



SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

GPR Rolling Density Meter (RDM) Peer Exchange

WSDOT – RDM Experience

Jim Weston, WSDOT Pavement Implementation Engineer

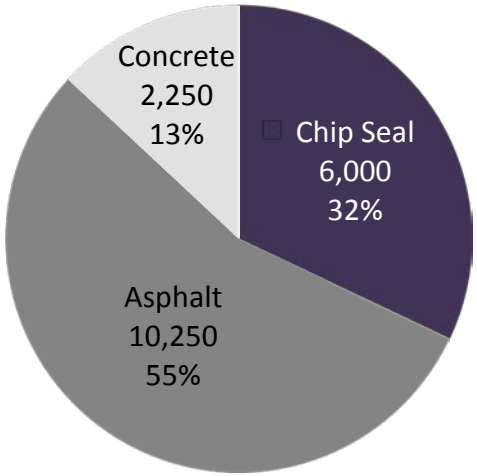
October 24, 2017

U.S. Department of Transportation
Federal Highway Administration

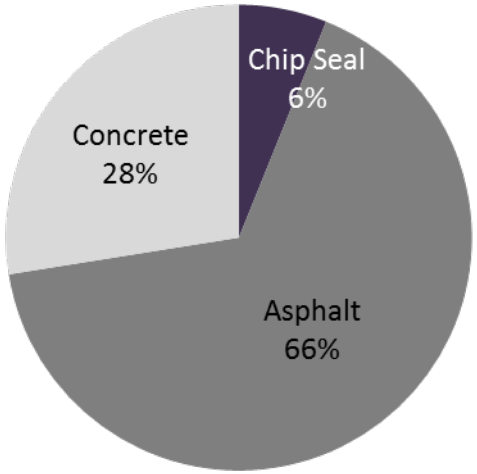
American Association of State Highway and Transportation Officials
AASHTO

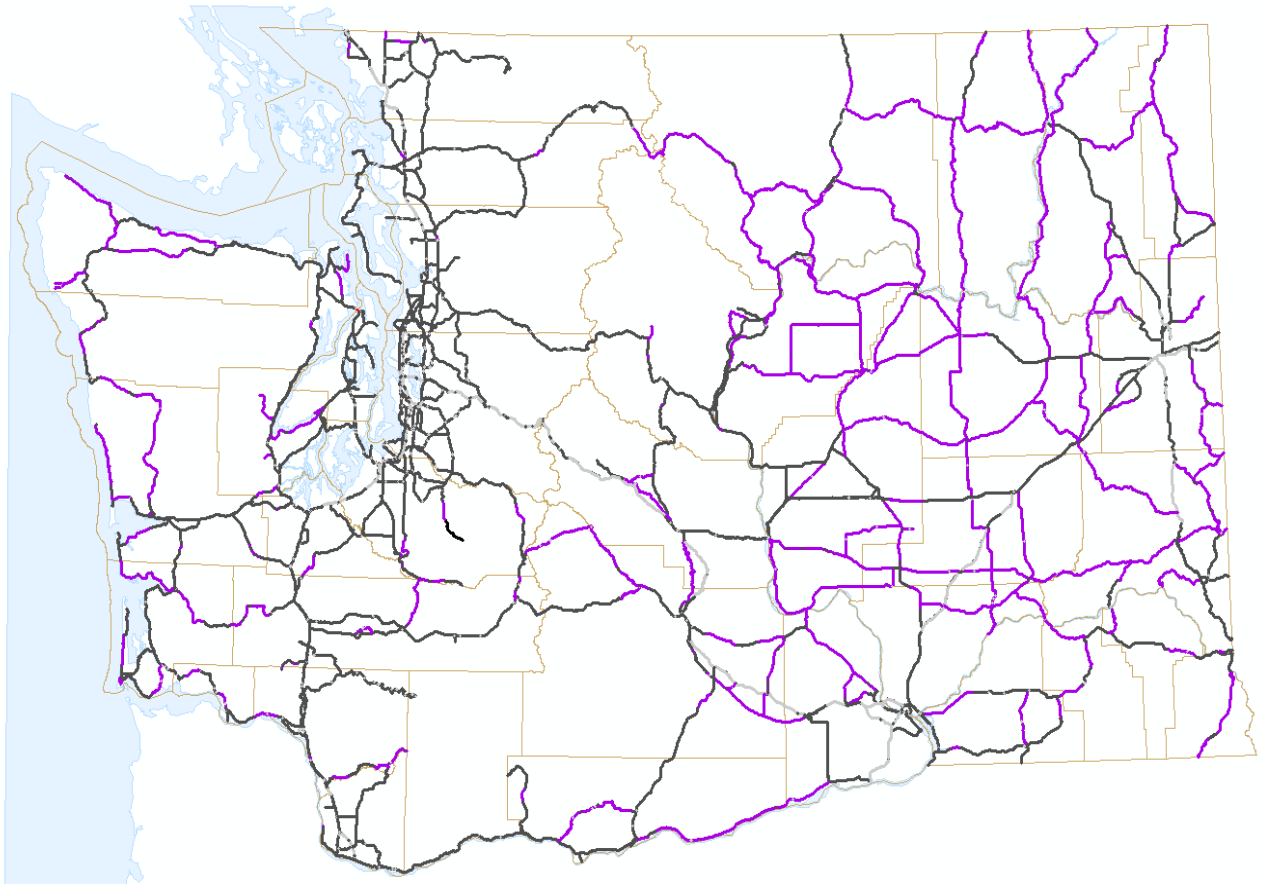
Washington Highway System

Statewide Lane Miles



Statewide VMT





Washington Density Testing

- Nuclear Density
  - 1980's – 2016, direct transmission
  - 2017 – current, backscatter
  - Correlated to cores
  - Licensing, storage, training, etc.
  - Limited testing
    - <20K tons = 100 tons
    - 20K–30K tons = 150 tons
    - >30K tons = 200 tons
      - » Small representation of what's occurring

