



SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

# Rapid Technologies to Enhance Quality Control on Asphalt Pavements Ground Penetrating Radar (GPR) Rolling Density Meter (RDM)

FHWA/AASHTO Hosted Webinar

March 8, 2018

U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO

# Purpose of Today's Webinar

- Provide an overview of SHRP R06C RDM technology project.
- Discuss the value added by using RDM technology (what it is, why should you care, how it affects your bottom line, and how you get there).
- Illustrate RDM use in day-to-day practice.
- Present a summary of the results from the field demonstration projects in terms of its day-to-day application.
- Discuss the benefits from the RDM technology as related to improvement of uniformity of compaction density.

# A Few Housekeeping Details

- **Tell us what you think**. We want to hear from all of you on the call during the discussion segments.
- **Please add your comments and questions throughout the webinar to the chat box provided.**

# Agenda

- Welcome and Introduction
- SHRP2 Overview – AASHTO
- SHRP2 R06C GPR Product Overview – FHWA
- GPR and RDM Technology – GSSI
- Results of R06C Implementation – Lev Khazanovich
- Application and Benefits from RDM Users
  - Minnesota DOT
  - TTI
  - Alaska DOT&PF
- Questions and Discussion

# Welcome

Presenters

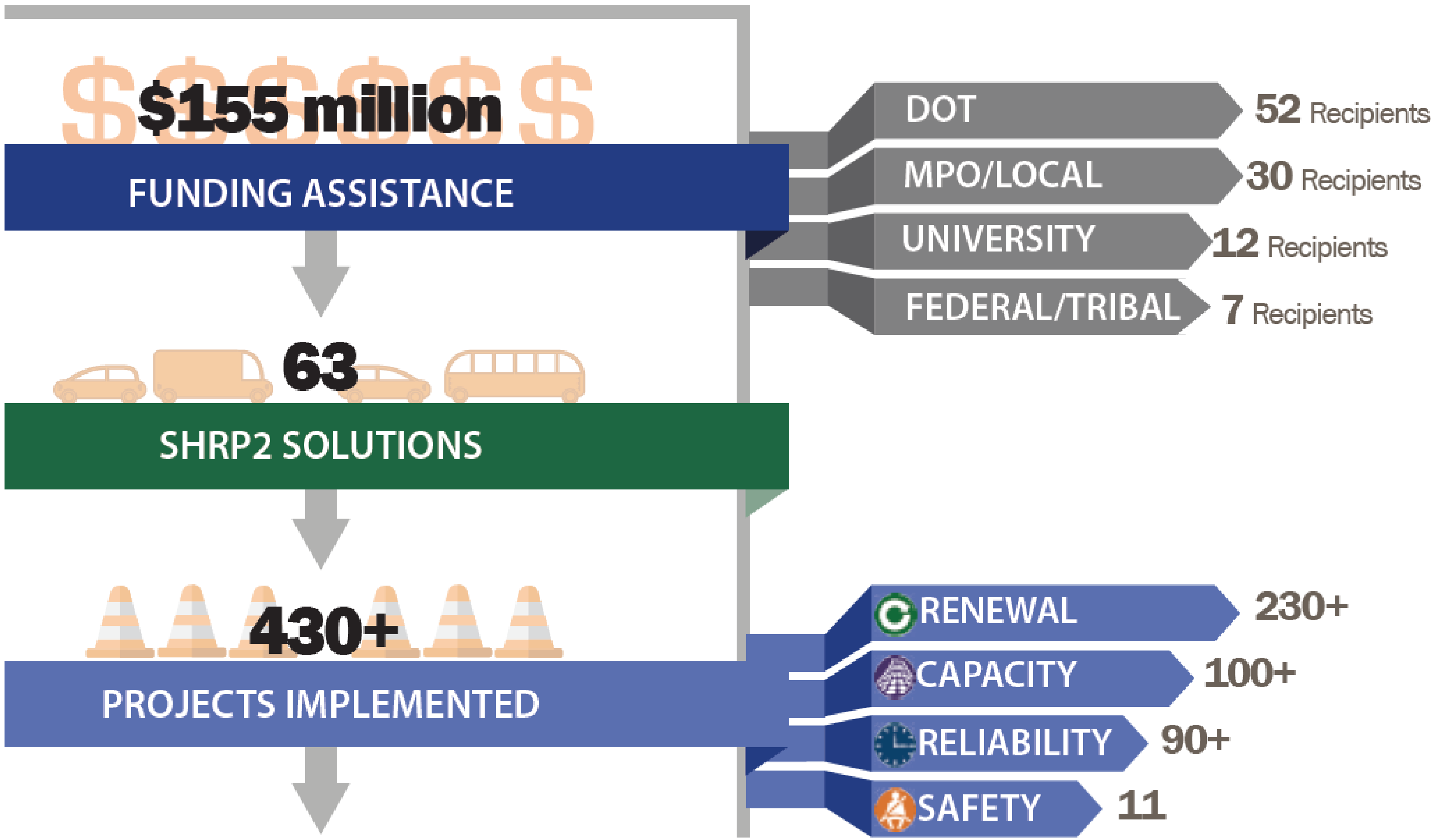
- Roger Roberts, GSSI
- Curt Turgeon, Kyle Hoegh and Shongtao Dai, Minnesota DOT
- Stephen Sebesta and Bryan Wilson, TTI
- Rich Giessel, Alaska DOT&PF

Moderators

- Kate Kurgan, Moderator/ R06C Product Lead, AASHTO
- Steve Cooper/ R06C Product Lead, FHWA
- Lev Khazanovich, Subject Matter Expert

Recorded presentation will be posted on the AASHTO SHRP2 website: http://shrp2.transportation.org/Pages/R06C_RapidTechnologiestoEnhanceQualityControl.aspx

# SHRP2 Implementation:
# INNOVATE – IMPLEMENT - IMPROVE



# SHRP2 Implementation:
# INNOVATE – IMPLEMENT - IMPROVE

**304,406**
PARTICIPANTS ENGAGED

**12,378**
OUTREACH ACTIVITIES

- TRAINING 11,435
- WORKSHOPS 710
- PEER EXCHANGES 106
- DEMOS 76
- SHOWCASES 51

**16,629**
HOURS TECHNICAL ASSISTANCE

## RESULTS

**Save lives, money, and time**

- Bridges being built more quickly
- Smoother traffic flows and less congestion
- Reduced construction costs
- Safer roadways
- Smarter environmental reviews

# R06C Technologies to Enhance QC on Asphalt Pavements

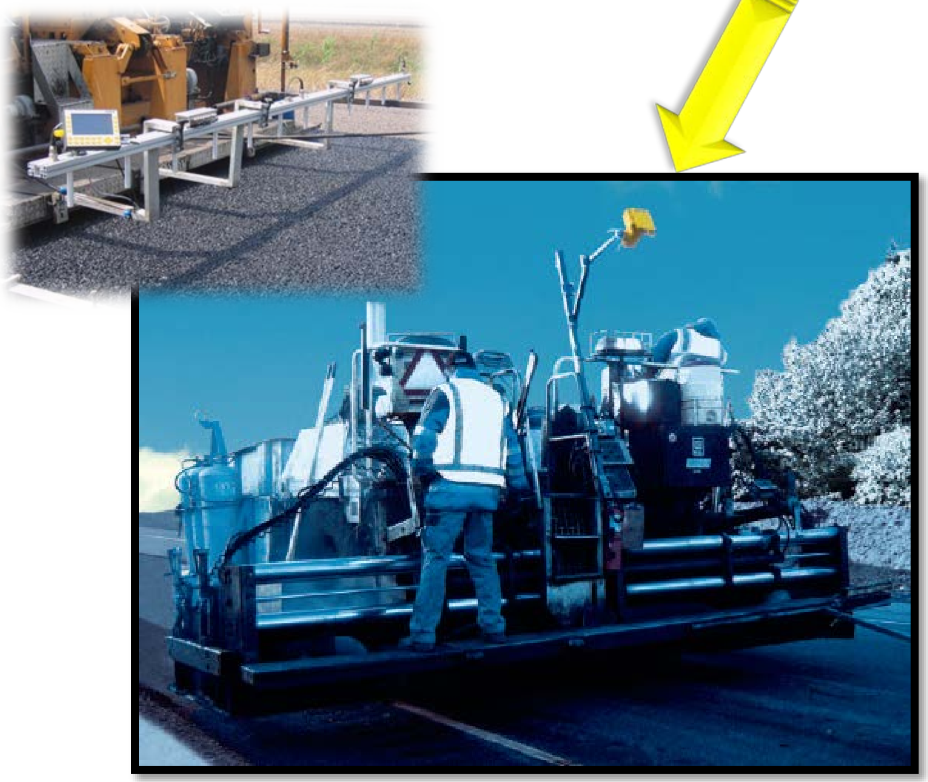
THE CHALLENGE: Develop solutions to measure and quantify non-uniformity of asphalt mixture construction

Localized non-uniform areas fail prematurely. Random testing seldom catches problem


Increased use of night paving makes inspection more difficult

# R06C - Technologies to Enhance QC on Asphalt Pavements

**Thermal Profile during Placement: Pave-IR**



**Density uniformity and compaction: GPR Rolling Density Meter**

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# PaveScan RDM

## SHRP2 Implementation Task Force Meeting

March 8, 2018

U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO

# PaveScan RDM – What is it?

**It is a complete GPR system providing:**

- **Real-time** dielectric values of compacted asphalt
- **Full Coverage** (lane width and length)
- **Automatically located core locations**
- **Compaction information on-site** (after core calibration)
- **Export to CSV and Google Earth KML files**

# PaveScan RDM – Configurations


1-Channel Configuration

3-Channel Configuration

# PaveScan RDM – Field Setup

(1) Attach antennas and cabling
(2) 10 Minute warm-up
(3) System Calibration (3 minutes)
    (a) Airwave
    (b) Metal Plate

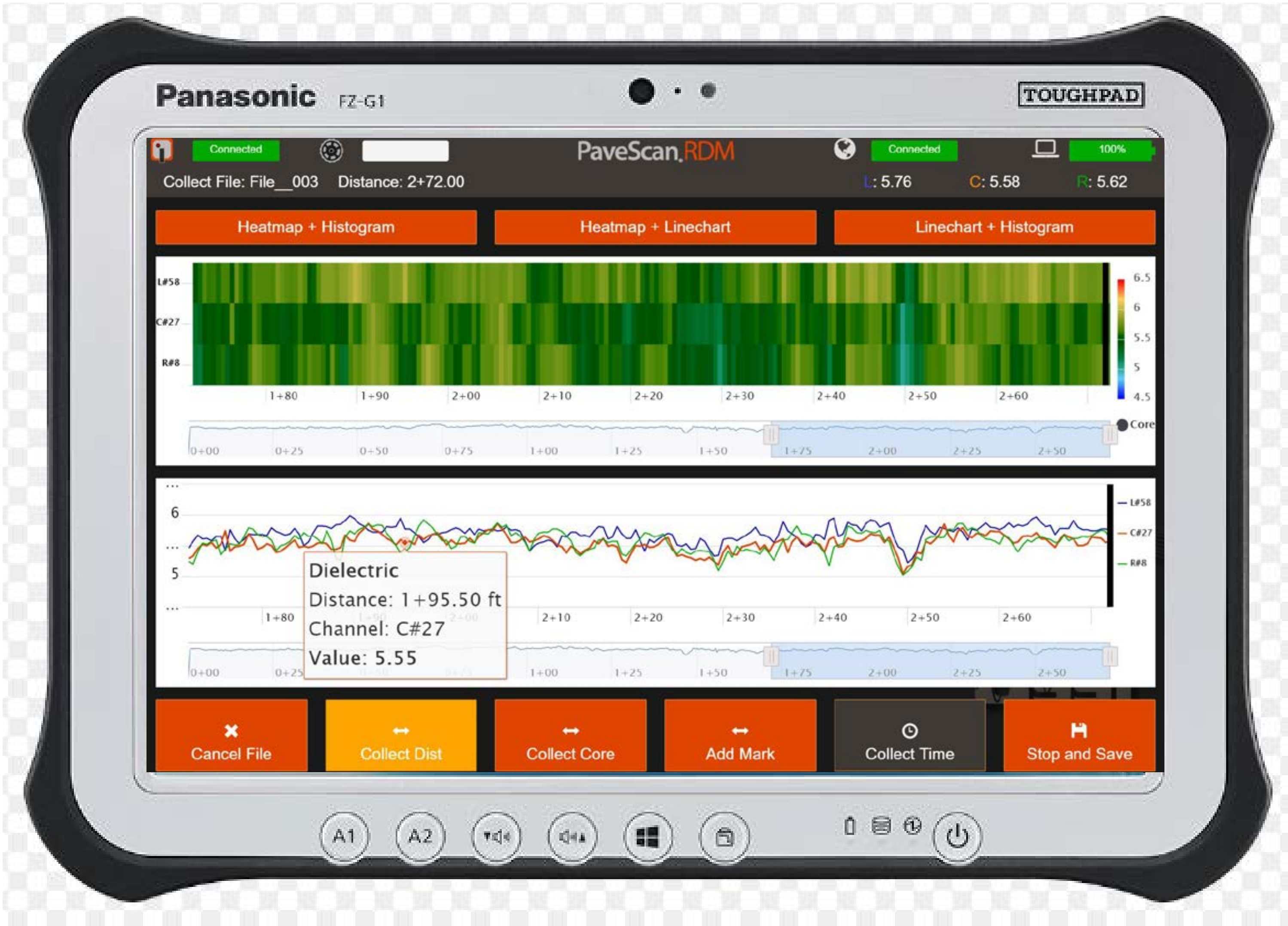
# PaveScan RDM – Data Collection Strategies

