Ohio Asphalt Paving Conference

Columbus

February 7, 2018

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Ohio Research Institute for Transportation and the Environment
Russ College of Engineering and Technology
Ohio University, Athens, Ohio

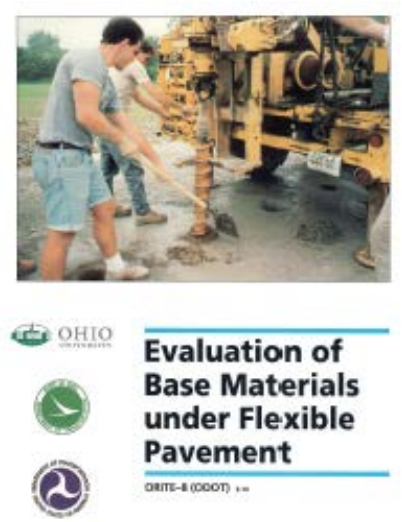
ODOT Mission Statement

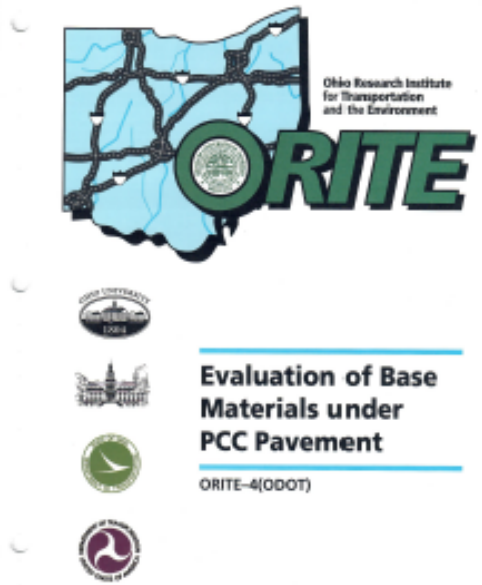
To provide easy movement of people and goods from place to place, we will . . .

1. **Take Care of What We have**
   - ODOT is moving from reactive, or “worst first”, to preventive maintenance, “selecting the right treatment for the right pavement at the right time ”
2. **Make Our System Work Better**
   - Improved pavement performance elongates service life
3. **Improve Safety**
   - Quantify skid resistance of chip seal and fine graded polymer asphalt concrete
4. **Enhance Capacity**
   - Improved rehabilitation strategies reduce user delays

Test Roads in Ohio have been valuable

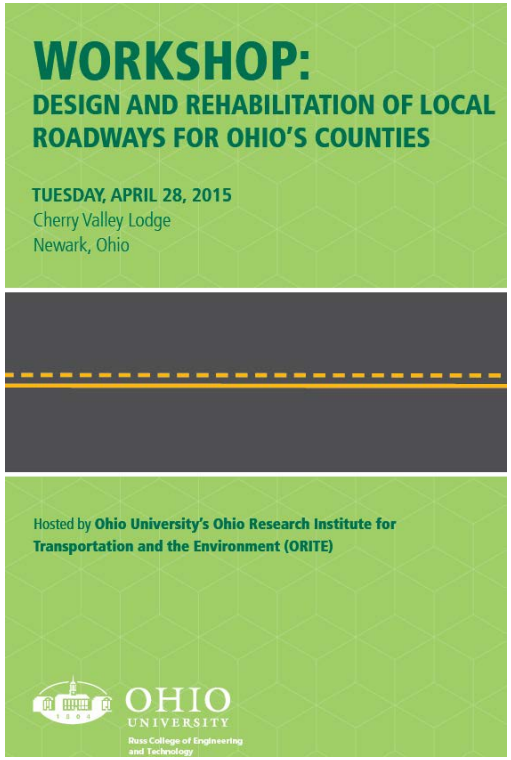
- The value of test roads was demonstrated on the Ohio/SHRP Test Road on US 23 in Delaware County and on US 30 in Wayne County

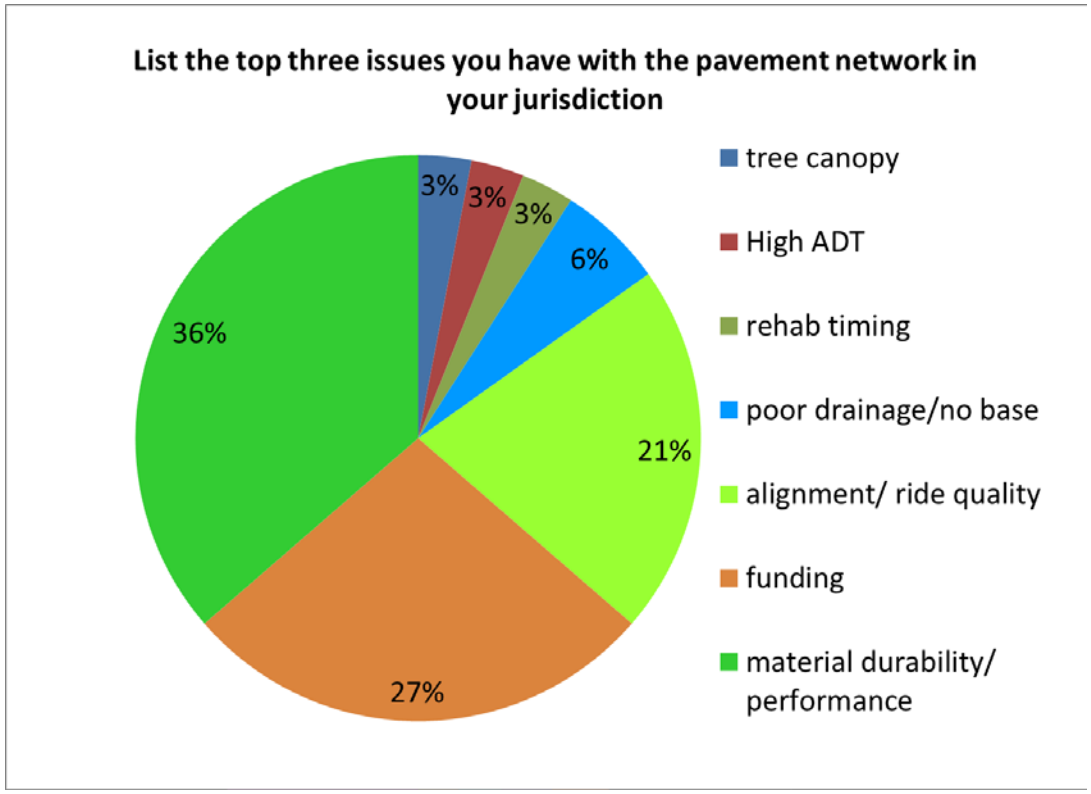




Workshop on Design and Rehabilitation of Local Roadways for Ohio's Counties

Held April 28, 2015 at Cherry Valley Lodge in Newark, Ohio





Attended by representatives from counties, cities, ODOT, industry, and consultants

