Regional Meeting – Aggregate Updates

March 2022

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Updates

- Specification Changes
- Indiana Test Methods
- Other

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Specification Updates

- January 2021
  - 917, updated reference manual name from
    - *Inspection and Sampling Procedures for Fine and Coarse Aggregates Manual*

      to
    - *CAPP Training Manual for Producer Technicians*

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Specification Updates

- February 2021
  - Issued RSP for QC/QA Soil Embankments and Subgrade
  - Projects as decided by Geotech
  - Planned 2024 Standard Specs

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Specification Updates

- May 2021
  - B Borrow shall not have ACBF or GBF within 2 ft of the free water level

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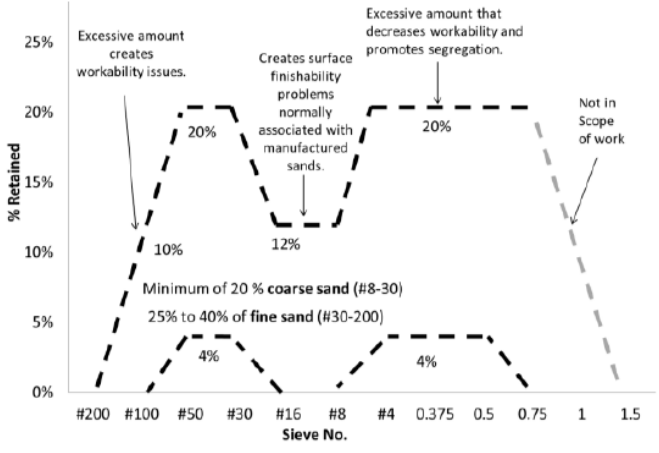
Optimized Concrete Aggregate

- What are we trying to do?
  - Improve concrete performance
- "Tarantula Curve"



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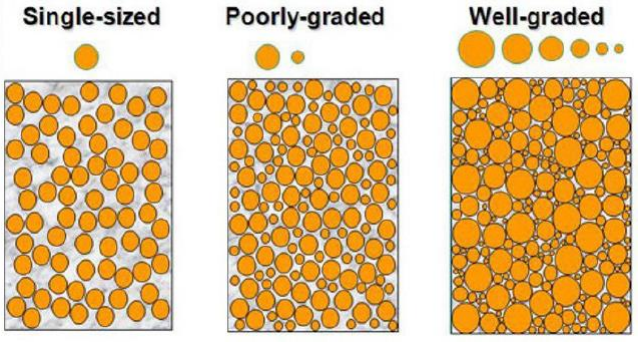
Optimized Concrete Aggregate

- Tarantula Curve
- Developed by researchers at Oklahoma State
- Aggregate proportioning method to improve workability
- Goal of minimizing paste content



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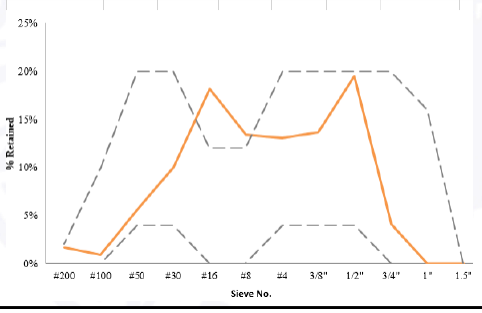
Optimized Concrete Aggregate

- Issues prior to set
- Poor Workability
  - Surface won't close behind paver
  - Poor consolidation
  - Segregation
  - Mix is "sticky" or harsh and/or stiff



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Specification Updates

- January 2021
  - Changes to CA No. 8 gradation
  - Results in optimized concrete mix design
    - 501 QC/QA PCCP,
    - 502 PCCP,
    - 506 Concrete Pavement Patching,
    - 702 Structural Concrete, &
    - applications that reference these sections.
  - Approved; implementation set for September 2021

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Specification Updates

- August 2021
  - Rollback of implementation of January 2021 CA No. 8 changes.
    - Use of the optimized gradation changed to be optional in
      - 506 and 702 concrete, and
      - 502 concrete used in 605, 610, 715.12, and 801.11 applications.
- What happened?
- What's next?

