



**KNIK
CONSTRUCTION**

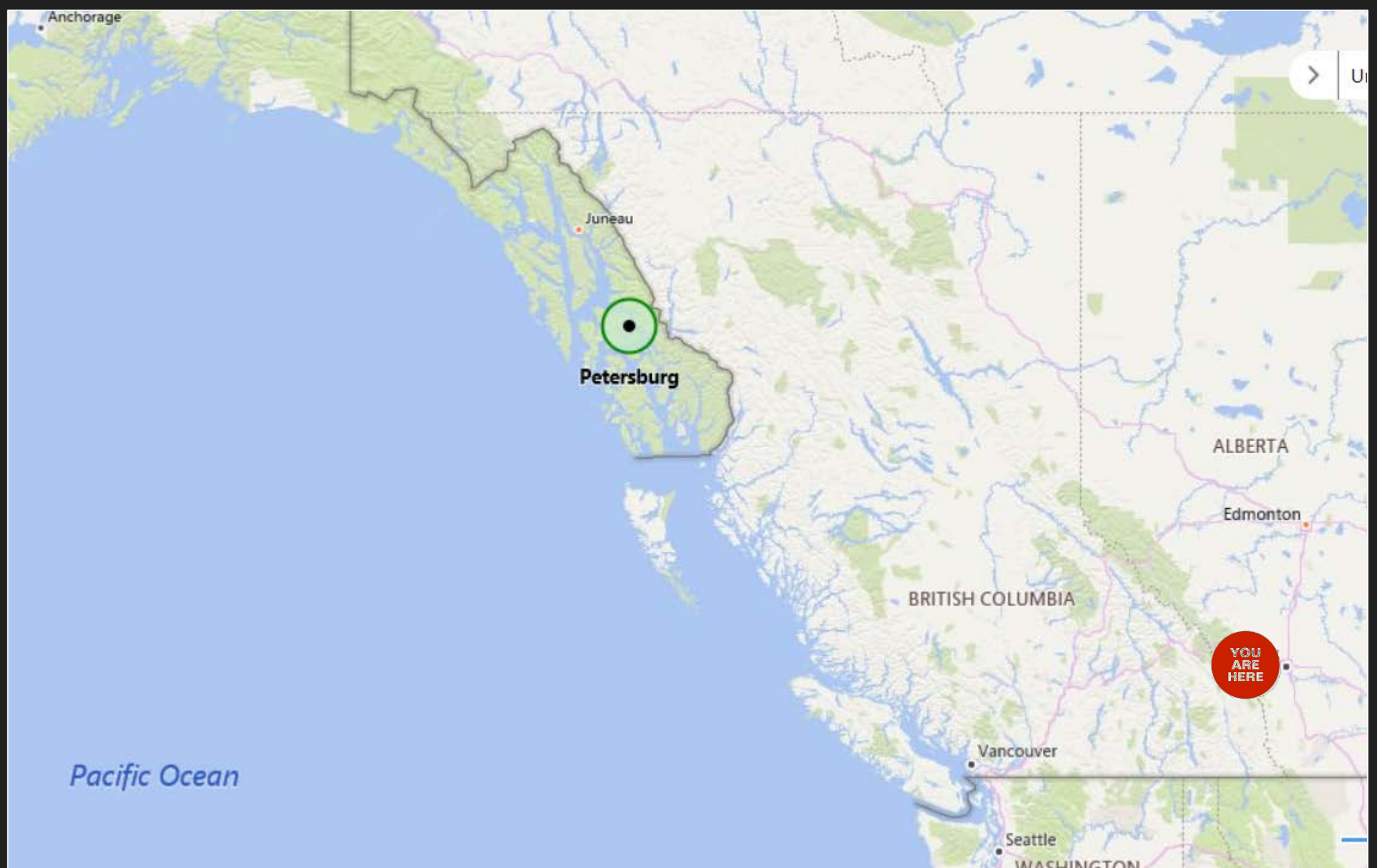
IT'S NOT THE ASPHALT IT'S YOUR FAULT

Use of Innovative
Paving Practices to
Achieve Excellent
Pavement Density

OVERVIEW

- Project location and background
- Successful use of innovative technologies – and how
- Results





Shop/Parts Cans

Truck Boxes



Asphalt Cement
(~25 metric ton cubes)

Asphalt Plant Pieces

18 Man Camp





PETERSBURG AIRPORT TAXIWAY AND APRON REHABILITATION

- Original apron construction: 1987
- Original taxiway construction: 1981

ASPHALT CRUSHING AND MARSHALL MIX DESIGN

MIXTURE AT OPTIMUM

	MARSHALL		REQUIREMENTS
ASPHALT CONTENT %	5.1	★	5.0 MIN
UNIT MASS-PCF	153.0		
VOIDS FILLED-%VFA	81		
VOIDS TOTAL MIX-%VTM	2.8	★	2.8 - 4.2
VOIDS MIN AGG-%VMA	14.5	★	13.0 MIN
STABILITY-LBS	3200		2150
FLOW-IN	13		10 - 14
MAXIMUM SPG Gmm	2.528		
MAX UNIT MASS-PCF	157.4		
DUST / ASPHALT RATIO	1.5		
NUMBER OF BLOWS	75		75



