



Case Study: Washington Metropolitan Area Transit Authority; Washington D.C.



intelliRock™ has been an effective, and economical alternative to purchasing additional traveling forms. Furthermore, it provides the concrete maturity data and QC/QA information needed to keep the project moving on schedule, even during the cold weather months.

Project Background

Lane Construction Corporation, Granite Construction and Slattery Skanska, known as LGS, constructed a \$217 million major mass transportation project in suburban Washington, D.C. for the Washington Metropolitan Area Transit Authority (WMATA).

This contract involved 3.1 miles of concrete cut-and-cover double box units with a concrete wall separating the inbound and outbound track. Several multi-span aerial structures on concrete piers were constructed along with retained cut reinforced concrete walls. Extensive mechanical and electrical systems including tunnel ventilation systems as well as track electrification were also included in the design-build contract. All track work and automated control systems including train protection, train operation, and automatic train supervision will provide WMATA with a complete system ready for use by winter of 2004.

Maturity Method is Project Accelerator

For the WMATA project, construction of the double-box concrete tunnel was in the critical path. In order to meet the aggressive construction schedule, LGS utilized the concrete maturity method to determine how soon it was safe to strip forms. The intelliRock system uses the Nurse-Saul maturity method to estimate concrete strength within the placement itself, as opposed to a companion test specimen. This is a critical difference, since the placed concrete and companion test specimens typically gain strength at different rates.

LGS Selects Maturity Measurement Device

The intelliRock system uses an embedded sensor that contains a microprocessor, a precision temperature sensor and battery to measure temperature and calculate concrete maturity 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 then activated

using a handheld reader. The reader is then disconnected, leaving only 18-gauge lead wires extending from the concrete. Whenever a strength measurement is desired, the handheld reader is easily connected to the leads and the current maturity and associated temperature are displayed. In addition, a seven-day history of temperature and maturity values, and the time-stamped minimum and maximum temperatures are displayed and then full documentation is downloadable to a personal computer in a secure, unalterable format.

Maturity & intelliRock Create Immediate Savings

For this project, construction crews placed concrete on one day, and then striped forms the following day based on maturity data provided by the intelliRock system. This allowed the project to progress without increasing the number of traveling form units estimated at bid time.

intelliRock Benefits

"The intelliRock system has been easy to use and allows us to pour and strip forms like clockwork. It is very straightforward – either you have maturity and strength or you don't, and the system tells you this," says Bob Bolduc, P.E., QA/QC Manager for Lane Construction Corporation. Another significant advantage of the intelliRock system is the result of its design: All the intelligence of the system is contained in the sensor, which is protected by the concrete in which it is embedded. This approach ensures that the data for documenting strength and critical construction activities in unalterable, and uninterrupted.

intelliRock allowed LGS to continue working through the harsh winter of 2002, extending the construction calendar and allowing the project to stay on the aggressive schedule throughout the winter. The winter of 2002 was one of the harshest on record in the DC area.

The intelliRock system provided the project team with data that simplified the determination of how much protection and heat the placement required to keep construction on pace.

In warmer weather, companion test cylinders often do not gain strength as rapidly, since placed concrete generates more internal heat than companion test cylinders.

For this reason, relying on traditional cylinder testing during cold weather can provide unreliable data from which to make construction decisions, leading to premature forms removal and safety issues. According to Bolduc, “Loggers documented and defined all the parameters and variables, so we have the confidence and documentation to strip in cold weather and keep work moving.” In addition to the time saved, the intelliRock system eliminated the expense of purchasing additional specialty traveling forms systems.

Mr. Ed Shepperson, WMATA Construction Project Engineer, states “having the strength data taken directly from the structure being placed assured WMATA’s Management and QA staff that the Design-Builder’s early stripping procedure was safe and ultimately resulted in enhanced concrete quality and production.”

The irony of using maturity in the DC area is this: cold weather concreting accidents in this area during the 1970s led to ASTM approval of maturity for early concrete strength estimation