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Indiana Test Method (ITM) Updates

- ITM 226 (new in 2021)
  - Defines material requirements for CA used in concrete.
  - CAs suitable to create an optimized concrete mix design called Concrete Coarse Aggregates (CCA).
  - Concrete used in 501 QC/QA PCCP applications requires use of a gradation in ITM 226.
  - Concrete used in 502, 506, and 702 applications use EITHER aggregate meeting:
    - INDOT coarse aggregate No. 8 gradation

      or
    - AASHTO No. 57 gradation

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Indiana Test Method (ITM) Updates

- ITM 210 – Class AP Coarse Aggregate
- ITM 211 – Certified Aggregate Producer Program
- ITM 224 – Flakiness Index of Aggregates
- ITM 902 – Verifying Sieves

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Indiana Test Method (ITM) Updates

- ITM 210
  - Added a concrete slump requirement (1” - 3”) in the mix design parameters part of the preparation of test specimen section.

8.5 Mix Design Parameters. The concrete shall have the following properties:

Portland Cement Content	564 lb/yd^3
Water/Cement Ratio (Weight Basis)	0.43
Air Content	6.5 ± 1.5%
Slump	1 in. to 3 in.
Absolute Volume of Coarse Aggregate (Saturated Surface Dry)	0.40

NextLevel INDIANA

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Indiana Test Method (ITM) Updates

- ITM 211
  - Added/clarified language in the Certification section regarding a producer going on “Inactive” status.

17.5.1 A Producer may request to be placed on Inactive Status to temporarily suspend meeting the requirements of a Certified Producer by submitting a statement to the State Materials Engineer, Division of Materials and Tests requesting Inactive Status. If for a duration of three years, a Producer has not produced or shipped any material which would require production or loadout testing under the CAPP, the Division of Materials and Tests may notify and place the source in Inactive Status.

NextLevel INDIANA

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Indiana Test Method (ITM) Updates

- ITM 224
  - ASTM E11
  - Require two specimens (up from one);
    - both reduced in accordance with AASHTO R 76;
      - AASHTO T 27 is then performed on specimen 1
      - specimen 2 is further reduced per R 76, then T 27 is performed
    - revised the worksheet to be more clear

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Indiana Test Method (ITM) Updates

- ITM 902
  - Appendix A updated

Opening Verification No. 4 and Coarser					
	Field 1		Field 2		
	X	Y	X	Y	
1					Average X = _____
2					
3					Average Y = _____
4					
5					

Figure 1

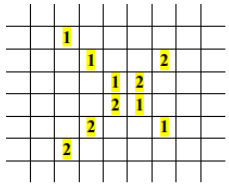
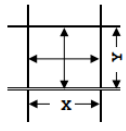


Figure 2



No X or Y component exceeds the maximum individual opening given in Table 1 (Y or N)

The X or Y average does not exceed the permissible average opening given in Table 1 (Y or N)

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Other Topics

- Modified Coarse Aggregate No. 53 gradation

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No. 53 Gradation

- Idea = split current gradation into permeable and impermeable
- Current spec

Sieve Sizes	Dense Gr
	53(1)
4 in. (100 mm)	
3 1/2 in. (90 mm)	
2 1/2 in. (63 mm)	
2 in. (50 mm)	
1 1/2 in. (37.5 mm)	100
1 in. (25 mm)	80 - 100
3/4 in. (19 mm)	70 - 90
1/2 in. (12.5 mm)	55 - 80
3/8 in. (9.5 mm)	
No. 4 (4.75 mm)	35 - 60
No. 8 (2.36 mm)	25 - 50
No. 16 (1.18 mm)	
No. 30 (600 µm)	12 - 30
No. 200 (75 µm)(2)	5.0 - 10.0(4)
Decant (PCC)(3)	
Decant (Non-PCC)	
Decant (SC)	

