SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Eastern Federal Lands' Perspective on Deploying Infrared Thermal Imaging for Asphalt Pavement Quality Control

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U.S. Department of Transportation
Federal Highway Administration

USDOT, Federal Highway Administration
Office of Federal Lands Highway

American Association of State Highway and Transportation Officials
AASHTO

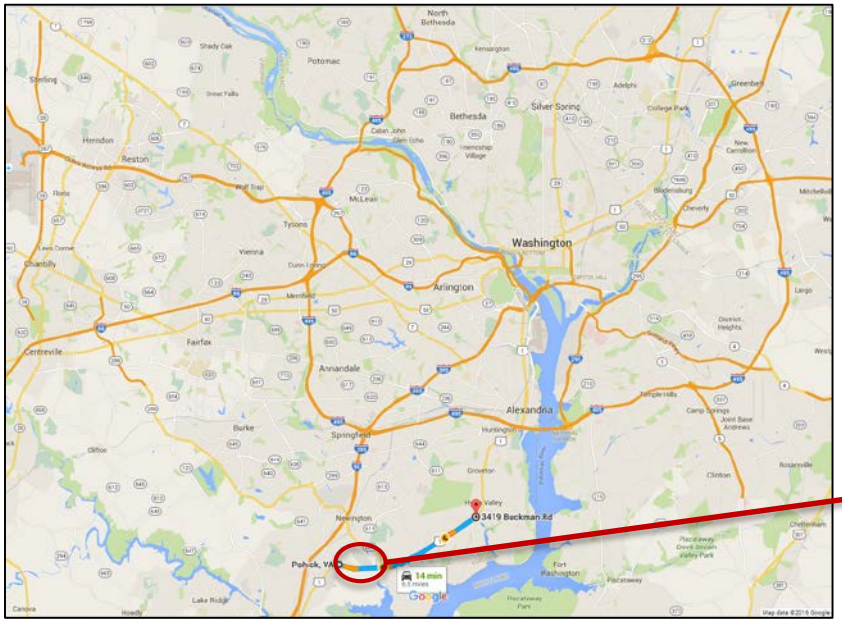
Overview

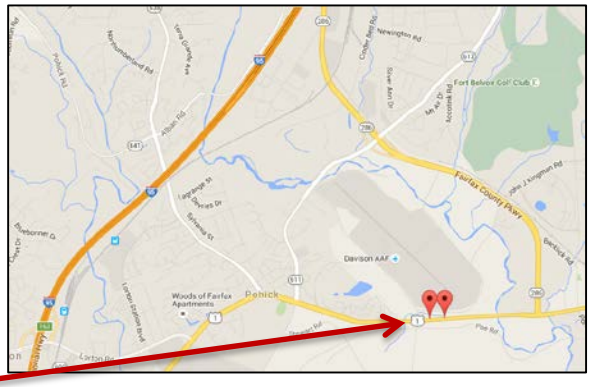
- Project Info
- Typical Results
- EFL's Experience
- EFL's Perspective
- Deployment Hurdles
- Anticipated Benefits

Project Location

Project Location

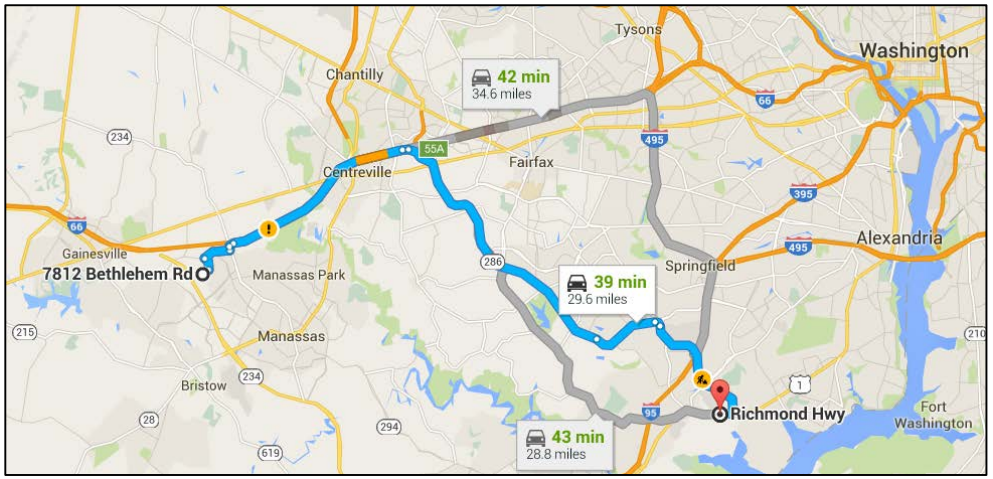
(Newington, VA)





