Software update:

Virginia DOT uses SCADA for tunnel traffic control

A commercial Supervisory Control and Data Acquisition package solved traffic control problems in Virginia.

The Virginia Department of Transportation has recently implemented a computer system upgrade for less than half of the originally anticipated cost. How? By using commercially available hardware and software and working in partnership with its vendor, the traffic control group from MODCOMP, Inc. The project was completed on time, and for the original bid cost of $850,000 with no additional charges.

"This was like an entirely new way of doing business," explains Alton Yates, computer systems engineer at VDOT's Hampton Roads bridge tunnel complex. "A lot of people in the Richmond VDOT headquarters are very interested in the outcome of this project, because we were in partnership with the contractor and everything went so smoothly."

System upgrade

The project was an upgrade of the Hampton Roads traffic control computer system. On a typical summer's day, more than 100,000 vehicles pass through the Hampton Roads bridge/tunnel project connecting Norfolk and Hampton, Virginia. That's about 25% above its designed capacity.

"Traffic engineering tells us that people are traveling at a much higher speed, and much closer together, than they should be for safety. When you have traffic as dense as this, any one incident will precipitate other incidents," says Morris Pearson, with VDOT's Hampton Roads installation. "We need to make sure there's enough signage and warnings to keep traffic flowing even when there are problems."

One of the two existing tunnels was first opened in the late '50s, and the second was added in the early '70s, and upgraded in the '80s. Then a few years ago,

Yates and Pearson, shown above, began planning for another upgrade when it became clear the old systems were becoming too expensive to maintain. Traffic control projects are notoriously hard to manage, and Alton says that less than 20% are completed successfully. The Hampton Roads project sets a new standard.

SCADA use the key

The secrets to this project's success are: using commercial SCADA (Supervisory Control and Data Acquisition) software rather than a proprietary system; and working with the software contractor as a partner.

For most large government contracts, an agency issues a Request for Quotation that specifies what the system should do, and how. The RFQ mandates a certain engineering approach. Later, after the contract is awarded and a contractor begins work, changing the specifications raises costs unnecessarily.

VDOT took a different approach. Its Request for Proposal specified using a commercial, off-the-shelf SCADA package as the basic software solution, but left the rest of the engineering decisions to the contractor. "That puts the onus of engineering the system on the contractor," Pearson notes.

The traffic control team at MODCOMP used Itellution's FIX and Paradym-31 software products for the basic solution. Both are widely used in industrial SCADA installations.

Why SCADA?

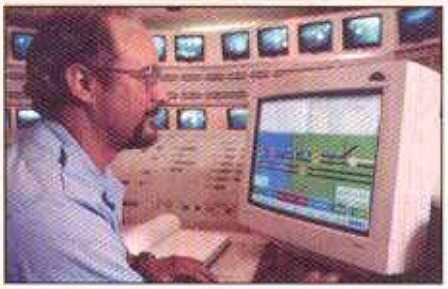
"Because SCADA has all the intelligence and built-in communications ability required for traffic control," says Frank Roark, principal project engineer from MODCOMP. It also offers plug-and-play compatibility with existing field equipment. Use of proven, commercially available software lowers the initial cost of implementing the system, and the ongoing cost of maintaining it.

In addition, using commercial software reduces the risk of hav-

ing a system no one will maintain. "The worst thing that can happen is to have orphan software — that is, software nobody else is using or maintaining," Roark says. "The SCADA software being used here is essentially orphan-proof because it has an installed base of 80,000 licenses."

Hardware in the Hampton Roads project is also commonly available. The system uses a bank of five Compaq Pentium-based PCs to monitor and control traffic lights, sign plans, overheight detectors (to prevent oversized trucks from entering the tunnel), and other functions. Two SQL servers maintain the database required for ongoing operations.

Operators sit at one of two Gateway PCs that are linked to the other systems over a 100-Mb Ethernet network. The PC's Windows-type interface has a detailed diagram showing the entire bridge/tunnel project, from one end to the other. It replaces a map board that stretches from one end of the control room to the other and a massive push-button control panel with close to 400 push buttons.



New operators need two weeks of training to be up and running on the SCADA system.

"It takes two weeks to train new operators on this system," notes Pearson. "It took six to eight weeks to become proficient on te old system."

The system has eliminated typing and some opportunities for error. High-level commands are password-protected, so that only supervisory personnel can implement them.

VDOT's Yates and Pearson say the Hampton Roads computer upgrade may well become a model for similar projects elsewhere. Already VDOT is in discussions to apply a similar solution in other tunnel projects.

Roark predicts that SCADA will become the solution of choice as municipalities across the nation prepare to spend billions on Intelligent Transportation Systems under TEA-21.

"SCADA has all the communication and interconnectivity required for traffic control built into it," he says. "It incorporates concepts like redundant systems, alarms, warnings, and responses, so adapting it to traffic control makes perfect sense. It's a natural fit." ❐