

An aerial view of the southern end of Highway 52's main line where Highway 63 crosses it. High-performance concrete, with a 60-year life span, was used on the main line of the project to reduce long-term maintenance costs.



MINNESOTA Slicing Eight Years Off Major Highway Construction

SAFETY GOALS AND CREATIVE CONTRACTING FUEL MINNESOTA'S AGGRESSIVE SCHEDULE

Get in, get out and build to last – these were the underlying instructions by the Minnesota Department of Transportation (Mn/DOT) when it issued a call for proposals four years ago to reconstruct US Highway 52 in Rochester, Minnesota. They're also elements of the Federal Highway Administration's (FHWA) Highways for LIFE paradigm for building safer, better highways with faster, more cost-effective delivery.

US Highway 52 is a four-lane congested highway that is being widened from four to six lanes in the path of 24 bridges and 11 interchanges. This 11-mile (90 lane miles) project also includes reconstruction of a confusing network of frontage roads. Many departments of transportation would assume that such a project would take over a decade to construct, and that is what Mn/DOT thought too. But this complex road project that began in the spring of 2003 will be finished by the end of 2005 – in less than three years – and more than eight years earlier than Mn/DOT's original estimated timeframe, which used a conventional contract.

When completed, the road will have a 60-year life cycle, 25 years more than most roads built in Minnesota. And all of this has been accomplished under a carefully orchestrated traffic management plan that has kept traffic moving to the community's satisfaction.

US Highway 52 traverses the heart of growing Rochester, situated in southeastern Minnesota's Zumbro River Valley. The project has been nicknamed ROC 52 for Rochester, Olmsted County. It is also the major route between Rochester and the Twin Cities. The highway carries more traffic than any other roadway in Rochester and is a lifeline to the regional economy, including IBM and the world-renowned Mayo Clinic, employer of 11,000 people. Daily traffic volumes in the Highway 52 corridor currently exceed 54,000 and will double by 2029.

Thousands of motorists have navigated the congested four-lane road each day over old pavement and bridges, getting off and on a complex of frontage roads that lead to over 400 businesses. As a result, the road had become a safety hazard and was identified in Minnesota's Toward Zero Deaths program due to the number of accidents.

So how has Mn/DOT sliced the construction schedule to less than three years? And what can other departments of transportation around the country learn from the Minnesota example?

Let the Contractor Be Creative

A traditional contracting method simply would not have worked for this project considering the fact that speedy delivery was a top priority. Accelerating delivery on this complex road system would require very creative thinking.

Mn/DOT chose a design build strategy and spiced up the procurement by giving proposing firms the freedom to determine how the job could be done quicker and better using the basic alignment. In the contracting world this approach is called "best value." Mn/DOT's RFP specified that the project had to be completed within five years. Although the design build concept is not new, it was somewhat new to Mn/DOT. The department has used it on smaller projects but never on anything as large or as complex as Highway 52.

To begin the process, Mn/DOT issued a Request for Qualifications. Four firms responded and all four made the short list. The firms then were asked to submit to the department in draft proposals "confidential" creative concepts or Alternative Technical Concepts (ATCs) as referenced in the RFP. The RFP also specified a construction schedule with a maximum of five years.

"Throughout the process, we received over 100 concepts from the four participating firms," said Mn/DOT's Project Manager Terry Ward, "and we approved or conditionally approved about 50% of them."

Before the firms submitted their final ATCs, Mn/DOT met with each one to discuss the feasibility of their concepts. Some were accepted and others were not. The bidding firms could choose the ones Mn/DOT had approved to submit in their final proposals. Those final proposals included pricing on the base technical proposal and a separate price on the ATCs. "We wanted to know the value the different concepts added to the project," said Ward.

In the end, Zumbro River Constructors (ZRC) brought the best proposal to the table with a \$236 million price tag and a four-year construction schedule. But the company's eight innovative design concepts, or ATCs, lopped a further four million dollars off the top, producing a final bid of \$232 million. Even though value dictated which firm received the award, in the end, ZRC brought value along with the lowest price tag compared to the other bidders.

