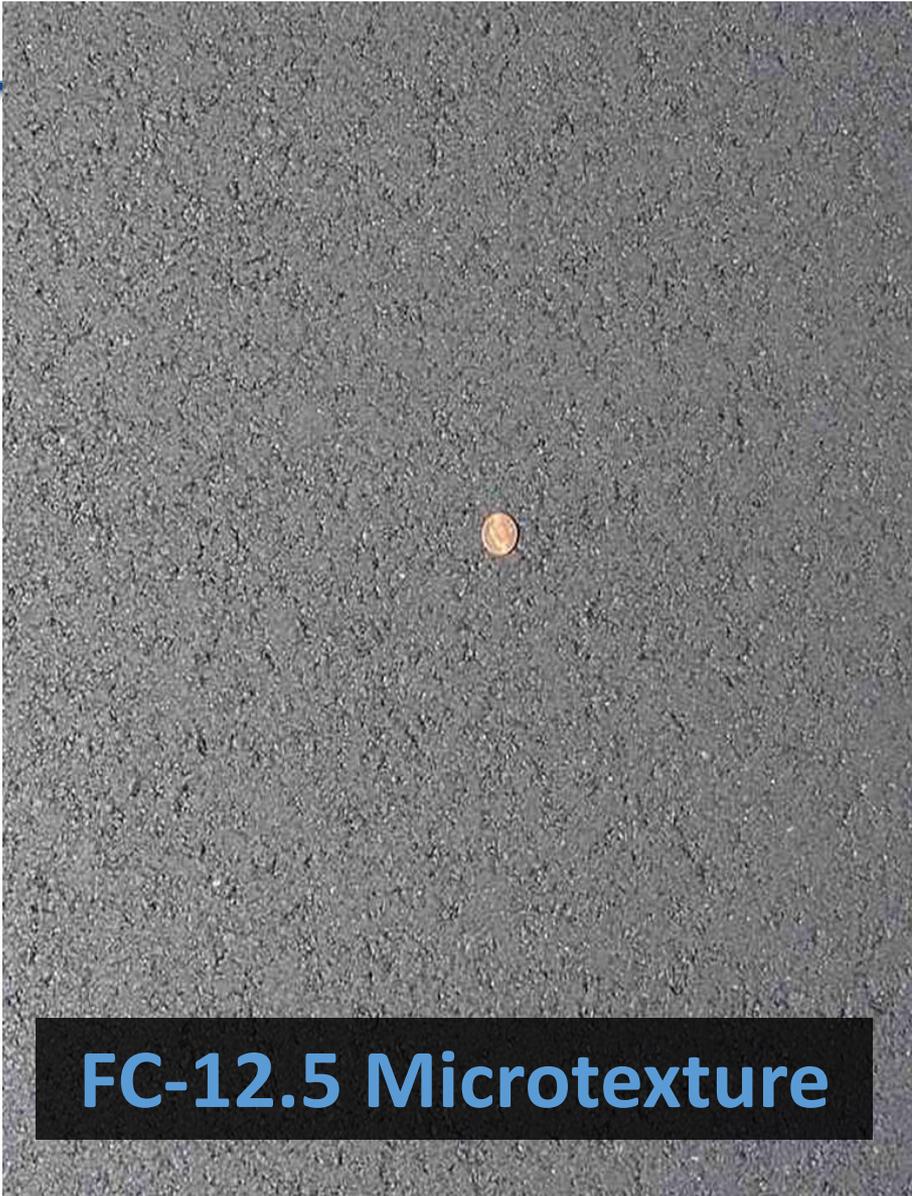
# Open-Graded Friction Courses, FC-5 (337)

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- Required on high-speed multi-lane facilities
  - Design Speed  $\geq$  50 mph
- Good macrotexture
  - Minimize hydroplaning
- 100% friction approved aggregate (No RAP)
- PG 76-22(ARB) or PG 76-22(PMA), contractor's option
- High Polymer binder when specified in the plans
- Stabilizing fibers (more asphalt, less draindown)
- Granite aggregate requires hydrated lime

# FC-5 Nassau County





# Other Asphalt Mixtures

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- Superpave Asphalt Base (234)
  - B-12.5 mm
  - Traffic Level B
  - May substitute an SP-12.5
  - Paid by the square yard (285 – Optional Base)
- Asphalt Treated Permeable Base (ATPB) (287)
  - No. 57 or 67 Stone
  - $\frac{3}{4}$ " Aggregate
  - Approximately 3% asphalt binder
  - Used under PCC Pavement for drainage

# Recently Completed Contracted Research

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## **Evaluation of FC-5 with High Polymer to Reduce Raveling** (Texas A&M Transportation Institute)

Compare the durability of OGFC mixtures: polymer modified PG 76-22 and High Polymer modified binders.