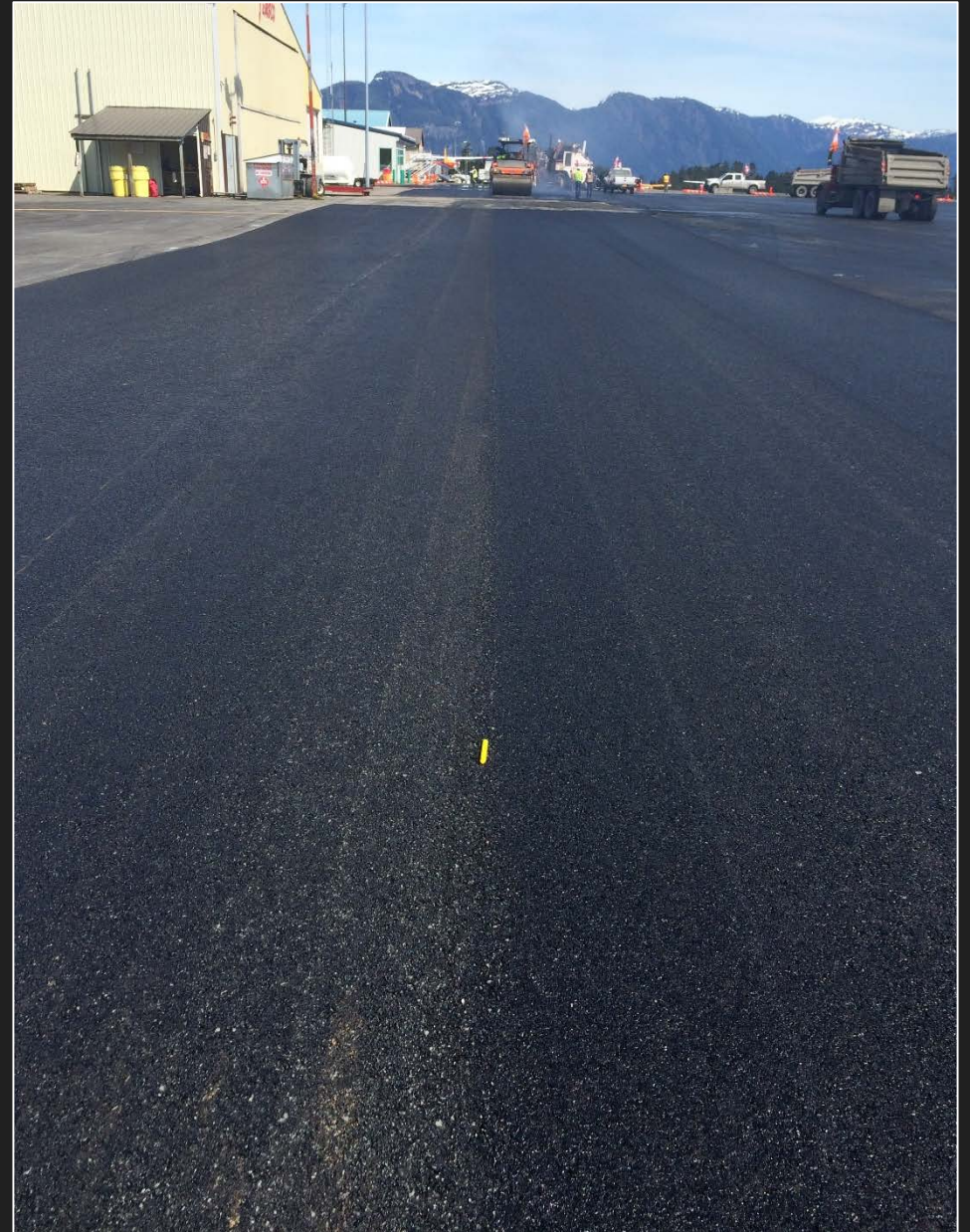


INFRARED JOINT HEATER

Heat Design Equipment

BACKGROUND

- Project originally specified echelon paving – impractical for apron and taxiway
- Good joints most critical
- “Cold” joint spec required cutting
- Poor agency definition of cold joint for modified asphalt – 160 degrees F (71 degrees C)



EQUIPMENT AND COST TO RUN



- Heat Design Equipment: JMH 500-PA 500,000 BTU Joint Heater
- Runs off liquid propane – 1 to 2 tanks per shift in Petersburg (low setting)

Cost Comparison per meter
Cutting/Milling vs. Joint Heater

Cutting	Cutting	Joint Heater
Labor plus Joint Adhesive	Waste Asphalt (Agency)	Propane
\$2.79	\$2.95	\$0.39

