



ILLINOIS CENTER FOR TRANSPORTATION



Where Transportation & Excellence Meet

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Where Do We Go From Here??

- How to get word out on LCA?
- How to start education on LCA?
- LCA “Sausage Making” too much detail for many transportation and elected officials.
- Most leaders interested in end product and process of how LCA will impact transportation decisions
- Education of agency Management

Education of Management

- Basic terms
 - Sustainability
 - Life cycle Assessment (LCA)
 - Environmental product declaration (EPD)
 - CO₂ Equivalent
 - Global warming potential (GWP)
 - Triple bottom line
- Will this save \$\$ or cost \$\$?
- What resources will this take?
- Impacts (agency, public and industry)

Nutrition Labeling

(Environmental Product Declaration - EPD)

- Raw foods (construction materials) and common products in database.
- Input recipe (pavement cross-section).
- Output new product nutrition facts (pavement energy and GWP)

Nutrition Labeling

(Environmental Product Declaration - EPD)



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Nutrition Facts

Serving Size
Servings Per Container

Amount Per Serving

Calories Calories from Fat

% Daily Value*

Total Fat

Saturated Fat

Trans Fat

Cholesterol

Sodium

Total Carbohydrate

Dietary Fiber

Sugars

Protein

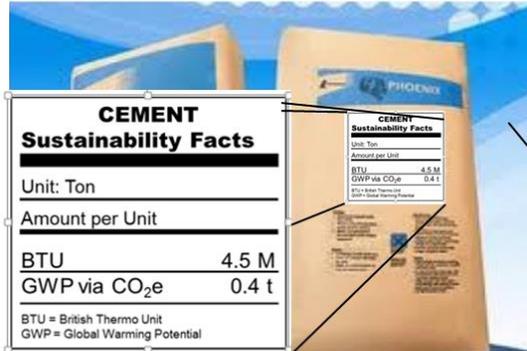
Vitamin

*Percent Daily Values are based on a 2,000 calorie diet.



