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## STIC Innovations:

**1.) Cold Central Plant  
Recycling (CCPR)**

**2.) Fuel Resistant (FR)  
Highly Modified Asphalt  
Binder – Amish Buggy  
Routes**

**March 19-21, 2024**

*2024 PAPA Regional Technical Meetings*



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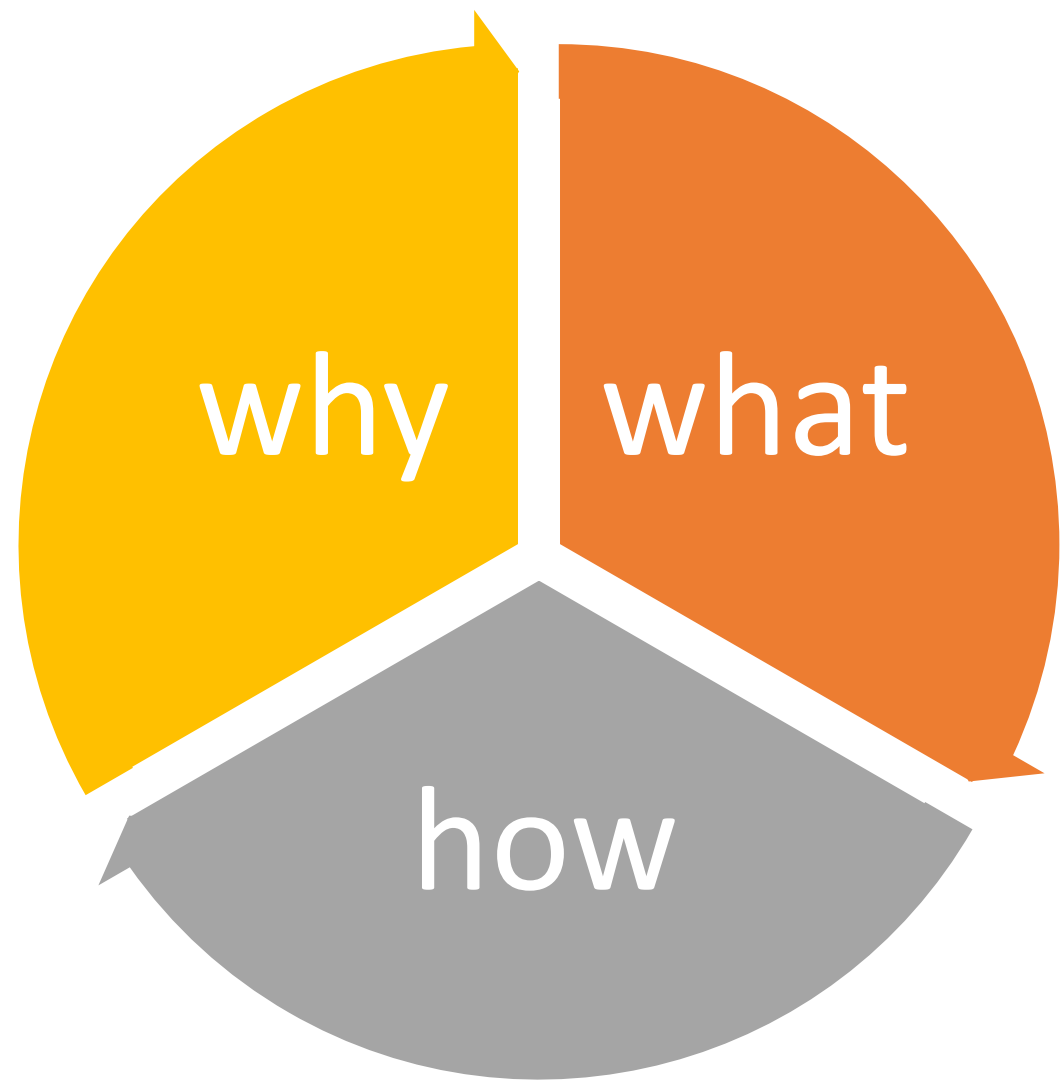
# **STIC Innovation:**

## **Cold Central Plant Recycling (CCPR)**

**March 19-21, 2024**

*2024 PAPA Regional Technical Meetings*

# CCPR



# Sustainability

## President Biden, USDOT Announce New Guidance and \$6.4 Billion to Help States Reduce Carbon Emissions Under the Bipartisan Infrastructure Law

Thursday, April 21, 2022

**Key program will fund projects that help fight climate change and save Americans money on gas**

FHWA 12-22

Contact: [FHWA.PressOffice@dot.gov](mailto:FHWA.PressOffice@dot.gov)

Tel: (202) 366-0660

WASHINGTON, D.C. – The U.S. Department of Transportation's Federal Highway Administration today announced a new program that unlocks \$6.4 billion in formula funding for states and localities over five years. The new Carbon Reduction Program (CRP), created under the President's Bipartisan Infrastructure Law, will help states develop carbon reduction strategies and address the climate crisis facing our nation. States can use the funds in CRP to expand transportation options for American families that can help them save money on gas.



