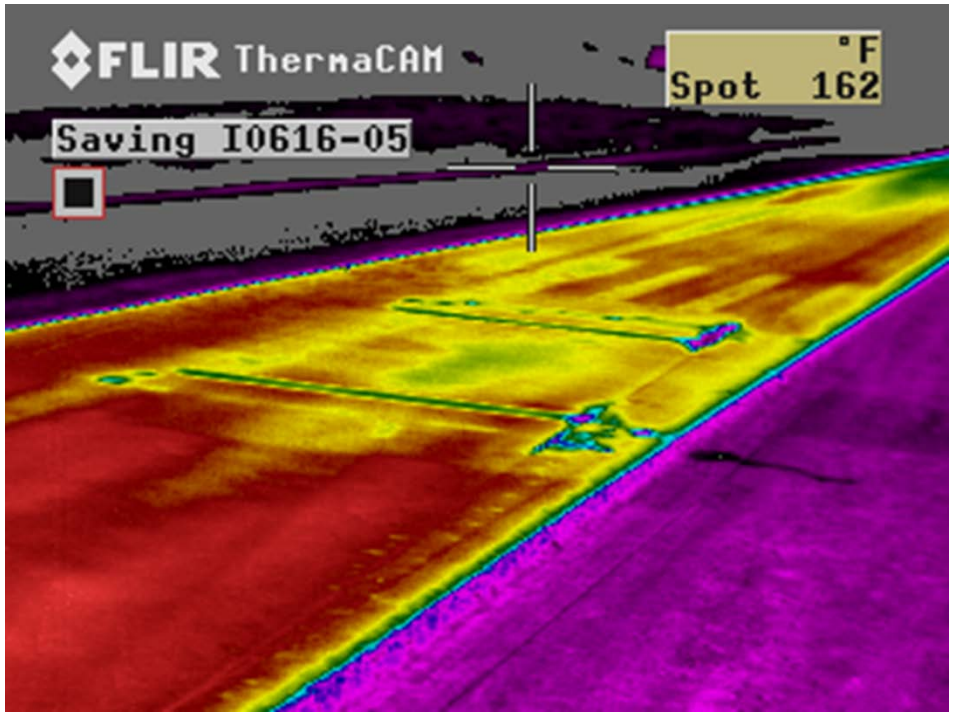
Minnesota's IR, IC and GPR Implementation Efforts

Curt Turgeon, PE
State Pavement Engineer

SHRP2 Showcase St. Joseph, MO
June1, 2016

A BRIEF HISTORY OF IR AND HMA

- Pooled fund partners: Washington, California, Texas & Minnesota
- Data collection using FLIR cameras



A BRIEF HISTORY OF IR AND PAVING

- Washington DOT develops Spec: handheld

A BRIEF HISTORY OF IR AND PAVING

- Texas DOT shows interest TTI says we can automate

Stephen Sebesta and Tom Scullion, TTI TRB 2006

- TTI works with MOBA
- MOBA moves from BAR to Scanner

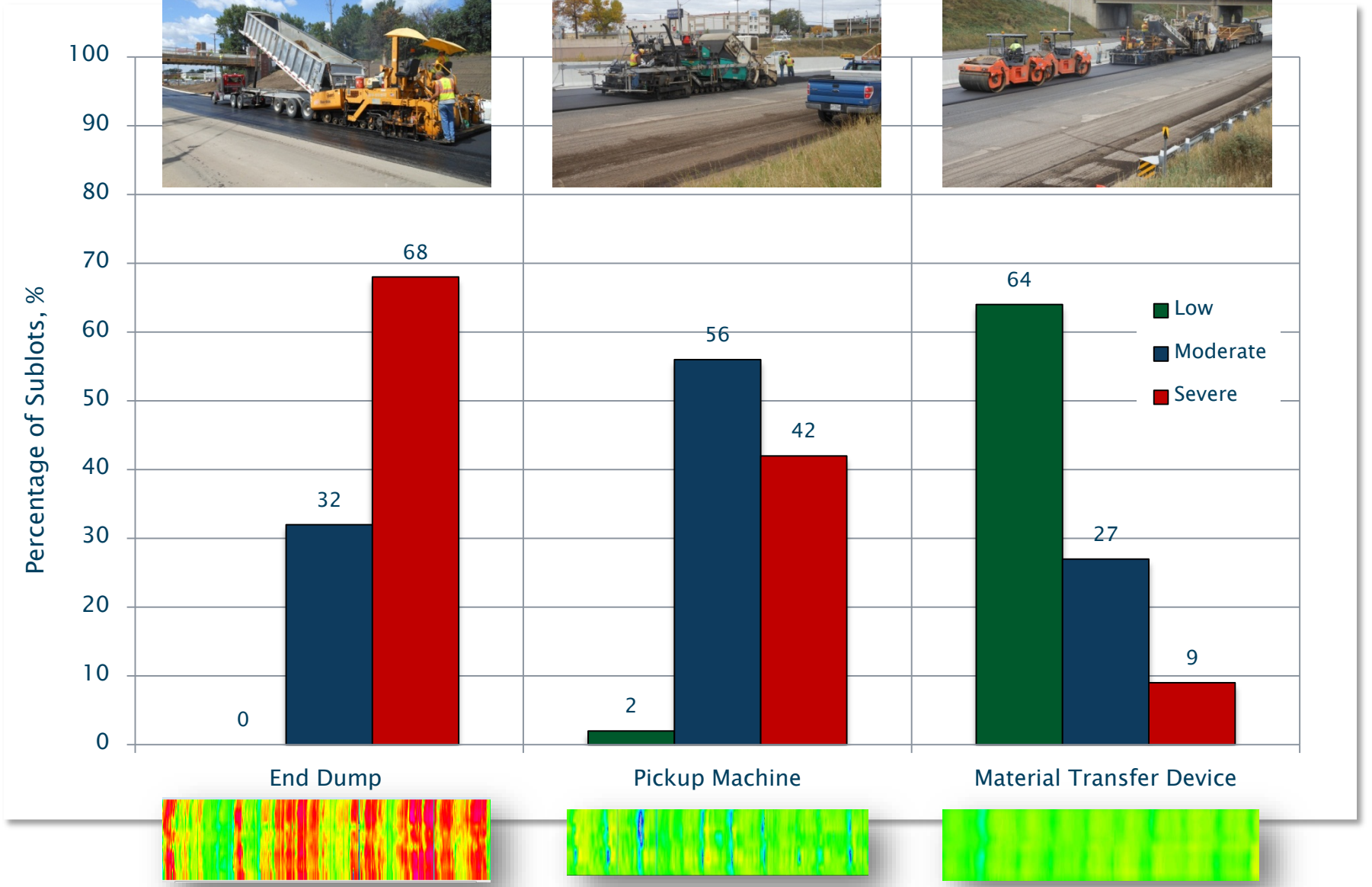
MINNESOTA JUMPS ON BOARD

	IR only	IC only	BOTH
2010	2		
2011			1
2012			1
2013	9		2
2014*	12	2	8
2015	8	2	14
2016	13		21

