

WSDOT WMA Experience:

Early Results

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Trial Project

- Focused on protocol for early results:
 - Wearing course preferred
 - Two days production (to dial in the plant), so about 4000-5000 tons
 - Comparative paving to HMA, so we can compare performance
 - Same RAP percentages
- All 1/2" Superpave mixes with PG binders

2008

- First WMA project (C7419)
- I-90 near Vantage, WA
- Sasobit
- Generally good production, good compaction
- Some issues with RAP balls in the mix, possibly due to lower mixing temp
 - We have not required fractionating RAP
 - Necessary with WMA and RAP in the future???

2008: C7419

- **Project Data**

- Project: C7419 - I-90 West of George Paving
- Region: North Central
- P.E. Eric Pierson
- Contractor: Central Washington Asphalt

- **Mix Design Data**

- Class of Mix: 1/2" PG76-28
- Asphalt Source: SEM
- Aggregate Source: GT-318
- WMA Technology: Sasobit
- Production Temp:
 - Proposed: 207 – 272 F
 - Actual: 285 – 300 F
- Design AC: 5.5%
- Antistrip: 0.00%

- **Production Data**

- Paving Start Date: 6/23/2008
- Paving Completion Date: 6/24/2008
- Actual Tons Placed: 4724.12

- **Compactive Effort**

- The contractor used a breakdown, intermediate and finish roller.
- The breakdown roller was an Ingersoll Rand DDV 138, 15 tons, 3 passes
- The intermediate roller was as Ingersoll Rand DDV 130, 12 tons, 2 passes
- The finish roller was an Ingersoll Rand 412, 6 tons, 1 pass

2009

- **C7748: WMA 1/2 Inch PG64-22 with Double Barrel Green**
Variable correlation for nuke gage (1.0176 for the HMA and 0.9937 for the WMA or 2.2%)
 - WMA does not fix bad paving practices
- **C7755: WMA 1/2 Inch PG64-28 with Ultrafoam GX**
 - Temperature behind the screed was fairly consistent with temperatures from 245 to 265°F. Cyclic temperature differentials were seen at times which resulted from the placement techniques of the windrow
 - For this project correlation cores indicate a correction factor below that of the HMA. Correlation cores were taken on 8/26/09 and the correction factor was 0.9712. With this correction factor density results were below specification requirements. Another set of correlation cores were obtained on 8/28/09 on material placed 8/26/09. Results indicate a correction factor of 0.9901. Using this correction factor, density was achieved. The difference of in-place density with these two correction factors was 1.7 percent (89.3 to 91.0 percent)
 - WMA does not fix bad paving practices

2009

- **C7645: WMA 1/2 Inch PG64-28 and PG70-28 (AllPave plant with water injection)**
 - Temperature differentials present (25 to 40°F)
 - Temperatures behind the paver ranged from 250 to 290°F
- **C7640: Two Trials**
 - **WMA 1/2 Inch PG64-22 with Ultrafoam GX**
 - Gencore counter flow drum plant
 - Internal temperatures remained around 260°F with crust temperatures averaging approximately 165°F
 - Temperature behind the screed was consistently around 245°F
- **C7669: no detailed site visit**
- **C7679: no detailed site visit**

2009: C7748

- **Project Data**

- Project: C7748 – SR 6 to Grays Harbor County Line - Paving
- Region: Southwest
- P.E. Colin Newell
- Contractor: Granite

- **Mix Design Data**

- Class of Mix: 1/2" PG64-22
- Asphalt Source: Paramount PT
- Aggregate Source: J-186
- WMA Technology: Astec Double Barrel Green
- Production Temp:
 - Proposed: 275 F
 - Actual: 290 F
- Design AC: 5.4%
- Antistrip: 0.00%

- **Production Data**

- Paving Start Date: 8/13/2009
- Paving Completion Date: 8/19/2009
- Actual Tons Placed: 4076.67

- **Compactive Effort**

- The contractor used two double drum vibratory rollers and one tandem steel roller.
- The breakdown roller was a Volvo DD128HF, 15 tons, 4+ passes
- The intermediate roller was a Volvo DD90, 11 tons, 4+ passes
- The finish roller was a tandem steel roller, 4+ passes

2009: C7755

- **Project Data**

- Project: C7755 – Naches to Mitchell Road Vicinity - Paving
- Region: South Central
- P.E. Paul Gonseth
- Contractor: Granite Northwest

- **Mix Design Data**

- Class of Mix: 1/2" PG64-28
- Asphalt Source: McCall
- Aggregate Source: E-349
- WMA Technology: Gencor Ultra Foam GX
- Production Temp:
 - Proposed: 270 F
 - Actual: 270 F
- Design AC: 5.8%
- Antistrip: 0.00%

- **Production Data**

- Paving Start Date: 8/26/2009
- Paving Completion Date: 9/15/2009
- Actual Tons Placed: 4800

- **Compactive Effort**

- The contractor used two double drum vibratory rollers, one pneumatic roller, and one tandem steel roller.
- The breakdown roller was a Ingersoll Rand DD138, 15 tons, 2 to 3 passes
- The intermediate roller was an Ingersoll Rand DD136, 2 to 3 passes
- The pneumatic roller was an Ingersoll Rand PT125R, 20 tons
- The finish roller was an Ingersoll Rand 130HF, 14 tons, 4 to 5 passes

