

Asphalt Material Considerations for FAA Airport Projects

John Duval, P.E.
Asphalt Institute



Overview

- Performance Graded (PG) Binder
- Modified Asphalt Binders
- Prime Coats
- Tack Coats



Perspective

- Material selection is a major influence on the performance of hot-mix asphalt (HMA)
 - Performance Graded (PG) Asphalt Binder
 - Use of Asphalt Modifiers
- Proper application/use of asphalt materials leads to success during construction
 - Prime coats
 - Tack coats



Performance Graded Asphalt

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Grading System Based on Climate

PG 70-22

**Performance
Grade**

**Average 7-day
max pavement
design temp**

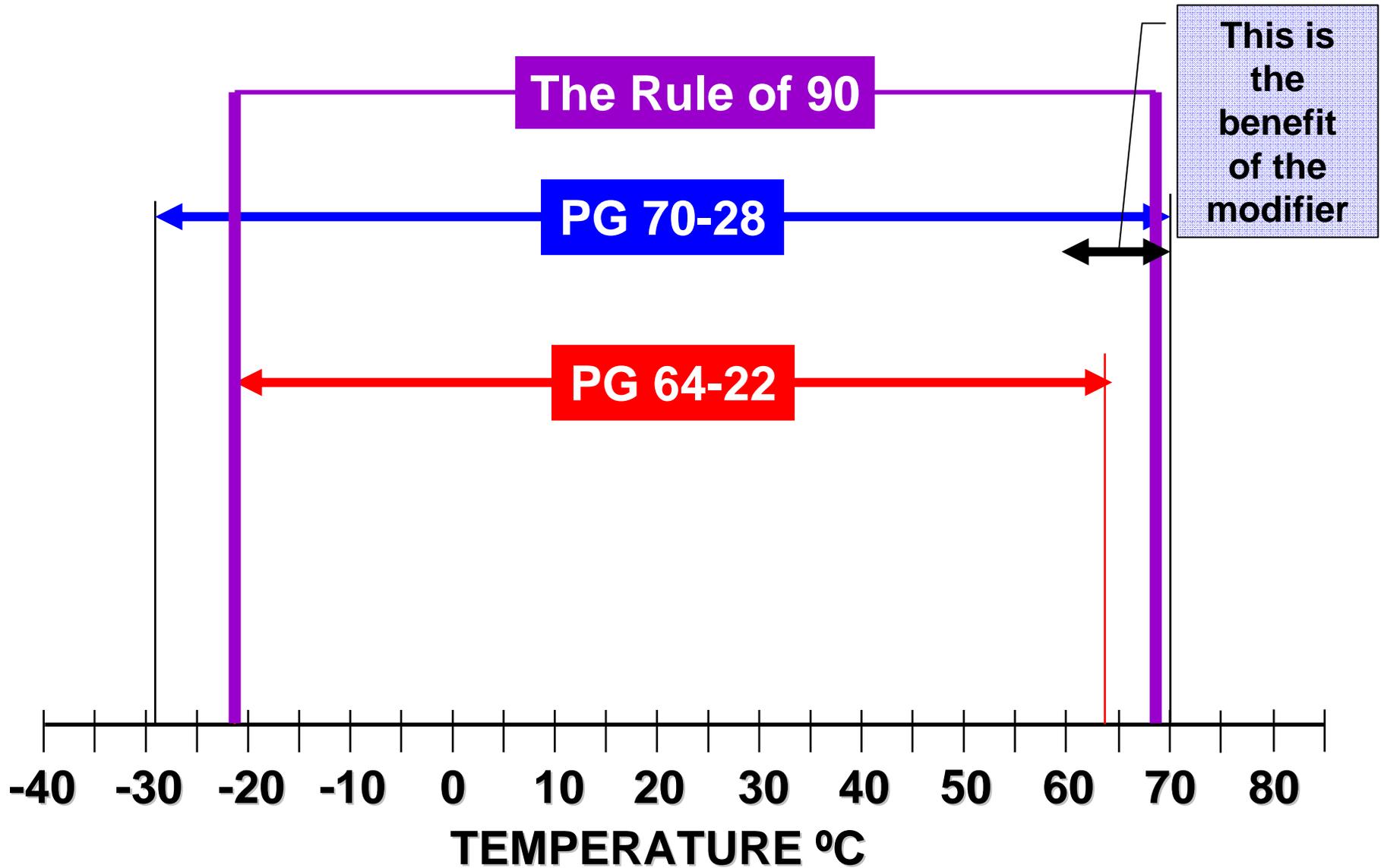
**Min pavement
design temp**



PG Binder Grades

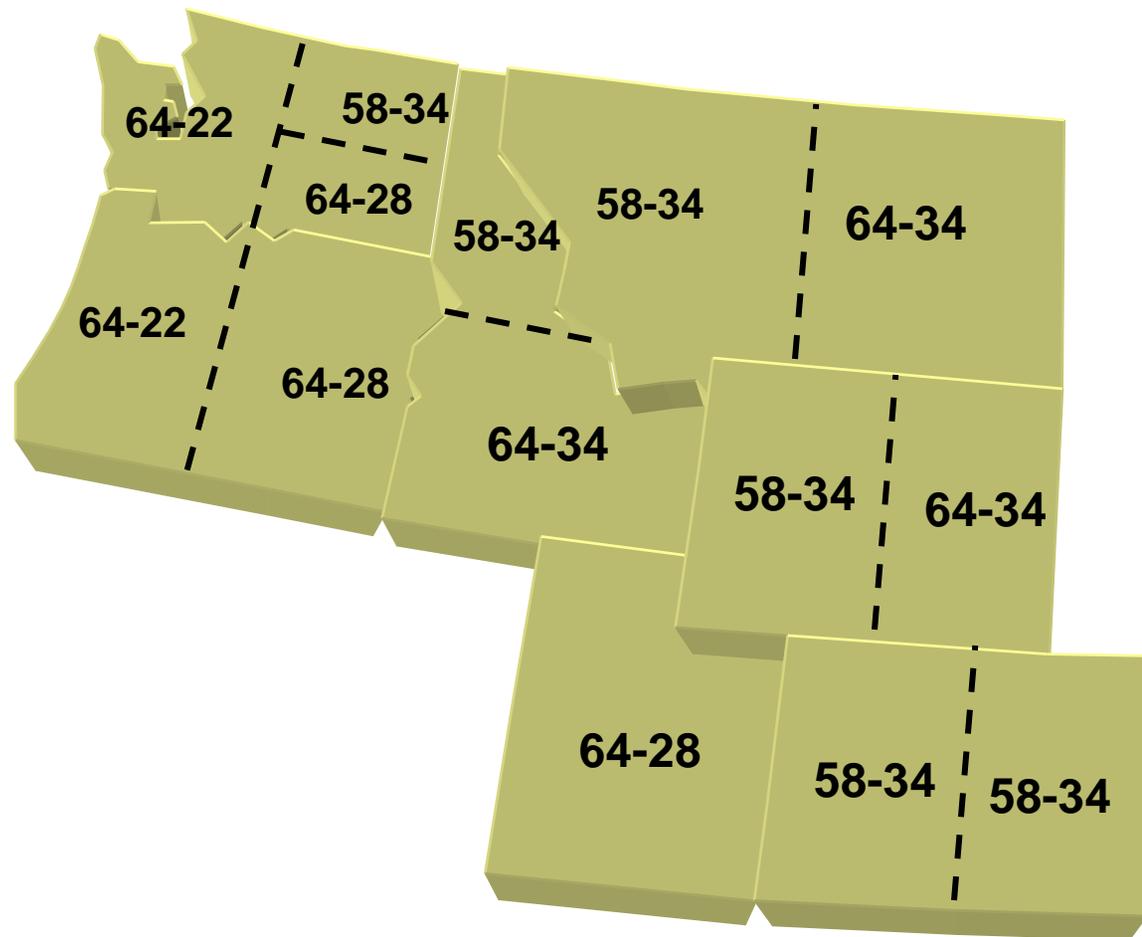
PG 64-22 Probably Unmodified

PG 70-28 Probably Modified



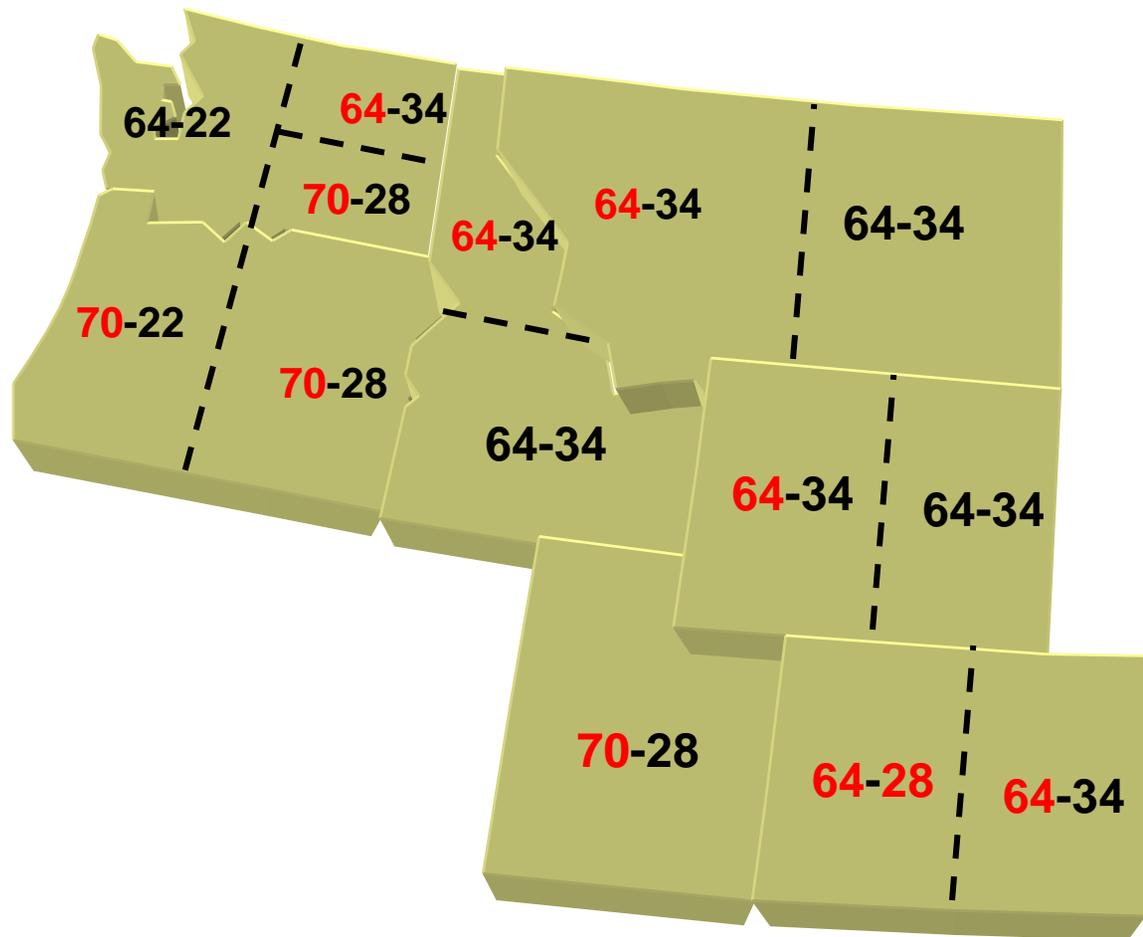
FAA ANM PG Binder Requirements

For Aircraft Gross Loading \leq 60 kips



FAA ANM PG Binder Requirements