## FHWA Steps Up Efforts to Tackle Greenhouse Gas Emissions from Highway Construction with \$7.1 Million for 'Climate Challenge' Participants

Thursday, October 20, 2022

**Challenge will advance the use of sustainable pavements and quantify environmental impacts**

FHWA 43-22

Contact: [FHWA.PressOffice@dot.gov](mailto:FHWA.PressOffice@dot.gov)

Tel: (202) 366-0660

WASHINGTON – As part of the U.S. Department of Transportation's ongoing work to address climate change, the Federal Highway Administration (FHWA) today announced \$7.1 million for 25 state departments of transportation involved in [FHWA's Climate Challenge](#). FHWA launched the Climate Challenge Initiative earlier this year to quantify the impacts of sustainable pavements and to demonstrate ways to reduce greenhouse gas emissions in highway projects using sustainable construction materials. The new funding is being announced as part of the Federal Buy Clean Initiative to promote the use of American-made, lower-carbon construction materials in Federal procurement and Federally-funded projects. More information is available at [FHWA Climate Challenge - Quantifying Emissions of Sustainable Pavements](#).



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March 19-21, 2024

# Sustainability



OFFICE OF THE FEDERAL CHIEF SUSTAINABILITY OFFICER  
COUNCIL ON ENVIRONMENTAL QUALITY

HOME ABOUT PLAN POLICY PROGRESS RESOURCES & GUIDANCE

## Federal Buy Clean Initiative

[Home](#) / [Federal Sustainability Plan](#) / [Net-Zero Emissions Procurement](#) / [Buy Clean](#)

### Federal Sustainability Plan

Carbon Pollution-Free Electricity

Zero-Emission Vehicle  
Acquisitions

Net-Zero Emissions Buildings

**Net-Zero Emissions  
Procurement**

**Federal Buy Clean Initiative**

Federal Supplier Climate Risks  
and Resilience Proposed Rule

Net-Zero Emissions Operations

Climate Resilient Infrastructure  
and Operations

### On This Page

- [About the Federal Buy Clean Initiative](#)
- [About the Buy Clean Task Force](#)
- [Buy Clean News and Announcements](#)
- [Frequently Asked Questions](#)

### About the Federal Buy Clean Initiative

The Federal Government is the largest purchaser in the world, with annual purchasing power of over \$650 billion. To harness that procurement power to support low-carbon, made in America materials, President's Biden charged his Administration through his December 2021 [Federal Sustainability Plan](#) and [Executive Order 14057](#) to launch a Buy Clean Task Force and initiative to promote use of low-carbon, made in America construction materials. **Through Buy Clean, the Federal Government will for the first time prioritize the use of American-made, lower-carbon construction materials in Federal procurement and Federally-funded projects,** which will advance America's industrial capacity to supply the goods and materials of the future while growing good jobs for American workers.



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# Sustainability

## Wolf Administration Highlights Collaborative Pilot To Pave Roadway With Recycled Plastic

10/13/2021

**Harrisburg, PA** – Officials from the state Departments of Transportation (PennDOT), Conservation and Natural Resources (DCNR), Environmental Protection (DEP), and General Services (DGS) today highlighted a pilot project to pave part of a Ridley Creek State Park roadway with an asphalt and recycled plastic mixture.

The project, coordinated through PennDOT's [Strategic Recycling Program](#) which is funded through DEP, includes two quarter-mile roadway stretches surfaced with an asphalt/recycled-plastic mix. The material is intended to strengthen the roadway surface without leaching plastic material into the surrounding environment.

[Pollution Prevention Strategic Recycling Program Overview.pdf \(pa.gov\)](#)



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# Sustainability



Two ways to reduce carbon emission in asphalt pavements:

1. Increase RAP
2. Reduce Temperatures

The Road   
Forward

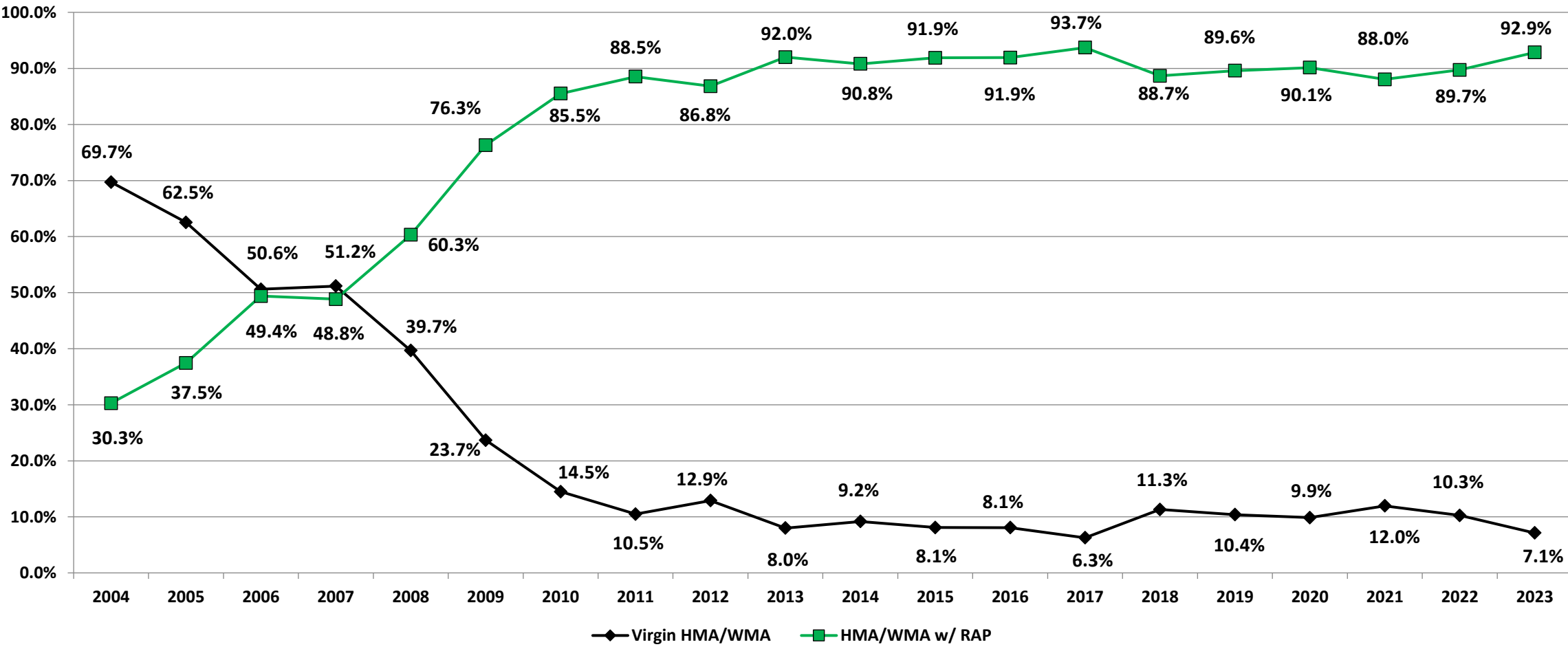
A Vision for Net Zero Carbon Emissions  
for the Asphalt Pavement Industry



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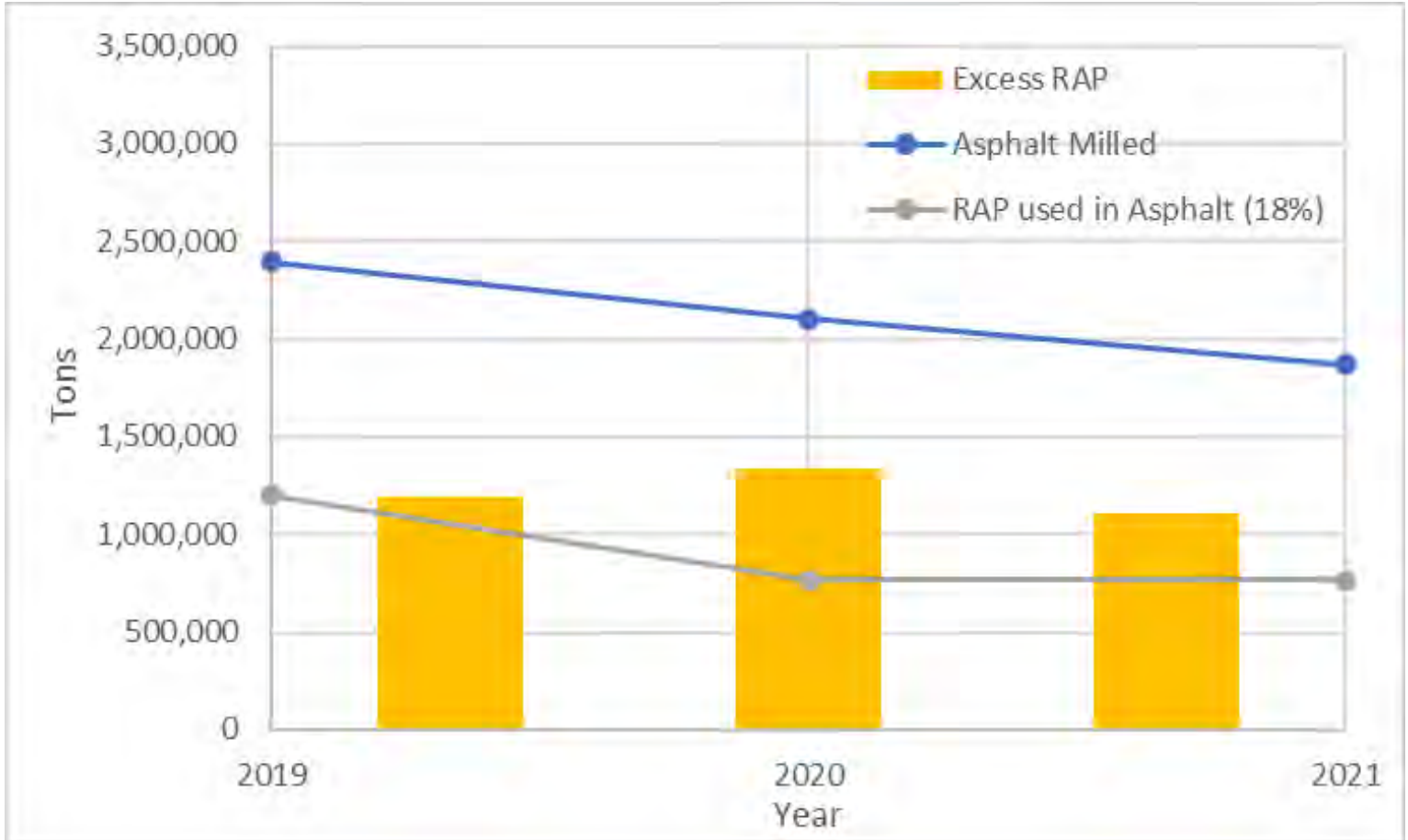
March 19-21, 2024

