MOWER COUNTY BRIDGE INSTRUMENTATION

Introduction

It is not often well enough noted when research techniques and practices cross over into real-world problem solving, bringing purpose and practice together in a pragmatic fashion. Research and practice do rely on each other for informative construction techniques and real-world application, whether successful or not, but they are separated by the bulk of time required for research to be verified and implemented and the necessity to practice road construction and repair in a concurrent manner. Recently though, a unique case involving a bridge, some fresh-poured concrete and a petulant flash-flood helped to spectacularly showcase how ongoing research projects, such as MnROAD, can help to effectively, practically and pragmatically solve situational crisis around the state of Minnesota.

The Problem

Far into Southern Minnesota, nestled in the buttress between this state and Iowa, rests Mower County and in particular the bridge (#50590) which was in a necessary state if repair. The bridge consists of a monolithic structure supporting a three span, slab deck superstructure that crosses over the Cedar River. Fresh concrete was required to repair the structure of the bridge and all was well until less than 24 hours after the last concrete pour a flash flood developed from the intensive summer rainfall. This flash flood washed away the falsework which had supported the overhead superstructure while maintaining the cementing concrete form. This falsework had been supporting the dead load of the bridge (the permanent weight of the bridge itself) so that the concrete could dry and effectively support the weight. With the falsework being swept away before the concrete was thought to be completely hardened, the construction engineers could not be certain the bridge would be safe for the live loads of public traffic.
The Solution

This is where MnROAD researchers were able to contribute to help fully ensure this bridge was safe to travel on. Len Palek, a MnROAD site researcher, was available to help test the concrete reinforcements of bridge #50590. Linear Variable Differential Transducer (LVDT) sensors were installed to test the deflection of the concrete during controlled live load testing. The LVDT measures the deflection of concrete as a weight passes over it allowing the stresses and compression to be quantified into a statistical unit of value. This unit can be verified with previous research to ascertain the ability of the concrete to withstand live and dead loads safely. As the controlled live traffic drove over the bridge the LVDT sensors were able to measure these loads, the engineers were able to quantify these units and cross-check them with previous research and determine that bridge was indeed safe to travel on and did not have to be reconstructed.

This effective application of research helped to avert the expansion of time and cost that could have happened if the research techniques were not available to test the concrete. By having a balance between research and real-time construction the state of Minnesota has allowed itself to be prepared to solve situational crisis that can occur at any moment.

For more information:

Len Palek
Office of Materials & Road Research
Phone: 651-366-5502
E-mail: leonard.e.palek@state.mn.us

www.mndot.gov/mnroad