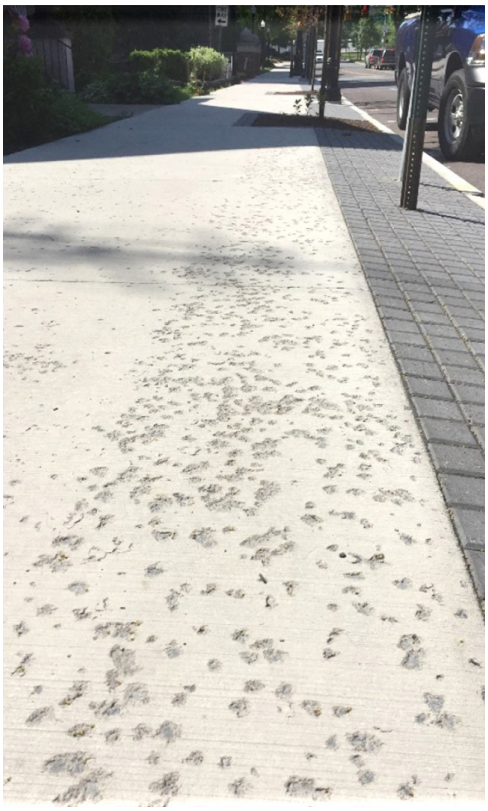
2040 Linglestown Road, Suite 204
Harrisburg, PA 17110
717-234-2603
www.pacaweb.org

Pennsylvania Aggregates and Concrete Association

REDUCING CONCRETE SCALING

Protecting the concrete you place this year from next year's winter

Before it's too late



The severity of this past winter, with its numerous freeze-thaw cycles has brutally reminded us that we need proper specifications, construction practices, and post construction care to prevent newly placed concrete from damage after its first winter.

Concrete scaling is the flaking or peeling away of the surface, typically caused by exposure to wet freeze-thaw cycles and the aggressive use of deicing chemicals. It is often misinterpreted as a material failure when it is really a symptom of specification, construction, curing, and exposure challenges. Pennsylvania's climate, with its fluctuating winter temperatures and common use of chemical deicers, creates a higher risk for scaling. Recent changes to the materials used in the manufacture of concrete provide additional challenges.

With an increased understanding of this issue by those who design, build and manage our construction projects, along with the certification of our craftsmen, we can reduce the occurrence of this problem.

Specification details to reduce the occurrence of scaling include:

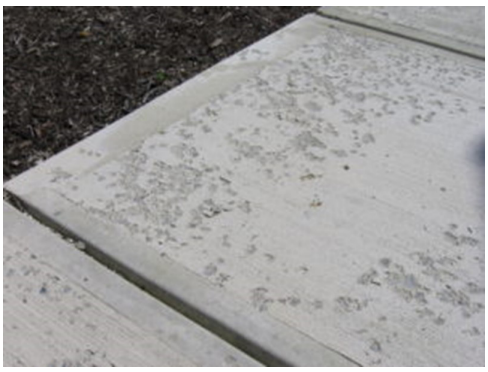
- 4000 psi minimum compressive strength.
- A water-to-cementitious material ratio ≤ 0.45.
- 5% -8% entrained air content.
- Use of SCMs (e.g. fly ash, slag, silica fume) with proper testing and approval.

Improved construction practices to reduce scaling include:

- Use of surface evaporation retarders.
- Waiting to finish the concrete until the surface is sufficiently stiff, and not just the absence of bleed water.
- Minimal finishing.
- Use curing compounds or wet coverings immediately after finishing.
- Applying a high-quality penetrating sealer prior to the first freeze-thaw cycle.

Construction management considerations include:

- Do not schedule exterior placements in mid to late fall, just prior to the beginning of Pennsylvania's October freeze-thaw cycles.
- Avoid the use of any deicing chemicals during the first year of the concrete's life.
- Avoid the use of aggressive deicers that chemically attack the concrete at any time.
- Educate the projects owners and managers on proper maintenance practices, including the use of deicers and subsequent sealing.



These above noted items are just a brief outline of the specification and construction practices that construction professionals need to be aware of to provide the durable product that we all desire.

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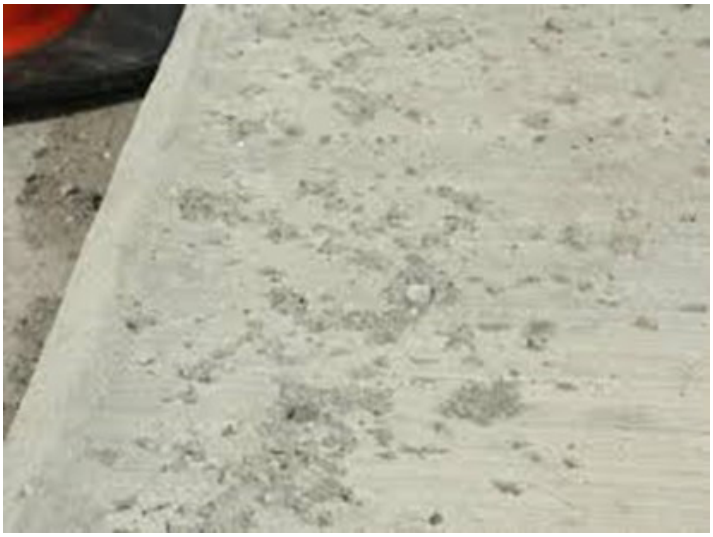

To protect your clients, your projects, and to develop the skill of our craftsmen, education for both specifiers and contractors is now available. To date over 2000 Pennsylvania craftsmen have been certified according to the National Ready-Mixed Concrete Association (NRMCA) Exterior Flatwork Finisher Certification program. This one-day program includes not only classroom education but also hands-on practice. It is specifically designed to provide insights into the issues that cause scaling and the challenges of dealing with today's concrete mixtures. Requiring this certification in your project's specifications is an important step towards reducing scaling.

The Pennsylvania Aggregates and Concrete Association (PACA) can provide this education and certification to contractors, and insights into specification details to design professionals, and construction management personnel at your facility. Please contact us at the e-mail addresses or phone numbers below to schedule these educational opportunities and help improve the outcomes on your project.

Scaling is not an inevitable outcome of winter exposure but often the result of avoidable deficiencies in design, placement, or curing. By aligning specification, education, and construction practices across Pennsylvania's construction industry, we can significantly reduce the occurrence and faulty perception of scaling as a concrete quality issue.

CONTACT INFORMATION

James Casilio, P.E.
jimc@pacaweb.org
Director of Technical Services and Codes & Standards
610-730-2385

Susan Armstrong
susan@pacaweb.org
Director of Specifications and Sustainability
570-428-2338

May 2025
Version 2