Ohio Warm Mix Asphalt Demo Preliminary Results

Presented by Cliff Ursich

Flexible Pavements of Ohio

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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

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- 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

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- 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

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- 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 - ¾, + ¾	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

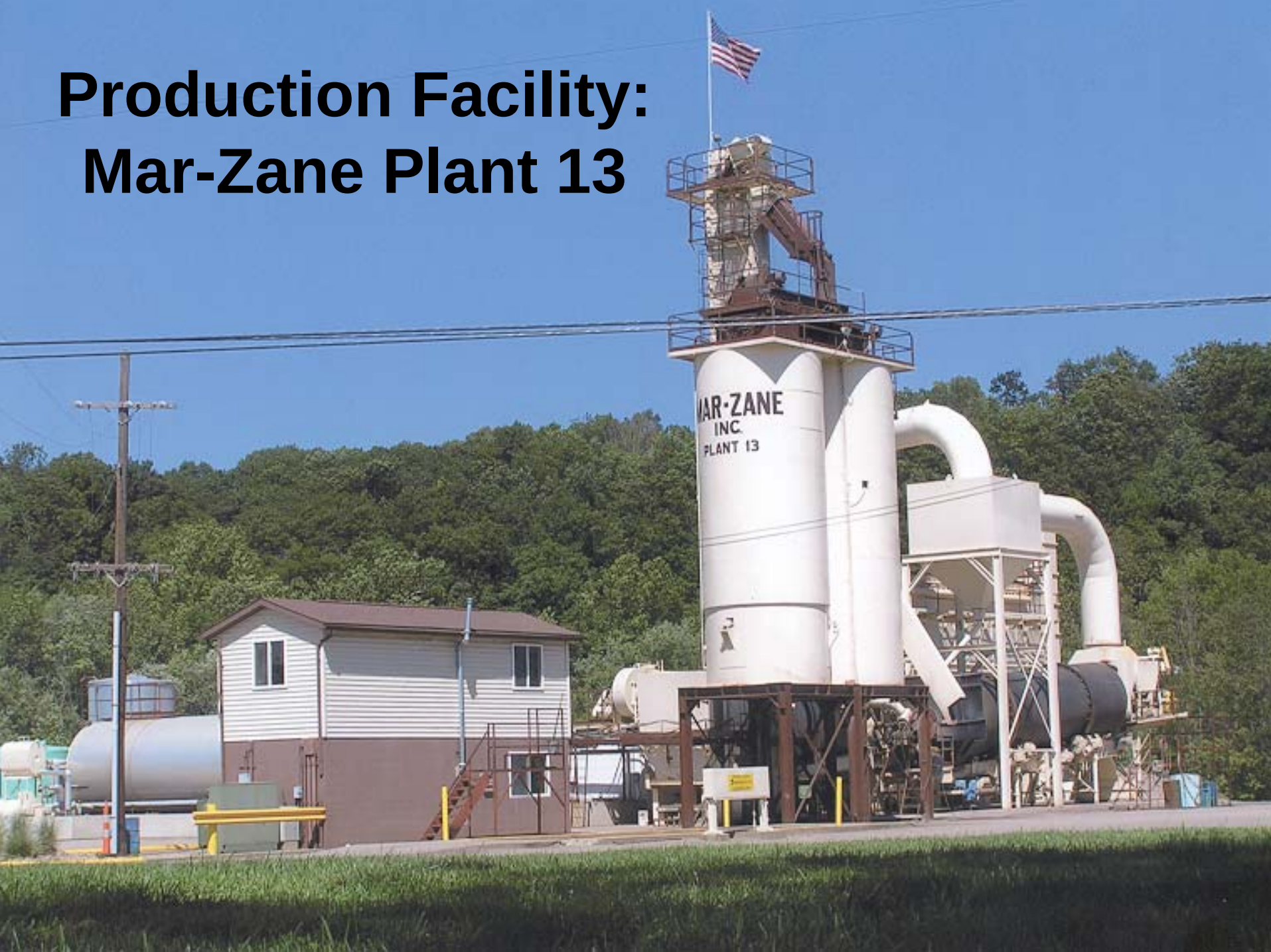
Bid Data – ODOT COS/GUE Rt.541

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

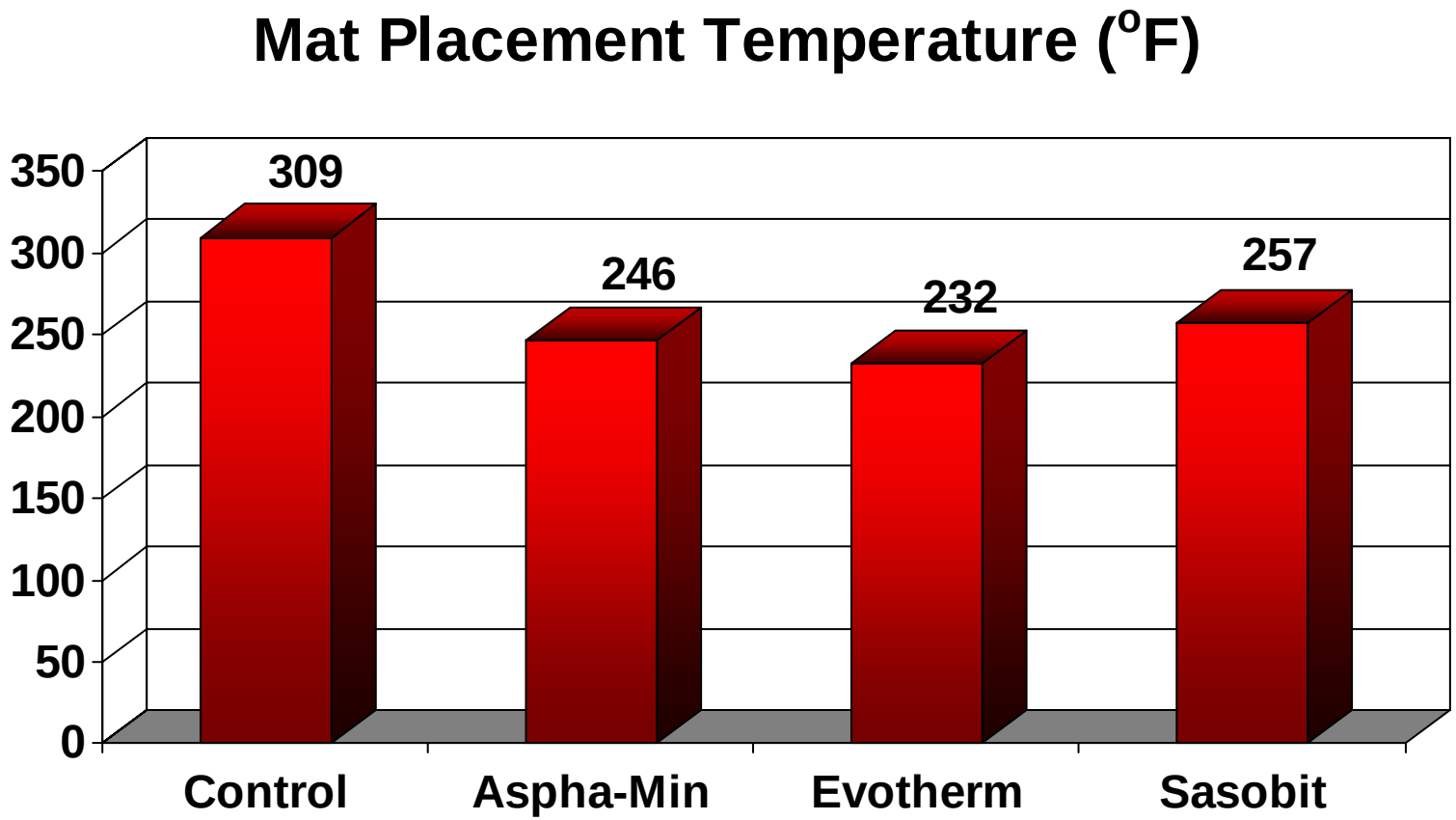
Sample Location 5 – Left Front Operator Panel

