INDOT High Friction Surface Treatment
Special Provision

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HFST Special Provision

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Background

High Friction Surface Treatments (HFST)
- Consist of a high friction aggregate (primarily calcined bauxite) set in a polymer resin binder.
- HFST was first developed in Europe in 1960’s
- Currently HFST has been installed in over 43 states.

Source: Missouri Department of Transportation
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Background (Cont’d)

- HFST Purpose
  - Can reduce stopping distances by 40%
  - Negotiating a sharp curve is much easier with a high friction road surface.

Source: Kentucky Transportation Cabinet
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- **Background (Cont’d)**
  - Applications for HFST
    - Horizontal Curves
    - High Volume Intersections
    - Interchange Ramps
    - Any location where stopping distances are an issue.

Source: Missouri Department of Transportation
Background (Cont’d)

HFST Project Expectations

- Service Life ~ 10 years
- Cost ~ $30 /syd
- Crash Modification Factor ~ 0.52
  (Some locations have a higher level of crash reductions)
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Background (Cont’d)

- HFST Aggregate:
  - Research indicates that calcined bauxite is the most effective high friction aggregate.
  - However, calcined bauxite is not mined commercially in the U.S.
  - Other aggregates such as taconite, granite, steel slag, flint, emery, and basalt have been tried but have not been found to be as durable or effective.
  - There is a JTRP research project underway (SPR-3832) which is comparing the durability of steel slag from electric arc and oxygenated blast furnaces.
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Polymeric Resin Binder

- Cure rate (dry through time) = 3 hrs max.
- Gel time for concrete surfaces = 10 minutes
- Ultimate tensile strength = 1,500 to 5,000 psi
- Mixing ratio per manufacturer (must be provided to INDOT at least 14 days before installation.)

Source: Kwikbond Polymers
Special Provision (Cont’d)

- Calcined Bauxite Aggregate
  - Aluminum oxide content = 87% min.
  - Gradation = 100% of aggregate is smaller than 4.75 mm and 95% of the aggregate is bigger than 3.35 mm
  - Hardness (Mohs Scale) = 8 min.
Special Provision (Cont’d)

- Steel Slag Aggregate
  - Aluminum oxide content = 5% min.
  - Gradation = 100% of aggregate is smaller than 4.75 mm and 95% of the aggregate is bigger than 1.18 mm
  - Hardness (Moh’s Scale) = 7 min.
  - The steel slag must be weathered for at least one year.
Special Provision (Cont’d)

- Installation Requirements
  - Contractor must use a truck mounted application machine.
  - Polymeric resin binder minimum thickness = 50 mils
  - Aggregate from a drop spreader at 11 lb/sys (min.)
  - Minimum continuous application rate of 2300 sys/hr

Source: Dbi Services
Special Provision (Cont’d)

Surface Preparation & Weather Restrictions

- Surface must be clean with PCCP surfaces being cleaned by shot blasting and HMA surfaces cleaned with an air wash of compressed air.
- New pavement or crack sealing or PCCP/HMA patches must be applied at least 30 days before HFST installation.
- Application temperature range: 60°F to 105°F
- No rain forecast during application or curing
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- Clean-up and Acceptance
  - Initial clean-up before opening to traffic.
  - Second clean-up 3 to 5 days after installation.
  - Field testing by INDOT
    - Mean profile depth of 1 inch min.
    - Dynamic friction > 0.90
  - Any failing sections must be removed and replaced
Questions?

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