District 5

2024 PAPA Bus Tour

Innovations and Best Practices

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Void Reducing Asphalt Membrane (VRAM)

- What is VRAM (J-Band)

VRAM material fills the longitudinal joint voids, this increases density along the joint and in return reduce the permeability of the joint. Reduced permeability will minimize water and air intrusion into the joint, which should result in reduced cracking, raveling and early deterioration of the longitudinal joint and in turn improve the asphalt pavement performance, increasing the life cycle before the asphalt pavement.

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Void Reducing Asphalt Membrane (VRAM)

- VRAM is a PG 88-22 polymer modified asphalt. The VRAM is applied on the binder course using a modified distributer along the area where a longitudinal joint will be between pavement lanes. This could be either the centerline or between the mainline and the shoulder. The modification of the distributor bar will apply the longitudinal joint sealant in several coats. The longitudinal joint sealant will be much thicker than a tack coat and stiffer. The longitudinal joint sealant should set within 30 minutes, so it should not track.

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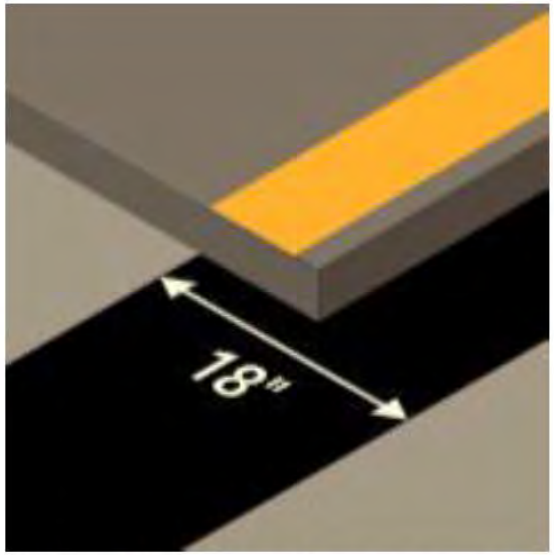
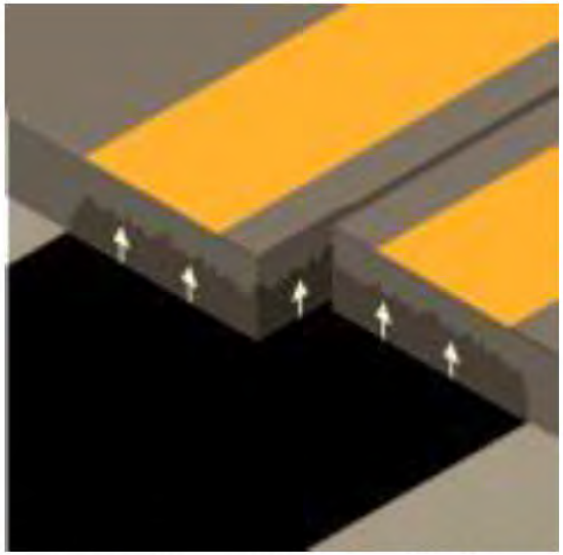
Void Reducing Asphalt Membrane (VRAM)

Apply a heavy band of polymer modified binder in the area where the new paving joint will be placed



Place the first paving pass over half the width of the band of polymer modified binder



Polymer modified binder migrates into the HMA at the joint

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Void Reducing Asphalt Membrane (VRAM)

