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(photo credit: Shane Biggs, Bowman County Highway Superintendent)

# Smart Paving: Rolling Density Meter, a TLN Plug

Presented by: Bryce Wuori, Wuori Consulting and Developer of PaveWise



North Dakota Asphalt Conference

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# PaveScan RDM 2.0 GPR, Dielectric Principles

- PaveScan 2.0 GPR Overview
- How PaveScan is used as a Quality Control Tool
- Looking for Uniformity
- GPR Project data overview
- Why PaveScan GPR Testing?



# PaveScan RDM 2.0 Overview





- Collects surface dielectric value
- Dielectric values indicate uniformity
- Cores can be taken to calibrate with compaction (Pucks can be used instead)
- An option to collect data viewing void content percentage instead of dielectric based on the calibrations



# Achieving Quality with PaveScan

Used immediately after compaction, on-site full data shows the potential of possible low-density patterns to be evaluated on-site

- Roller pattern issue
- Paver issue
- Asphalt transportation issue

Having a continuous full coverage information, this can have a direct affect regarding pay factors

**Increase chances for incentive payments** 

- Decrease penalties
- Provide information to improve procedures for both the DOT and contractors

# Using PaveScan, RDM 2.0 as a PAQC

#### Produces Data in Real-Time

- Provides on-site dielectric values of newly laid and compacted asphalt
- Continuous Full Coverage (CFC)
- Provides a full-lane compaction contour map
- Core results calibrate Dielectric to:
  - Compaction percentage
  - Void content percentage
  - Density

**Real-Time Data allows Improvements for Quality** 

- Dielectric Values for uniformity
- Identifying Areas of Low Dielectric
- Core Calibrations



#### PaveScan, RDM 2.0 Data



#### PaveScan, RDM 2.0 Data





# PaveScan Longitudinal Joint Data

|       | Joint Density Data  |                              |
|-------|---|------------------------------|
|       |   |                              |
| Lot # | Average Dielectric Collected at Core Locations for<br>Lot | Average Core Density For Lot |
| 2     | 4.4   | 90.6                         |
| 3     | 4.46  | 91.5                         |
| 5     | 4.33  | 89.4                         |
| 7     | 4.37  | 90.5                         |
| 8     | 4.41  | 91.6                         |
| 9     | 4.45  | 91.2                         |
| 11    | 4.45  | 91.6                         |
| 13    | 4.46  | 91.6                         |
| 18    | 4.62  | 93.7                         |

### PaveScan HMA Mat Data

|                 | Mat Density Data  |      |  |                  |   |                   |      |
|-----------------|---|------|--|------------------|---|-------------------|------|
|                 |   |      |  |                  |   |                   |      |
| Lot #           | Average Dielectric Collected at Core<br>Locations for Lot |      | Average Core Densi <sup>.</sup><br>For Lot | ty .             | Average Median Dielectric fro<br>Method on Mat) | om RDM (Swe       | erve |
| 1               | Z   | 4.63 | 93   | 3.4              |   | 4.67              |      |
| 2               | Z   | 4.56 | 93   | 3.5              |   | 4.64              |      |
| 3               | ζ   | 4.43 | 93   | 3.5              |   | 4.52              |      |
| 4               |   | 4.54 | 93   | 3.6              |   | 4.65              |      |
| 5               | Δ   | 4.44 | 93   | 2.5              |   | 4.51              |      |
| 6               | i 2   | 4.52 | <mark>9:</mark>                            | <mark>3.6</mark> |   | <mark>4.58</mark> |      |
| 7               | ζ   | 4.47 | 93   | 2.7              |   | 4.55              |      |
| 8               | ζ Δ   | 4.48 | 93   | 3.2              |   | 4.59              |      |
| g               | 2   | 4.44 | 93   | 2.7              |   | 4.53              |      |
| 10              | 2   | 4.59 |  | 94               |   | 4.68              |      |
| 11              |   | 4.52 | 93   | 3.3              |   | 4.63              |      |
| 12              | <u> </u>  | 4.56 | 9  | 3.8              |   | 4.65              |      |
| <mark>13</mark> | 2 <mark>2</mark>  | 4.42 | <mark>9:</mark>                            | <mark>3.7</mark> |   | <mark>4.58</mark> |      |
| 14              |   | 4.56 | 93   | 3.3              |   | 4.61              |      |
| 15              | ζ   | 4.73 | 9  | 5.2              |   | N/A               |      |
| 18              | ζ Δ   | 4.59 | 94   | 4.1              |   | 4.65              |      |

# Why PaveScan GPR Testing?

**Proactive Procedure** 

No Physical Damage to Asphalt Section

Accurate Representation of Entire Asphalt Section

Elimination of guessing on if quality is being achieved

Modification made to benefit entire Asphalt Section



### Questions?

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