



Case Study: City of Wichita, Kansas



Using IntelliRock, Pavers, Inc. learned that it was obtaining strength for concrete it placed faster than destructive testing methods indicated. As a result, it was able to open pavement sooner for businesses and residents, and recover time lost due to weather delays.

Project Background

Over the past three years, Pavers Inc. Project Manager, Neal Saskowski, had read about how contractors in other states were utilizing the maturity method to estimate the strength of concrete placements. "I was intrigued with how quickly they were achieving concrete strengths, in two or three days." In March 2002, Saskowski attended the Kansas/Missouri ACPA annual conference and encountered IntelliRock, a system using proprietary sensors to measure concrete strength in real-time by utilizing the maturity method, based on ACI and ASTM standards. At the time, Pavers Inc. had already begun an urban paving job for the City of Wichita. With Saskowski at the conference were two of the city's engineers. Together, they reviewed the IntelliRock system and made the decision to try it on this project, reconstructing a section of Seneca Street that is a main thoroughfare through the city. The Seneca Street project required reconstructing 3,300 feet of a busy thoroughfare with a traffic count of 15,000 cars per day. The existing pavement was a combination of decades-old concrete, brick and asphalt paving that Pavers Inc. would replace with eight inches of concrete pavement. This section of Seneca street is a venue for a variety of businesses – fast-food restaurants, convenience stores, attorney and dentist's offices, auto-repair shops – as well as a middle school and residences.



Expectations for IntelliRock

Saskowski's objective for using IntelliRock was to know more quickly when concrete placements achieved strength, in less time than destructive testing methods indicated. "When doing jobs, you have businesses and residents to consider. You can't let traffic on concrete until you know its strength. Traditionally, we cast and break cylinders to determine concrete's strength, but this method doesn't let you take a strength reading at anytime. Since we don't own a lab, the ability to use IntelliRock and obtain a strength reading anytime, on the spot, was a great convenience."

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Project Data

The City of Wichita's specification is 550-PSI flexural strength within seven days before pavement is reopened. The project used the Kansas Department of Transportation (KDOT) Optimized Mix, a fairly standard mix consisting of: 580 lbs. of cement per cubic yard, 60% coarse MA2 sand and 40% rock with a mid-range water reducer. The mix did not contain any fly ash. The water: cement ratio for the mix varied between .43 and .45, the slump was between 1.25 and 2 inches, and the air content was 5.5 to 6.5%. Overall, the project required 8,000 cubic yards of concrete.

The City of Wichita has its own testing lab, so Saskowski involved the lab's testing personnel to develop a maturity calibration curve for use with the IntelliRock system. In compliance with ASTM C 1074, the city made 12 cylinder specimens, two were tested at Day 1, two at Day 3, two at Day 7,

two at Day 14 and two at Day 28. In addition, two maturity curves were developed for the project, one for a hot water mix for use in colder weather, and another for a standard mix for use in warmer weather. The specifications for both mixes were the same, but the mix (using 160-°F water) was used when air temperatures were below 35 °F, to get the minimum concrete temperature up to 50 °F. During the course of placing concrete, the ambient temperatures ranged from 25 °F to 110 °F. Blankets were used to protect the placements in cooler weather.

intelliRock Results

At the project's next concrete placement, intelliRock sensors were placed at a depth of 4 inches. The data provided by intelliRock revealed that strength was being achieved within two or three days, even in cooler weather. Data from cylinder breaks confirmed the strength indicated by intelliRock.

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Using the intelliRock sensors, Pavers Inc. was able to open one section of pavement (a driveway to a convenience store) 30 hours after concrete placement. Many other sections were opened in the 36-40 hour range based on concrete maturity readings provided by the intelliRock system. "Prior to using intelliRock, we would have expected to open pavement in approximately four to seven days, because KDOT begins testing at four days, and the City of Wichita standards call for testing in seven days," adds Saskowski.

On June 1, 2002, there were 45 days remaining to finish the project, which was about 60% completed. The owner of a car wash, whose business was directly affected by the repaving project, told Pavers Inc. representatives that he did not expect them to finish the project by the July 15th deadline. "I bet him that if we completed the project within plus or minus five days of July 15th that he would have to thank us by putting a sign on his marquee. We did complete the project, and the business owner kept his word by putting up a sign publicly thanking us. The intelliRock system helped by allowing us to complete our work more quickly."

Pavers Inc. used the intelliRock system throughout the job, and has made it a standard part of subsequent paving projects. After completion of the Wichita project, the intelliRock system was employed on two paving projects in Manhattan, Kansas, a different part of the state, with different concrete materials and a slightly modified concrete mix – but with the same strength gain results. "Utilizing this method saved us time on all of our projects in 2003, and allowed us to complete those projects within the times anticipated by the owners, despite losing working days to the weather," Saskowski concluded. "Before we began using intelliRock to test concrete strength, we had to cast extra cylinders so we could test them more frequently. With intelliRock, we don't have to do this. We still do traditional cylinder testing, but intelliRock lets us measure strength anytime we want to. It's quick, easy and accurate."

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Randy Roths, the City of Wichita's Senior Lab Technician, commented on his experience with intelliRock: "It is easy to calibrate and easy to use. Not only is it easy to use, it is the most accurate way to determine 'in-place – real-time' concrete strength. I feel that Nomadics maturity meter [intelliRock] is one of the most important and useful tools to hit the testing industry in 25 years!"

ⁱ ACI, Non-destructive- Committee 228, par. 2.6 & ACI, Cold Weather- Committee 306, par 6.4

ⁱⁱ ATSM C1074-98 Standard Practice for Estimating Concrete Strength by the Maturity Method