Life-cycle cost analysis determined the advantages of HP binders would translate into cost savings.

# Recently Completed Contracted Research

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## **Determine the Structural Coefficient for Asphalt Mixes Containing High Polymer Binder** (University of Nevada Reno)

PG 76-22 (PMA) mixtures = 0.44 structural coefficient.

Increasing the polymer content (high polymer mixes) = 0.54 structural coefficient.

Additional testing is planned.

# Recently Completed Contracted Research

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## Enhanced Characterization of RAP for Cracking Performance (University of Florida)

- Perform additional tests to characterize RAP for PG 76-22 mixture inclusion.
- More specifically, can we put more RAP in structural courses that contain PG 76-22 binder?
- Can RAP be used effectively in high polymer mixes?

# Recently Completed Contracted Research

## Enhanced Characterization of RAP cont.

January 2021 specification change.

Allow structural courses with PG 76-22 asphalt binder to have more than 20% RAP.

Allowable RAP Percentages <sup>1</sup> in Structural Mixtures with PG 76-22 Asphalt Binder				
		Coarse RAP	Intermediate RAP	Fine RAP
Gradation % Passing #16 Sieve <sup>2</sup>		≤ 40%	> 40% to ≤ 50%	> 50%
PG <sub>HT</sub> <sup>3</sup> > 100.0° C	Allowable RAP Percentage	≤ 25%	≤ 20%	≤ 20%
PG <sub>HT</sub> <sup>3</sup> ≤ 100.0° C		≤ 30%	≤ 25%	
Notes:				
1. RAP aggregate by weight of total aggregate or RAP binder by weight of total binder.				
2. RAP gradations based on ignition oven extraction of RAP material in accordance with FM 5-563.				
3. PG <sub>HT</sub> : asphalt binder high temperature continuous performance grade of RAP in accordance with Section 916.				

RAP percentage in dense-graded friction courses remains at a maximum of 20%.  
No change for High Polymer mixtures.

# Recently Completed Contracted Research

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## Study of the Potential Benefits of Anti-Strip Additives on Granite Based FC-5 Asphalt Mixture (NCAT)

July 2021 specification change

- These mixtures currently contain 1% hydrated lime.
- Determine if adding a liquid anti-strip, additional hydrated lime, or both improves performance and longevity of granite FC-5 mixtures.

# Recently Completed Contracted Research

## Study of the Potential Benefits of Anti-Strip Additives on Granite Based FC-5 Asphalt Mixture (NCAT)

July 2021 specification change

SUBARTICLE 337-3.2.1.3 is deleted and the following substituted:

**337-3.2.1.3 Hydrated Lime:** Add 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.

SUBARTICLE 337-3.2.1.4 is deleted and the following substituted:

**337-3.2.1.4 Liquid Anti-Strip Additive:** Use a liquid anti-strip additive at the approved dosage rate as indicated on the APL for all mixtures ~~containing limestone aggregate.~~

# Recently Completed Contracted Research

## Evaluation of Roadway Worms/Distortions

(Applied Research Associates, Inc.)

- Determine the contributing cause(s) for roadway worms/distortions.
- Identify their impacts on pavement lifespan.
- Develop rehabilitation strategies to prevent these distortions from occurring.



# Recently Completed Contracted Research

## Evaluation of Roadway Worms/Distortions

Many projects require extensive field work by the FDOT's SMO and DMOs and the research consultants.



# Recently Completed Contracted Research

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## Evaluation of the Cracking Performance of Asphalt Binders at Intermediate Temperatures (University of Florida)

- Binder plays a critical role in the cracking resistance. Cracks typically initiate and propagate through the binder or the interface between binder and aggregate, as opposed to fracture through the aggregate.
- Load-induced fatigue cracking can be either bottom-up or top-down.