Washington Performance

- Cyclic Density
  - 1999 – 2001, research
  - 2002 – 2004, special provisions
  - 2004 – current, standard specification
- Pavement Design
  - Most roadways are designed thick enough
    - Drives distress to the top lift
  - Rehabilitation is generally 0.15’ grind and inlay

Washington Distress

- Premature Distress Leads to Early Rehabilitation

Washington Distress (cont.)

GPR Interest

- What we want to learn
  - Can we measure density?
  - Can we measure uniformity?
  - Can we locate low density locations?
- Potential ways to use RDM for acceptance
  - Location of low density areas for additional testing
    - GPS to collect cores
  - Uniformity measurement to determine pay factor
  - Direct measurement of density to use in pay factor

GPR Data Collection

- Wanted to get familiar with the device in 2017
- Trained in June by Rob Sommerfeldt
- Collected data from 5 projects
  - 2 in the South Central Region
  - 2 in the Eastern Region
  - 1 in the Southwest Region
    - Bridge

GPR Data Evaluation

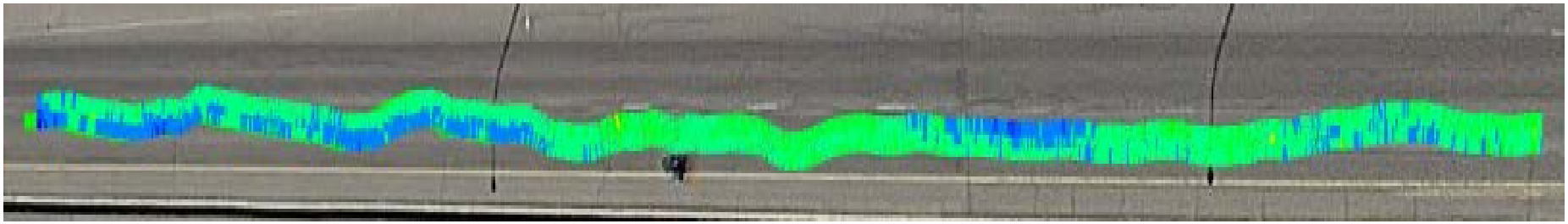
- Still need to evaluate data
  - 2 projects show higher correlation to cores than nuclear gauge to cores
  - 2 projects show lower correlation to cores than nuclear gauge to cores
  - 1 project still needs data evaluation
- 2018 will likely include two specific regions
- There is a strong desire to evaluate bridges
  - Currently core

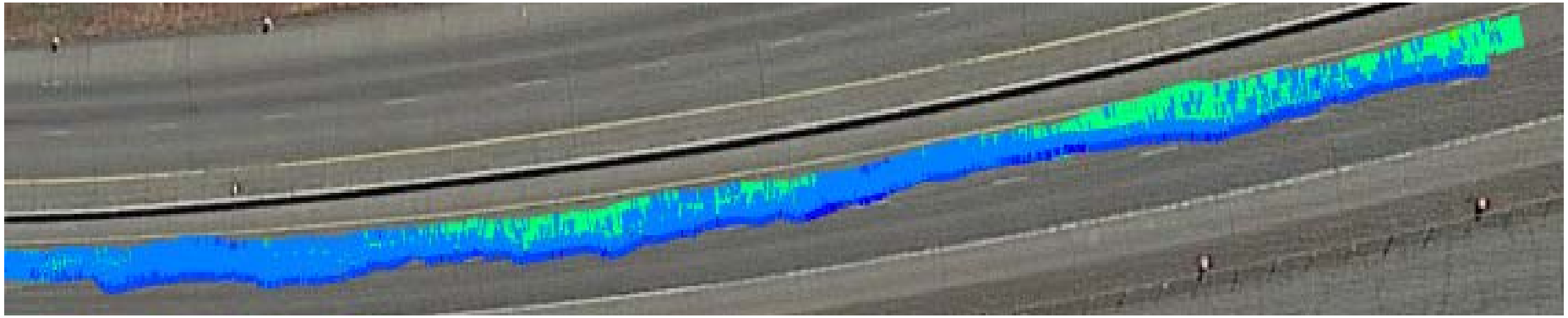
Initial Findings

- Correlates to density
- Can measure uniformity
- Can locate low density areas for testing
  - GPS should be enhanced for coring
- Construction process aid…?
  - IC has benefits but GPR-RDM could be an improvement tool

Initial Findings (cont.)

- Construction process aid
  - Trucking
  - Compaction process





Focus of Future Testing

- Uniformity measurement to determine pay factor
- Measurement of density to use in pay factor
- Eliminate/Reduce nuclear density gauge

Enhancement Opportunities

- Better GPS
- Density input parameters (modifiable)
  - Based on LSL and USL requirements
  - Density measurement to use as pay factor
    - % of tonnage
  - Uniformity measurement to determine pay factor
    - % of roadway within limits
- Wi-Fi data transfer
- App for real-time viewing and reporting