INFRARED DATA

White = degrees F

Black = degrees C



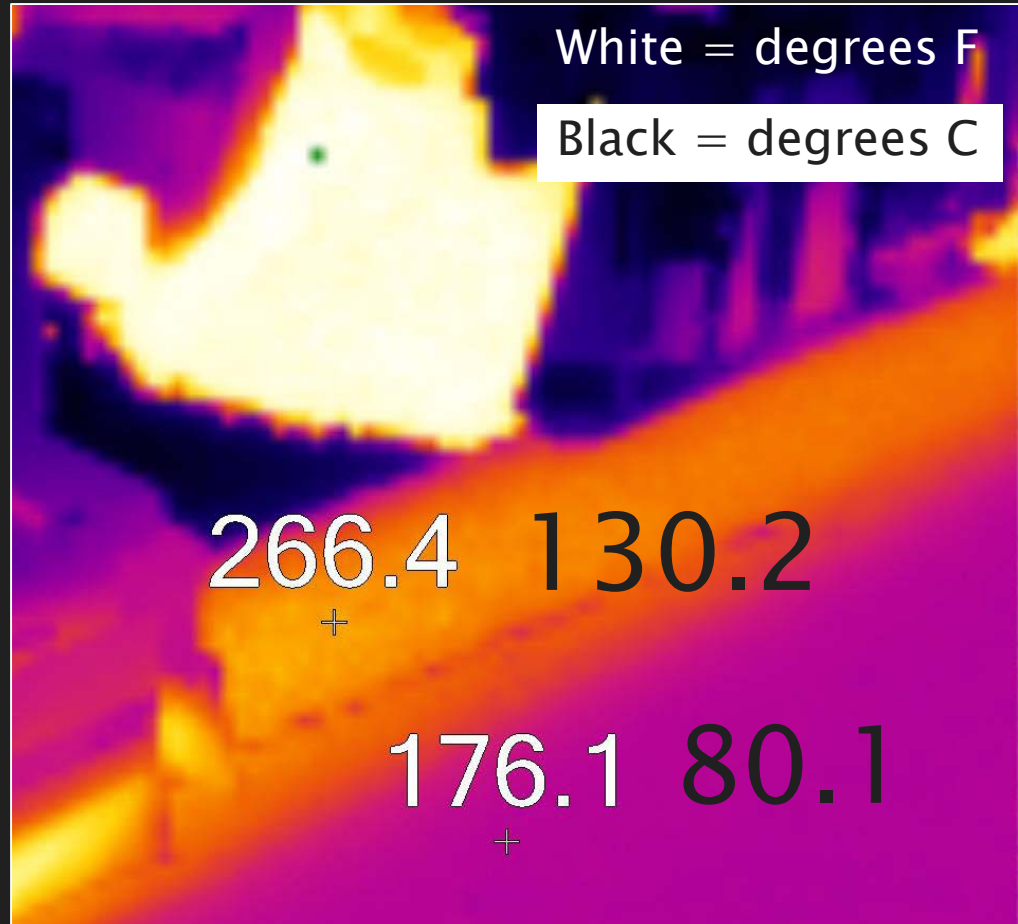
Core I.D.	Joint Density (% MSG)	Corresponding Mat Density (% MSG)
HMA 6	90.9	94
HMA 7	93.9	93
HMA 8	93.3	94
HMA 9	94.4	96
HMA 10	93.9	95
HMA 11	91.5	93
HMA 19	92.9	96
HMA 20	94.7	95
HMA 21	94.6	93
HMA 22	94.7	96
HMA 23	93.0	92

**Average
Joint Density:
93.5% MSG**

DENSITY DATA

**Full joint density
bonus received!**

GOOD DENSITY GOOD AESTHETICS (WIN-WIN)



FREQUENTLY ASKED QUESTIONS

Q: Will the joint heater overheat the pavement and prematurely oxidize the asphalt?

A: If it does it's YOUR FAULT!



FREQUENTLY ASKED QUESTIONS

Q: Will I have to slow the paving train down to snail speed to get the temperatures I need?

A: No – Knik average paving speed with joint heater = 8 meters/min

Q: Can the joint heater be used in the rain?

A: ... But should you really be paving in the rain?

Q: What prep work is required on the edge prior to using the joint heater?

A: None – not even for ugly, deformed, traffic rolled edges.



INTELLIGENT COMPACTION

Wirtgen/Hamm

BACKGROUND

- Required per contract
- No acceptance criteria
- Contractor to provide training and data to Agency

