Industrial Resources Council

Improving Performance of Transportation Projects Using Industrial Materials

Ohio Sustainable Roadways Workshop
December 3, 2014

Sustainable Highways

- Construction of transportation systems can significantly impact the environment.
- Environmental impact can be reduced through sensitive system design.
- Quality and cost can be maintained while meeting technical performance standards

Drivers for Environmental Stewardship

- National and international focus on energy, climate change and sustainability
- National and state focus on waste reduction, pollution prevention, and recycling
- Escalating costs of energy, labor and materials
- Environmental effects of mining, processing and transporting materials

FHWA Recycling Policy

- Recycling & Reuse can offer Engineering, Economic and Environmental Benefits
- Recycled materials should get first consideration in materials selection
- Engineering & environmental properties are important
- Life Cycle Costs assessment is helpful
- Restrictions on recycled material without technical basis should be removed
Industrial Resources Council

- A collaborative partnership working to develop markets for industrial materials
- Goals:
  - Create awareness & increase understanding
  - Share technical & environmental information
  - Develop codes, standards, and regulatory guidance through organizational partnerships
- National, regional and state workshops
http://www.industrialresourcescouncil.org/

How can the IRC help transportation Agencies?

- IRC is comprised of non-profit industry associations who spearhead their industry’s efforts on material utilization
  - American Coal Ash Association
  - Construction & Demolition Recycling Association
  - AFS- FIRST (Foundry Industry Recycling Starts Today)
  - National Council for Air & Stream Improvement
  - National Slag Association
  - Rubber Manufacturers Association

Why should Agencies care about IRC materials?

- Material volumes are large
  - Less fragmented than Municipal Solid Waste
- Industrial materials can:
  - Provide comparable or better performance
  - Meet engineering standards
  - Save money
  - Help achieve sustainability goals

The RCRA Program

Total Quantity of Wastes Generated (million tons)

- Municipal Solid Waste (232)
- Hazardous Waste - RCRA Managed (40)
- Construction & Demolition (136)
- Special Waste - Incineration Cog Ash (4852)
- Coal Combustion Ash - Sp W (121)
- Industrial Waste (7660)
## Availability of IRC Materials

- **Generation Rate:**
  - CCPs: 122 million TPY
  - Steel Mill Residuals: 19.7 million TPY
  - Foundry Sands & Slags: 10 million TPY
  - Paper Mill Residuals, Boiler Ash & Others: 15 million TPY
  - Tires: 300 million tires/yr
  - Recycled Concrete: 180 million tons est.
  - 325 million total C&D

- **Number of Facilities:**
  - Power Plants: ~500
  - Steel Mills: ~130
  - Foundries: 2,800
  - Pulp & Paper Mills: ~430
  - Tires: Municipal, commercial & industrial generation points
  - Recycled Concrete: ~2,300

## Industrial Material Applications

- **Manufactured products**
  - Cement
  - Asphalt
  - Concrete pavement
  - Concrete products
    - Brick, block, mortars
    - Flowable fill/CLSM

- **Geotechnical applications**
  - Bases and subbases
  - Structural fills
  - Embankments

- **Soil amendments**
  - Manufactured topsoils
  - Rain gardens & swales
  - Mulches & composts

## “Greener” Roadways

- **Sub-base Materials** using fly ash, bottom ash, iron and steel slags, recycled concrete, recycled asphalt or foundry sands

- **Pavements** using concrete or asphalt containing coal ash, foundry sand, recycled concrete, asphalt shingles, or steel slags

- **Embankments and Fills** using CCPs, steel slag, tires, recycled concrete or foundry sands

- **Landscaping materials** using compost, foundry sands and other industrial materials

## US EPA’s IMR Program

- Cooperative outreach effort w/other parties, inc. IRC & FHWA
- Currently dormant but materials on EPA website
- Hope to reenergize in the future
Construction - Engineered Fill

Asphalt

Cement Manufacturing & Concrete Products
**Flowable Fill (CLSM)**

**Specialty Soils & Landscaping Products**

**IRC website**

- Industrial Resources Council is a resource for information about how to use industrial materials in various applications
- [http://www.industrialresourcescouncil.org](http://www.industrialresourcescouncil.org)

**Industry Snapshots**

- Where does each material come from
- Info on generators
- How much material
- Most common uses
Material Profiles

- Snapshot of each material type
- Downloadable as PDF’s
  - CCP’s
  - Foundry Sands & Slags
  - Steel Furnace Slags
  - Pulp & Paper Industry Materials
  - Reclaimed Concrete Aggregate
  - Tire-Derived Materials

Application Profiles

- Structural fill
- Embankments
- Granular bases
- Stabilized bases
- PCC Concrete
- Hot Mix Asphalt
- Flowable Fill
- Portland Cement
- Other PCC concrete products
- Soil Stabilization

Sustainable Materials Matrix

- Matches between Materials and Applications
- Downloadable PDF
- E-version provides additional details
- Work in progress
- FHWA wants your inputs!

E-matrix

- How is material used in this application?
- How does it perform?
- Technical issues?
- QA/QC Issues?
- Environmental issues?
- Other Resources
**Sustainable highways require efficient material management systems to account for embedded costs**

- DOT leadership important
  - DOT’s set construction standards
  - Most pavement miles controlled at county or local level
- Materials are often the highest cost in any construction project
  - Recovered materials can save dollars
  - Specifications should be performance-based, not material-based

**FHWA encourages support for a proposed project to build a robust web-based E-matrix**

- FHWA webinar series:

**National & regional workshops:**

- See EVENTS tab on IRC website
- IRC welcomes outreach partnerships

---

**For More Information**

- American Coal Ash Association  
  [www.acaa-usa.org](http://www.acaa-usa.org)

- Construction & Demolition Recycling Association  
  [www.cdrecycling.org](http://www.cdrecycling.org)
  [www.concreterecycling.org](http://www.concreterecycling.org)

- AFS-FIRST, Inc.  
  [www.foundryrecycling.org](http://www.foundryrecycling.org)

---

**For More Information**

- National Council for Air & Stream Improvement
  269-276-3548  
  [www.NCASI.org](http://www.NCASI.org)

- National Slag Association  
  [www.nationalslag.org](http://www.nationalslag.org)

- Rubber Manufacturers Association  
  [www.rma.org](http://www.rma.org)