

Costs Reduced Through Earlier Access to New Concrete Pavements

Earlier opening of new concrete pavements to traffic is achievable without a detrimental impact to short- and long-term pavement performance. Earlier openings will reduce construction time and cost, and shorten the period that the traveling public has to detour around road closures, thus saving user cost. Improving concrete strength estimations in the field and strength gain predictions, as well as early age damage modeling, are keys to determining when new pavements can be opened.

A strength gain prediction model was created that combined the benefits of ultrasonic tomography for strength estimation with the predictive ability of the maturity method for future strength development. A mechanistic-based early opening damage analysis procedure was developed to predict the effects of early loading. A web-based tool was created to facilitate the implementation of this procedure.

An analysis of a hypothetical construction project involving a simulation analysis of an urban street closure in the central business district of Pittsburgh was performed to demonstrate the potential user benefits.

In this example, user delay costs totaled \$123,645 per day due to the street closure.

Another research finding is that High Early Strength (HES) concrete may not be required to meet construction schedules. A recent construction project in PennDOT District 11-0 on Route 837 demonstrated that by using a standard mix design, combined with the in-situ testing and development of worst-case maturity curves, HES concrete was not needed. This translated to a total cost benefit of \$40,950 by using the normal strength PennDOT class AAPAVE mix in lieu of the HES mix.