# Recently Completed Contracted Research

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## Design and Performance of Open-Graded Friction Course (OGFC) Mixtures Containing Epoxy Asphalt (NCAT)

- Raveling is a durability issue. Once the distress begins, it progresses rapidly.
- Previous research has shown that the properties of asphalt binders can be significantly improved by adding epoxy resins.

# Recently Completed Contracted Research

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## Laboratory Testing Protocol to Evaluate Alternative Materials for use in Modifying Asphalt Binders and Asphalt Mixtures

(Texas A&M Transportation Institute)

- A laboratory testing protocol to properly assess new asphalt mixture additives.
- Determine if their performance is equal to or better than SBS modified (PG 76-22) mixtures.
- Both asphalt binder and mixture tests will be used to evaluate asphalt binder additives.



# Active Contracted Research

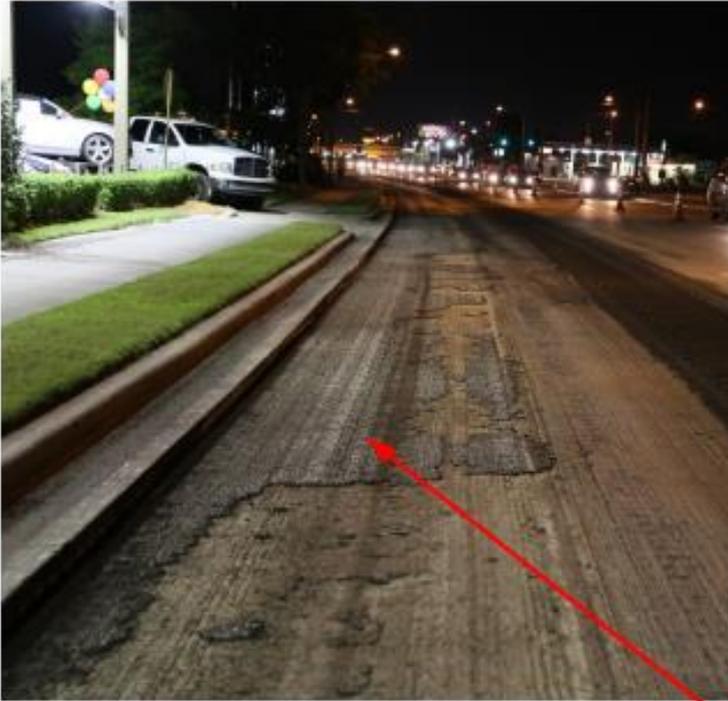
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## Investigation of the Impact of Milling and Construction on Bond Strength of Remaining Thin (scab) Layers (University of Florida)

- If the depth of milling is close to the interface between previously paved HMA lifts, a thin layer of the upper lift may be left behind (scab).
- If these scabbed layers are not removed, will the new HMA be properly bonded to the pavement structure?

# Active Contracted Research

## Bond Strength of Thin (scab) Layers cont.



# New Research Projects

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## Improved Resilience of Asphalt Pavements due to Flooding (University of Florida)

- Evaluate the resilience of an asphalt mixture that is loaded while inundated with water.
- Improve asphalt mixture properties to resist the impacts of flooding.

# New Research Projects

## Improved Resilience of Asphalt Pavements due to Flooding (University of Florida)



# New Research Projects

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## Open-Graded Friction Courses Suitable for Suburban Environments

(Texas A&M Transportation Institute)

As Florida urbanizes more rapidly, friction courses will be subjected to traffic movements associated with signalized intersections and turn lanes.

- The objective of this research is to determine alternative friction courses that are more durable in suburban environments while providing adequate friction and texture properties.

