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Implementation of the Concrete Maturity Meter for Maryland

Problem

The process of waiting for concrete to attain its desired strength for certain construction applications can pose one of two problems. The concrete strength may be overestimated, which creates a safety concern for workers and the general public. The concrete strength may also be underestimated, which incurs costs because of delays due to the curing of the concrete. The maturity method was viewed as a viable option for determining concrete strength, since it requires only the concrete's temperature history to estimate in-place strength.

Objectives

The research objectives were to use a wireless maturity meter on a newly constructed bridge in the state of Maryland, to use the maturity method to estimate compressive strengths during curing of freshly placed State Mix Six concrete, and to establish a protocol for the application of the maturity method in Maryland.

Description

The maturity method can be used to estimate the strength of concrete as it is curing in order to provide a safely constructed product and to expedite the construction process. This study examines protocols to understand the best way to use the method and to manage engineering variability, human error, and quality control.



RESEARCH SUMMARY

Results

The maturity method is a powerful tool that can allow for the nondestructive testing of concrete to determine in-place strength. This method is extremely sensitive to concrete mixture proportions, and a strength-maturity relationship must be developed for every application. Special care must be taken to ensure that the concrete used for calibration and the concrete poured in the field are exactly the same. This method is more efficient than traditional methods because the time taken for concrete to reach its desired minimum strength is known beforehand. Compression tests may be carried out at that time, eliminating the need to wait until predetermined intervals to test the concrete. As shown in this investigation, the Arrhenius method more accurately estimates the maturity of concrete, and the hyperbolic graph best represents the strength-maturity relationship. In order to achieve maximum accuracy when using the maturity method, it is imperative that the determination of constants is carried out for each maturity application.

Report Information

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