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Using EPD's



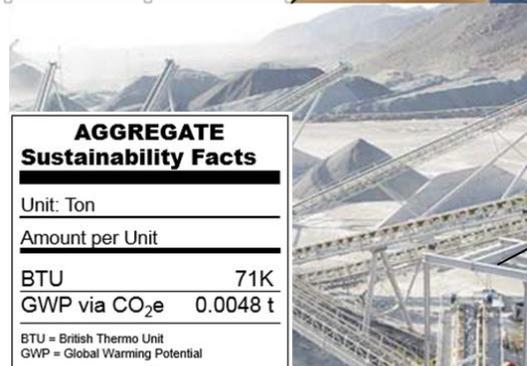
CEMENT
Sustainability Facts

Unit: Ton

Amount per Unit

BTU	4.5 M
GWP via CO ₂ e	0.4 t

BTU = British Thermo Unit
GWP = Global Warming Potential



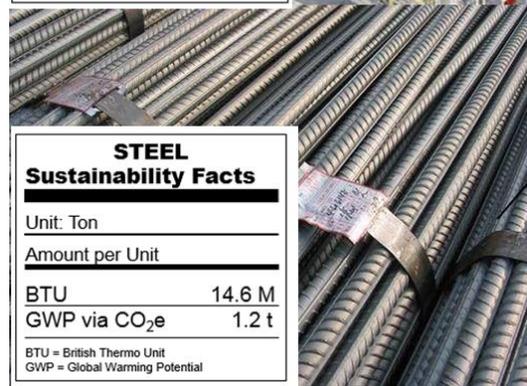
AGGREGATE
Sustainability Facts

Unit: Ton

Amount per Unit

BTU	71K
GWP via CO ₂ e	0.0048 t

BTU = British Thermo Unit
GWP = Global Warming Potential



STEEL
Sustainability Facts

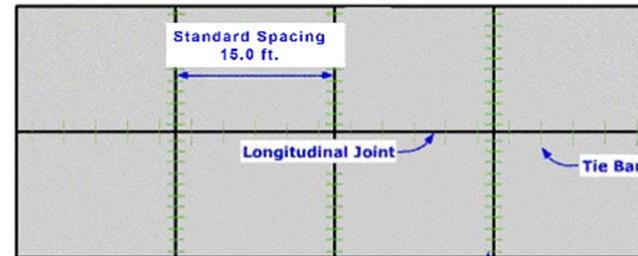
Unit: Ton

Amount per Unit

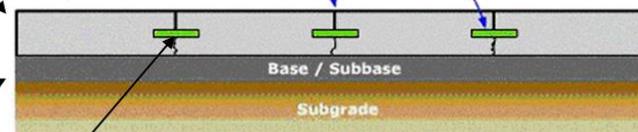
BTU	14.6 M
GWP via CO ₂ e	1.2 t

BTU = British Thermo Unit
GWP = Global Warming Potential

Top View



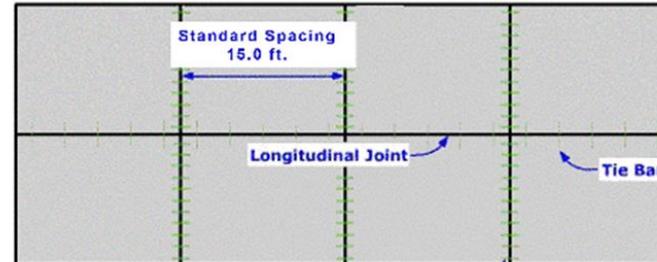
Side View



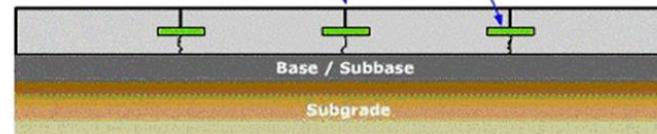
Construction Phase



Top View



Side View



Pavement Construction Sustainability Facts

Unit: Mile

Amount per Unit

BTU	100 M
GWP via CO ₂ e	9.5 t

BTU = British Thermo Unit
GWP = Global Warming Potential

JRCP Pavement Sustainability Facts

Unit: Sq Yd

Amount per Unit

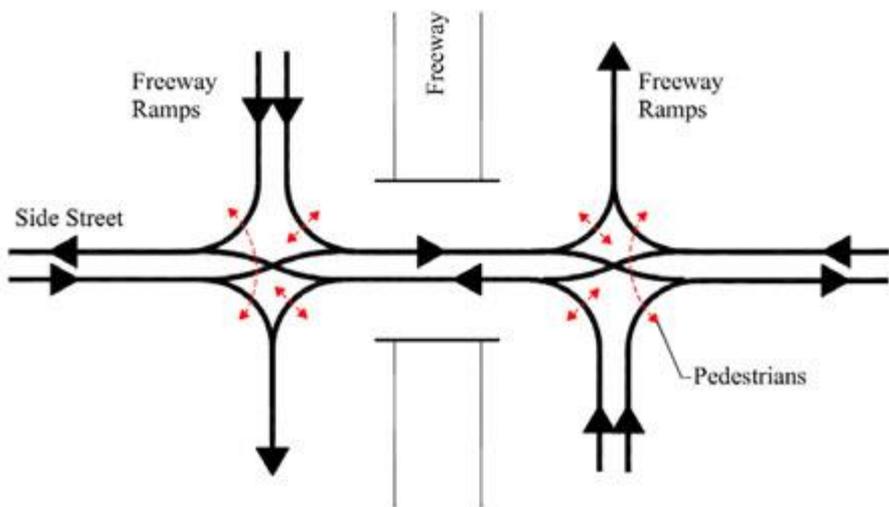
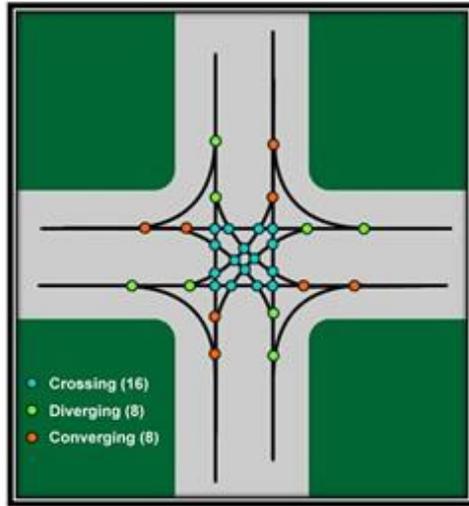
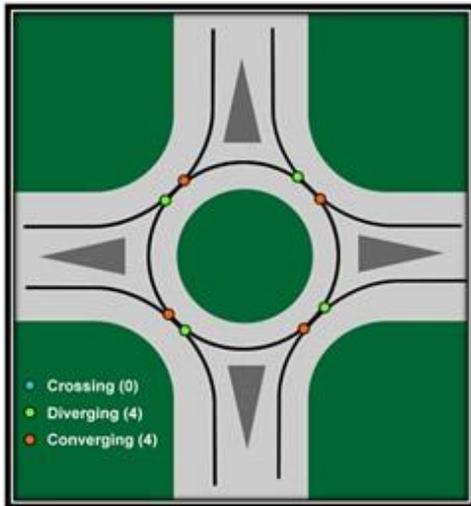
BTU	2 M
GWP via CO ₂ e	0.15 t