# In-house Research

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## Heavy Vehicle Simulator (HVS) 10 Studies (Phase 1, 2020 ~ 2021)

- Single Lift Deep Mill/Fill (6-inch)
- 9.5/12.5 mm Mix Study
  - ✓  $N_{des} = 50$ , VMA > 14.5 @ higher density (93-94%)
  - ✓  $N_{des} = 50$ , VMA > 14.5 @ lower density (90-91%)
  - ✓ Air voids = 4%

# In-house Research

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## HVS 10 Studies (Phase 1, 2020 ~ 2021)

- Binder Study (alternative modifier, terpolymer)
- Scabbing Study
  - ✓ Scabbing impact on interlayer bonding strength: (0.25 in, 0.5 in, 1 in thicknesses)

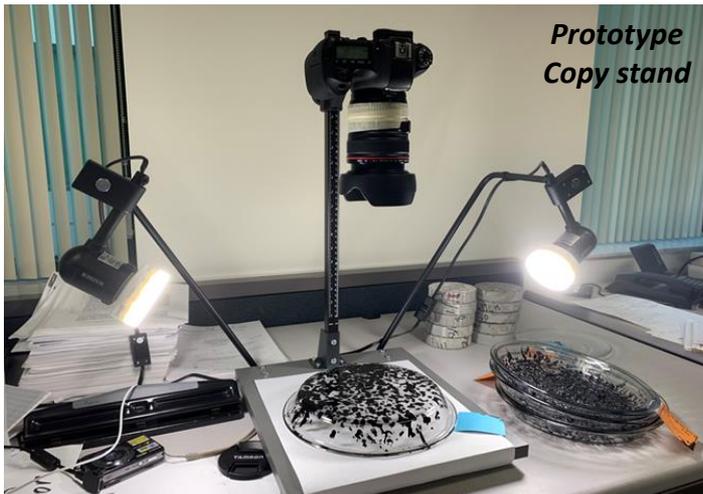
# In-house Research

## Pie Plate Imaging

Florida Method FM 5-588 is currently done by visual examination to determine the optimum asphalt binder content of OGFC mixes.

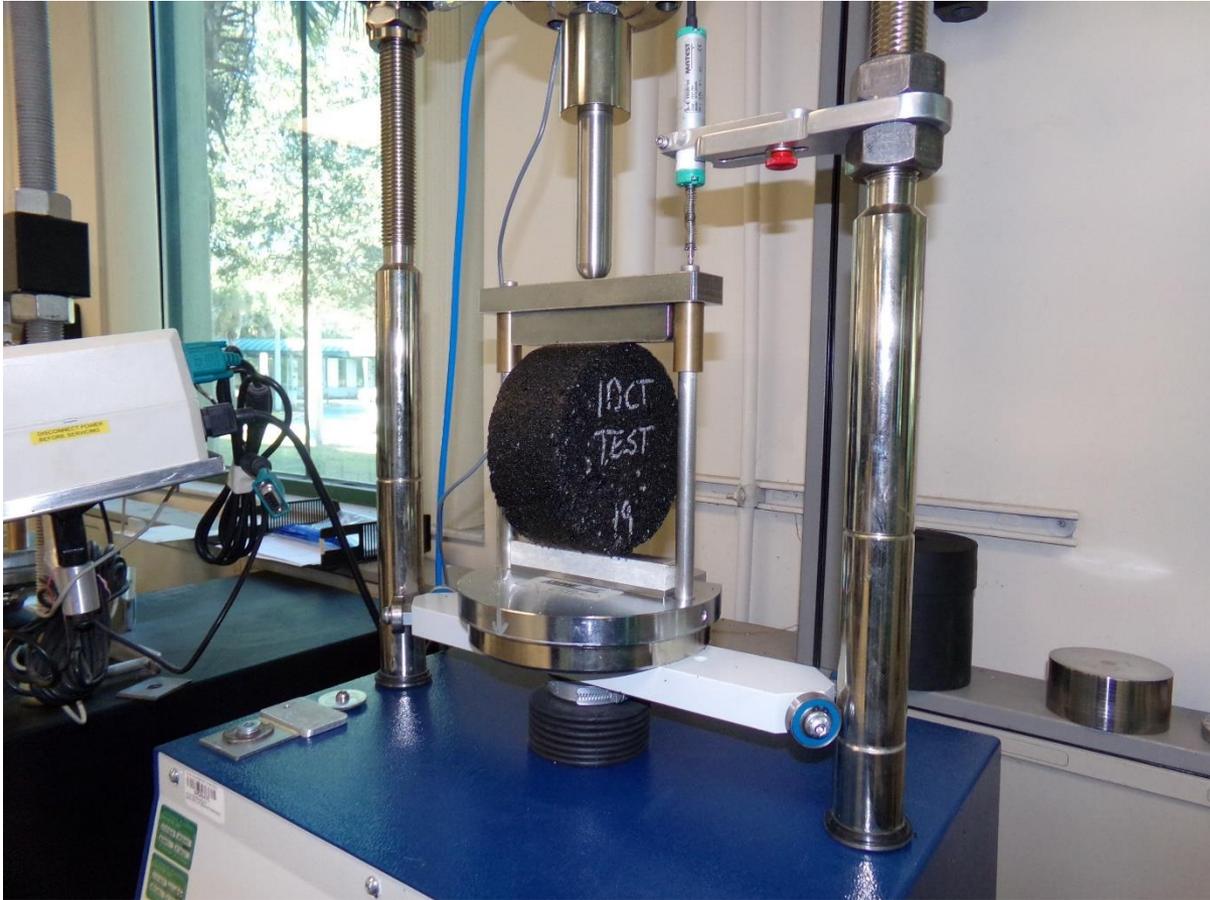
### Alternative Quantification: Pie Plate Image Processing