Low Volume Roads in Ohio

- Most of the road inventory in state and local jurisdictions is classified as local roads, less than 6000 ADT*

* "Sustainable Roadway Widening Practices", Douglas Davis, Muskingum County Engineer

Southern Ohio Low Volume Experimental Road (SOLVER)

- Main Objective
  - Focus on low-volume roads and evaluate performance of various:
    - Mixes
    - Materials
    - Construction processes
    - Maintenance options
- 3 Phases
  - Phase 1: Minor rehabilitation of existing composite pavement
  - Phase 2: New AC construction with focus on sustainable materials
  - Phase 3: TBD

SOLVER Benefits

Short term benefits:

– Improved design procedures and construction specifications

– Effect of various treatments on texture, skid, and noise

– Test and evaluate drainage structures, e.g. pipes

Long term benefits:

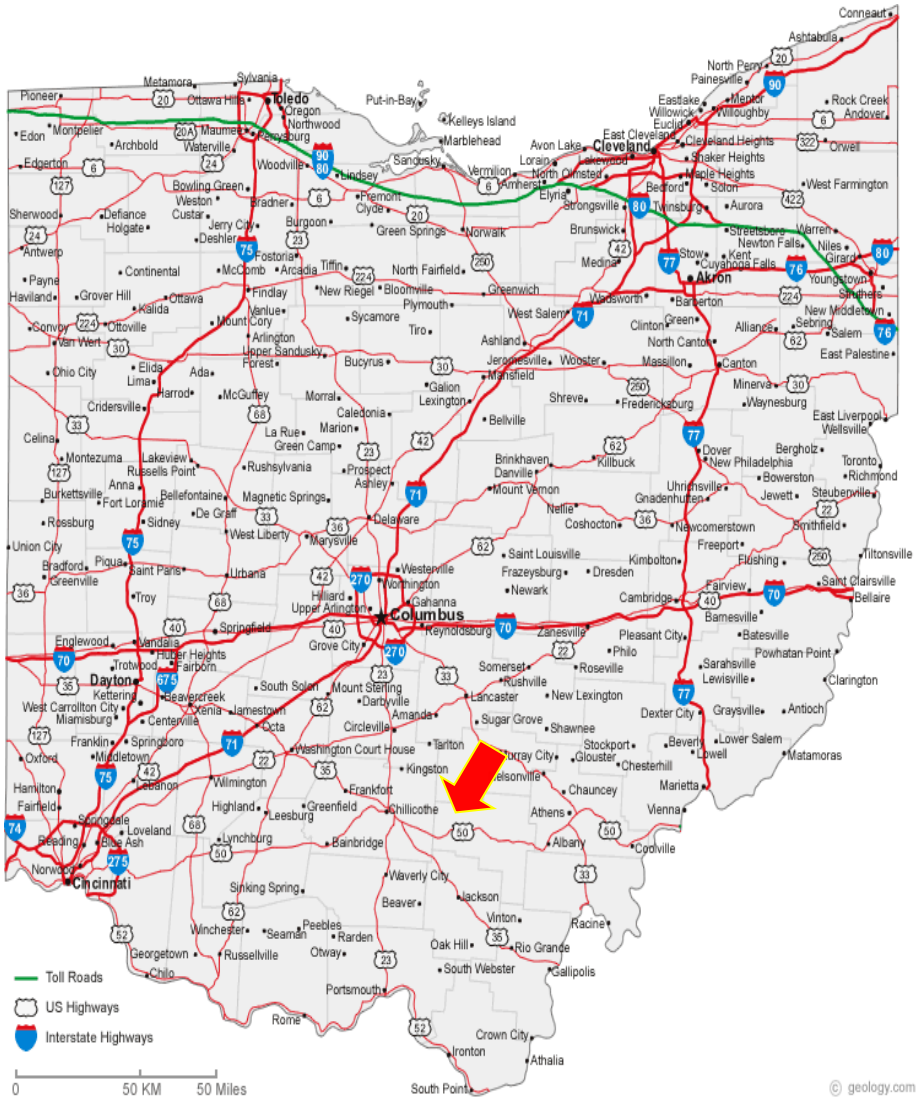
– Increased use of recycled materials

– Validation of completed research

SOLVER Location

VIN-50

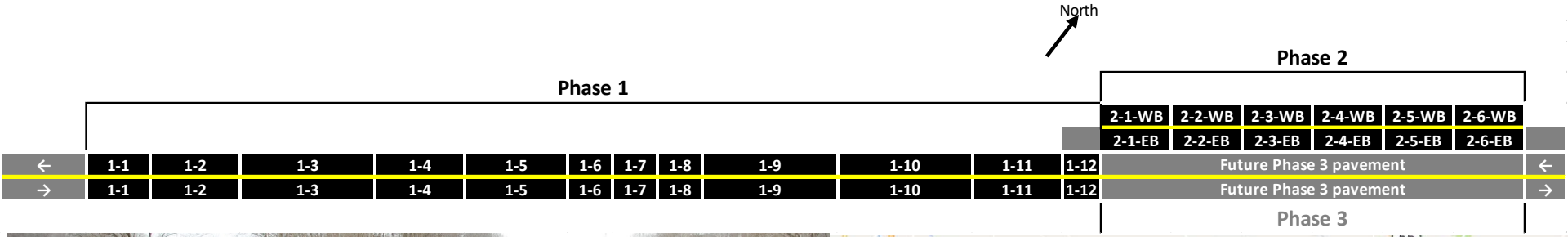
- 4.58 centerline miles
- Existing composite pavement:
  - 9 in. Jointed Reinforced Concrete Pavement (JRCP) constructed in 1964
  - 4-5 in. existing Asphalt Concrete overlay
- 3080 – 3980 ADT
- 280 – 360 Trucks
- 20 year design ESAL
  - Rigid - 1.5 million
  - Flexible - 0.9 million