**Data is collected at walking speed (4-5 ft/second)**

Single Pass – Wheel Paths and in between

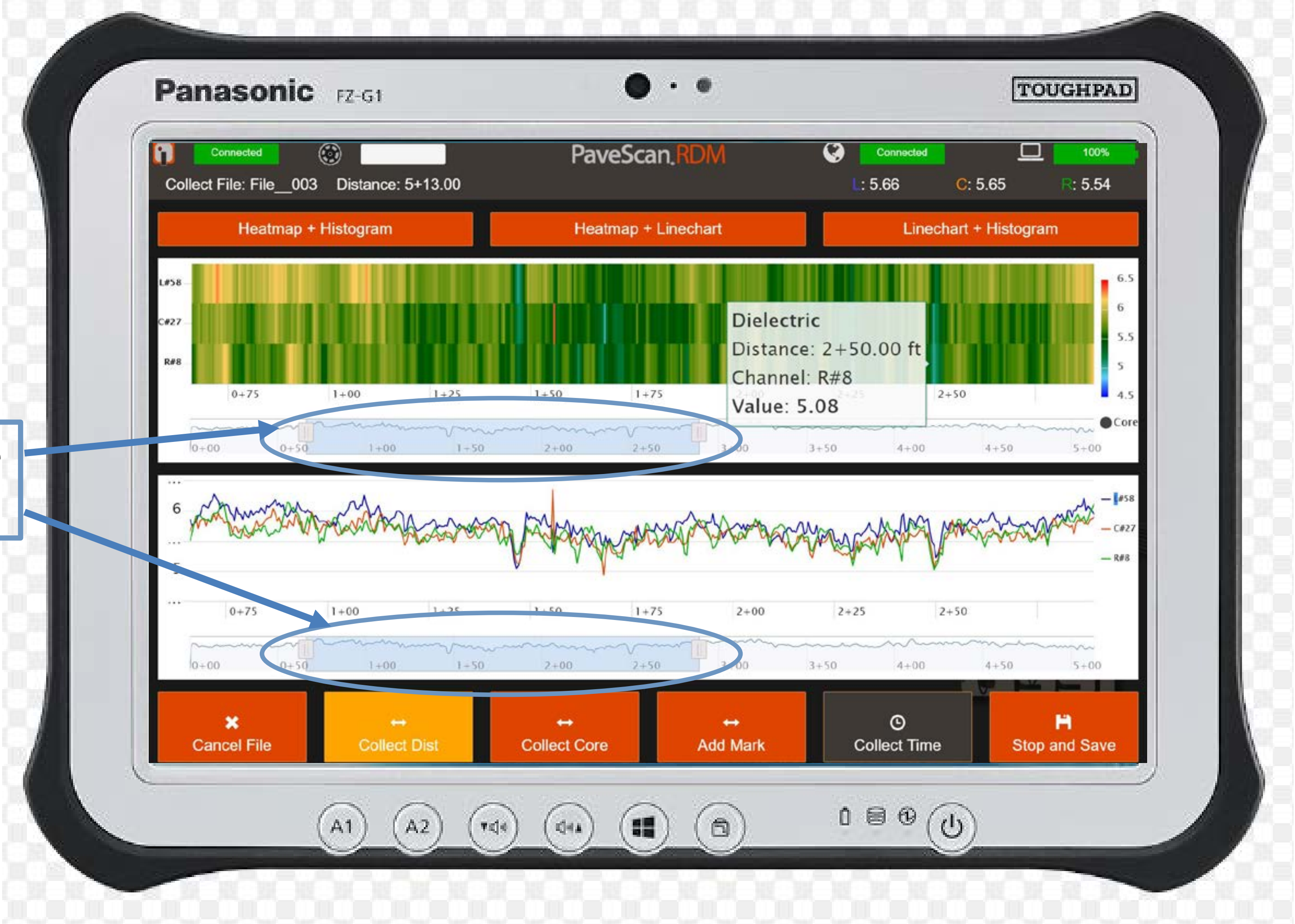
Two Pass – Down and back

# PaveScan RDM – Data Collection

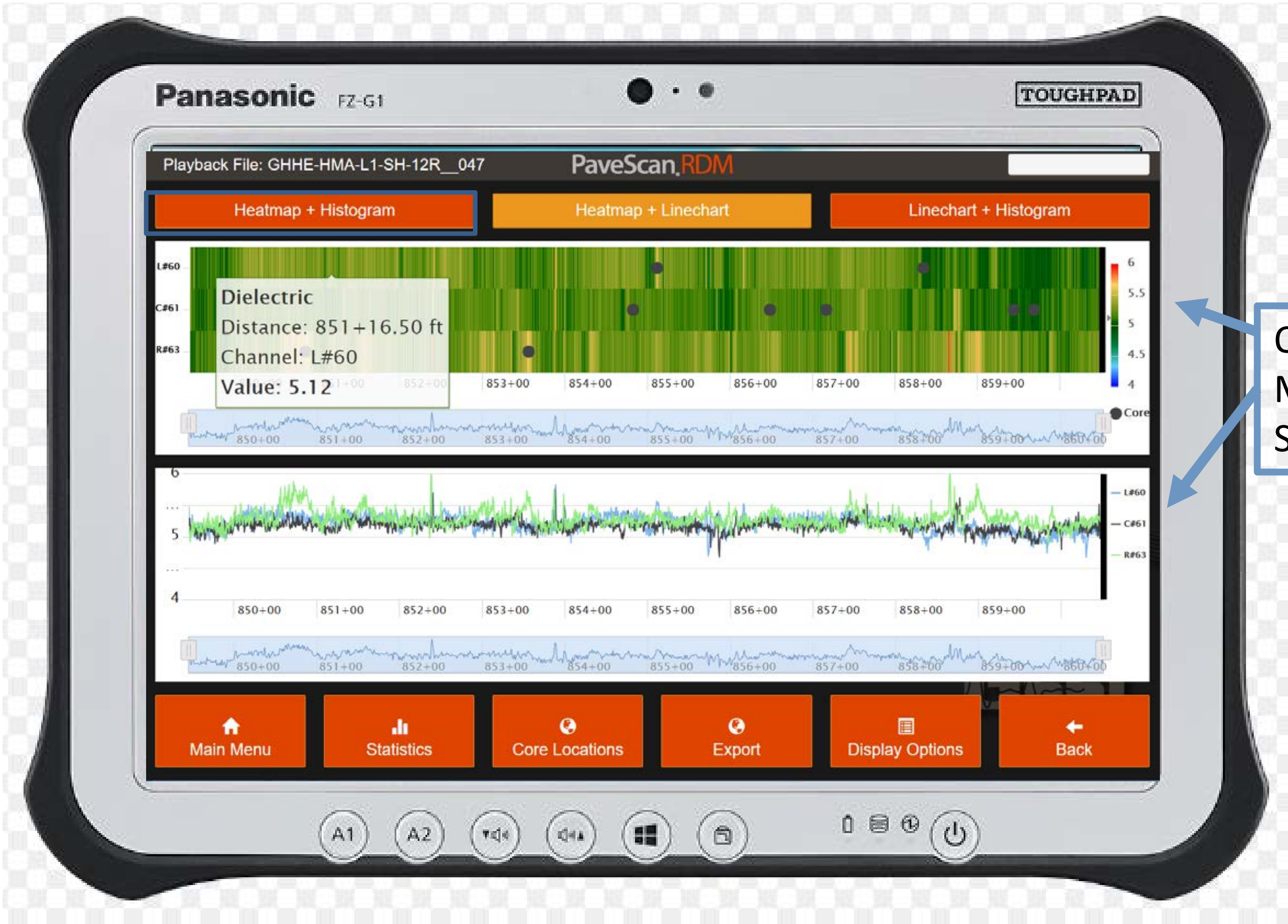


# PaveScan RDM – Data Collection Con't

Adjustable Scrollbars

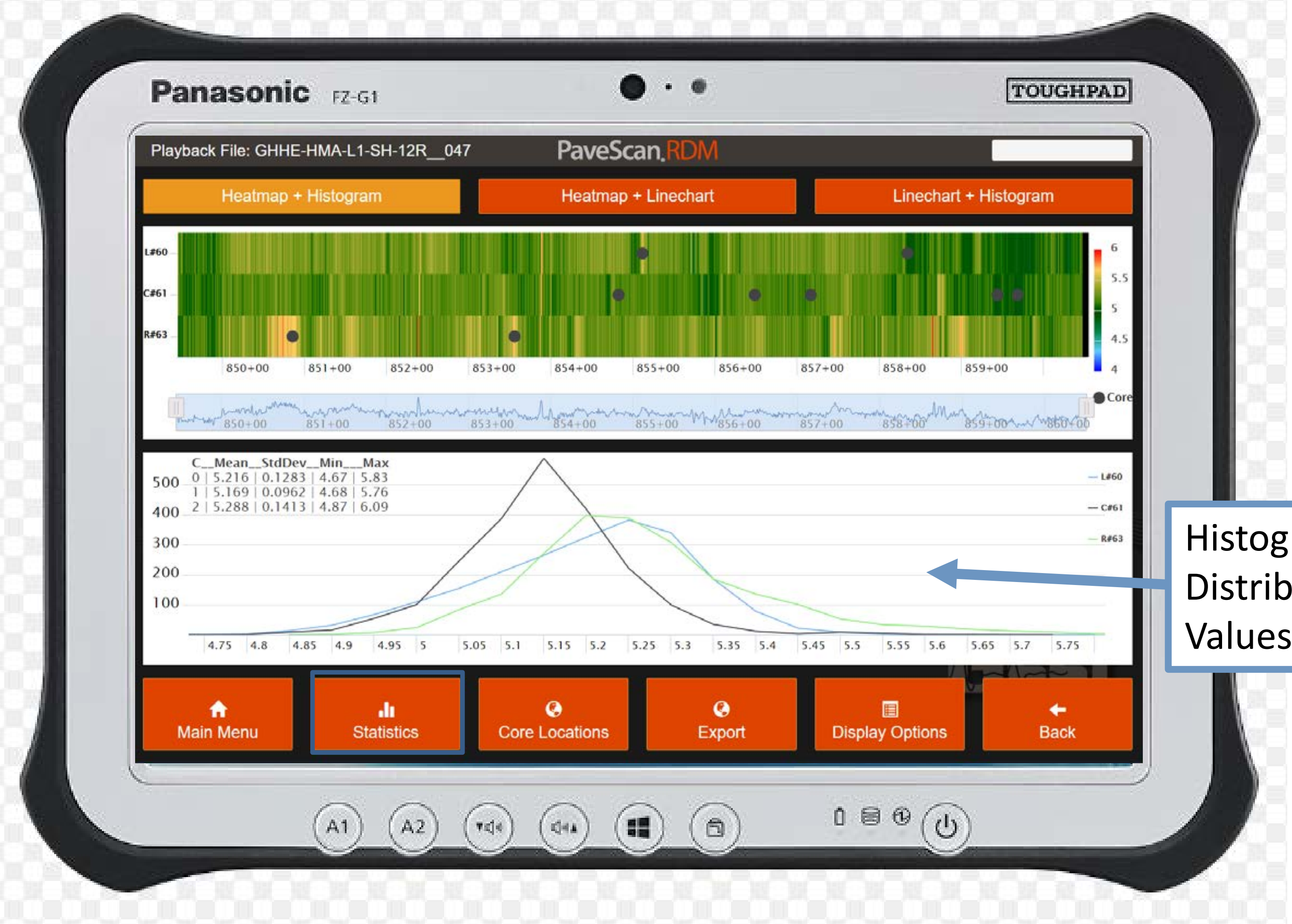


# PaveScan RDM – Playback



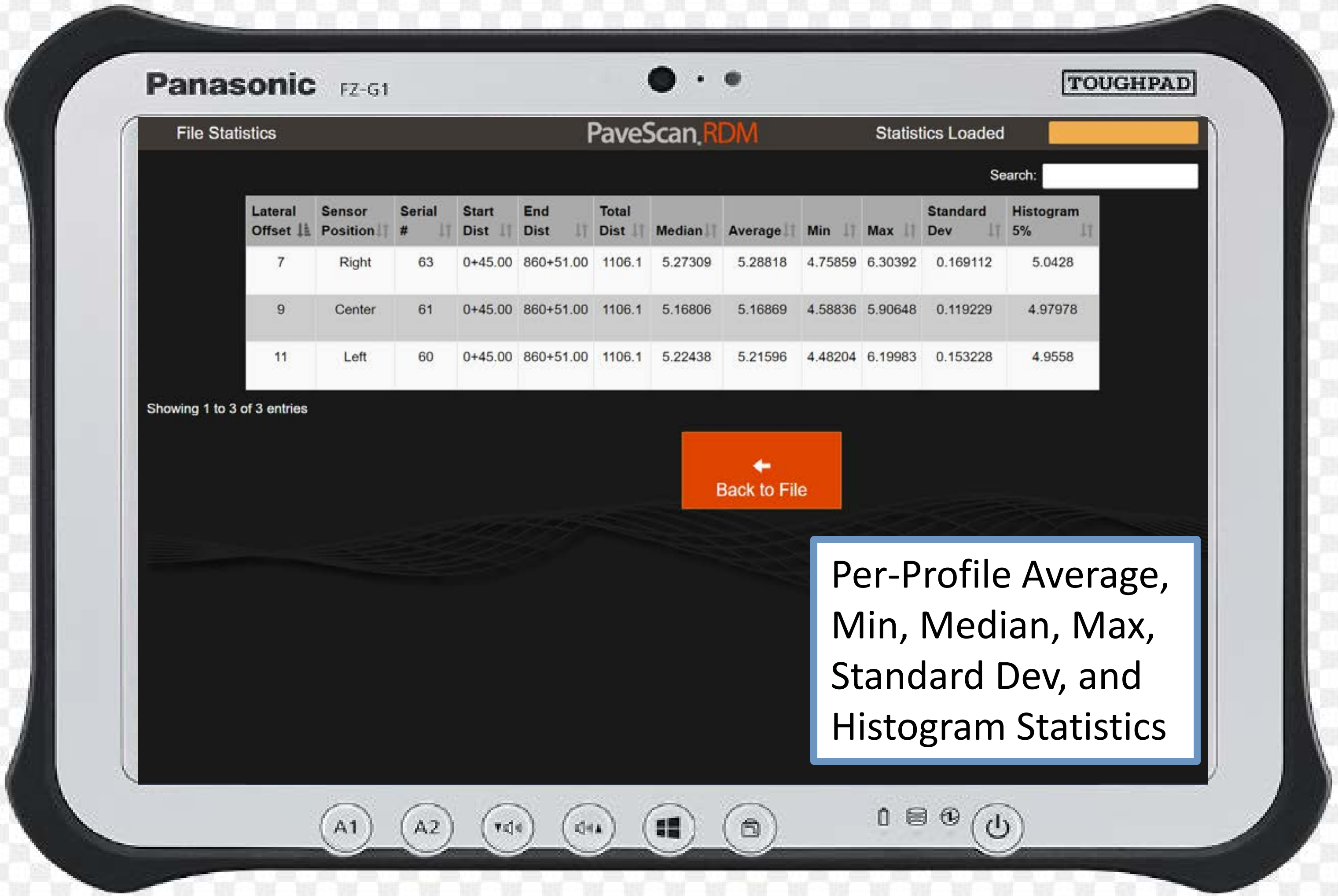

Over 6000 Measurements Shown

# PaveScan RDM – Playback




Histogram Distribution of Values

# PaveScan RDM – Playback Statistics

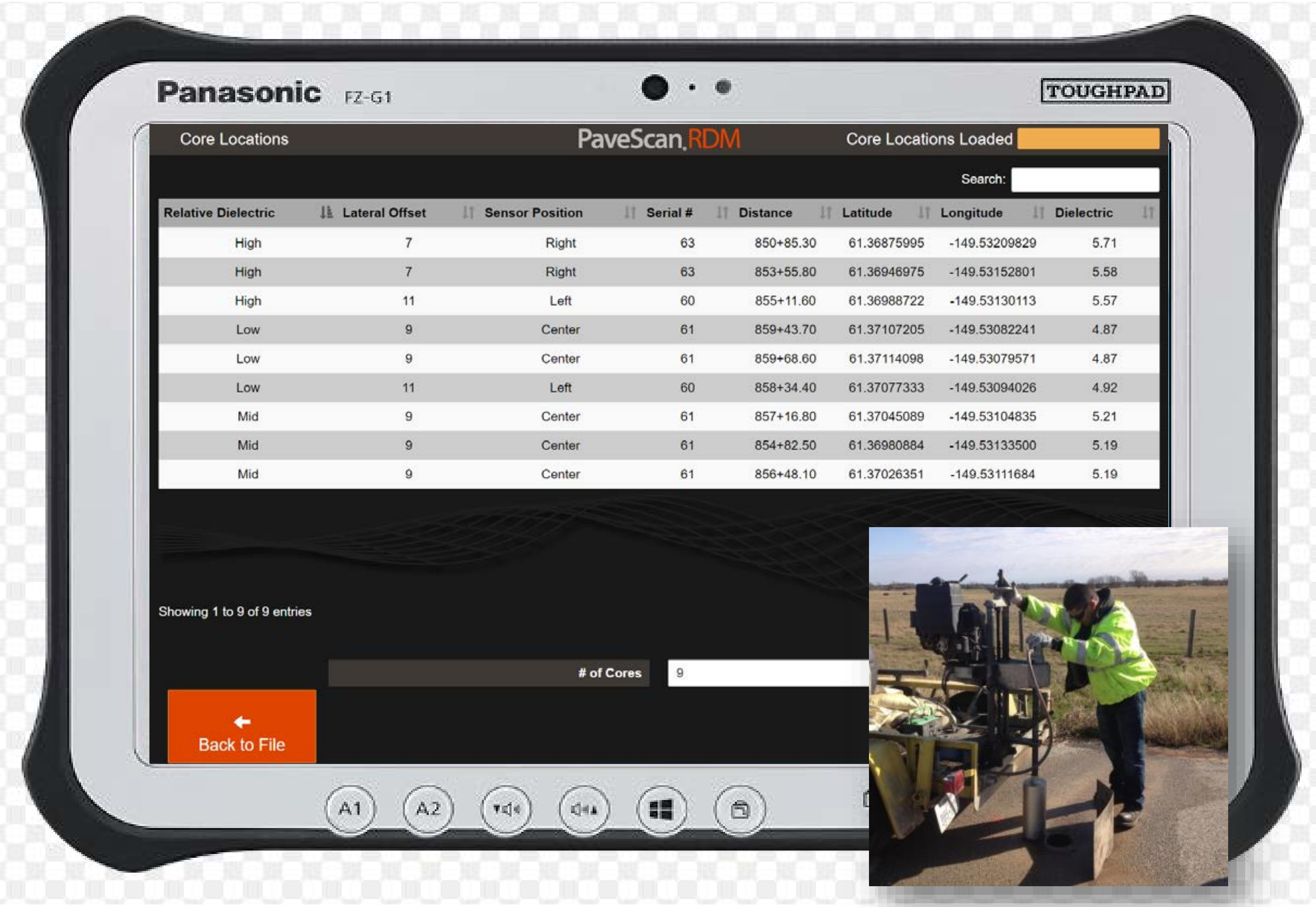



| Lateral Offset | Sensor Position | Serial # | Start Dist | End Dist | Total Dist | Median | Average | Min | Max | Standard Dev | Histogram 5% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Right | 63 | 0+45.00 | 860+51.00 | 1106.1 | 5.27309 | 5.28818 | 4.75859 | 6.30392 | 0.169112 | 5.0428 |
| 9 | Center | 61 | 0+45.00 | 860+51.00 | 1106.1 | 5.16806 | 5.16869 | 4.58836 | 5.90648 | 0.119229 | 4.97978 |
| 11 | Left | 60 | 0+45.00 | 860+51.00 | 1106.1 | 5.22438 | 5.21596 | 4.48204 | 6.19983 | 0.153228 | 4.9558 |