- ✓ Optimum asphalt binder %. Area, aggregate type, and sampling error adjustment.



# In-house Research

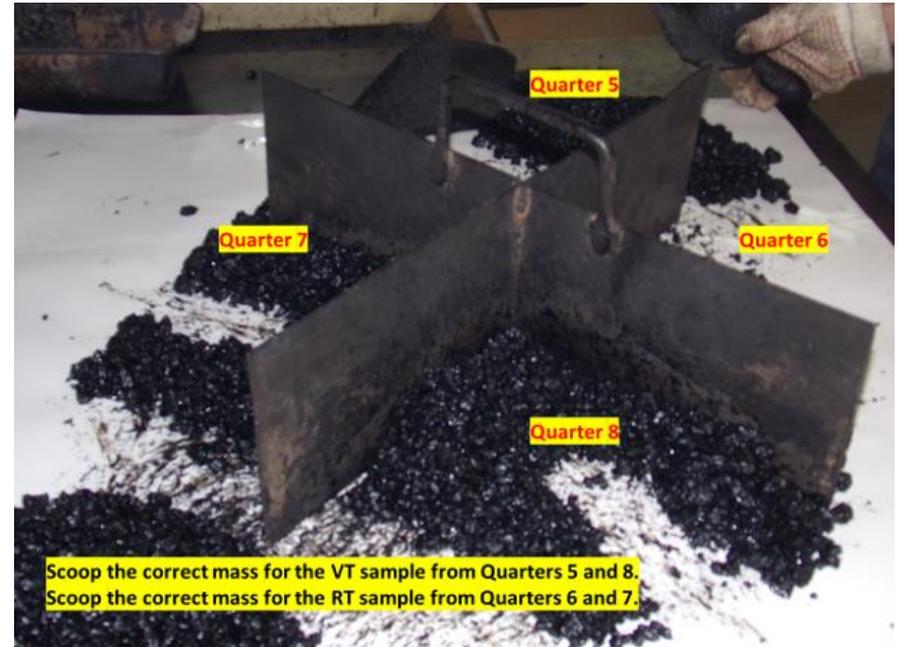
## IDEAL-CT



# Procedure

## Florida Method FM 1-T 168

## Sampling Bituminous Paving Mixtures



# Major Specification Changes

January 2022 Section 300

Tack Coat Application Rates

<b>Tack Coat Application Rates</b>		
<b>Asphalt Mixture Type</b>	<b>Underlying Pavement Surface</b>	<b>Target Tack Rate (gal/yd<sup>2</sup>)<sup>1</sup></b>
<b>Base Course, Structural Course, Dense-Graded Friction Course, Open-Graded Friction Course</b>	<b>Newly Constructed Asphalt Layers</b>	<b>0.06</b>
	<b>Milled Asphalt Pavement Surface, Oxidized and Cracked Asphalt Pavement, Concrete Pavement</b>	<b>0.09</b>
<small>Note 1: Target tack application rates greater than those specified may be used upon approval of the Engineer.</small>		

# Major Specification Changes

## January 2022 Section 300

### Prime Coat, Tack Coat, and Equipment

A trailer-mounted pressure distributor can be used for non-mainline applications, if approved by the Engineer.