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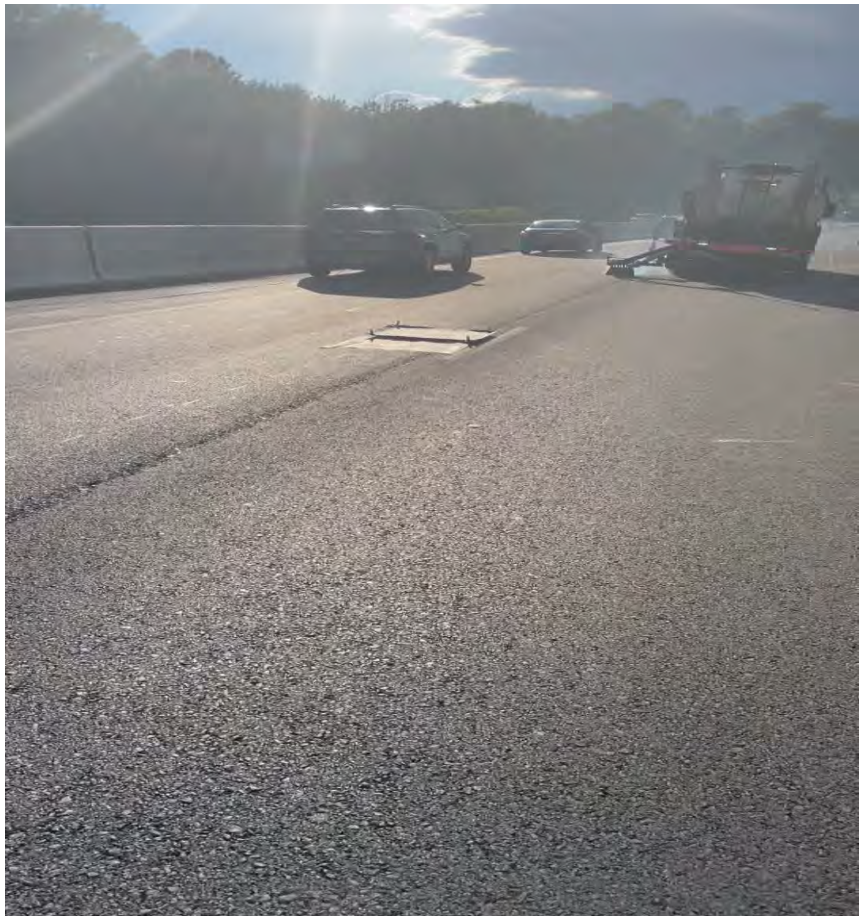
Void Reducing Asphalt Membrane (VRAM)

- ECMS 113863 SR 33-05M 2024
- Application calibration and width check.



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Void Reducing Asphalt Membrane (VRAM)

- ECMS 111081 SR 380 Monroe County
  Pilot Project 2018 Centerline Joint Core

Testing of cores:

1) Higher IDEAL-CT Results
2) Less Permeability
3) Lower Air Voids
4) 50% + upward migration

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Void Reducing Asphalt Membrane (VRAM)

- SR 380 Today!!

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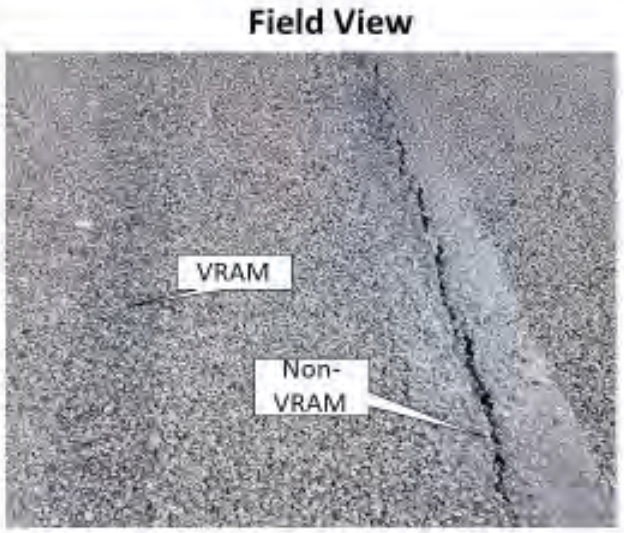
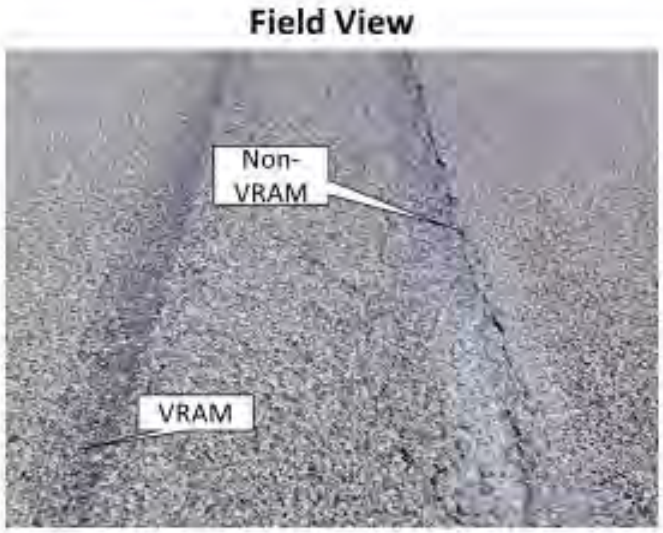
Void Reducing Asphalt Membrane (VRAM)

- ECMS 87661 SR 81 Pilot Project 2018-2019

*Note: VRAM joint from 2018, Non-VRAM joint from 2019





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Void Reducing Asphalt Membrane (VRAM)

- Additional Projects in District 5 that used VRAM or will be using in one to two years.

