

A large asphalt paver machine is shown in operation on a road construction site. The machine is a yellow and black Blaw-Knox model, with an American flag mounted on its side. A worker in a light green shirt is seated on the machine, and another worker in a light blue shirt stands to the left. A third worker in a bright green shirt stands to the right. The background shows a green, hilly landscape with trees and a clear sky. The text "Ohio Department of Transportation" is overlaid in white, bold font across the top half of the image. Below it, "COS/GUE - SR 541" and "Warm Mix Asphalt Field Trial" are also overlaid in white, bold font.

Ohio Department of Transportation
COS/GUE - SR 541
Warm Mix Asphalt Field Trial



Ohio WMA Demo

- National WMA TWIG group wanted some specific data from a couple of WMA jobs in 06
- Ohio Industry approached ODOT in March with the idea of participating and it was agreed to try a job.
- Difficulties were getting district buy in, finding a job, paying for a job, getting a research study started, creating notes etc all by mid summer!

Ohio WMA Demo



Ohio WMA Demo

301(06)

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

GUE-541-0.00
COS-541-31.87

**WHEELING & LIBERTY TOWNSHIPS,
GUERNSEY COUNTY
LINTON TOWNSHIP,
COSHOCTON COUNTY**

PROJECT DESCRIPTION:
2 LANE ASPHALT CONCRETE
RESURFACING, AND RELATED WORK.

*Project Earth Disturbed Area =
N/A (Maintenance Project)
Estimated Contractor Earth Disturbed Area =
N/A (Maintenance Project)
Notice of Intent Earth Disturbed Area =
N/A (Maintenance Project)*

LOCATION	COUNTY	ROUTE	PROJECT TERMINI		NET LENGTH MILES
			BEGIN	END	
1	GUE	SR 541	0.00	8.47	8.46
2	COS	SR 541	31.87	34.90	3.03

FEDERAL PROJECT NO.
NON - FEDERAL
 PID NO.
25680
 NO.

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Revised Bid Items: Alternate 1

Ref	Item No	Qty	Unit	Description
13	448E46080	4509	CU YD	Asphalt Concrete Intermediate Course, Type 1, PG 70-22
14	448E46904	4161	CU YD	Asphalt concrete Surface Course, Type 1, PG 70-22M

Added Bid Items: Alternate 2

Ref	Item No	Qty	Unit	Description
	448E90000	1155	CU YD	Asphalt Concrete, Misc.: Evotherm
	448E90000	1155	CU YD	Asphalt Concrete, Misc.: Aspha-Min
	448E90000	1339	CU YD	Asphalt Concrete, Misc.: Sasobit
	448E46904	1602	CU YD	Asphalt concrete Surface Course, Type 1, PG 70-22M
	448E46020	3545	CU YD	Asphalt Concrete Intermediate Course, Type 1, PG 64-22

Ohio WMA Demo

Note: Alternate 2

Additions for a Warm Mix Asphalt Trial Project

Section Limits

Place the WMA and control sections as follows:

Control Section : Cos-541-31.87 to 34.90 (3.03 mile)

**Evothem : Gue-541-0.00 to 2.70 (Bridge Rd TR0186)
(2.70 mile)**

**Aspha-min: Gue-541-2.70 (Bridge Rd. TR0186) to 5.40
(Structure No. 541-0540) (2.70 mile)**

**Sasobit : Gue-541-5.40 (Structure No. 541-0540) to
8.47 (eastern most ramps of I-77) (3.07 m)**

Ohio WMA Demo

Mix Design

Design the control section mix to meet ODOT requirements. Design three surface course mixes to incorporate the above noted WMA technologies. Use the same aggregates and gradation in all four mixes. Design RAP into the control mix at the desired percentage of 0 to 15 percent by adjusting the virgin binder for the RAP binder content to achieve the design total binder content. Use the same binder content and RAP content for all four mixes. Use the same starting binder grade (PG 70-22M before altering with WMA products) in all four mixes.