2 Lane Road on 4 Lane Right-of-Way

Phase 1: Minor rehabilitation of existing pavement

Phase 2: New construction adjacent to existing road



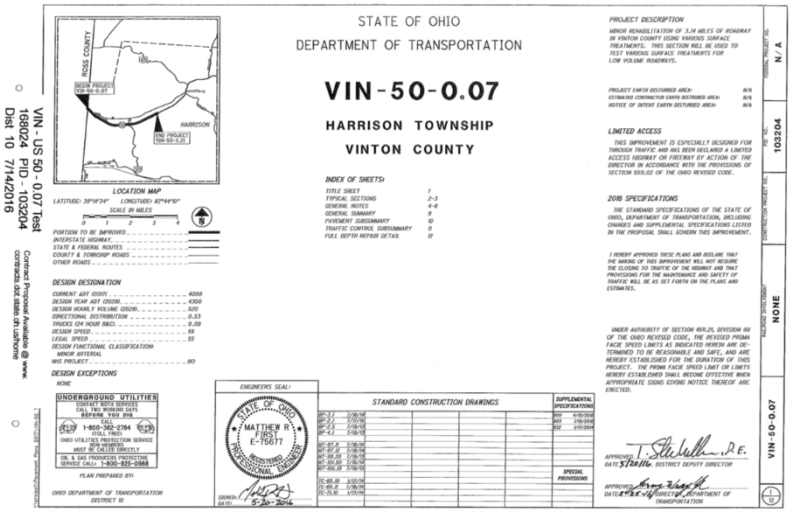
Phase 1

North

Phase 1

←	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10	1-11	1-12
→	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10	1-11	1-12

- Minor rehabilitation of existing two-lane composite pavement
  - Construction completed 2016
  - Repairs made prior to construction
- 3.14 miles long starting at Ross/Vinton County line
- Section lengths range from 581 ft to 2112 ft


STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

VIN-50-0.07

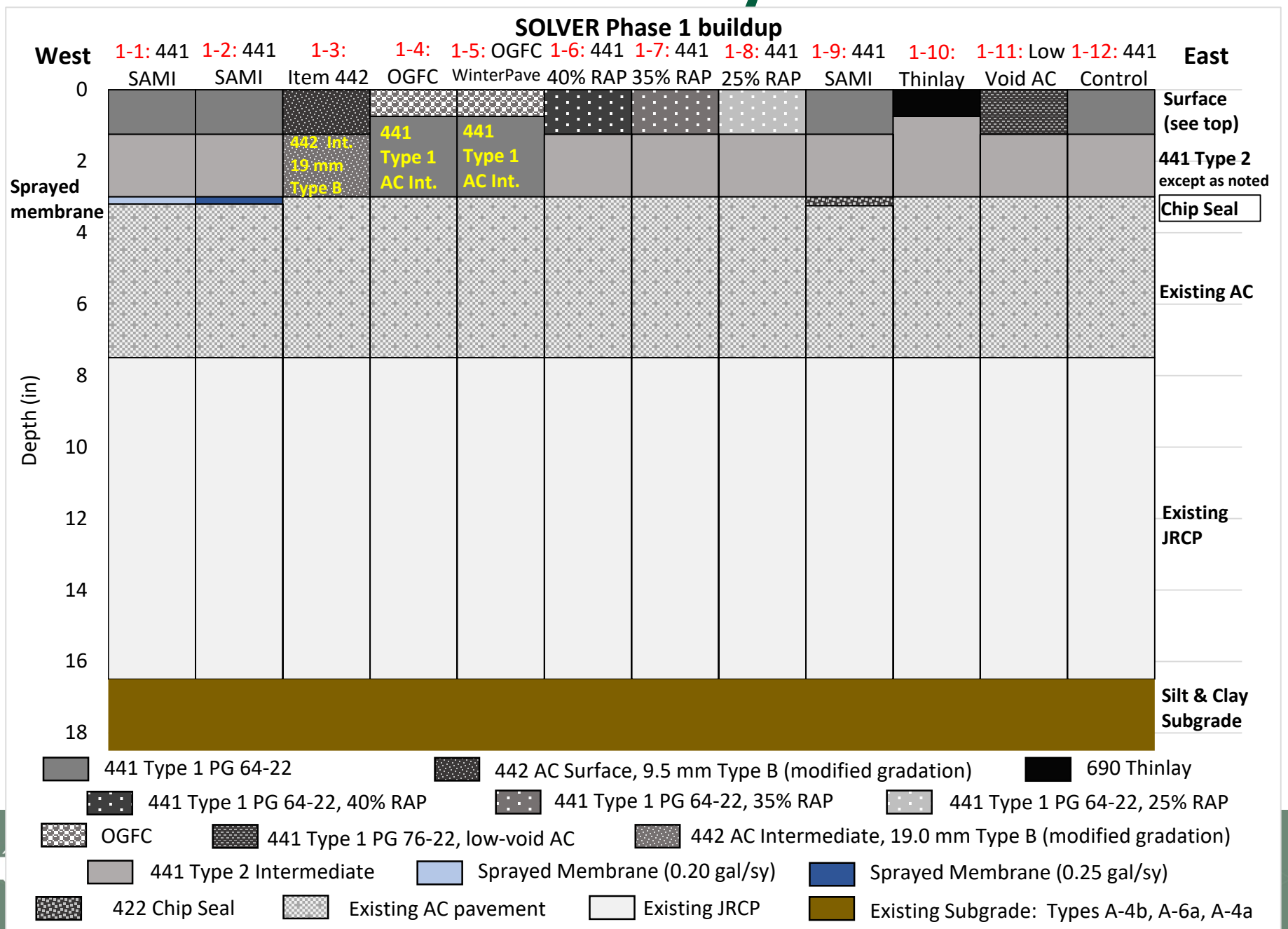
HARRISON TOWNSHIP
VINTON COUNTY

VIN - US 50 - 0.07 Test
168024 PID - 103204
Dist 10 7/14/2016

Phase I - Low Volume Road Rehabilitation Techniques

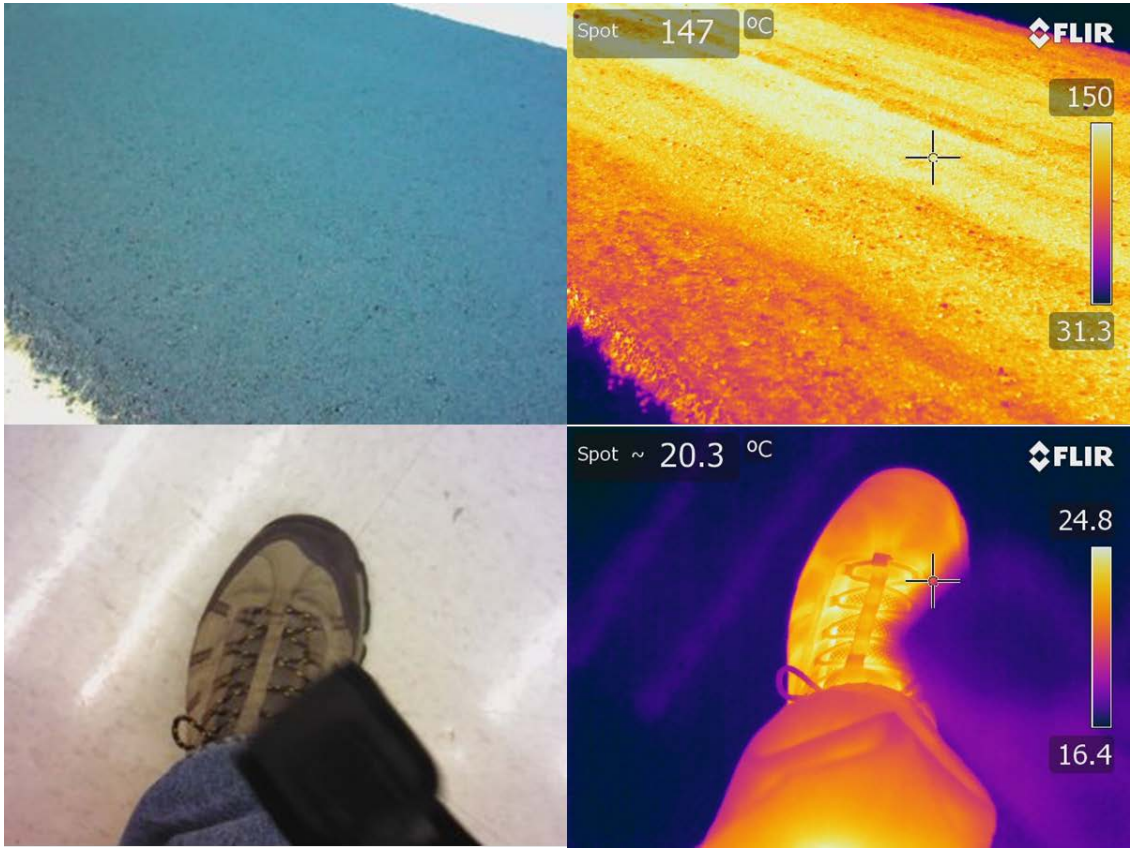
	Treatment	Layer			
		Surface	Intermediate	Interlayer	Asphalt base
Phase 1: Minor Rehabilitation, bi-directional	SAMI - VRAM			x	
	SAMI - chip seal			x	
	Low void asphalt concrete	x			
	Modified gradations	x	x		
	Open Graded Friction Course w/ Winterpave additive	x			
	Open Graded Friction Course	x			
	RAP (25%) modified with rejuvenator	x			
	RAP (35%) modified with rejuvenator	x			
	RAP (40%) modified with rejuvenator	x			
	Thinlay	x			

