The Optimistic View

CalCIMA 2008
Annual Conference

September 16-19, 2008
Rancho Mirage, California

Speaker
Mike Donovan, P.E.
Environmental Concerns/Actions

Which one is it?
Is opportunity knocking???
Are We Listening?
Just an Unfortunate Fact!

**CEMENT AND CO2 EMISSIONS**

In recent decades, the production of cement has been designated as a major greenhouse gas pollutant. Worldwide, the production of Portland cement alone accounts for 6-8% of human-generated carbon dioxide (CO2), the greenhouse gas most attributed as the source of global warming.
What is this Green Stuff About?
Its About AB32!
AB32 - Governor’s Executive Order

AB 32: The California Global Warming Solutions of 2006

Signed on June 1, 2005
Its About LEED!
Commercial LEED Certified Projects (cumulative)

* As of May 2008

1,540*
Some More Facts

Education & Accreditation Programs

- LEED workshop attendance: 83,136
- LEED Accredited Professionals: 57,417
- Greenbuild Attendees 2006: 13,382
- Greenbuild Attendees 2007: 22,835
Its About SCM’s!
Fly Ash

Fly ash is fine residue produced by the combustion of coal in coal burning power stations. In the presence of moisture, fly ash reacts with calcium hydroxide to form compounds possessing cementitious properties.
Granulated Blast-Furnace (GGBF)

Slag is a nonmetallic product developed simultaneously with iron in a blast-furnace, then chilled rapidly to form glassy granular particles. These granules are ground to cement fineness or finer. In concrete this slag will react with calcium hydroxides to form cementitious products.
Its About Innovation!

CLIMATE CHANGE CURE?: By running the flue gas from Moss Landing's mammoth smokestacks through ocean water, a new company can make cement from carbon dioxide pollution.
Its About the Need for Mechanisms to Allow Rapid Change

- Cements with lime dust percentages
- 1157 Cements generally accepted
- Acceptance of cements with SCM’s
- Blended “1157” SCMs
- Performance Specifications - Starting with Caltrans and the “Green” Book
- Cements optimized for SCM’s or other products
Its about Testing!
All cements are not created equal!

All SCM’s are not created equal!

All aggregates are not created equal!
Shrinkage Comparison
550 lbs Cementitious
Our Success Story!
A Few Concrete Examples

- Center for Jewish Life
- Webcor Builders
- Mountain View
## A Few Concrete Examples

### Webcor Center for Jewish Life

<table>
<thead>
<tr>
<th>Mix Number</th>
<th>Mass of Portland Cement (lbs)</th>
<th>Mass of Recycled SCM's (lbs)*</th>
<th>Mass of Total Cementitious Material (lbs)</th>
<th>SCM's as % of Total Cementitious Material</th>
<th>Cubic Yards placed in project</th>
<th>% of Cyds X %SCM's</th>
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<tbody>
<tr>
<td>4040</td>
<td>240</td>
<td>240</td>
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<td>460</td>
<td>245</td>
<td>705</td>
<td>35%</td>
<td>4416</td>
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<td>17863</td>
<td>45.3%</td>
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</tbody>
</table>
California Academy of Sciences

35,000 cubic yards of concrete

As-cast ‘A+’ architectural finish

Ultra low shrinkage

50% supplementary cementitious materials
### A Few Concrete Examples

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<td>858</td>
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<td>316</td>
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<td>8.3%</td>
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</table>

Total: 30587

% of Cyds X %SCM's: 47.8%
SCM % Replacement History

- 19% in 2005
- 23.5% in 2006
- 28.9% in 2007
- 36% in Sep-08
## Daily Dashboard

### CO2 Reduction

<table>
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<tr>
<th></th>
<th>Daily</th>
<th>MTD</th>
<th>YTD</th>
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<tr>
<td><strong>Actual</strong></td>
<td>35.94%</td>
<td>36.01%</td>
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<td><strong>2008 Target</strong></td>
<td>35.00%</td>
<td>35.00%</td>
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<td><strong>More Than</strong></td>
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It’s About Challenges!
Speaking of Challenges

500 Capital Mall
Sacramento

Lightweight concrete 4000 psi
- 320 lbs cement
- 192 lbs slag
- 128 lbs fly ash

Highest strength mix is 8000 psi
- 450 lbs cement
- 450 lbs slag

The sidewalk in front per city specifications
- 564 lbs cement
- 0 SCM’s
Another Concrete Example

- Almaden Towers
- Webcor Builders
- San Jose
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<td>33425</td>
<td>22.7%</td>
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Much Easier Acceptance of Change if There is a Pull from the Owners, Architects, and Engineers

AB32, LEED, and Build it Green are the pull we need to change the way we do business!
Thank You!