Construction

The mainline Intermediate Course shall be a Type 1, PG 64-22 placed 0.75” thick. All Surface Course mixes shall be Type 1, PG 70-22M placed 1.25” thick.

Construct at least 500 tons of control section mix before beginning any WMA mix production. Before placement of WMA produce a test batch of a minimum of 50 tons of each WMA mix to verify mix properties and acceptability. Do not place the test material on the project. Sample and test one series of QC tests. Place and compact the test material. Provide results to the DET.

For each section provide a roller pattern and suitable nuclear or non-nuclear gauge results to satisfy the WMA supplier adequate density is being achieved.

Evotherm:

For the Evotherm adjust the asphalt plant to take into account the total emulsion vs. residue, ensuring the mixture binder content conforms to the job mix formula. Provide a technical data sheet to the researcher and Engineer summarizing the emulsion technical data and final PG grade.

Sasobit:

Add Sasobit at a rate of 1.5% of the total binder. If plant induced, use a feed method to achieve blending acceptable to the supplier and that achieves a uniform blend.

Aspha-Min:

Add Aspha-Min at a rate of 0.3% of the total mix. Use a feed method to achieve blending acceptable to the supplier and that achieves a uniform blend.

Shelly and Sands WMA Designs

Mix Type	Type I
Usage; ("1" for Surface)	Surface
Traffic Designation:	Medium
("1" if <u>Heavy</u> ; "2" if <u>Light</u>)	
Line Item Reference Number(s)	103
% Binder Content @ Max. Stability	6.2
% Binder Content @ Max. Unit Weight	7.2
% Binder Content @ Opt. Air Voids	6.1
Max. Theoretical @ Optimum	2.429
PG Grade by Proposal	PG 70-22
% Virgin Binder	5.3
Virgin Binder Grade	PG 70-22

Shelly and Sands WMA Designs

Coarse aggregate

%	Size	Type	Producer/Location	Code	ODOT Gsb
53	No. 8	Limestone	Shelly Materials - E. Fultonham, OH	4413	2.606