BTU = British Thermo Unit
GWP = Global Warming Potential

Maintenance



Use Phase



Pavement Life Cycle Assessment

- Engineering based approach rather than political for improving sustainability.
- Extension of life cycle costing to bring in global aspect as well as local.
- Complex but can be made simple.
- Aid in design and defending new and existing policy.

Show What LCA Can Do!

- Most DOT's not currently geared to CO₂ evaluations under LCA
- Most elected officials and State DOT's focused on recycling tons and related cost savings (Backward looking).
 - Why? Data is easy to obtain.
 - Most work is accepted by weights and measures - excellent records easy to determine tons of stuff....

Needed: Opportunities to use LCA

- Need to get exposure
- Demonstrate how LCA can be a tool for informed cost effective emission reduction efforts (Forward looking)
- Use effort to develop a more informed community

Look for Opportunities

- The “Opportunity” in Illinois: 2012 Legislation required IDOT to allow shingles in HMA mix design
- Prepare Annual Report
 - Shingle use
 - Efforts to reduce “carbon foot-print”

IDOT Materials Sustainability Efforts of 2015

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UIIU-ENG-2016-2019
ISSN: 0197-9191

ILLINOIS HIGHWAY MATERIALS SUSTAINABILITY EFFORTS OF 2015

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Research Report No. FHWA-ICT-16-017

A report of the findings of
ICT PROJECT R27-160

The work described in this report was
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On ICT Publications
Page:

<https://apps.ict.illinois.edu/projects/getfile.asp?id=5016>



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Illinois Usage Records

□ Aggregate Related

- Recycled Concrete Material (RCM)
- Recycled Asphalt Pavement (RAP-Aggregate)