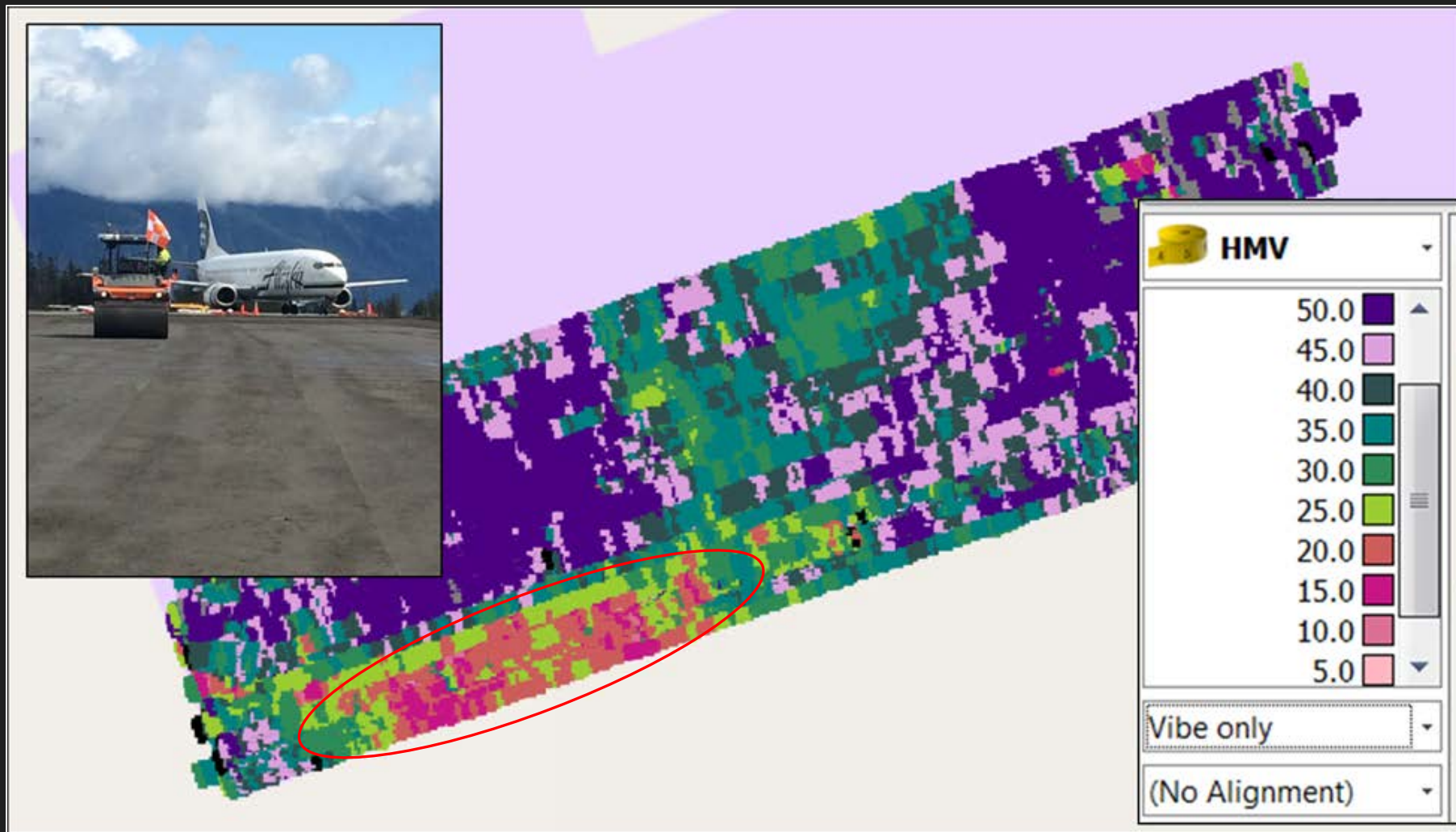


EQUIPMENT AND COST TO RUN

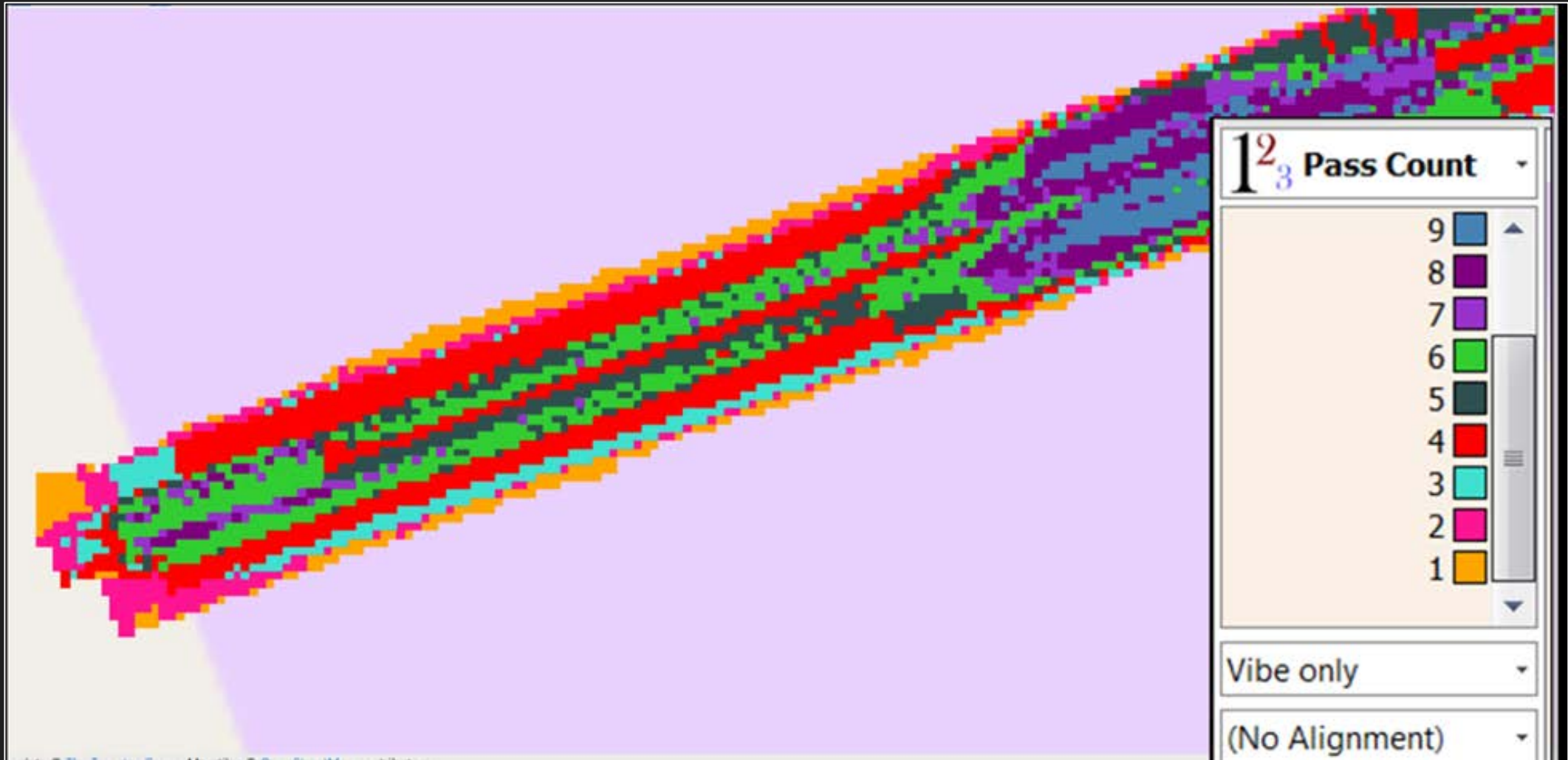


- Wirtgen/HAMM HD + 140 VO IC roller
- Topcon GPS (not standard)
- Knik purchased three rollers in 2013
- No cost to run after equipment is purchased
- Does “tie up” GPS receiver
- Training in less than one day

