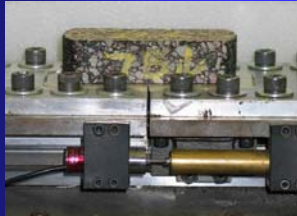


Use of the Overlay Tester for Designing Crack Resistant Asphalt Mixes

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Background

- Reflective cracking is arguably the most common distress associated with flexible pavements in Texas.
- The Overlay Tester appears to be a good predictor of reflective cracking.
- Currently only Crack Attenuating Mixes (CAM) have an Overlay Test requirement specified (750 minimum)
- There is a lot of potential for using the Overlay Tester to improve the way we design our mixes.
- Testing variability is one of the primary obstacles to further implementing the Overlay Test.

Designing mixes resistant to thermal reflection cracking

Background to the overlay tester

- Concept over 40 years old
- Early work at Texas A&M and in Europe
- Used extensively in 1980's to study inter-layers and fabrics
- Currently being used in NCHRP model evaluation study
- TxDOT study (2001) evaluation as mix design tool



Equipment Upgrades

1. Upgrade Hardware and software
2. Fully computer-controlled test

TxDOT's New Overlay Tester



Sample Preparation



Mix Design Test Protocol

- Sample size: 6" long by 3" wide by 1.5" high
 - Loading: Continuously triangular displacement 5 sec loading and 5 sec unloading
 - Standard Test Conditions

- Opening displacement: 0.025 in.
- Room temperature: 77 F

 - Definition of failure

- Discontinuity in Load vs Displacement curve
- Visible crack on surface

Statewide Evaluation of Good/Bad reflection cracking projects

US 84 Abilene (6 mo old) US 175 Dallas
 Inplace Recycling 10 year old section

Latex Modified Asphalt Binder

Crack Stops

No reflective cracking in travel lanes evident

48A502 2" Recycled Overlay - no milling

Field Validation Studies

1) does the test rank materials correctly?
 2) What are acceptable criteria?

77 Deg F 25 mils opening

Material	Reps-Feature
US 84	2
SH 3	25
US 175	300
D64-22 L	520
IH 20	700

IH-10 Type C (PG76-22L), 4.4%AC

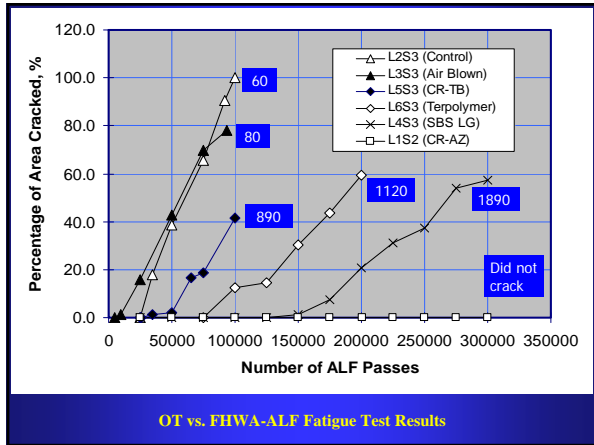
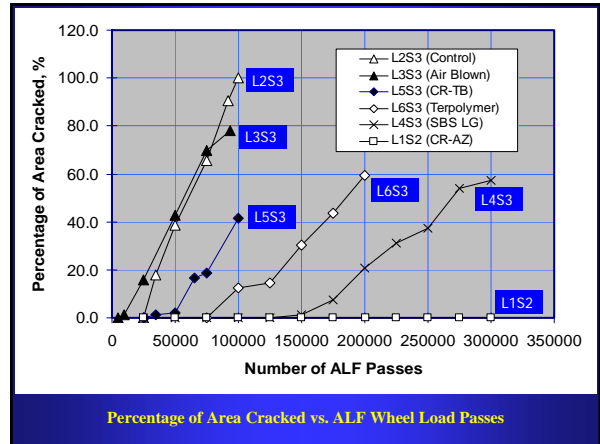
Properties	Result	Target
Cracking (overlay tester cycles to failure)	2	>200
Rutting (APA rutting after 8000 cycles)	2.6 mm	<6mm
Rutting Hamburg (Hamburg cycles to 0.5 inch rut)	>20K	>20K

Rut resistance mix (4 in thick) placed on IH 10 in 2002 heavy traffic
Reflection cracking in 2004



As-Built Pavement Lanes

CR-AZ	PG	Air	SBS	CR-TB	TP	PG	PG	SBS	Air	SBS	TP
70-22	70-22	Blown	LG			70-22	70-22	Blown	Blown	LG	
70-22	Control					Fibers	70-2254-40				
1	2	3	4	5	6	7	8	9	10	11	12



