

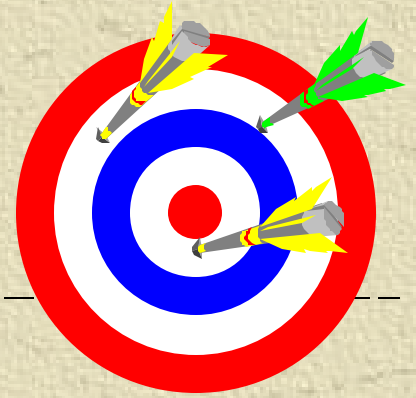


***SUPERPAVE***

***CONTINUING  
IMPROVEMENTS***

# Asphalt Today

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## ✦ AASHTO 2002 Design Guide

- ◆ On track – validation required (NCHRP)

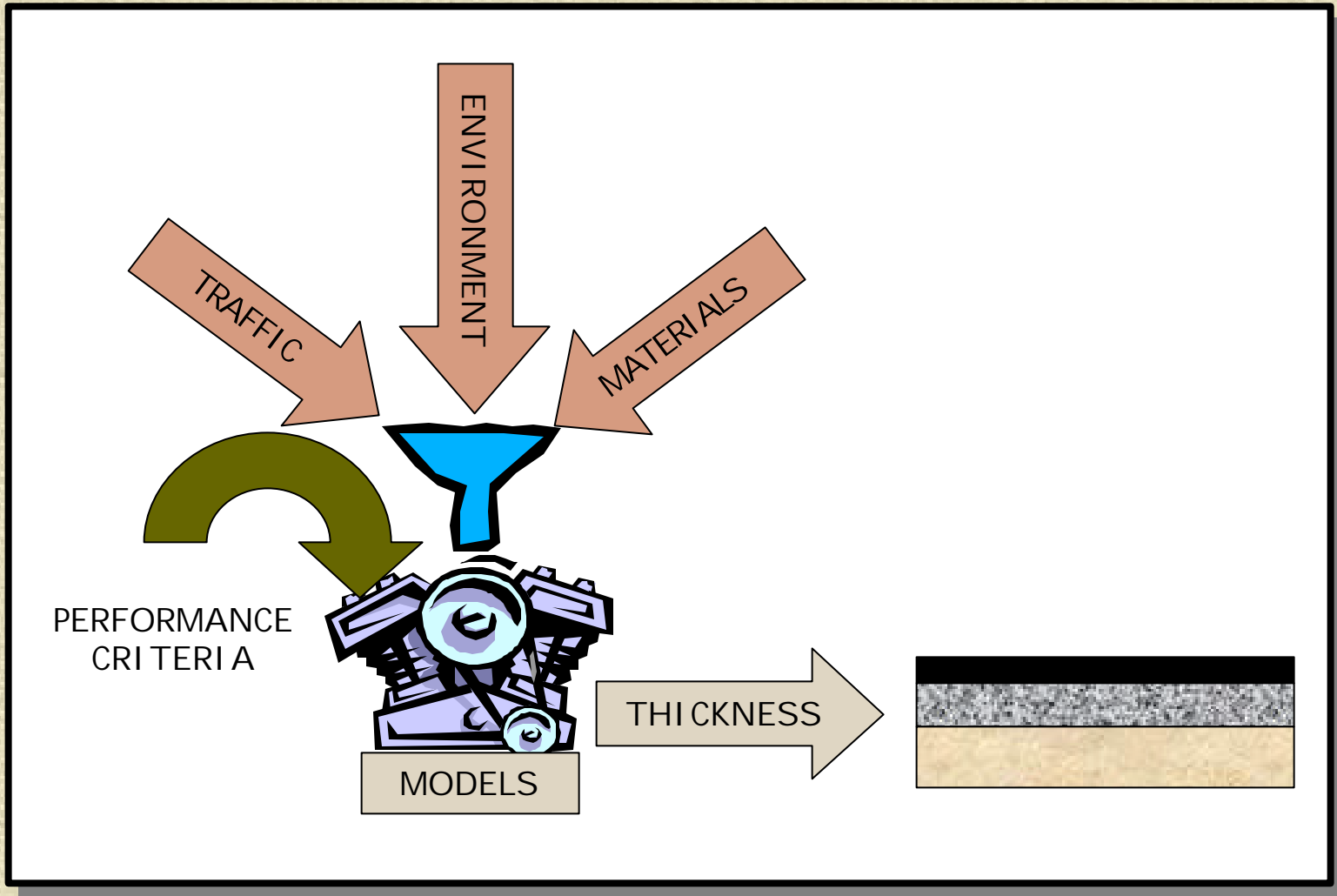
## ✦ Superpave System

- ◆ Binder specification - modifiers?
- ◆ Mix design – candidate SPT
- ◆ Models System – framework on track

