

Ohio Warm Mix Asphalt Demo Preliminary Results

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Ohio WMA Demo. Project

- Ohio Department of Transportation (ODOT) COS/GUE Rt. 541
 - Contractor: Shelly & Sands, Inc.
 - Material Supplier: Mar-Zane, Inc.
 - Constructed September, 2006
 - WMA Technologies Demonstrated
 - Aspha-Min
 - Evotherm
 - Sasobit

Ohio WMA Demo. Project

- Objective: Assess the advantages of WMA over conventional HMA in regards to...
 - Reduced energy utilization
 - Reduced fume emanation during processing and placement
 - Opportunity for extending paving season

Ohio WMA Demo. Project

- Investigation:
 - Structural evaluation of existing pavement condition
 - WMA compaction behavior
 - Mix temperature (production & laydown)
 - Fuel usage (plant)
 - Emissions (plant and paver)
 - Mix extended performance

ODOT COS/GUE Rt.541

- FHWA Technical Working Group (TWG) protocol – Production Information
 - Plant type and model
 - Method of WMA introduction
 - Production rate(s)
 - Temperatures: aggregate, WMA discharge
 - Power usage of conveyance equipment
 - Silo usage: min. and max. storage time of mix

ODOT COS/GUE Rt.541

- FHWA Technical Working Group (TWG) protocol – Laydown Information
 - Mix delivery:
 - Haul distance and time
 - Vehicle type (i.e. end-dump, live-bottom, other)
 - Release agent: type, usage
 - Observations of mix behavior while dumping; mix sticking to truck bed?
 - Use of windrow or transfer vehicles

ODOT COS/GUE Rt.541

- FHWA Technical Working Group (TWG) protocol – Laydown Information (contd.)
 - Paving Equipment:
 - Paver type and model
 - Vibratory screed used?
 - Was screed heated?
 - Compacted thickness measurement
 - Mat temperature readings immediately behind screed

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- FHWA Technical Working Group (TWG) protocol – Laydown Information (contd.)
 - Compaction / roller train
 - Type and model of compaction equipment
 - Rated weight
 - Vibratory rollers – amplitude and frequency used
 - Pneumatic roller – tire pressure
 - Rolling pattern for control and all WMA mixtures

ODOT COS/GUE Rt.541

- FHWA Technical Working Group (TWG) protocol
 - Moisture content of mix at load out (sampled from haul vehicle)
 - All QC data
 - For each mix provide fuel consumption data for...
 - Plant
 - Paving train

Mix Composition – ODOT COS/GUE Rt.541

Agg:	Size:	Type:	% of Composition:	
Coarse:	No. 8	Limestone	53	
Fine:	Sand	Natural	32	
RAP	Processed - 3/4, + 3/4	Limestone / Natural	15	
Binder:		70-22M SBS Modified	Virgin: 5.3% Total: 6.1%	
Mix:	Control	Aspha-Min	Evotherm	Sasobit
Additive Amount:		0.3 % by wt. of total mix	5.3 % by wt. of total mix	1.5 % of total binder

Bid Data – ODOT COS/GUE Rt.541

Mix Type:	Control	Aspha-Min	Evotherm	Sasobit
Course Thickness (in.)	1.25	1.25	1.25	1.25
Section Length (mi.)	3.03	2.70	2.70	3.07
Quantity (CY):	1,602	1,155	1,155	1,339
Unit Cost (\$/CY):	113 ⁷⁵	135 ⁰⁰	147 ⁷⁵	129 ⁰⁰

Preliminary Investigation – ODOT COS/GUE Rt.541

Mix Type:	Control	Aspha-Min	Evotherm	Sasobit
Air Voids (%):				
@ 300 °F	3.5	2.4	2.0	1.6
@ 240 °F		3.8	3.2	3.0

Production Facility: Mar-Zane Plant 13







Production Data – ODOT COS/GUE Rt.541

Mix Type:	Control	Aspha-Min	Evotherm	Sasobit
Burner Tuning:	Performed	Performed	Performed	Performed
Fuel Type:	Nat. Gas	Nat. Gas	Nat. Gas	Nat. Gas
Ave. Production Rate (TPH):	165	168	167	167
Tons Produced:	1,367	1,139	1,207	835
Stack Gas Temp. (°F):	195	220	255	222
Mix Discharge Temp. (°F):	335	250	240	250