2010 – 2013, Projects done by Supplemental Agreement

* AASHTO Standards Published

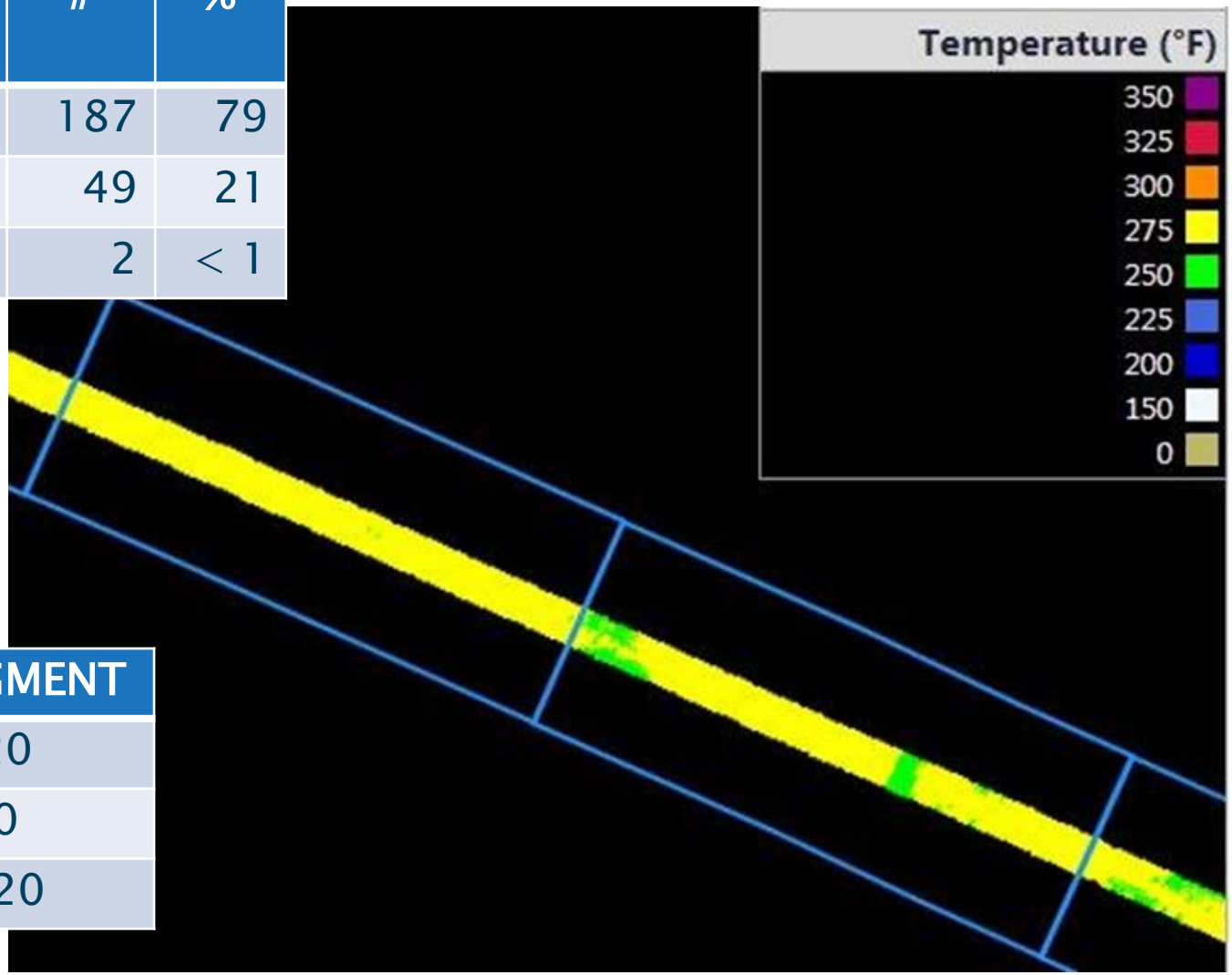
MnDOT's Plan is 100% IMPLEMENTATION ON PROJECTS GREATER THAN 6 LANE MILES BY 2018 SEASON


Percentage of Sublots, %
100
90
80
70
60
50
40
30
20
10
0
0
32
68
2
56
42
64
27
9
Low
Moderate
Severe
End Dump
Pickup Machine
Material Transfer Device

RESULTS FROM LAST WEEK

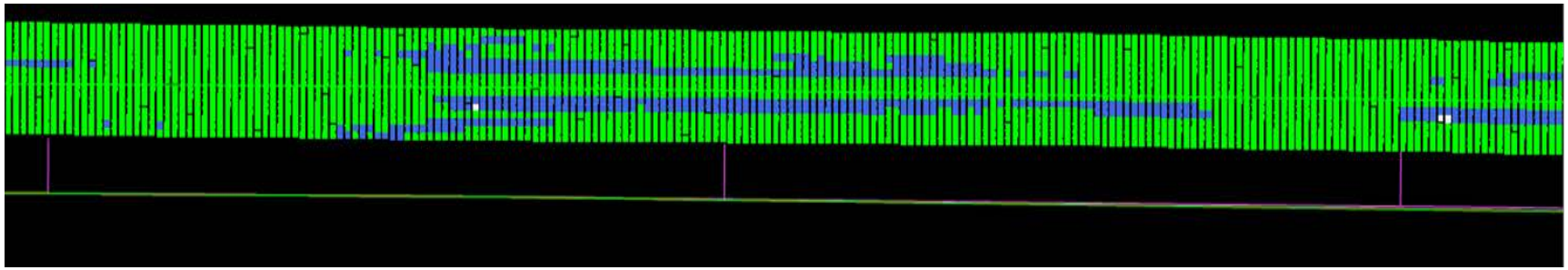
150' SEGMENTS	#	%
Low	187	79
Medium	49	21
Severe	2	< 1

