IDOT HMA Tech Briefs

62nd Annual Bituminous Conference

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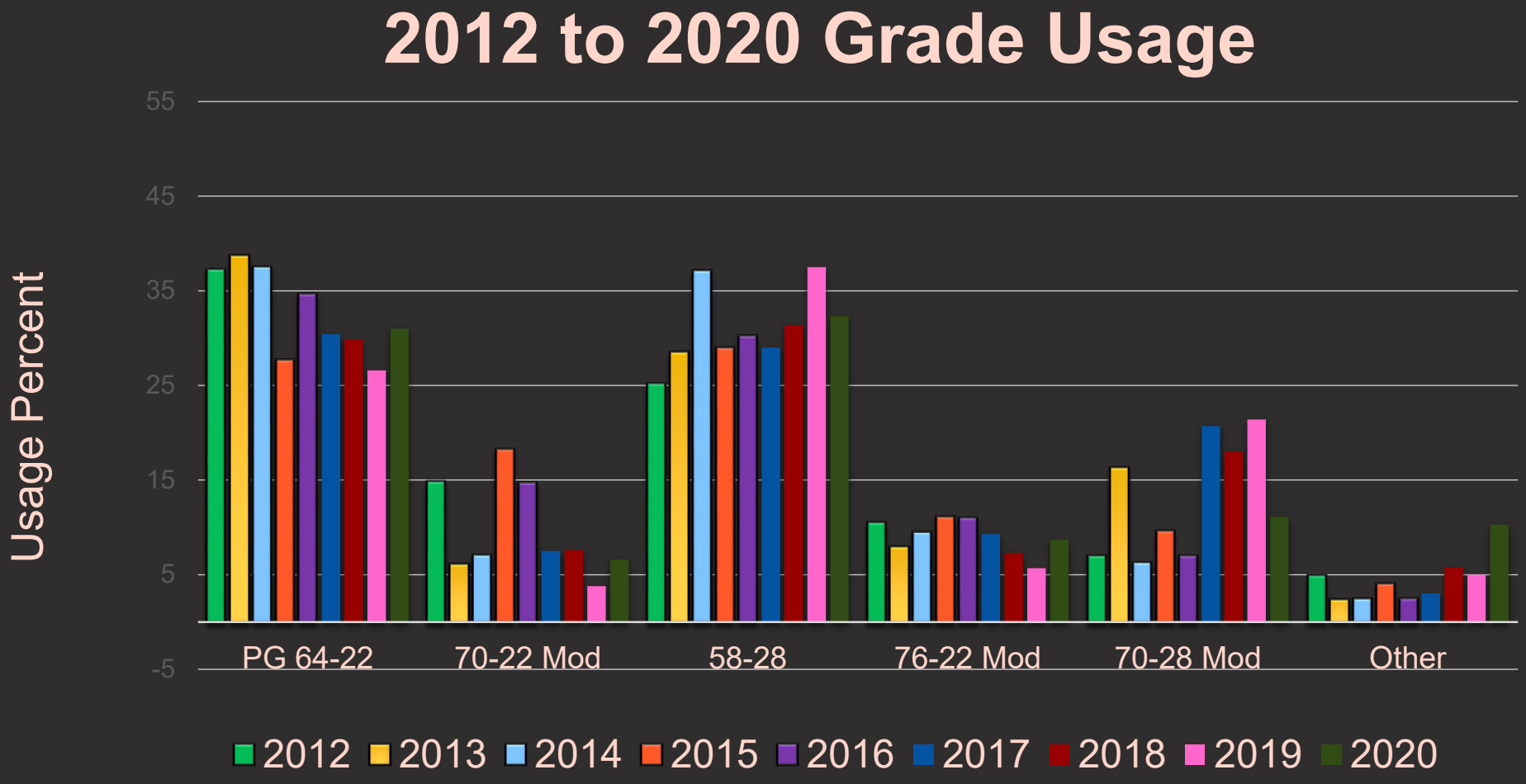
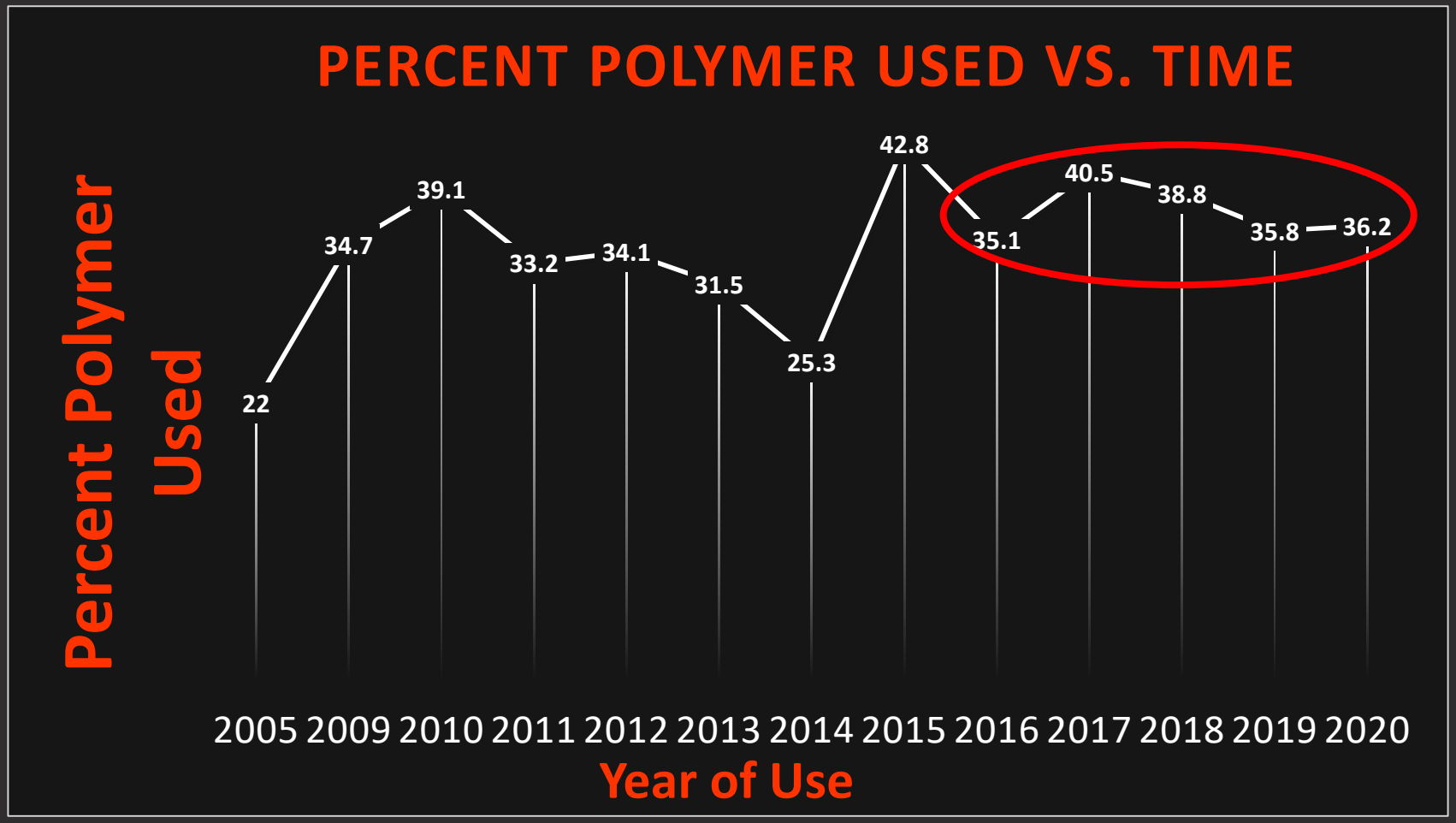
Topics