## ✦ Construction Practices

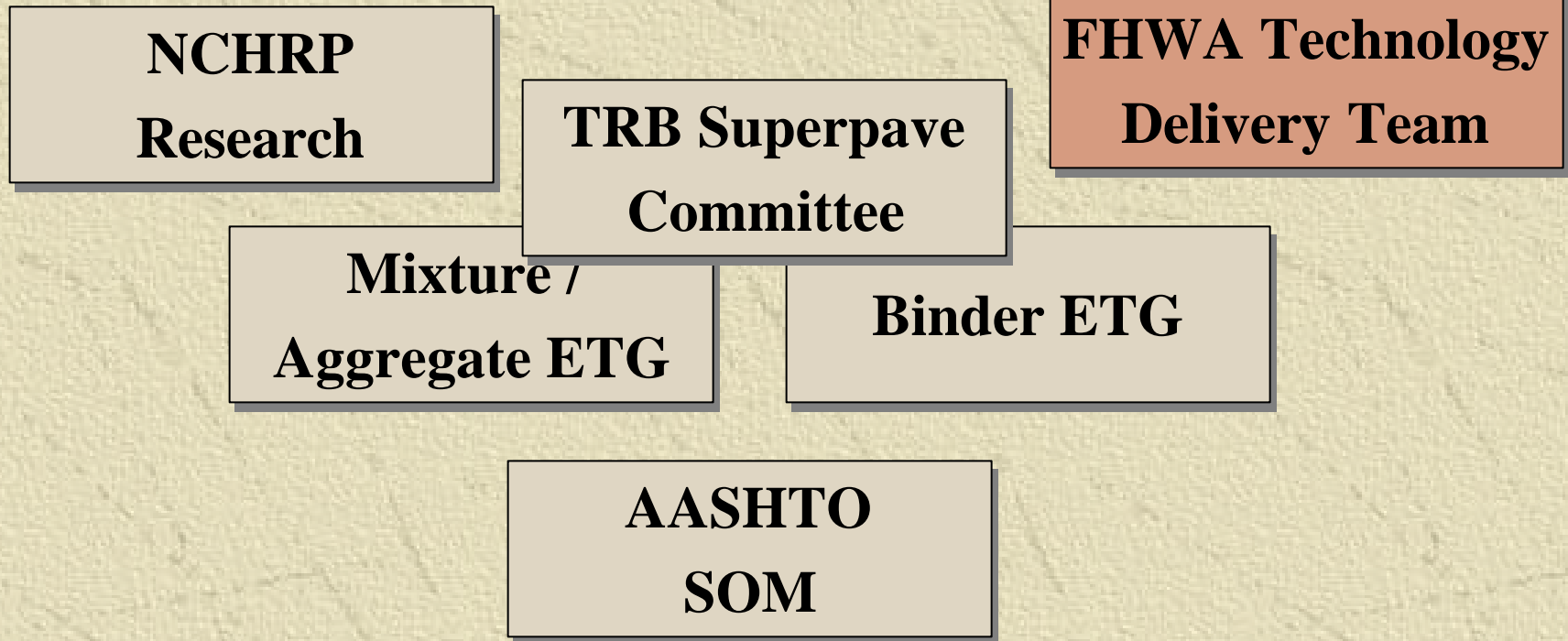
- ◆ Tools: New Gsb, Moisture, SGC angle kit. . .
- ◆ Contracting: PRS framework, Warranty

# AASHTO 2002



# Superpave Relationships

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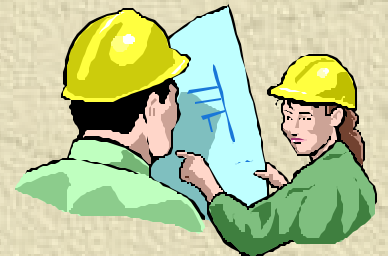




# Superpave Binder Direction

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- ✦ Not all binders of the same grade perform the same.
- ✦ Not all modifiers are the same.
- ✦ The Superpave binder specification has to be made blind to modifiers.



# High Temperature Performance I-80, Nevada

✦ Same gradation - different binders.