Plant Location

(45 – 120 minute hauls)



Project Info

General contractor:

Corman-Wagman (a joint venture)

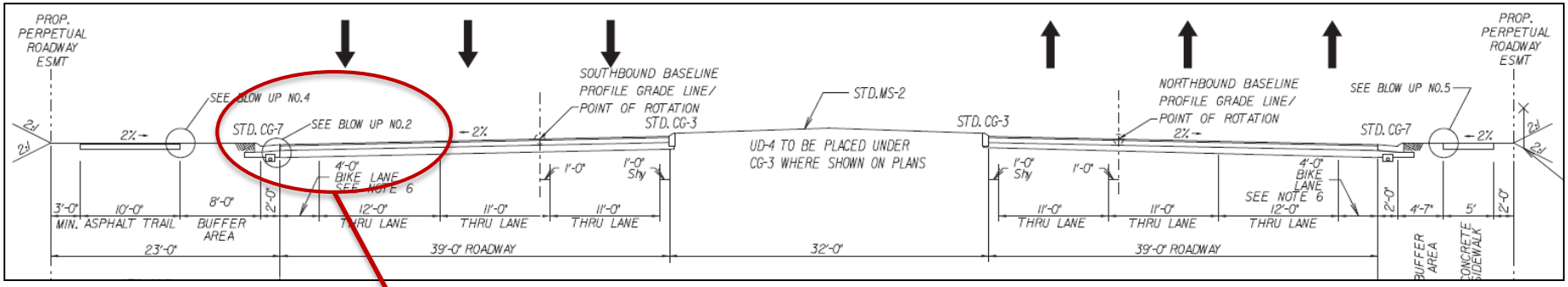
Paving subcontractor:

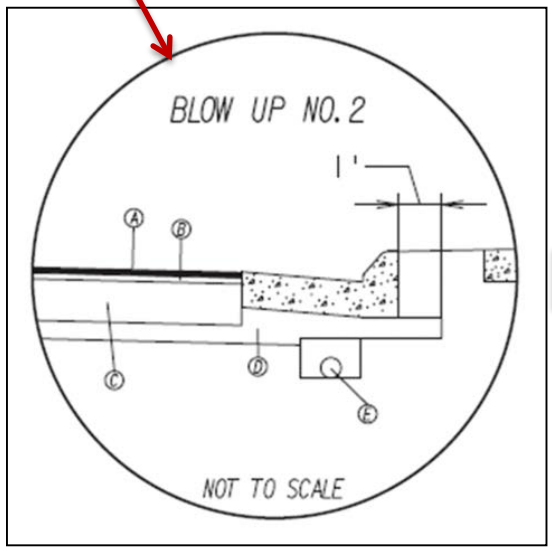
Branscome Paving

Design-Build with VDOT design specs

Project Info

IR pavement section:





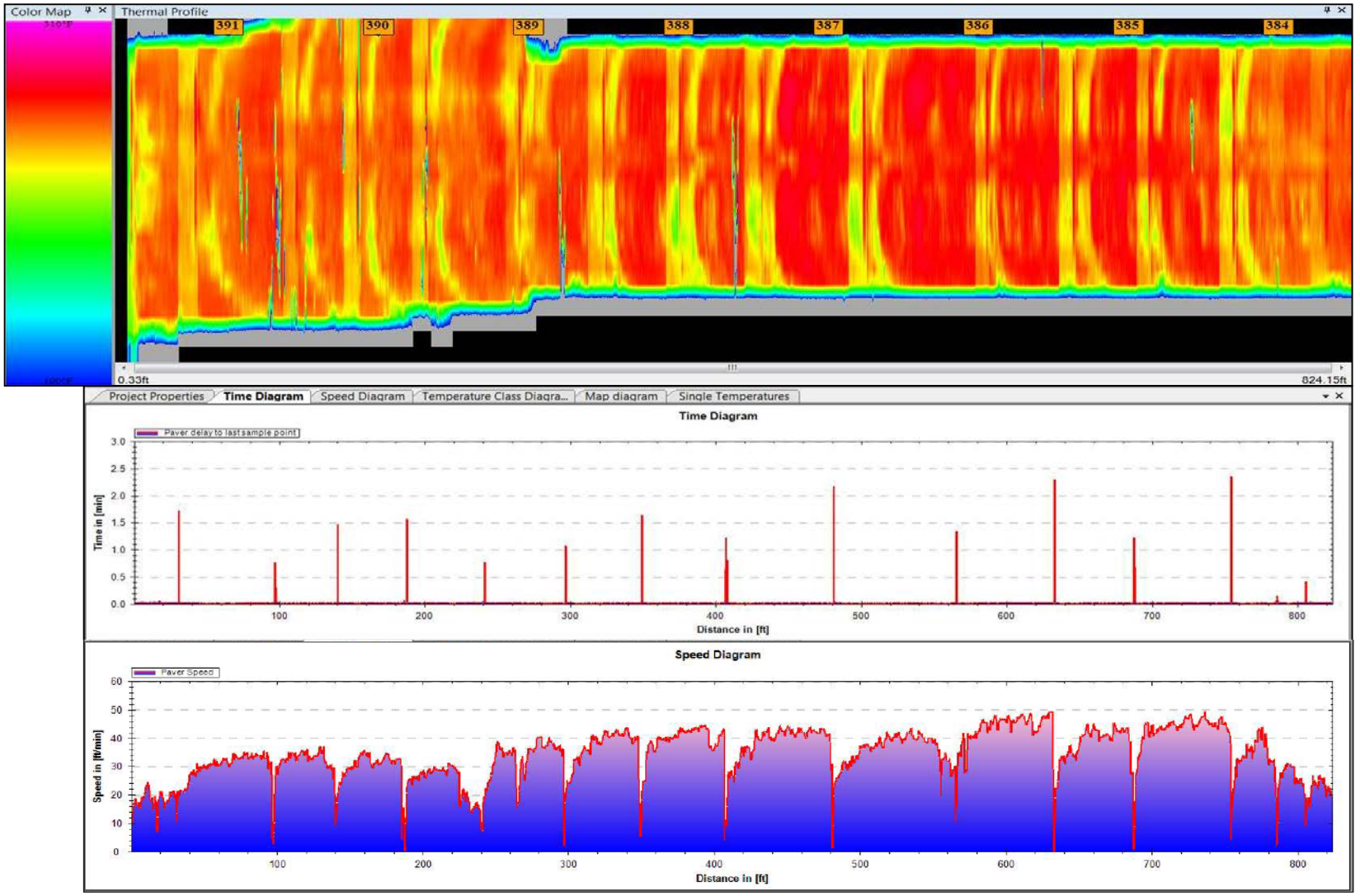
Ⓐ 1.5" - ASPHALT CONCRETE TYPE SM-9.5A — ~ 30k tons

Ⓑ 2.5" - ASPHALT CONCRETE TYPE IM-19.0A — ~ 25^{k} tons

Ⓒ 10.0" ASPHALT CONCRETE TYPE BM-25.0A — ~ 100^{k} tons

Ⓓ 7" AGGREGATE BASE MATERIAL TYPE 1, SIZE NO. 21B (For Subbase)

Typical Project Results



Typical Project Results

Lift	Lift Thickness & JMF	Lane	Segment	From (ft)	To (ft)	Average (°F)	Standard Deviation (°F)	Minimum (°F)	Maximum (°F)	Temp. Differential (°F)	Segregation
1	3" of BM-25.0A	Right	Project	0	619.75	264.7	13.6	171.3	298.2	64.4	Severe
			SG1	0	150	266.5	11	171.3	285.6	51.4	Severe
			SG2	150	300	268	15.4	210	287.6	66.8	Severe
			SG3	300	450	268.1	10.3	192.2	298.2	42.7	Moderate
			SG4	450	600	256.5	14.2	192.2	291.7	64	Severe
			SG5	600	619.75	266	6.8	223.9	276.6	27.1	Moderate
1	3" of BM-25.0A	Center	Project	0	606.63	257.3	13.6	172.4	289.4	65	Severe
			SG1	0	150	258.2	11.2	202.1	284.4	52.1	Severe
			SG2	150	300	253	15.6	172.4	276.8	69.4	Severe
			SG3	300	450	252.7	12.9	178.7	277.7	58.8	Severe
			SG4	450	600	264.3	11.3	189.7	289.4	58.8	Severe
			SG5	600	606.63	259.3	5.2	248.4	270.9	20	No Segregation
1	3" of BM-25.0A	Left	Project	0	612.53	264.8	16.5	179.4	298	77.6	Severe
			SG1	0	150	256.6	17.1	190.6	281.5	76.3	Severe
			SG2	150	300	259.8	18	195.1	287.8	71.3	Severe
			SG3	300	450	269.1	12.5	179.4	289.6	61.8	Severe
			SG4	450	600	270.9	15	194.4	298	78.6	Severe
			SG5	600	612.53	269	9.7	192	283.3	32.5	Moderate

Table courtesy of Applied Research Associates, Inc.

