



**ILLINOIS CENTER FOR
TRANSPORTATION**



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Sustainability: The Road Ahead at IDOT

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ILLINOIS
TRANSPORTATION
AND HIGHWAY
ENGINEERING
CONFERENCE

The Road Ahead at IDOT

- 2013 Material Recycling
- ICT/IDOT Sustainability Efforts Completed/Underway
- Future Sustainability Efforts

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IDOT Materials Sustainability Efforts of 2013



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ILLINOIS HIGHWAY MATERIALS SUSTAINABILITY EFFORTS OF 2013

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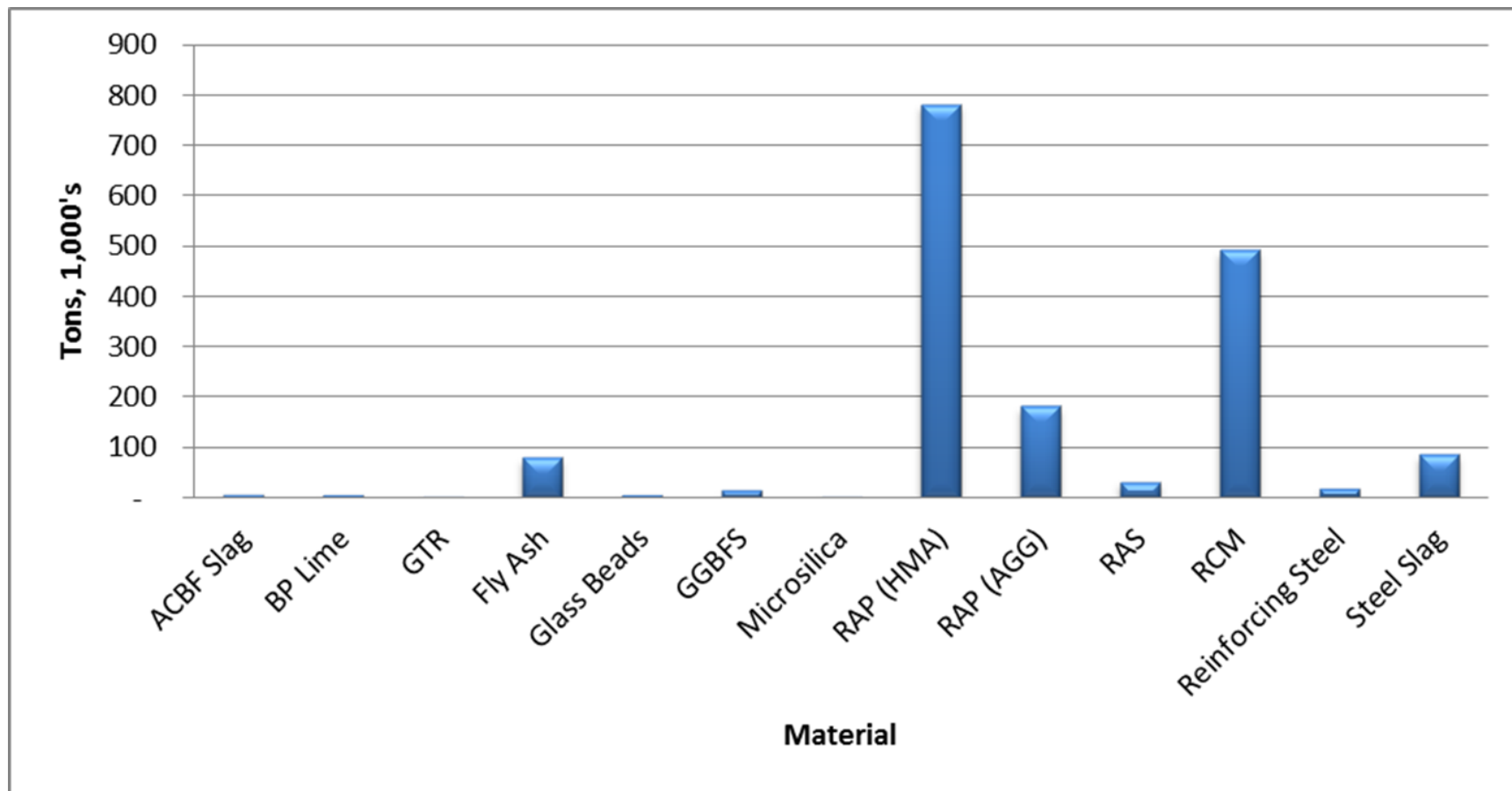
August 2014

On ICT Publications
Page:

