

# Meeting Minutes: TPF-5 (334) Veta Enhancements & Technology Exchange (Meeting No. 11)

Date: February 15, 2019  
 Minutes prepared by: Rebecca Embacher  
 Location: Skype

## Attendance

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Pooled Fund State Contacts:

Participated	State	State Contact
<input checked="" type="checkbox"/>	Alaska	Richard Giessel
<input type="checkbox"/>	Alaska	Dan Gettman
<input checked="" type="checkbox"/>	California	Ebi Fini
<input checked="" type="checkbox"/>	California	Ragu Thangavelautham
<input type="checkbox"/>	California	Chuck Suszko
<input type="checkbox"/>	California	Blair Anderson
<input checked="" type="checkbox"/>	Connecticut	Dave Howley
<input type="checkbox"/>	Connecticut	John Henault
<input type="checkbox"/>	Georgia	John Martin
<input checked="" type="checkbox"/>	Illinois	Brian Hill
<input checked="" type="checkbox"/>	Maine	Ulrich Amoussou-Guenou
<input checked="" type="checkbox"/>	Maine	Richard Bradbury
<input checked="" type="checkbox"/>	Maine	Dale Peabody
<input type="checkbox"/>	Maine	Casey Nash
<input checked="" type="checkbox"/>	Minnesota	Rebecca Embacher
<input checked="" type="checkbox"/>	Minnesota	Curt Turgeon
<input type="checkbox"/>	Mississippi	Alex Middleton
<input type="checkbox"/>	Missouri	Bill Stone
<input checked="" type="checkbox"/>	Missouri	Dan Oesch
<input type="checkbox"/>	New York	Zoeb Zavery
<input type="checkbox"/>	New York	Michael Heim
<input type="checkbox"/>	North Dakota	Amy Beise
<input checked="" type="checkbox"/>	North Dakota	Curt Dunn
<input type="checkbox"/>	North Dakota	Eric Gaasland
<input checked="" type="checkbox"/>	Ohio	Craig Landefeld
<input checked="" type="checkbox"/>	Ohio	Adam Au
<input type="checkbox"/>	Oregon	Larry Illg
<input type="checkbox"/>	Oregon	Mike Stennett
<input checked="" type="checkbox"/>	Pennsylvania	Dan Clark
<input checked="" type="checkbox"/>	Pennsylvania	Sheri Little

<input type="checkbox"/>	Tennessee	Matt Chandler
<input type="checkbox"/>	Tennessee	Brian Egan

**Additional State Attendees:** Eric Gaasland

FHWA:

Participated	Contact
<input type="checkbox"/>	Michael Arasteh
<input type="checkbox"/>	Steven Cooper
<input checked="" type="checkbox"/>	Matt Corrigan
<input checked="" type="checkbox"/>	Dennis Dvorak
<input type="checkbox"/>	Richard Duval
<input checked="" type="checkbox"/>	Kevin Kliethermes
<input type="checkbox"/>	Antonio Nieves
<input checked="" type="checkbox"/>	Jeff Withee

The Transtec Group:

Participated	Contact
<input checked="" type="checkbox"/>	George Chang
<input type="checkbox"/>	Jason Dick

## Decisions Made

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- The pooled fund decided that it will not be able to fund the coding required to download data directly from a given vendor's server.

## Action items

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- MnDOT | Start review of independent verification of PMTP temperature and IC pass count measurements. Will keep pool fund updated with results.
- Pooled Fund Participants | Share with pool fund any work being completed to assist with owner verification of IC and PMTP measurements.
- Pooled Fund Participants | Let Embacher know if interested in presenting state update during future pooled fund meeting.

## Agenda

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- Direct Download

- Independent Owner Verification of Contractor Supplied Data

## Next Meeting

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Date: TBD

Time: TBD

Location: Skype

Agenda items: TBD

## Meeting Notes

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### Direct Download

The pooled fund had agreed to pay for the changes in Veta for data meeting a standardized format. This work has been completed.

There have been questions imposed by vendors as to whether the pooled fund would support payment of the coding required for Veta to download data from the vendor's server. The following was noted:

- Direct download processes are different from vendor to vendor.
- It is difficult for the pooled fund to have an allotment of money available for when a vendor is capable of moving forward with the direct download.
- The total number of vendors for IC and PMTP technologies, and any future intelligent construction technologies, is unknown.
- In the future, there is complexity regarding who would pay for any vendor changes that may occur after creation of the direct downloader that prevents the direct downloader from working properly.

