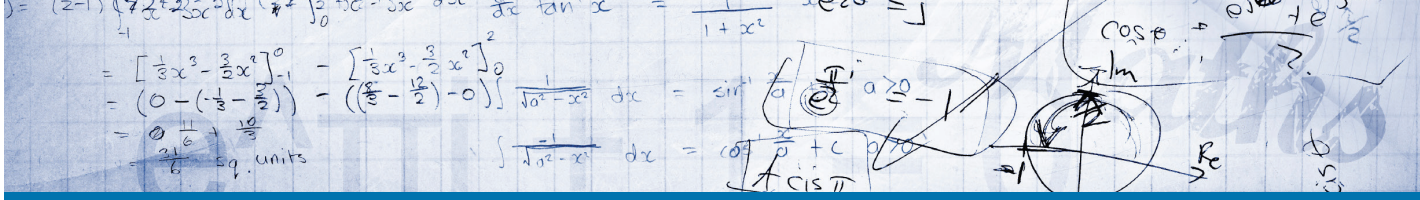

Discussion

Experimental Investigation of 0.6 in. Diameter Lifting Loops

"Experimental Investigation of 0.6 in Diameter Lifting Loops"[1] by Sandip Chhetri, Rachel Chicchi, and Andrew Osborn, which appeared in the March–April 2021 issue of *PCI Journal*, is an important research document that addresses a practical safety issue, the common practice of the handling of very heavy precast concrete girders using 0.6 in. (15.2 mm) scrap strand available in the pretensioned concrete plants producing such girders. Such scrap strand is fashioned into various shapes and configurations by the production bending shop in such plants. This paper formalizes the types of shapes and addresses their safe capacities through well-documented pullout tests from test blocks cast in a pretensioned concrete girder production facility.

One of the variables addressed in the paper is the Mohs hardness of the coarse aggregate used in the casting of the test blocks from which the strand pullout capacities were recorded. The reader is cautioned that a comment in the paper regarding the Mohs hardness issue on page 73 refers to research conducted by Russell and Paulsgrove,[2] which is not appropriate because that paper does not address Mohs hardness. Instead the reader should review the appendix, "Concrete Toughness," which I wrote and which addresses the Mohs hardness issue in depth.[1]

The pullout test values recorded in this paper apply to 0.6 in (15.2 mm) strand with an A1081 test value of 18.2 K and coarse aggregate in the test block with a Mohs hardness value of 3.8. They are conservative for cases where such test values exceed those indicated.

Typically, the Mohs hardness for common coarse aggregates in most parts of the country exceeds 3.8. Even the Mohs hardness of the lightweight coarse aggregates recently tested by Robert J. Peterman was 4.1, which is greater than 3.8.

The important message to pretensioned concrete producers is that samples of your hard rock and lightweight concrete coarse aggregates should be tested by a research laboratory that is experienced in conducting the Mohs hardness test so you can compare the research test results to probable performance using your coarse aggregates. The Mohs hardness tests, as well as the A1081[3] strand bond tests for this research program, were conducted by Peterman.

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References

1. Chhetri, Sandip, Rachel Chicchi, and Andrew Osborn. 2021. "Experimental Investigation of 0.6 in Diameter Lifting Loops." *PCI Journal* 66 (2): 71–87. https://doi.org/10.15554/pcij66.2-03.
2. Russell, B. W., and G. A. Paulsgrove. 1999. *NASP Strand Bond Testing Round One Pull-Out Tests and Friction Bond Tests of Untensioned Strand*. Final report 99-03. Norman, OK: University of Oklahoma Fears Structural Engineering Laboratory.
3. ASTM International. 2015. *Standard Test Method for Evaluating Bond of Seven-Wire Steel Prestressing Strand*. ASTM A1081/A1081M-15. West Conshohocken, PA: ASTM International. https://doi.org/10.1520/A1081_A1081M-15.

Authors' response

First of all, thank you to Don Logan for recognizing the value of this research,[1] as well as his many contributions to the project. Logan's discussion focuses on possible issues regarding Mohs hardness literature references and a desire to make clear the implications of Mohs hardness on pullout capacities based on some research Mohs hardness tests.

There is very little in the literature regarding Mohs hardness, which is in large part why Logan's appendix was welcomed. It provided an opportunity to bring this topic to light and give it more focus than would have otherwise been possible in the body of the paper. The authors determined that the Russell and Paulsgrove report[2] presents significant strand bond research data and should be included. Although Mohs hardness is not specifically noted in that work, it demonstrated that lower pullout values could be associated with softer aggregates found in Florida. The NCHRP 621[3] report by Osborn et al., which is also referenced in regard to Mohs hardness, includes a brief commentary on Mohs hardness in appendix A. Appendix A reads: "The use of this test has been observed by Logan at numerous facilities, and test results similar to Stresscon were reproduced as long as the aggregates used were relatively hard aggregates with Moh's hardness exceeding 6.0 similar to aggregates used originally by Moustafa in the Pacific Northwest. Concrete with relatively soft limestone aggregates consistently produced lower pullout capacities than concrete with the harder aggregates." Since there are no other known references for this topic, the authors determined that both of these references are appropriate and no modifications should be made.

The second main issue was about emphasizing the importance of Mohs hardness on pullout capacities. The authors think the appendix provided by Logan that was published along with the paper already does a fine job of pointing out the issues associated with using softer aggregate. The appendix reads: "The test results from the Mertz Fellowship project may not be sufficiently conservative for use by Florida girder producers or for products with sanded lightweight concrete. Therefore, the testing program should be expanded to include pullout testing of concrete with lower Mohs hardness values."

While the authors are not opposed to a reader comment that stresses these points, it does not appear that the new reader comment provides any type of new information that isn't already stated in the appendix.

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References

1. Chhetri, Sandip, Rachel Chicchi, and Andrew Osborn. 2021. "Experimental Investigation of 0.6 in Diameter Lifting Loops." *PCI Journal* 66 (2): 71–87. https://doi.org/10.15554/pcij66.2-03.
2. Russell, B. W., and G. A. Paulsgrove. 1999. *NASP Strand Bond Testing Round One Pull-Out Tests and Friction Bond Tests of Untensioned Strand*. Final report 99-03. Norman, OK: University of Oklahoma Fears Structural Engineering Laboratory.
3. Osborn, A. E. N., J. S. Lawler, and J. D. Connolly. 2008. *Acceptance Tests for Surface Characteristics of Steel Strands in Prestressed Concrete*. National Cooperative Highway Research Program report 621. Washington, DC: Transportation Research Board. https://doi.org/10.17226/14206

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