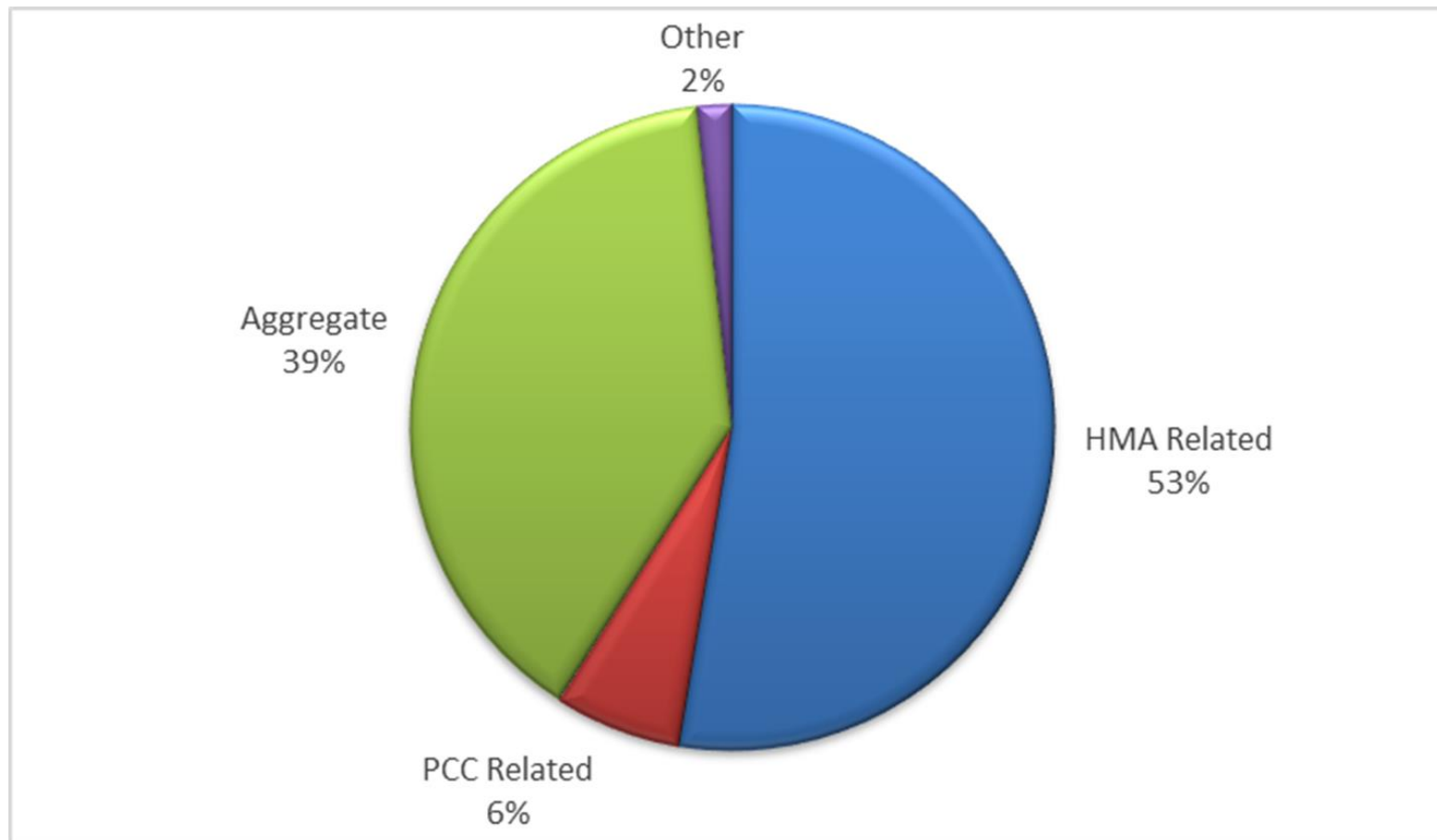
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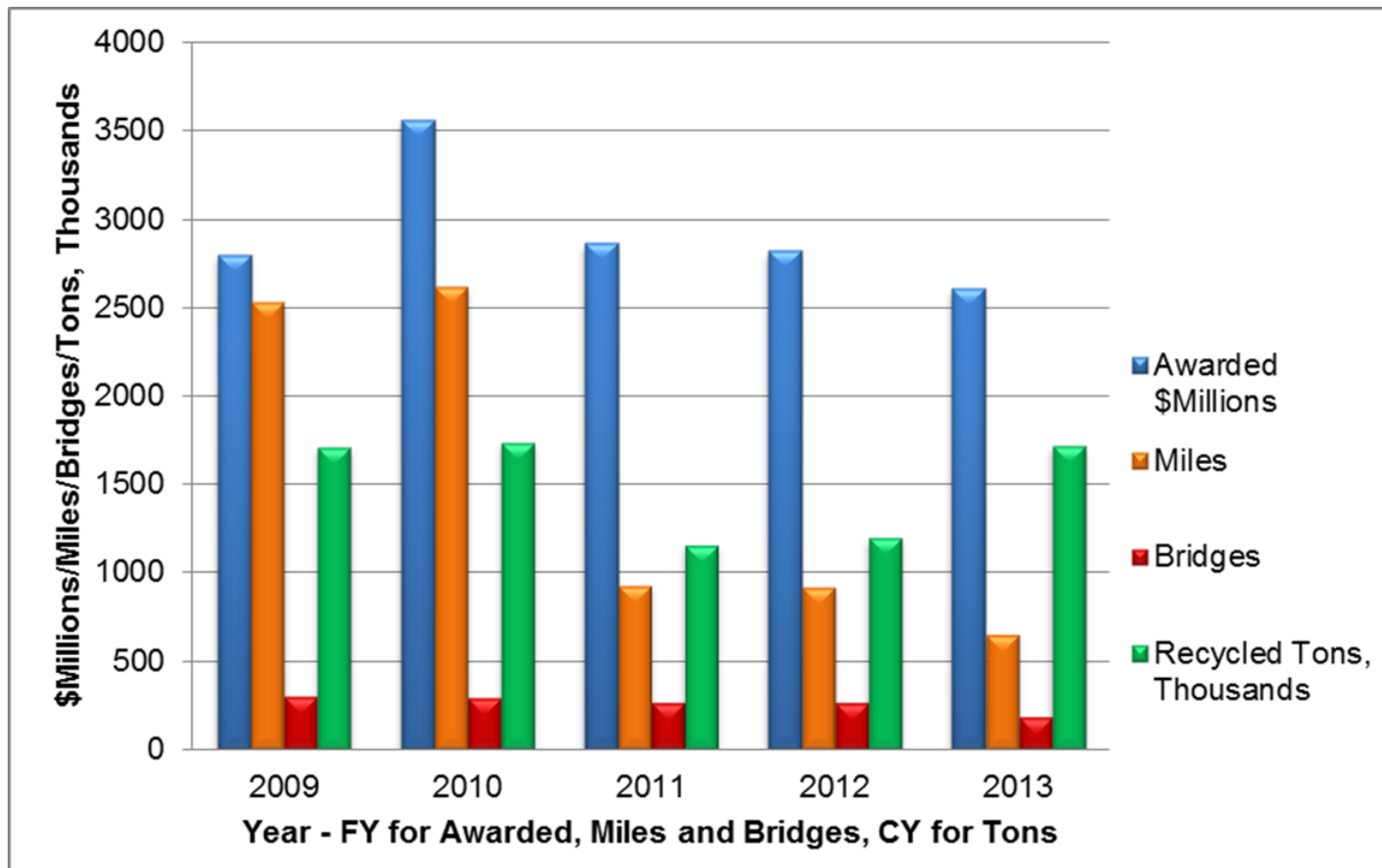
Reclaimed Material Use, 2013