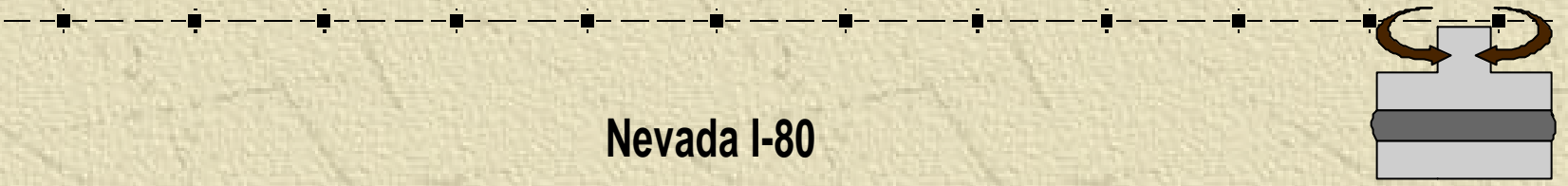


PG 67-22 modified  
No rutting

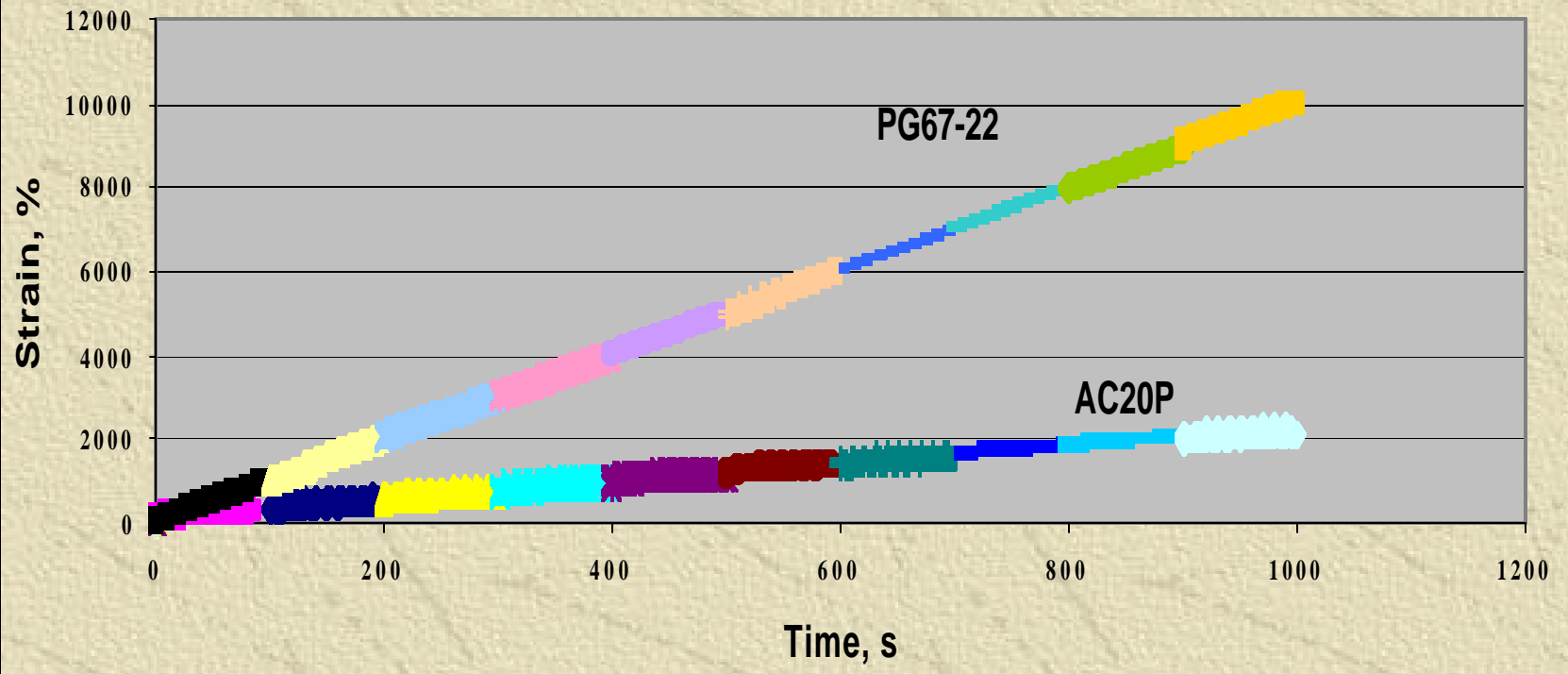


PG 63-22 unmodified  
15mm of rutting

# NCHRP 9-10 Rutting Test Repeated Creep Recovery Test

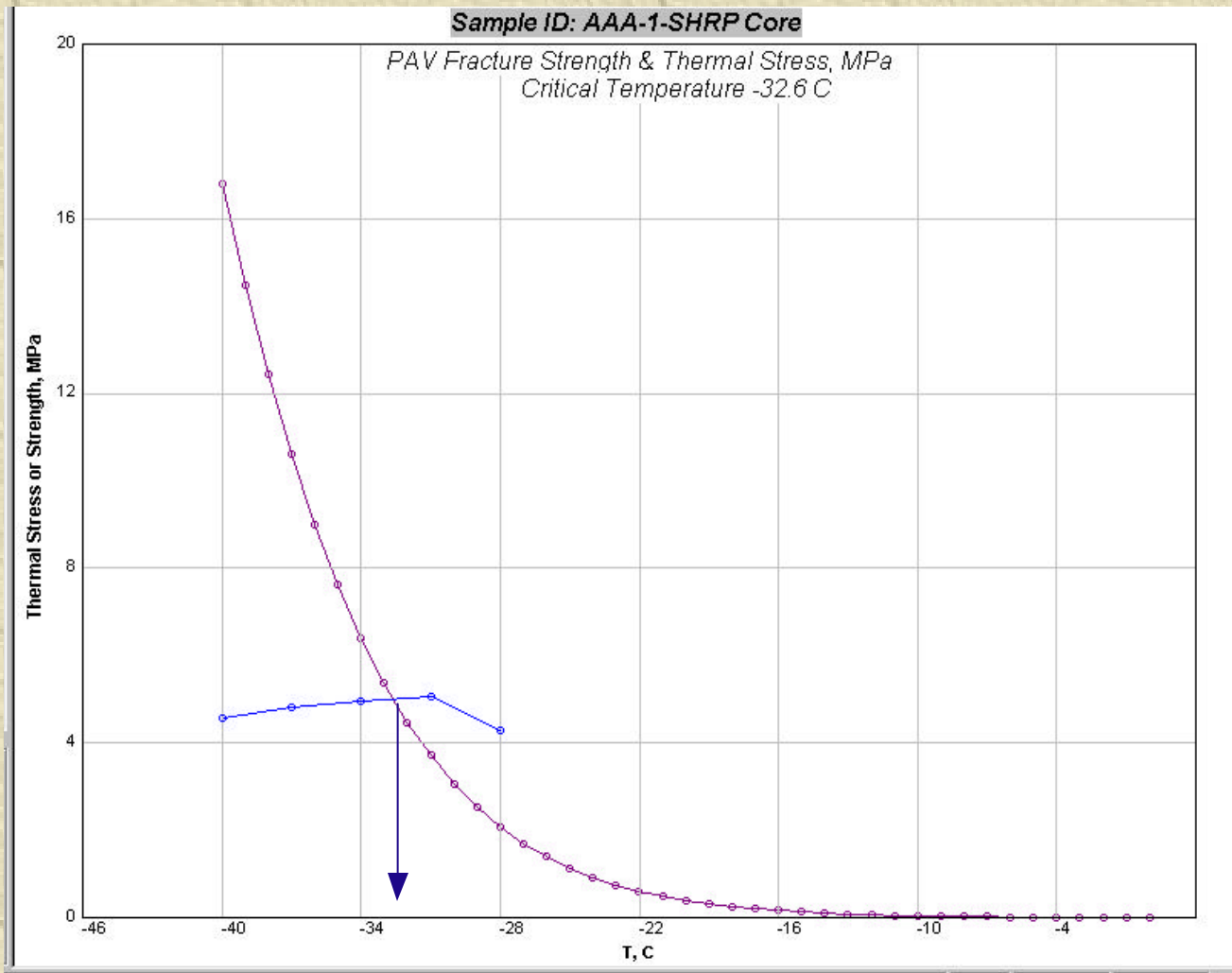


Nevada I-80





# Thermal stress compared to strength.



# New Superpave MP1a Spec.

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Binder	T <sub>cr</sub> Current Spec	T <sub>cr</sub> Proposed Spec
70-22 Air Blown	-24.5	-22.5
70-22 Conventional	-25.1	-22.5
70-22 SBS Modified	-26.0	-30.5
Chemically Modified 64-28 A	-29.0	-28.0
Chemically Modified 64-28 B	-27.5	-27.0
Chemically Modified 64-28 K1	-29.5	-27.5
Chemically Modified 58-28 M1	-27.3	-27.0
Elvaloy Modified 64-34 DP	-34.7	-36.0



# Superpave Plus Specifications

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- ✦ The Direct Tension Tester provides a great deal more information about the binder and its make-up.
- ✦ The strain at failure can tell a lot about what is in the binder.