Phase 1 Layout



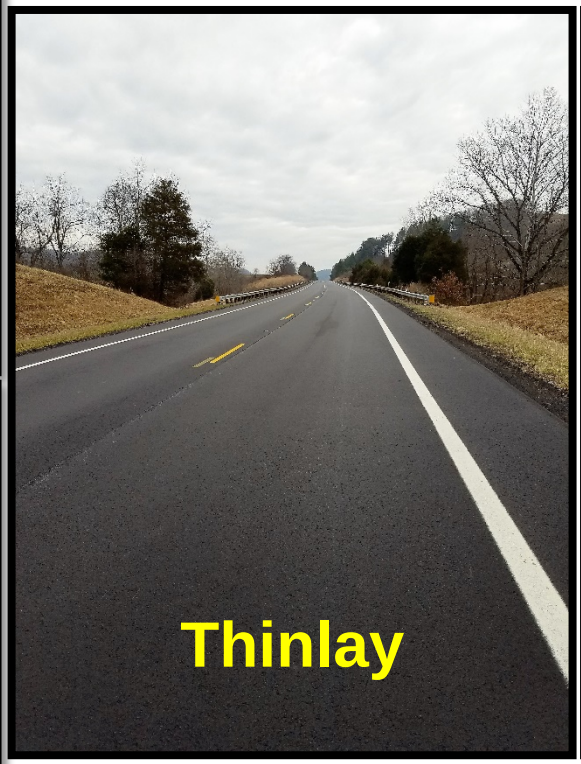
Phase 1: Construction

SAMI- Chip seal



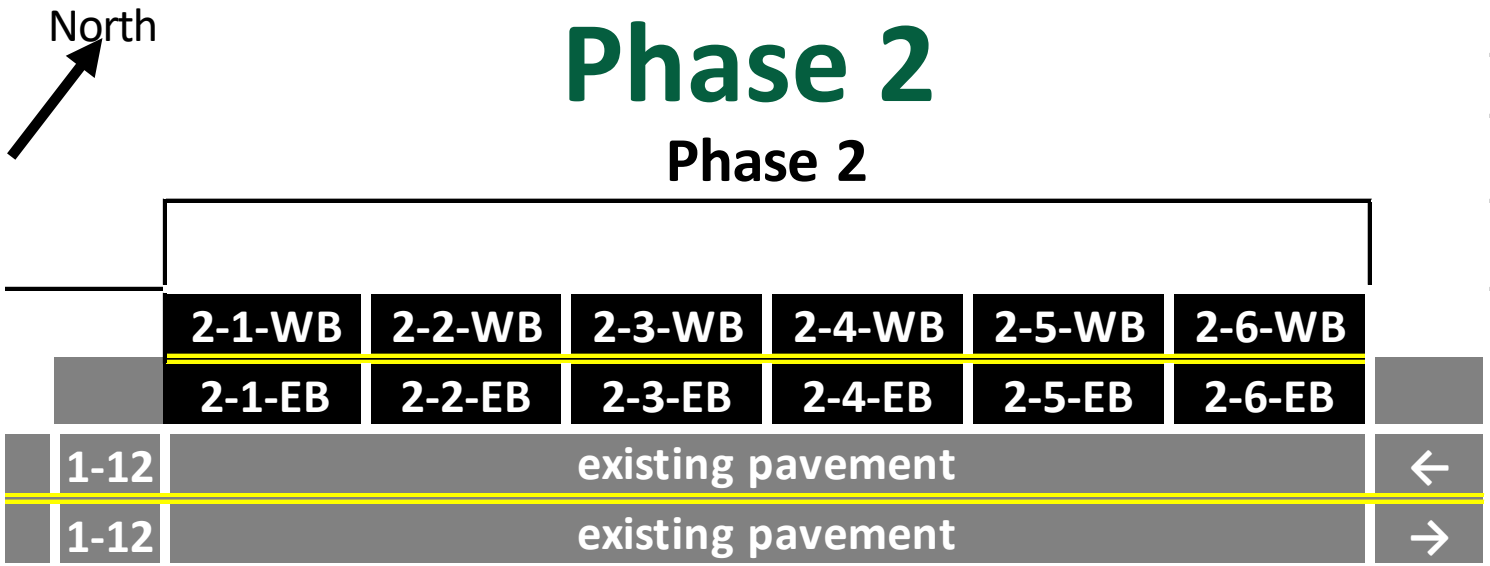
IR Camera – Thermal Imaging

Phase 1: Completed Test Sections

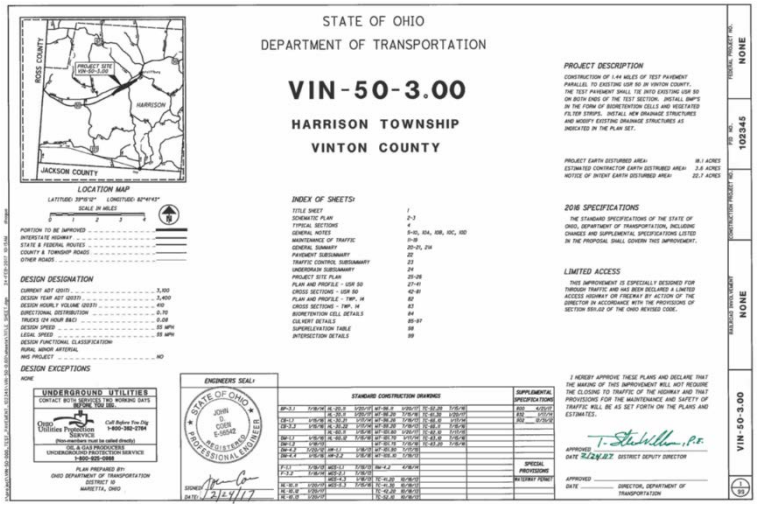


Phase 1: Debonding/Snow Plow Damage

Phase 2



- New construction adjacent to existing lanes
  - Focus on sustainability
    - Use of rejuvenators with various RAP percentages
  - Construction: 2017/2018
- 1.44 miles long
- Sections 1100 ft long


STATE OF OHIO
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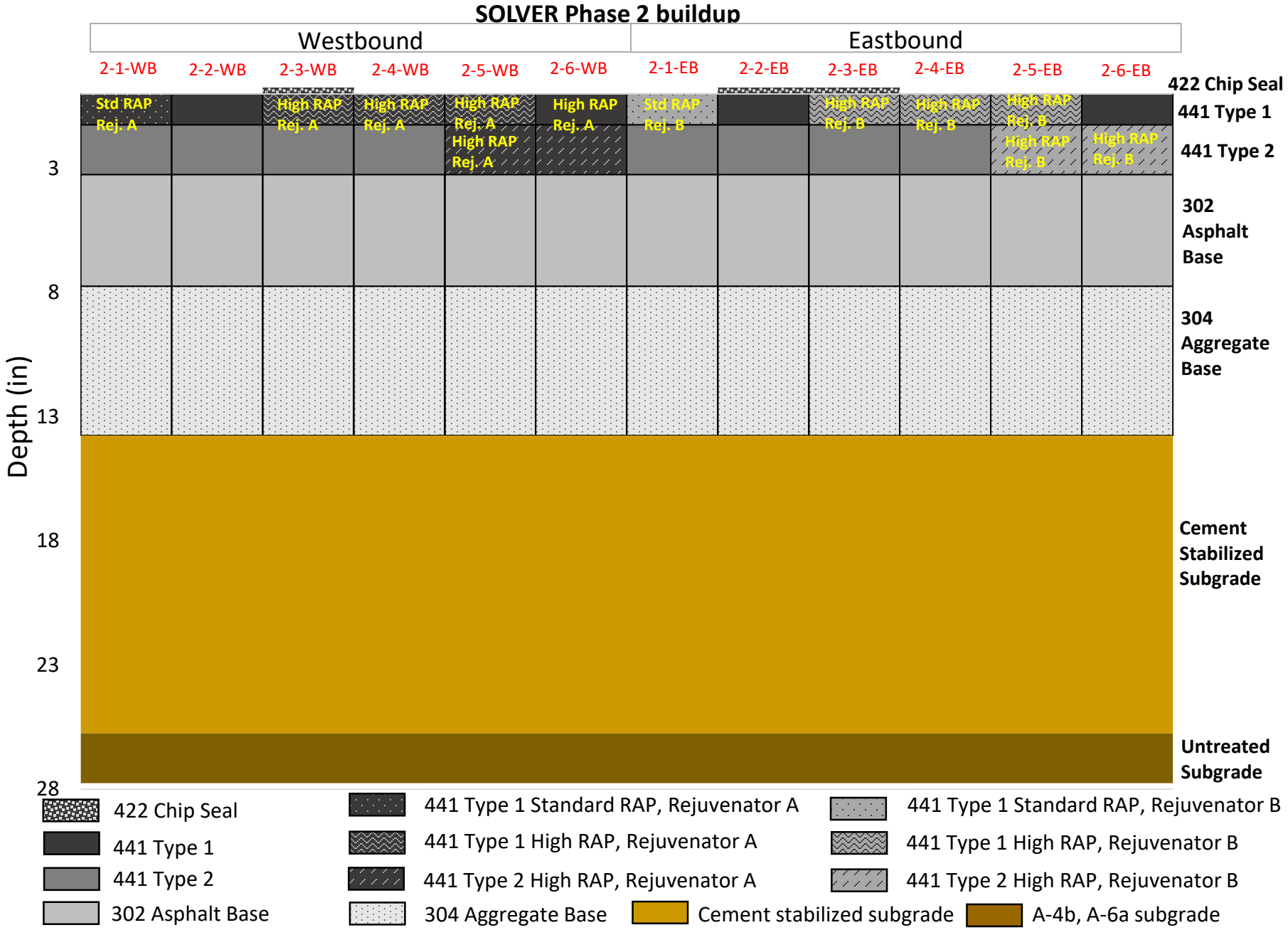
VIN-50-3.00
HARRISON TOWNSHIP
VINTON COUNTY