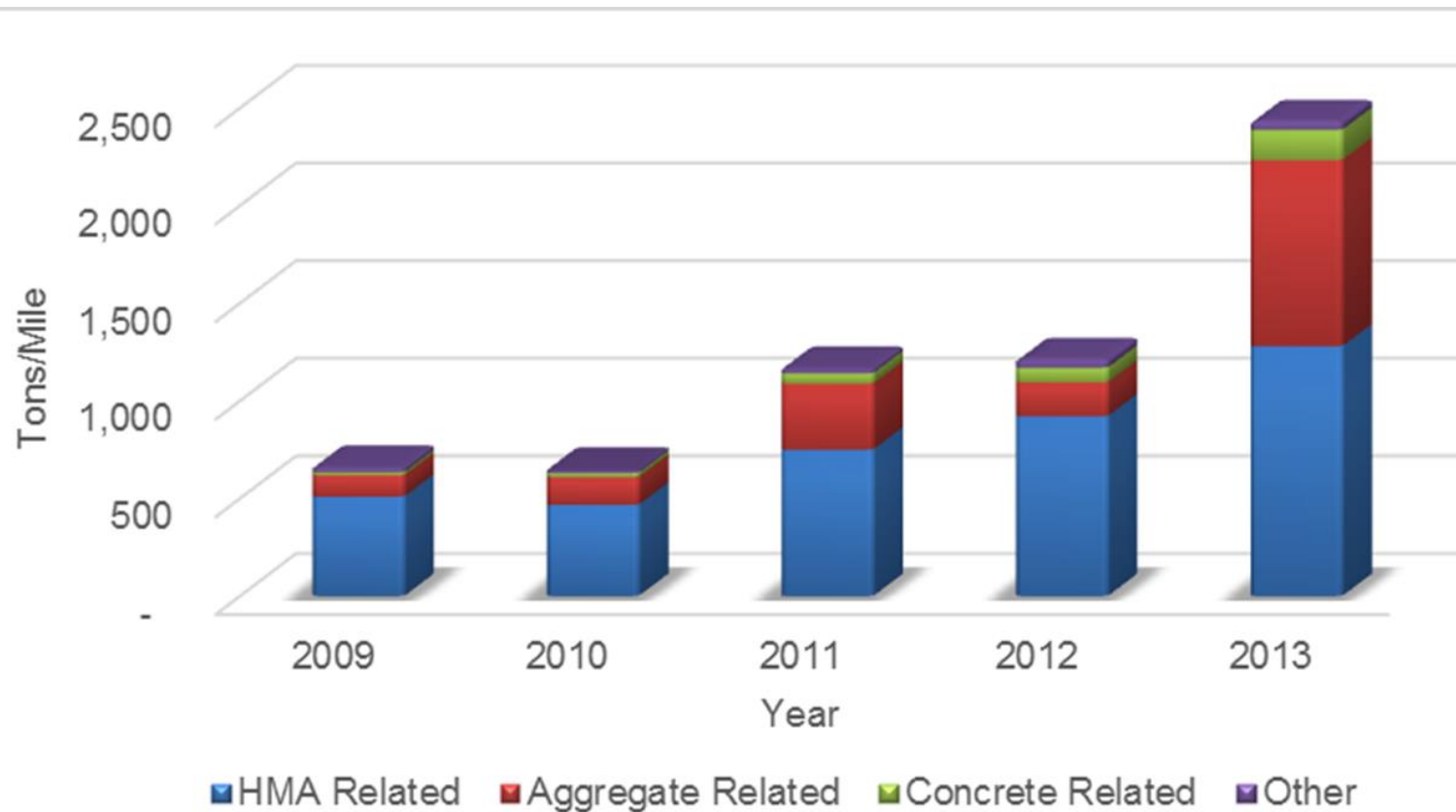
Reclaimed Materials by Related Use, 2013



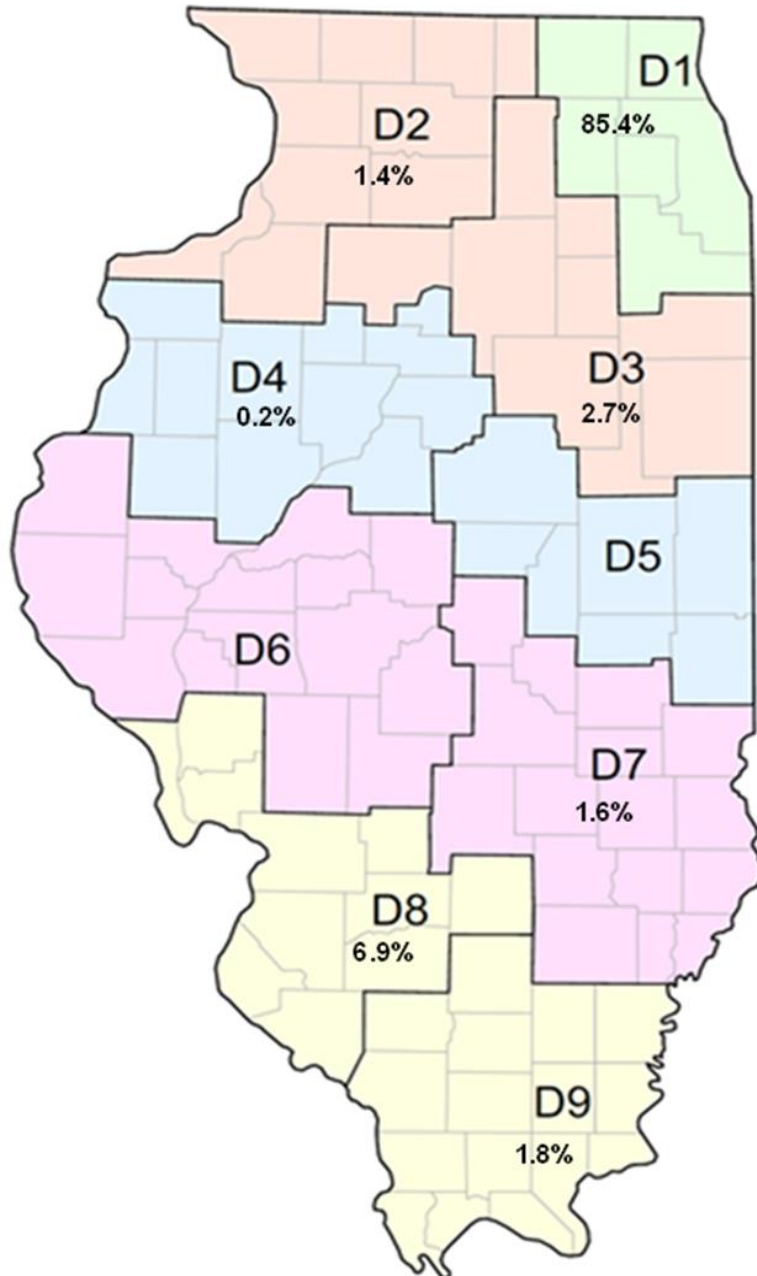
Annual Projects Awarded (FY), Miles Improved (FY), Bridges Built/Improved (FY), and Recycled Tons (CY)



Historical Recycled Content



Percentage of RAS Used by Each District in Calendar Year 2013 ~ 40K t



2013 Recycling Highlights

- 13 Materials Recycled
- 1.7M+ Tons of Material Recycled
- \$58,000,000 Value
- 39,791 Tons of RAS an Increase of 221%
- 124,599 Tons of WMA ~ 3% of HMA
- Nearly a four fold increase in recycle content per mile since 2009

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Green-Friendly Best Management Practices for Interstate Rest Areas

- **Impact:** Sustainable technologies implemented by IDOT at rest areas bring cost savings, provide better energy efficiency, and support IDOT's green initiatives.