- Binder Usage & Trends
- HMA & Binder Research
- FLS & FLSWS
- I-FIT Implementation
- HMA Specifications
- BDE Special Provisions
- Paver Segregation Process Review
- Miscellaneous Topics

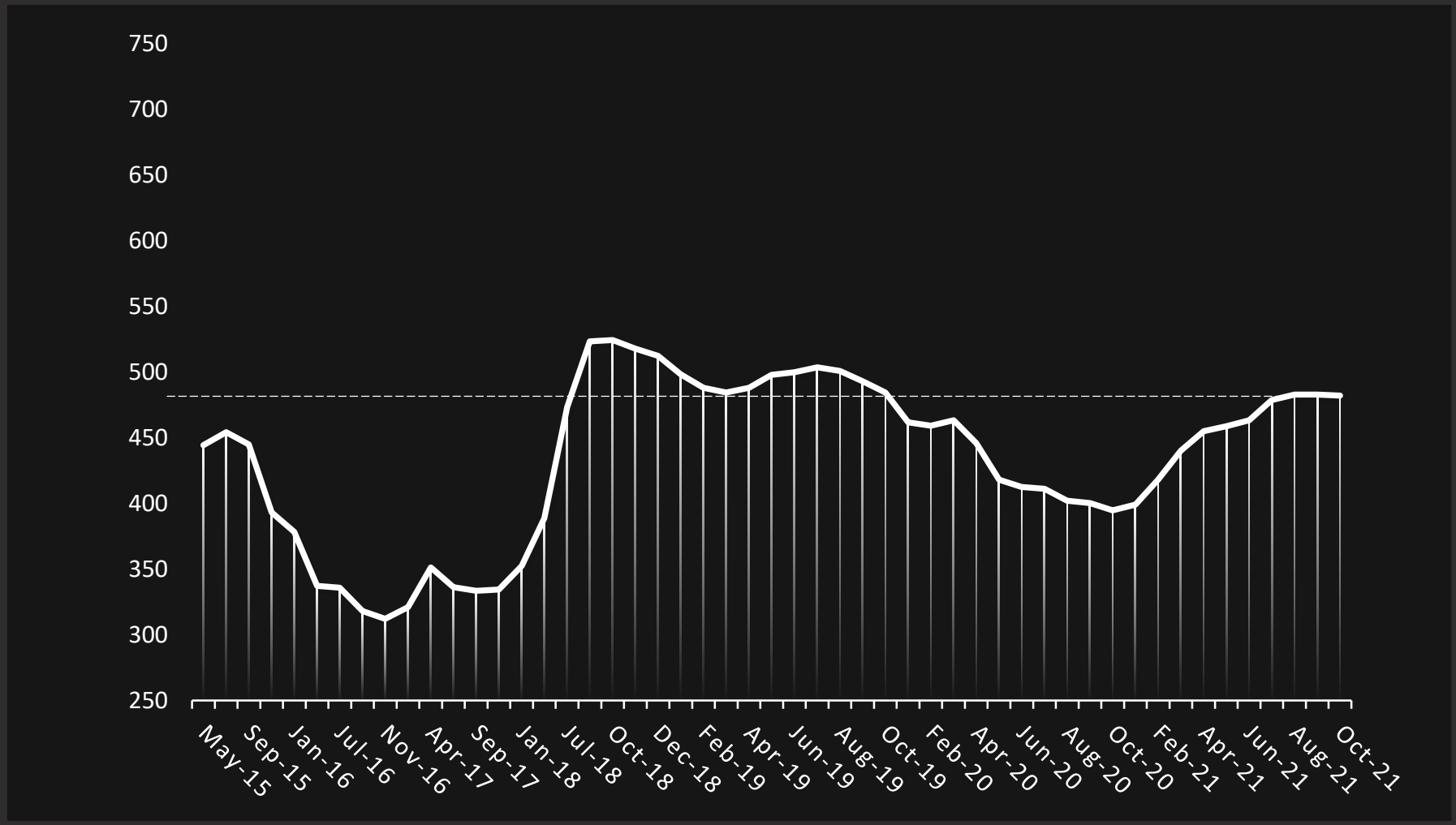
Binder Usage



Polymer Usage



Bituminous Price Index



Asphalt Binder and HMA Research Timeline

2017 – R27-175 Development LTA Protocol for I-FIT Begins

2018 – R27-196HS Development of Asphalt Binder Performance Testing Begins

2019 – R27-175 Development LTA Protocol for I-FIT Completes

2020 – R27-196HS Development of Asphalt Binder Performance Testing Delays due to COVID

- R27-216 Use of Local Aggregates in SMA Begins

2021 – R27-196HS Development of Asphalt Binder Performance Testing Completes

2022 – R27-175 - LTA Protocol for I-FIT Implements via BDE Spec for January 2022

- R27-196HS – Asphalt Binder Performance Testing Implements via BDE Spec for January 2022 including GTR & Softener modified binder requirements.