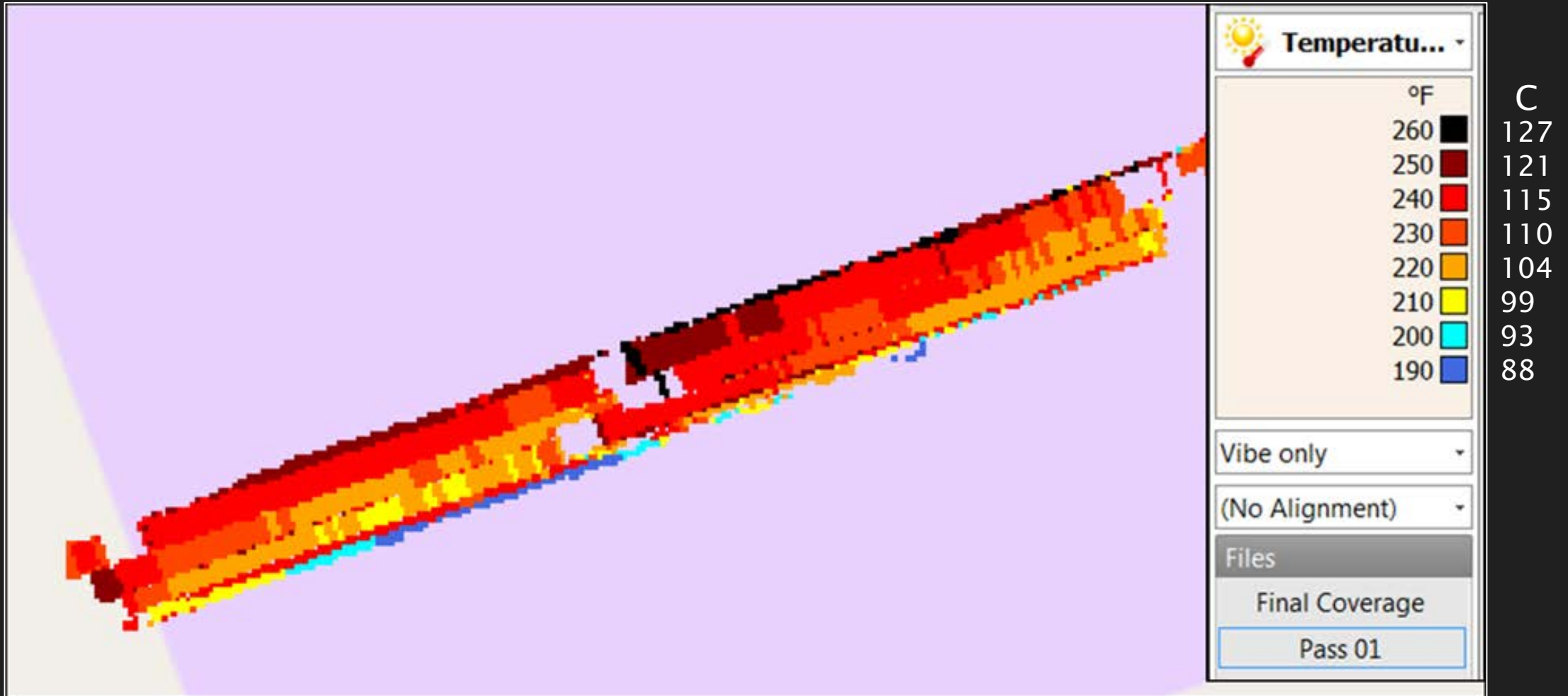
DATA — PRE PAVING MAPPING



DATA — PASS COUNTS



DATA — TEMPERATURE



DATA — DENSITY

Summary	Mat Density
Average (% MSG)	95
Target (% MSG)	95
St. Deviation	1.55
Percent Within Limits	98



Maximum asphalt mat density bonus achieved!