Phase 2 - Low Volume Road New Construction

	Material/Mix	Layer		
		Surface	Intermediate	Asphalt base
Phase 2: New construction	Chip Seal	x		
	441 Type 1	x		
	441 Type 2		x	
	441 Type 1 Standard RAP (23% - 25%) w/ rejuvenator A	x		
	441 Type 2 Standard RAP (33% - 35%) w/ rejuvenator A		x	
	High RAP (48% - 50%) w/ rejuvenator A	x	x	
	441 Type 1 Standard RAP (23% - 25%) w/ rejuvenator B	x		
	441 Type 2 Standard RAP (33% - 35%) w/ rejuvenator B		x	
	High RAP (48% - 50%) w/ rejuvenator B	x	x	
	302 Asphalt Base			x

Phase 2 Layout



Groundbreaking: July 6, 2017

SOLVER in the News

Vinton County Courier

The experiment has commenced

Test pavement highway now under construction on Route 50

BY TYLER BUCHANAN
COURIER EDITOR

RATCLIFFBURG — The project to build test pavement lanes on Route 50 on the west end of Vinton County is now under construction.

A groundbreaking for the $3.8 million state project was held Thursday, July 6, bringing together numerous county and Ohio Department of Transportation officials to the intersection of Route 50 and Clark Road.

The 1.44-mile stretch of land will feature two lanes of test pavement. For years, ODOT has tested various pavement types to seek one that can stay preserved for longer. Previous test projects have taken place on high-volume highways like Route 23 north of Columbus, but this will be the first built on a "low-volume" roadway.

Called the "Southern Ohio Low Volume Experimental Road" (SOLVER), contractor Shelly and Sands is planning for a November completion date.

SEE TESTING ON PAGE A2

The Athens News

Thursday, July 6, 2017

LOCAL

Road project begins on U.S. Rt. 50 in Vinton County

The public is invited to a groundbreaking ceremony at 10 a.m. today (Thursday, July 6) on U.S. Rt. 50 in Vinton County. The event marks the beginning of construction on Ohio's first low-volume, two-lane test road, according to a news release from Ohio University.

The project is a joint effort of the Ohio Department of Transportation and OU's Ohio Research Institute for Transportation and the Environment (ORITE), whose researchers will use the 1.44-mile stretch of Rt. 50 to test ways to preserve pavement.

"Meetings and discussions with county engineers, local agencies and DOT personnel indicated the next step was to establish the Southern Ohio Low Volume Experimental Road (SOLVER) as a means to evaluate the performance of various mixes, materials, construction processes and maintenance," ORITE Associate Director Shad Sargand said in the release. "The findings will take on increasing significance as Ohio moves from reactive to preventative maintenance as a strategy for better stewarding taxpayer dollars."

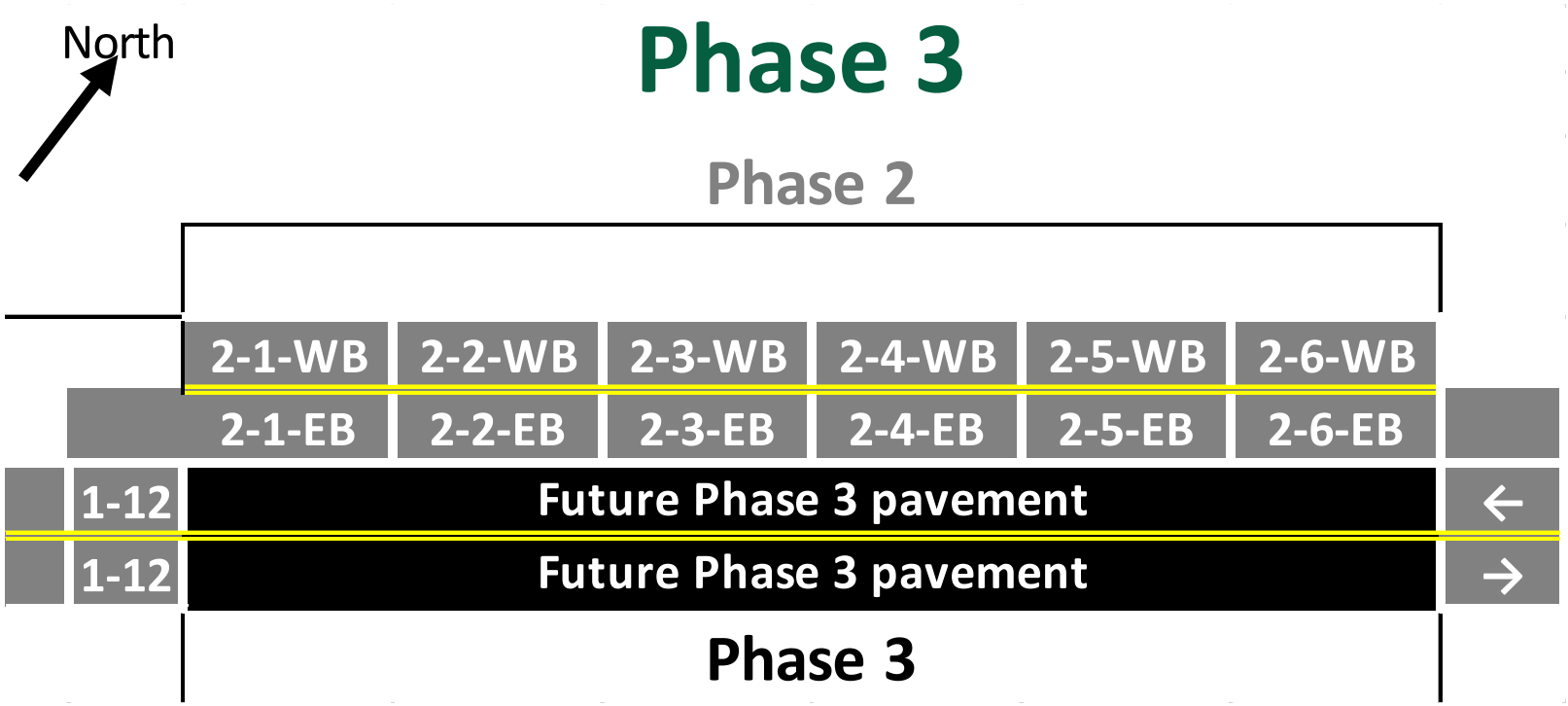
In the past, test pavement was only constructed on heavily traveled Ohio freeways, including U.S. Rt. 23 in Delaware County and U.S. Rt. 30 in Wayne County. Given that 78 percent of Ohio's roads are low-volume roads, it makes sense to pursue the project in Vinton County, Sargand said in the release.