# RAP in PA (From PennDOT)





# RAP in PA

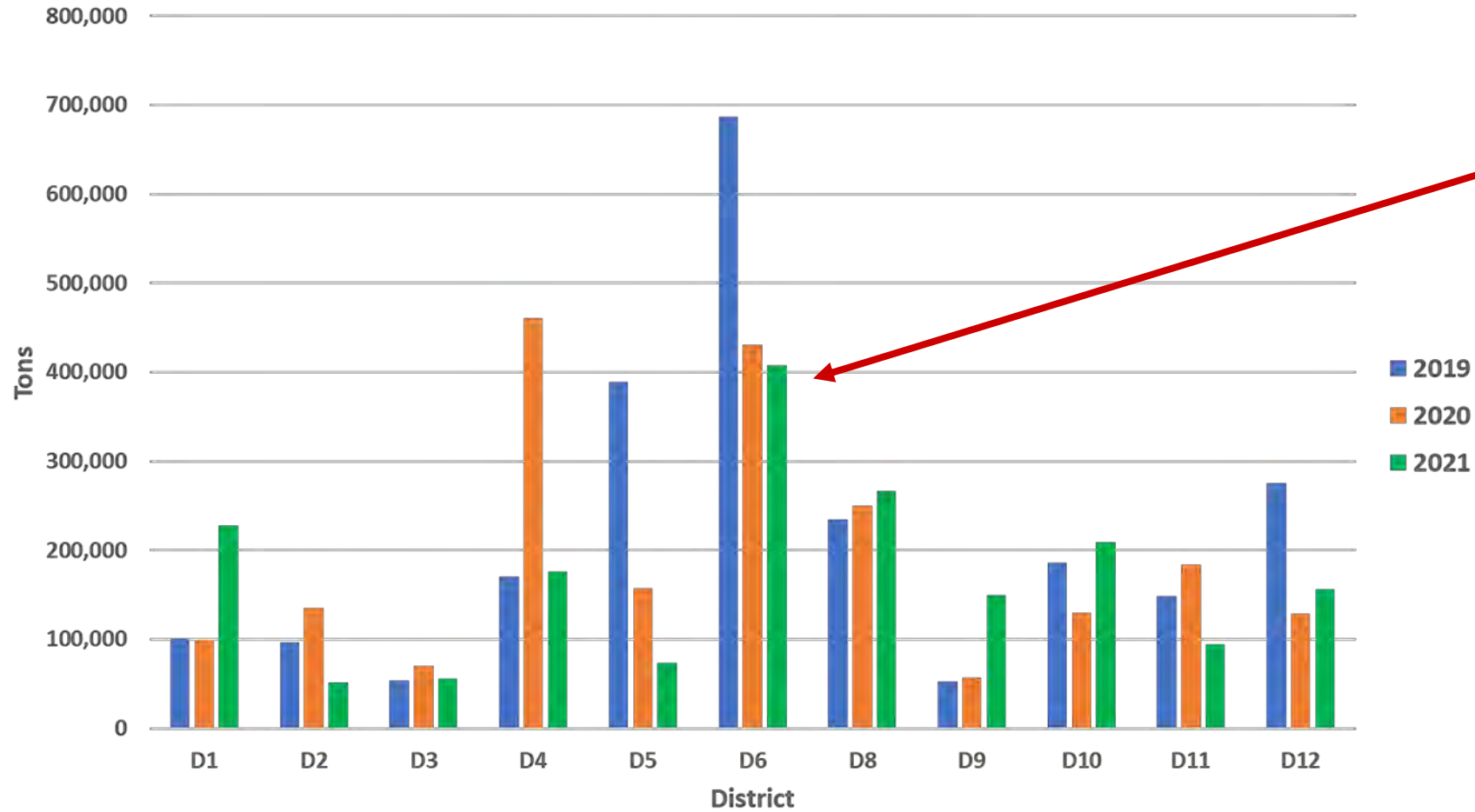


Year	Asphalt Milled	Asphalt Placed	RAP in Asphalt	Difference
2019	2,394,076	6,667,762	1,200,197	1,193,879
2020	2,102,339	4,240,700	763,326	1,339,013
2021	1,869,704	4,252,700	765,486	1,104,218



# RAP in PA

Amount of RAP Milled from Pavements



Largest quantities of RAP are in URBAN parts of the state