Full Lane Sealant (FLS)

Full Lane Sealant

Three Years Later:

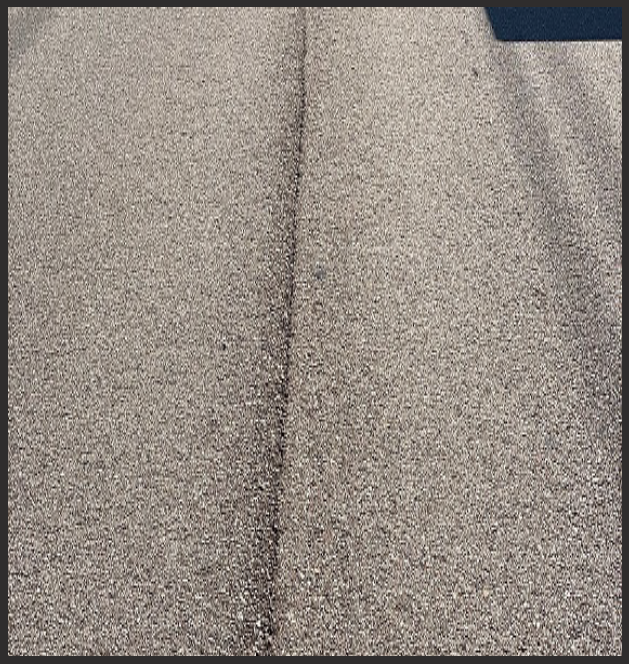
- No visible difference between controls and FLS applications
- All sites are performing well

FLS Waterproofing System

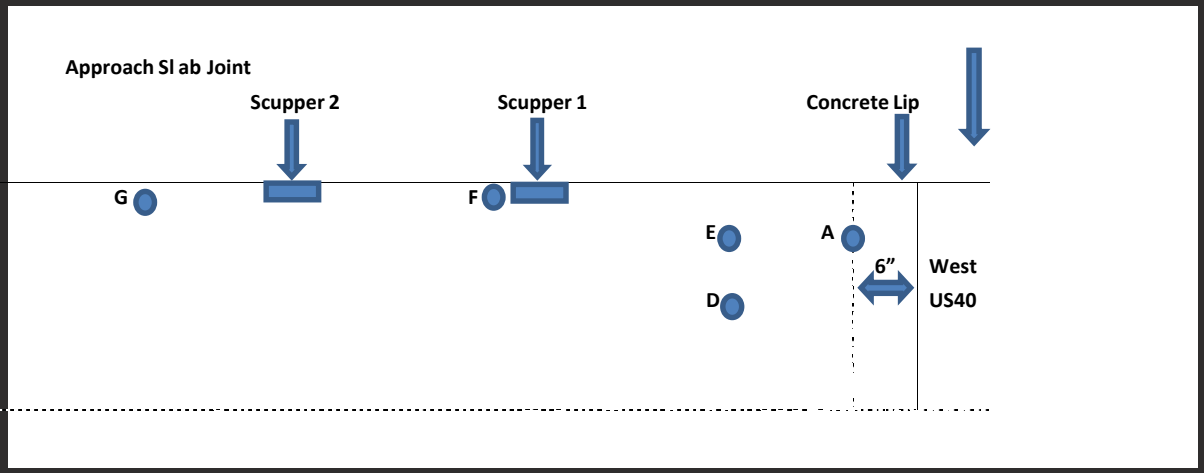
- Waterproofing system for bridge decks
- Uses FLS and low permeability HMA mixtures that are easier to achieve a higher density with static rolling
- Prevents the ingress of water and chlorides
- Provides an improved wearing surface
- More efficient & cost-effective means of construction than System in 581

Full Lane Sealant Waterproofing System (FLS)