The contractor on the $3.8 million project is Shelly & Sands. The project is estimated to be complete in November.

The ceremony will take at the intersection of Clark Road and Rt. 50 in Vinton County.

Phase 2 Construction

Phase 3



- Potential experiments:
  - PCC in the original lanes could be recycled into material for a new base (ODOT Item 304, 305, and/or RCC base)
  - Evaluation of other experimental materials and construction methods

Binder Testing

Laboratory Test	Parameters measured	Binders in	Phase 1	Phase 2
Multiple Stress Creep and Recovery (MSCR)	Non-recoverable creep compliance; resistance to permanent deformation	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		
Glover/Rowe damage*	Susceptibility to block cracking	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		
Binder continuous grade/Performance Grade*	Performance grade and true grade	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		X
Linear Amplitude Sweep (LAS)	Binder fatigue resistance properties	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		X
Asphalt Binder Cracking Device (ABCD)	Binder fracture properties (low-temperature cracking)	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		X
Direct Tension Test with $T_{critical}$	Binder fracture properties and critical cracking temperature	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		X

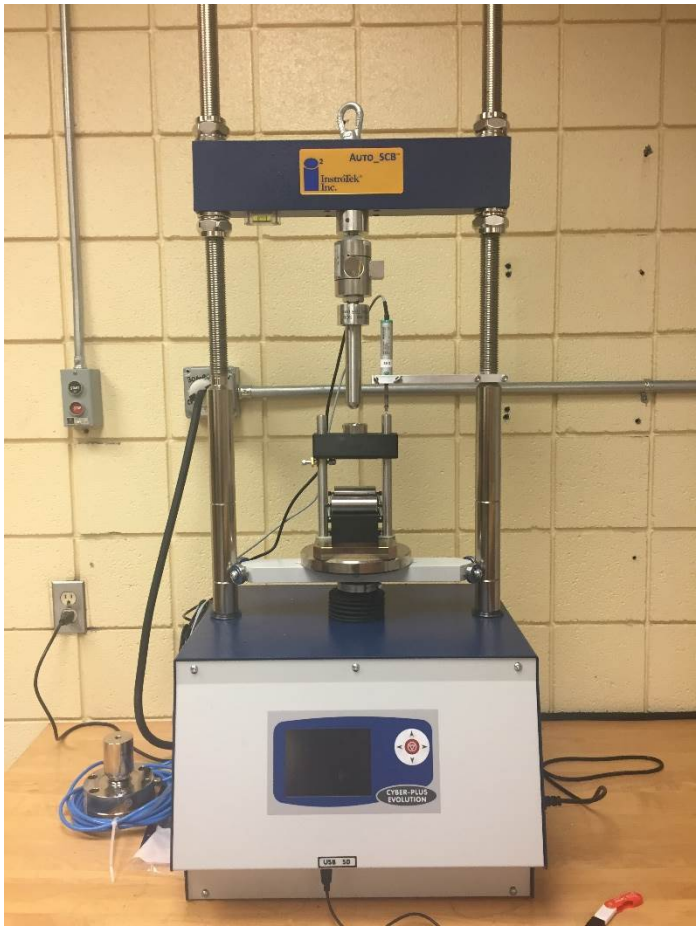
*To include standard PAV aging and 2x PAV aging

Mix Testing

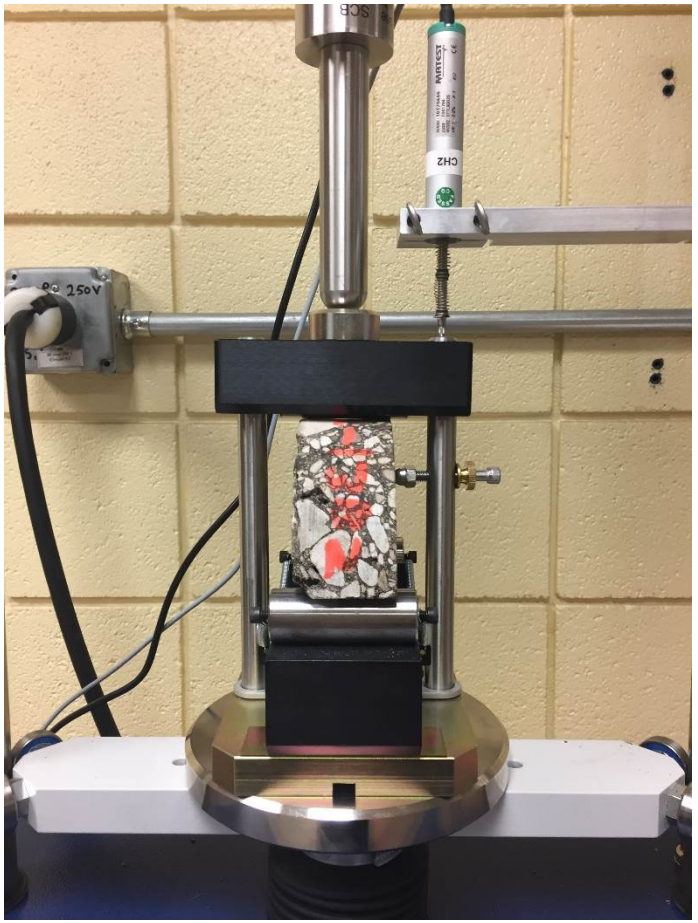
Laboratory Test	Parameters measured	Material	Phase 1	Phase 2
Boiling Test	Aggregate/emulsion compatibility and stripping susceptibility	Chip seal		X
Semi-circular bending (SCB)	Fracture energy; Toughness of AC mix; Stiffness	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		X
Indirect Tensile Strength (ITS) and Tensile Strength Ratio (TSR)	Stripping potential	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		X
Creep compliance	Master relaxation curve; Fracture parameters; Thermal cracking susceptibility	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		X
Flow number	Resistance to permanent deformation	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		
Dynamic Modulus	Dynamic modulus (E*) master curve	Surface Mixes	X	X
		Intermediate mixes	X	X
		Base Mix		X
In-place density	Bulk specific gravity; Air voids	Surface Mixes		X
		Intermediate mixes		X
		Base Mix		X
Asphalt Pavement Analyzer (APA)	Rutting susceptibility	Surface Mixes	X	X
		Intermediate mixes		X
		Base Mix		