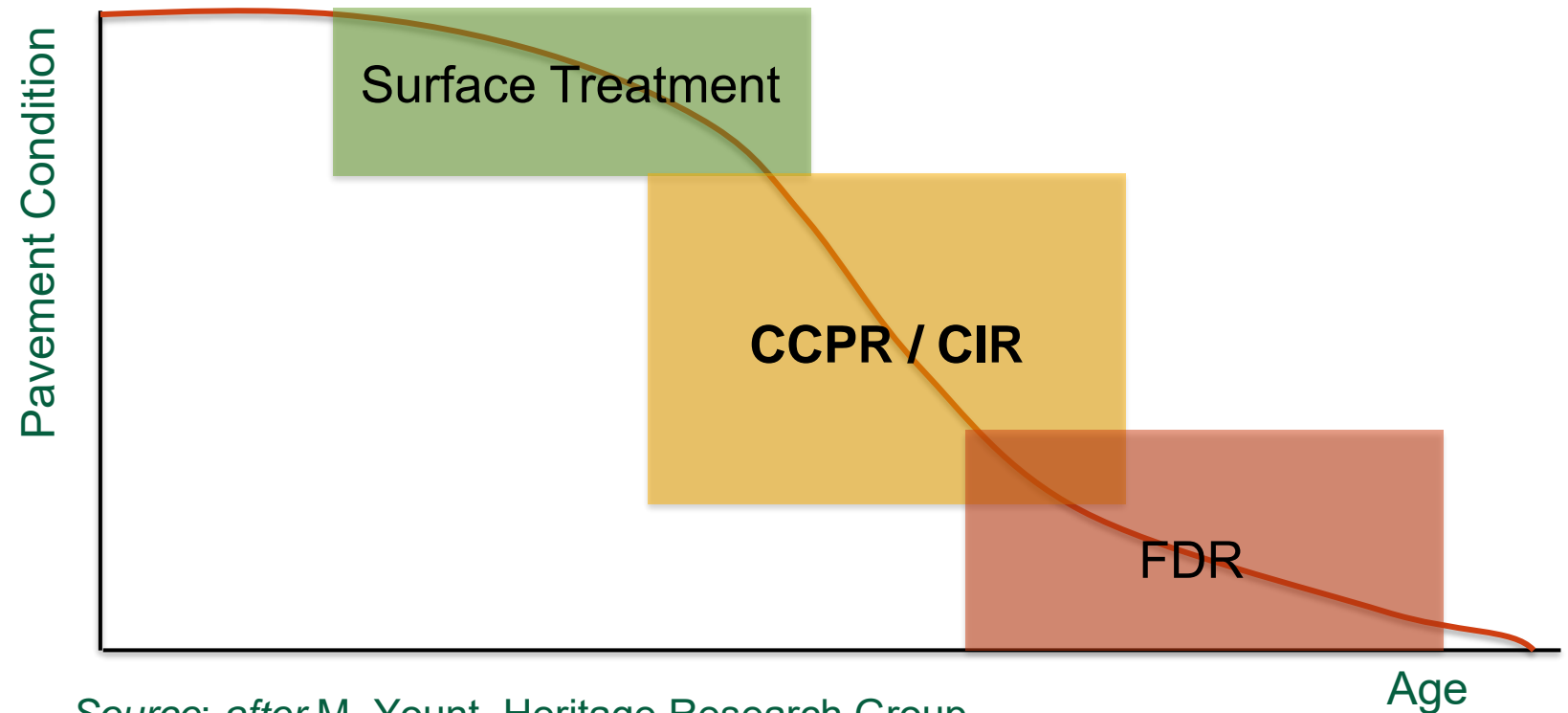
# Sustainability

- Be good stewards of the environment
- Utilize excess stockpile RAP (reduces the need for virgin materials)
- Low-cost alternative to plant produced asphalt mix
  - Reducing the cost for rehabilitation/reconstruction means more miles can be addressed
  - Funding opportunities at the federal level (IIJA, Buy Clean, IRA, etc.) that can be used to offset costs