Paver Emissions Sampling – ODOT COS/GUE Rt.541

Sample Location 6 – Central Step Railing

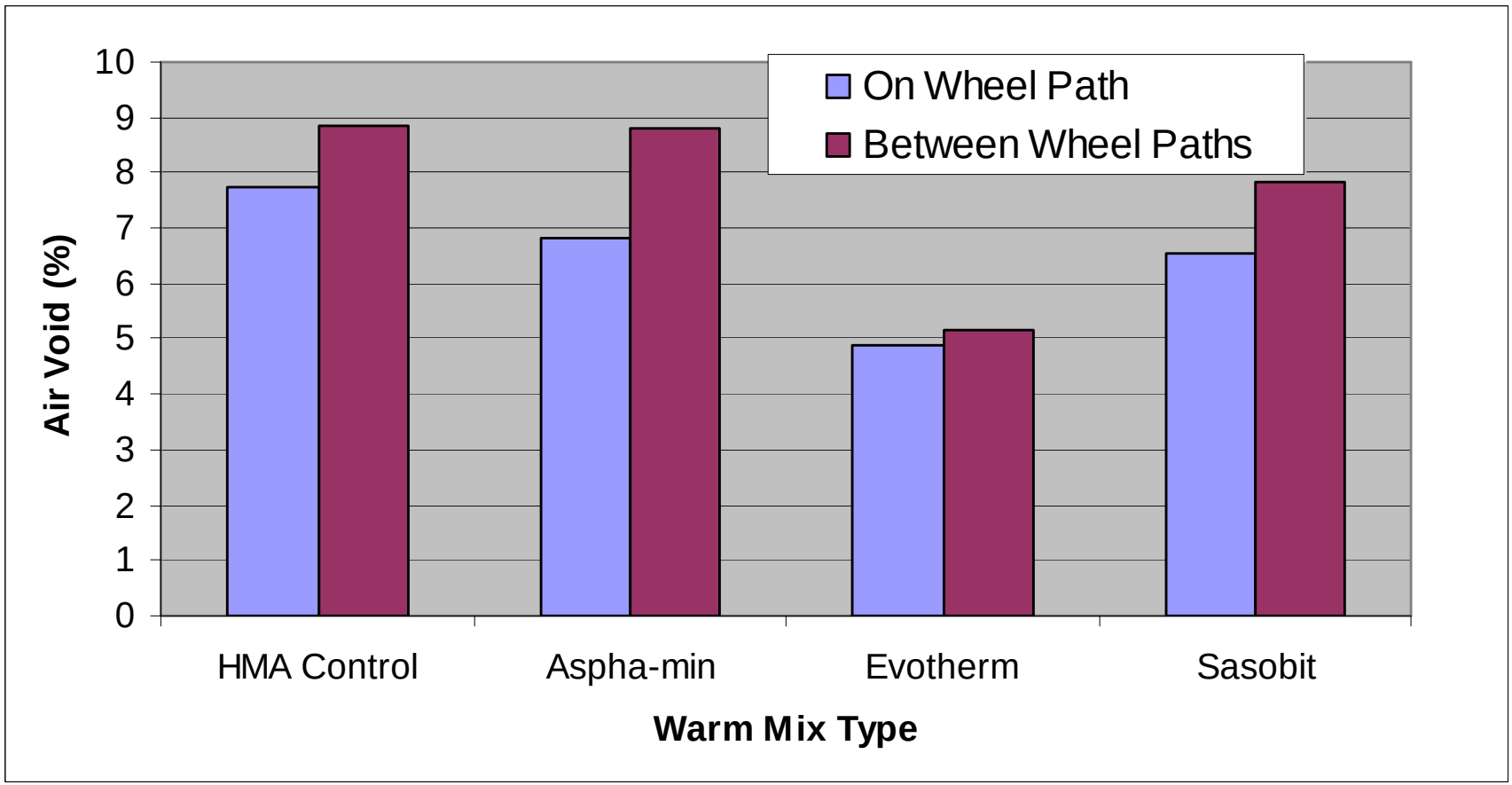
Emissions Background Sampling – ODOT COS/GUE Rt.541