Presented at Presented at CRC Conference, 2014 & IAARC Conference, 2013.

Published ASCE Journal 2013 & Journal of Automation in Construction 2013.

Erosion & Sediment Control Training

- **Three modules were developed for IDOT contractors, inspectors, designers, etc.:**
 - *Fundamentals of Storm Water Pollution & Erosion and Sediment Control*
 - *Erosion and Sediment Control Planning and Design*
 - *Inspection of Erosion and Sediment Control Best Management Practices (BMPS)*
- **Professional Development Hours (PDHs)**
- **20 classes offered last year**
- **25 classes are planned this year**



Bus Riding on Shoulders

- Investigated the feasibility of “bus on shoulder” (BOS) service in the Chicago metro area. With BOS service, public transit buses may ride on designated highway shoulders when vehicles in the general traffic lanes are moving less than 35 mph.
- \$9.5M Cost - \$22M Benefit to riders and environment over next 16 years.
- Expanded to Edens Expressway (I-94) and Tollway by legislation.



Light-Emitting Diode (LED) Lighting for Highways

Researched trends and direction in this fast moving technology.

Developed a model specification that is in process of being adopted by IDOT.

Implementation pending briefing of upper management.



Before and After Pictures of Program

Fc.: 4.31

Ave./Min.: 2.40

Max./Min.: 5.4



BEFORE – 200 W HPS (240 W)
6th Street Bridge over Los Angeles River



Before and After Pictures of Program

Fc.: 3.48

Ave./Min.: 1.63

Max./Min.: 2.67



AFTER – 180 W LED (180 W)
6th Street Bridge over Los Angeles River



Before and After Pictures of Program

Fc.: 1.46

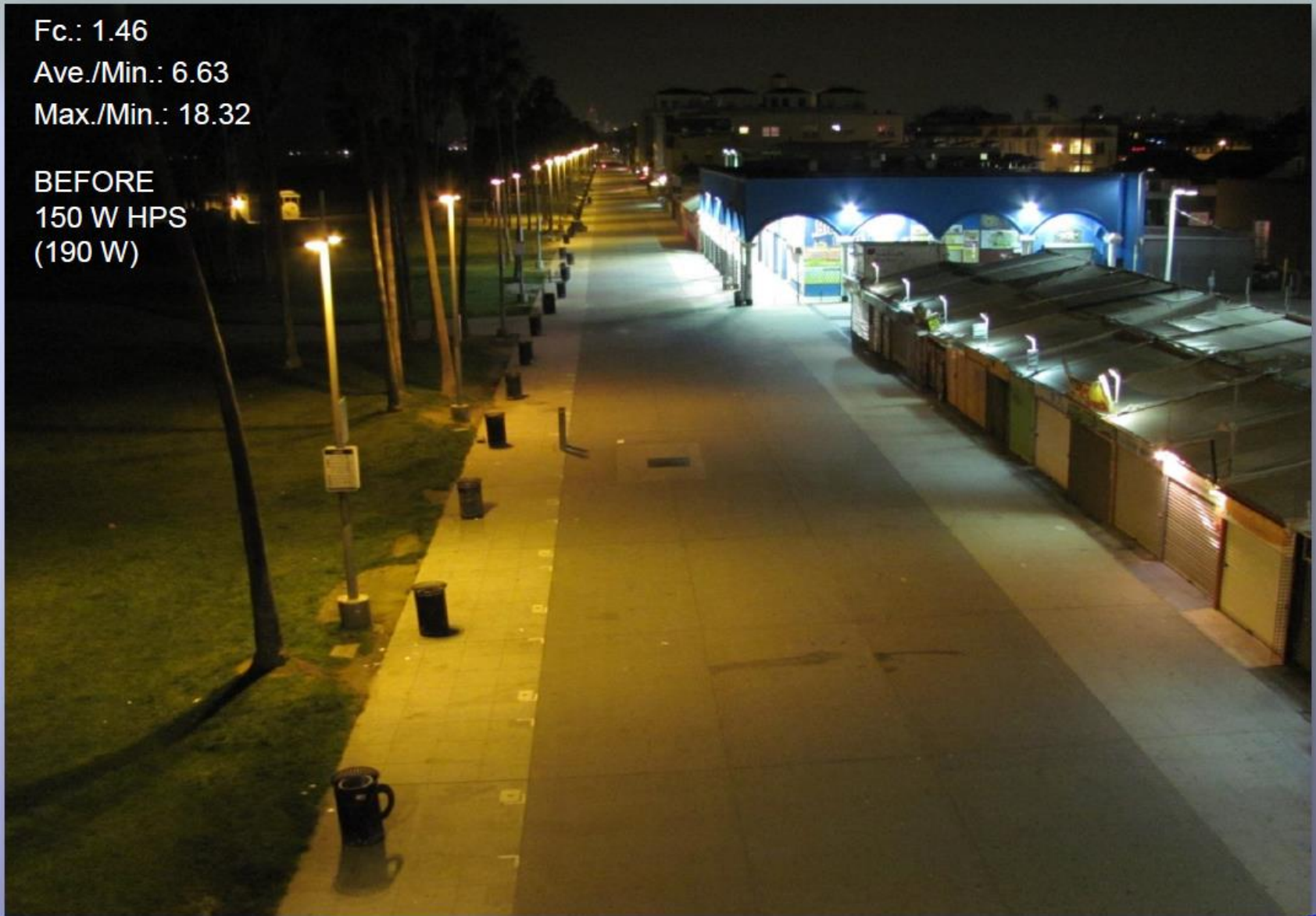
Ave./Min.: 6.63

Max./Min.: 18.32

BEFORE

150 W HPS

(190 W)