For Aircraft Gross Loading > 60 kips



Modified Binder Use to Increase

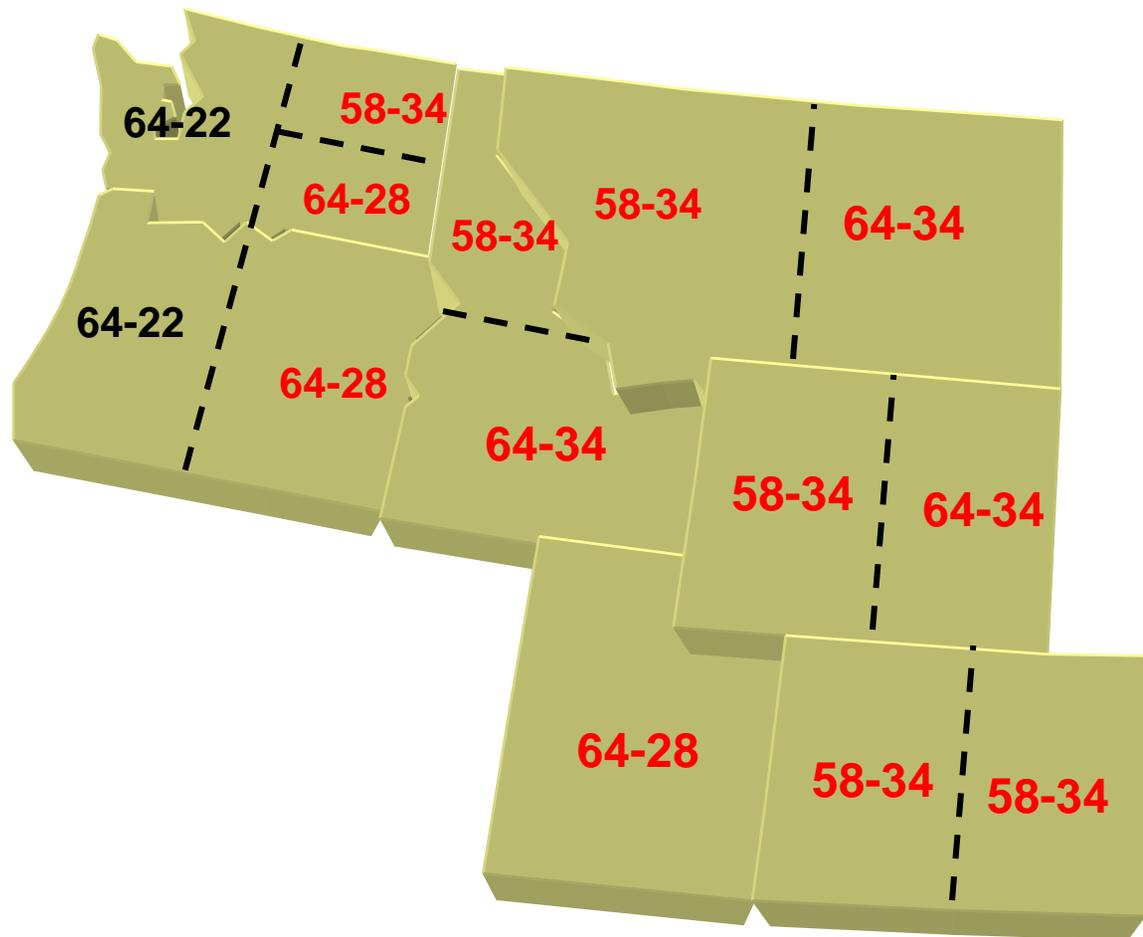
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It is likely that modified binders represent as much as 15% of the total annual tonnage of asphalt binder used in the United States; this percentage is expected to increase in the coming decade