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No. 53 Gradation

Sieve Sizes	Dense Gr
	53(1)
4 in. (100 mm)	
3 1/2 in. (90 mm)	
2 1/2 in. (63 mm)	
2 in. (50 mm)	
1 1/2 in. (37.5 mm)	100
1 in. (25 mm)	80 - 100
3/4 in. (19 mm)	70 - 90
1/2 in. (12.5 mm)	55 - 80
3/8 in. (9.5 mm)	
No. 4 (4.75 mm)	35 - 60
No. 8 (2.36 mm)	25 - 50
No. 16 (1.18 mm)	
No. 30 (600 µm)	12 - 30
No. 200 (75 µm)(2)	5.0 - 10.0(4)
Decant (PCC)(3)	
Decant (Non-PCC)	
Decant (SC)	

	IN-53's, type 1[1]	IN-53's, type 2[1,6]
2"		
1-1/2"	100	100
1"	80-100	80-100
3/4"	70-90	70-90
1/2"	55-80	55-80
3/8"		
No. 4	35-60	35-60
No. 8	25-50	25-50
No. 16		
No. 30	12-30	12-30
No. 40		
No. 100		
No.200	5 - 13[4]	0-8

6. Permeability shall be a minimum 350 ft/day, in accordance with AASHTO T215

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No. 53 Gradation

- Benefits:
  - Better defined material usage
    - Either permeable or impermeable, depending on application
  - Easier to produce with higher % passing No. 200
  - Better constructability in the field

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No. 53 Gradation

- What now?
- INDOT Geotech and Pavement have confirmed the idea is valid
- We would like some volunteers to pilot
- Will need to coordinate with INDOT, Supplier, and Contractor on an existing project

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Other Topics

- PRA materials – where are we?

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PRA Materials

- ITM 214
- Current process:
  - Part 1 – Validation on British Polishing machine
  - Part 2 – Test strip, minimum two years
- Concerns
  - Test strip is time consuming and expensive
  - Approval is based on one project, one mix design, may not be apples to apples comparison

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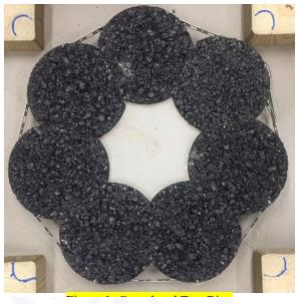
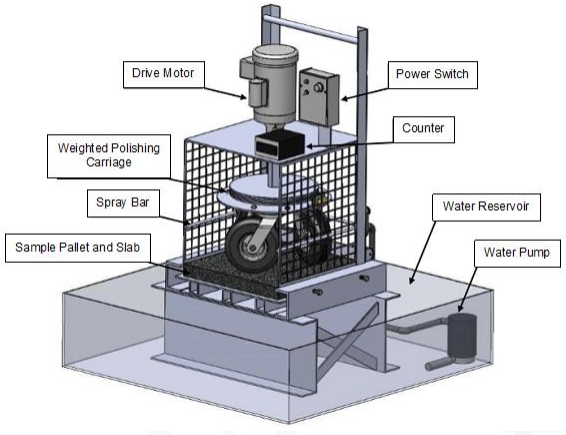
PRA Materials

- Idea:
  - Can we replace the ITM 214 process with ITM 221 process?
- ITM 221
  - Dynamic Friction Tester





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PRA Materials

- Dynamic Friction Tester
  - Unresolved Issues:
    - Can the test discern between good and poor aggregates?
      - What's our confidence in abandoning test strips?
    - What mix designs should be used?
    - Who will make and test the samples?

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Other Topics

- AP Testing – ITM 210
- Current specified gradation is problematic with certain aggregates
- Reviewing Illinois method

Sieve Size	Percent Passing
1 in.	100
3/4 in.	95
1/2 in.	55
3/8 in.	35
No. 4	0

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Thank You

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