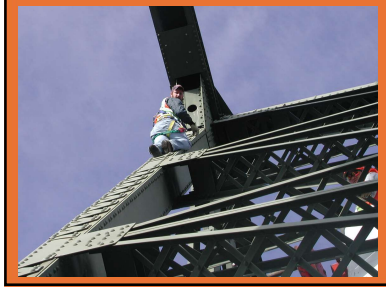
DAN L. WADLEY, P.E.
KANSAS DOT – RESEARCH

A LONG TIME AGO... IN A GALAXY FAR, FAR, AWAY...

Dan used to spend a lot of time hanging out under bridges with the tics and poison ivy writing up bridge condition states (Routine and Fracture Critical Bridge Inspections). That turned out to be an outstanding short course in concrete (and steel) deterioration case studies. With over 6,000+ bridges on the State system, of all different ages, types, sizes... that's a lot of time spent looking at stuff falling apart.

From there the hook was set, and Dan spent the next epoch in Bridge Maintence Plans– producing plans to fix the stuff that was broke, blending the worlds of Inspection and Design. From there he transferred into a regular Bridge Design Squad to learn about new construction, because why not? And then one day the phone rang... And the rest, as they say, is history...



Dan is currently the Assistant Bureau Chief of Research, stationed out of the Materials and Research Center – KDOT Central Lab in Topeka. KDOT Research has a strong research partnership with both KU and KSU through our K-Trans program, but also has an internal staff of investigative Engineers and Technicians on both the concrete and asphalt fronts, as well as advanced technology and just about anything else transportation related there is to look at. Plus we have an outstanding new Research Geologist who's about to get her very own laser!!

The Lab is a great place to work with lots of fun people and fun gadgets, but perhaps best of all... he gets to spend a lot of time mixing and testing concrete!!

THAT alone should make any Engineer happy–
because who doesn't love concrete!!?! ;)

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NCC- FALL 2020

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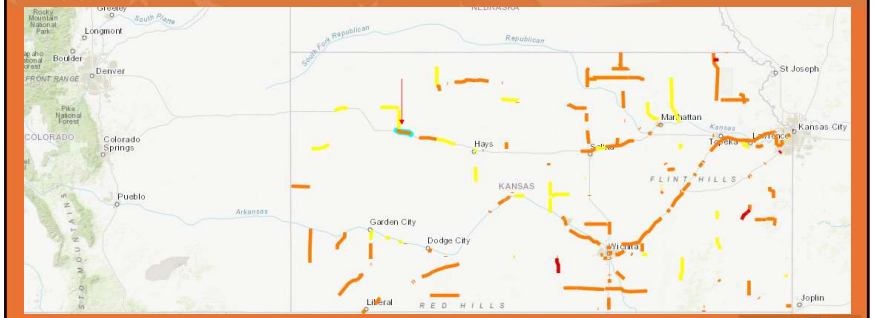
SHADOW PROJECT UPDATE
KA-0726-01 (PHASE 1=WB)

KA-0726-01 in Gove Co., KS



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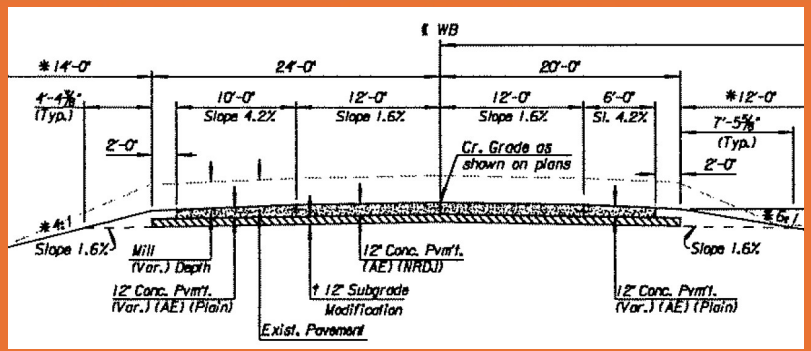
KA-0726-01 = $ 38.1 M

PHASE 1=(WB)42'x12"NRDJ(AE)