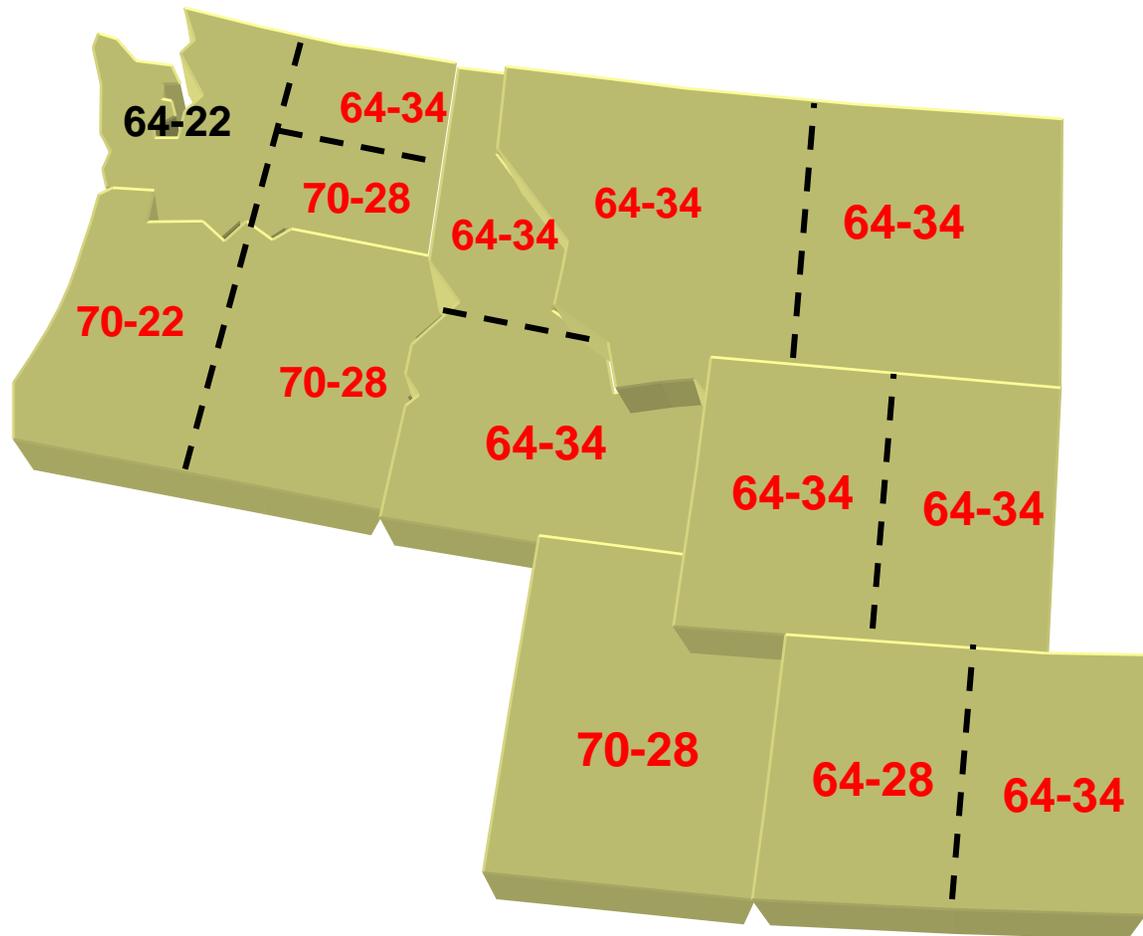
FAA ANM—Rule of 90

For Aircraft Gross Loading \leq 60 kips



FAA ANM—Rule of 90

For Aircraft Gross Loading > 60 kips



FAA ANM—“PG Plus” Tests

- PG Plus tests—confirm the presence of a specific type of polymer modifier
- Elastic Recovery—tends to favor synthetic elastomeric polymers such as SB, SBS
- Toughness and Tenacity—tends to favor natural or synthetic elastomeric polymers made with rubber such as SBR



Prime Coat—Purpose

- Fills the surface voids and protects the base from weather.
- Stabilizes the fines and preserves the base material.
- Promotes bonding to the subsequent pavement layers.



FAA Item P-601 Prime Coat

- Cutbacks
 - RC-30, RC-70, RC-250
- Emulsions
 - SS-1, SS-1h, CSS-1, CSS-1h
 - MS-2, CMS-2, HFMS-1
- Application
 - Rate: .25 to .50 gal per sq yd
 - Cure: 48 hrs



Cutbacks = Asphalt + Solvent

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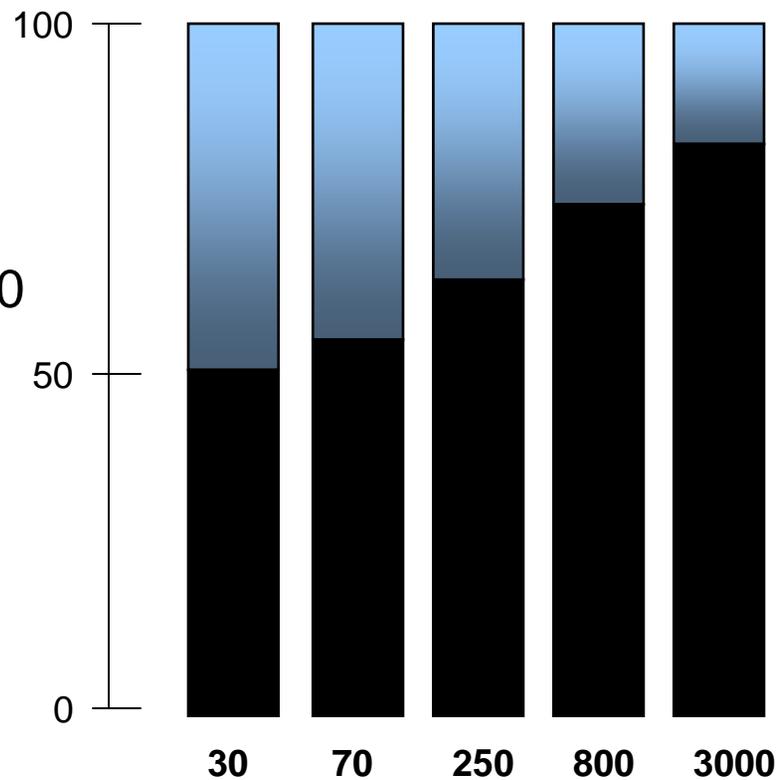
“Cutbacks Cure”