Laboratory Testing

Semi-circular Bending (SCB) Test

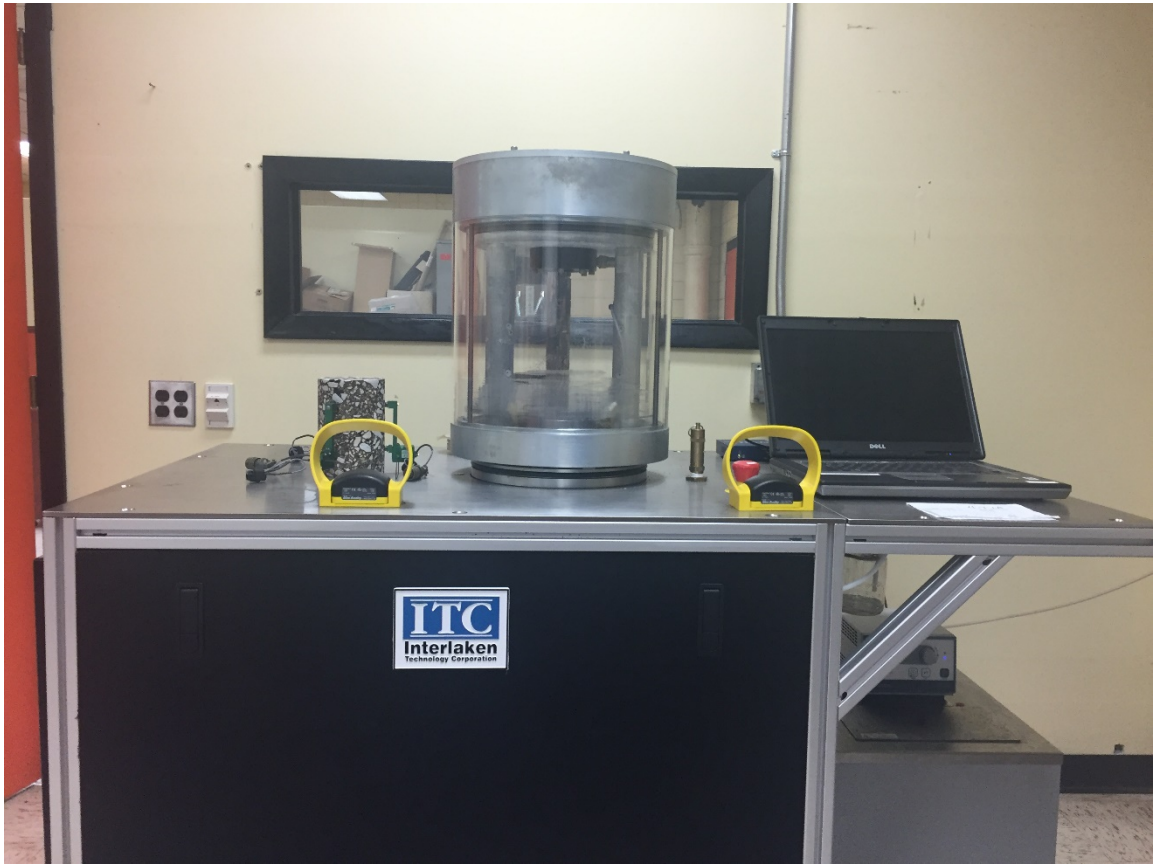


SCB Apparatus



Specimen undergoing SCB testing

Laboratory Testing



- Tensile Strength Ratio (TSR)
  - Moisture susceptibility
- Dynamic Modulus (E*)
  - M-E design input

Testing During Construction

- Performed by OU unless indicated otherwise:
  - QC/QA [Contractor/ODOT]
  - Infrared Thermography* (IR)
  - Falling Weight Deflectometer (FWD) [ODOT]
  - Lightweight Deflectometer* (LWD)
  - Dynamic Cone Penetrometer* (DCP)
  - Portable Seismic Pavement Analyzer* (PSPA)
  - Coring
  - Ground Penetrating Radar* (GPR)

*Not included in Phase 1

Long Term Performance Monitoring

ODOT:

- Pathrunner multisubsystem van
  - Images
  - Rutting
  - Ride quality
- Friction
  - Skid resistance (smooth and ribbed tire)
- Weigh-in-motion

OU:

- Distress Survey
  - Cracking
- Noise
- Weather Station
- Texture
  - Mean texture depth/ mean profile depth
- Friction
  - Dynamic friction tester

Stakeholders

ODOT Offices Involved in SOLVER

- ODOT Office of Materials Management
- ODOT Office of Pavement Engineering
- ODOT Office of Geotechnical Engineering
- ODOT Office of Hydraulic Engineering
- ODOT Office of Construction Administration
- ODOT District 10
- ODOT District 5

Others Involved in SOLVER

- Shelly and Sands
- Advanced Drainage Systems (ADS)
- National Center for Asphalt Technology (NCAT) at Auburn University
- Flexible Pavements of Ohio (FPO)
- Ohio Concrete
- Utility Technologies International Corporation (UTI)
- Arizona Chemical
- Ingevity

Questions?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