Production Data – ODOT COS/GUE Rt.541

FOSSIL FUEL USAGE				
Mix Type:	Control	Aspha-Min	Evotherm	Sasobit
Tons Produced:	1,367	1,139	1,207	835
Fuel Usage (mcf):	387	283	412	198
Fuel Usage (cf per mix ton):	283	248	341	237
Reduction in Fuel Usage (%):		12	-21	16

Paver Emissions Sampling – ODOT COS/GUE Rt.541



Paver Emissions Sampling – ODOT COS/GUE Rt.541



Sample Location 2 – Left Side Screed
Discharge over Auger



Sample Location 3 – Right Side Screed
Discharge over Auger

Paver Emissions Sampling – ODOT COS/GUE Rt.541



Sample Location 4 – Center of Paver Hopper



Sample Location 5 – Left Front Operator Panel

Paver Emissions Sampling – ODOT COS/GUE Rt.541



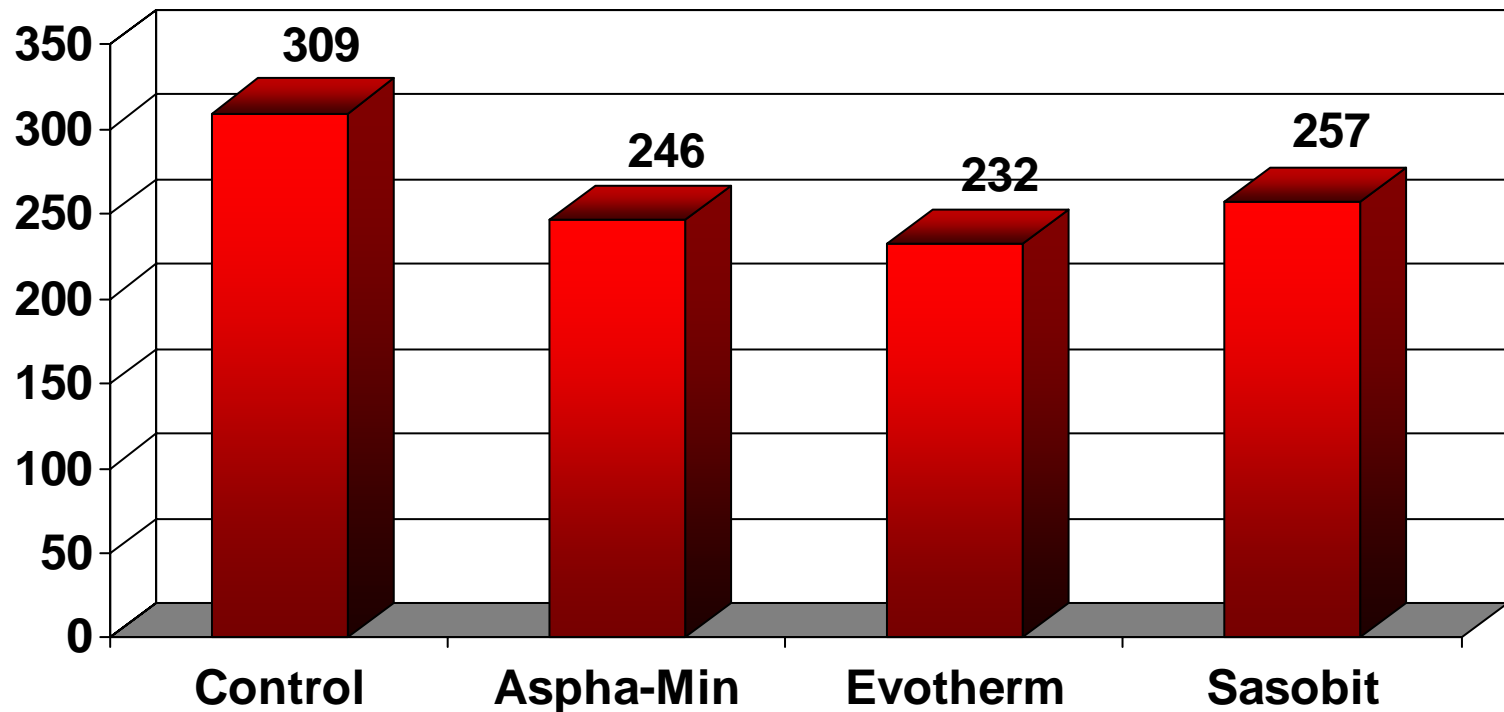
Sample Location 6 – Central Step
Railing