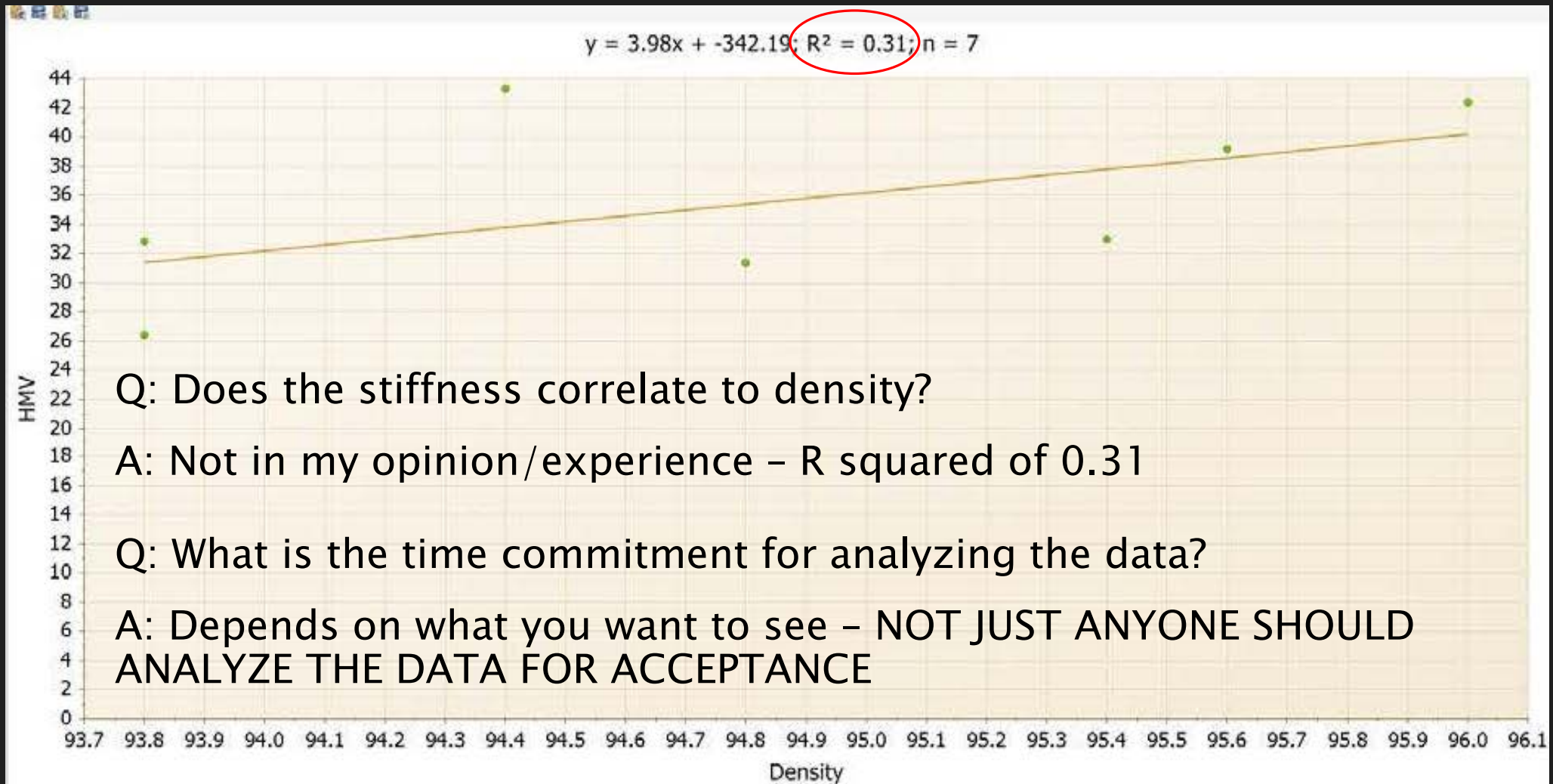
QUOTE FROM THE AGENCY

“[We] noticed little deviation in both mat and joint densities and mix properties (Oil content and Gradation) once Knik’s QC team dialed in on a project. This demonstrates Knik’s QC program is proactive, has good process control and is utilizing both the IC rollers and the QC program to provide the Department with a quality, consistent product.”

– Don Newell, AK DOT &PF

Note: Takes the technology AND a good QC program – if you aren’t getting the benefits of your technology it’s YOUR FAULT

FREQUENTLY ASKED QUESTIONS



FREQUENTLY ASKED QUESTIONS

Q: What are the benefits of intelligent compaction

A: In my (contractor's) opinion:

1. Real time data – no guess work for operator
2. Trouble shooting – Not happy with density? What were breakdown temps, speed of roller, amplitude, frequency?
3. Guarantee of coverage and temperatures to agency
4. Pre-paving mapping – especially if another contractor built the grade
5. Training tool for less than desirable roller operators
6. Remember – you get out of it what you put into it



MATERIAL TRANSFER VEHICLE

Roadtec Shuttle Buggy
SB-25000

BACKGROUND

- Required per contract (all Alaska airport contracts require MTV)
- Knik uses MTV on all significant paving projects regardless of requirement
- Proven to be best tool for anti-segregation



EQUIPMENT AND COST TO RUN



- Roadtec SB-25000
- Does require one additional crew member to operate
- One more piece of equipment to fuel and move
- Best tool for anti-segregation
- 25 ton surge capacity
- Less stopping the paver
- Mobile – not attached to paver – ideal for difficult dumping locations

DATA — TEMPERATURE

White = degrees F

Black = degrees C



DATA — AGGREGATE

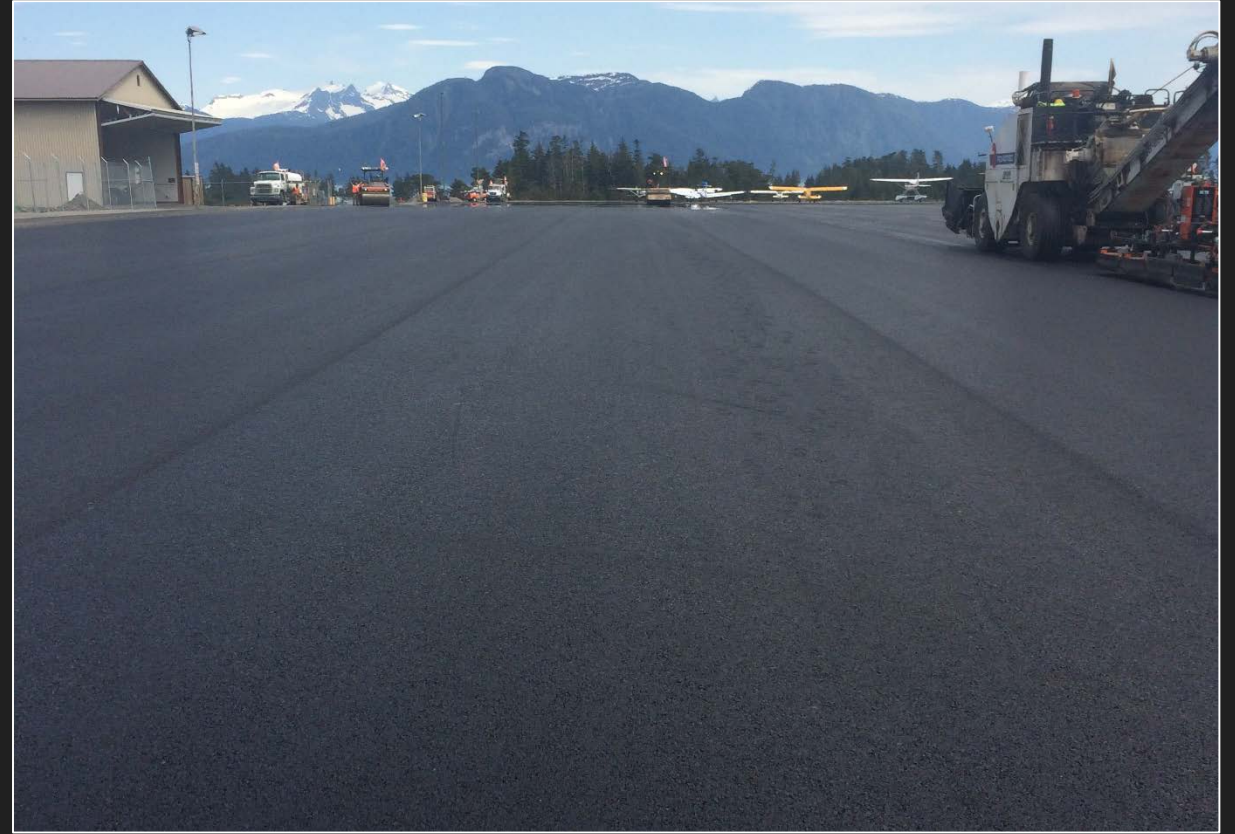
Summary	3/4" 19.0 mm	1/2" 12.5 mm	3/8" 9.5 mm	#4 4.75 mm	#8 2.36 mm	#16 1.18 mm	#30 0.60 mm	#50 0.30 mm	#100 0.15 mm	#200 0.075 mm
Average	100	90	77	49	32	21	16	12	10	7.4
Job Mix Formula	100	89	76	49	33	23	17	13	10	7.0
St. Deviation	0.00	2.56	2.79	2.52	1.19	0.85	0.64	0.49	0.51	0.38
Percent Within Limits	100	98	98	99	100	100	100	100	100	100