- SR 924-06M Schuylkill County
- SR 22-08M Northampton County
- SR 22-03M Northampton County
- SR 78-22M Berks County
- SR 78-25M Berks County

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Fiber Modified Wearing Course

- What are Aramid Fibers?
- Aramid fibers are aromatic polyamide fibers, containing more than 85% amide bonds directly connected with the two aryls. This kind of fiber has the following advantages: lightweight, high-strength, high-modulus, high-temperature resistance, and excellent corrosion resistance.
- Aramid is the same as Kevlar.
- Aramid fibers are a class of heat-resistant and strong synthetic fibers. They are used in aerospace and military applications, for ballistic-rated body armor fabric and ballistic composites, in bicycle tires, marine cordage, marine hull reinforcement, and as an asbestos substitute.

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Fiber Modified Wearing Course

- District 5 will be using a Fiber Modified wearing course on the upcoming project ECMS 101864, SR 1003-M89 in Lehigh County.
- Designs will be a 9.5mm .3-30 64S-22 SRL "E" at a 1 ½" depth and a 9.5 .3-30 64S-22 SRL "L" scratch.
- Approximately half the project will use fibers in the mix and half without.
- This is considered a pilot project and the mix without the fibers will be considered the control pave and all pave will be review over time.

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Fiber Modified Wearing Course

- Benefits of the Aramid Fibers.
- Aramid Fibers are a high tensile strength synthetic fiber blend formulated to reinforce asphalt mixes in both new construction or rehab projects. The mix of aramid and polyolefin fibers is designed to enhance your current mix design. Aramid fibers will not melt in the asphalt mix and are known for their strength and durability in both high and low temperatures.

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Fiber Modified Wearing Course

- Additional Benefits
- Fibers can provide initial cost savings through reduced pavement layer thickness while delivering the same durability as conventional mixes OR the ability to reduce the overall life-cycle costs by extending pavement life (when placed at a conventional pavement thickness).
- Higher Crack Resistance
- Higher Fatigue Life
- Higher Strength
- Higher Tensile Strength
- Lower Thermal Cracking
- Higher Fracture Energy

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Fiber Modified Wearing Course

As a truck stops, the force drives down into asphalt pavement and supporting layers, causing stress and fatigue where the tires meet the road.

As a truck stops, the aramid fibers spread the force throughout the treated layer, reducing stress and fatigue where the tires meet the road.

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Fiber Modified Wearing Course

- How are the fibers used?
- Can be added easily to a current mix design.
- Volumetrics weren't changed with addition of Fibers to Bituminous Suppliers design.
- Add fibers a rate of 2 oz (minimum) per ton of asphalt.
- District 5 pilot project is a drum plant with an automatic feeder supplied by the fiber supplier which is metered to provide dosage rates.

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SMA with Highly Modified Asphalt

- SMA Highly Modified Asphalt mix uses a modified asphalt (PG76E-28HP).
- Modified asphalt should be from a Bulletin 15 approved supplier of PG 64E-22.
- PG 64E-22 should be modified to meet Table PGHP in special provision,

c00370 ITEM 9000-0008 STONE MATRIX ASPHALT MIXTURE DESIGN WITH HIGHLY MODIFIED ASPHALT

Includes a lower minimum on Direct Shear and higher maximum on Dynamic Shear.

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SMA with Highly Modified Asphalt

- The PG 76E-28 HP (High Polymer) is produced using "SB" or "SBS" polymers blended into a neat asphalt binder to achieve enhanced elastic properties. Additives are then uniformly dispersed into the polymer-asphalt mixture to "crosslink" the polymer to prevent thermal separation. The finished product is a homogenous binder that requires minimal agitation or recirculation
- SBS are styrene and butadiene rubbers that make the polymer a hard and durable rubber like material.
- The higher viscosity and improved adhesion provided by the polymers help resist rutting under extremely heavy loads, while increased elasticity improves the fatigue resistance from repeated cycles of heavy truck loading over the lifetime of the pavement.