The pooled fund decided that it will not be able to fund the coding required to download data directly from a given vendor's server.

### Independent Owner Verification of Contractor Supplied Data

See attached slides for further details.

- Dennis Dvorak elaborated on what 23 CFR637.207 means and who would be affected.
- Reviewed the timeline was established through the roadmap that was sent out for review in November / December 2018.

- Explained the 3 elements that should be reviewed to ensure that the independent owner verification process is effective and in compliance with the CFR. The 3 elements discussed were: verification of field measurements, avoiding tampering of data and accuracy of submittals.
- Verification of pass counts with the IC method.
  - Proposed using a rover and magnetically attaching it to the roller to record the topo using either a fixed distance or time based interval. Most construction sites have rovers available for use by inspection staff.
  - Concerns were raised regarding the location of the GNSS receiver and offsets that are entered for each machine with respect to the drum location. Question was raised as to whether the manufactures can provide markings, a painted box, etc. where the magnetic mount should be located with known offsets from the GPS module. The magnetic device could be input with known offsets for both GPS and roller dimensions.
  - Questions arose as to whether one could connect directly into the contractor's receiver to separately record the trajectories. The FHWA stated that this would not be considered as an independent evaluation as the same receiver would be used for both. Wanting to confirm both the accuracy of the measurements and that no editing of the data has occurred.
  - Action: will move forward with magnetic mounted rover on roller and ignore current receiver offset information. It is believed, that the complexity wouldn't be as great when looking at the trajectory of only one roller at a time. Minnesota stated that they will start evaluating this during the 2019 construction season. No comments were made as to whether other states will try this method or another possible solution.
- Verification of temperature measurements with the IC method.
  - Agreed that a certificate of calibration is easy to obtain and will at least document that the sensor was originally in calibration prior to being brought out to the field.
  - Recommend reviewing temperature tapes.
  - Action: Minnesota stated that they will not be investing time to evaluate this method. No comments were made as to whether other states will try this method or another possible solution.
- Verification of surface temperature measurements with the PMTP method.
  - Agreed that a certificate of calibration is easy to obtain and will at least document that the sensor was originally in calibration prior to being brought out to the field.

- All agreed that an independent device would be the most promising method for independent verification. Discussions were held regarding attaching another PMTP device to the paver, but thought claims and other issues might arise from doing so.
- Action: Minnesota stated that they will start this evaluation using a FLIR temperature gun (which records radiometric data per pixel) this construction season. No comments were made as to whether other states will try this method or another possible solution.
- Avoiding tampering of data.
  - Will continue to move forward with the direct download of data method. Currently, can be completed with the Moba thermal data and Topcon IC data. More to come.
  - Plan to require the direct download method in 2 years, through the AASHTO Provisionals. This should allow industry time to make this feature available and Transtec to complete the needed work.
  - Field verifications will also address the review for tampering of data.
- Accuracy of submittals.
  - Process will be dependent upon each state's specification requirements.
  - Mitigation tools are available within Veta:
    - Automation, export reports, standardization of filter group naming conventions and definition of a data lot.
  - Recommend Veta training.
  - Concern was raised about how do we educate state's on how to create a standardized, base project? Where filters are used on this base project to address specification differences?
- Discussions about the need for consistency between states to allow for enhancements to Veta to be completed that would address the needed verification analyses.
- The FHWA would like to be kept updated with any work being completed to help ensure that it will be acceptable method. Additionally, they would like to be invited out to any projects that might be completing some of these pilot evaluations.
- It was recommended that state's try to work together for a solution and to please share any work that is being completed to address the above elements.

## **NRRA BIM for Pavements Workshop**

Briefly discussed BIM for pavements workshop on May 21, 2019 and NRRA Pavement Workshop on May 22-23. Additional details can be found at: <http://www.dot.state.mn.us/mnroad/nrra/pavementconference/index.html>.

## **Future Upcoming Meetings**

Asked if there were any future agenda items?

Proposed that time is set aside in the next few meetings to allow for detailed state updates. States will be contacted to determine if they are available to present at a given upcoming meeting. Maybe 30 minute presentations each.

