Transition to Portland Limestone Cement
A Ready Mixed Concrete Industry Perspective
PLC Industry Team

• Luke McHugh – Senior Director for Pave Ahead
  – National Ready Mixed Concrete Association

• John Whitman – Quality Control Manager
  – Clemente Latham Concrete (a CRH Company)

• Bart Bergsbaken – Technical Director
  – Specialty Products Group
Know the Audience
Sustainability
Roadmap to Carbon Neutrality: Cement & Concrete

Construct concrete structures for durability, resiliency, stiffness and thermal mass benefits.
Reducing Concrete’s Embodied Carbon Emissions (In-Use to Near-Term)

- Communicate Carbon Reduction Goals
- Ensure Good Quality Control and Assurance
- Optimize Concrete Designs & Mixtures
- Specify Innovative Cements
- Specify Supplementary Cementitious Materials
- Specify Admixtures
- Don’t Limit Ingredients
- Set Targets for Carbon Footprint
- Sequester Carbon Dioxide in Concrete
- Encourage Innovation

The embodied CO$_2$ footprint of a typical concrete paving mixture today is as much as 40 percent lower than just a few decades ago.
What is Portland-limestone cement?

**Traditional Portland Cement**
- 95% Ground Clinker
- Less than 5% Limestone

**Portland-Limestone Cement**
- 85% Ground Clinker
- Up to 15% Limestone
### What is Portland-limestone cement?

<table>
<thead>
<tr>
<th>Composition</th>
<th>Type I or II portland cement (ASTM C150)</th>
<th>Type IL cement (PLC) (ASTM C595)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinker</td>
<td>92%</td>
<td>82%</td>
</tr>
<tr>
<td>Limestone</td>
<td>3%</td>
<td>13%</td>
</tr>
<tr>
<td>Gypsum</td>
<td>5%</td>
<td>5%</td>
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</tbody>
</table>
History of PLC Acceptance/Use

Europe – 50+ years
Canada – 10+ years
USA – Growing in acceptance

greenercement.com
A Combination of Solutions Required to Reach the Goal

Greener Pavements
John Whitman
Quality Control Manager
Clemente Latham Concrete (a CRH Company)
Clemente Latham Experience

• Clemente Latham has done limited testing.

• All has been inhouse with adequate results.

• We will be proceeding with further trial testing until confident with results to involve Independent Testing Lab for verification.

• Depending on individual factors such as aggregates, and other constituent’s, costs can be extensive.
Limited testing at our company

a) Costs of testing for performance. Independent Labs.

b) Effectiveness of Admixtures. Air entrainment, water demand.

c) Ash quality effect on total strength.

d) ASR issues if any. Amount of ash used to mitigate any potential issues. Reactive aggregates effect.
a) Silo Space – Many smaller companies have limited storage space for an added cement. Doesn’t limit lab testing but can hinder field data collection. Make transitioning difficult with ongoing projects.

b) Other upgrades will be minimal. Some locations will require minor batch computer upgrades to allow for extra products.
Specifications

a) See little if any specifications requiring PLC.

b) Options will need to be given to companies that are unable to make the change early on.

c) EPD’s. Producers will need to invest in the cost. Most say they will wait until they transition before investing.
a) Several PLC’s are available for use on the approved list.


c) Work closely with our partners at NYSDOT to produce quality, cost effective and Eco-Friendly design to meet today's needs.
a) Clemente Latham Concrete is part of CRH. Worldwide company with local interests.

b) Working with sister companies across the country to share data regarding PLC’s. Some companies have partially made the transition.

c) Data sharing is taking place on several company platforms. Able to look “real time” at other plants data and use to formulate our trials and options.

d) Canadian arm of CRH using PLC’s exclusively. There data has been very helpful for other CRH companies to develop designs.
This is not any different than other changes we have gone through. Fly Ash and Slag were new products at one time. It will take time, effort and of course cost. Much like any Research and Development the costs associated with the transition will need to be recouped. With all materials used in the manufacture of concrete, those costs are on the rise. Any savings that may be seen through the use of a PLC will be absorbed to offset the other materials at this time.
Discussion
Thank You