6.8 MILES OF PAVING

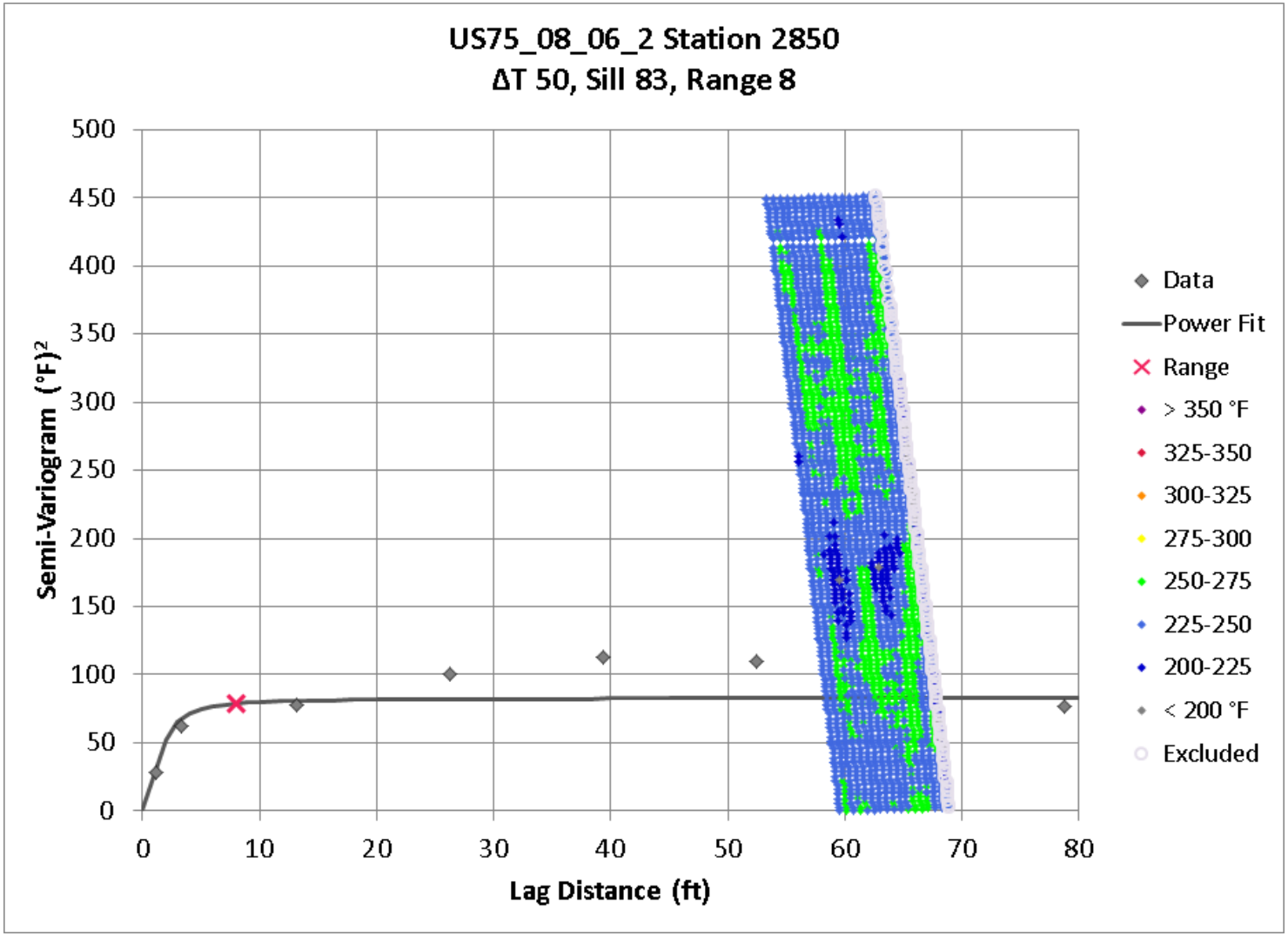


	$/SEGMENT
Low	20
Med	0
Severe	-20

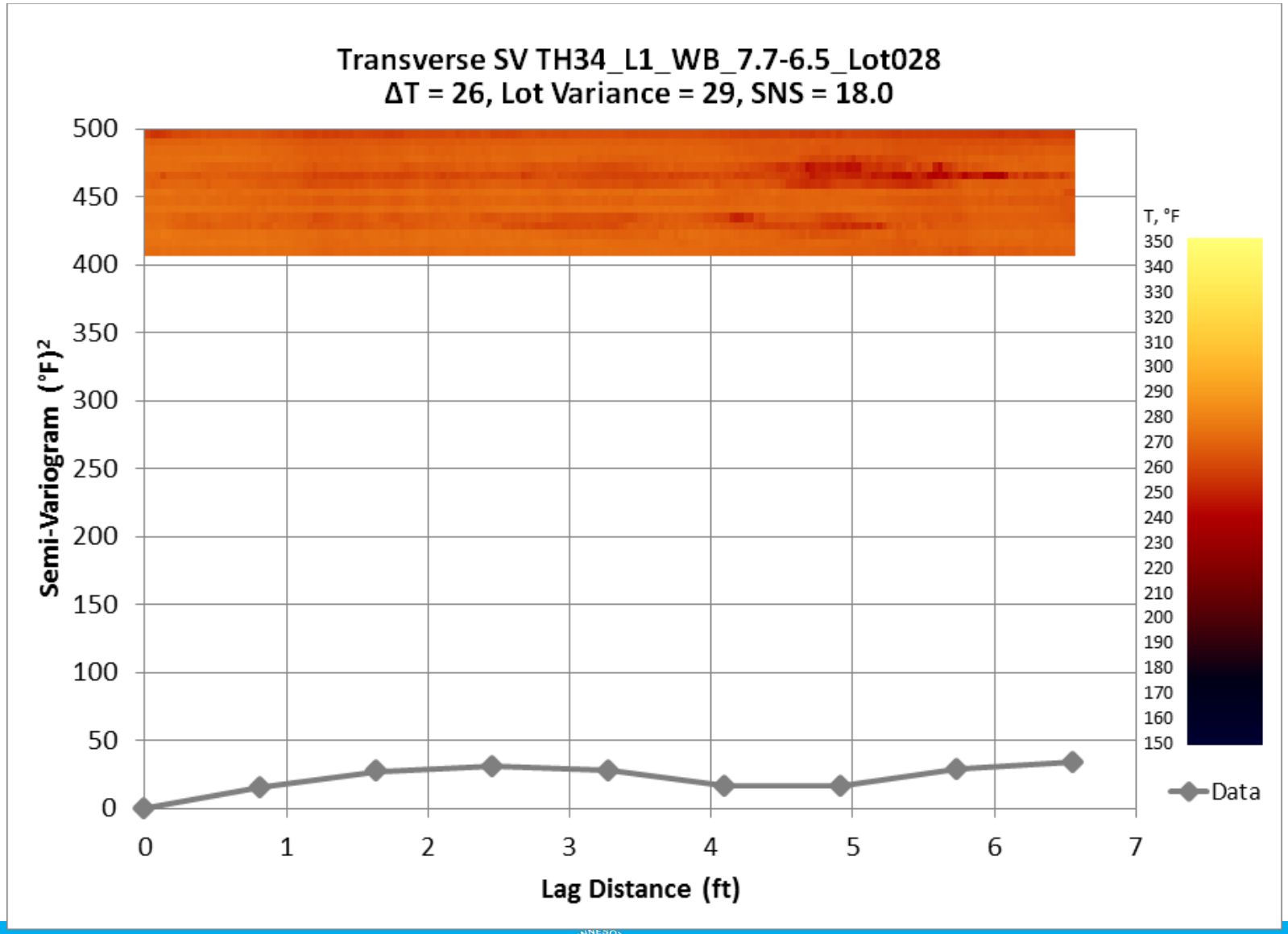
Not what we want!