Direct Download

Federal Highway Administration, DOT

§ 637.207

Subpart A [Reserved]

Subpart B—Quality Assurance Procedures for Construction

§ 637.201 Purpose.

To prescribe policies, procedures, and guidelines to assure the quality of materials and construction in all Federal-aid highway projects on the National Highway System.

§ 637.203 Definitions.

**Acceptance program.** All factors that comprise the State highway agency's (SHA) determination of the quality of the product as specified in the contract requirements. These factors include verification sampling, testing, and inspection and may include results of quality control sampling and testing.

**Independent assurance program.** Activities that are an unbiased and independent evaluation of all the sampling and testing procedures used in the acceptance program. Test procedures used in the acceptance program which are performed in the SHA's central laboratory would not be covered by an independent assurance program.

**Proficiency samples.** Homogeneous samples that are distributed and tested by two or more laboratories. The test results are compared to assure that the laboratories are obtaining the same results.

**Qualified laboratories.** Laboratories that are capable as defined by appropriate programs established by each SHA. As a minimum, the qualification program shall include provisions for checking test equipment and the laboratory shall keep records of calibration checks.

**Qualified sampling and testing personnel.** Personnel who are capable as defined by appropriate programs established by each SHA.

**Quality assurance.** All those planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality.

**Quality control.** All contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements.

**Random sample.** A sample drawn from a lot in which each increment in the lot has an equal probability of being chosen.

**Vendor.** A supplier of project-produced material that is not the contractor.

**Verification sampling and testing.** Sampling and testing performed to validate the quality of the product.

§ 637.205 Policy.

(a) **Quality assurance program.** Each SHA shall develop a quality assurance program which will assure that the materials and workmanship incorporated into each Federal-aid highway construction project on the NHS are in conformity with the requirements of the approved plans and specifications, including approved changes. The program must meet the criteria in § 637.207 and be approved by the FHWA.

(b) **SHA capabilities.** The SHA shall maintain an adequate, qualified staff to administer its quality assurance program. The State shall also maintain a central laboratory. The State's central laboratory shall meet the requirements in § 637.209(a)(2).

(c) **Independent assurance program.** Independent assurance samples and tests or other procedures shall be performed by qualified sampling and testing personnel employed by the SHA or its designated agent.

(d) **Verification sampling and testing.** The verification sampling and testing are to be performed by qualified testing personnel employed by the SHA or its designated agent, excluding the contractor and vendor.

(e) **Random samples.** All samples used for quality control and verification sampling and testing shall be random samples.

§ 637.207 Quality assurance program.

(a) Each SHA's quality assurance program shall provide for an acceptance program and an independent assurance (IA) program consisting of the following:

(1) Acceptance program.

(i) Each SHA's acceptance program shall consist of the following:

(A) Frequency guide schedules for verification sampling and testing which will give general guidance to

§ 637.207

A sample drawn from each increment in the lot has an equal probability of being chosen.

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# TPF-5 (334) | Independent Owner Verification of Contractor Supplied Data