# Montana Study DTT Results

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PG grade	Modifier	Test Temp	Strain	Stress
76-28	EVA	-18°C	1.8	3.4
76-28	EVA	-18°C	1.5	3.5
76-28	EVA	-18°C	1.7	4.0
76-28	EVA	-18°C	2.0	3.6
76-28	EVA	-18°C	1.7	4.2
76-28	SBS	-18°C	3.5	5.5
76-28	SBS	-18°C	4.0	5.9
76-28	SBS	-18°C	2.9	5.9

# FHWA Polymer Study DTT Results

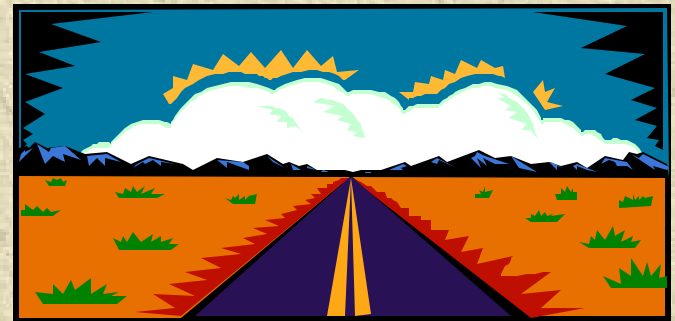
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PG GRADE	Modifier	Test Temp	Strain	Stress
70-28 (72-33)	SBS-Lin_GRF	-18°C	5.81	4.81
70-28 (72-31)	SBS-Linear	-18°C	2.09	5.37
70-28 (71-32)	SBS_RAD_GRF	-18°C	7.05	4.65
70-28 (70-31)	EVA	-18°C	1.94	4.81
70-28 (73-31)	EVA_GRF	-18°C	1.78	4.76
70-28 (73-31)	EVA_GRF	-24°C	1.15	6.24
64-34	Stylink	-24°C	2.07	5.07
64-34	Elvaloy	-24°C	2.3	4.98
64-40	EVA	-30°C	1.74	4.35
64-40	EVA	-30°C	0.59	1.53
63-22	SBS	-12°C	2.6	4.2

# Survey of 17 States – Highest Priority

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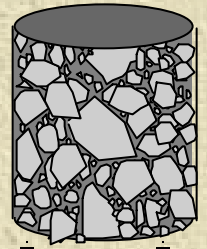
- ◆ Simple Performance Test
- ◆ VMA Criteria/Effects (Coarse/Fine)
- ◆ Flat & Elongated Criteria
- ◆ N-design Refinement/Validation
- ◆ Gyratory Compaction Equipment
- ◆ Construction Issues
  - Tenderness
  - Permeability





# NCHRP 9-19

## *A simple performance test*



✦ Objective:

✦ To recommend a fundamental based but simple performance test(s) in support of the Superpave volumetric mix design procedure.