Emissions Background Sampling – ODOT COS/GUE Rt.541



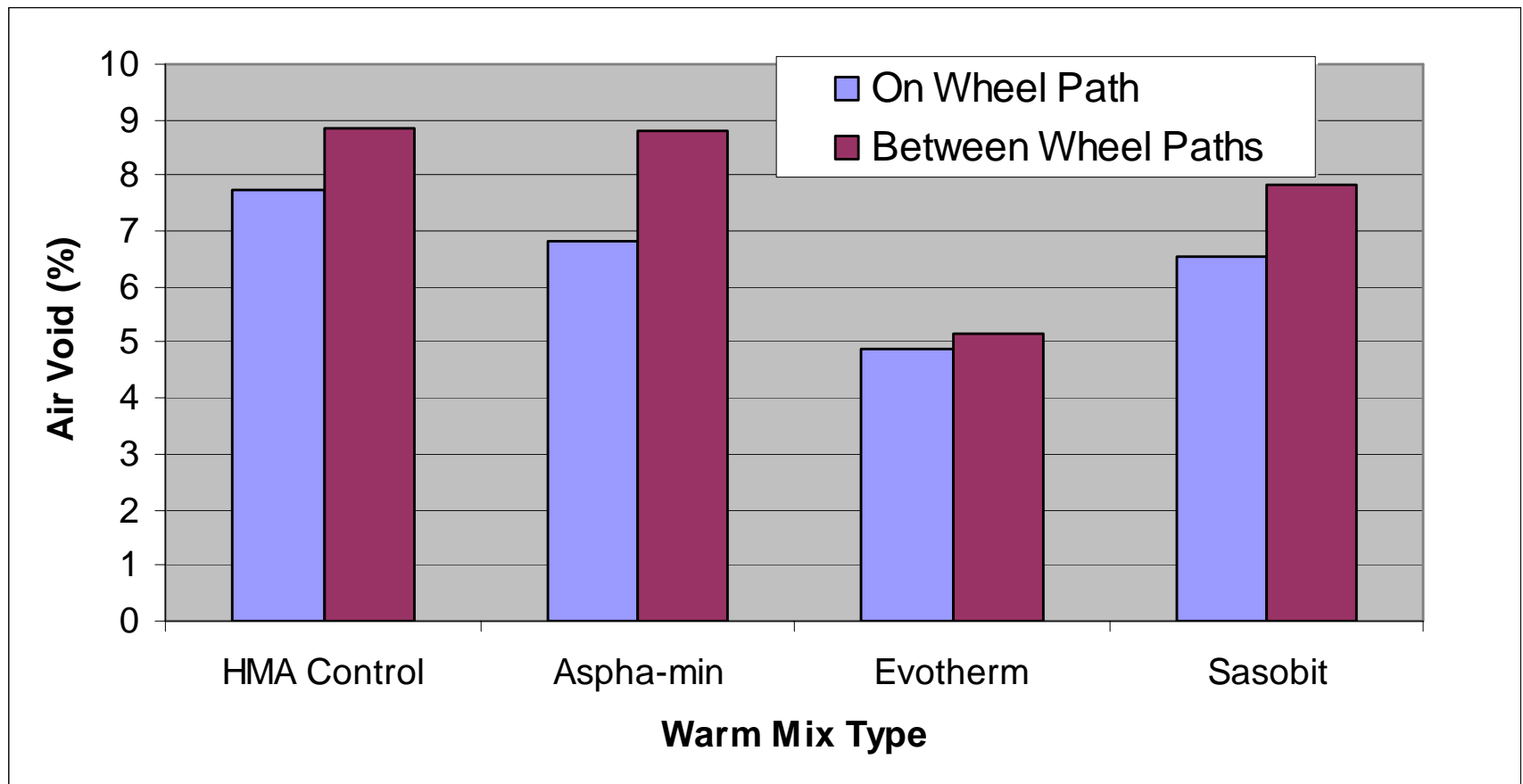
Laydown Operations Preliminary Results – ODOT COS/GUE Rt.541