EFL's Experience

- Initial set-up was relatively easy (2-3 hours)
- Very little impact to paving production
- Only a minor hiccup with equipment (my fault)
- Data processing has been easy (would like more versatility)
- Continue IR collection at least through end of year
- Presently **informally** for quality control
- 24% of profiles have moderate thermal segregation (Δ >25 to ≤50°F)
- 76% of profiles have severe thermal segregation (Δ >50°F)
- Current results provide a baseline and need for improvement

EFL's Perspective on IR Deployment

Deployment still a few years away

- CFL in 2017 & WFL in 2018

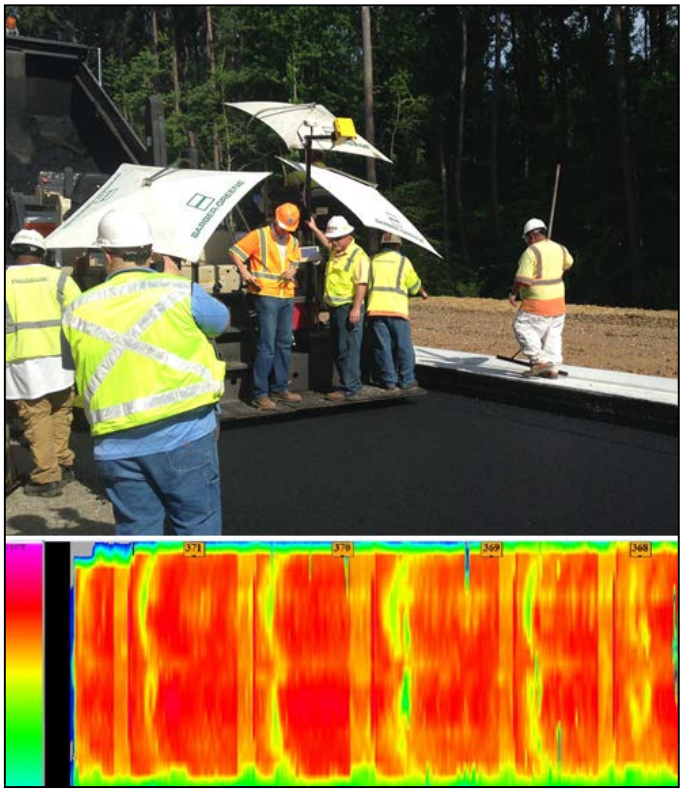
Only on selected projects

- Length of paving
- Pavement design & layer

Optional within contract

Specs based off of TxDOT / AASHTO PP 80-14

- Iterative with experience
- Balance contractor risk and reward
  - Incentive / disincentive approach



IR Deployment Complications

How to Administer Contractually?

Mounting of IR equipment on contractor's paver

- Installation requirements, time, and costs

Ownership of equipment (Gov't or contractor)

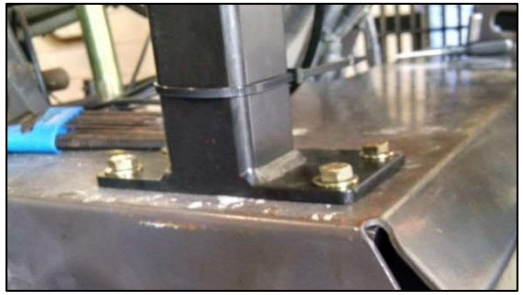
- Liability of equipment if damaged

Delineating responsibilities for daily collection

How to handle starts & stops and delays

How to handle hot and cold spots

Partner buy-in for potentially higher up-front costs



IR Deployment Complications

Other Complications:

- Is there a dedicated paver?
- Purchase of additional IR equipment?
- Quantifying added value by deploying
- Achieving contractor buy-in
- Managing perceived risk
- Field personnel requirements (oversight)
- GPS signal

Anticipated Benefits

Improved Durability, Performance, Field Density, & Rideability

- Approximately 100% testing coverage
- Real-time results & ability to make immediate corrective actions to paving practices (improved communication)
- Improved consistency of paving practices
- Reduced subjectivity in determining segregation
- Ability to identify & relocate areas of concern with precision

For More Information

For more information on improving the quality of your asphalt pavements through SHRP2 products contact:

- Steve Cooper (FHWA) stephen.j.cooper@dot.gov
- Evan Rothblatt (AASHTO) erothblatt@aashto.org

For more information on EFL's experience, contact:

- Rob Hinman, Materials Engineer (EFL-FHWA) robert.hinman@dot.gov
- Mike Dallaire, Division Materials Engineer (EFL-FHWA) Michael.Dallaire@dot.gov