Per-Profile Average, Min, Median, Max, Standard Dev, and Histogram Statistics

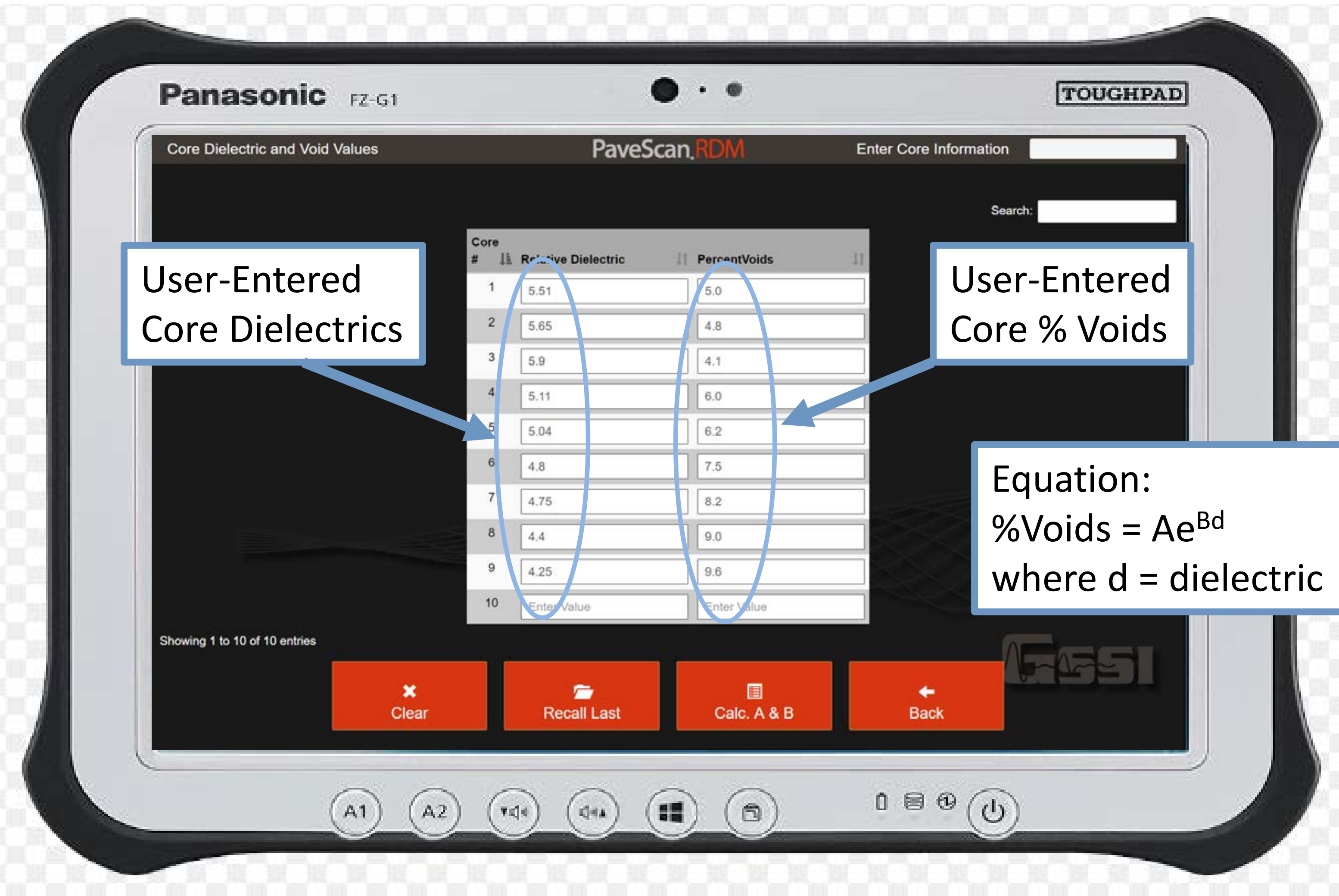
# PaveScan RDM – Playback

# PaveScan RDM – Locate Cores




| Relative Dielectric | Lateral Offset | Sensor Position | Serial # | Distance | Latitude | Longitude | Dielectric |
|---|---|---|---|---|---|---|---|
| High | 7 | Right | 63 | 850+85.30 | 61.36875995 | -149.53209829 | 5.71 |
| High | 7 | Right | 63 | 853+55.80 | 61.36946975 | -149.53152801 | 5.58 |
| High | 11 | Left | 60 | 855+11.60 | 61.36988722 | -149.53130113 | 5.57 |
| Low | 9 | Center | 61 | 859+43.70 | 61.37107205 | -149.53082241 | 4.87 |
| Low | 9 | Center | 61 | 859+68.60 | 61.37114098 | -149.53079571 | 4.87 |
| Low | 11 | Left | 60 | 858+34.40 | 61.37077333 | -149.53094026 | 4.92 |
| Mid | 9 | Center | 61 | 857+16.80 | 61.37045089 | -149.53104835 | 5.21 |
| Mid | 9 | Center | 61 | 854+82.50 | 61.36980884 | -149.53133500 | 5.19 |
| Mid | 9 | Center | 61 | 856+48.10 | 61.37026351 | -149.53111684 | 5.19 |

# PaveScan RDM – Core Calibration



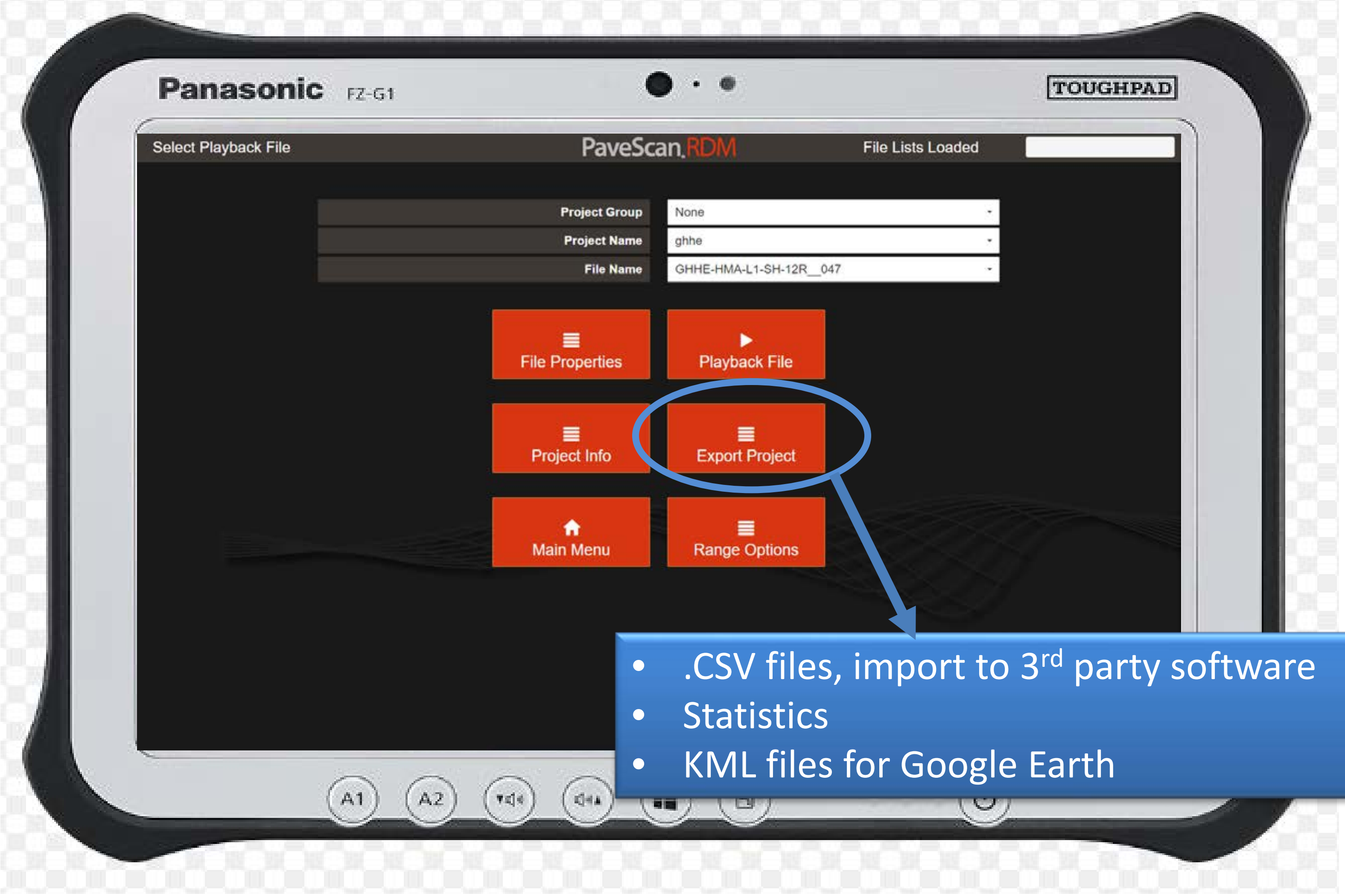

User-Entered Core Dielectrics

User-Entered Core % Voids

Equation:
$\%Voids = Ae^{Bd}$
where d = dielectric

# PaveScan RDM – Percent Compaction

# PaveScan RDM – Export




- .CSV files, import to 3rd party software
- Statistics
- KML files for Google Earth

# PaveScan RDM – Google Earth



Data provided by Rich Giessel, Alaska DOT

# PaveScan RDM – AND!!!

- No more certifications!!!
- No more security regulations!!!
- No more nuclear technology!!!

# PaveScan RDM – Summary

PaveScan RDM is a complete GPR system providing:

- Real-time dielectric values of compacted asphalt
- Full Coverage (lane width and length)
- Automatically located core locations
- Compaction information on-site (after core calibration)
- Export to CSV and Google Earth KML files

And

- No certifications, security issues, factory calibrations





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STRATEGIC HIGHWAY RESEARCH PROGRAM

# Nondestructive Evaluation of Bituminous Compaction Uniformity Using Rolling Density Meter

## Summary of SHRP2 R06C Implementation Project


Lev Khazanovich, Ph.D.
University of Pittsburgh


U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO

# SHRP2 R06C Implementation

- Objectives:
  - Evaluate RDM equipment
  - Provide support to states in implementing RDM
- Partnership
  - FHWA, AASHTO, CH2M Hill, and ARA
  - University of Minnesota
  - MnDOT, Maine DOT, and Nebraska DOT
- Field Trails
  - Maine
  - Nebraska
  - Minnesota

# Field Testing

- Objectives
  - DOT personnel training
  - RDM technology evaluation/refinement
  - Test protocols and specifications development
- Projects
  - US-52 near Zumbrota, Minnesota
  - HWY 2 in Lincoln, Nebraska
  - US-1 near Cherryfield, Maine
  - State Rte 9 near Clifton, Maine
  - I-95 near Pittsfield, Maine
  - US-14 near Eyota, Minnesota

# Field Testing – Lessons Learned

- RDM is an implementation-ready device
  - Easy to operate
  - Provides reparative measurements
  - Can operate continuously for 6-8 hours
- Day and night testing was conducted without interfering paving or delaying moving closure
- RDM is capable of providing real time assessment of in-place compaction uniformity
- Good dielectric – air void correlations were obtained for the majority of the projects
- Good core data collection protocol is a key





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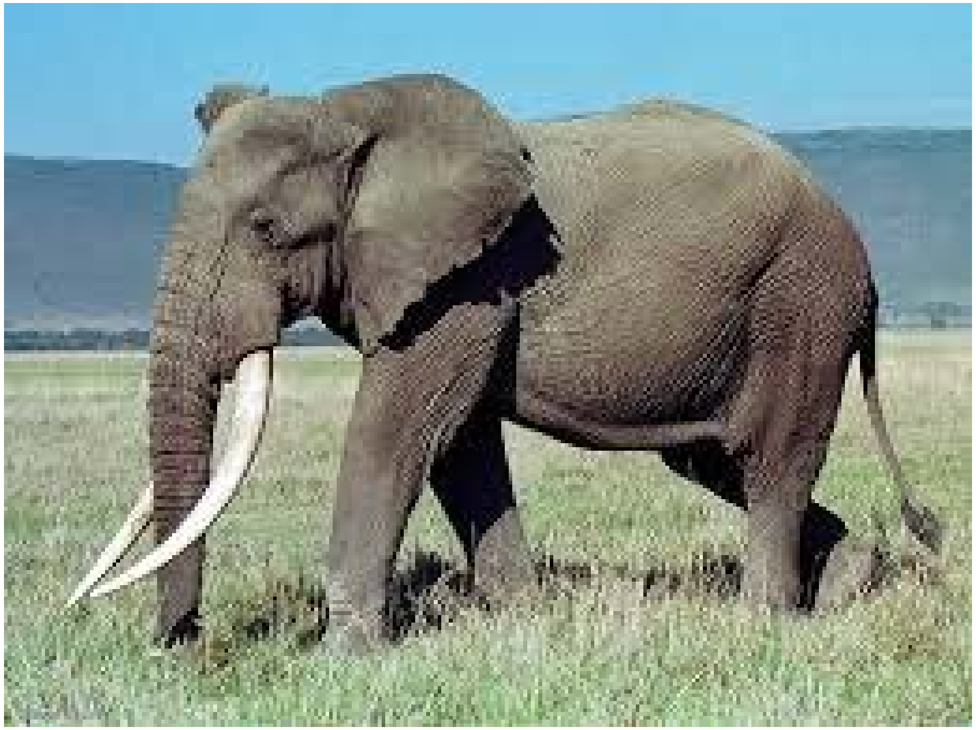
# Minnesota DOT Vision

Curt Turgeon, P.E.

U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO

# Not to scale



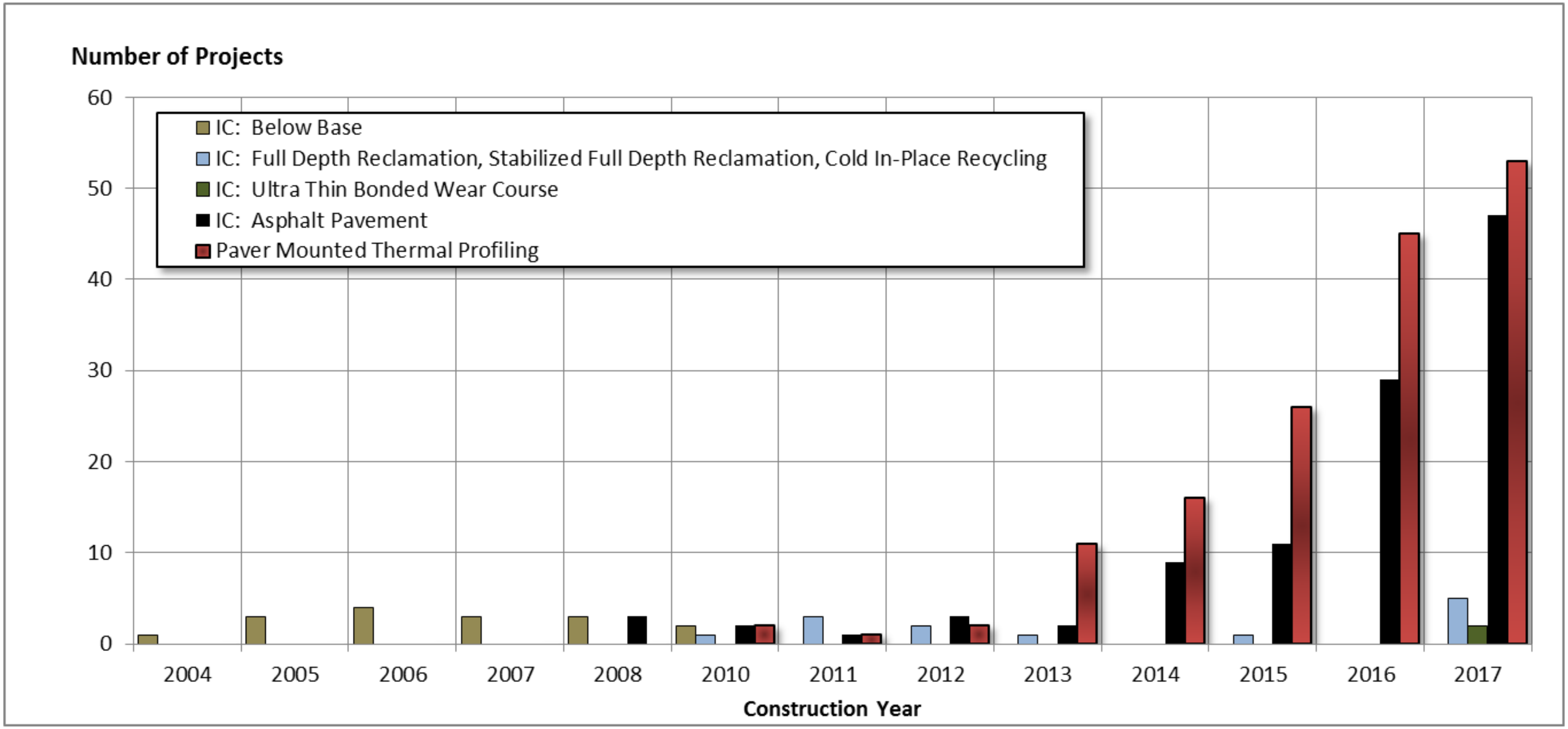
Elephant = 6 tons

Hedgehog < 1 pound

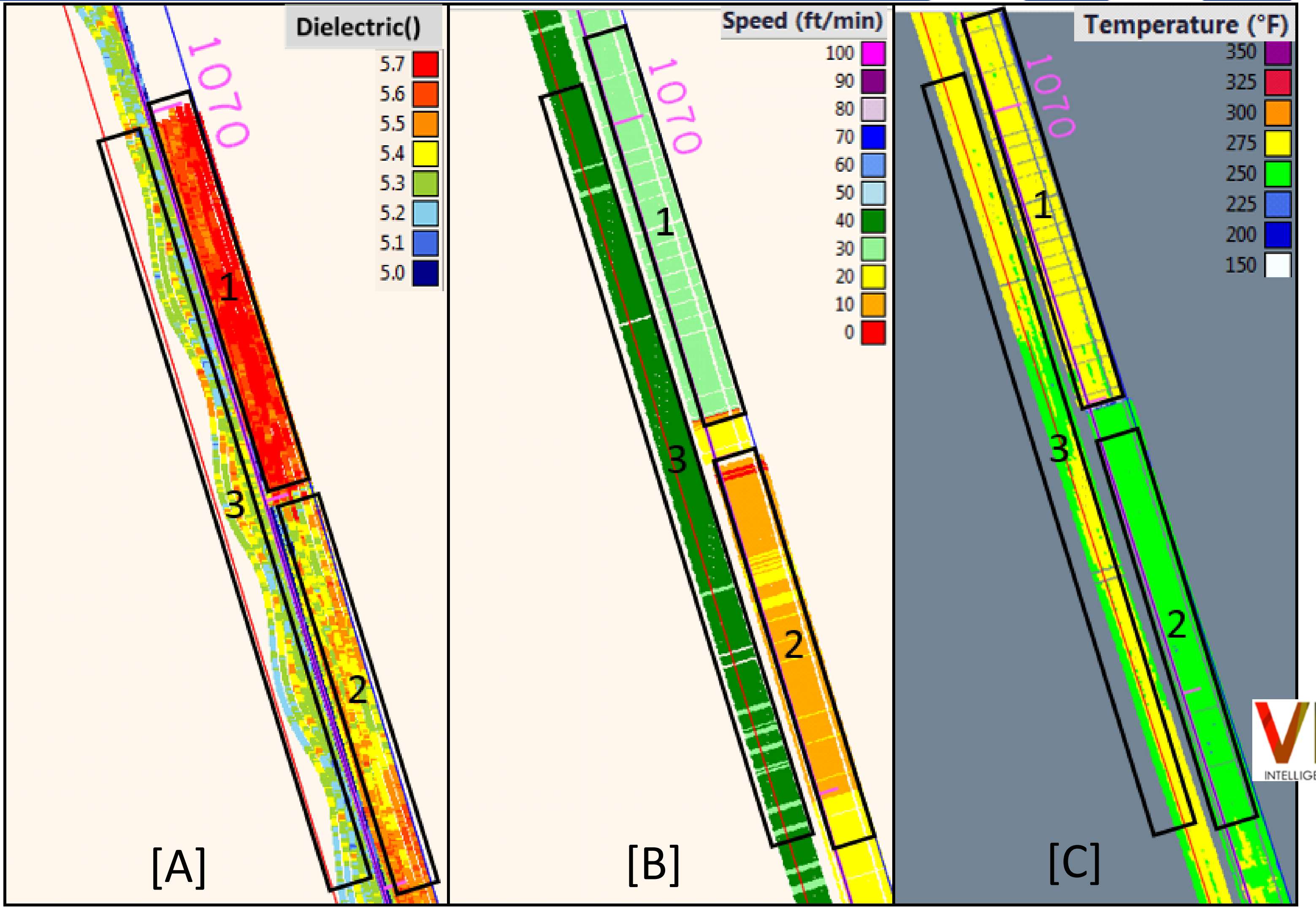
For every 100 elephants of mix, we sample and test two hedgehogs (cores)

