intelliRock Case Study

I-10 Hurricane Damage Reconstruction

Hurricane Katrina slammed into the Mississippi and Louisiana Gulf Coast on Monday, August 29, 2005 resulting in numerous bridges being damaged or destroyed. The I-10 east bound bridge over the Pascagoula River and adjacent marsh was badly damaged by two runaway barges.

The barges destroyed six of the bridge spans rendering the eastbound bridge impassable. Mississippi DOT reacted in a timely fashion and on Wednesday, September 7 they received four bids from various contractors. The project was awarded to TL Wallace of Columbia, MS for a 31-day contract to repair the bridge with a bid of $5.4 million. The contract called for $100,000 per day in potential damages. The same metric was used as the basis for determining the early completion incentive.

Getting Started

On Thursday, September 8, Mr. Mike Walpert and Mr. Clay Broom, TL Wallace's project managers along with Mr. Mike Ellis, the superintendent, arrived on site. The contract time clock began on Saturday, September 10 at 12:00 p.m. The demolition and removal work on beams, deck, barrier rails, piles and pile caps began immediately.

This project was somewhat unique in that Wallace chose not to move construction trailers to the site. Thus there were no hard-wired communication lines, e.g. faxes, etc. Wallace worked directly off the remaining bridge deck relying on portable generators, pickups as offices and cell phones for communications. All work was scheduled on a continuous 24-hour rotation.

Subsequent to the contract being awarded, Engius VP Richard Sallee contacted MDOT and the contractor regarding the possibility of utilizing the intelliRock system to help optimize work-flow. MDOT had allowed this technology to be used in other parts of the state on paving projects; however they had not utilized the technology for bridges. Mr. Mike O'Brien, P.E. with MDOT, had been contemplating the application of maturity on bridges for some time. This same technology had been utilized by numerous other state DOTs for bridge construction work. The most notable were the I-40 OK DOT bridge at Webbers Falls in the summer of 2002 and the I-20 bridge west of Pecos, TX in 2003.

Concrete Maturity was first described in Europe in 1949 and it became an ASTM method in 1987 [ASTM C 1074]. The maturity method is a non-destructive, in-situ method that measures the extent of hydration, and subsequently the strength,

of concrete by analyzing the time and temperature profile of the concrete.

Wallace contracted with Gulf Concrete, a Division of MMC Materials, Inc. to provide the concrete. Mr. Bobby Dowdy, regional QA manager for Gulf Concrete, had previously utilized the intelliRock system on commercial projects in the Mobile, AL area and therefore was familiar with the multifaceted benefits the system provided (e.g. critical path management, quality control and quality assurance enhancements).

Construction time was a critical factor on this project, and due to the chlorides associated with the salt water environment concrete durability was a serious concern as well. Therefore it was imperative that in-situ strength be determined accurately and immediately to allow for timely stripping of forms. It was also important that the concrete be protected from moisture loss for proper cure to ensure durability. Wallace and Gabe Faggard, P.E., the on-site project engineer for MDOT, were in agreement that concrete stripping strength would be determined by utilizing the maturity method. When the in-place strength was attained, the forms would be stripped and curing compound would be applied immediately to allow the concrete to continue to cure.

The mix design specified by the contractor and developed by Gulf Concrete called for a minimum strength of 2500 PSI in twelve hours. On Monday, September 19, Mr. Dowdy and Mr. Sallee began the process of developing a corresponding calibration curve for this mix design in Gulf Concrete's Pascagoula concrete laboratory. This calibration curve correlated the strength (in PSI) and corresponding maturity (˚C-H) for a particular mix. The calibration indicated that forms could be removed when intelliRock indicated a maturity of 206˚C-H (2000 PSI) and 2500 PSI would be reached when intelliRock indicated a maturity of 231˚C-H.

Construction

The first concrete, Pier cap #81, was poured on Tuesday, September 20 late in the afternoon. Mr. Broom first checked the intelliRock in-situ sensor at 9 hours and it read 318˚CH which corresponded to a strength of 3100 PSI. "Because of the mass associated with the pile caps the placed concrete was developing strength faster than anticipated" says Broom.

On Wednesday, September 21 two pier caps, #79 and #80, were poured. On Thursday #77 was poured, and late night Friday, September 23 pier cap #78 was poured. On average the caps were reaching the 2500 PSI strength in 7 to 8 hours. On Thursday, September 29 the entire 6 span bridge deck pour was accomplished. Guardrails followed on Friday.

Opening

Under the supervision of MDOT, Wallace opened the I-10 east span to full traffic on Saturday, October 1 at 2:00 p.m. TL Wallace had completed a challenging project ten days earlier than the allotted contract time and thus **earned $1 million in incentive bonus remuneration.**

Mr. Ellis says, "many hard working Wallace team members contributed to this high-profile and demanding work and the associated work schedule. It took everyone from the laborer to the home office folks to pull this off, but especially the on-site, round-the-clock crew".

Wallace, a respected regional bridge contractor established in 1975, had not previously undertaken a project of this nature. It therefore it presented a real opportunity for the 30 year old Columbia, MS bridge contractor. It was also their first experience utilizing the intelliRock concrete maturity system. "Wallace was very pleased with the results and the contribution intelliRock provided in the construction of the I-10 east span bridge, and we will definitely use this award winning* technology on future jobs. It changes one's perspective on the ability to schedule and process the work flow," Mr. Broom says. "This is certainly a milestone in the history of TL Wallace Construction," says Mr. Ellis. "However, it is the traveling public and the residents of Mississippi Gulf Coast who are the real beneficiaries of this timely work".

Project Timeline Summary

August 29th:	Hurricane Katrina
September 7th:	Bids Received
September 8th:	Contractor Arrived On-Site
September 10th:	31 Day Clock Started
September 19th:	intelliRock Calibration
September 20th:	Concrete Pours Start
September 29th:	Deck Complete
October 1st:	**Bridge Open (10 days early)**

*In 2004 intelliRock was the recipient of the NOVA award, for innovation in construction.