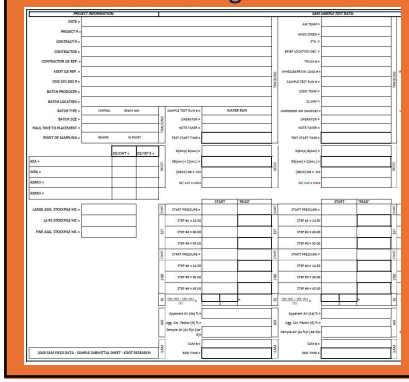


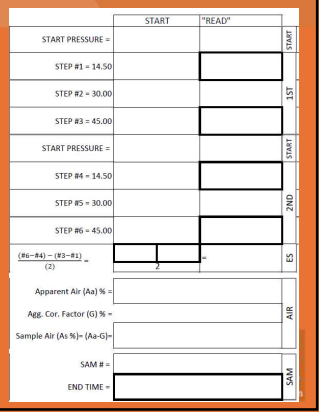
SAM Utilized as Primary Test

Gameplan is to minimize overall Errors:

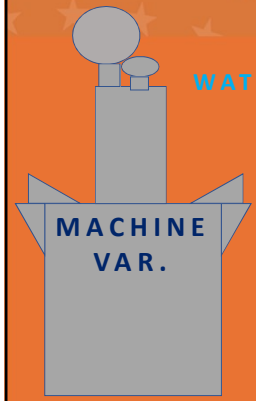
MACHINE	OPERATOR	MUD
GASKET	AIR DELIVERY	--G--
LEAKS	ENERGY DELIVERY	OPTIMIZED SCM'S
GUTS & VALVES	PRECISION	ADMIXTURES
PUMP	QA NOTES	BATCHING
GAUGE		PLACEING
		CURING

"If you didn't write it down, it never happened…" –He Who Wishes he had data the next morning. FIELD SHEET=





REDUCE… Machine Error…



WATER RUN = MACHINE ERROR CHECK

- ✓ SHOWS LEAKS
- ✓ SEATS RIM GASKET
- ✓ WAKES UP MACHINE
- ✓ WAKES UP OPERATOR!
- ✓ PROVIDES DOCUMENTATION OF DAILY MACHINE FUNCTIONALITY!!!

SAM #=

< 0.20 = OK
>0.20 = NO FLY, CHECK

Aa =

Aa< G = OK

Aa > G = CHECK

REDUCE… Operator Error…

WATER RUN = DAILY OPERATOR CHECK

- ✓ IS OPERATOR AWAKE?
- ✓ PROVE IT

MUD RUN = FIELD SHEET + E.S

<<OR>>

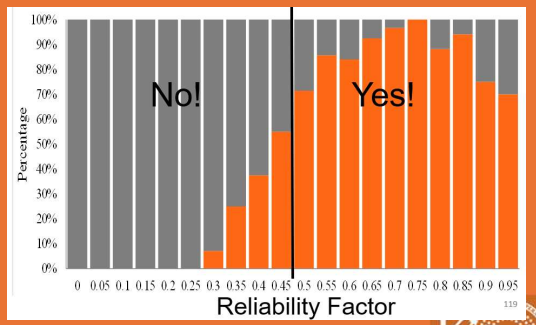
FIELD SHEET +
OSU 'RELIABILITY FACTOR'
a.k.a. "SAM's Chance"

- ✓ IS RESULT REASONABLE?
- ✓ PROVE IT

QUANTIFY… Machine + Operator…

O.S.U. RELIABILITY FACTOR

V3.0 Date		10/10/2018	10/10/2018
Location		Lab	Field
Test No.		Example	Example
First Run	14.5 psi	9.93	9.27
	30 psi	23.38	22.30
	45 psi	37.65	36.37
Second Run	14.5 psi	10.43	9.49
	30 psi	24.02	22.55
	45 psi	38.34	36.61
Air Content (%)		2.5	3.1
SAM @ 14.5 psi		0.50	0.22
SAM @ 30 psi		0.64	0.25
SAM @ 45 psi		0.69	0.24
SAM's Chance		0.656	0.260
Result:		Likely Correct	*Ran Incorrect*



QUANTIFY… Mud Runs…

MUD VAR.