Maximum asphalt mix composition bonus achieved!

FREQUENTLY ASKED QUESTIONS

Q: Why always use a MTV?

A: Nearly eliminates segregation in the mat





WARM MIX ADDITIVE (COMPACTION AID AND ANTI-STRIP)

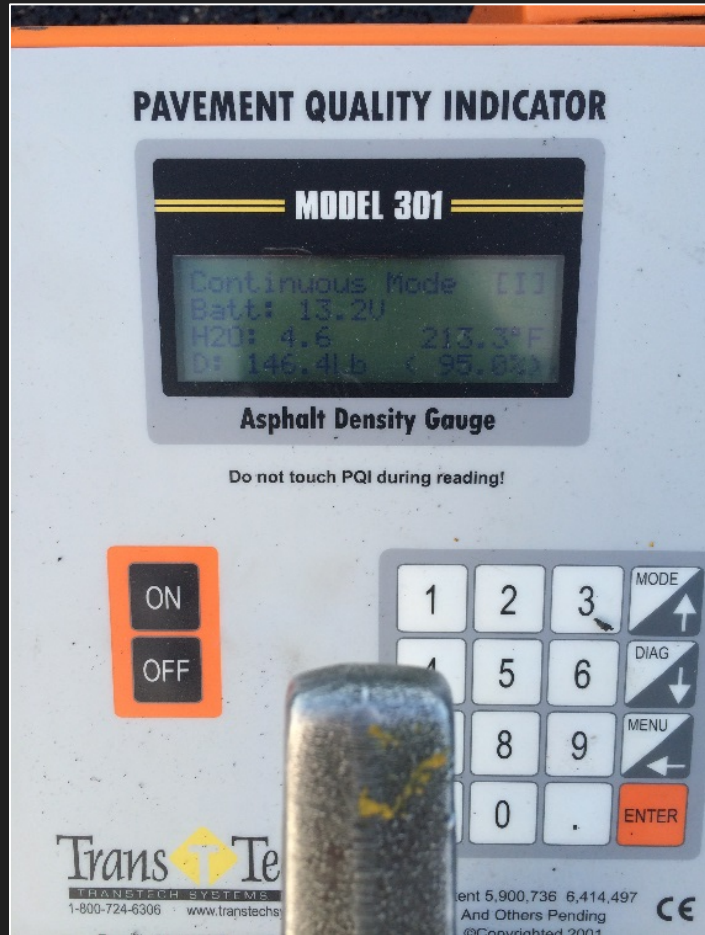
Evotherm 3G

BACKGROUND

- Added at 0.3% per weight of asphalt as anti-strip and compaction aid
- Added at terminal
- Slight reduction in temperatures at hot plant



