



U.S. Department of  
**Transportation**

# Federal Highway & Recycling

**FALCON – Environmental Stewardship  
Now and for the Future!**

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# WHY FHWA Promotes Recycling?

- **Environmental Enhancements and Stewardship**
- **Economical Savings Potentials**
- **Performance Enhancements**
- **Saving Non-Renewable Resources**
- **Cooperative Partnerships with Industry**

# Non-Renewable Resources



# Key Points Of FHWA Recycling Policy

- Recycled materials should get first consideration in overall materials selection.
- Recycling can offer engineering, economic and environmental benefits.
- Engineering and environmental properties are important.
- Life Cycle Cost benefits assessment is warranted.
- Restrictions prohibiting recycled material that are without technical basis should be removed.

# FHWA Recycling Happens - How!

- FHWA recognize the need to increase our highway industry's overall use of recycled materials
- Forge true partnerships among government, industry, and academia
- Strengthen the relationship between FHWA and the US. Environmental Protection Agency

# FHWA's 1st Targets

- **Clean up our own "Home"**
  - RAP (Reclaimed Asphalt Pavement)
  - RCA (Recycled Concrete Aggregate)
- **ETG for RAP Technology**
  - NAPA/AASHTO/FHWA workshop IN
  - NAPA/FHWA HMA Energy & Recycling Symposium in Oct- Austin TX
  - In-place Technology (CIR/HIR/FDR)
- **RCA**
  - National Review on practices
  - New TA - Use of Recycled Concrete Pavement as Aggregate in Hydraulic-Cement Concrete Pavement

## RAP ETG Focus Areas

- **Study to evaluate and develop a performance test that can be used as a guideline for evaluating RAP**
- **Development of a BMP manual for mix design and construction that will provides the advantages of RAP and has guidelines for producing a quality mix with % RAP**
- **Development of a method to characterize RAP that avoids hazardous solvents that will address how to quantify properties of RAP mix**
- **Evaluation of whether binder grade changes are necessary**

## More RAP ETG Tasks

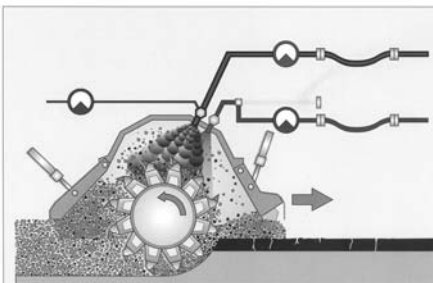
- Evaluation of the degree of co-mingling of RAP/virgin in plants
- Document of field performance of high % RAP mixes (>30%)
- Replication of RAP and virgin plant heating in laboratories.
- Outreach to states with no or low percentage of RAP specifications
- Variability of RAP (aggregate gradation, ac, modifiers, binder characterization)
- Processing/fractionating RAP

## Plans for RAP

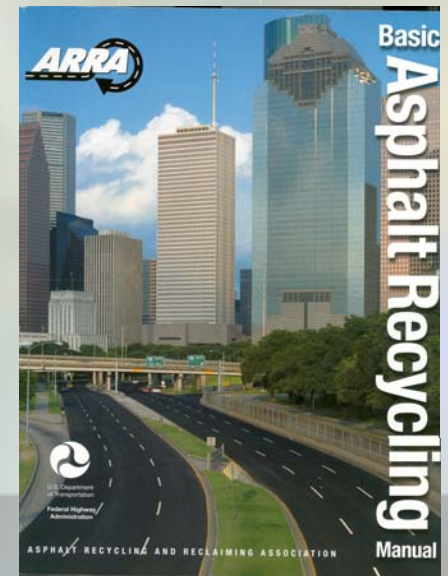
- **Demonstrate the use of high % RAP**
  - Build several test sections – fall/spring
  - CO, NC, IL, PA, FL
- **Use our Asphalt Trailer - TEST**
- **Repeat**
- **Repeat**
- **Warm Asphalt**
- **Foamed Asphalt**

# Partners in Recycling

- NAPA
- NCAT
- ARRA
- ACPA
- US EPA
- IRC
- RMRC
- FP2
- NOSAJ



*Wirtgen Cold Recycling Manual*



# Technical Advisory

- **TA 5040.37 – July 3, 2007**
- **Use of Recycled Concrete Pavement as Aggregate in Hydraulic-Cement Concrete Pavement**
- **Short title – how to use RCA in PCC**
- **TAs are guidance for our field to help in delivery of technology**

# IRC - Who and Why

- **Industrial Resources Council**
  - Represents large volume By-Product Sectors
  - Technical Support on the Benefits of Recycling Industrial Byproducts
  - How to do it - right
- **Mission/Goals of IRC**

# IRC Core Members

- **C&D**
  - Construction Materials Recycling Association (CMRA)
- **Coal Combustion Products**
  - American Coal Ash Association (ACAA)
- **Iron & Steel Slags**
  - National Slag Association (NSA)
  - Slag Cement Association (SCA)
- **Foundry Sands**
  - Foundry Industry Recycling Starts Today (FIRST)
- **Pulp & Paper Residuals**
  - National Council for Air & Stream Improvement (NCASI)
- **Tires**
  - Rubber Manufacturers Association (RMA)