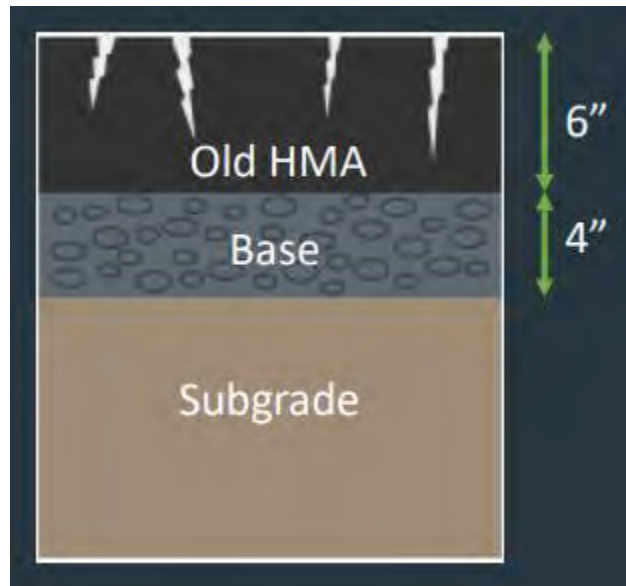
# Cold Recycling

- Pavements in poor condition
- Increase structure

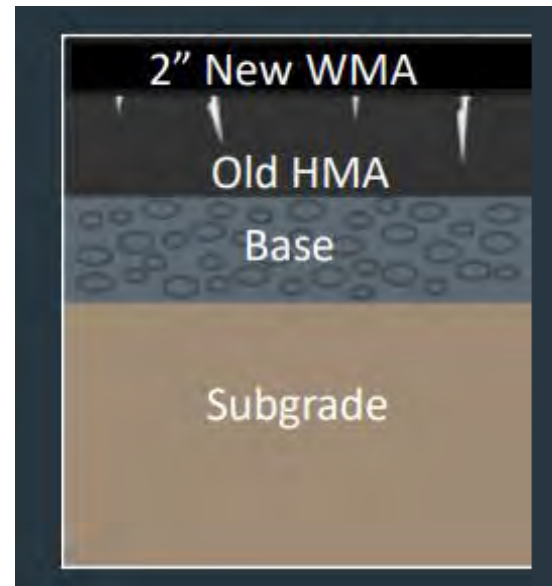


# Cold Recycling

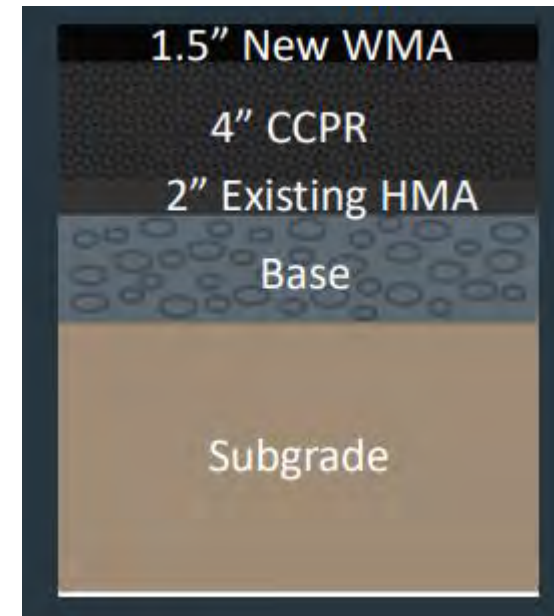
Existing distressed pavement



Mill & fill (band-aid)



Structural rehabilitation with cold recycled mix



*Cold recycling reuses existing pavement materials (100% RAP), asphalt emulsion or foamed asphalt, and a small amount of cement to create a new flexible base with increased structural capacity.*

# Cold Recycling

		
<p><b>Full Depth Reclamation (FDR)</b></p> <p>Typical Depth: 5 - 12 inches</p> <p>Stabilizer: Emulsified/ Foamed Asphalt or Portland Cement</p>	<p><b>Cold In-place Recycle (CIR)</b></p> <p>Typical Depth: 3 – 5 inches</p> <p>Stabilizer: Emulsified/ Foamed Asphalt</p>	<p><b>Cold Central Plant Recycle (CCPR)</b></p> <p>Typical Depth: 3 - 6 inches</p> <p>Stabilizer: Emulsified/ Foamed Asphalt</p>
<p>Agency Usage:</p> <ul style="list-style-type: none"> <li>- Alternative to Reconstruction</li> </ul>	<p>Agency Usage:</p> <ul style="list-style-type: none"> <li>- Alternative to Deep Mill and Fill or Partial Depth Patching</li> </ul>	<p>Agency Usage:</p> <ul style="list-style-type: none"> <li>- Structural Base Layer</li> <li>- Alternative to Deep Mill and Fill</li> </ul>

Cold recycling reuses existing pavement materials (100% RAP), asphalt emulsion or foamed asphalt, and a small amount of cement to create a new flexible base with increased structural capacity.