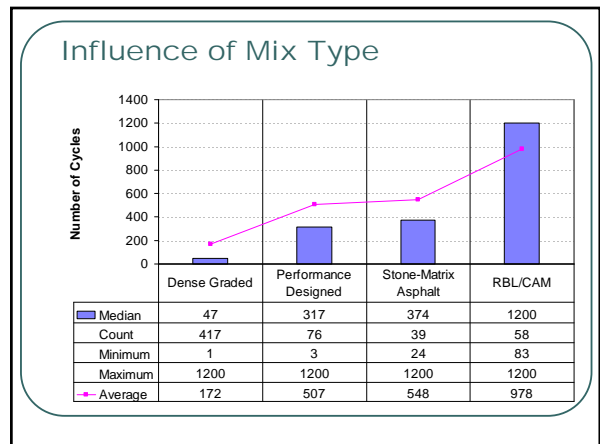
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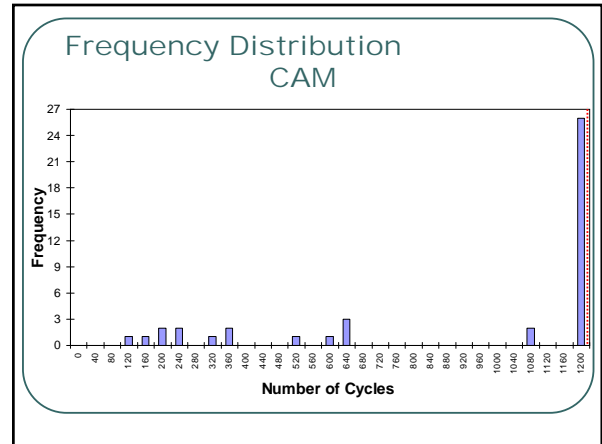
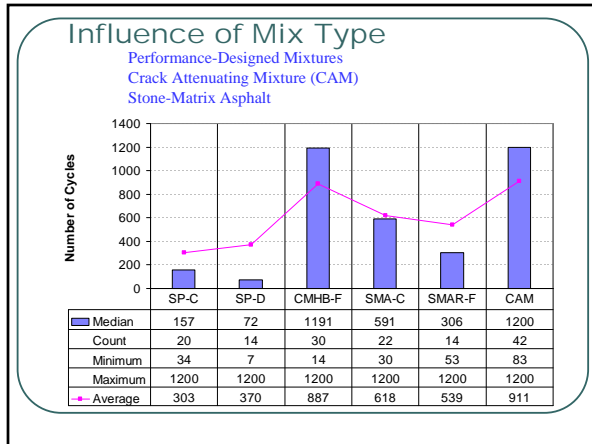
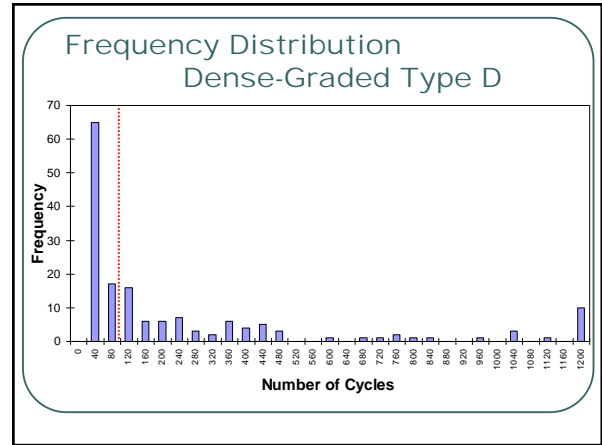
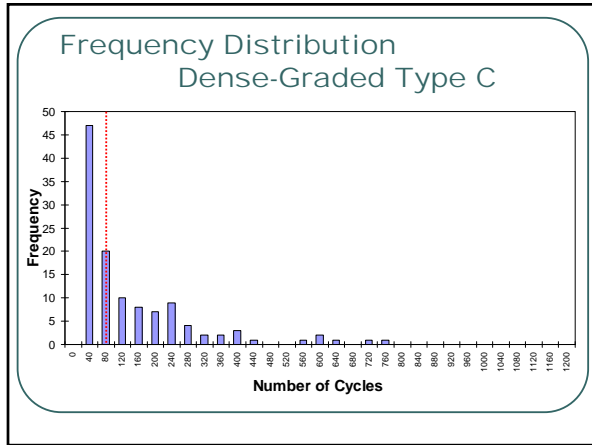
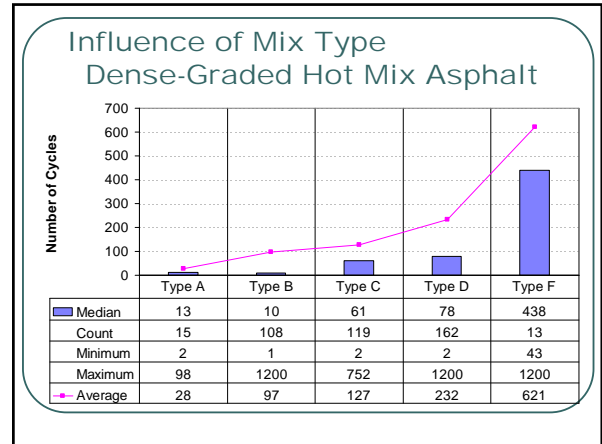
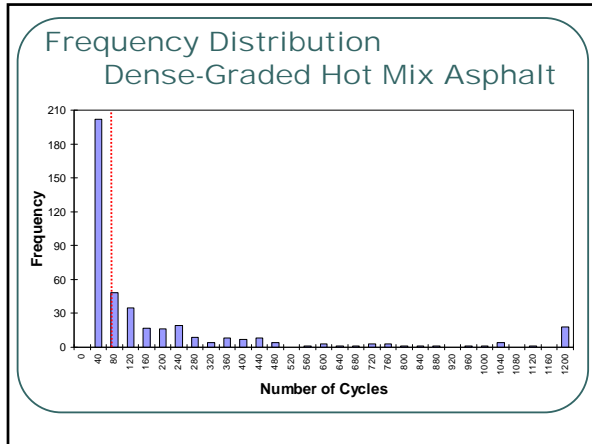
Summary of Overlay Test Results