# THAT'S IT?

# MN Intelligent Compaction and Thermal Profiling History

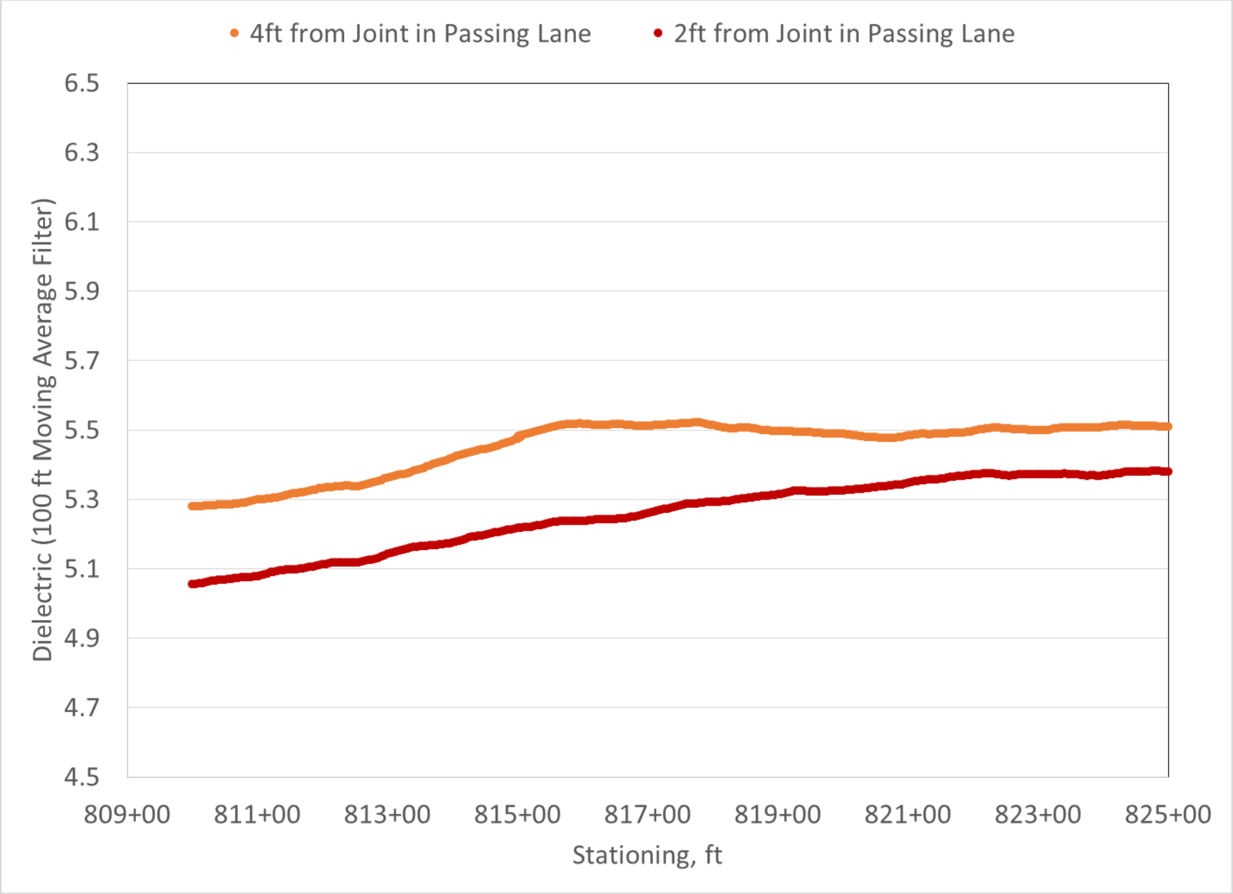


# TH 52: Comparison with Other Factors



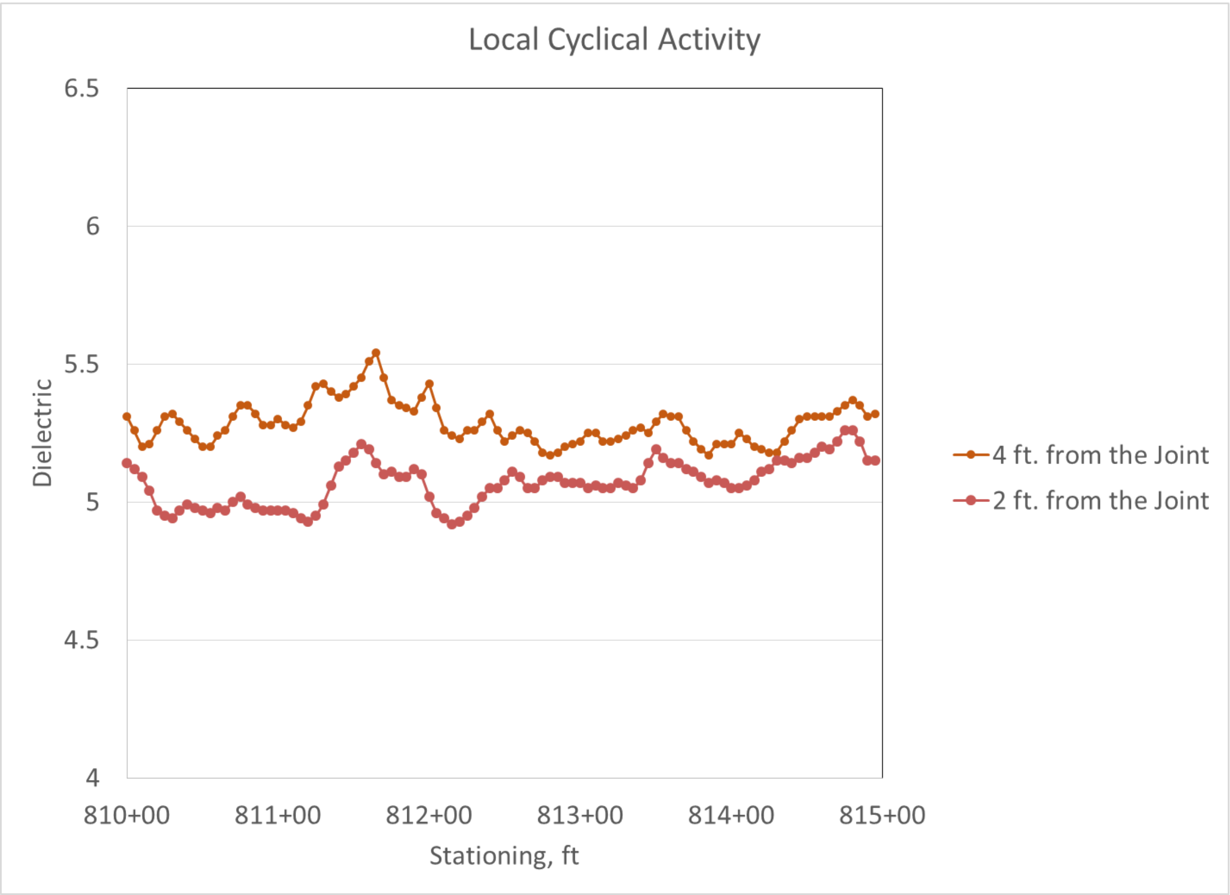

VETA INTELLIGENT CONSTRUCTION

# Interstate 35 –Passing Lane Offset Comparison



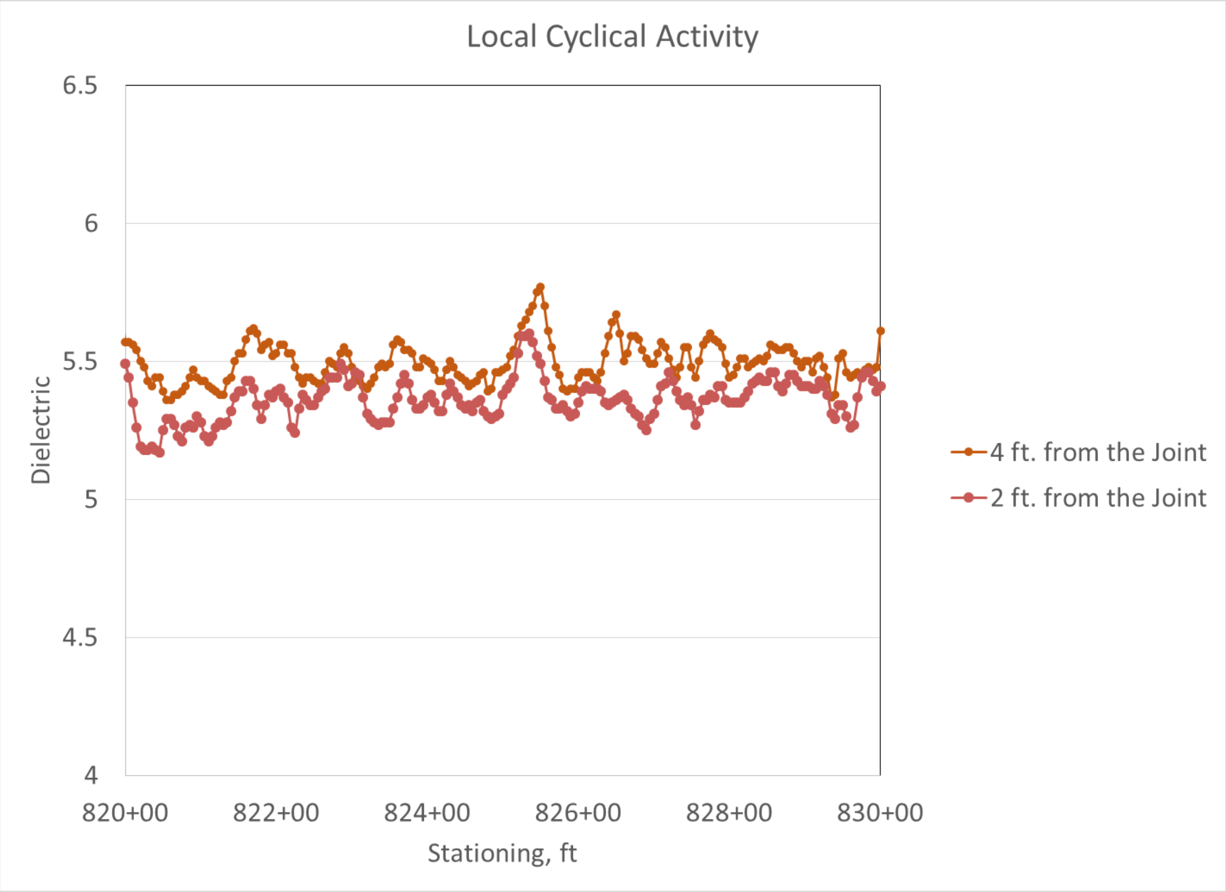

- First ½ mile stretch
  - Most of the increase occurs in the first 500 ft when 4 ft. away from the joint
  - Gradual increase over 2500 ft occurs at 2 ft. from the joint

# Interstate 35 –Local Variation Offset Comparison




- First 500 ft local comparison
  - Can observe cyclical variation in the mat at different compaction levels
  - Both offsets show similar variations in compaction

# Interstate 35 –Passing Lane Offset Comparison




- 1000 ft comparison after increase in compaction
    - Can observe cyclical variation in the mat at similar compaction levels
    - Variability within offsets are lower

# Minnesota DOT – RDM Experience

- Dr. Kyle Hoegh, MnDOT
- Dr. Shongtao Dai, MnDOT

Dr. Lev Khazanovich, U. of Pittsburgh

# Acknowledgements

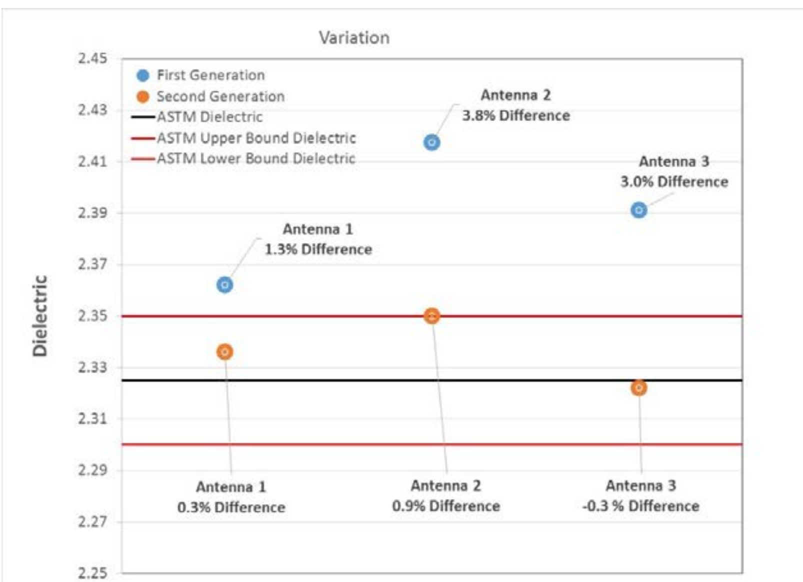
- FHWA/AASHTO for providing RDM
- MnDOT district materials and constructions
- UMN students

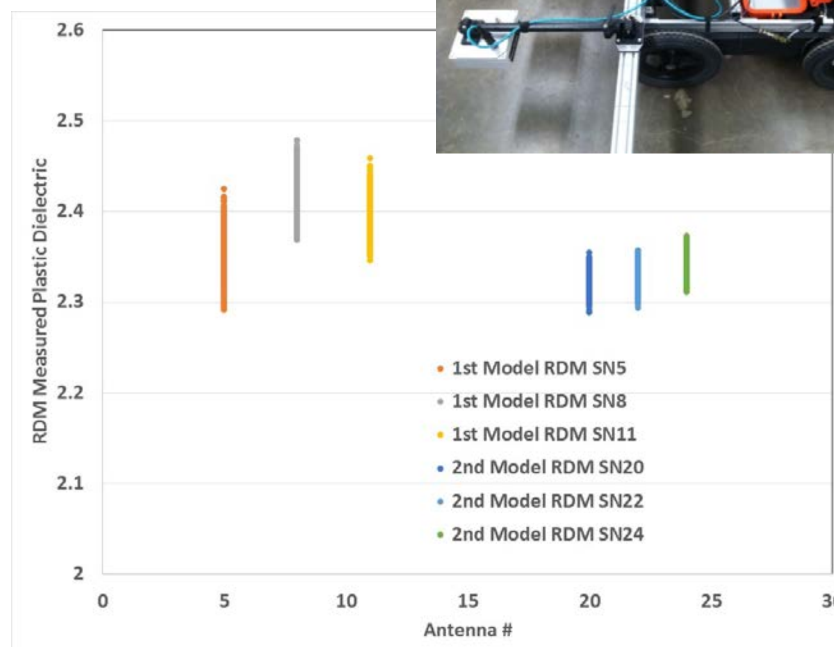
# Equipment Calibration

- Obtained RDM in 2015
- Measurement difference among the antenna

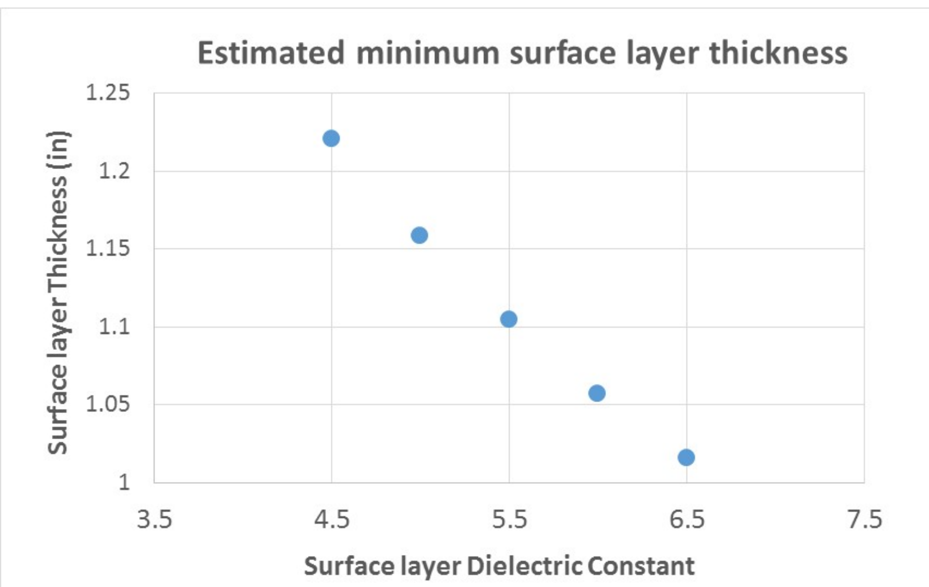
- **High Density Polyethylene (HDPE)**
  - Reported dielectric: 2.3-2.35

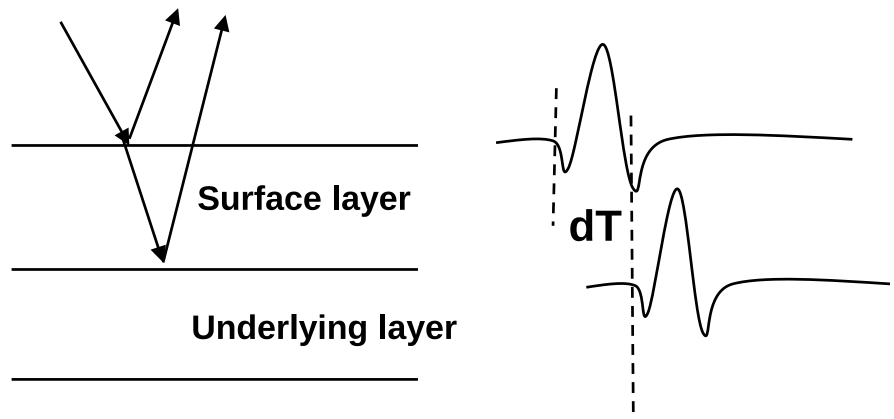
$$\varepsilon_{HMA} = \left( \frac{1 + \frac{A_0}{A_P}}{1 - \frac{A_0}{A_P}} \right)^2$$



- Underlying layer effect on surface measurement?
  - How thick does the HMA layer need to be so that the underlying layer (agg. base) has no effects?