# Dr. Witczak's Team's Recommendations



## ✦ Permanent Deformation

- ✦  $E^*/\sin F$

## ✦ Fatigue Fracture

- ✦  $E^*/\sin F$

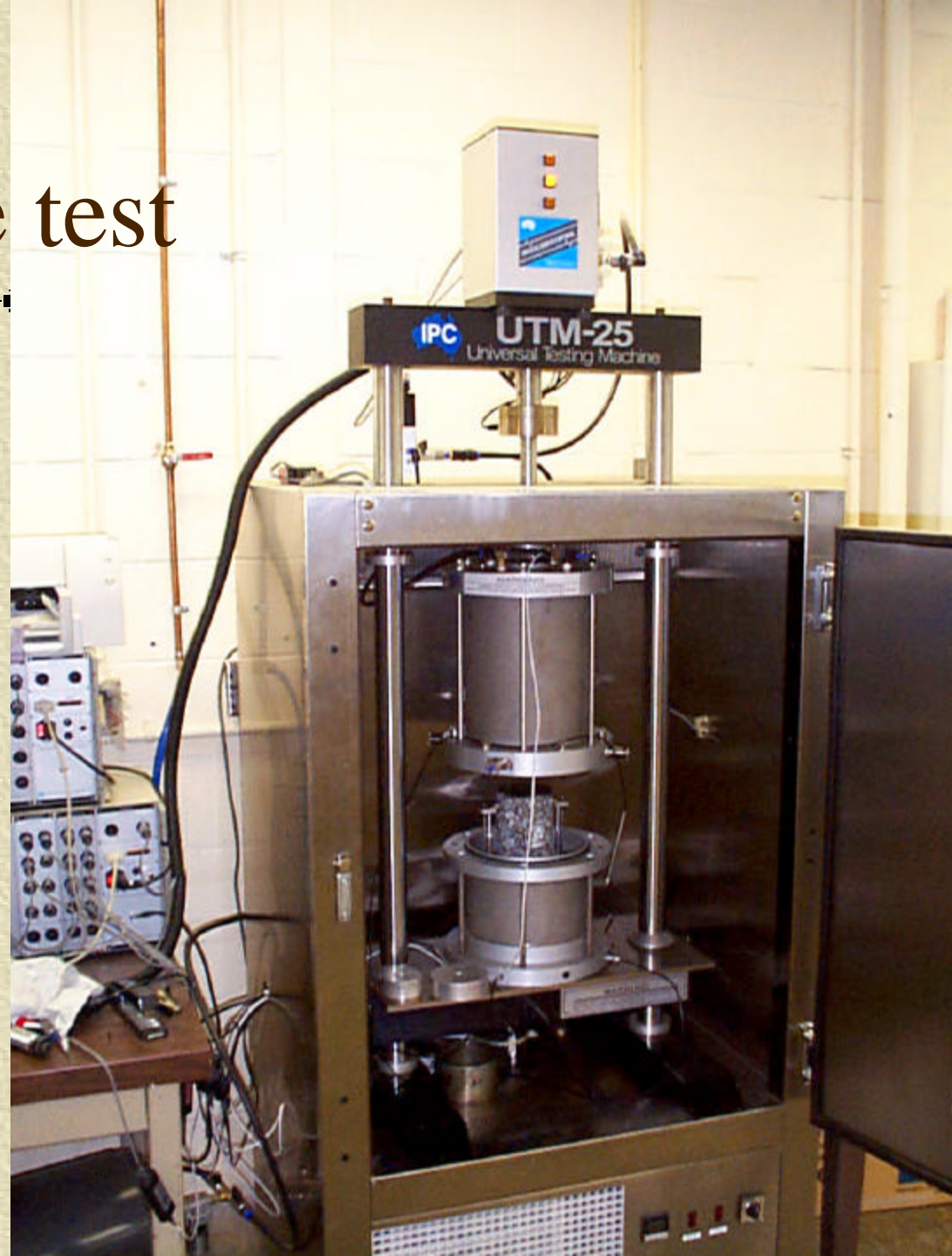
## ✦ Thermal Fracture

- ✦ IDT Creep Compliance -  $D(t)$

# A simple performance test

✦  $E^*$

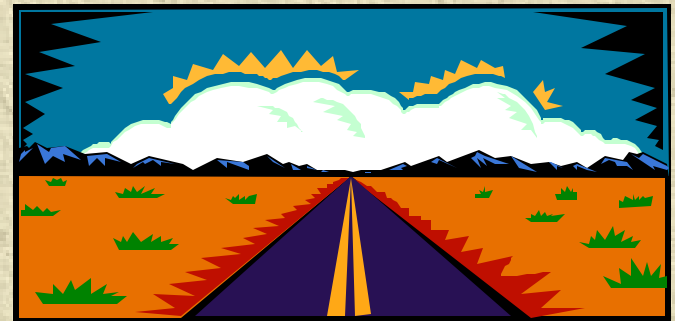