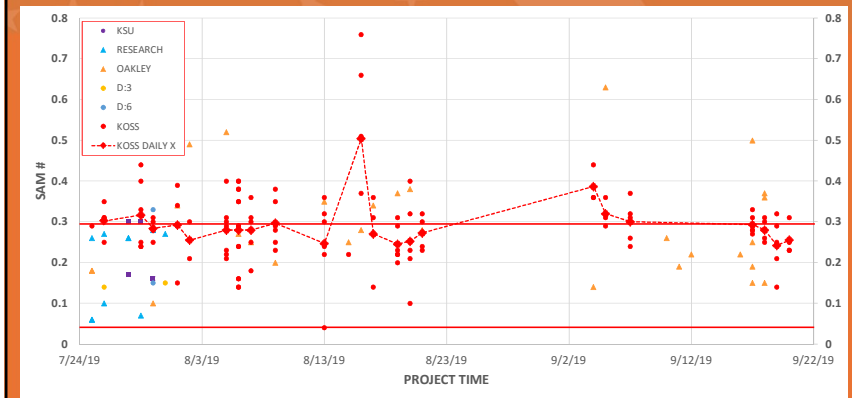
FOR EACH MIX: CALCULATE AGGREGATE CORRECTION FACTOR = --G--

* (Presumes the Cali-can used to calibrate the SAM.)