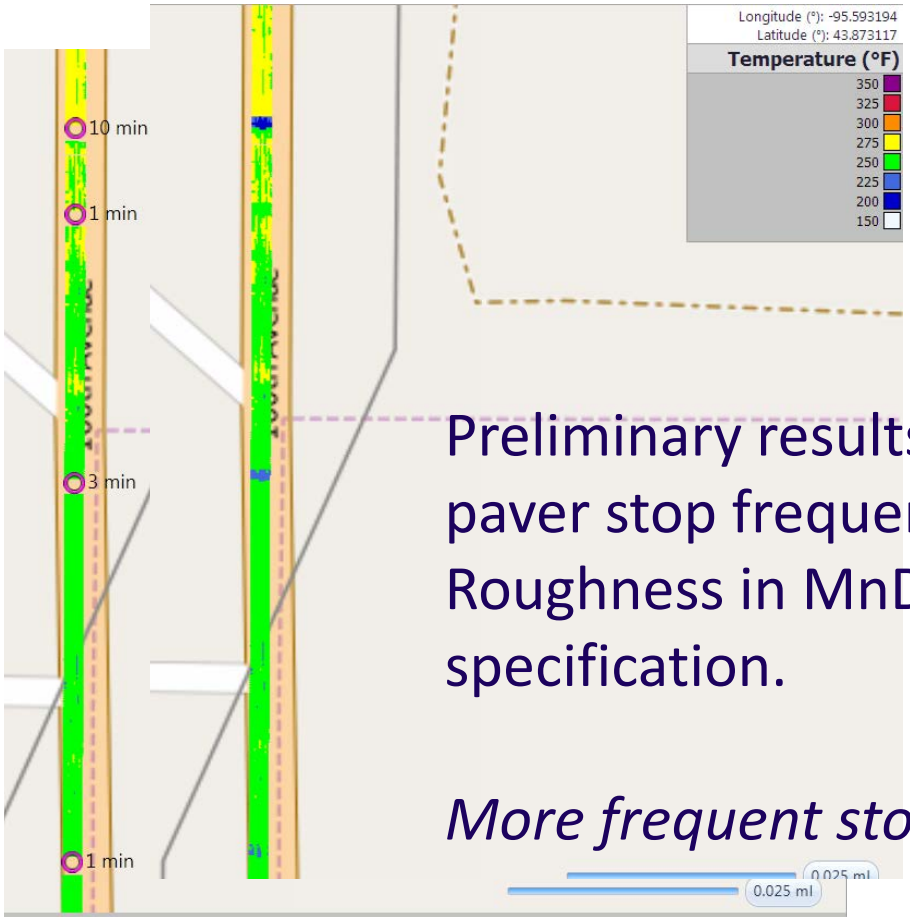
Semi-Variogram



Semi – Variogram Transverse



PAVER STOPS

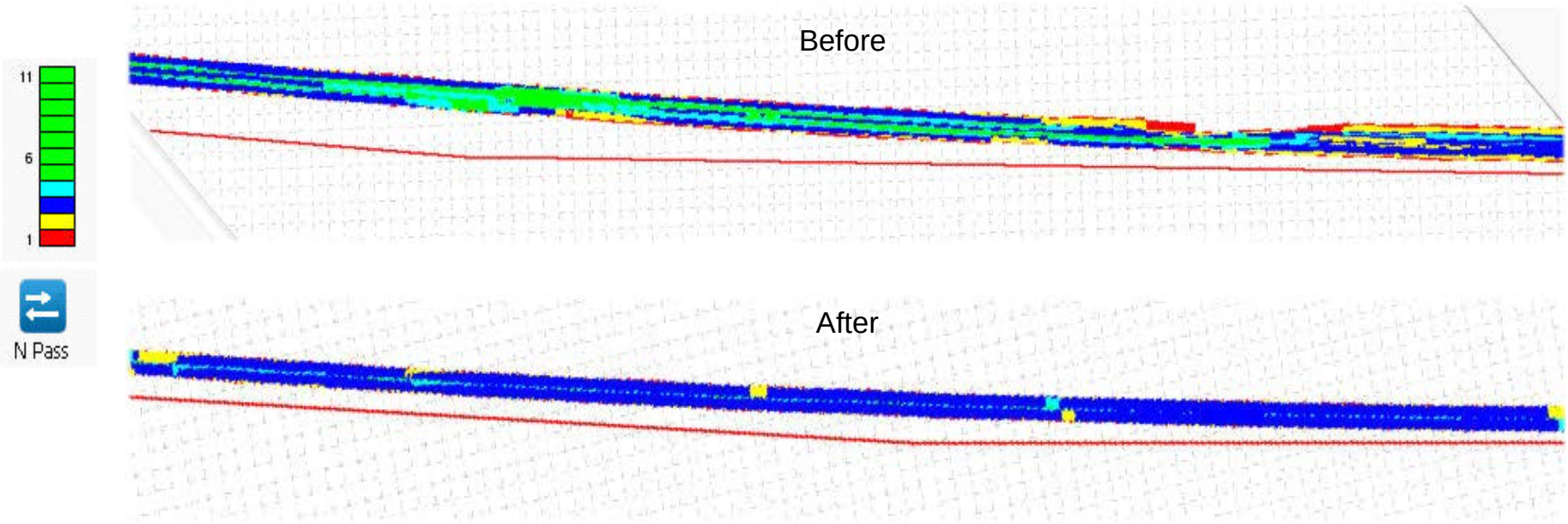


- Stop excluding ?
- Deduct for each ?
- Incorporate ProVal into Veta..future

Preliminary results show direct correlation of paver stop frequency and Areas of Localized Roughness in MnDOT's IRI based smoothness specification.

More frequent stops = higher ALR = Deducts

Intelligent Compaction – Rolling Patterns

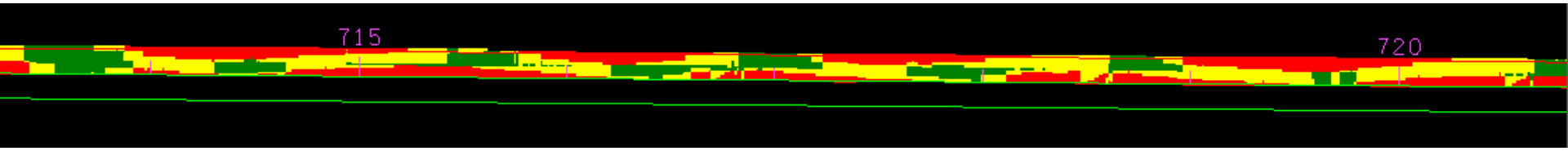


Less Compaction by Breakdown Roller & Cooler Compaction Temp.