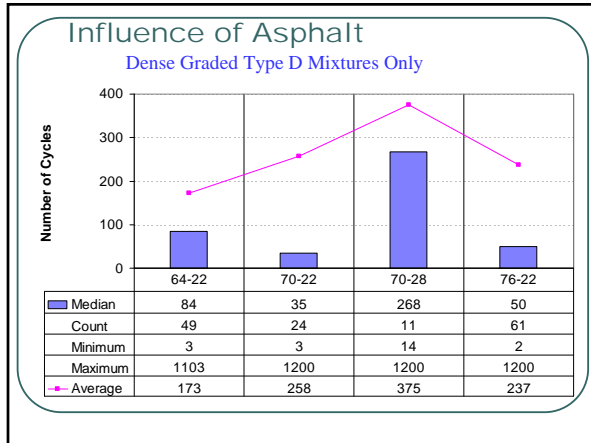
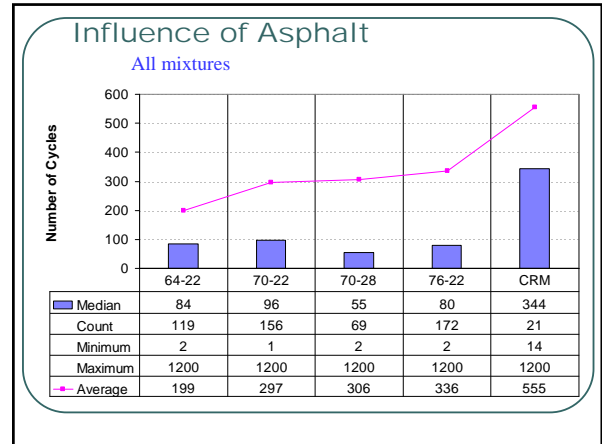
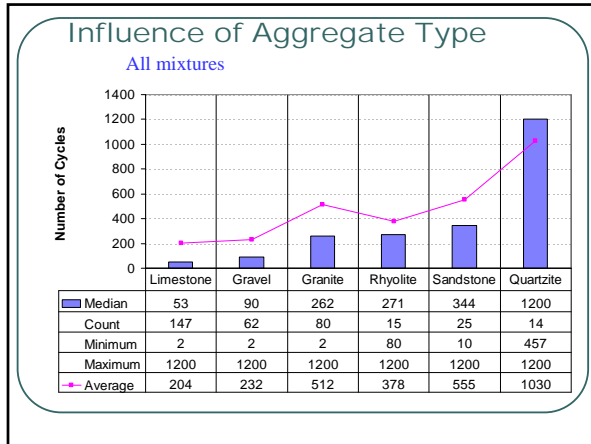
CST Flexible Pavements

Overlay Test Results

- Approximately **630** tests have been performed.
- The data includes duplication. After the mix is tested 3 times, the 3 test results are entered in the database.
- The summary only includes data where there were more than **10** occurrences of a similar variable (mix type, aggregate type, PG binder)
- Test is performed until a 93% reduction or more of the maximum load measured from the first opening cycle. If 93% is not reached, the test is run to 1200 cycles.







Overlay Tester Conclusions

- The Overlay tester is practical and appears to be an effective predictor of HMA cracking.
- The overlay tester has revealed that most TxDOT mixes are relatively susceptible to cracking.
- “Crack Attenuating Mixes” (CAM) are gaining popularity in Texas. CAM mixes are both rut resistant and crack resistant.
- Testing variability is an ongoing issue. Eventually we should have an overlay requirement for all mixtures.....not yet ready.