□ Concrete Related

- Fly Ash
- Ground Granulated Blast Furnace Slag (GGBFS)
- Microsilica

□ Hot Mix Asphalt Related

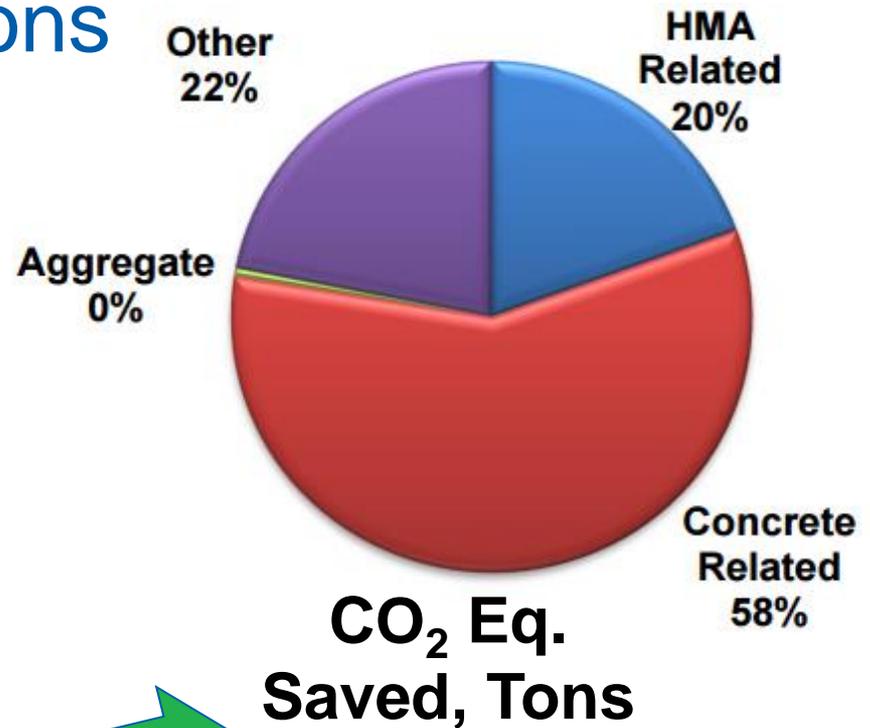
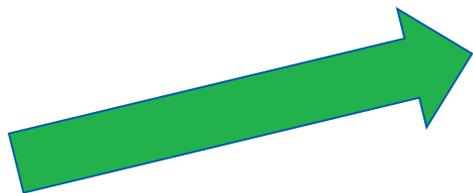
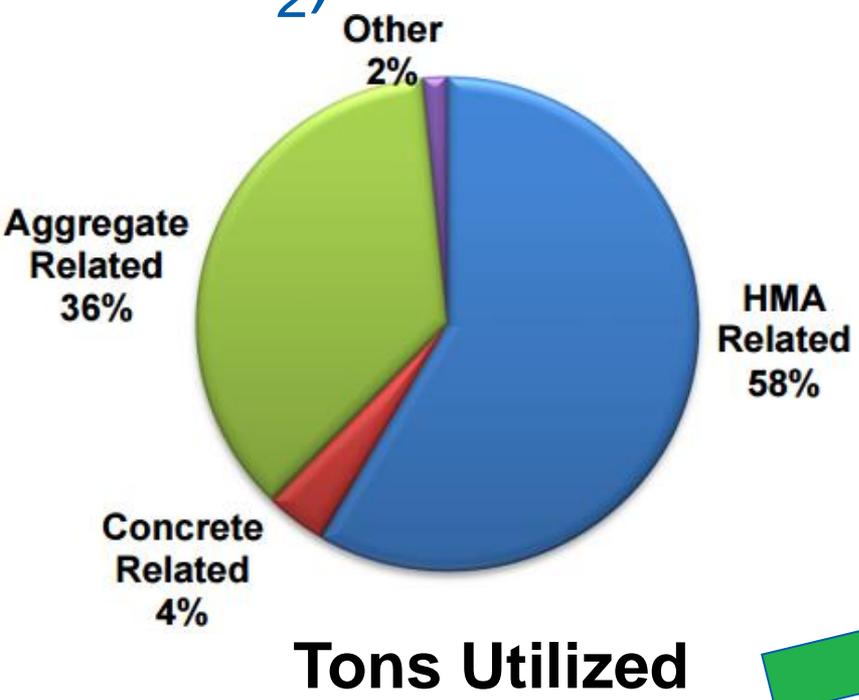
- Recycled Asphalt Pavement (RAP-HMA)
- Reclaimed Asphalt Shingles (RAS)
- Steel Slag
- Blast Furnace Slag

□ Other

- Recycled steel (re-bar)
- By-product Lime
- Glass Beads
- Ground Tire Rubber (GTR)

Tons Recycled vs Reduced CO₂

Need to move conversation from quantitative (tons of material) to qualitative (tons of CO₂)



Where do we go?

- Foundation building
- Education on use
- Need to show how LCA can assist in making good policy
- Use opportunities to utilize LCA
- As interest grows - AASHTO/NCHRP will support research and procedure development



High Tide Key West, Florida

Nov. 2014