## 23 CFR Part 637

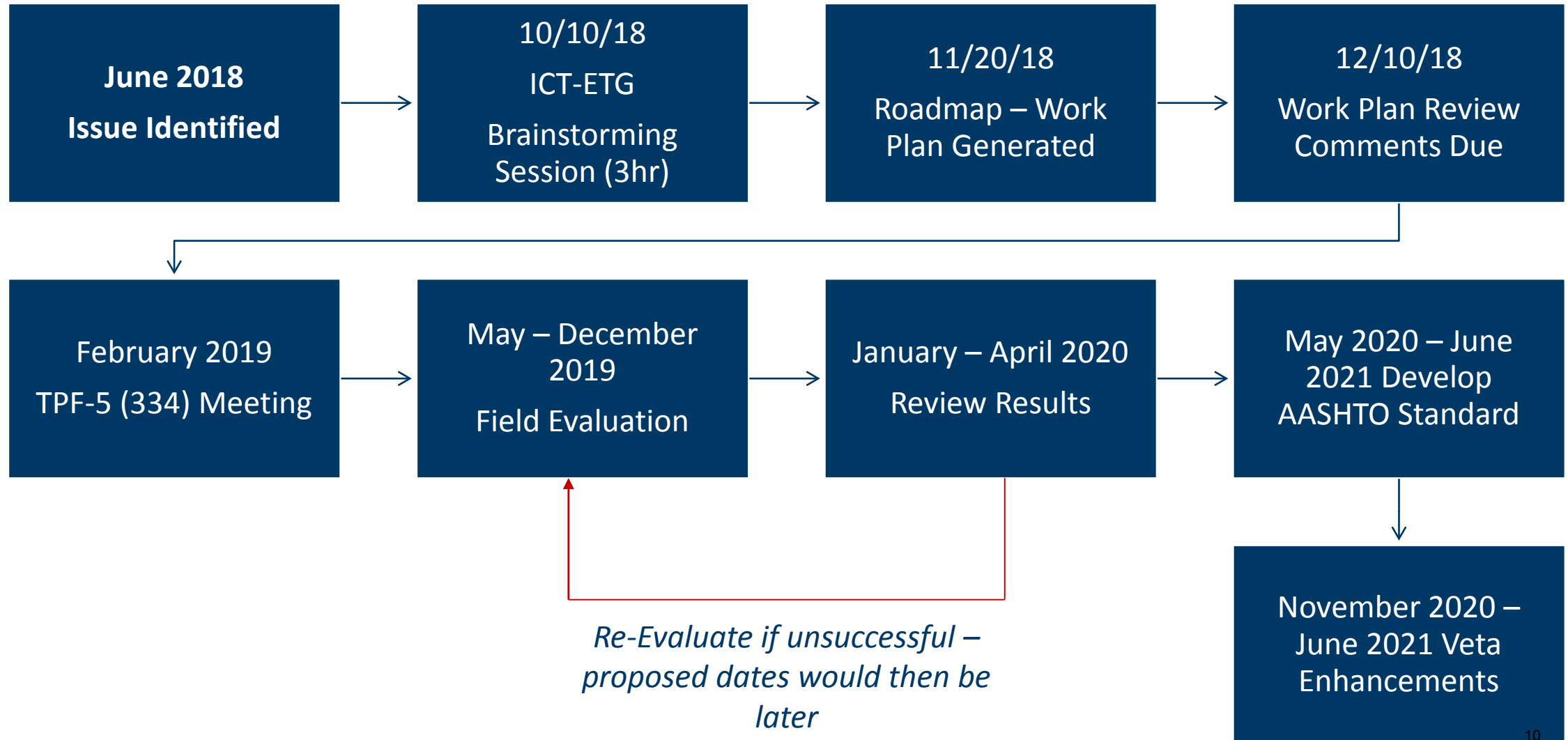


# Issues Identified

## 23 CFR 637.207 Independent Verification

- Quality control sampling and testing results may be used as part of the acceptance decision provided that the quality of the material has been validated by the verification sampling and testing.
- The verification testing shall be performed on samples that are taken independently of the quality control samples.

# Timeline





# 1. Verification of Measurements

## IC Method – Pass Count

- Proposed:
  - Independent Device; magnetic attachment
  - No – inspector counting (SAFETY, time, human error)

# Use of Rover

## Pass Count Measurements

*MnDOT will start evaluation during summer 2019. Any states interested in assisting with this effort?*

- Using Rovers already available in field
  - Other topo devices were found to be extremely low accuracy > 10ft (don't track movement, but ping locations infrequently)
- Magnetically attach to rollers
- Record topo:
  - Fixed Distance or Time Based
  - $\geq 2$  minutes / roller



# Rover Continuous Topo

## Fixed Distance

Trimble Access

### Continuous topo

Method:  
**Fixed distance**

Antenna height (Uncorr):  
?

Measured to:  
**Bottom of quick release**

Offset:  
**None**

Code:  
?

Distance:  
**1.000m**

Start point name:  
?

GNSS

Map  
Menu  
Favorites  
Switch to

RTK H:0.008m V:0.012m

Esc eBubble Options Start

# Rover Continuous Topo

## Fixed Time

Trimble Access

### Continuous topo

Method: **Fixed time**

Antenna height (Uncorr): ?

Measured to: **Bottom of quick release**

Start point name: ?

Time interval: **0m1s**

Code: ?