--RANGE--
(FOR OUR MACHINE)
MIN. = 0.2*
TYP. = +/-0.3*
MAX. = 1.2*

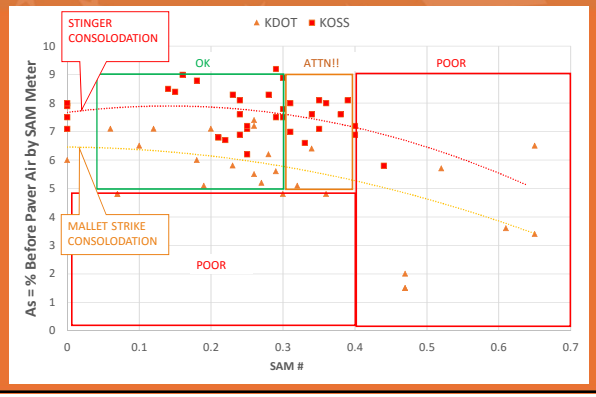
PRELIMINARY RESULTS…

WB MOTION



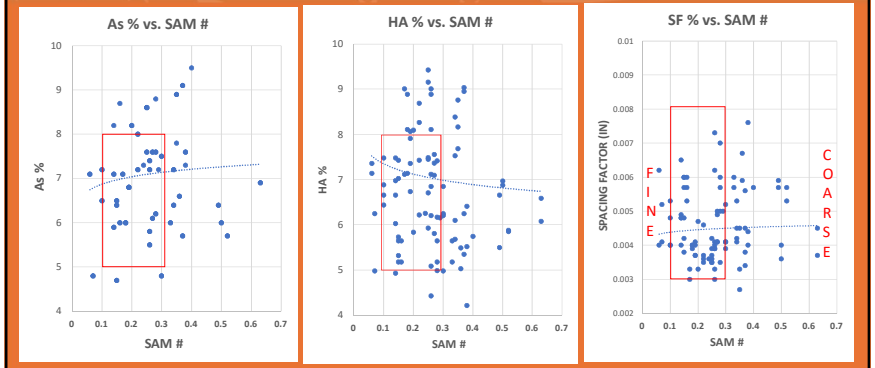
PRELIMINRY RESULTS…

MALLET VS. STINGER



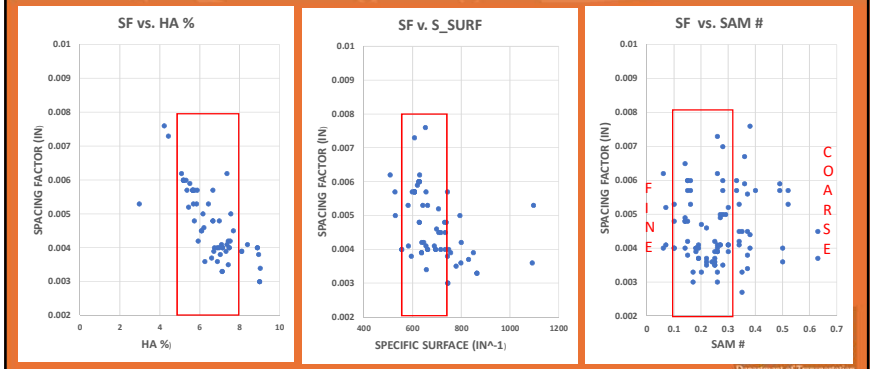
PRELIMINRY RESULTS…

As - HA - SF VS. SAM



PRELIMINRY RESULTS…

SPACING FACTOR VS. HA% - SS - SAM



TAKEAWAYS

- ✓ Calculate --G-- if using limestone or absorptive aggregates;
- ✓ Perform 'water run' once in the morning to document machine and operator are functioning;
- ✓ Have a sheet to track ending pressure steps;
- ✓ Mallet is more consistent than Stinger;

TAKEAWAYS

- ✓ SAM is a *dynamic response* test that gives you 4 important indicators :
  - ❑ An idea of how the mix will respond to energy (how it visually responds during consolidation);
  - ❑ Total Air (Aa-G=As%);
  - ❑ Indication of the overall quality of the air void system (Coarse or Fine via SAM #), and can recognize changes to the mix that are occurring in the field, making it a great->> QA/QC Tool;
  - ❑ Unit Weight;
- ✓ And it gives you these things quickly.

FINER POINTS…

- ✓ <1.25" SLUMP most difficult to run. MUST deliver sufficient energy by mallet strike or test will not run. (Recommend: hit, push button to start countdown, hit 3 more times.)
- ✓ Final Clean Meticulously – just a little sand on the rim may error out the test.
- ✓ DO NOT put the machine away wet or have any wet rags in case – it will shipwreck the gauge for the next day.

THANKS KOSS!!!

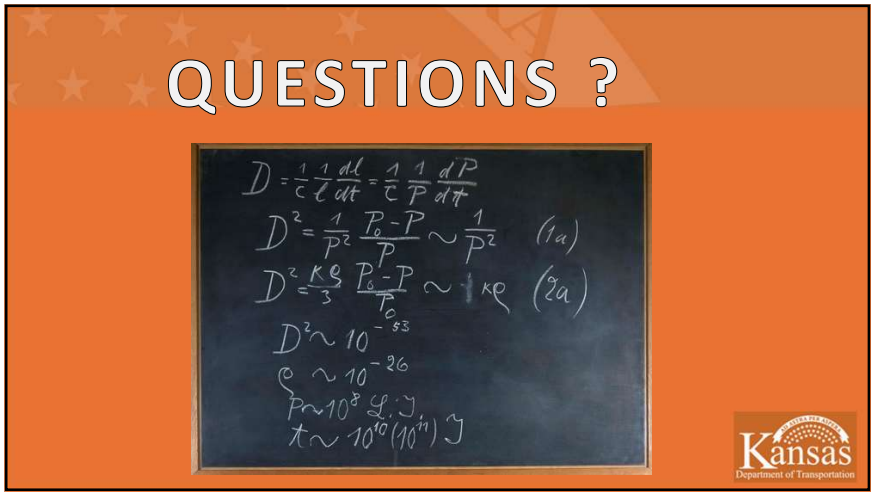
THANKS KATE!!

THANKS Jon, Todd, Eric, Zac, Bill, Mark, Rob, Dean!!!

Special THANKS: JH, MS, SJM, CW, JR and HL without whom this data would not have been collected or created for you.


SAFETY
FIRST–
FOR YOUR FAMILY
AND MINE.
Kansas
Department of Transportation

THANKS & BE


QUESTIONS ?
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