Ocean Front Walkway, Venice – HPS

Before and After Pictures of Program

Fc.: 1.90

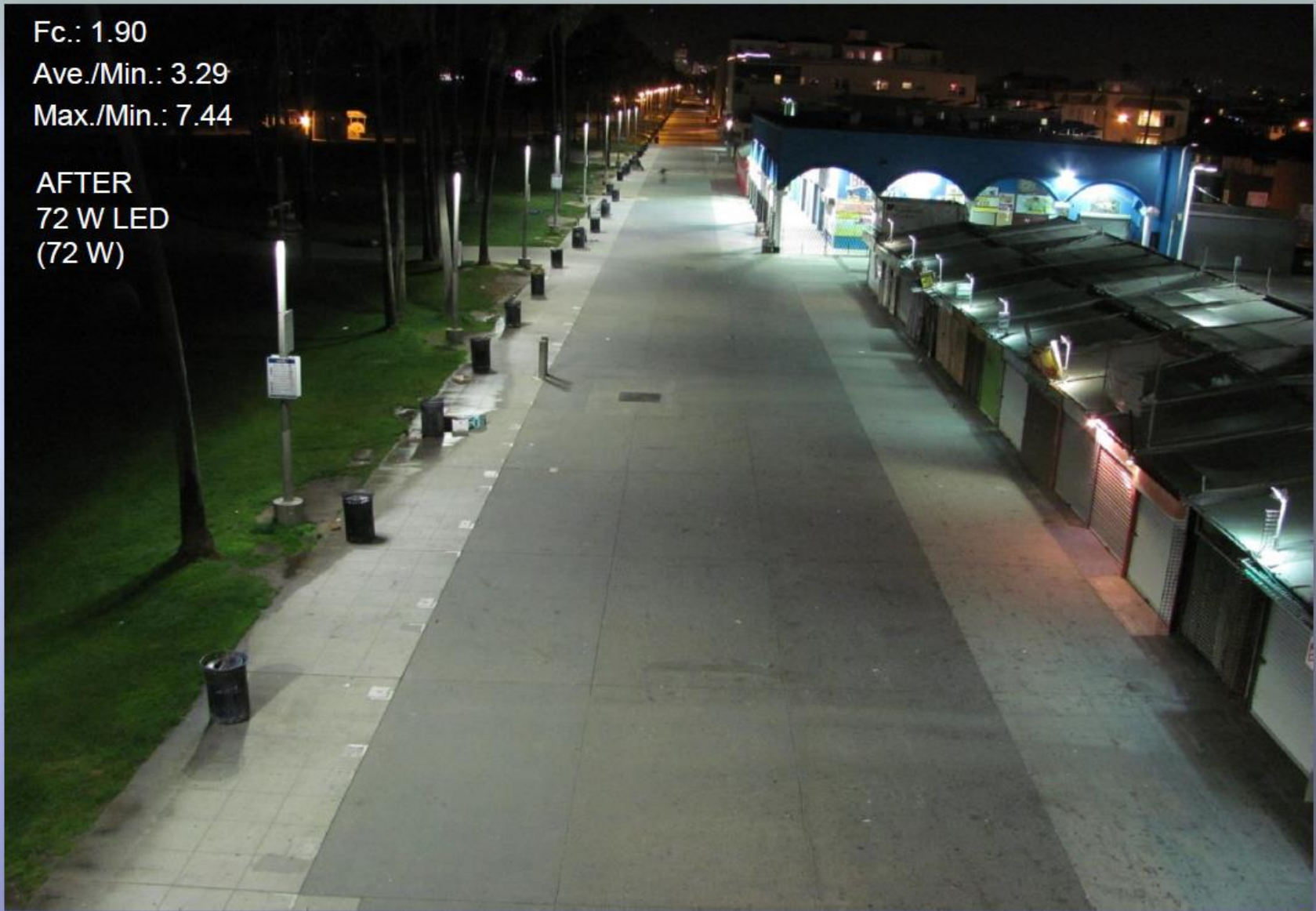
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Max./Min.: 7.44

AFTER

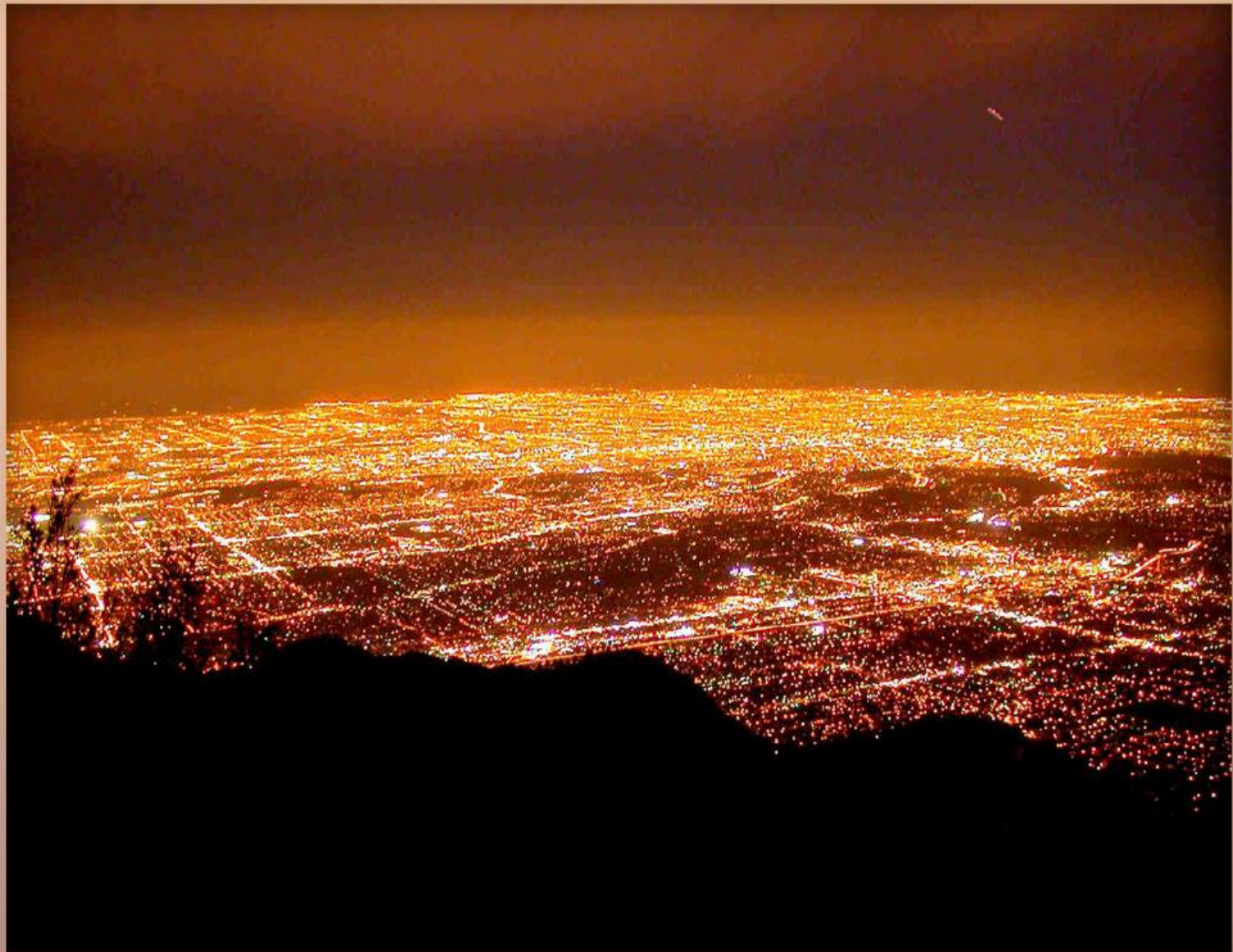
72 W LED

(72 W)