GNSS

Map  
Menu  
Favorites  
Switch to

RTK H:0.008m V:0.012m

Esc eBubble Options Start

### Evaluation

- Relative – Summer 2019
  - See if rover topo measurements work
  - Visual comparison of trajectories between Veta & Rover
- Future – Veta Enhancement
  - Overlay rover trajectory on top of roller data
  - Statistical comparisons between layers



# 1. Verification of Measurements

## IC Method – Temperature

- Proposed:
  - Certificate of Calibration
  - Static Check – start of paving
    - Temperature Tape, independent device temporarily mounted to roller, or PMTP Independent Device
  - No – inspector (SAFETY, water spray, angle, height, area size, etc.)

Recommend states using temperature method requirements complete evaluation.

- Start with evaluation of temperature tape specifications and options
  - Vendors might be able to assist with recommendations
- Field Testing & analyses

# 1. Verification of Measurements

## PMTP Method – Surface Temperatures

- Proposed:
  - Certificate of Calibration
  - Independent Surface Measurement



## Type of Camera

- Spot test devices might possible increase correlation errors
- Recommend evaluating radiometric data per pixel, along with spot test devices



# Model Comparison and Price

Features	FLIR E40	FLIR E50	FLIR E60	FLIR E75	FLIR E85	FLIR E95
Temperature Range	-4 to 1202° F (-20 to 650°C)	-4 to 1202° F (-20 to 650°C)	-4 to 1202° F (-20 to 650°C)	-4°F to 248°F (-20°C to 120°C), 32°F to 1200°F (0°C to 650°C) Optional 572° F to 1830°F (300°C to 1000°C)	-4°F to 248°F (-20°C to 120°C), 32°F to 1200°F (0°C to 650°C), 572°F to 1830°F (300°C to 1000°C)	-4°F to 248°F (-20°C to 120°C), 32°F to 1200°F (0°C to 650°C), 572°F to 2732°F (300°C to 1500°C)
Thermal sensitivity (N.E.T.D)	<0.07°C at 30°C	<0.05°C at 30°C	<0.05°C at 30°C	<0.03°C @ 30°C (88°F)	<0.03°C @ 30°C (88°F)	<0.03°C @ 30°C (88°F)
Detector Type - Focal plane array; (FPA) uncooled microbolometer	160 x 120 pixels	240 x 180 pixels	320 x 240 pixels	320 x 240 (76,800 pixels)	384 x 288 (110,592 pixels)	464 x 348 (161,472 pixels)
MSX® Thermal Image Enhancement	Yes	Yes	Yes	Yes	Yes	Yes
Picture-in-Picture (P-i-P)	Fixed P-i-P	Scalable P-i-P	Scalable P-i-P	Resizable and movable	Resizable and movable	Resizable and movable
MPEG 4 Video Recording	Yes	Yes	Yes	Non-Radiometric IR Video Streaming: H.264 or MPEG-4 over Wi-Fi, MJPEG over UVC or Wi-Fi	Non-Radiometric IR Video Streaming: H.264 or MPEG-4 over Wi-Fi, MJPEG over UVC or Wi-Fi	Non-Radiometric IR Video Streaming: H.264 or MPEG-4 over Wi-Fi, MJPEG over UVC or Wi-Fi
Digital Zoom	2X Continuous	4X Continuous	4X Continuous	1-4X continuous	1-4X continuous	1-4X continuous
Time Lapse	No	No	No	No	No	10 sec to 24 hours
Image annotation	Voice (80s)/Text Comments	Voice (80s)/Text Comments	Voice (80s)/Text Comments	Voice (80s)/Text Comments	Voice (80s)/Text Comments	Voice (80s)/Text Comments
Moveable Spot	3 Spotmeters	3 Spotmeters	3 Spotmeters	3 Spotmeters	3 Spotmeters	3 Spotmeters
Delta T	Yes	Yes	Yes	Yes	Yes	Yes
Data Communication interface	USB-mini, USB-A, Composite Video, Bluetooth, Wi-Fi			USB 2.0, Bluetooth, Wi-Fi		