2009: C7645 – 1st Trial

- **Project Data**

- Project: C7645 – Quincy Area Paving
- Region: North Central
- P.E. Eric Pierson
- Contractor: Central Washington Asphalt

- **Mix Design Data**

- Class of Mix: 1/2" PG70-28
- Asphalt Source: WSA
- Aggregate Source: GT-318
- WMA Technology: Foam
- Production Temp:
- Proposed: 290 F
- Actual: 300-345 F
- Design AC: 5.5%
- Antistrip: 0.00%

- **Production Data**

- Paving Start Date: 7/15/2009
- Paving Completion Date: 7/19/2009
- Actual Tons Placed: 5600

- **Compactive Effort**

- The contractor used a breakdown, intermediate and finish roller.
- The breakdown roller was an Ingersoll Rand DDV 138, 15 tons, 3 passes
- The intermediate roller was an Ingersoll Rand DDV 130, 12 tons, 1 pass
- The finish roller was an Ingersoll Rand 412, 6 tons, 1 pass

2009: C7645 - 2nd Trial

- **Project Data**

- Project: C7645 – Quincy Area Paving
- Region: North Central
- P.E. Eric Pierson
- Contractor: Central Washington Asphalt

- **Mix Design Data**

- Class of Mix: 1/2" PG64-28
- Asphalt Source: WSA
- Aggregate Source: GT-318
- WMA Technology: H2O Injection
- Production Temp:
- Proposed:
- Actual:
- Design AC: 5.4%
- Antistrip: 0.00%

- **Production Data**

- Paving Start Date: 7/06/2009
- Paving Completion Date: 7/08/2009
- Actual Tons Placed: 4000

- **Compactive Effort**

- The contractor used a breakdown, intermediate and finish roller.
- The breakdown roller was an Ingersoll Rand DDV 138, 15 tons, 3 passes
- The intermediate roller was an Ingersoll Rand DDV 130, 12 tons, 1 pass
- The finish roller was an Ingersoll Rand 412, 6 tons, 1 pass

2009: C7460

- **Project Data**

- Project: C7640 – I-405 to WLSP I/C Paving
- Region: Northwest
- P.E. Jon Chi
- Contractor: Granite Northwest

- **Mix Design Data**

- Class of Mix: 1/2" PG64-22
- Asphalt Source: Sound
- Aggregate Source: B-335
- WMA Technology: Gencor Green Machine Ultrafoam GX
- Production Temp:
 - Proposed: 270 F
 - Actual: 260 – 275 F
- Design AC: 5.2%
- Antistrip: 0.25%

- **Production Data**

- Paving Start Date: 7/16/2009
- Paving Completion Date: 9/02/2009
- Actual Tons Placed: 4800

- **Compactive Effort**

- The contractor used a breakdown, intermediate and finish roller.
- The breakdown roller was an Ingersoll Rand DDV 130HF, 12 tons, 3 passes
- The intermediate roller was an Ingersoll Rand DDV 130HF, 12 tons, 3 passes
- The finish roller was an Ingersoll Rand DDV 110, 10 tons, 3 passes

2009: C7669

- **Project Data**
- Project: C7669 – 52nd Ave West to SR 526 NB Paving
- Region: Northwest
- P.E. Jon Chi
- Contractor: Granite
- **Mix Design Data**
- Class of Mix: 1/2" PG64-22
- Asphalt Source: U.S. Oil
- Aggregate Source: B-335
- WMA Technology: Gencor Green Machine Ultrafoam GX
- Production Temp:
- Proposed: 270 F
- Actual: 275 F
- Design AC: 5.0%
- Antistrip: 0.25%
- **Production Data**
- Paving Start Date: 7/16/2009
- Paving Completion Date: 9/02/2009
- Actual Tons Placed: 3000
- **Compactive Effort**
- The contractor used two breakdown rollers, one intermediate, and one finishing roller
- The first breakdown roller was an Ingersoll-Rand DDV 138, 15 ton, 3 passes
- The second breakdown roller was an Ingersoll-Rand DDV 130, 12 ton, 3 passes
- The intermediate roller was an Ingersoll-Rand DDV 130HF, 12 ton, 3 passes
- The finishing roller was an Ingersoll-Rand DDV 110, 10 ton, 3 passes