Annual Chloride Ingress Testing



FLSWS D8 IL 40 Year 3



Hole Depth	Initial ppm	Year 1 ppm	Year 2 ppm	Year 3 ppm
0.5”-1.5”	4637.2	3373.7	3543.3	3509.7
1.5”-2.5”	2241.1	1915.7	2397.3	2547.1
2.5”-3.5”	1848.1	1721.7	1975.7	2055.2

FLS Waterproofing System

- FLSWS is working well on all sites applied. Chloride ingress has been stopped.
- Pavement surfaces are holding up very well.
- Pending one more year of positive test results, FLSWS will be removed from experimental status.

I-FIT Implementation

I-FIT 2021

- Research wasn't far enough along to complete the new Asphalt Binder Performance Testing Suite ∴
  - No Binder Modifiers in 2021
  - No LTA I-FIT Testing Requirement for Surface Mixes in 2021
- As-Produced I-FIT Testing required for All Mixes
- Long Term Aged I-FIT Testing for **All Surface** Mixes **(For Informational Purposes Only)**

I-FIT 2022 & Beyond

- **As-Produced** I-FIT Testing requirements in place for **All Mixes**
- **Long Term Aged** I-FIT Testing requirements in place for **All Surface Mixes**
- Begin Allowing Asphalt Binder Modifiers January 2022
  - 2-PAV **$\Delta T_{cr} \geq -5^{\circ}$ C** for **Neat** and **Softener Modified** asphalt binders - **in effect beginning January Letting**
  - 2-PAV Large Strain Parameter **$\Delta|G^*|$ peak $\tau \geq 54\%$** for **Softener Modified** asphalt binders - **in effect beginning April Letting**

    (Allows extra 4 months for producers to acquire testing software & characterize their Softener-Modifiers)

HMA Specifications

2022 Spec Book

- QC/QA Revised to meet Federal Regulations
- PFP & QCP added to Section 1030
- 40+ Documents updated for Clarity & Consistency
  - Std Specs, Special Provisions, Policy Memos, Procedures, Des. Manual etc…
- District 1 & Statewide RAP/RAS Special Provision Consolidated & Incorporated into Section 1031

Hamburg Wheel Changes

- 2021
  - Relaxed minimum # wheel passes for IL-4.75 by 5,000 passes
    - Plan PG 70-XX – 10,000 passes
    - Plan PG 76-XX – 15,000 passes
- 2022
  - Moving to average rut depth failure approach
  - Max rut depth difference between wheels at failure < 6.25 mm

2022 BDE Special Provisions

Material Transfer Devices

- Removed Fill-In the Blanks for Mix Designation
  - Moved to Mix Requirements Table in BDE Manual

Location(s):	
Mixture Use(s):	
PG:	
Design Air Voids:	
Mixture Composition:	
Friction Aggregate:	
Mixture Weight:	
Quality Management Program:	
~~Sublot Size:~~	
Material Transfer Device (Required?)	

Material Transfer Devices

- Separated MTD's into Two Categories:
  - **Cat 1** – Heavyweight (better remixing capability)
  - **Cat 2** – Lightweight – Only where **Cat 1** can't be used
- Added Category Application Requirements:

MTD Category	Usage
Category I	Any resurfacing application Full-Depth HMA where the in-place binder thickness is ≥ 10 in. (250 mm)
Category II	Full-Depth HMA where the in-place binder thickness is < 10 in. (250 mm)

Material Transfer Devices

- Created New MTD Qualified Product List

Category I Devices		
Manufacturer	**Manufacturer Address**	**MTD Model No.**
Astec Industries Co.	800 Manufacturers Road Chattanooga, Tennessee, 37405 USA	Roadtec SB-2500
		Roadtec SB-1500
Weiler Inc.	815 Weiler Dr. Knoxville, Iowa, 50138 USA	Weiler E2850B
		Weiler E1650A
BOMAG Americas Inc.	125 Blue Granite Pkwy Ridgeway, South Carolina, 29130 USA	Cedarapids CR662RM