**FLIR E75**  
Advanced Thermal Camera 320x240 with MSX, 24 deg

In Stock

**\$6,999.00 USD**

Order #: E75



**FLIR E85**  
Advanced Thermal Camera 384x288 with MSX, 24 deg

In Stock

**\$8,499.00 USD**

Order #: E85



**FLIR E95**  
Advanced Thermal Camera 464x348 with MSX, 24 deg

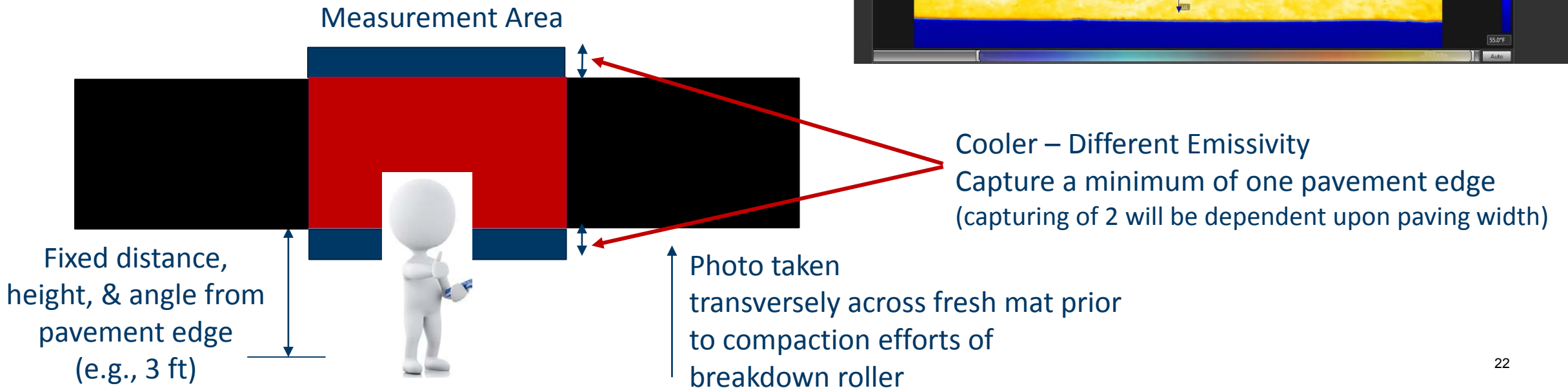
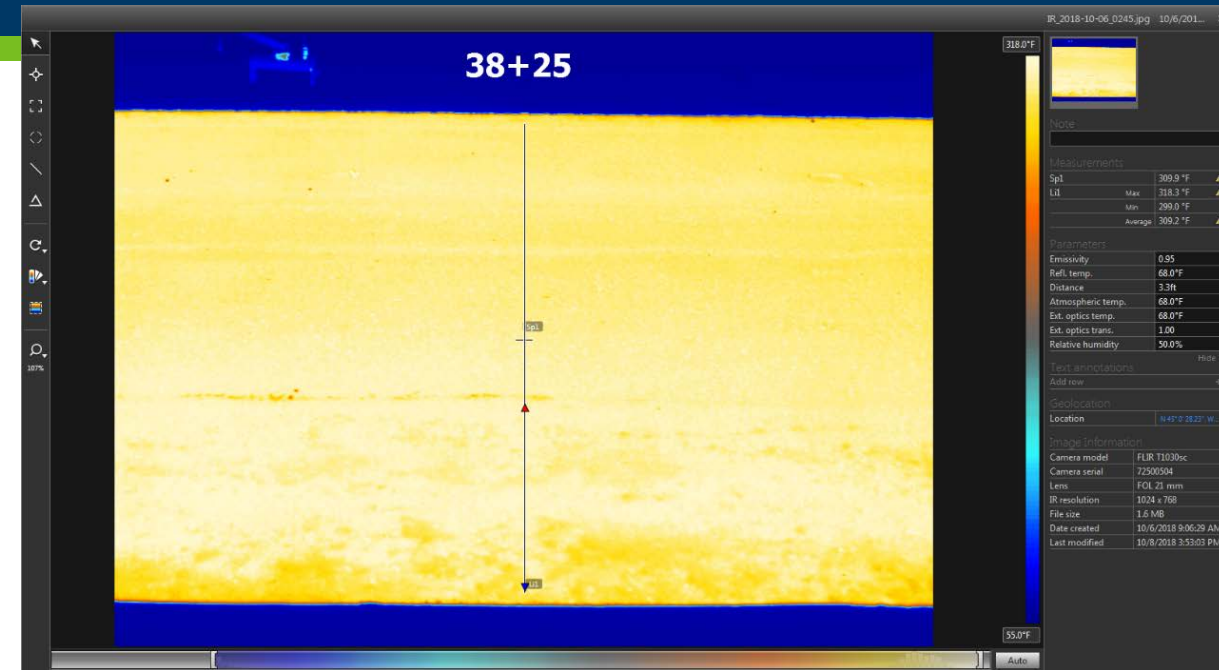
In Stock

