

Sustainability and environmental care for all our construction activities is an important consideration these days. The following summary is circulated for awareness of current thinking and expectations. This info can be useful when preparing submissions or tenders.

National Conference on Preservation, Repair and Rehabilitation of Concrete Pavements

21 – 24 April 2009
St Louis Missouri

DEBRIEF NOTE

SUSTAINABILITY IN CONCRETE PAVEMENTS

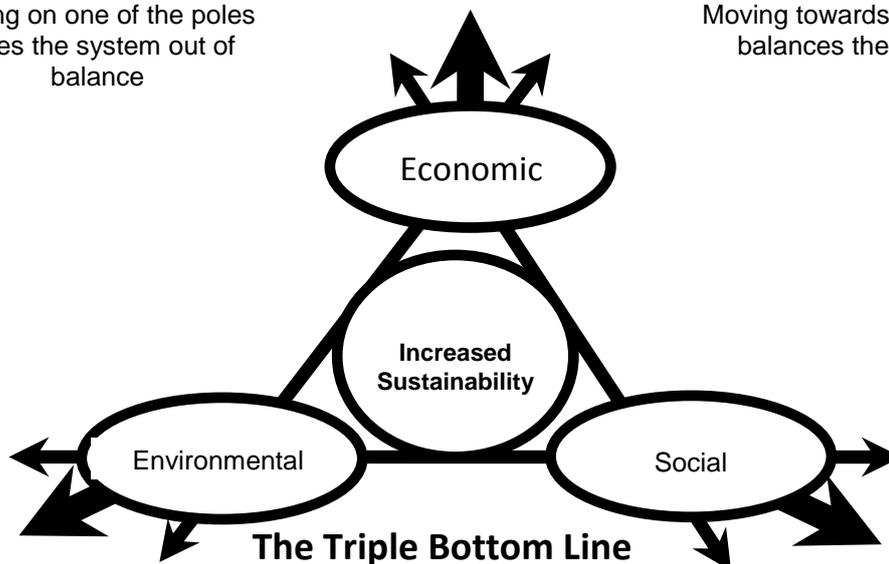
(with thanks to Peter Taylor for information supplied herein)

BACKGROUND

- Concrete is the most commonly used building material on the planet
 - Modern civilization is built on concrete
 - The positive social impacts are immense
- Therefore, it has a relatively large environmental footprint
- Sustainability provides a way to balance the various economic, environmental, and social factors

Pulling on one of the poles takes the system out of balance

Moving towards the center balances the system



SUSTAINABLE CONSTRUCTION, REHABILITATION, PRESERVATION & REPAIR

- It is simply good engineering
 - Using limited resources to achieve design objectives
 - Not about perfection, but about balancing competing, and often contradictory, interests
- Considers life-cycle economic, environmental and societal factors
- It's complicated – get over it

COMMON SENSE PRINCIPLES OF SUSTAINABILITY

1. Get smart
2. Design to serve the community
3. Choose what you use
4. Less is more
5. Minimise impact
6. Take care of what you have
7. Innovate

1. Get Smart

- Design for what you need
 - No more and no less
 - Don't sacrifice engineering quality
- Ensure that relevant design criteria are met
 - Holistic approach to design – it is not just thickness

2. Design to Serve the Community

- Listen to the communities being affected
- Design to address the specific needs of the community...
 - Ride quality
 - Delays

3. Choose What You Use

- Recycle – zero waste (concrete is 100% recyclable, steel, etc.)
- On-site recycling reduces time, energy, pollution, and makes money
- Cement and concrete industries consume the majority of coal combustion bi-products
- Local first – minimize transportation
- Select the materials to use – don't let the materials select themselves
 - Understand what is available
 - Import only what you need

4. Less is More

- All things equal, less material means less impact
- Using less portland cement can improve sustainability
 - Blended and performance specified cements
 - Supplementary cementitious materials (fly ash, slag, etc.)
 - Aggregate grading
 - Optimized mixture design

5. Minimize Impact

- Noise – Construction and traffic
- Safety
 - Splash and spray
 - Lighting
- Delays – During construction and rehabilitation
- Emissions
 - Green house gases
 - Pollution
 - Particulates
- Energy efficiency –
 - Construction
 - Operation
- Urban heat island effect

- Portland cement is responsible for approximately 90% of the CO2 and 85% of the embodied energy in concrete

Phases of a Pavement's Life

- Design (cut & fill, design life, drainage, construction method, thickness, LCC, material selection, capacity)
- Construction (Virgin materials, dust, noise pollution, energy, CO2, delay time, LCC)
- Operation (Maintenance, longevity, capacity, noise pollution, water runoff, heat island, safety, skid resistance, Ride Quality)
- Rehabilitation, Recycling & Removal (Removal = waste disposal; Repair / Rebuild = similar issues to construction; Recycling materials into other construction material)

6. Take Care of What you Have

- Use the equity already in the existing subgrades & pavement
- Well timed maintenance and rehabilitation is essential
- Design to maintain (e.g. additional thickness to accommodate future diamond grinding)

7. Innovate

- Identify problems/opportunities, generate solutions, implement, and reiterate
- Learn from mistakes
- Good specifications
- Evaluate emerging technologies and adopt those with demonstrated promise
- Educate and challenge yourself and your workforce
- Conduct research to fill the gaps in knowledge

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