Ohio DOT Office of Materials Management

interoffice communication

to: District Construction Engineers ***date:*** January 3, 2005

attn: District Testing Engineers

from: David Powers, Asphalt Materials section

subject: 2004 Asphalt Pavement Joint Density Study Results

Attached find a summary of data from efforts this past construction season to determine actual densities of longitudinal joints in asphalt pavements. The Excel file with all data and a copy of the summary is attached to this e-mailing.

10 districts submitted joint core data representing 26 projects, 76 acceptance lots and 468 cores.

In your reviewing the data keep in mind a couple points. While we tried to make the core collection as representative of actual practice as possible there is no way to quantify when the contractor personnel altered their practice because of the sample taking. Several projects seemed to show that this may have occurred. In addition, while we tried to be as accurate as possible in reporting the numbers there were several points of confusion with several districts both at the project level and in communicating results. We have tried to re-verify as much of the data as possible in working with district personnel. Finally, the vast majority of projects had Superpave 12.5 mm 442 mixtures with PG 70-22M binder.

My review of the data leads me to conclude the following:

- The current 446 specification yields consistent, high mat densities necessary for durability.
- The current 446 specification does not yield consistent joint densities.
- The current 446 specification does not yield joint densities adequate to have joint durability similar to the mat durability.
- The current 446 specification has provided better joint density overall compared to data collected on joints thru the mid 1990s under an older specification. Asphalt pavement joint performance improvement since the mid 1990s has been noted by the Office of Pavements.
- Unconfined joint densities are on the average about 1.5% lower than confined joint densities and 4.3% lower than mat densities..
- Confined joint densities are on the average about 2.8% lower than mat densities.

- Because of high density deviations and ranges on individual projects some project joints or joint lots within projects will fail (due to permeability of water) sooner than those on other projects in the study.

- Several projects had confined joints that were high enough in density to be very durable. This as well shows that contractors are able to construct adequate density into confined joints.

- The vast majority of unconfined joints had densities between 88 and 91%. These are high permeability joints prone to premature failure. Current contractor equipment and practice may not able to construct unconfined joints to more adequate densities.

This office will be meeting with industry this winter to develop a revised 446 specification adequate to ensure joint durability. A future joint density specification will have to recognize the difficulty in achieving joint densities as high and consistent as current mat densities as well as lack of district personnel to manage additional district workload in processing additional cores.

DBP:dbp
c. Lloyd Welker, Bill Lindenbaum, Gary Middleton, Keith Keeran, Dave Humphrey, Aric Morse, John Neenan, Jim Jenkins, Bud Stehmeyer, Bob McQuiston –FHWA, Cliff Ursich – FPO, Pat Jacomet - OAIMA

DIST	PROJ	# LOTS	JOINT SDT DEV CONF	JOINT SDT DEV UNCONF	JOINT AVG DENSITY CONF	JOINT AVG DENSITY UNCONF	MAT AVG DENSITY	MAT - JOINT AVG DENSITY CONF	MAT - JOINT AVG DENSITY UNCONF
1	487-03	3	1.71		92.30		94.82	2.52	
	515-03	3	1.03	0.77	94.42	89.67	94.76	0.34	5.09
	569-03	3	1.59	1.07	92.88	89.62	95.00	2.12	5.38
2	476-03	2	1.05	1.19	90.79	88.82	93.72	2.93	4.90
	325-04	3	1.07	0.79	90.31	90.56	94.08	3.77	3.52
	421-02	3	1.18	1.86	95.13	92.36	94.04	-1.09	1.68
3	567-03	3	0.97	0.90	94.09	88.45	93.93	-0.16	5.45
	73-04	3	1.48	1.56	90.62	88.23	95.22	4.60	6.99
	118-04	2	0.93	0.84	94.52	89.62	94.14	-0.38	4.52
	297-04	4	1.74	1.10	90.63	87.25	94.63	4.00	7.38
5	492-03	1(12 cores)	2.28		93.03		93.51	0.48	
	543-03	3	1.16		92.96		94.82	1.86	
	389-04	3	2.06		92.73		94.64	1.91	
6	258-04	4	3.57	1.32	90.96	91.72	95.61		
7	405-04	4	1.81		91.98		91.99	0.01	
8	420-02	3	0.78	1.94	90.72	92.38	94.02	3.30	1.64
9	580-03	3	1.33		87.33		94.07	6.74	
	608-03	3	2.41		89.31		94.20	4.89	
	434-04	3	1.58	1.66	93.57	91.62	95.47	1.90	3.85
11	513-03	3	1.50	0.81	90.26	89.34	93.53	3.27	4.19
	421-03	3	2.74	1.70	90.51	90.09	95.13	4.62	5.04
	414-04	3	1.86	1.12	88.95	88.30	94.03	5.08	5.73
12	271-04	3	1.87	3.54	89.01	90.20	93.78	4.77	3.58
	510-03	3	1.31	2.03	89.06	93.42	94.35	5.29	0.93
	452-03	3	1.66	1.86	93.20	88.93	94.73	1.53	5.80
	508-03	2	4.12	2.98	88.55	89.67	93.32	4.77	3.65
				ALL STD DEV	2.10	1.64	0.77	2.10	1.75
				ALL AVG	91.45	90.01	94.29	2.76	4.41