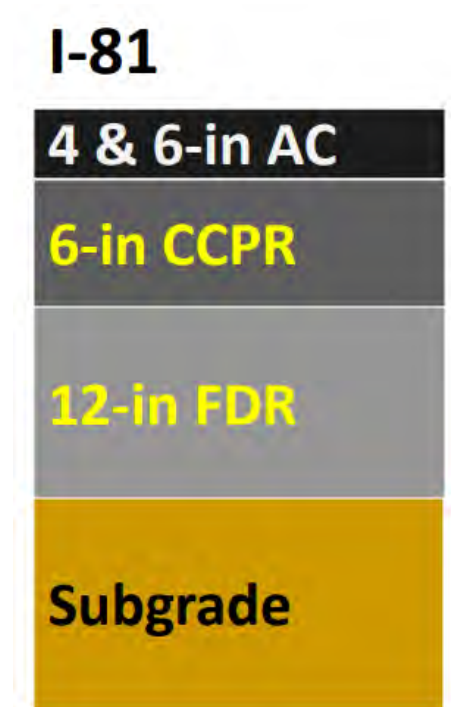
# CCPR

- Similar to traditional asphalt mix:
  - Designed mix
    - Considers properties and variation of RAP
    - Dosage of asphalt emulsion/foamed asphalt based on lab testing
  - Hauled to site
  - Paved with paver
  - Compacted
- Different in that
  - RAP %
  - Temperatures
  - Use of cement (1% or less)



# Uses of CCPR

- **VDOT, I-81 (3.66 mile section):**
  - 23,000 vpd, 28% trucks
  - Existing condition:
    - structural related distresses
    - deep patching and AC mill and inlays
  - Performed well under interstate traffic
  - Cost savings (depending on alternative):
    - \$7.9 million to \$70 million
  - Shortened construction time (depending on alternative):
    - Several weeks to almost 1 year
  - High structural contribution
    - Structural coefficient estimated at 0.37 – 0.44



I-81 in Virginia (Brian Diefenderfer)

Source: FHWA/VCTIR 15-R1, 2014



# CCPR on High Volume Routes

## Virginia DOT's Experience with CCPR on Interstates:



### I-64, Williamsburg (Segments II and III)

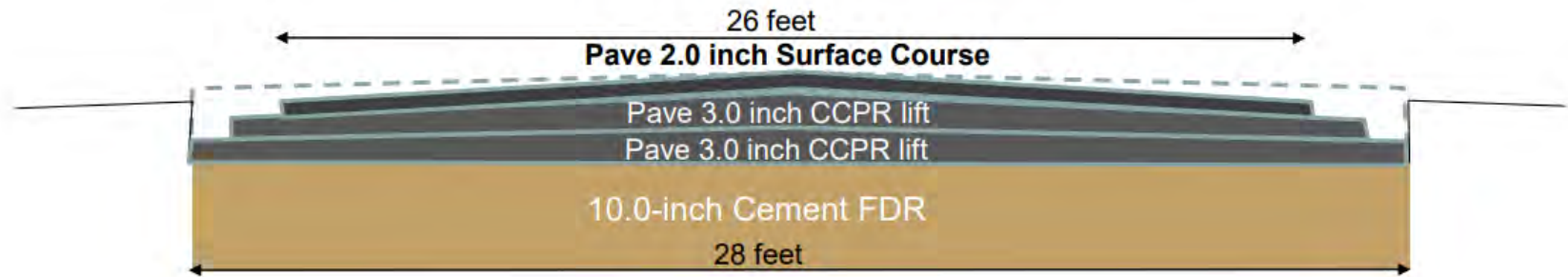
- 43,000 vpd, 9% trucks
- Reconstruction of existing lanes
- Widening (additional lanes)
- Estimated \$10 million cost savings for Segment II
- Segment II used 180,000 tons of stockpiled RAP

[https://www.fhwa.dot.gov/pavement/sustainability/case\\_studies/hif19078.pdf](https://www.fhwa.dot.gov/pavement/sustainability/case_studies/hif19078.pdf)

[https://i64widening.org/learn\\_more/pavement\\_recycling\\_methods.asp](https://i64widening.org/learn_more/pavement_recycling_methods.asp)