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



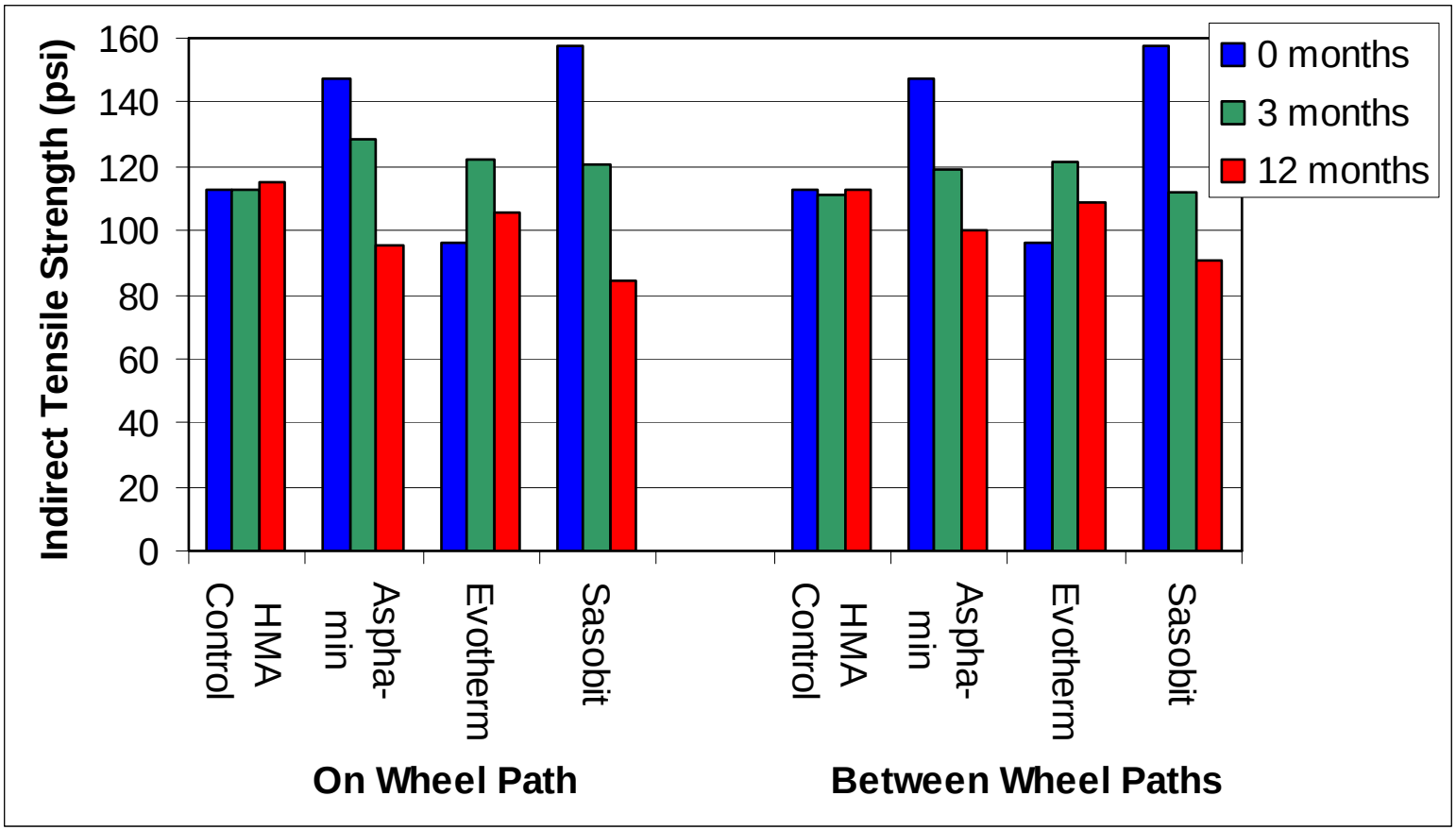
Mix Performance Preliminary Results – ODOT COS/GUE Rt.541

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)



Contributors:

- **Shelly & Sands, Inc.**
  - Ed Morrison, Quality Control Manager
  - Harold Walton, Quality Control
  - Tony Ruggiero, Environmental QC Manager
- **Chief Environmental Group, Inc**.
- **Ohio Department of Transportation**
  - David Powers, Bituminous Concrete & Materials Engineer
  - Tim Dannemiller, Office of Production, District 5
- **Ohio University**
  - Dr. Shad Sargand, Dr. Ludwig Figueroa, Sang-Soo Kim
- **EES Group, Inc.**