# Their Individual Logos



CMRA



# Another Partner

- **U.S. EPA**

- Coal Combustion Products (CCP's)
- Foundry Sand
- Construction & Demolition Debris
- Tires
- Glass
- Asphalt Shingles
- 31 Oct – 3 Nov  
Shingles and Foundry Sand workshop - Chicago

- **FHWA**

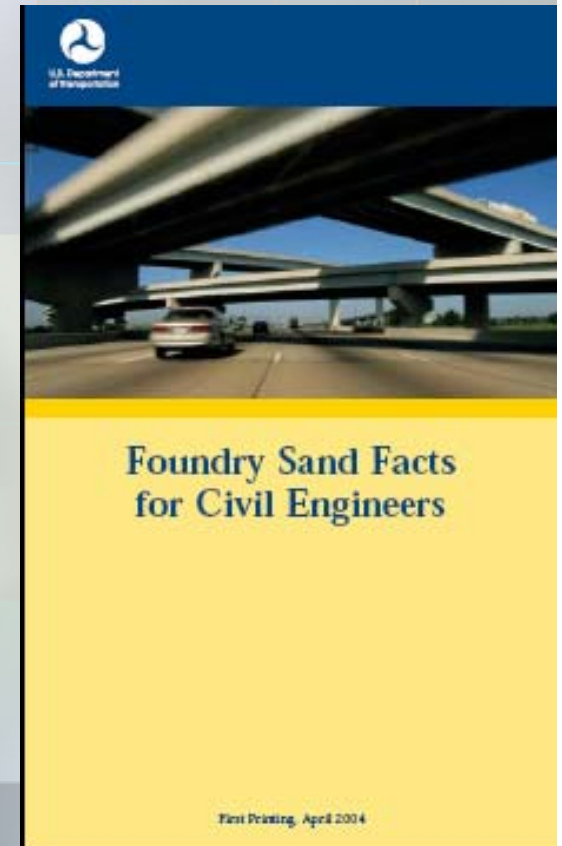
- Recycled Asphalt
- Recycled Concrete
- Coal Ash/CCP
- Foundry Sand
- Steel Slag
- Tires
- Asphalt Shingles
- Mine Tailings

# Perception needs continuous change

- **NOT MSW, NOT GARBAGE**
- **Industrial By-products are:**
  - Fly ash from coal combustion
  - Slag aggregate from iron/steel production
- **Products are recyclable materials**
  - Fly ash in concrete
  - Slag cement
  - Rubberized asphalt
- **NOT Linear Landfill – NOT WASTE**

# How to change Perception

- **Structural Fills & Embankments**
- **Flowable Fills – pipe/trench backfill**
- **Roadway Base material**
- **Cement feed stock**
  - Fine Aggregate for PCC
- **Hot Mix Asphalt aggregate**
- **Soil Amendment**



# Coal Combustion Products (CCP)

- **Fly Ash Facts Book:**
  - PCC
  - Stabilization of base course
  - Flowable fill
  - Structural fills/Embankments
  - Soil improvements
  - Asphalt pavements

# Slag Aggregate & Slag Cement

- **Slag Aggregate – Iron/Steel**
  - Aggregate for concrete and HMA pavement
  - Roadway base
  - Structural fill
  - Roadway base material
  - Soil amendment
- **Granular Blast Furnace Slag Cement**
  - Cement substitution – blended cement
- **Slag Facts booklet in the process**

# Rubber Tires

- **Rubber Asphalt – modified binder**
- **Lightweight material**
- **Mulch**
- **Rubber products:**
  - **Guiderails block outs**
  - **Vegetation mats under guiderails**
- **Civil Engineering applications**
- **Playground/athletic track surfaces**
- **Tires for Civil Engineer Facts booklet – needed.**

# Construction & Demolition Debris

- **Recycled Concrete material**
- **Asphalt Shingles**
- **Mulch**
- **RAP**
- **Bricks**
- **Large volume stream of materials – urban quarry**

# Paper By-Products

- **Mulch**
- **Concrete additives**
- **Short paper fiber or Blended material**
  - **Soil amendment blended with organics**
  - **Slope stabilization – mixed into top slope covering**

# In-Place Recycling of HMA/PCC

- **Asphalt Recycling and Reclaiming Association (ARRA)**
  - In-place recycling of HMA
  - Milling
  - FP2 & pavement preservation program
  - FHWA CIR review done – draft report due
    - NV, NY, KS
    - Findings – GREAT process – under utilized

# **FALCON#6 – Environmental Stewardship**

- **New Road Map for FHWA**
  - Lead into Strategic Implementation Plan
  - Higher priority than past
- **Green Highway Partnership**
- **Use of Alternative Materials**
  - Industrial by products
- **Warm Asphalt**
- **Stormwater mitigation**
  - New area for FHWA pavement engineers

# Why Here Today?

- **Stewards of Environment but:**
  - You have lots of High Quality Aggregate
  - Plenty of landfill
  - Public/Government has no issues
    - Plenty of money, recycling is bad word.
- **URBAN Quarry**
  - Best materials already used
- **Need to change & evolve**



# Thank You for the Lend of Your Ears!!

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Go Airforce