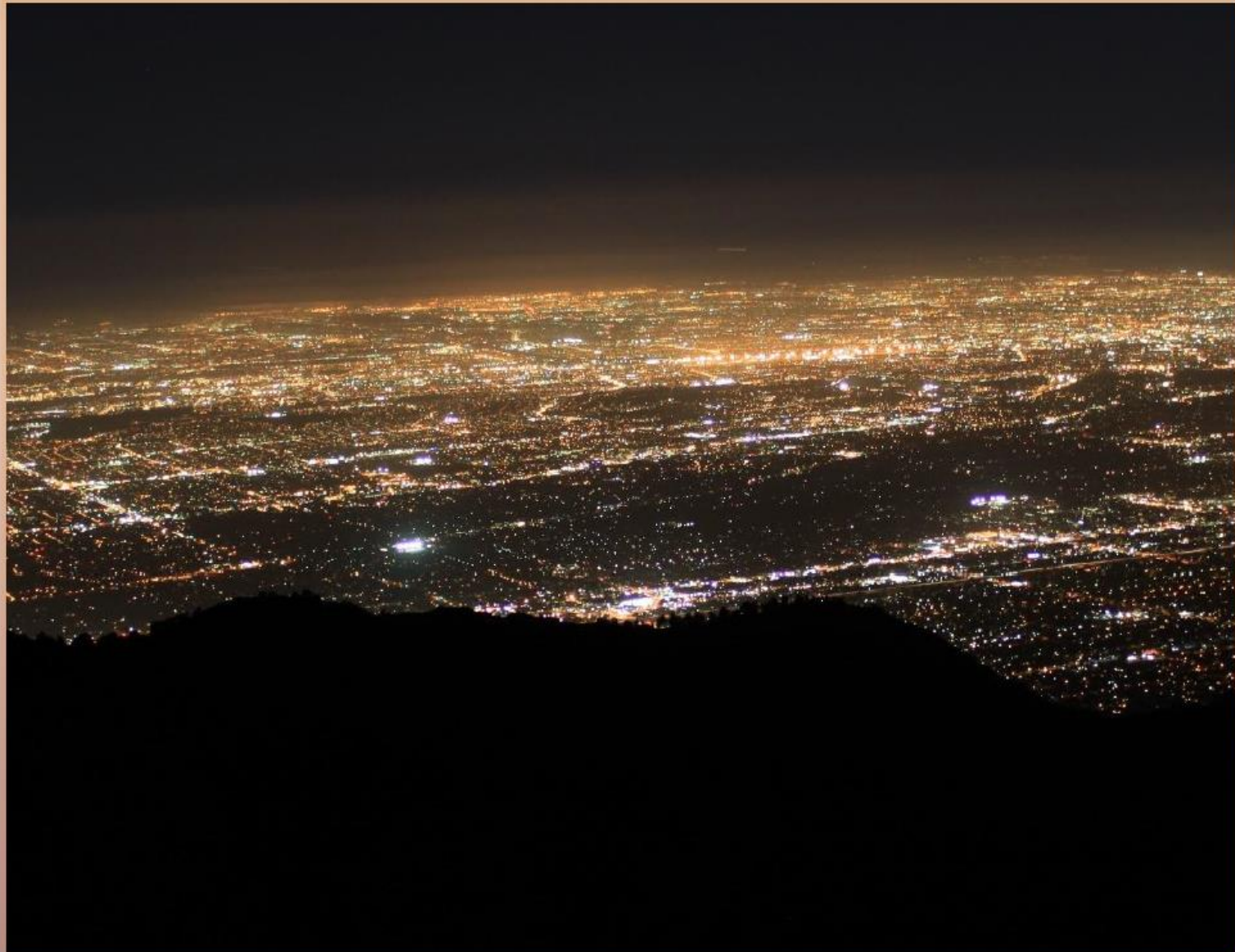


Ocean Front Walkway, Venice – LED

Los Angeles Basin – View from Mt. Wilson Before LED Retrofit Project – 2008



Los Angeles Basin – View from Mt. Wilson After LED Retrofit Project – 2012



R27-127 Testing Protocols to Ensure Performance of High Asphalt Binder Replacement Mixes Using RAP & RAS

Performance is very important for sustainability.

High recycle content Hot Mix Asphalt (HMA) improves sustainability as long as it performs equivalent or better than traditional mixes.

SuperPave was developed for neat materials.



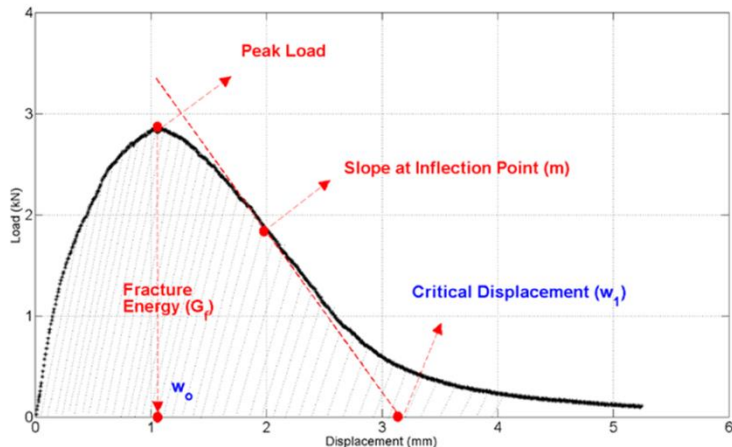
R27-127 Testing Protocols to Ensure Performance of High Asphalt Binder Replacement Mixes Using RAP & RAS

Goal is to develop a simple, low cost, easy to run test that provides an indication of cracking potential of HMA.