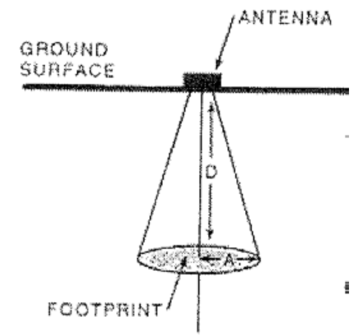

$$h_1 = v^* \Delta t_1 / 2$$
$$v = c/\sqrt{\varepsilon_1}$$

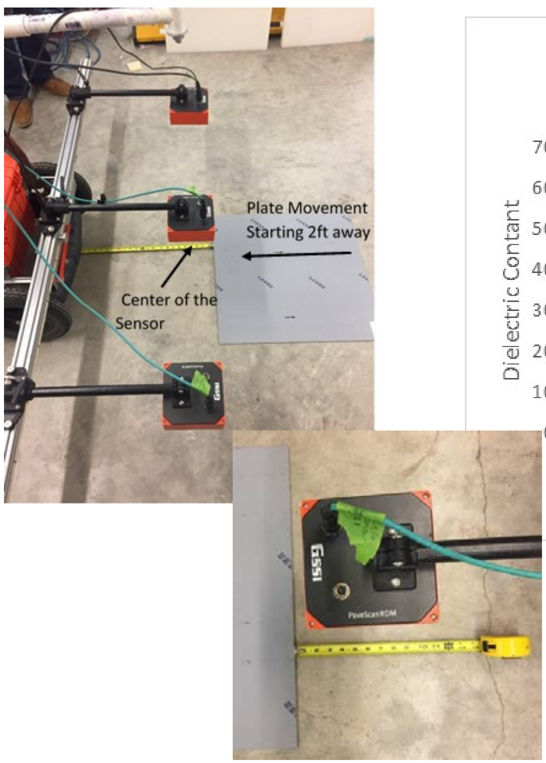
**dT ~ 0.439us**

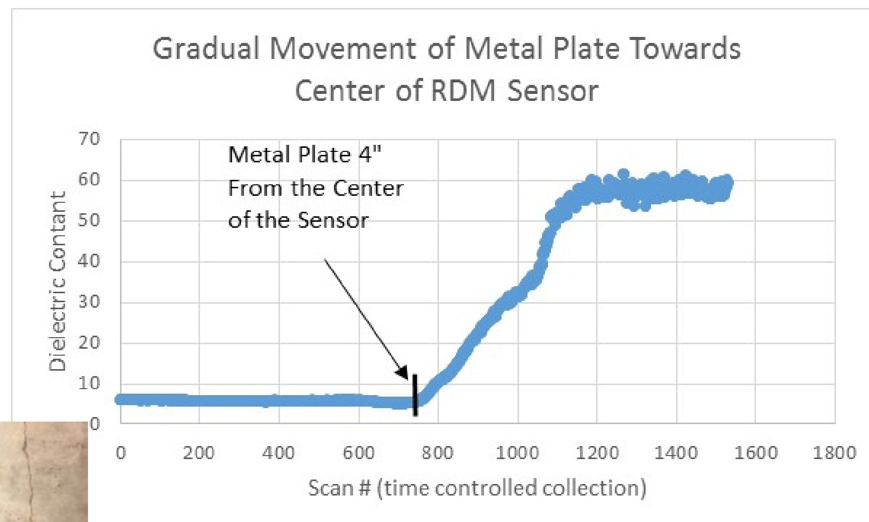
## Footprint area of an antenna (Fresnel Zone)?

$$Fr \sim 0.5\ v\ (tr/fc)^{1/2}$$

D=12”, Fr (Radius) ~ 3.6” (for 2.7Ghz-RDM)

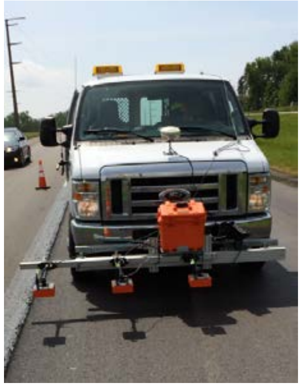


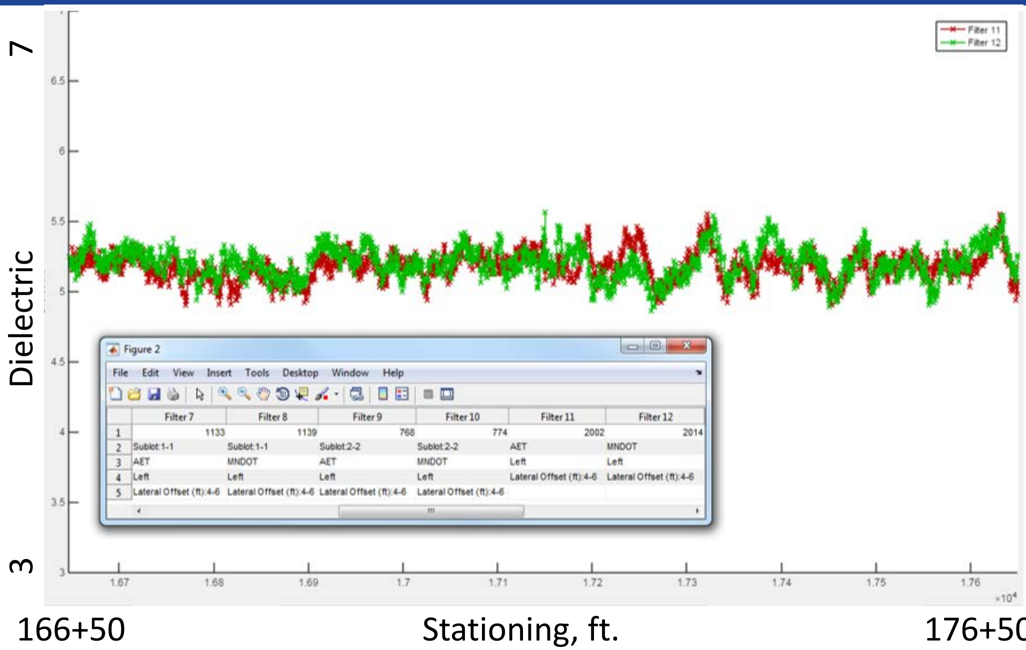

# MnDOT's Plan

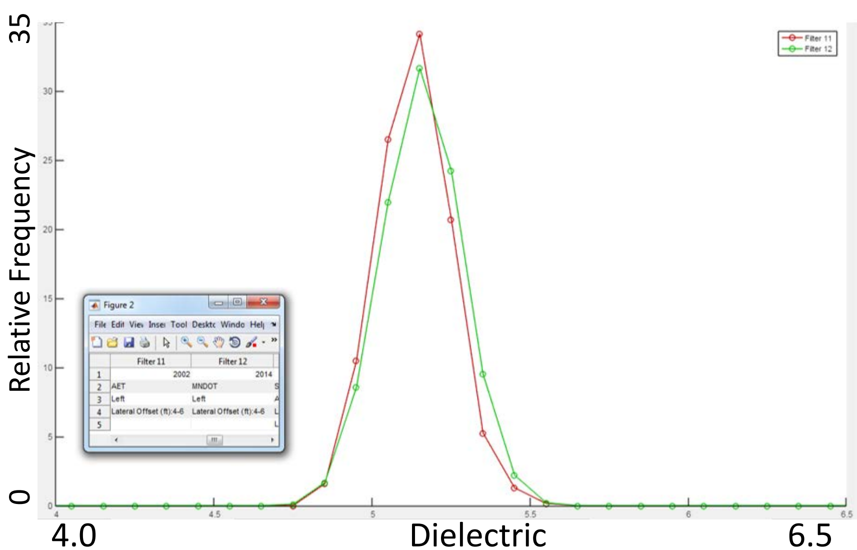
- 2016 Field Testing:
  - TH52 and TH14: Surveyed about 18miles.
- 2017 Field Testing
  - I35; Th52; Th22; Th60; CR86; Th110; CSAH13 and MnROAD
  - Hired American Engineering Testing (AET) to collect data
    - Educating consultant and contractors on this new technology
    - Testing application feasibility of vehicle mounted RDM system on construction projects.



- 2018 Plan
  - "Ghost" specification for contractor to use.
  - Further improve the system based on feedback.

# Field Equipment Validation



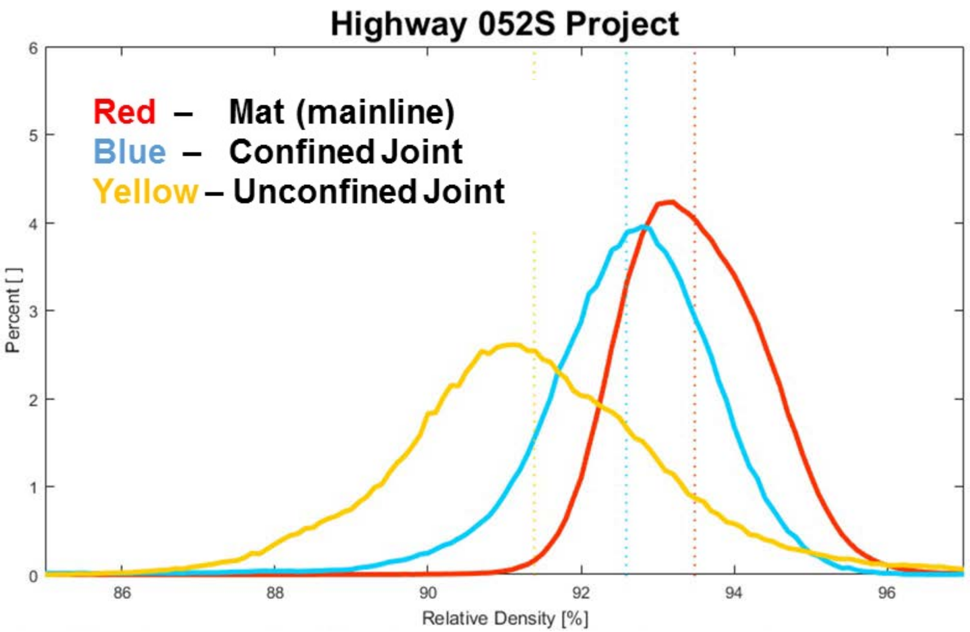




Green-MnDOT with Vehicle Mounted RDM

Red – Consultant with Walking Cart RDM

# GPR Asphalt Compaction Evaluation: 2016 TH 52 Field Testing

- **Top lift Mainline vs Confined and Unconfined Joints Summary:**
  - **93.5% (ML), 92.6%(CJ) and 91.4%(UCJ)**
  - **SD: 0.94(ML); 1.22(CJ); 1.8(UCJ)**
  - **Density:**
  - **UCJ/ML=97.7%; CJ/ML=99%**
  - **Core data: UCJ/ML=95.1%**
  - **CJ/ML = 99.1%**
    - 97.5% locations:
    - > 91.6%(ML),
    - > 90.2% (CJ)
    - > 87.8% (UCJ)

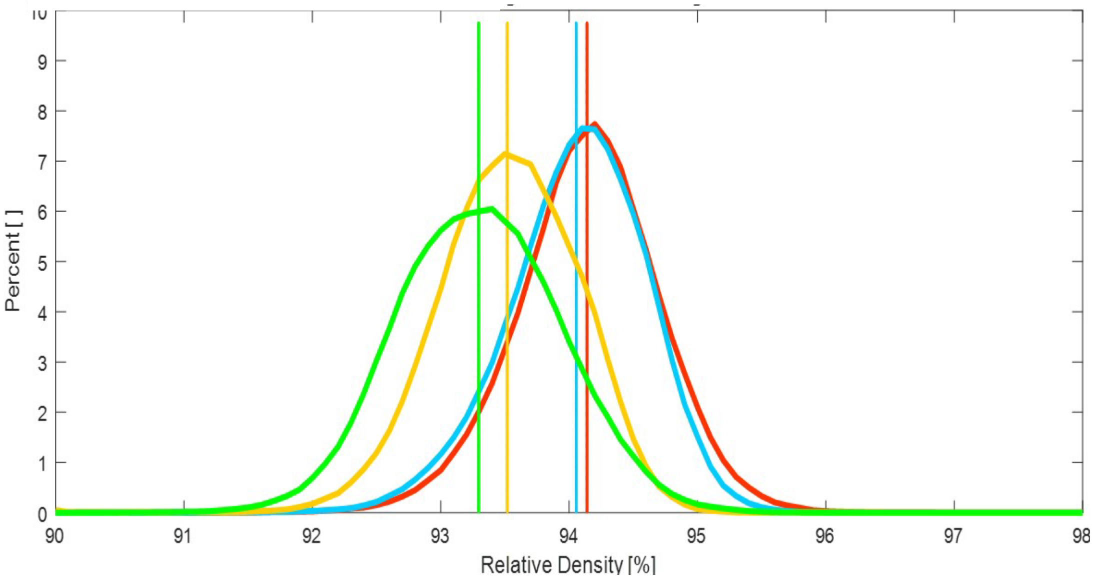


# GPR Asphalt Compaction Evaluation: 2016 TH 14 Field Testing

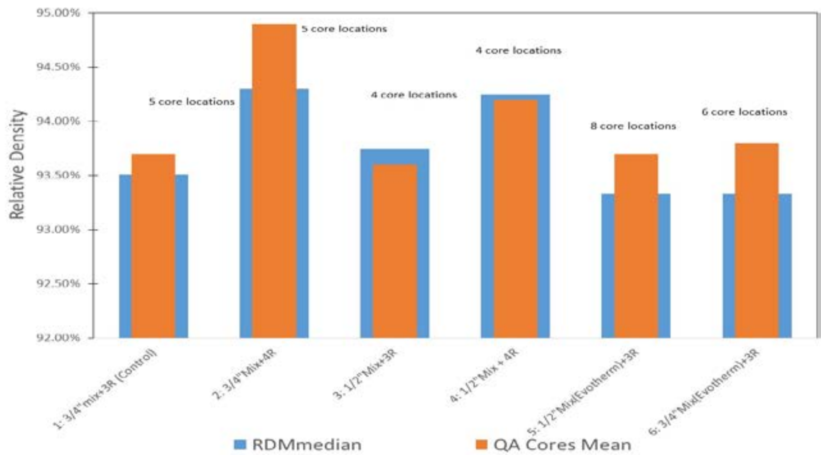
- Comparison of Test Sections
  - **Mix B (3/4-) to A(1/2-): not much difference on compaction.**
  - **Adding a roller: density slightly increased on this project.**

**Red** – ¾” mix + 4 rollers
**Blue** – ½” mix + 4 rollers
**Yellow** – ½” mix + 3 rollers
**Green** – ¾” mix + 3 rollers
**[control (4’-8’)]**