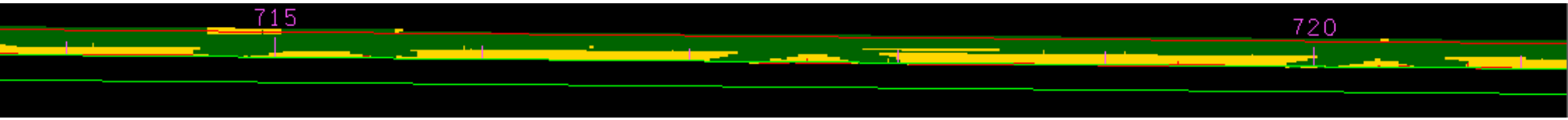
May 8, 2015

Density Deduction = ($9,405.25)

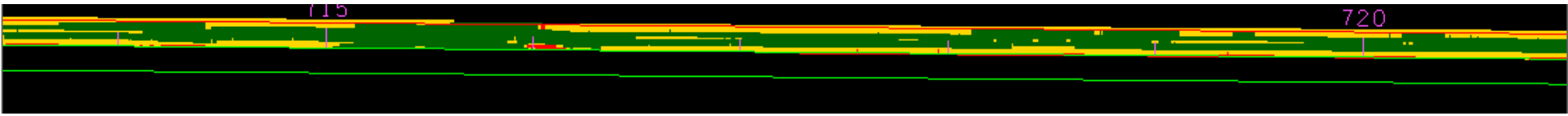
Breakdown (Tmean = 235°F)



Intermediate (Tmean = 185°F)



Finishing (Tmean = 125°F)

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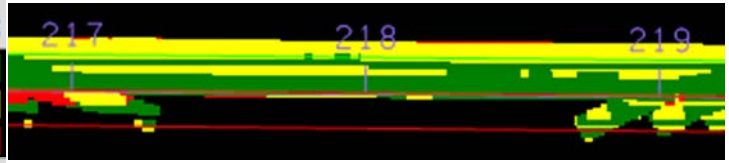
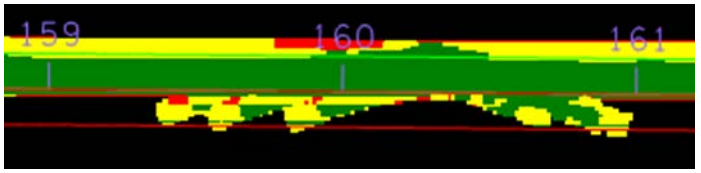
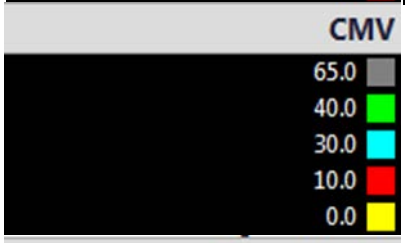
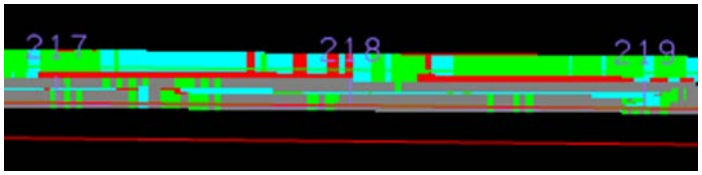
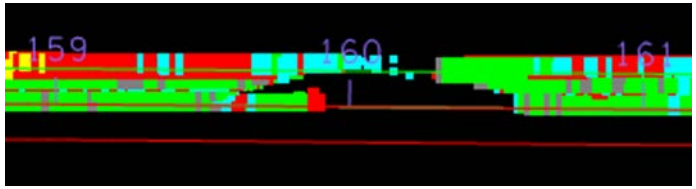
IC Data vs. Cores