“If I had to identify the major innovation for this project,” said Herb Morgan, project manager for ZRC, “no doubt it would be Mn/DOT’s use of the design build, best value approach.”

Morgan explained that the project simply could not have been done in the short time frame unless the contractor had the flexibility to innovate in design and construction.

Cutting construction time saved money—and lots of it. Mn/DOT calculated that the compressed schedule saved more than \$30 million over the life of the contract by avoiding costs related to inflation. Millions also will be saved in right of way acquisition several years into the future. One large contract, instead of several small ones, maximizes construction efficiency and purchasing power. And perhaps most importantly, it lessens the impact on local businesses and commuters – Mn/DOT’s customers.

According to Mn/DOT, the calculated long-term cost/benefit ratio for the project is 1.58. This means for every dollar invested a \$1.58 return in benefits is realized due to reduced travel times, fewer crashes, savings in vehicle operating costs, and lower maintenance costs.

Strictly Business

As it turned out, the public and the business community were catalysts behind selecting the design build, best value approach.

According to Charleen Zimmer, spokesperson for the project, an economic study cited definite monetary benefits to the community if the project could be built faster. “We have over 400 businesses on the Highway 52 frontage roads,” said Zimmer, “so the negative impact on the business community could have been significant.”

The local business community wanted Mn/DOT to get the job done and get out, and it was willing to work with the department to do whatever was needed to push toward the goals.

Make the Public Part of Your Team

On a project like this, traffic management plans must be as fine-tuned as a world-class orchestra. Ramps leading off and on an extensive frontage road system into a dense business community can be tricky and closures can be controversial. This was an area addressed early in the planning process.

Before the project RFP was issued, Zimmer said Mn/DOT consulted with the city and county in every aspect of how traffic would move through the area, which ramps would be closed, and for how long. Zimmer said city and county officials became part of the project team and influenced how the RFP addressed traffic management. The RFP contained very specific language concerning ramp closures. When the design build team was selected, a Traffic Management Task Force formed to expand the local government group

to include representatives of the business and health care community and emergency responders. This group was consulted when modifications had to be made to ramp closures and other traffic management activities.

Critical to a successful design build project is teamwork. Clearly, the public was very much part of the project team, noted Morgan. “In fact, in my 30 years of building projects throughout the country, I’ve never seen a community as engaged in a project as Rochester.”

Building a Road to Last a Lifetime

Because Highway 52 is a critical corridor, Mn/NDOT wanted to build a highway that would require low maintenance and last through a generation of drivers. Increasing the pavement’s life span was a Mn/DOT requirement. The agency’s pavement specifications typically are designed for a 35-year life cycle. ZRC focused on a 60-year life cycle, an RFP requirement. Instead of asphalt, they specified a high performance concrete, higher quality dowel bars and longer estimation of traffic loading.

Building low-maintenance bridges was another major initiative. In ZRC’s experience, steel-girder bridges were more expensive to build and maintain. As an alternative, prestressed concrete was used on all the bridge beams with the exception of two bridges. This would eliminate the need for painting, which would promise another maintenance disruption to traffic down the road. Steel also increased dramatically in cost during the project so using prestressed concrete, rather than steel, saved money as well as time.

Cutting the Construction Schedule

How is ZRC completing the job in less than the four years put forward in its final proposal? The answer provides one reason the project has been singled out for best-practice sharing by the FHWA Highways for LIFE program.

One of the most innovative measures employed in order to slice up to a year off the project was the use of Mechanically Stabilized Earth (MSE) retaining walls instead of conventional cast-in-place walls. “MSE walls are used in other parts of the country but Minnesota had avoided them because salt-treated roads during harsh winters were not conducive to using this type of building material,” explained Morgan. “But the building materials have become much more corrosion-resistant, and these walls now can last up to 100 years.”

Another timesaving measure involved highway alignment. The project would have required grade changes up to 25 feet to accommodate widening of the road, ramp and frontage



ZRC focused on a 60-year pavement life cycle, using high-performance concrete to reduce long-term maintenance costs.