- Median Density:
  Red: 94.2%
  Blue: 94.1%
  Yellow: 93.5%
  Green: 93.3%

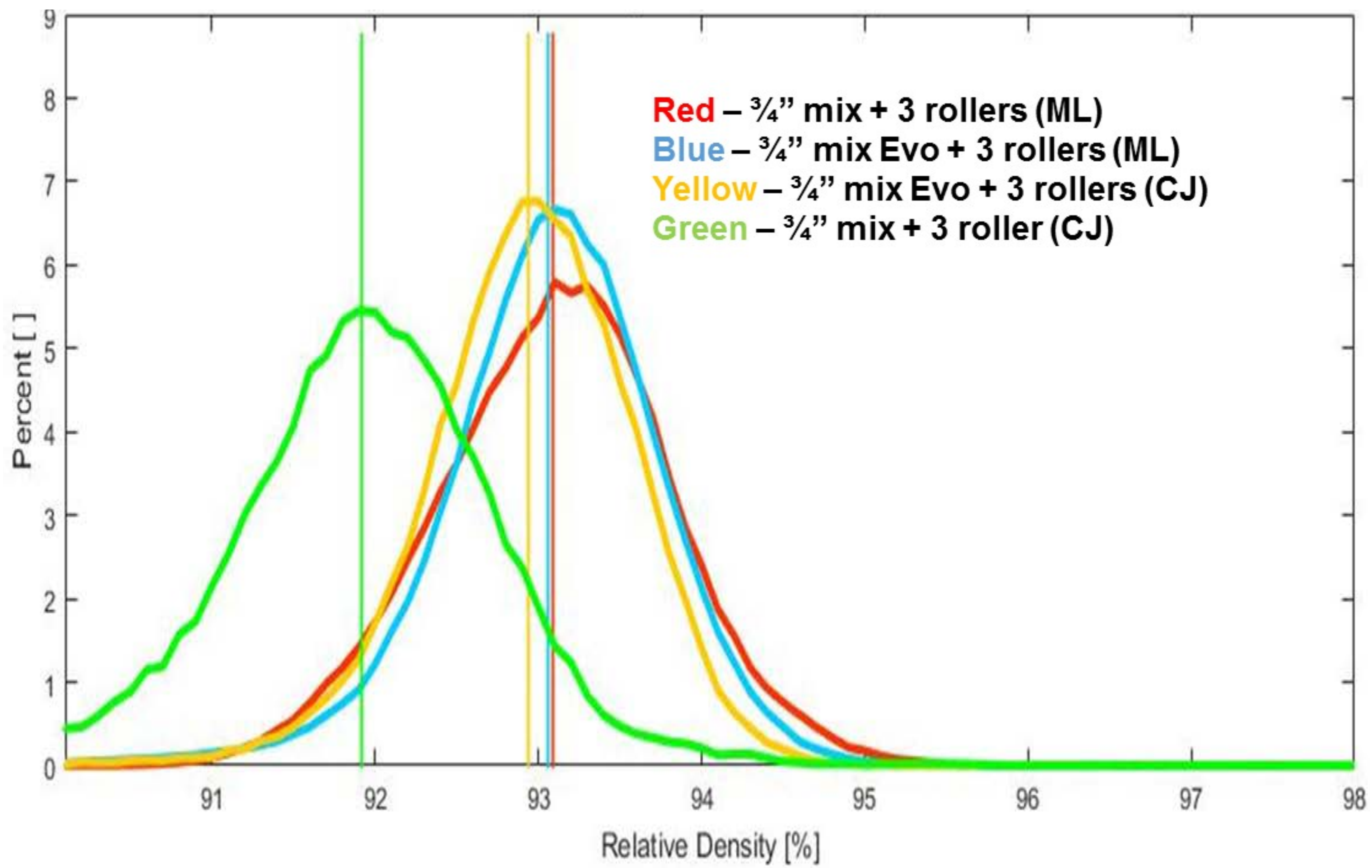



Cores vs RDM Medians



# GPR Asphalt Compaction Evaluation: 2016 TH 14 Field Testing

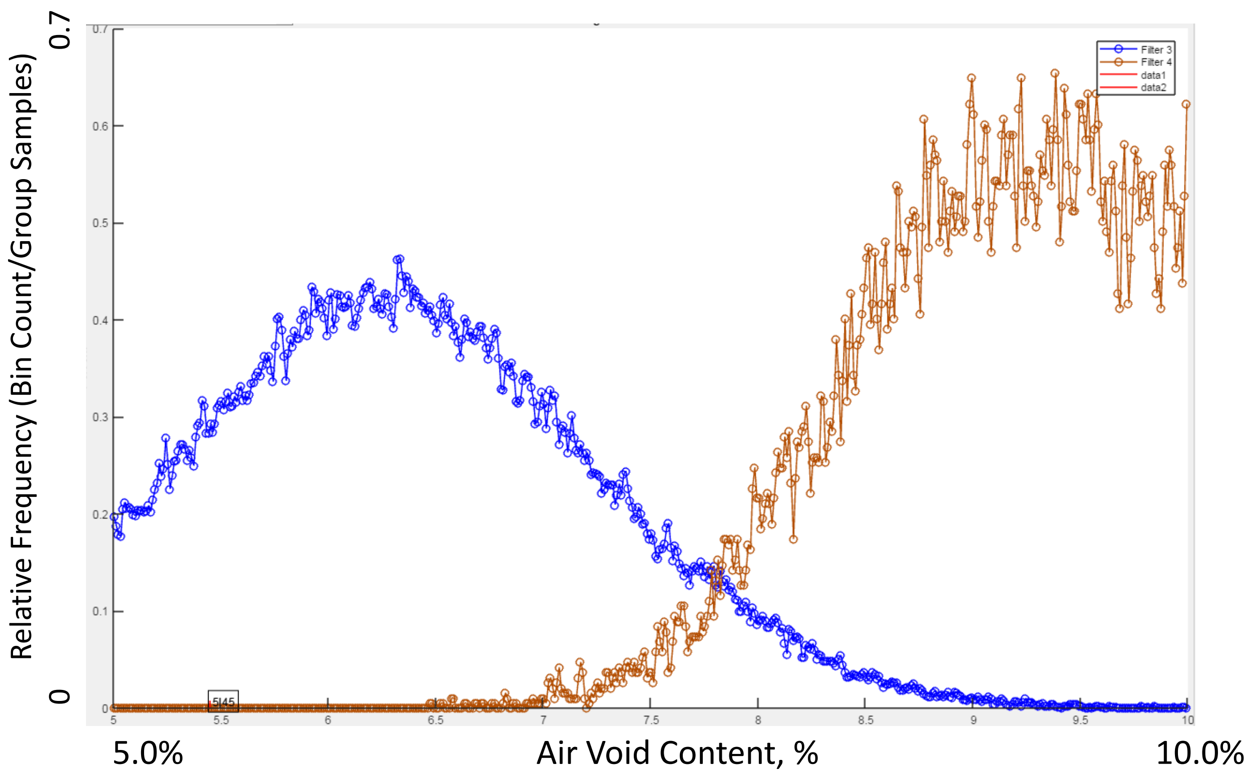
- **Evotherm helped joint compaction density**




- Median Density:
  - Red: 93.1% (ML)
  - Blue: 93.1% (ML)
  - Yellow: 92.9%(CJ+Ev)
  - Green: 91.5% (CJ)
  - (CJ+Ev)/ML=99.7%
- Core:
  - 93.8%(ML)
  - 93.5%(CJ+Ev)-only 2 cores
  - CJ/ML= 99.6%

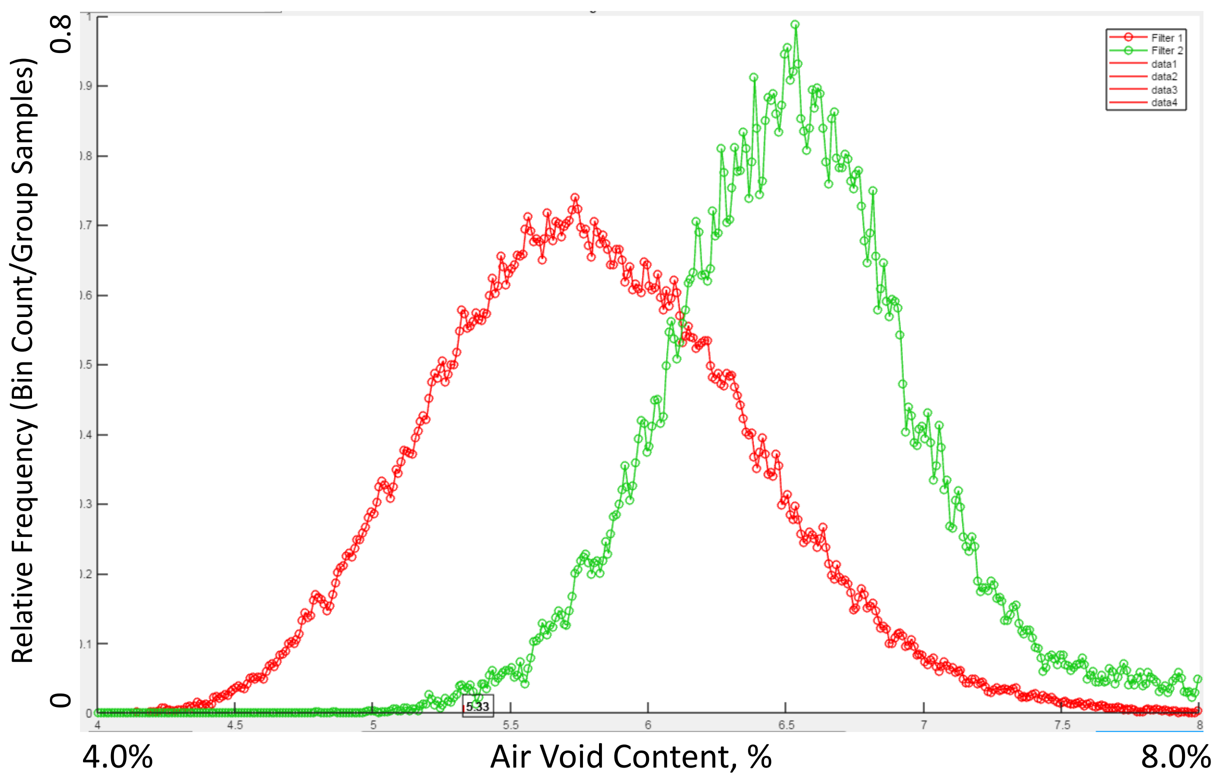
# 2017 TH52 N Standard Paving

| Group Name | Stationing range, ft. | Offset range, ft. | Color | Samples | 10th Percentile Air Void Content |
|---|---|---|---|---|---|
| Driving Mat | 223+50 to 1012+13 | 2 to 10 | Blue | 257,817 | 7.5% |
| Driving Joint | | 0.3 to 0.7 | Brown | 95,706 | 11.8% |

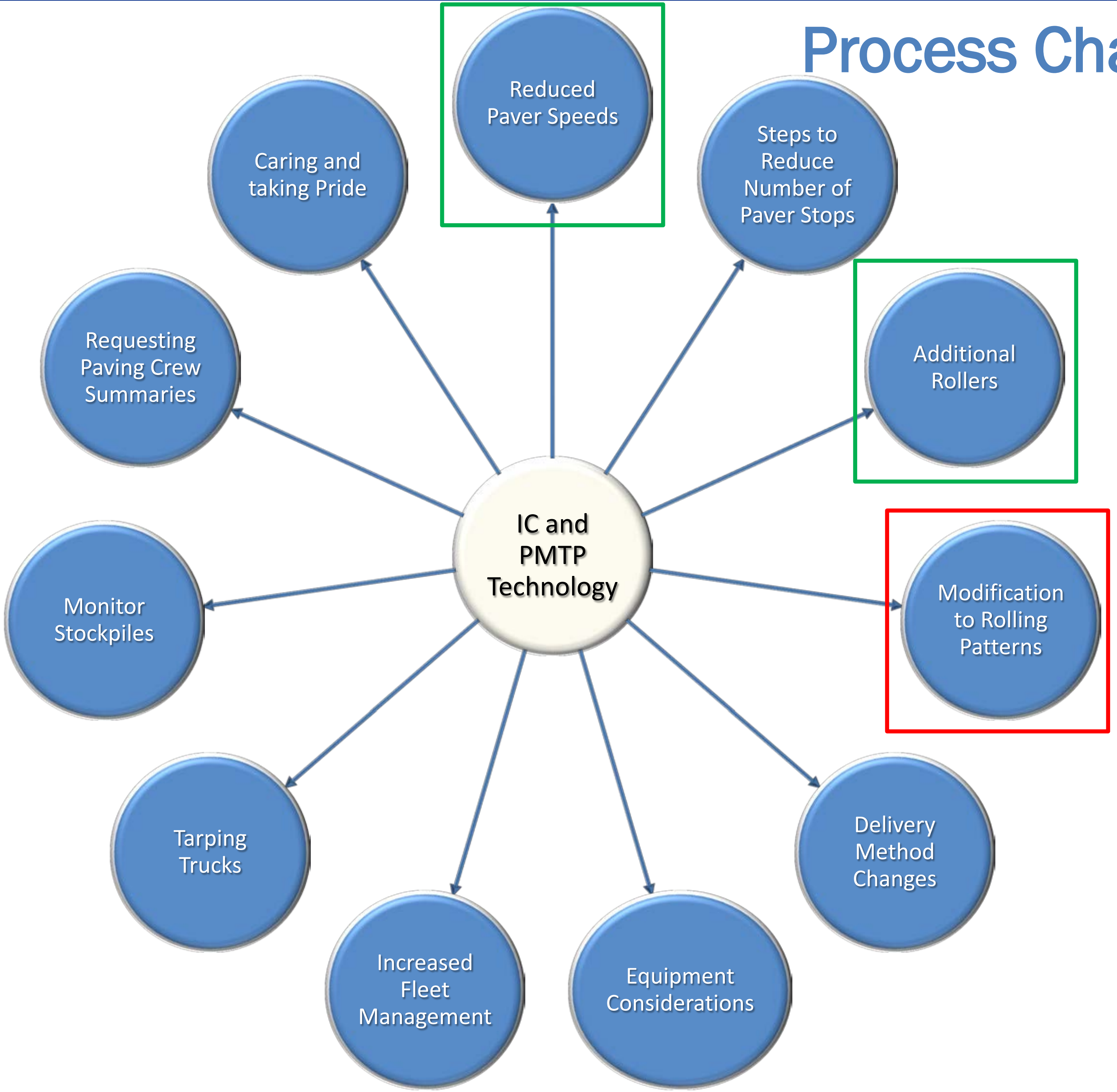


# 2017 I-35 Echelon Paving

| Group Name | Stationing range, ft. | Offset range, ft. | Color | Samples | 10th Percentile Air Void Content |
|---|---|---|---|---|---|
| Passing Mat | 507+24 to 1012+13 | -10 to -2 | Red | 137,309 | 6.5% |
| Passing Joint | | -0.7 to -0.3 | Green | 37,864 | 7.4% |

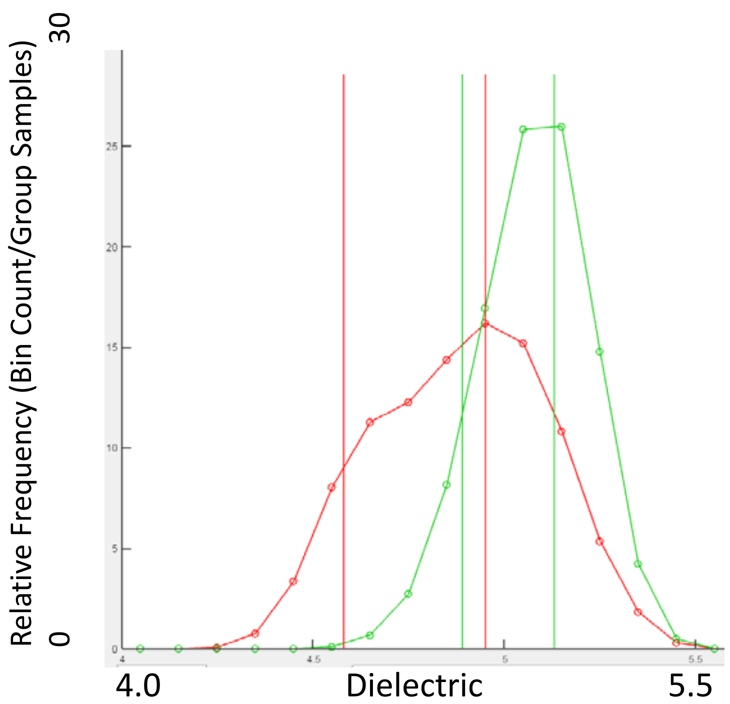


# Process Changes



# GPR Asphalt Compaction: Roller Technique Evaluation

| Group Name | Stationing range, ft. | Offset range, ft. | Color | Samples | Core Taken at 10th %, Air Void Content |
|---|---|---|---|---|---|
| Roller Technique #1 | 920+00 to 925+00 | Centered on Joint | Red | 1000 | 9.6% |
| Roller Technique #2 | 935+00 to 940+00 | Centered on Joint | Green | 1000 | 7.7% |



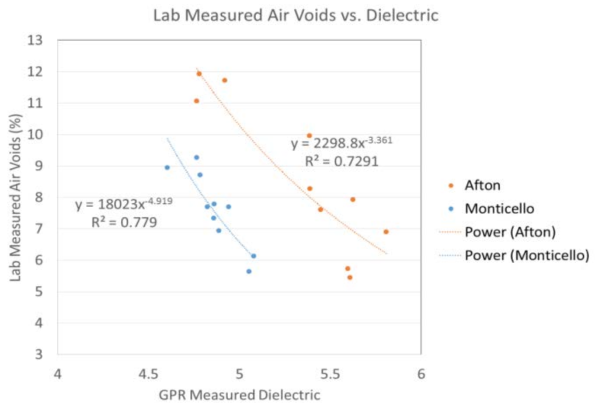

- Example 500 ft section where 2 different echelon breakdown roller techniques were used on the joint:
  - On-site RDM dielectric indicated greater compaction using technique 2
  - Core taken at 10th percentile indicated greater compaction in technique 2
- On-site dielectric can be used to give feedback as to what techniques are more effective for compaction

# Future Improvements for Implementation

- **Sensitivity Study**
  - How does each component in a mixture affect dielectric constant, such as aggregate type, gradation, binder type and content?

    Develop a guideline on when contractor should notify agency if there is mixture change during construction.

- **Establish Calibration Curve in Lab**
  - Potentially no field core needed
  - Currently use field cores for calibration
    - Location accuracy ?




- **Calibration Procedure**
  - Current: High-density polyethylene (HDPE) and Garolite
  - Swerving on field: max difference of 0.08 ?