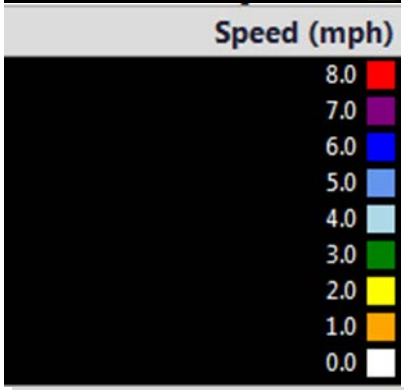


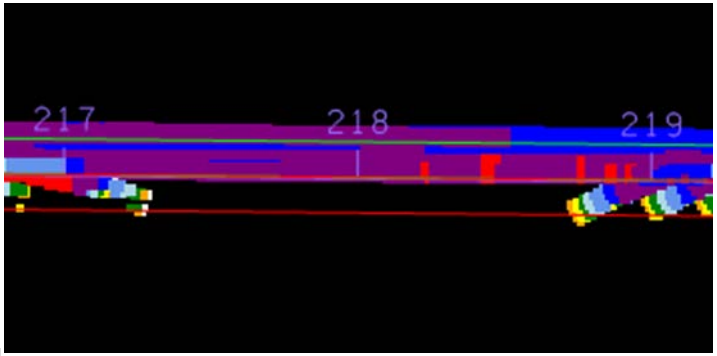


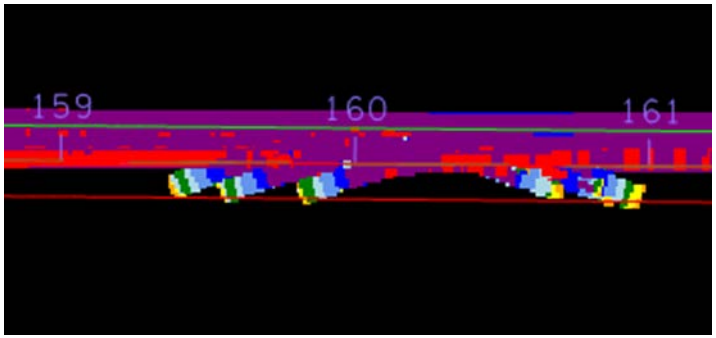


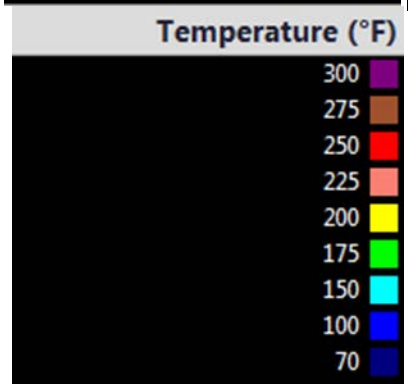


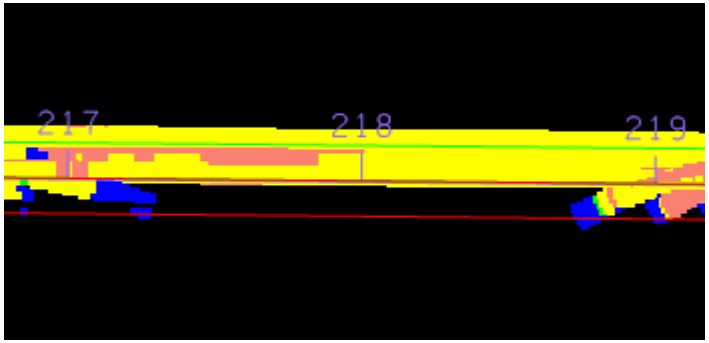


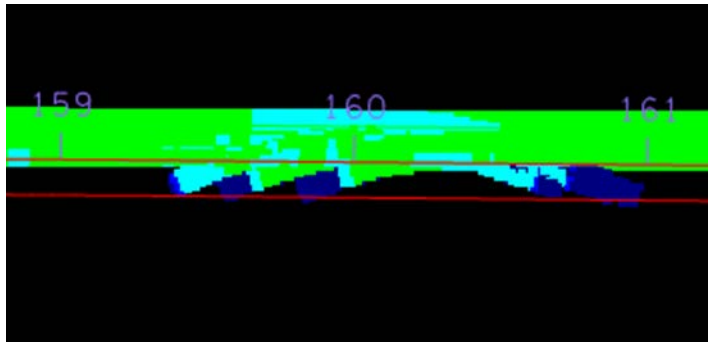




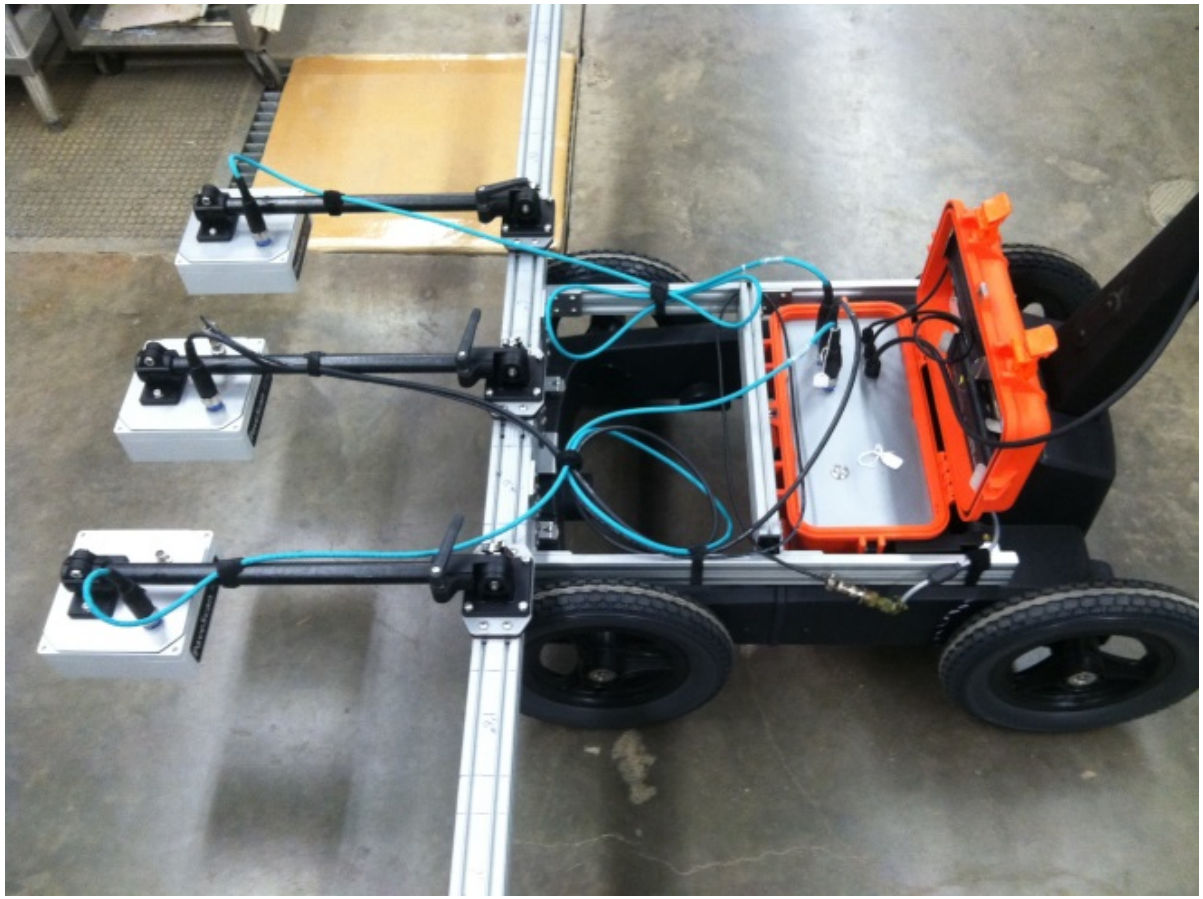




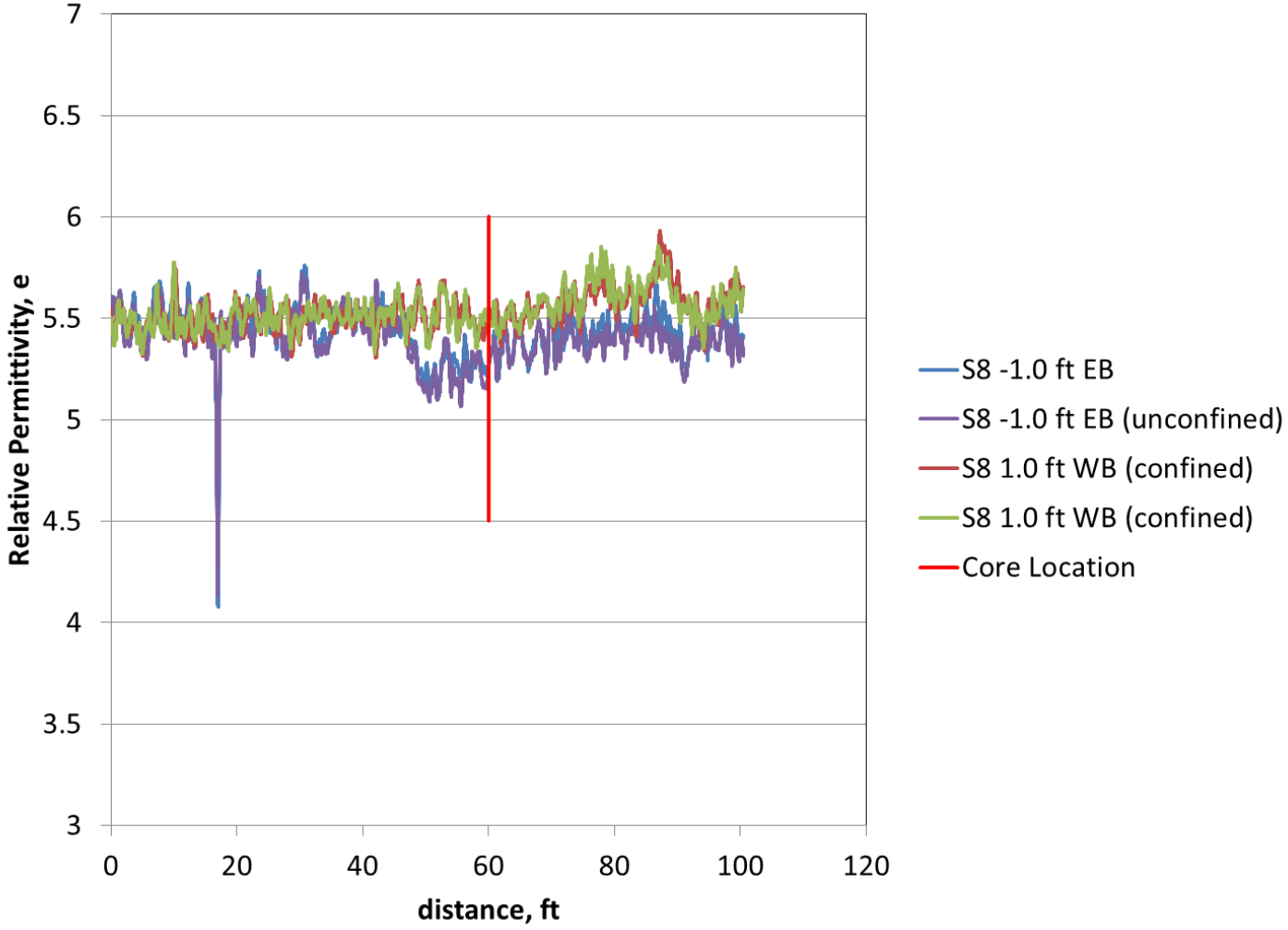




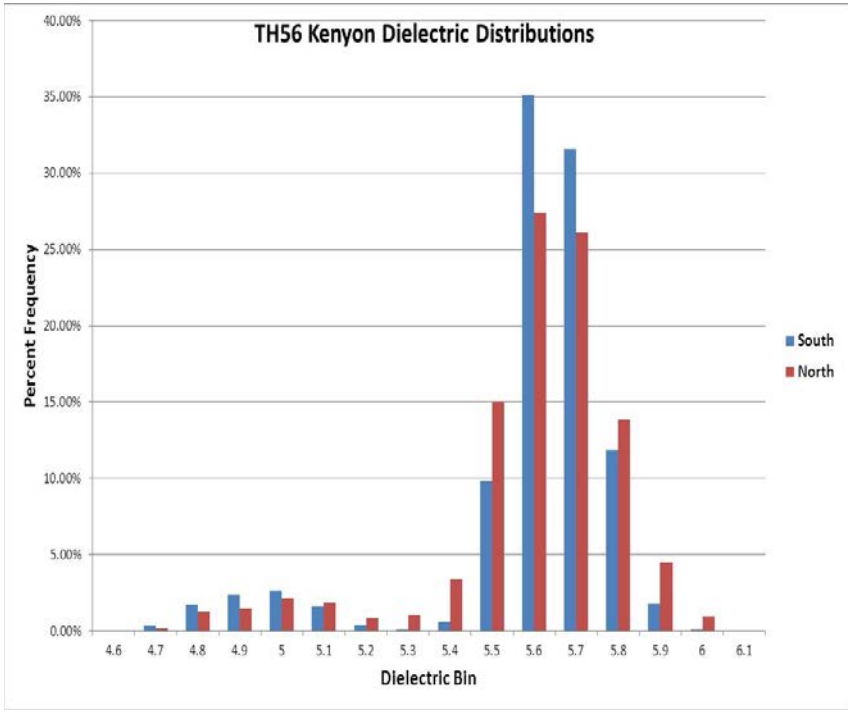
ROLLING DENSITY METER