Mat Placement Temperature (°F)



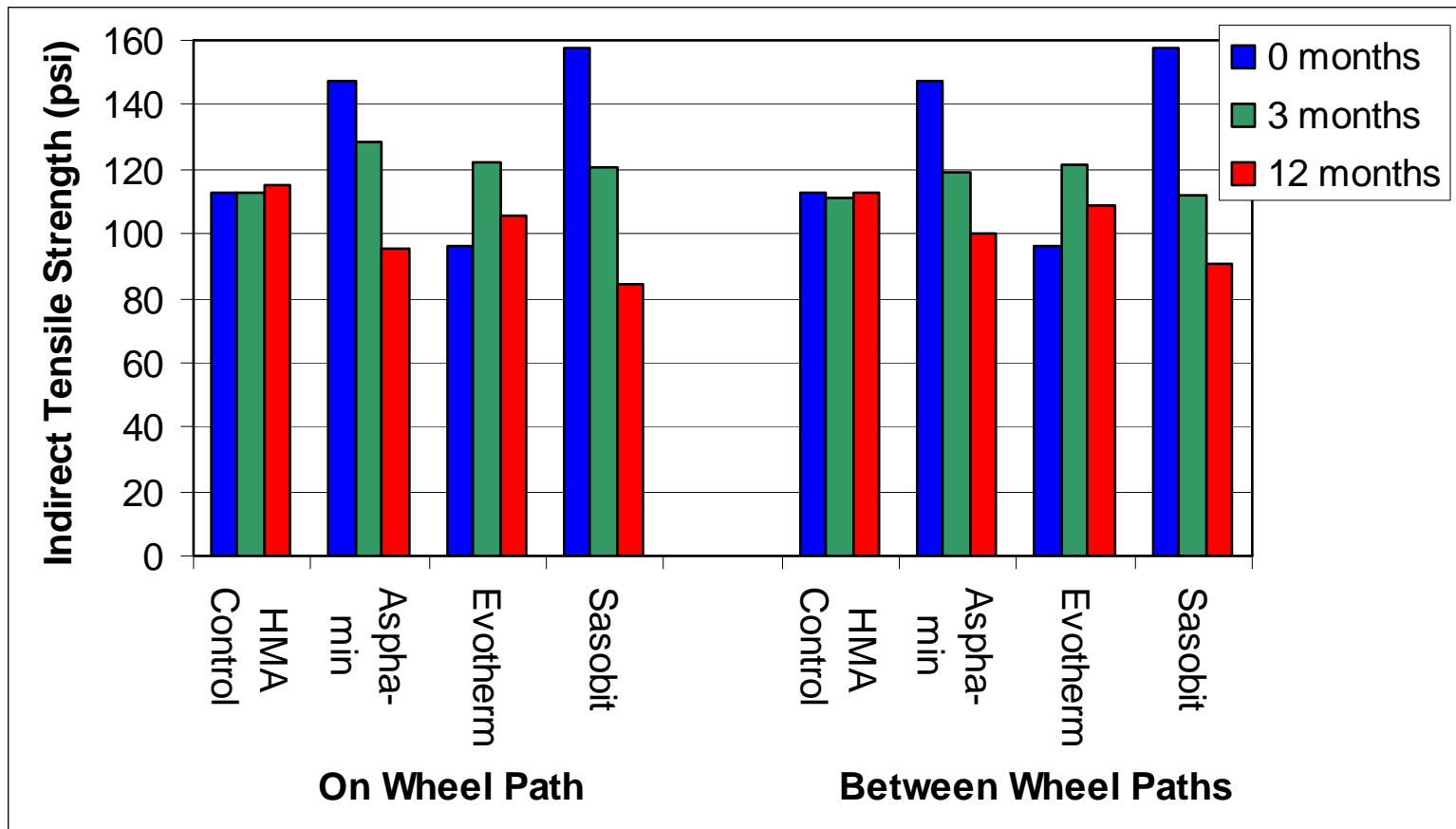
Mix Performance Preliminary Results – ODOT COS/GUE Rt.541

Air Voids of Cores (3 Months after Construction)



Mix Performance Preliminary Results – ODOT COS/GUE Rt.541

Indirect Tensile Strength (0, 3, 12 month cores)



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