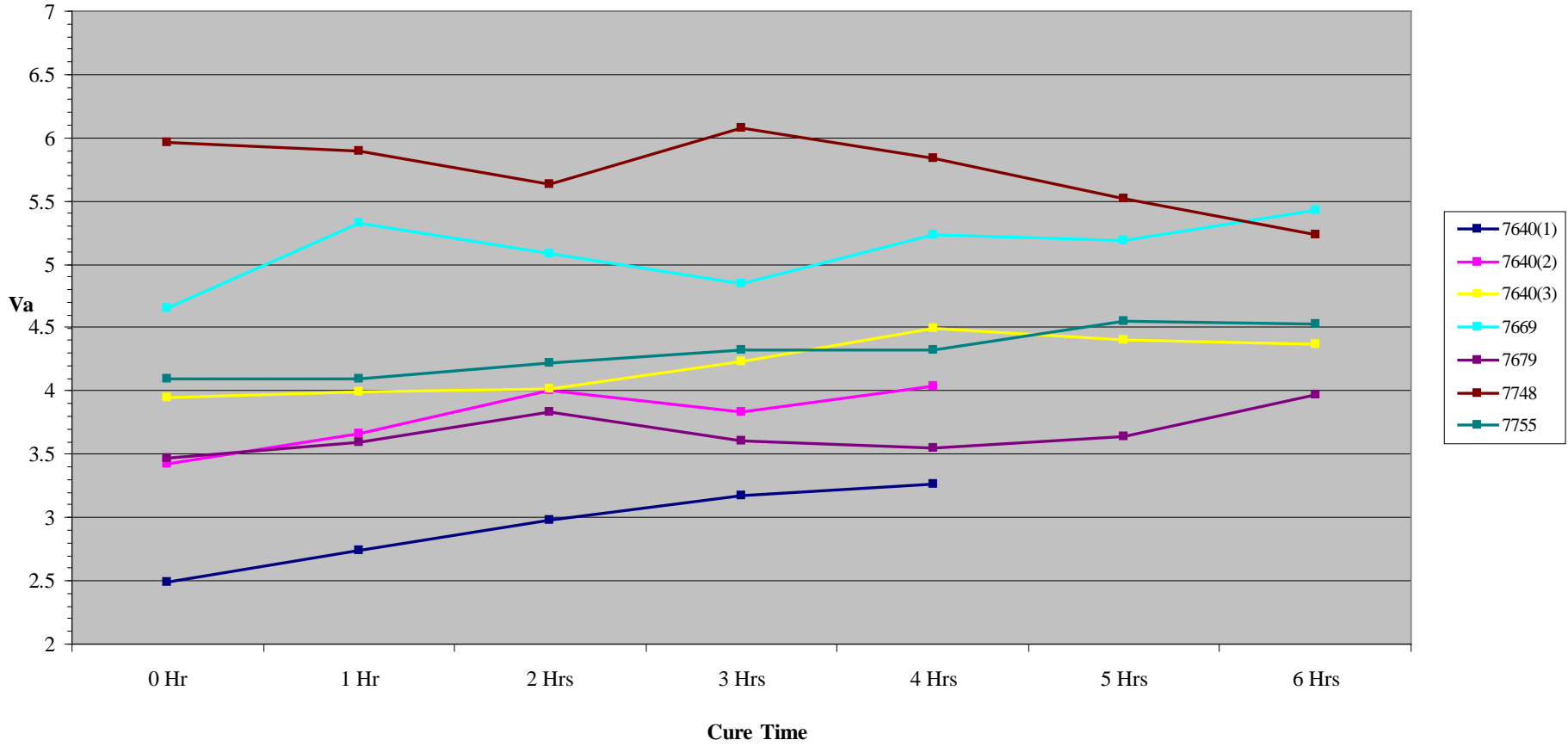
2009: C7679

- **Project Data**
- Project: C7679 – SR 16 to Long Lake Road Vic
- Region: Olympic
- P.E. Brenden Clarke
- Contractor: Tucci & Sons
- **Mix Design Data**
- Class of Mix: 1/2" PG64-22
- Asphalt Source: Sound
- Aggregate Source: B-335
- WMA Technology: Evotherm
- Production Temp:
- Proposed: 230 F
- Actual: 260 F
- Design AC: 5.7%
- Antistrip: 0.25%
- **Production Data**
- Paving Start Date: 10/05/2009
- Paving Completion Date: 10/05/2009
- Actual Tons Placed: 2800
- **Compactive Effort**
- The contractor used two breakdown rollers, one intermediate, and one finishing roller
- The first breakdown roller was an Ingersoll-Rand DDV 138, 15 tons, 3 passes
- The second breakdown roller was an Ingersoll-Rand DDV 130, 12 tons, 3 passes
- The intermediate roller was an Ingersoll-Rand DDV 130HF, 12 tons, 3 passes
- The finishing roller was an Ingersoll-Rand DDV 110, 10 tons, 3 passes

Conditioning Time Study

- Conditioned mixes to see if it affects voids
- No clear trend seen

WMA Va - All Projects



Themes and Trends

- Density correlation different for HMA and WMA
- In-place density was lower on nearly all of the WMA jobs compared to HMA paved on the same project
- Thermal differentials not fixed by WMA
- WMA does not fix poor paving practices (lack of rollers, thermal differentials, paving machines that segregation mix, improper use of transfer devices/machines)
- No sign of a need for different conditioning time compared to HMA

2010

- 2010 Standard Specs allow WMA to be proposed on every project unless called out otherwise
- May restrict use on some projects, but on case by case basis and clearly identified in the special provisions so bidders know up front
- Moving toward use of the Hamburg as screening tool, but not there yet...
- Look for paper on our results (2008/9) in 2010
- Questions?