Gasoline, Naphtha	R	C	70, 250, 800 or 3000
# 2 Diesel, Kerosene	M	C	30, 70, 250.....3000
Bunker fuels, heavy oils	S	C	70, 250, 800 or 3000



Prime Coat—Materials

- Cutbacks
 - Medium-curing cutbacks
 - MC-30, MC-70, MC-250
 - not allowed in some areas due to environmental concerns—VOCs



Residual Asphalt
in MC Cutbacks



Asphalt Emulsion Primes

- Materials
 - SS-1, SS-1h
 - CSS-1, CSS-1h
- Environmentally Friendly—no VOCs
- Do not penetrate well—even when diluted
- Slip Plane?



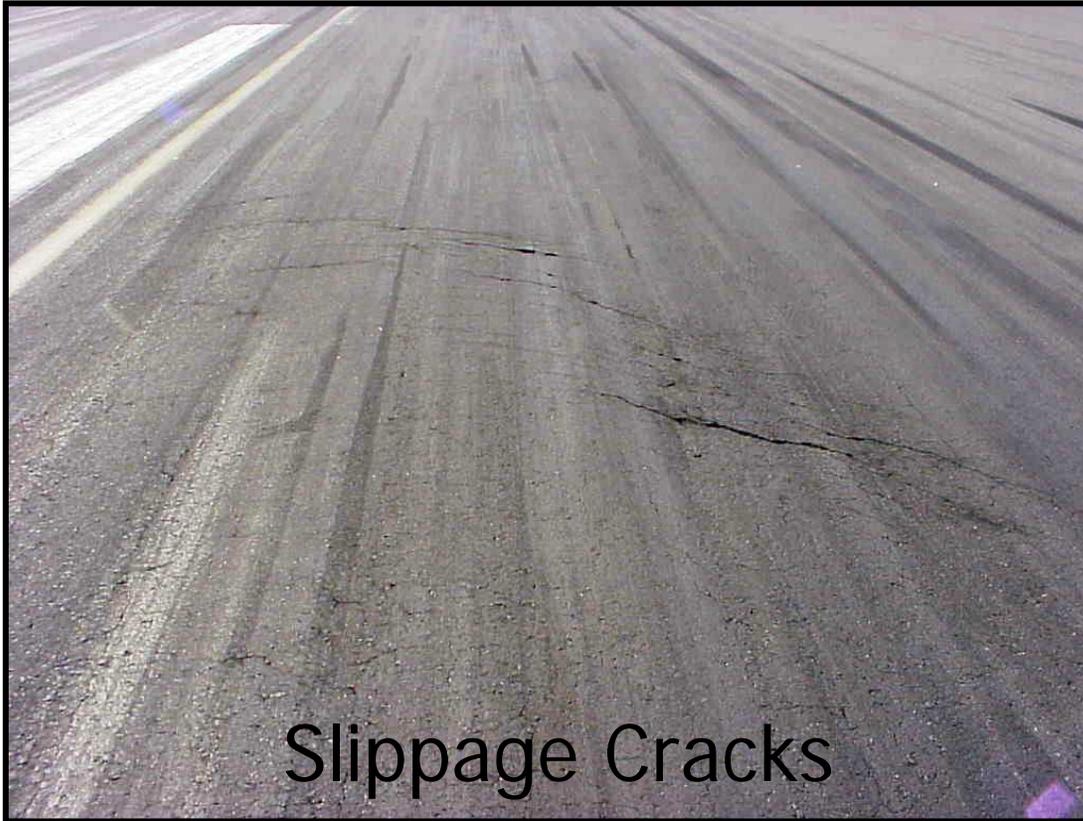
To Prime or Not to Prime...?

