

PITTSBURGH
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CHAPTER



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**American Concrete Institute
Pittsburgh Area Chapter**
P.O. Box 86
Zelienople, PA 16063

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February 2020

Chapter News

2020 PITTSBURGH AREA CHAPTER UPCOMING MEETINGS & EVENTS

MEMBER DINNER MEETINGS

(Domenico's Restaurant, Piazza Plaza, 20550 Route 19, Cranberry Twp., PA 16066)

Wed. - February 12, 2020

Dale Rosinski, P.E. from CDR Maguire will give an overview of The Southern Beltway Project and Steven Hrvoich, P.E. of PA Turnpike will discuss Long Life Concrete Pavement specified on the Beltway

Wed. - March 18, 2020

Shane Szalankiewicz, P.E. - Structure Control Engineer (District 11)
Topic: PENNDOT 408 Section 1000 – Structures: New Changes coming in April 2020

AWARDS BANUQET

Saturday, April 18, 2020

Please join us for this year's **Awards Banquet at the Beaver Station Cultural & Event Center**, located in the charming and historic town of Beaver, Pennsylvania. It is a restored vintage Pittsburgh & Lake Erie Railroad passenger station dating to 1897.

Visit our website for a list of upcoming events at www.acipgh.com/calendar-of-events.

Be sure to check the website, as our meeting minutes are posted there for review. In addition, members are welcome to observe board meetings, to obtain a better understanding of Chapter activities.



Chapter News

Concrete Q&A

Cold Weather Cylinder Protection

February 2016 Edition of Concrete International

Q We've been placing elevated decks and recently had a cold stretch on our project where ambient temperatures ranged from 5 to 20°F (-15 to -7°C) over several weeks. We followed a cold weather plan during this time that involved heating decks from below as well as applying blankets to the surface as soon as finishing was complete. To reduce finishing time, our supplier used hot water and increased the dosage of accelerator as the placement progressed. Field test reports show that the concrete was typically placed at 60 to 65°F (16 to 18°C).

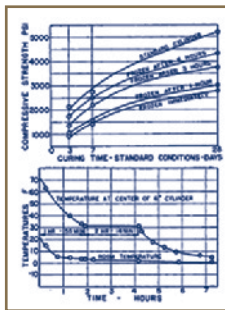


Fig. 1: Strength of concrete at different ages when molded at 72°F and allowed to set for the indicated times before being placed in a freezing unit at 5°F and the corresponding temperature curve of the concrete while freezing¹ (Note: 1 psi = 0.007 MPa; 1 in. = 25.4 mm; °C = (°F - 32) / 1.8)

Some initial strength tests from this period have come back significantly lower than expected. The testing lab had a heated cure box on ground level, but 6 x 12 in. (152 x 305 mm) cylinders were cast on the deck and not brought down to the cure box until the placement was completed—generally within 2 to 6 hours, depending on size.

I suspect that the low strengths are related to early cylinder protection. Could test cylinders freeze during that time frame? How much strength loss can be expected if they froze? Is there a way to confirm if cylinders froze or not?

The best answer to your questions can be found in the results of a study by McNeese¹ conducted in 1952. The author was trying to determine the placement conditions under which freshly placed concrete would be damaged by freezing and how much is it damaged when frozen at various intervals and temperatures. He cast 6 x 12 in. (152 x 305 mm) cylinders at either 72 or 40°F (22 or 4°C), varied their exposure, and compared the strength loss of exposed cylinders to standard cured cylinders. Some cylinders were protected prior to exposure to freezing temperatures while others were exposed to freezing temperatures immediately upon casting.

McNeese's results for cylinders immediately exposed to freezing appear to be applicable to the conditions described for your project. The two bottom plots shown in Fig. 1 and 2 represent the temperature history of cylinders cast at 72°F (22°C) and immediately exposed to ambient conditions of 5 and 15°F (-15 and -9°C).

According to these plots, the temperature in your cylinders would likely have reached freezing after approximately 2 to 3 hours of cold weather exposure. McNeese found that cylinders can drop to about 32°F (0°C) within this period and suffer no long-term strength loss as long as the cylinders are protected prior to entering the freezing period. Once concrete freezes solid over the next 2 to 3.5 hours (flat-line portion of the bottom plots), permanent strength loss will occur due to the formation of ice crystals and disruption of the concrete paste. McNeese¹ and others^{2,3} found that unprotected concrete loses approximately 30 to 50% of its strength potential when frozen early.

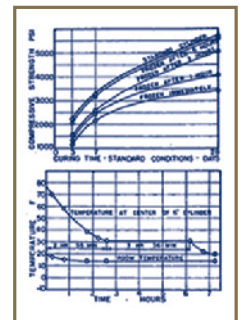


Fig. 2: Strength of concrete at different ages when molded at 72°F and allowed to set for the indicated times before being placed in a freezing unit at 15°F and the corresponding temperature curve of the concrete while freezing¹ (Note: 1 psi = 0.007 MPa; 1 in. = 25.4 mm; °C = (°F - 32) / 1.8)



President's Message

By *Tricia G. Ladely*



Hello and Happy 2020 to our members! I hope everyone had some time to rest and spend time with family and friends during the recent holidays. We have a busy few months ahead of us so please keep in touch through our website and social media platforms.