# Uses of CCPR

- INDOT, SR 236
  - Rural, state collector
  - Distressed pavement with subgrade failures



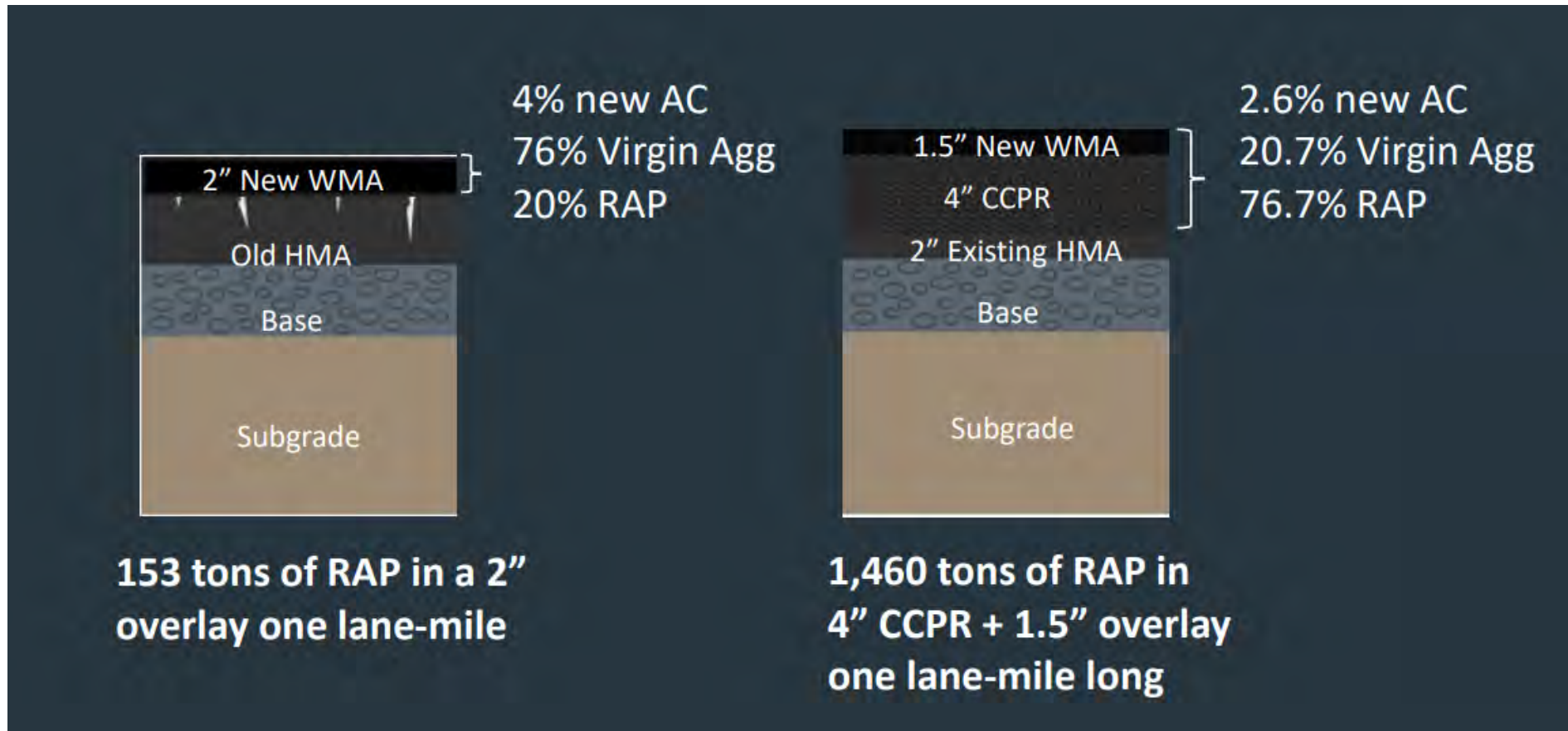
Weighted Cost Comparison- 2020 Averages	
Reconstruction with Recycling	Traditional Reconstruction
Asphalt Milling	Soil Improvements
10" Cement FDR	3" Compacted Aggregate
6" CCPR	3" HMA Base
2" HMA Surface	2.5" HMA Intermediate
	1.5" HMA Surface
<b>78% of cost of Traditional Reconstruction</b>	

# Uses of CCPR

- **On top of**
  - Break and seat/ Crack and seat
  - FDR
  - Existing asphalt layer
- **Overlaid with**
  - Surface treatment
  - Thin overlay
  - 2-4" asphalt layer



# CCPR



*Courtesy: J. Bowers, Ingevity*

*9.5 times more RAP usage (in this example)*



# CCPR

- Next Steps?
  - Work group for path forward (concept -> construction)
    - PennDOT
    - PTC
    - NECEPT
    - FHWA





# Thank you

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