**\$9,999.00 USD**

Order #: E95

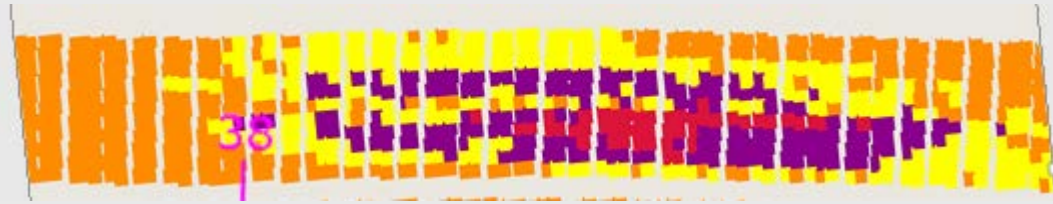
# Field Measurements PMTP Method

*MnDOT will start evaluation during summer 2019. Any other states interested in assisting?*

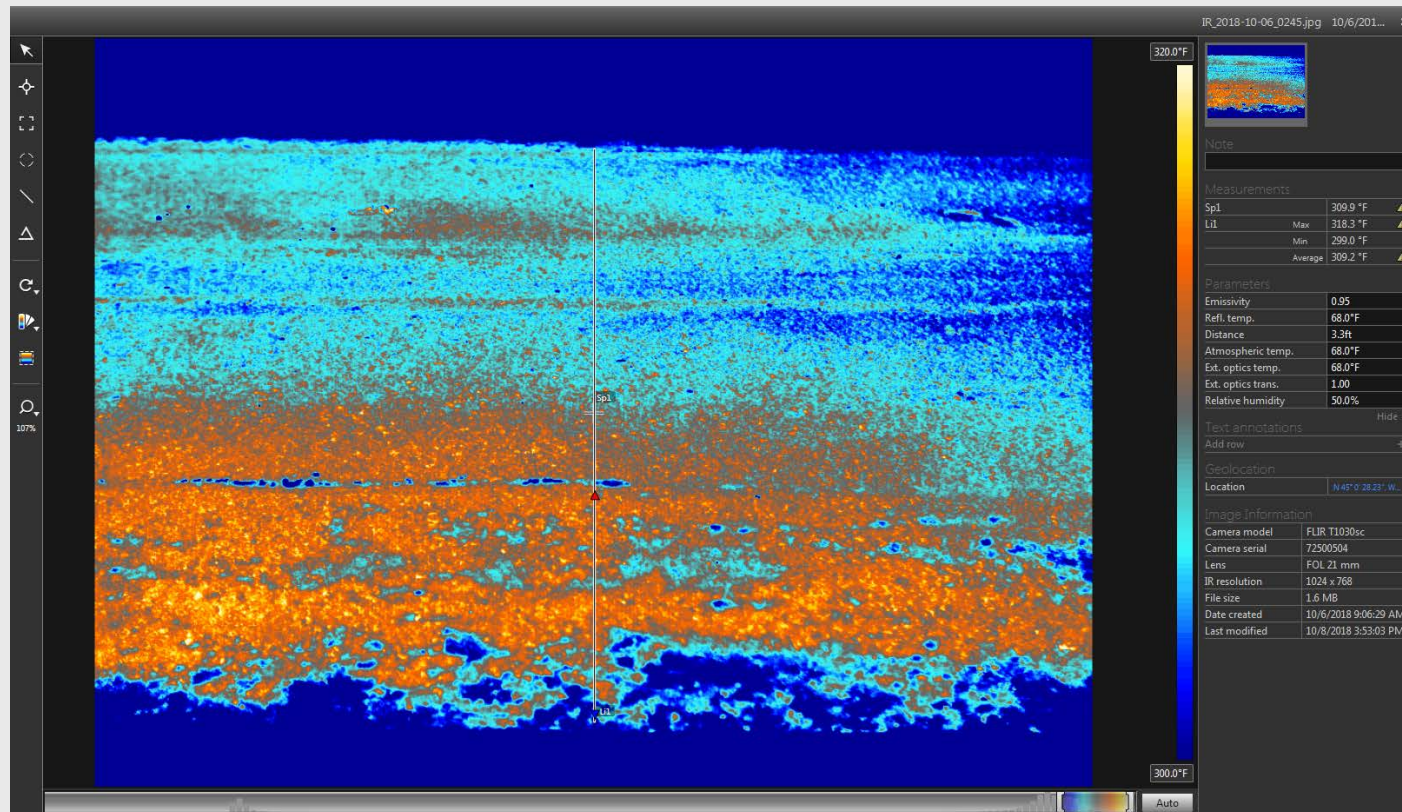


# FLIR vs. PMTP Measurement

Veta – PMTP Data



FLIR Camera  
Image



# PMTP vs. FLIR Measurement

<b>Statistic</b>	<b>Veta Statistics</b>	<b>FLIR Statistics</b>
Mean (F)	315.5	309.9
Max (F)	322.9	318.3
Min (F)	302.5	299.0



# 1. Verification of Measurements

## What's Needed?

- Determine and Purchase Equipment (\$\$)
- Field Procedures and Evaluation
- Statistical Evaluations / Precision - Bias Thresholds
- Veta Enhancements
- AASHTO Provisional
  - Consistency between states



# 2. Avoiding Tampering of Data

IC-and-PMTP-Systems



Secure

Only if in binary format

Cloud-Storage-and/or-Removable-Storage-Device-  
 (Data-in-Binary-Format-[Machine-Code]):

- Leica-|·ConX
- Moba-|·eRoutes