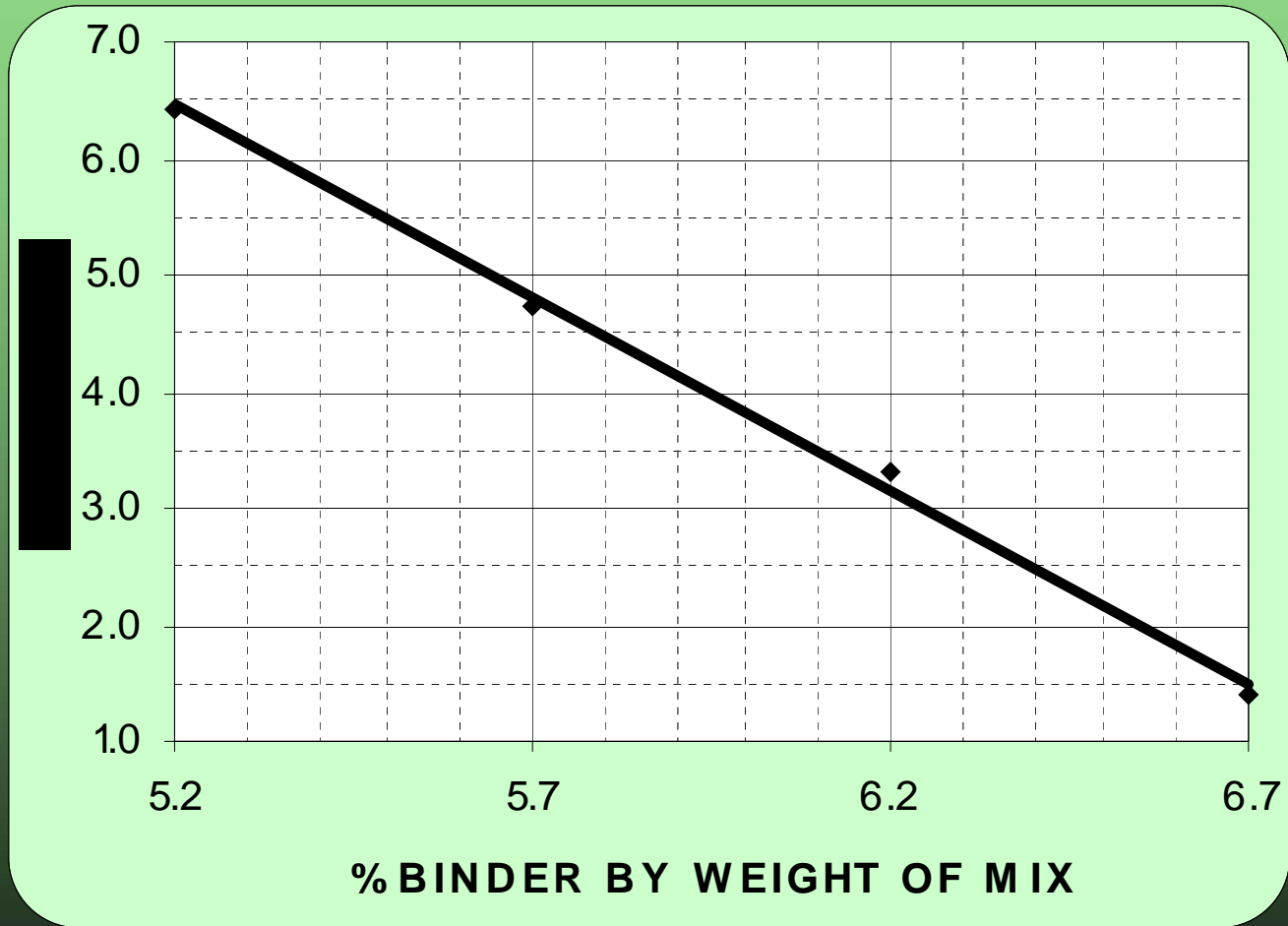
Fine aggregate

%	Size	Type	Producer/Location	Code	ODOT Gsb
32	Sand	Natural	Shelly Materials - Coshocton, OH	4403	2.585

*RAP

%	% AC	Type	Source	Composition	Gse
15	5.01	Crushed	Projects 547-97 & 766-98	Limestone / Natural	2.691