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SMA with Highly Modified Asphalt

- District 5 is doing a Polit Project for ECMS 72807, SR 78-22M in Berks County. The project is still in design and due to be let on 9/12/2024.
- Approximately half of the project will be SMA Modified Asphalt (83,963 SY) and the remaining 96,757 SY will be 64E-22 SMA.
- Both mix designs will be the same but using the two different grade asphalts.
- This will give the District the ability to assess both areas and compare.

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Asphalt Paving Interlayer System

What is the Asphalt Paving Interlayer System?

- The Interlayer System is commonly called Paving Fabric.
- The following are requirements right out of the Pub 408.
- The Paving Fabric is a stable fiber, needle-punched, nonwoven material consisting of at least 85% by weight polyolefins, polyesters or polyamides.

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Asphalt Paving Interlayer System

- The paving fabric must be resistant to chemical attack, rot and mildew, and have no tears or defects that will adversely alter its physical properties.
- The fabric must be specifically designed for pavement applications and be heat-set on one side to reduce asphalt material bleed-through and to minimize fabric pick-up by construction equipment during installation.
- Material must be from an approved supplier in Bulletin 15.

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Asphalt Paving Interlayer System

- Why use Paving Fabric?
- Reduces Reflective Cracking
- Aides in Pavement Flexibility
- Substantially Decreases Water Intrusion
- Increase roadway lifespan and decrease maintenance intervals

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Asphalt Paving Interlayer System

- Installing Paving Fabric
- Prep surface by sealing cracks, repairing potholes or other pavement distresses and clean surface of all dirt, oil etc.
- Spray 64S-22 asphalt by distributor at a rate of .22-.28 gallons per square yard with additional 6″ outside fabric width.

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Asphalt Paving Interlayer System

- Only spray asphalt material in front of fabric as to ensure it remains tacky.
- Lay Fiber with mechanical or manual laydown equipment capable of providing minimal wrinkles.
- Use brooming or rubber tire roller to maximize contact with pavement.
- Gradually turn paver or other equipment on fabric to avoid damage.
- Paving Fabric should only be used under new pavement with minimum depth of 1 ½”.

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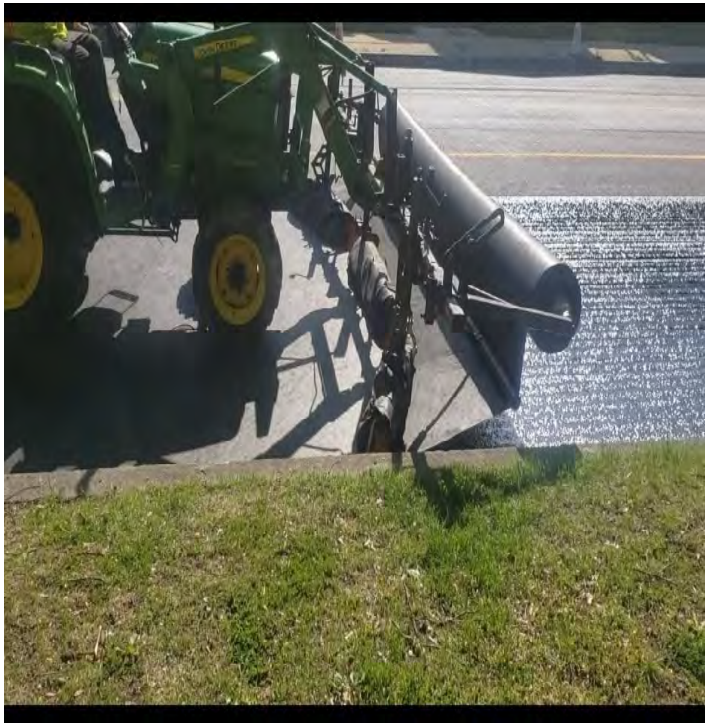
Asphalt Paving Interlayer System

- ECMS 101794 SR 2003-M89 in Berks County placed 63,376 SY of Paving Fabric this Year.



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Asphalt Paving Interlayer System

- Projects that District 5 has used Paving fabric.

- ECMS 96426 SR 248-M89 Northampton County 29,542 SY.
- ECMS 101809 SR 2014-M89 Berks County 14,502 SY.
- ECMS 114350 SR 22-14M Northampton County 18,469 SY.