- Topcon-|·SiteLink3D
- Trimble-|·TCC
- Volvo-|·FileUpload
- Wirtgen-|·Witos-HCQ-Roadscan



Secure



Secure

Veta  
(Non-proprietary-software)



Not-Secure

Cloud-Mapping:

- Topcon-|·SiteLink3D
- Trimble-|·VisionLink
- Wirtgen-|·Witos

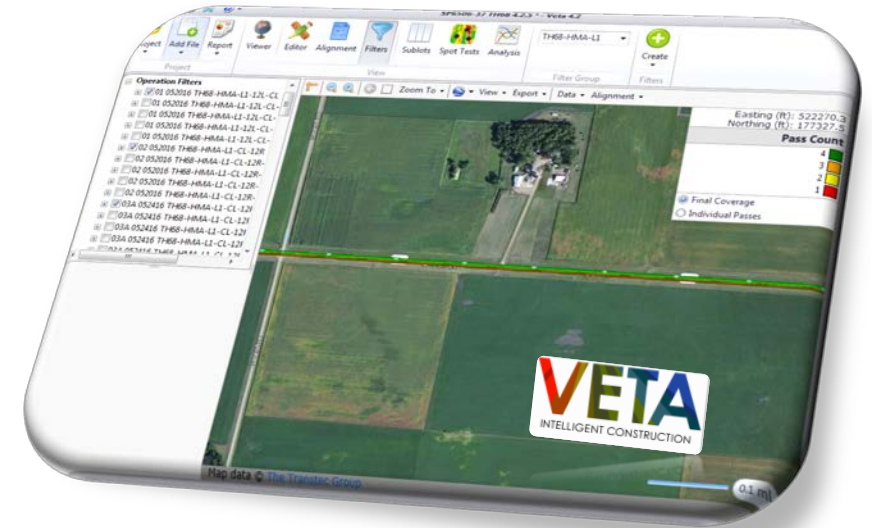


**Secure = Highly Unlikely to Modify the Data**

- Update AASHTO Provisionals
  - PP-80 and PP-81
  - Require Method 1 (Direct Download of Data)
- Continue to enhance Veta – direct download
- Field Verifications for validation

# 3. Accuracy of Submittals

- Dependent upon given state's specification requirements
  - Each state will need to develop submittal review process
- Mitigation Tools
  - Veta
    - Automation
    - Export Reports
    - Standardization
      - Filer Group Naming Conventions
      - Base "Data Lot" filter group
  - Veta & Submittal Form Training



# Thank you again!



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