Flexibility Index proposed.

Evaluation 2015.

Possible implementation in 2016.



R27-148 Development of Low-Water Crossing Design Guidelines for Very Low ADT Routes in Illinois

Just underway.

Goal is to formalize guidelines and use.

Low cost alternative in design, building and maintenance of structure.

Also has use for wildlife crossings to address endangered aquatic species.



R27-SP27 Investigation of Relationships between AIMS Shape Properties and VST Friction Values

IDOT currently hauls large tonnages of aggregate from Indiana and Wisconsin to insure good friction properties in HMA surfaces.

Using the Aggregate Imaging System (AIMS) with the Micro-Deval polishing device to predict friction properties of aggregate source.



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What Is Sustainability?

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

*Most definitions of sustainability begin with that issued by the World Commission on Environment and Development (WCED), often referred to as the Brundtland Commission Report (WCED 1987).

What Is Sustainability - Simply?

**Meet the needs of today
without compromising
future generations.**

CLIMATE CHANGE IS A HOAX

2005



CLIMATE CHANGE IS A CROCK

2008



CLIMATE CHANGE DOESN'T EXIST

2012

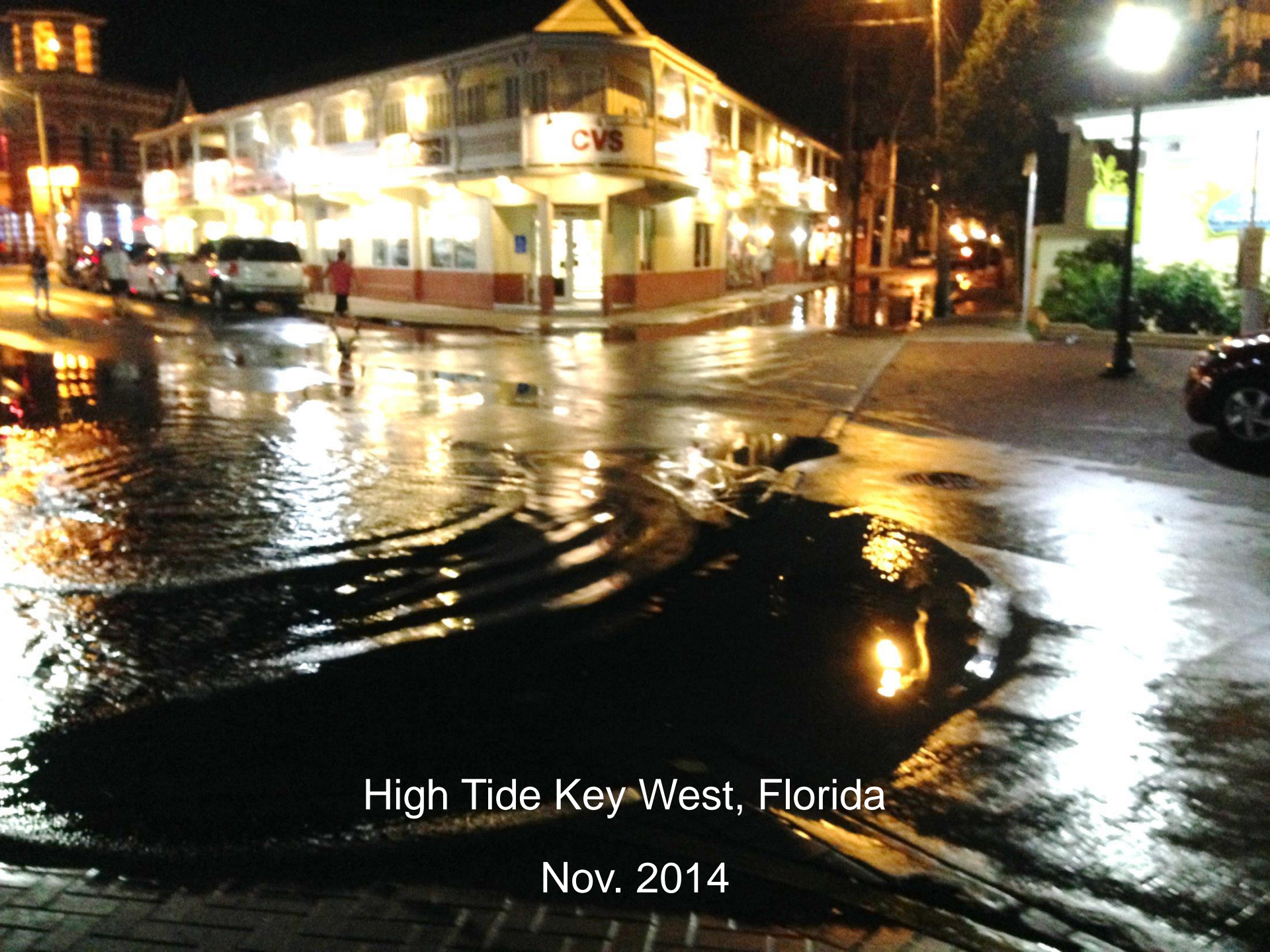


OK, THERE IS CLIMATE CHANGE BUT IT'S NOT MAN-MADE

2015



WAT DAVIES 2015



High Tide Key West, Florida

Nov. 2014

Measure and Value

Measure Global Warming Potential (GWP) in the form of CO₂

(Engineering Effort)

Place Value on CO₂

(Political Effort – Federal Level – May Never Happen?)

Reducing CO₂

Saves Energy and Saves \$\$

Determine what is actually sustainable

Measuring Sustainability

- **Performance assessment**
 - Metrics providing information about the health of pavement over its life-cycle
- **Life-cycle cost analysis (LCCA)**
 - Total user and agency costs over its life-cycle
- **Rating systems**
 - A list of sustainability best practices with a common metric
- **Life-cycle assessment (LCA)**
 - Environmental burden of a pavement from cradle to grave

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.
 - Establish regional database.
 - Develop software tool for typical applications.
- Aid in design and defending new and existing policy.