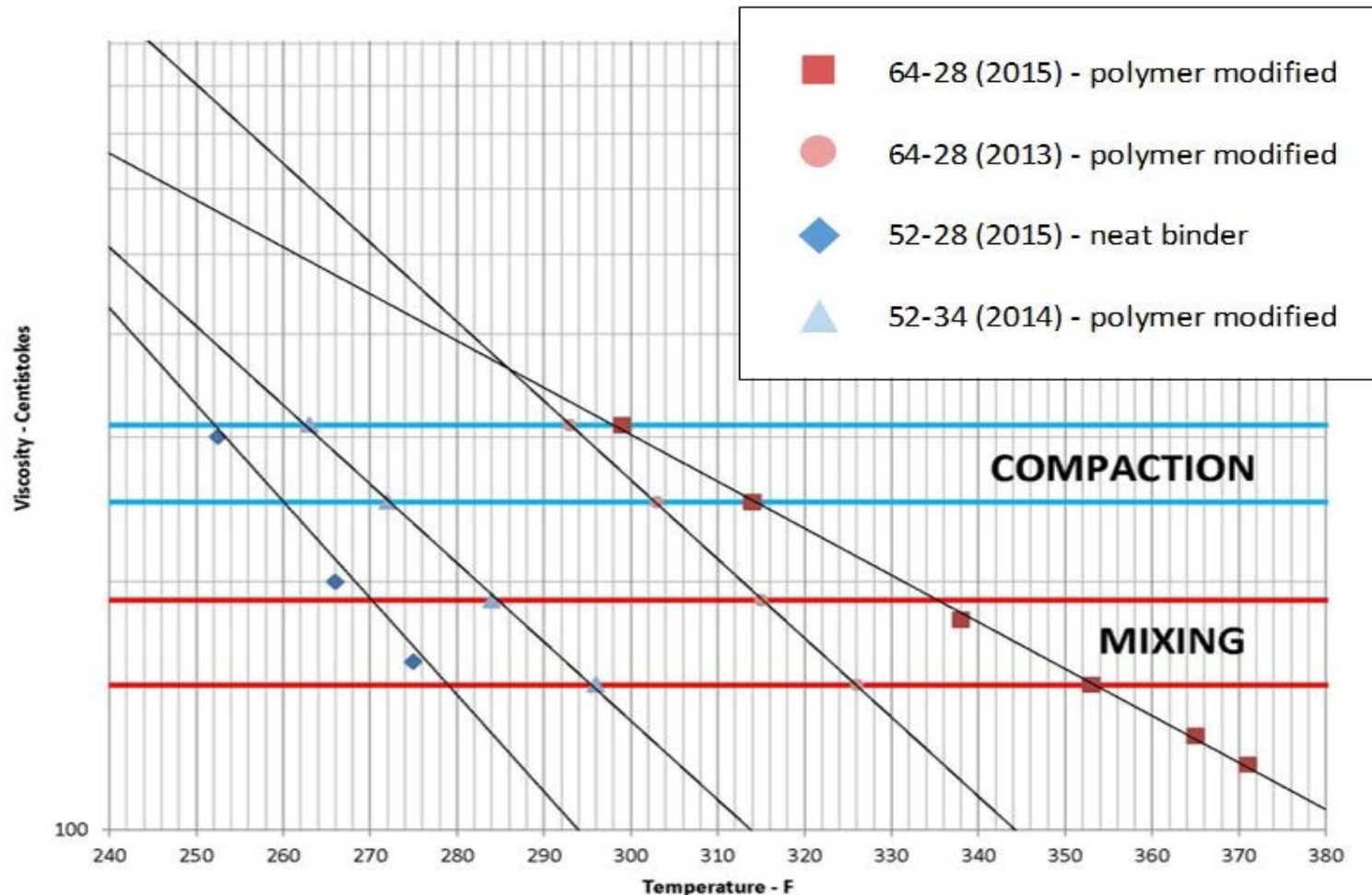
EQUIPMENT AND COST TO RUN



- Evotherm 3G
- Slightly higher price than typically used anti-strip
- Added at terminal – no need for additional equipment at hot plant
- Benefit in compaction aid and density related bonuses
- Benefit with difficult to compact modified binder

TYPICAL ALASKA BINDERS

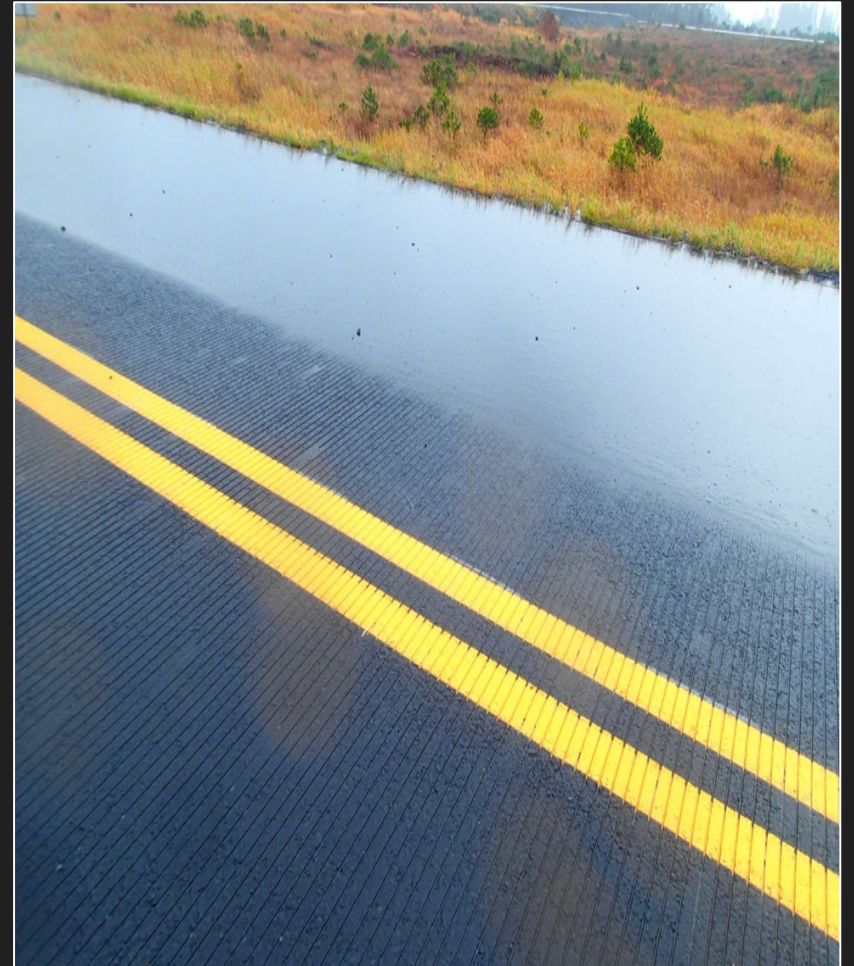
Cost of fuel in Petersburg
\$6.00 per metric ton!



Process	Lab (mix design) Temp F (C)	Field (construction) Temp F (C)
Mixing	325 (163)	300-310 (148-154)
Compaction	305 (152)	260-280 (127-138)

No issues with compaction
(two double drum rollers)
No issues with mixing

FINISHED PRODUCT TAXIWAY



FINISHED PRODUCT APRON



FINAL NUMBERS

- Contract Amount: \$2,987,200
 - (originally bid to echelon pave – two crews and two sets of equipment)
- Final Project Amount: \$2,855,000
- Total Bonus for quality: ~ \$100,000
- Completed under budget (Agency and Contractor)
- Completed ahead of schedule
- No delays to Alaska Airlines