Material Transfer Devices

Category II Devices		
Manufacturer	**Manufacturer Address**	**MTD Model No.**
Astec Industries Co.	800 Manufacturers Road Chattanooga, Tennessee, 37405 USA	Roadtec MTV-1105e
Wirtgen Group Inc.	6030 Dana Way Antioch, Tennessee, 37013 USA	Vögele MT 3000-2i Offset
BOMAG Americas Inc.	125 Blue Granite Pkwy Ridgeway, South Carolina, 29130 USA	Cedarapids CR662RM

Start of Production

- Each mixture ≥ 3,000 tons requires sampling for Performance Tests in Test Strip or 1st day of Production
  - I-FIT and Hamburg wheel testing for **High ESAL**
  - I-FIT for **Low ESAL**
  - Tensile Strength & TSR testing **in 1st test strip of year per mix design**

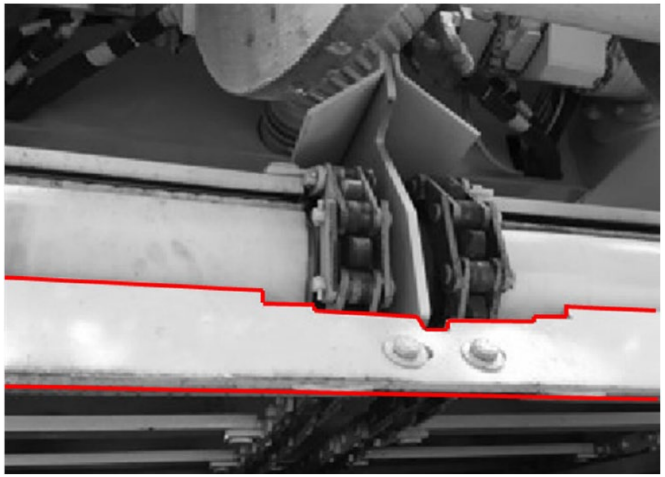
Paver Segregation Process Review

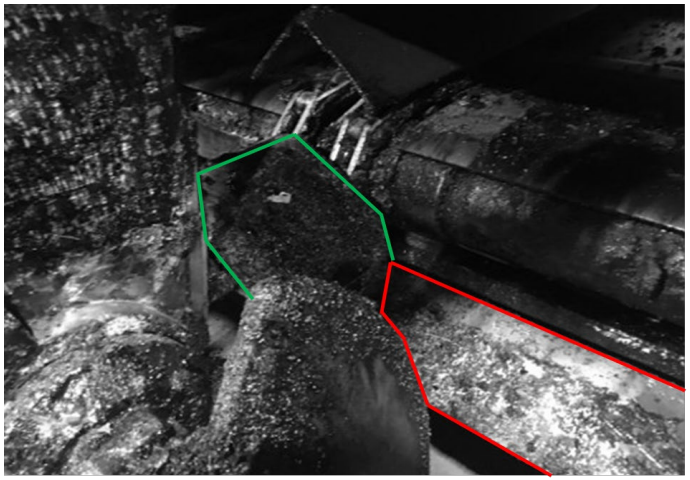
Process Review Timeline & Purpose

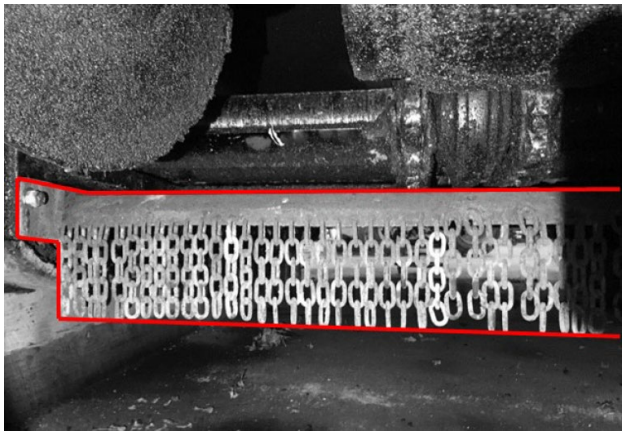
- Timeline
  - Began – August 2018
  - Completed – June 2021
- Purpose
  - Study paver segregation & gain understanding of how current paving machinery & anti-segregation components perform