- Prime must adequately penetrate aggregate base to function properly
- Prime must cure completely before paving
- Prime is “deleted” during cold weather—uncured prime is worse than unprimed base
- Prime generally not required when the 7-day forecast is dry
- Do not prime on stabilized bases



Tack Coats Help Bond Layers

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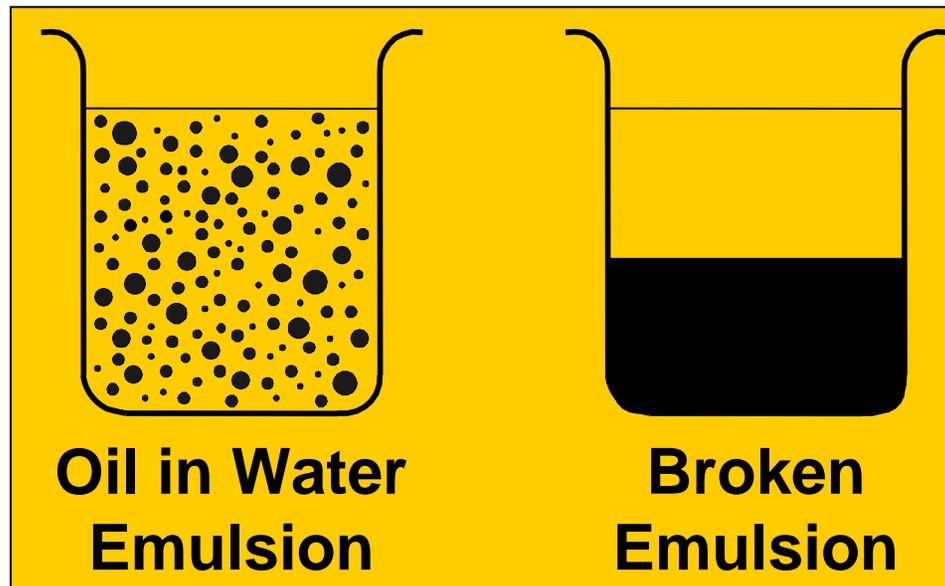


Pavement Structure Acts Like a Glue-Lam Beam



Emulsified Asphalts “Break”

- Emulsion = Asphalt globules suspended in water
- Broken = Complete separation of phases



FAA Item P-603 Tack Coat

- Cutbacks
 - RC-70
- Emulsions
 - SS-1, SS-1h, CSS-1, CSS-1h
- Application
 - Dilute with water—how much?
 - Rate: .05 to .15 gal per sq yd
 - Set time: Indefinite



Emulsions = Asphalt + H₂O + Emulsifiers

Emulsions “Set” or “Break”

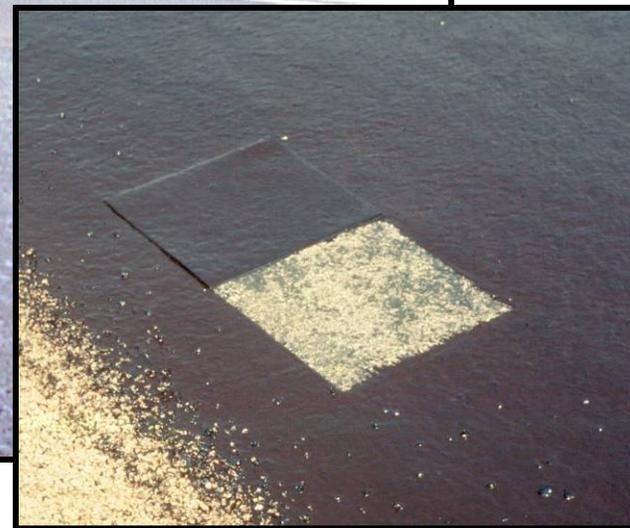
C R S		1, 2
C M S		1, 2
C S S		1, 1-h

Cationic -
Positive Charge

Anionic -
Negative charge



QC/QA of Tack Application



Thank you