RDM JOINT ANALYSIS

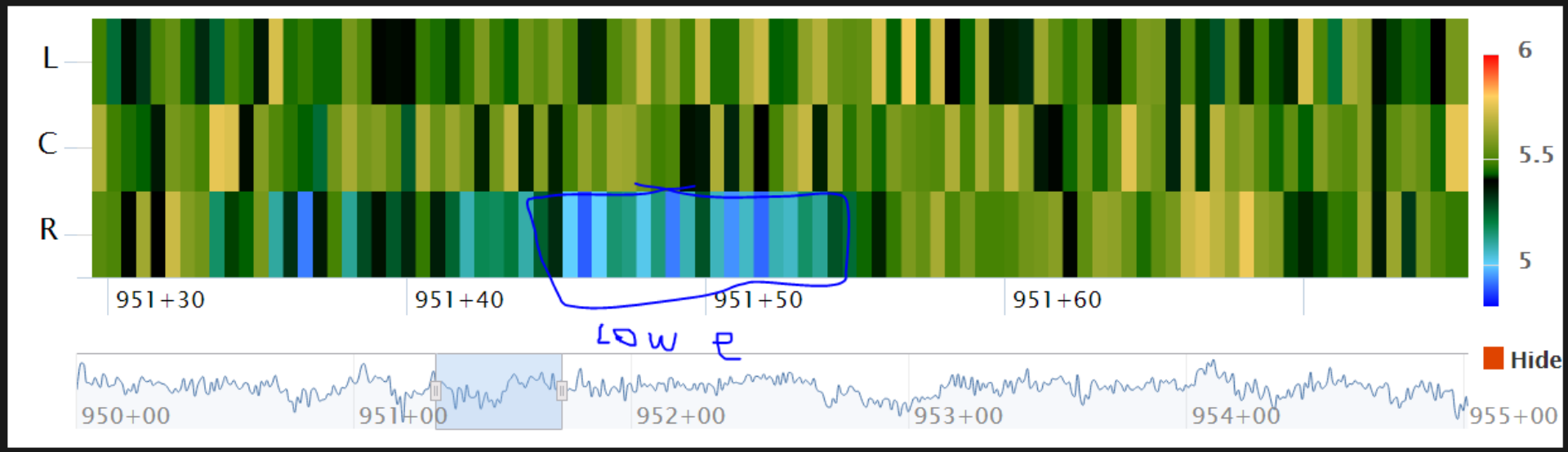


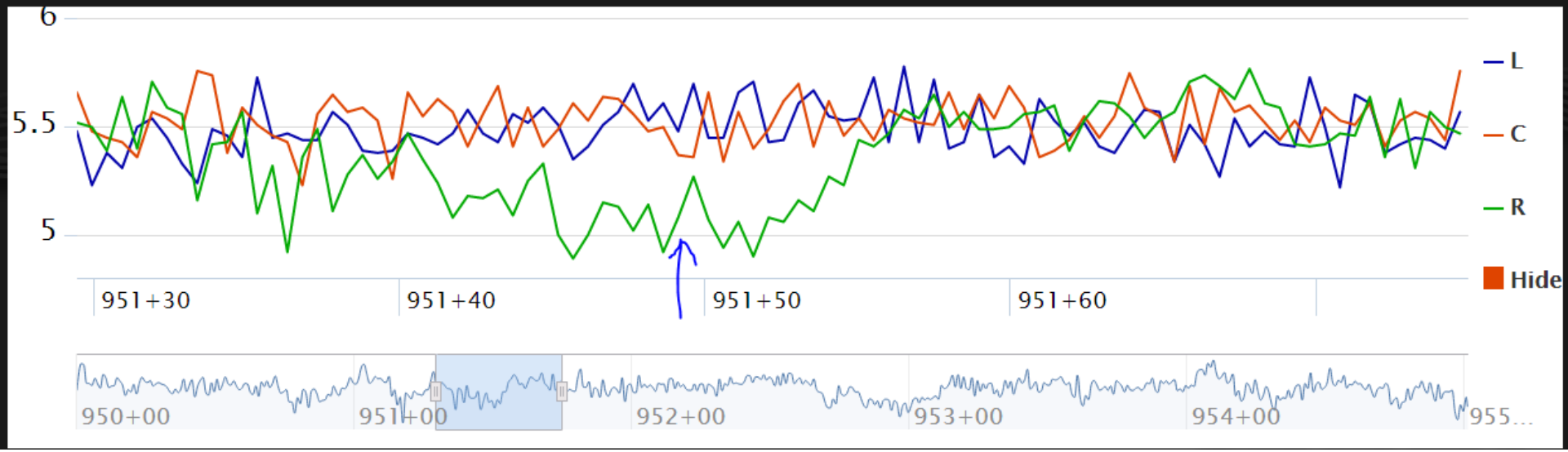
RDM MAT AND JOINT ANALYSIS



JOINT MAINLINE

GSSI ROLLING DENSITY METER



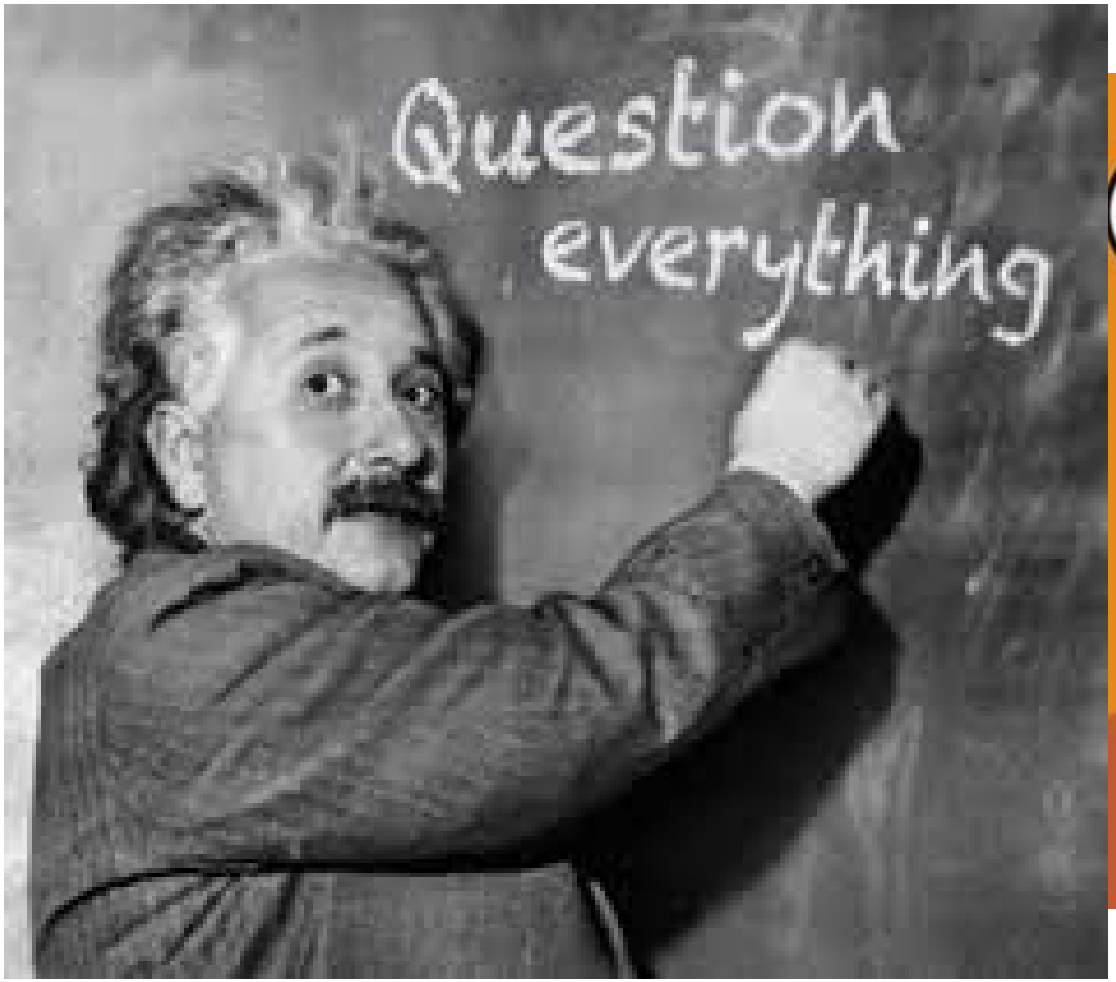


HOW DO YOU HANDLE ALL THIS DATA?

TPF-5 (334) Enhancements to Veta: California, Connecticut, Georgia, Maine Missouri, Oregon, Pennsylvania and Minnesota

What's the future for ~~IR~~?
PAVER MOUNTED THERMAL PROFILING

- Re-examine High vs Low temperature per Lot
- Paver stop data is available, how to best use
- Continue to develop Veta
- Upgrade of phone connection 2G is not OK
- Upgrade GPS accuracy on system. All other equipment is much more accurate
- Data speed can be an issue, we pave fast in the United States – Don't use on a Novachip spray paver.


Question
everything


Trying is
the first step
towards failure.