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# Texas Experience with the RDM

Stephen Sebesta, TTI
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U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO

# How to Improve Acceptance Testing

More

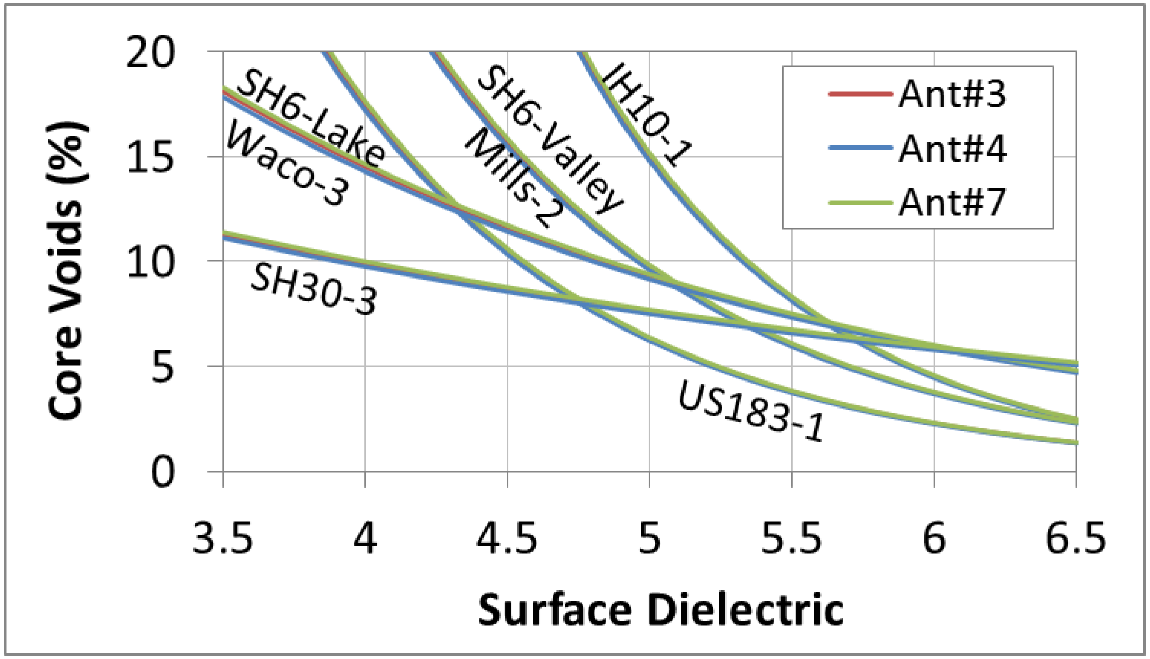
Bigger

Smarter

# Deployment of RDM on Projects

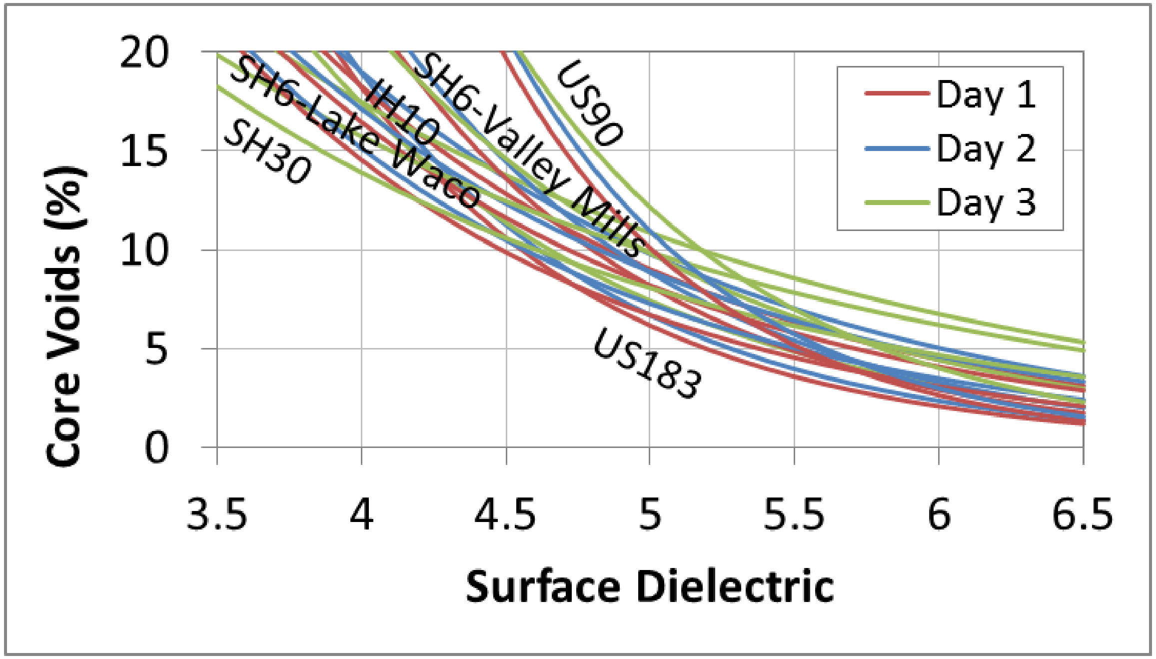
| Generation | Phase | Project | Mix Type | NMAS (in.) | Binder Type | Optimum AC (%) | Aggregate Type | Theo. Max SG | Thickness (in.) |
|---|---|---|---|---|---|---|---|---|---|
| Gen 1 & 2 | | FM 1887 | TOM-C | 3/8 | 70-22 | 6.7 | Limestone | 2.474 | 1.0 |
| Gen 1 & 2 | | RM 12 | TOM-F | 1/4 | 76-22 | 7.3 | Sandstone | 2.348 | 0.5 |
| Gen 1 & 2 | | Riverside | DG Ty-C | 1/2 | 76-22 | 4.8 | Limestone | 2.447 | 2.0 |
| Gen 3 | Phase I | US 183 | TOM-F | 1/4 | 76-22 | 7.2 | Sandstone | 2.376 | 0.75 |
| Gen 3 | Phase I | US 90 | SP Ty-D | 3/8 | 70-22 | 5.2 | Quartzite Limestone | 2.443 | 1.5 |
| Gen 3 | Phase I | IH 10 | SP Ty-C | 1/2 | 64-22 | 5.1 | Sandstone Limestone | 2.462 | 2.0 |
| Gen 3 | Phase I | FM 31 | DG Ty-D | 3/8 | 64-22 | 5.4 | … | 2.481 | 2.0 |
| Gen 3 | Phase II | SH 6-VM | DG Ty-D | 3/8 | 64-22 | 5.2 | Dolomite Gravel | 2.447 | 2.0 |
| Gen 3 | Phase II | SH 6-Waco | TOM-C | 3/8 | 76-22 | 6.6 | Sandstone Dolomite | 2.434 | 1.25 |
| Gen 3 | Phase II | SH 30 | SMA-C | 1/2 | 76-22 | 6.0 | Sandstone Dolomite | 2.405 | 2.0 |

# Antenna impact on Calibration



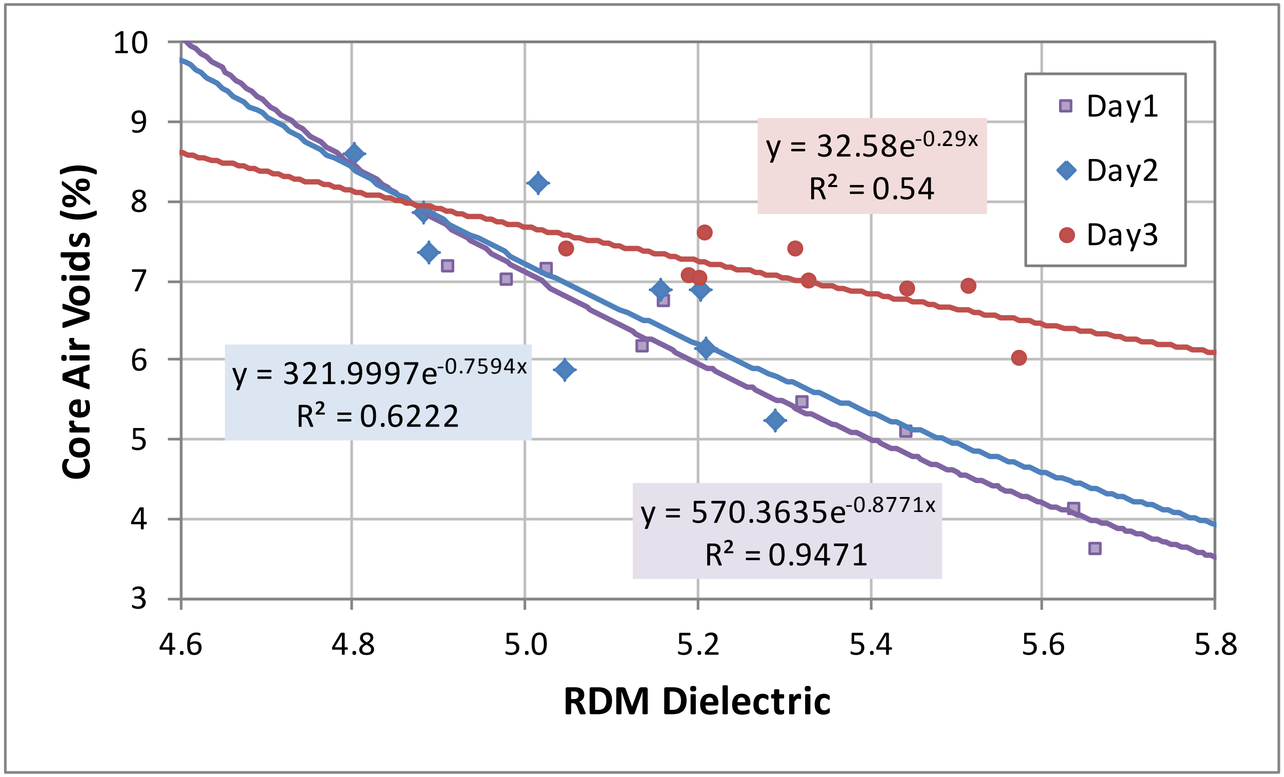

| Predictor Variable | Model p-value | Model $R^2$ | Variable p-value | Significant |
|---|---|---|---|---|
| Dielectric | <0.0001 | 0.895 | <0.0001 | Yes |
| Antenna | | | 0.3111 | No |
| Project_Day | | | <0.0001 | Yes |
| Project_Day*Dielectric | | | <0.0001 | Yes |

# Production Day impact on Calibration




| Predictor Variable | Model p-value | Model $R^2$ | Variable p-value | Significant |
|---|---|---|---|---|
| Dielectric | <0.0001 | 0.845 | <0.0001 | Yes |
| Project | | | <0.0001 | Yes |
| Day | | | 0.0696 | No |
| Project*Dielectric | | | <0.0001 | Yes |
| Day*Dielectric | | | 0.0145 | Yes |

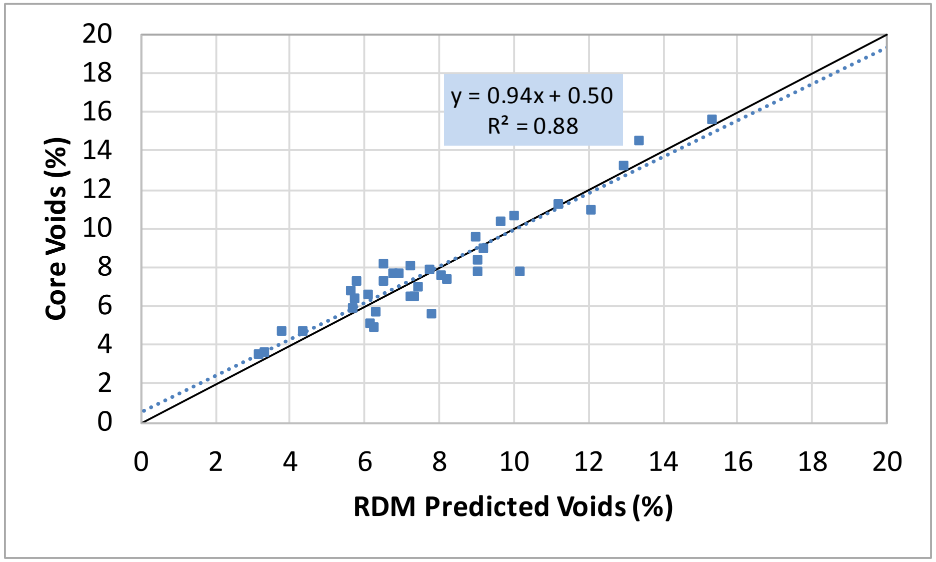
# Example influence of Paving Day




No clear explanation for this shift. Records show no major change in mix design or construction processes.

# Accuracy and Bias

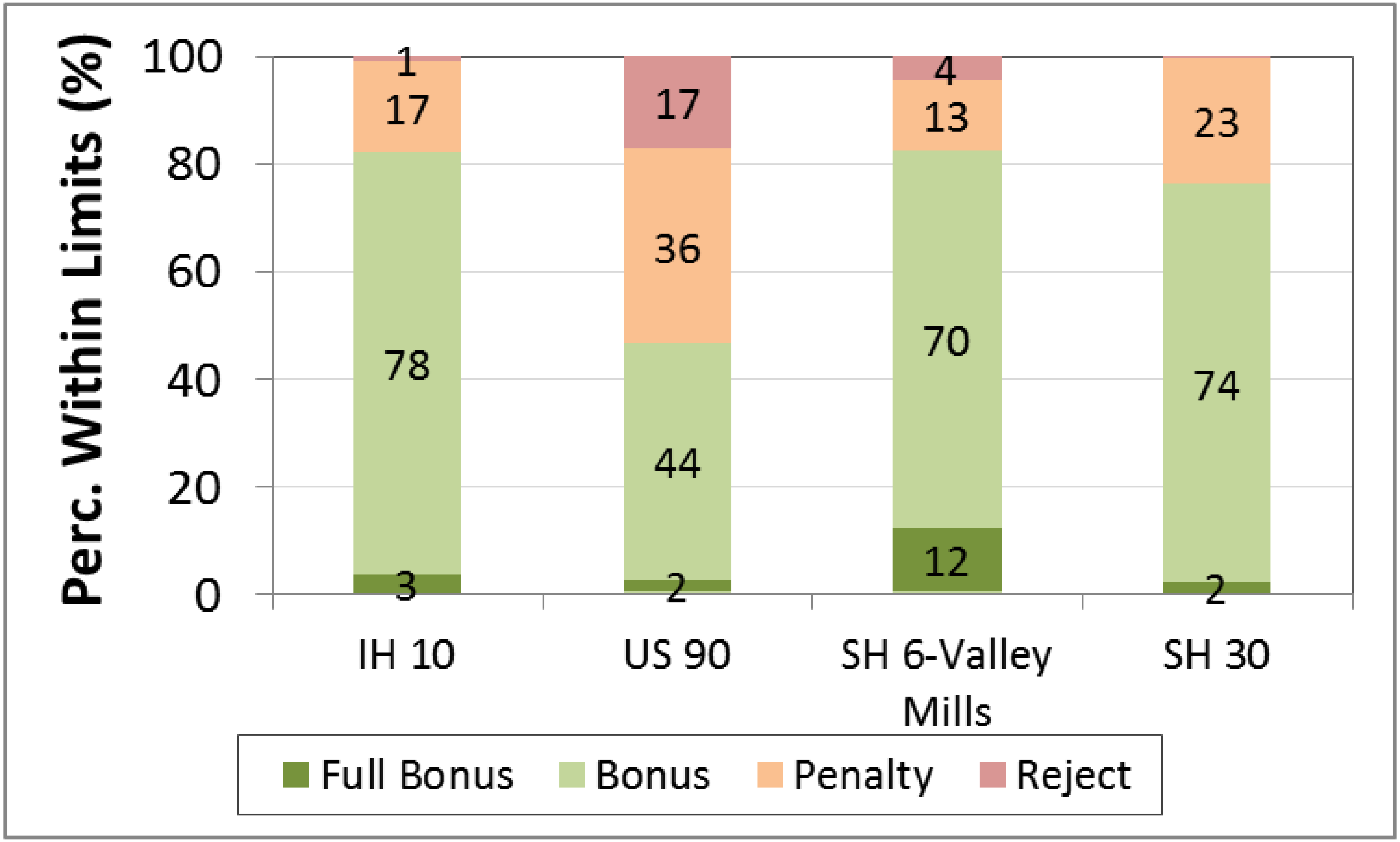
Example iteration of one possible air void prediction scenario




Overall Accuracy and Bias Results (TxDOT Phase I Projects)

| Prediction Method | Bias | | Error Standard Deviation (% voids) | Accuracy 95% Confidence Interval (% voids) |
|---|---|---|---|---|
| | Avg. Error (% voids) | p-value | | |
| GPR Dielectric (empirical) | 0.02 | 0.463 | 0.99 | 0.02 ± 1.94 |

# Potential applications for Acceptance




Currently projects w/ ~ 20% not in target compaction region often receive bonus. As an industry, are we ok with this?