Materials



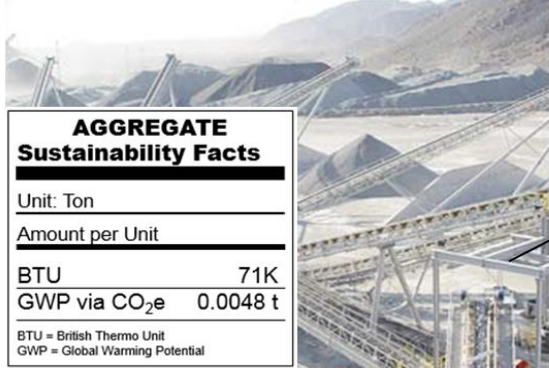
CEMENT Sustainability Facts

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



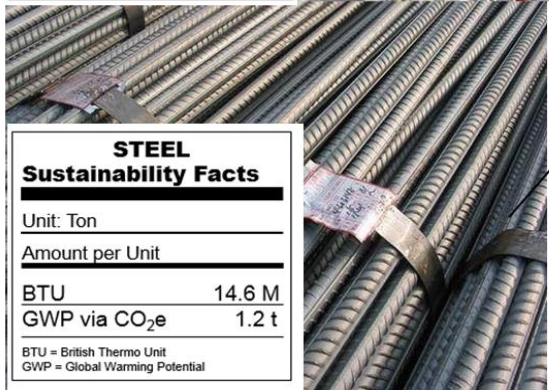
AGGREGATE Sustainability Facts

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

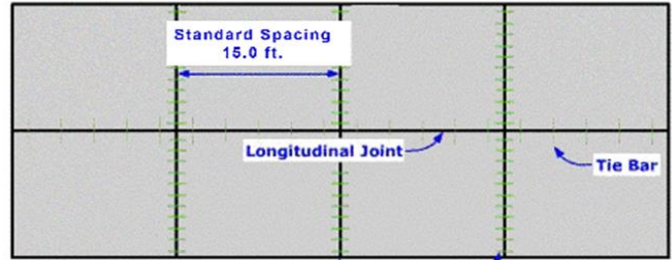
Unit: Ton

Amount per Unit

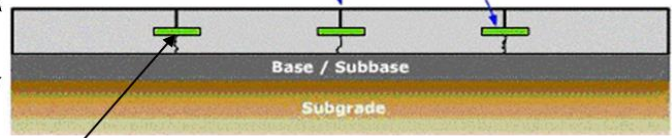
BTU	14.6 M
GWP via CO ₂ e	1.2 t

BTU = British Thermo Unit
GWP = Global Warming Potential

Top View



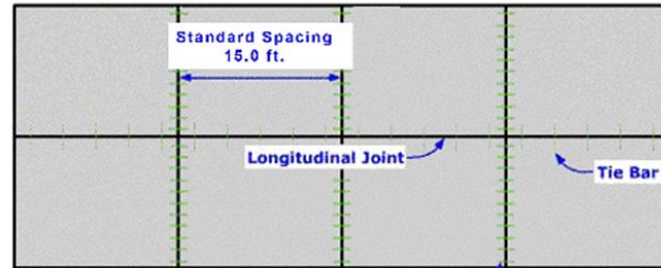
Side View



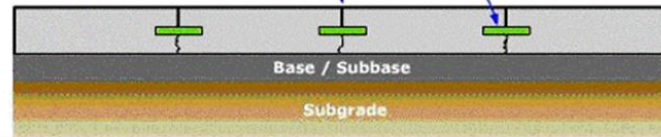
Construction



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

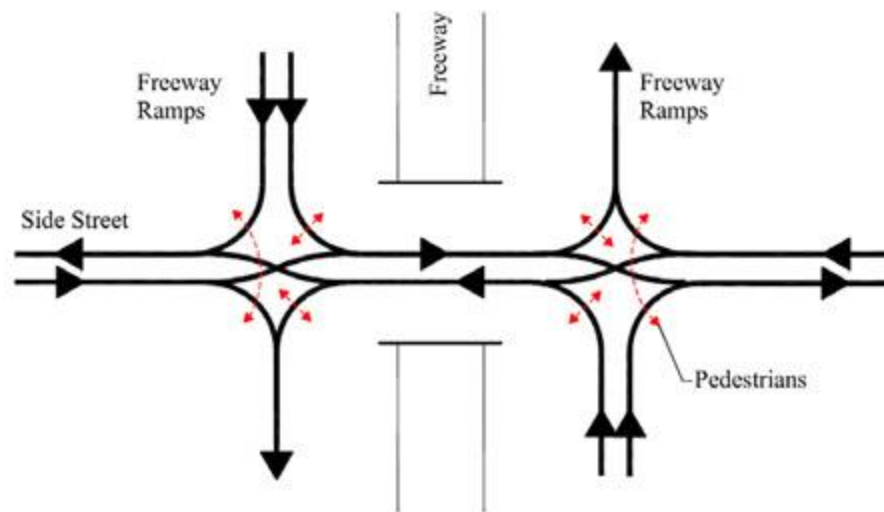
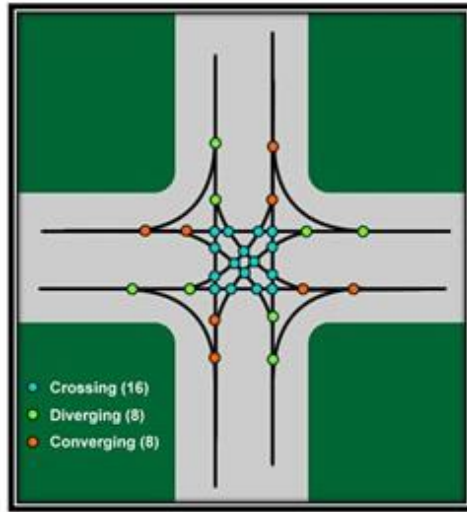
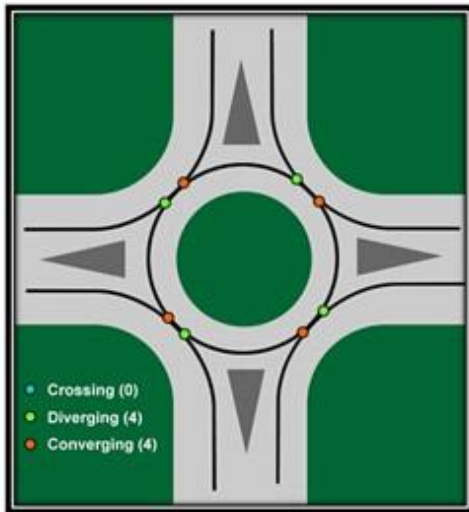
BTU	2 M
GWP via CO ₂ e	0.15 t

BTU = British Thermo Unit
GWP = Global Warming Potential

Maintenance



Traffic Operations



FHWA Draft

TOWARDS SUSTAINABLE PAVEMENT SYSTEMS A REFERENCE DOCUMENT

Draft Final Report



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Federal Highway Administration

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Questions??