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District 5 Core Rig

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- M89 to verify history for Design
- Various jobs with Maint and Geo
- Verify for CIP

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Cold-In-Place (CIP) Pub 408 Sec 341

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Cold-In-Place (CIP) Pub 408 Sec 341

- Cold Recycled Asphalt Base Course, Cold-In-Place (CRABC)
- Big Big Picture!!!
  - Mill it
  - Mix it
  - Place it
  - Squish it

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Cold-In-Place (CIP) Pub 408 Sec 341

- Mill out existing material to a given depth
- Process in a pug mill adding additional materials as needed
  - (various methods)
- Placed back on the roadway via a paver
- Roller compacted

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Mill it ... Prep work

- Cores were taken to determine depth of paving prior to Letting.

- Prior to construction the contractor needs to take cores to determine characteristics of existing pave for mix CIP mix designs.

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Materials and prep work

- Considerations and Materials for mix design
  - Existing roadway
  - RAP (placed just prior to mill)
    - If existing depth is not sufficient
  - Aggregate
  - Asphalt
    - Straight and emulsified

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Why?

- EPD's and Cost
  - Thermal input compared to WMA
  - Hauling
    - Removal of existing
    - New material
- Shorter closure time

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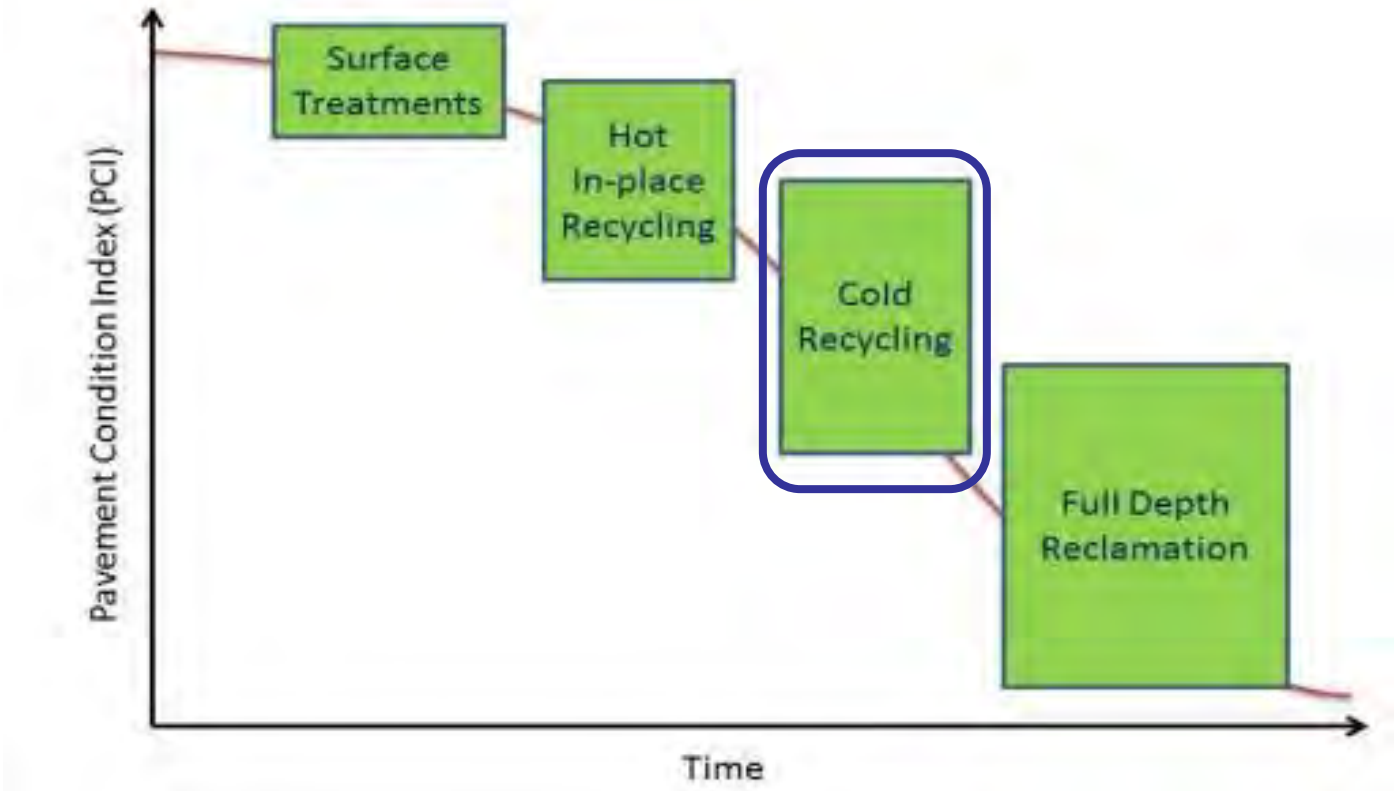
When?