# Next Steps

- TxDOT considering implementation effort using empirical calibration approach
- Deployment of RDM for information on projects in 2018 paving season
  - Test on sublot level
  - Void distributions
  - Hypothetical composite pay factor
  - Random placement sampling and testing still applicable
- Continued work on calibration approaches





SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

# Compaction Acceptance of Asphalt Paving using PaveScan RDM Continuous Full Coverage Data

## SHRP2 R06C GPR RDM Implementation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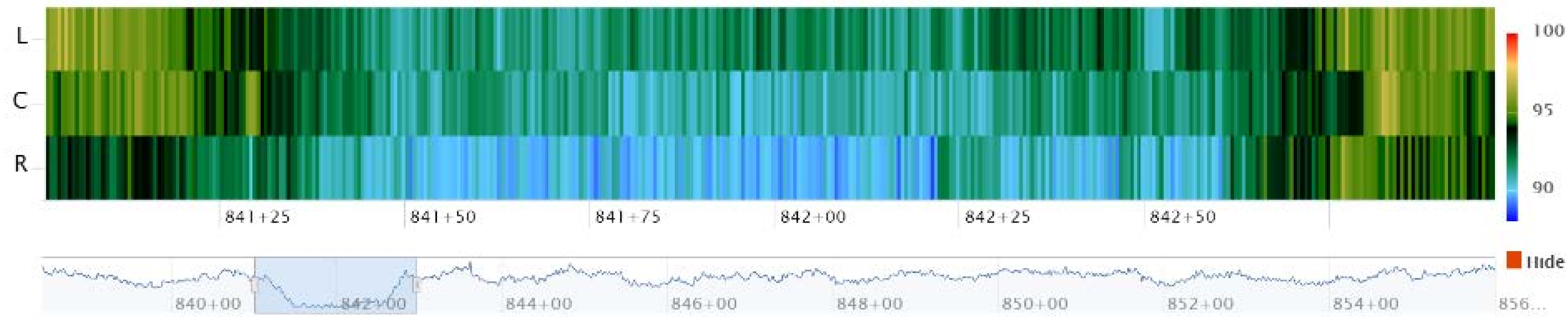
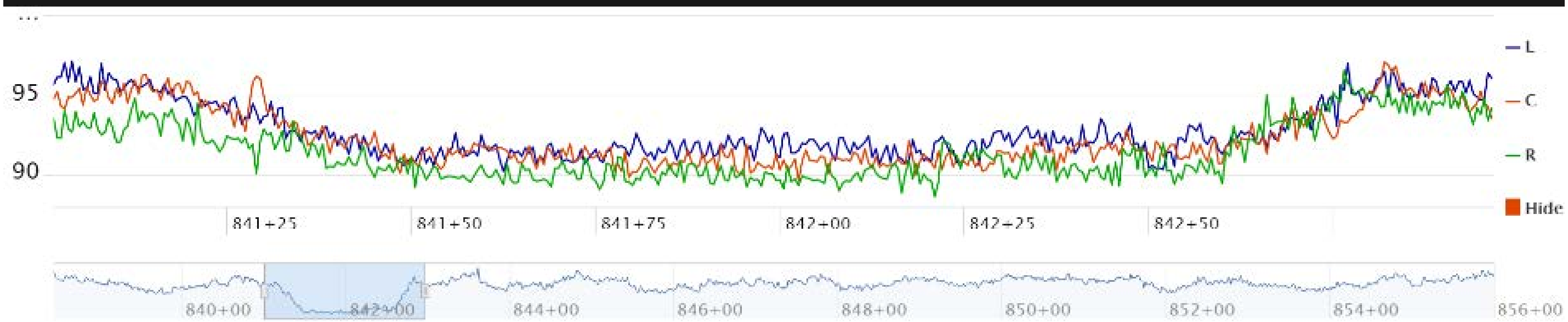
AASHTO

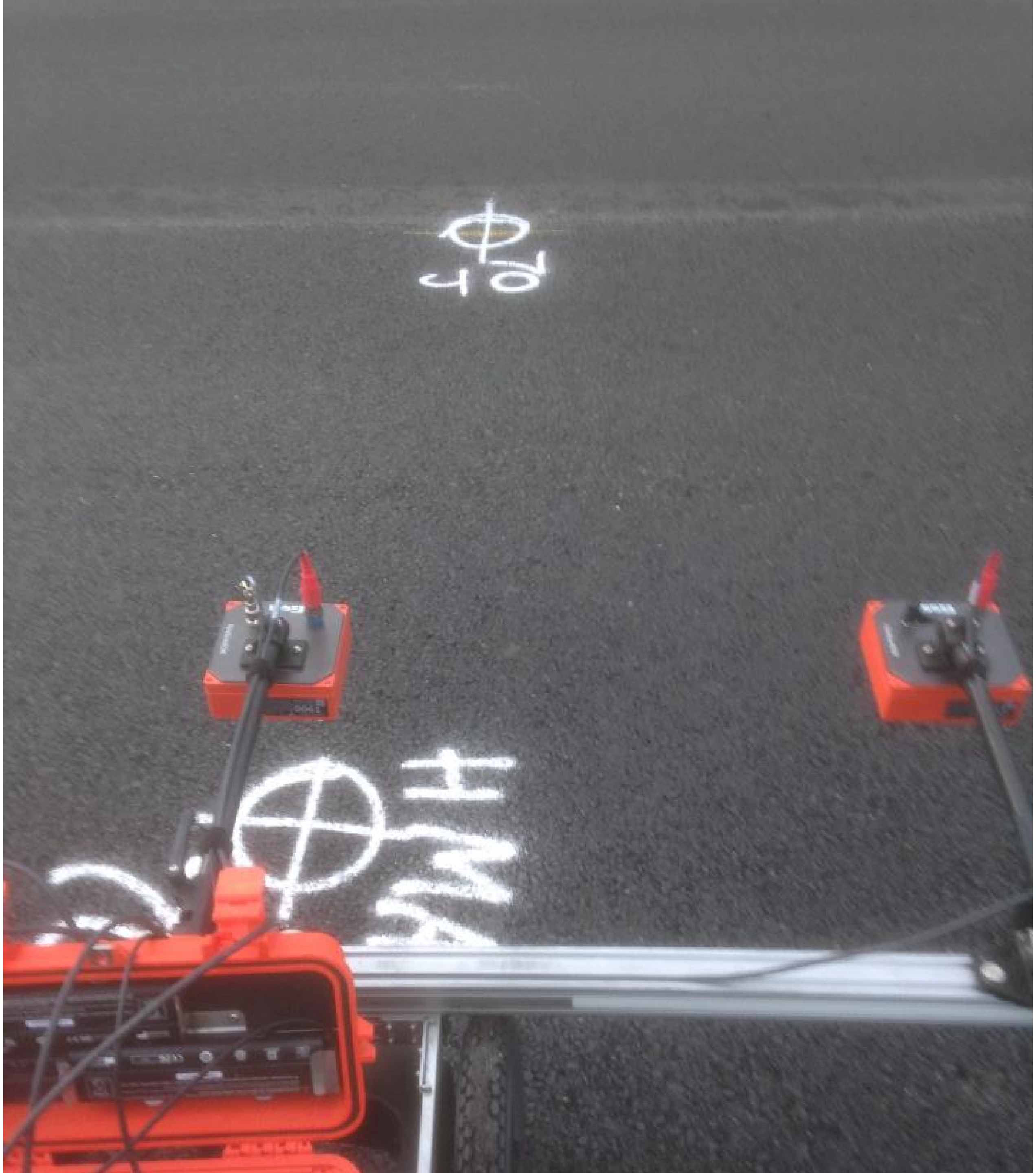
# 2.5 Million Compaction Tests in 22 Nights

- 50,000 Tons of Alaska Type VH Asphalt Paving (Superpave mix with Hard aggregate and Modified Oil)
- 15.2 Miles of 4 lane divided highway
- 2” Mill and fill to repair studded tire damage
- 65,000 ADT
- Alaska’s Glenn Highway-Hiland Rd to Eklutna
- May 22 to June 21, 2017

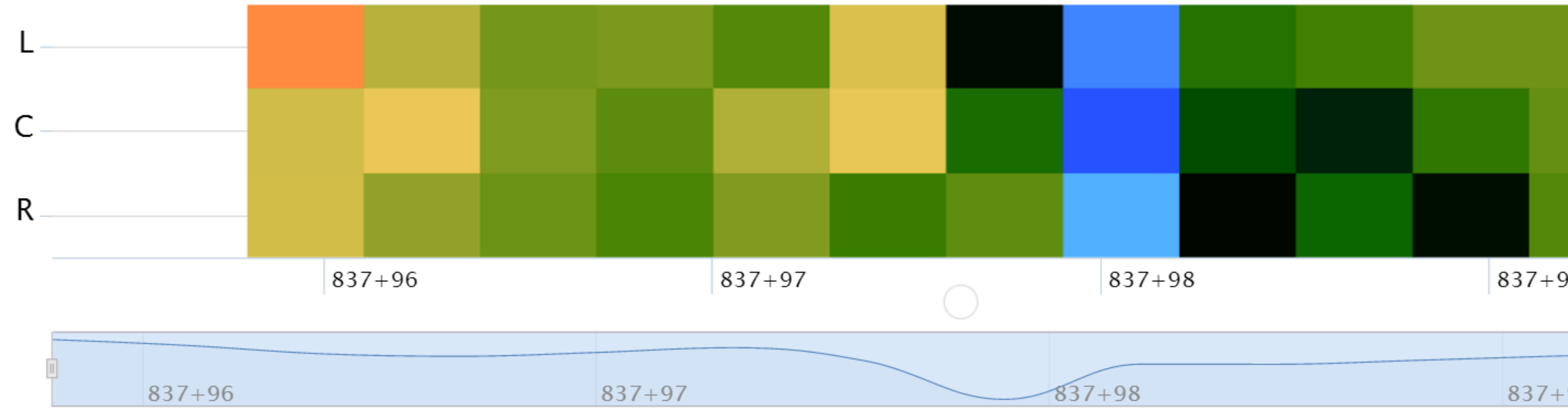
# Low Density was Typical at Bridges
# S. Birchwood Bridge,

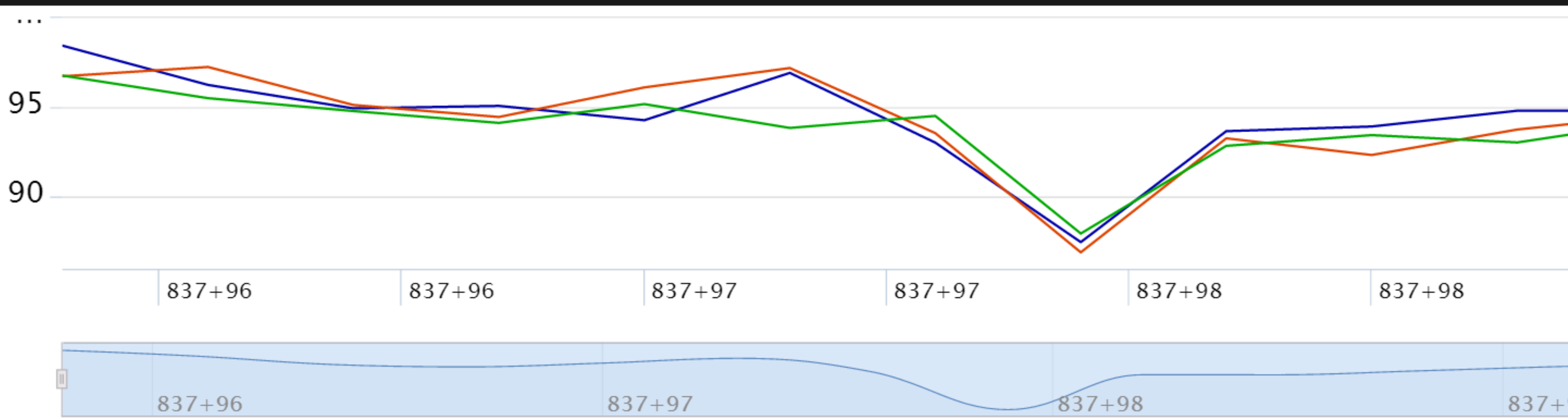


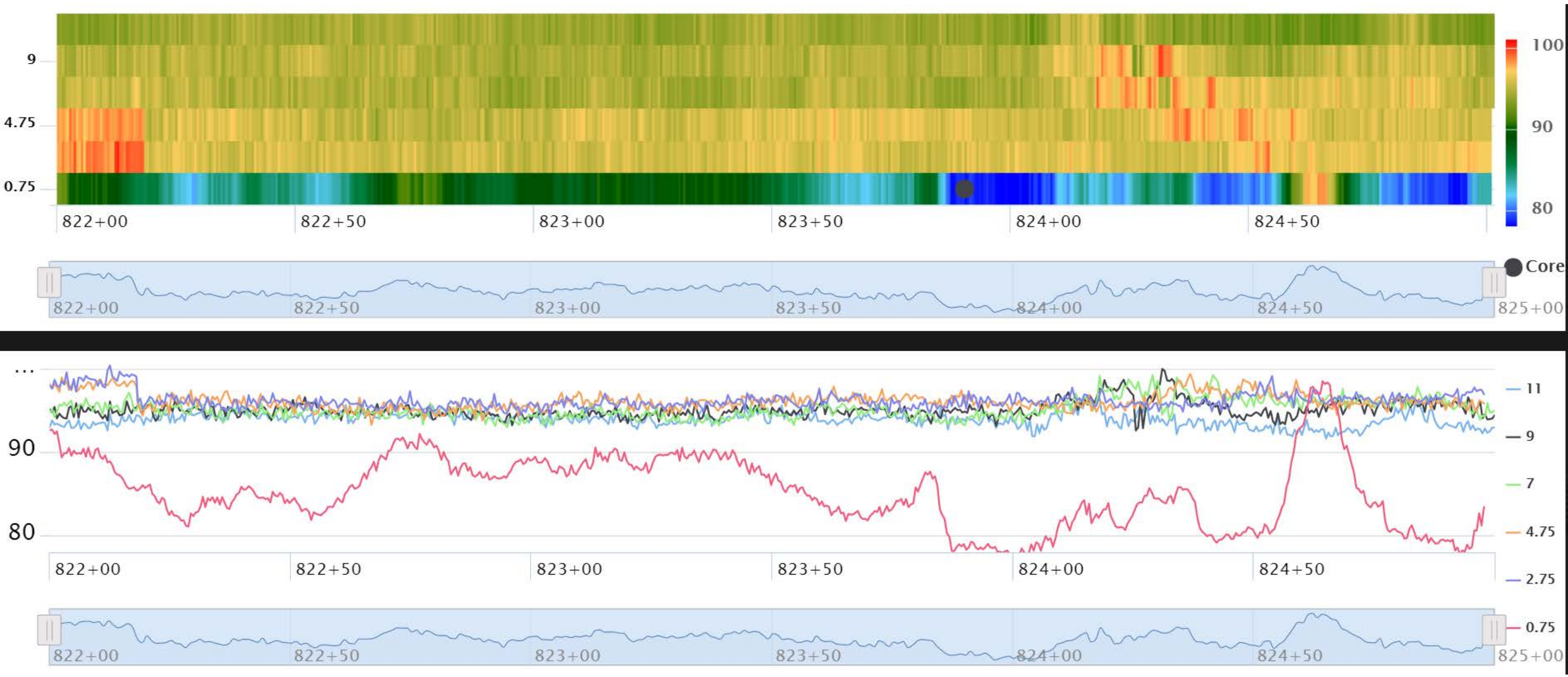


# Low Density (87%) at Longitudinal joint @ RDM Resolution of 3 inch, but Core = 92.9%



# Low Density Adjacent Rumble Strip



# The Carrot

## You get what you pay for!

On this project we offered a stepped bonus of up to $1.50/ft if average longitudinal joint compaction for the project achieved 94% of MSG

- >92.0% = $0.50 per lineal foot is added
- >93.0% = $1.00 per lineal foot is added
- >94.0% = $1.50 per lineal foot is added


16-8527
E650

# Alaska' Compaction Goal

Alaska's goal is to compact asphalt pavements to our mix design value which is 96% for a mix designed with 4% Air Voids.

- Use the raw lot data to calculate % Conforming (PC) directly
- 5000 Ton lot with 2" lift thickness and 150 pcf density = 400,000 sf
- With PaveScan RDM readings every square foot, raw lot data will have 400,000 compaction values on about 6.3 lane miles

# New Specification for Mat Compaction

## Mat Compaction Bonus:

1. Set Lower Specification Limit for mat bulk density at 93.0% of Maximum Specific Gravity
2. For asphalt mat density pay factor calculate the Percentage of Conforming (PC) compaction values from the raw PaveScan RDM data for each lot.
3. Mat Density Pay Factor = 0.55 + PC/200

# New Specification for Joint Compaction

- Increase the longitudinal joint bonus linearly from the minimum value of 92.0% to 96.0% in 0.1% increments
- Alaska may offer a joint compaction bonus of $2.00/lineal foot when mix design compaction value is achieved.
- Joint compaction bonus may be based on average compaction and number of lineal feet of joint per lot or for the entire project.

# The Stick

## Q: What happens when you don’t get what you paid for?

A: Require Repairs

Goal is “No Potholes Left Behind”

# REPAIRING DEFECTIVE MAT AREAS

- Apply Sand Seal to the mat of an entire lane station that contains low (<92%) density areas that are small (less than 8 $ft^2$), discontinuous, and total more than 2% of a lane station area [(2%)(12'x100') = 24 $ft^2$]

# REPAIRING DEFECTIVE MAT AREAS

- Apply Sand Seal to the mat of an entire lane station that contains a large (equal to or greater than 8 $ft^2$) contiguous low density area.  If a large, low-density area straddles a station line, is less than 50’ in length, and if it is the only low density area in both stations, then the 100’ lane length of sand seal shall be centered on the defect.

# REPAIRING DEFECTIVE JOINTS

- Apply Joint Sealant to each station where the longitudinal joint within that station contains ≥5% joint density readings below 92.0%
- Receiving full joint bonus will not relieve Contractor from requirement to seal all defective segments of longitudinal joint
- Joint bonus is not paid until sealant has been successfully applied to all defective segments of the lot or project

# Questions?

# Resources

## Contacts:

- Steve Cooper, FHWA, Stephen.J.Cooper@dot.gov
- Pam Hutton, AASHTO, phutton@aashto.org
- Kate Kurgan, AASHTO, kkurgan@aashto.org

## Resources:

- **AASHTO SHRP2 R06C Webpages:**
  - http://shrp2.transportation.org/Pages/R06C_RapidTechnologiestoEnhanceQualityControl.aspx
- **FHWA GoSHRP2 R06C Webpage:**
  - https://www.fhwa.dot.gov/goshrp2/

# Thank you!