✦ Flow Time



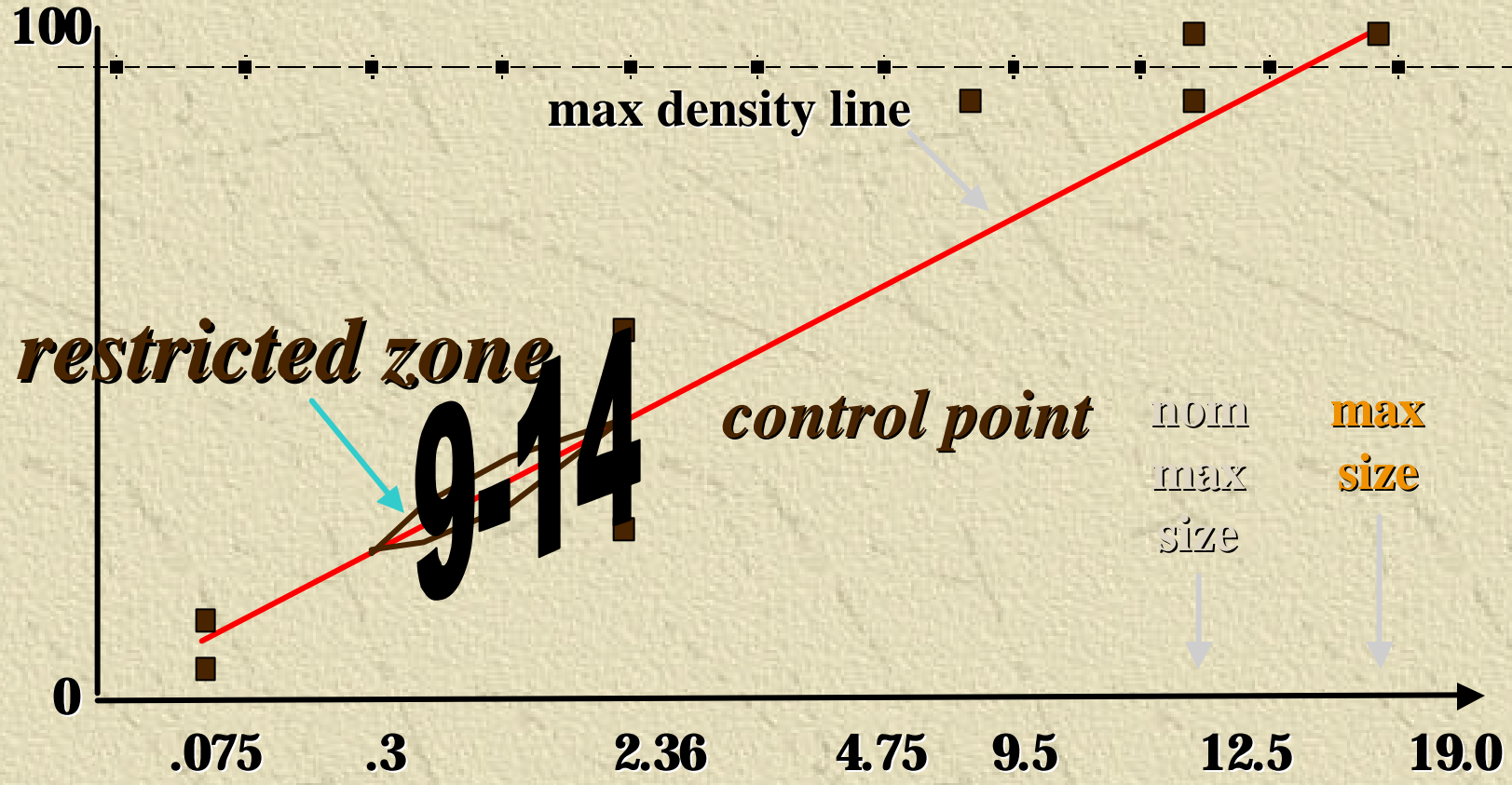


# Survey of 17 States – Highest Priority

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# Percent Passing

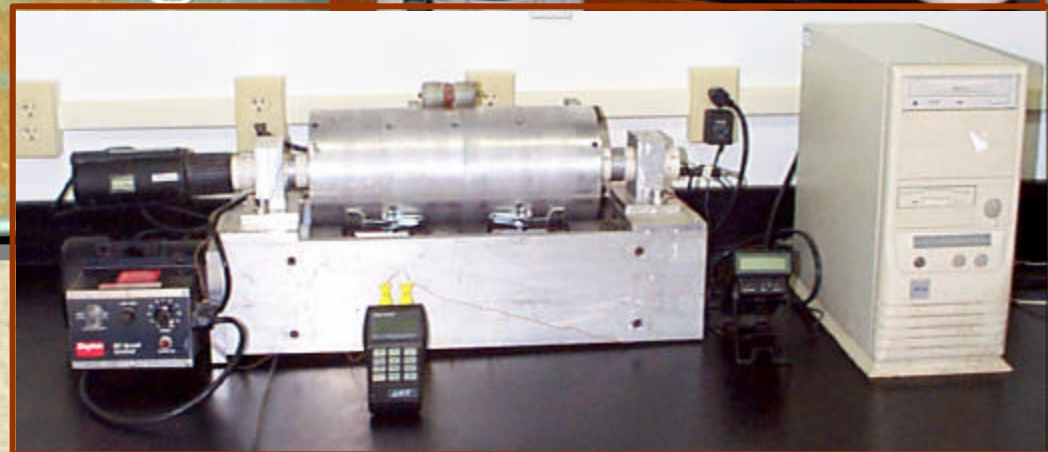


Sieve Size (mm) Raised to 0.45 Power

# Fine aggregate specific gravity test

✦ Issue:

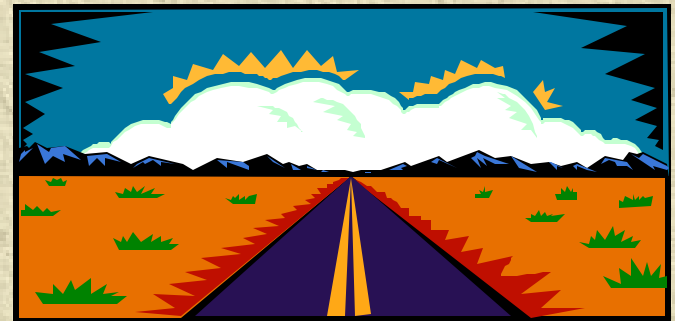
✦ VMA Field QC



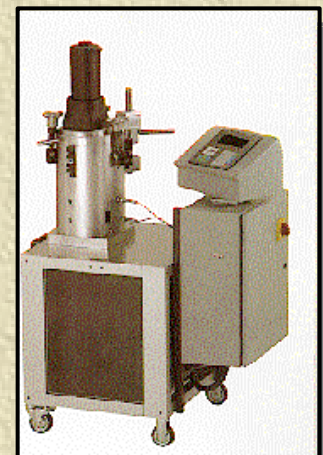
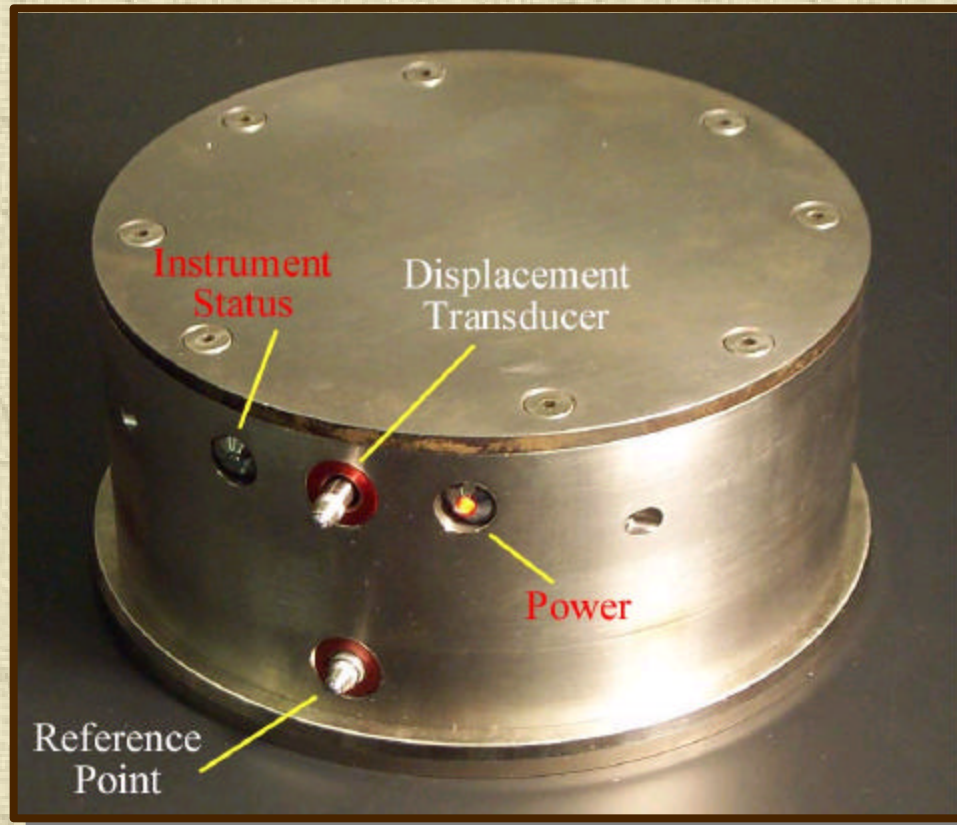


# Survey of 17 States – Highest Priority

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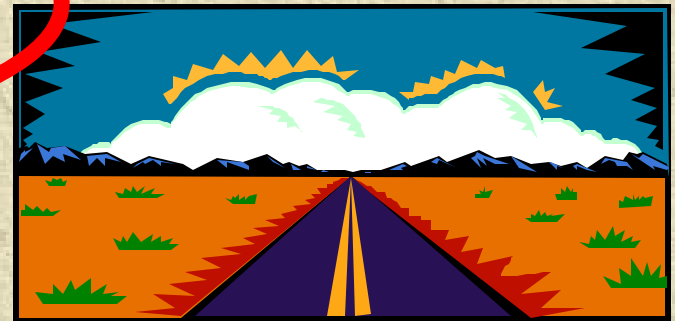
“It is critical all gyratories compare.”



# Survey of 17 States – Highest Priority

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# **NCHRP Program FY 2001**

## **Asphalt Pavements**

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**➤ NCHRP Funds \$ 2.5 million**

- 9-22 Performance Related Specifications**
- 9-23 Environmental Effects Model**
- 9-25 VMA Relation to Mix Properties**
- 9-26 SGC Precision and Bias**
- 9-27 In-Place Pavement Density**
- 9-28 Models Field Validation**
- 9-29 Simple Perf. Tester Commercial Model**



# Thank You



**Federal Highway Administration**  
*Office of Pavement Technology*