I am not sure if you are aware, but I wear two different ACI 'hats' for work. My volunteer duty is serving as Chapter President and I am also employed as Assistant Director for the ACI Foundation. I am careful to not let these duties conflict. I will always recuse myself from board votes related to the ACI Foundation, but I did want to take this opportunity to share a little about the ACI Foundation with you.

The ACI Foundation's mission is to **promote progress, innovation, and collaboration in the concrete industry through strategic investments in research, scholarships, and ideas.** There are three councils that help the ACIF accomplish its mission:

- Concrete Research Council – seeks and supports concrete research projects that further the knowledge and sustainability of concrete materials, construction, and structures, in coordination with ACI Technical Committees.
- Scholarship Council – establishes and distributes fellowships and scholarships to high potential students in concrete-related graduate and undergraduate degree programs.
- Strategic Development Council - provides a forum where professionals from the concrete industry convene at the senior level to discuss strategic issues, research needs and new technology and innovation.

In 2018 the ACI Foundation was able to make a positive impact to the concrete industry by contributing:

- \$375,000 to 8 different research projects;
- over \$360,000 in support of innovative technology; and
- over \$200,000 to deserving students.

If you are interested in learning more about the Foundation, please visit the website: www.acifoundation.org.

Contact Information:

Tricia G. Ladely

p +1.724.601.3075

e Tricia.Ladely@acifoundation.org

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Chapter News is published by the American Concrete Institute, Pittsburgh Area Chapter for the purpose of informing members and others about issues of concern to the concrete industry. If you have information to include in this publication or any comments, contact ACI Pittsburgh Chapter at 724-452-1468

5th Annual

Excellence in Concrete Project Award

If you wish to submit an entry to be considered for this award, please visit our website www.acipgh.com to download the application form.

Reminder:

The deadline for project entries is February 29, 2020.



If your placement times ranged from 2 to 6 hours, it is very likely that some of the test cylinders cast during longer placements froze before they were transferred to the curing box. To investigate if low strengths are due to freezing, you may be able to identify if the low-strength sets correlate with the first sets of cylinders cast for a particular placement. Those cylinders would have been exposed to low temperatures the longest. Also, if the lab retained the low-strength samples or if there are still cylinders left for testing, you can inspect broken sections for “crow’s feet”—evidence that ice crystals formed in the fresh concrete (Fig. 3).

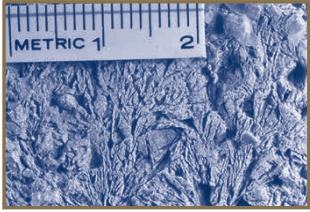


Fig. 3: “Crow’s feet” visible in this micrograph show that ice crystals formed in the fresh concrete (photo courtesy of the Portland Cement Association)

Regardless, your description indicates cylinders were not sampled in accordance with standard practices (ASTM C31/C31M⁴). To avoid similar issues on future projects, the construction team should discuss if a curing box can be located on the deck where the concrete is being placed or what arrangements need to be made to transport cylinders to ground level more quickly.

References

1. McNeese, D.C., “Early Freezing of Non-Air-Entraining Concrete,” *ACI Journal Proceedings*, V. 49, No. 12, Dec. 1952, pp. 293-300.
2. Bernhardt, C.J., “Damage Due to Freezing of Fresh Concrete,” *ACI Journal Proceedings*, V. 49, No. 12, Jan. 1956, pp. 573-580.
3. Jonasson, J.-E., “Slipform Construction—Calculations for Assessing Protection Against Early Freezing,” Swedish Cement and Concrete Research Institute, Stockholm, Sweden, 1985, 70 pp.
4. ASTM C31/C31M-15, “Standard Practice for Making and Curing Concrete Test Specimens in the Field,” ASTM International, West Conshohocken, PA, 2015, 6 pp.

Thanks to Ron Kozikowski, North S.Tarr Concrete Consulting, Dover, NH, for providing the answer.

Questions in this column were asked by users of ACI documents and have been answered by ACI staff or by a member or members of ACI technical committees. The answers do not represent the official position of an ACI committee. Comments should be sent to rex.donahey@concrete.org.

TINK BRYAN AWARD TRIBUTE TO: THOMAS “TINK” BRYAN

The Tink Bryan Award was created in honor of an outstanding individual who dedicated himself to his family, business and the concrete industry. For several years now the Chapter has honored various individuals with this award. The Pittsburgh Chapter Board of Directors is requesting nominations for a 2020 recipient. If a candidate is selected, they will be announced at the Awards Banquet in April. The candidate should demonstrate an exceptional commitment and achievement of service to the concrete industry.

Please forward a letter with your candidate(s) name and reasons for nomination to:

ACI, Pittsburgh Area Chapter | PO Box 86, Zelienople, PA 16063 | or email to: bethaci@zoominternet.net

To be accepted for board review, nominations should be received by March 15th.