



Case Study: Cold Weather Paving Project Interstate 30; Little Rock, Arkansas



DUIT CONSTRUCTION CO., INC.
CONCRETE PAVING

Cold weather threatened to set an Interstate Highway paving job back between six to eight weeks at the outset of the project. Using the IntelliRock™ system, the paving contractor was able to monitor the in-situ temperature of the pavement in real-time, providing the owner with necessary quality assurance data to allow the contractor to proceed as scheduled.

Project Background

When Duit Construction Company won the bid to pave a section of Interstate 30 southwest of Little Rock, Arkansas; it ran into a weather problem almost from the start.

The first step in this job involved pouring a temporary concrete pavement in order to divert traffic from the lanes of the Interstate highway for construction of new, permanent pavement. Unseasonably cold weather during the winter of 2002-2003 threatened to delay the pouring of temporary pavement from between six to eight weeks. Also, Duit would face the very real possibility of paying a penalty for late completion at the end of the project unless innovative methods were utilized.

Temperature Profiling System Introduced

The Arkansas Highway & Transportation Department (AHTD) specifications for paving in cold weather do not allow for concrete paving to occur when the ambient temperature is 40° F (4.4° C) and falling. Furthermore, paving cannot begin again until ambient temperature is 35° F (1.7° C) and rising.

John Privat, Quality Control Engineer for Duit, began to investigate what other states were doing with respect to cold weather concrete paving. He looked very closely at the specification developed by the Colorado Department of Transportation to address this concern. The result of this research revealed that the primary consideration when paving in cold weather is to protect the slab from freezing during the first 72 hours by monitoring the temperature of the slab and using the appropriate thermal protection.

Privat approached the resident engineer of PBS&J, the consultant on the project, and proposed a change: If Duit could monitor and document that the pavement temperature did not freeze during the initial 72 hours after placement, could Duit continue placing temporary pavement during cold weather? The resident engineer agreed to the change, with

the stipulation that Duit would be responsible for performing a petrographic analysis of any slab whose monitored temperature fell below freezing during the initial 72-hour period, and removed and replaced damaged slabs.



Duit crew places temporary pavement for the I-30 job.

Temperature Profiling with IntelliRock

To prove that it could safely place concrete during cooler weather, Duit required an in-situ monitoring system that logs and documents temperature data that is unalterable and un-interruptible. Privat chose the IntelliRock system, which uses an embedded sensor to measure, log and document temperature in real time with no permanently affixed external devices.

The sensor (or "logger") is placed into the concrete structure at the time of placement and activated using a handheld reader. The reader is then disconnected, leaving only 18-gauge lead wires extending from the concrete. Whenever a temperature measurement is desired, the handheld reader is simply connected to the leads and the current temperature is displayed. In addition, a history of temperature values, and the time-stamped minimum and maximum temperatures are displayed and full documentation is downloadable to a personal computer in a secure, unalterable format.

Cold Weather Paving Proceeds

Duit began using the IntelliRock system to continue paving when specifications would normally require a halt to operations. As a slab was being poured, the Project Engineer chose three locations in the slab where an IntelliRock logger was embedded - one near the top of the pavement, one in the middle of the pavement thickness, and one near the bottom of the pavement. These sensors/loggers were monitored to help determine how much thermal protection to apply to the slab and to provide documentation on the temperature of the slab during the initial 72-hour window.



Placing temporary concrete pavement for I-30 project.

The IntelliRock data from Duit's experience documented that the entire pavement stayed close to 40° F (4.4° C) – none of the slabs froze.

Had Duit not been able to use IntelliRock for temperature profiling on this project, delays of six to eight weeks would have resulted. "More than half the days we actually paved using the IntelliRock system to monitor slab temperatures, would have been non-permitted placement days," states Privat. "Right now, the project is very tight, so the ability to pave in cold weather was critical to keeping Duit on schedule."

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