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Contract Considerations / Pay Items

Item	Description	UOM
0341-0010	ASPHALT MATERIAL	Gallon
0341-0020	COARSE AGGREGATE FOR COLD RECYCLED ASPHALT BASE COURSE	Ton
0341-0101	COLD IN PLACE RECYCLED BASE COURSE WITH EMULSIFIED ASPHALT, 3" DEPTH	Square Yard
0341-0102	COLD IN PLACE RECYCLED BASE COURSE WITH EMULSIFIED ASPHALT, 4" DEPTH	Square Yard
0341-0103	COLD IN PLACE RECYCLED BASE COURSE WITH EMULSIFIED ASPHALT, 5" DEPTH	Square Yard
0341-0104	COLD IN PLACE RECYCLED BASE COURSE WITH EMULSIFIED ASPHALT, 6" DEPTH	Square Yard
0341-0105	COLD IN PLACE RECYCLED BASE COURSE WITH EMULSIFIED ASPHALT, 7" DEPTH	Square Yard
0341-0106	COLD IN PLACE RECYCLED BASE COURSE WITH EMULSIFIED ASPHALT, 8" DEPTH	Square Yard
0341-0107	COLD IN PLACE RECYCLED BASE COURSE WITH EMULSIFIED ASPHALT, VARIABLE >3" DEPTH	Square Yard
0341-0110	EMULSIFIED ASPHALT MATERIAL	Gallon
0341-0201	COLD IN PLACE RECYCLED ASPHALT BASE COURSE WITH FOAMED ASPHALT, 3" DEPTH	Square Yard
0341-0202	COLD IN PLACE RECYCLED ASPHALT BASE COURSE WITH FOAMED ASPHALT, 4" DEPTH	Square Yard
0341-0203	COLD IN PLACE RECYCLED ASPHALT BASE COURSE WITH FOAMED ASPHALT, 5" DEPTH	Square Yard
0341-0204	COLD IN PLACE RECYCLED ASPHALT BASE COURSE WITH FOAMED ASPHALT, 6" DEPTH	Square Yard
0341-0205	COLD IN PLACE RECYCLED ASPHALT BASE COURSE WITH FOAMED ASPHALT, 7" DEPTH	Square Yard
0341-0206	COLD IN PLACE RECYCLED ASPHALT BASE COURSE WITH FOAMED ASPHALT, 8" DEPTH	Square Yard
0341-0207	COLD IN PLACE RECYCLED ASPHALT BASE COURSE WITH FOAMED ASPHALT, VARIABLE >3" DEPTH	Square Yard

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- Lower volume roads
- 2 week wait prior to overlay
- New to Construction but not to Industry
  - Getting inspection staff comfortable
  - No "Tribal knowledge"
  - Testing
    - Compaction/In place density
    - Depth
- Intended to be a day time process
  - "… complete base course construction during daylight hours."

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Central Plant Cold Recycled Pub 408 Sec 342

- Central Plant Mix Cold Recycled Asphalt Base Course (CPMCRABC)
  - Because we cant give it a shorter name
- Same basic concept with the exception of the pug mill being at a fixed location
  - Better control of materials
  - More homogenized
  - If we have to haul RAP and or Agg to the site, might as well mix it at the plant

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Crack and Seat Existing Concrete…

- Intent is to utilize existing concrete as a base for asphalt road.
- From a Construction viewpoint, we have seen
  - Considerable time savings
    - For the job
    - Lane closures
  - Hauling and labor savings
- From a Maintenance viewpoint, we have seen
  - Elimination of reflective cracking in the asphalt
  - Reduction in roadway failures/pot holes etc
- Dist 5 is applying crack and seat on 209 which connects to 33 at this location

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SR 33

- which is a main north south connector between I-80 in the north and US-22 and I-78 in the south.
- e88351
  - NTP of 2/25/2010
  - Physical Work Complete 11/14/2011
  - ADT of 22,019 in 2010
  - Projected 22,217 in 2030
- Neighboring project
  - NTP of 7/16/2009
  - Physical Work Complete 11/11/2011

- Current project that abuts this one has
  - ADT of 36,625 in 2023
  - Projected 43,058 in 2043

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2008

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2011

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2018

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2024

ATION

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2009

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2011

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2013

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2018

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2021

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Audience Questions/Comments???

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