A copy of the Bill of Lading representing the prime coat or tack coat material in the distributor tank must be in the truck or available at all times.

What is actually in the tank?

Shipment and production data.

# Major Specification Changes

January 2022 Section 334

Mix Designs for only three traffic levels.

No TL-A or TL-D.

Gyratory Compaction Requirements	
Traffic Level	$N_{design}$ Number of Gyration
<del>A</del>	<del>50</del>
B	65
C	75
<del>D</del>	<del>100</del>
E	100

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# Major Specification Changes

## January 2022 Section 916 Tack Sampling

- Sample tack from the distributor, once per project per product. Tested by the Department.
- Failing test results:
  - Not to be used on Department projects.
  - May require three 6" diameter roadway cores from the day of production.
  - Tested for bond strength.
  - Individual bond strength results less than 80 psi will require removal and replacement.
  - May result in bond strength testing in additional areas with failing tack material.

# Major Specification Changes

## July 2022 (approved) Section 300

**Curing and Time of Application:** When using a distributor, apply tack coat sufficiently in advance of placing the mix to permit drying but not so far in advance that it might lose its adhesiveness as a result of being covered with dust or other foreign material. When using a spray paver, the requirements above do not apply.

# Major Specification Changes

July 2022 (approved) Section 330

Maximum temperature of 355°F for any load of mixture containing PG 76-22 PMA or High Polymer binder, regardless of the target mixing or compaction temperatures.

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# Major Specification Changes

July 2022 (approved) Section 334

## Defective Material

Any additional PC samples obtained in the same work shift after an IV sample has been obtained shall include enough material for three complete sets of tests (PC, IV and IV check samples) in the event the Contractor requests using the PC test results for engineering analysis or delineation. These additional PC samples must compare with verified IV test results as determined by the comparison process of 334-5.7.1 in order to be used for engineering analysis or delineation.

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# Major Specification Changes

## July 2022 (approved) Section 337

**Fiber and Hydrated Lime Supply Systems:** Provide flow indicators or sensing devices, interlocked with plant controls so that ~~the mixture production will be interrupted~~ an alarm will be activated if fiber or lime introduction fails. Stop production of the asphalt mixture. Resume production once the supply system is operating correctly.

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# Major Specification Changes

## July 2022 (approved) Section 337

Up to a 1.05 Pay Factor for small quantities of open-graded friction course (FC-5).

See next slide.

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# Major Specification Changes

Small Quantity Pay Table for FC-5		
Pay Factor	1-Test Deviation	2-Test Average Deviation
<b>Asphalt Binder Content (%)</b>		
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
<b>3/8 inch Sieve (%)</b>		
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
<b>No. 4 Sieve (%)</b>		
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
<b>No. 8 Sieve (%)</b>		
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

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# Major Specification Changes

**July 2023 (for discussion)**

**334-5.1.2 Acceptance Testing Exceptions:** Density testing for acceptance will not be performed on widening strips or shoulders with a width of 5 feet or less.

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# Minor Specification Change

July 2023 (suggest 35 days)

**320-3.2.4 Monthly Electronic Weigh System Comparison Checks:**

Check the accuracy of the electronic weighing system at the commencement of production and thereafter **at least every 30 days.**

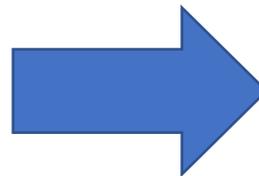
**320-3.2 Electronic Weigh Systems:** Equip the asphalt plant with an electronic weigh system..., and meets **monthly comparison checks** with certified truck scales.

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# Major Change

## Specifications Annual Publication Transition

Semiannual  
(January and  
July)



Annual (July)

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# Major Change

## Specifications Annual Publication Transition

Florida is the only state to publish specifications semiannually

Frequency of Publishing a New Spec Book (In theory if not reality)	Every 6 months – 1  Annually – 7 2 years – 1 3-5 years – 18 6-8 years – 5 9-11 years – 3 More than 11 years – 2 Varies Substantially/Not Specified – 9
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# Questions/Comments?



# Thank you!

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