Process Review - Select Observations

- Paver manufacturers have incorporated many anti-segregation components

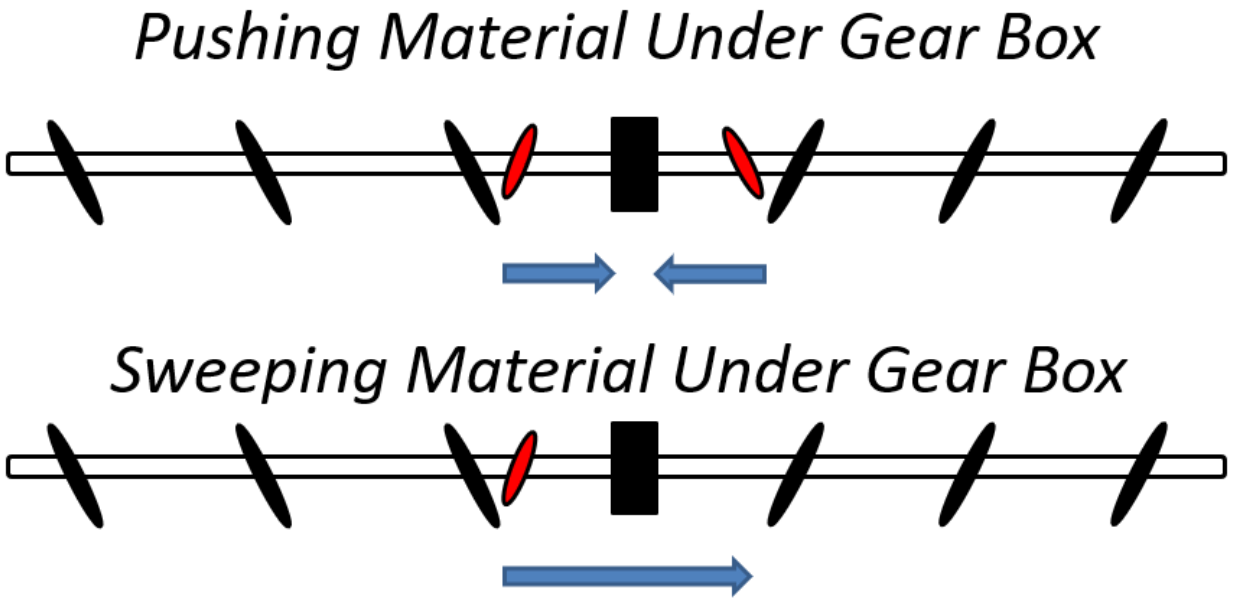




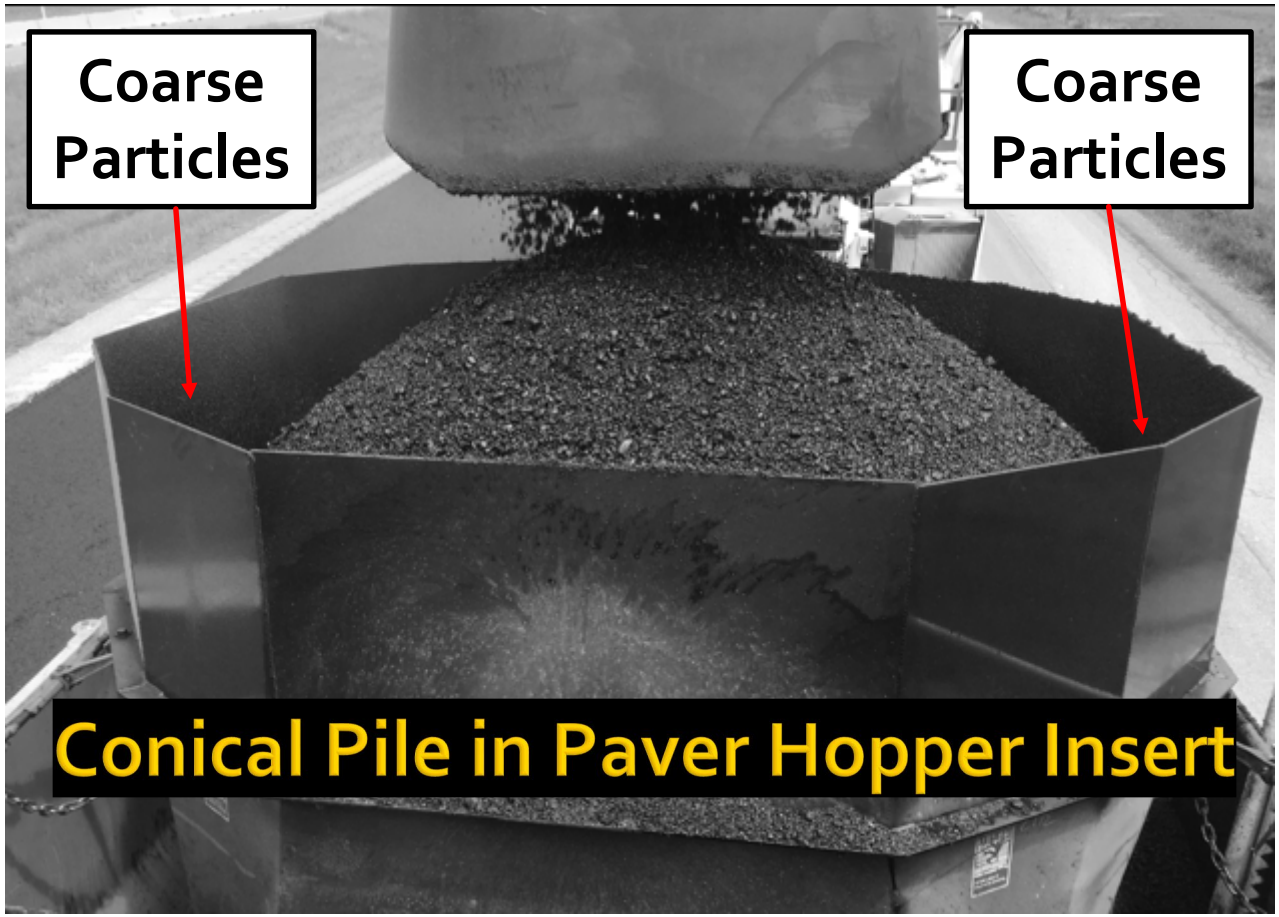


Process Review - Select Observations

- Forcing (Pushing) vs. Sweeping Material Beneath the HMA Paver Gearbox



Process Review - Select Observations



Select Recommendations/Resolutions

- Meet with paver manufacturers to review observations & offer suggestions
- Increase emphasis in training courses & professional development opportunities
- Implement segregation crack analysis to ID paver segregation ASAP after construction
- Pursue Quick Action Review of MTD's & paver hopper inserts to ID segregation tendencies

Miscellaneous Topics

2021 Asphalt Release Agent (ARA) Field Testing

2021 ARA Field Testing Summary

- **40** samples submitted
  - **6** different ARA manufacturers and **11** different products
  - Multiples from different Contractors submitted
  - **112** individual Ultrasonic Strip Tests completed
  - **ALL** tests passed Ultrasonic Strip Test

ARA FTIR Fingerprinting

- All approved products have FTIR fingerprint now
- CBM currently has threshold limit of 85%
- **34** of **40** samples within 85% limit
- **4** samples did not meet 85% limit
- **2** samples not tested because of dilution issues

Lake Land QMP Training

- All IDOT QMTP courses this year in-person only
- Students must wear masks and self-evaluate to Attend
- If running fever or showing COVID symptoms **Do Not Attend**
  - For refund or reschedule to another section:
    - Be tested & provide Positive test results or
    - Documentation that you were Quarantined

Lake Land QMP Training

- Recertification:
  - Continuing to work w/ LLC to set up QMP Recert Program beginning in Fall of 2022
  - 2-3 year Phase-In w/ most recent being lowest priority (15 or longer, 10-15, 5-10)
  - Required every 5 years
  - Written exams for highest Level taken but will include material from lower levels
  - Lab Proficiency Testing required for 5-Day Aggregate & Level I Techs
  - Self-Paced Online Review Sessions
  - Draft policy will be sent to Districts & Industry for review & comment

Thank You For Your Attention

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