LESSONS LEARNED

- Ensure key staff have no other project commitments.
- Ensure key technical experts outside the key group know that the design build project takes precedence over other projects.
- Assign senior and trusted staff to the core project team to make on-the-spot decisions and commit resources to the project.
- Ensure that a public relations professional is dedicated to the project.
- Secure municipal consent before the Request for Qualifications is distributed.
- Define department and design builder risk. If not defined early, bidders will ask questions during the proposal stage.
- Craft a well thought-out traffic management plan that includes input from those surrounding the project.
- Establish a strong relationship with local governments and regulatory agencies.
- Carefully review every aspect of the RFP and ensure clear, concise language is used in the assignment of responsibilities between the contractor and the DOT.

road construction, and grade separation at the bridge abutments. ZRC's proposal made a slight horizontal alignment shift that eliminated a temporary bypass and two temporary bridges. This single change resulted in time and money savings.

Acquisition of right of way often can cause project delays, but Mn/DOT found a way to reduce potential problems with the help of a Federal Highway Administration pilot program.

“For a \$100 payment, the landowners could grant Mn/DOT, ZRC and the utility company's authorization to use their property for construction purposes prior to the right of way process being finalized,” said Ward. “We obtained over 90 rights of entry permits on the project, significantly mitigating delay issues.”

Scheduling utility work can be another issue that causes project delays. Mn/DOT had a utility company bid two schedules for their relocation work, one “traditional” and one accelerated. Bids were accepted on the accelerated work at a higher cost but at a savings of one month's time in relocating utilities.

Let the Public Be Your Cheerleader

Reflecting back over the three years since the project began, Ward said the public was supportive from the beginning. He credits good public relations prior to and during the project as key.

“Prior to an RFP ever being issued, the project team educated local government officials and regulatory agencies on the design build concept,” said Ward. “And countless presentations were made to civic associations and community groups. We told everyone what to expect from the beginning. They knew what was coming.”

The day the project began though, the public got a surprise—and so did Ward.

The contractor swooped in and began its work with a vengeance. As Ward described it, activity launched from one end of the corridor to the other with hundreds of trucks moving in all directions.

“I've been in construction for 18 years, and I've never seen anything like the exerted effort this contractor made,” said Ward. “The public saw work going on immediately and they were impressed too. In fact, there was so much going on that the project's oversight team had a difficult time keeping up.”

Ward said the public's perception is that highway construction moves at a snail's pace. They were not expecting Mn/DOT and the contractor to “attack” a project in this way.

A True Partnership

Ward is most proud of the relationship between the contractor and Mn/DOT and how they have worked together to resolve issues at the project level. “We have had some major issues with right of way and utilities and still we’re bringing this project ahead of the schedule with minimal cost growth,” he noted. “I think that says something about this team!”

Ward credits the outcomes to good partnering, a can-do attitude, and having the contractor and Mn/DOT project teams located under one roof.

Is there anything that could have been done differently to make this project even more successful? Ward said that if he had to select one additional aspect it would be a more careful review of the RFP before it went out. “I wish I had spent more time reviewing it to make sure clear, concise language was used in assignment of responsibilities between the contractor and Mn/DOT,” he said. “We were, however, on a very aggressive schedule and although we had a well-written RFP, a little more attention on the scope of work responsibilities may have helped.”

Media Celebrate Mn/DOT

Ward and others members of the teams have received many positive comments about the project from the public. Perhaps the one Ward finds most rewarding came from an editorial in the Post-Bulletin, the local newspaper. In the words of the editorial writer of “U.S. 52 project speeds along” on July 14, 2005:

“Remarkable” describes the news this week that work on U.S. 52 could be wrapped up a full year ahead of schedule. It is a testament to the labor of the men and women working on the project.

This fall, when a celebration of the project happens, this entire city needs to turn out and pay tribute to the people who made it happen.

Sweat-of-the-brow labor was once lauded. Today, the country, and this city as well, is more focused on the fantastic achievements of science and cutting-edge engineering.

Holding up groundbreaking achievements in science, medicine and engineering is important. It inspires all of us.

What can't be forgotten is the work that pours the concrete for our roads and their maintenance.

The labor that toughens hands and wears out backs and knees is the work that enables the country to function. This labor makes Rochester a better place.

Rochester owes these people a debt of gratitude.