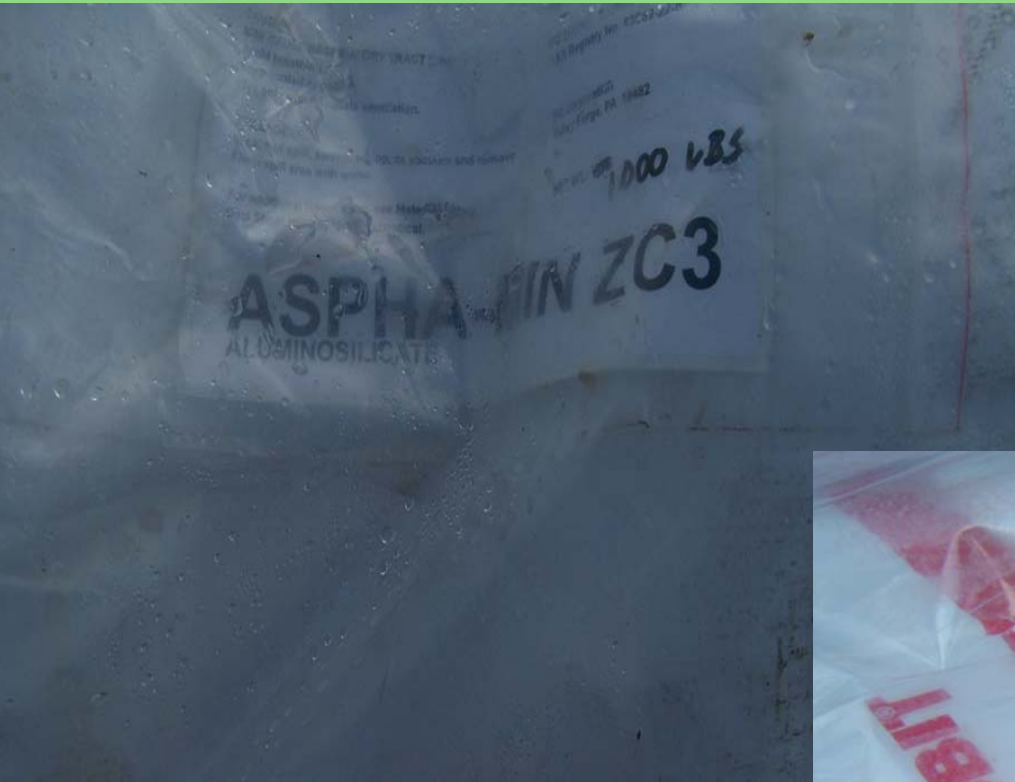
Shelly and Sands WMA Designs



Ohio WMA Demo



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Ohio WMA Demo

Research

- **Contractor Responsibilities**
- **Environmental**
- **Ohio DOT let APLF study**

Ohio WMA Demo

Contractor Responsibilities

- **Production information**
 - **Plant type**
 - **Plant model**
 - **Describe method of introducing WMA additive(s)**
 - **Production rate**
 - **Aggregate temperature**
 - **Mix discharge temperatures (history during production)**
 - **Observations regarding motor amperages. Record the amperage reading from the hot elevator drag chain motor(s) every 60 minutes of production.**
 - **Use of silos and typical storage time. Provide the minimum, maximum and average time mix was held in silo storage.**

Ohio WMA Demo

Contractor Responsibilities

- Laydown information
 - Temperature range of WMA at load out
 - Truck type (tandems, live bottom etc.)
 - Haul distance/Haul time
 - Release agent used (if any)
 - Observations regarding dumping material/sticking in truck beds (if any)
 - Use of windrow or transfer vehicles
 - Paver type and model
 - Vibratory screed on?
 - Screed heated?
 - Compacted thickness
 - Record the mat temperature measured immediately behind screed every 60 minutes of placement.
 - Roller Train
 - Type and model
 - Weight
 - Amplitude and frequency of vibratory rollers (if applicable)
 - Tire pressure of pneumatic roller (if applicable)
 - Roller pattern used for each WMA mix and the control section

Ohio WMA Demo

Contractor Responsibilities

- **Moisture content of mix at load out (sampled from truck) and all QC data.**
- **Provide fuel consumption data for the plant and paving train for each of the four sections.**

Ohio WMA Demo

Environmental

Plant -

- **Average mix production rate in tons/hour over entire**
 - Conventional Mix Test Period
 - WMA Test Period
- **Ibs CO₂/hour; Ibs NO_x/hours; Ibs VOC/hour reported as MW of propane**
 - Conventional Test Period (average all runs)
 - WMA Test Period (average all runs)
 - percent Reduction

Ohio WMA Demo

Environmental

Paver -

- **Anomalies in sampling and results**
- **Visual observations of emissions**
 - Conventional Test Period
 - WMA Test Period
- **Mix temperature (hopper and mat)**
 - Conventional Test Period
 - WMA Test Period
 - Percent reduction
- **Background-corrected asphalt fume emissions (TPM and BSM) reported in mg/m³**
 - Conventional Test Period (average all runs)
 - WMA Test Period (average all runs)
- **Percent reduction**



Ohio WMA Demo

APTLF Contracted Research

- **To build and test pavement sections containing each of the selected mixtures (3 WMA types and one conventional) as a wearing (sacrificial) course compacted on conventional HMA layers designed following perpetual pavement guidelines.**

Ohio WMA Demo

APTLF Contracted Research

- To examine the influence of pavement thickness on the tensile strain developed at the bottom of the perpetual pavement layer.
- To compare the performance of WMA mixtures with that of conventional HMA in the controlled setting of the APLF.
- To document the performance of perpetual pavements containing 3 types of WMA and one conventional wearing course and to monitor pavement response in the form of deflections, strains and pressures in and under perpetual pavements.

Ohio WMA Demo

APTLF Contracted Research

