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DESIGNER

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CORE Competencies

Procurement strategy leads to bigger, better, faster delivery of Utah's I-15

Positive train control on Boston's Green Line will serve as national safety model for light rail systems

HNTB assists Miami-Dade Expressway with full system conversion to all-electronic tolling

Boston completes first U.S. runway rehabilitation using warm-mix asphalt

CORE COMPETENCIES

As seen in HNTB DESIGNER Number 95 – 2011

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As the largest road project in state history, Utah's I-15 CORE reconstruction program could have fallen victim to change orders and missed deadlines. Instead, a unique procurement strategy, rigorous project controls and the right team have contributed to the project being completed two years ahead of schedule with double the number of freeway lane miles and three additional interchanges — all while staying under budget.

Sporting a price tag of $1.725 billion, the 24-mile reconstruction of Interstate 15, Utah's primary north-south corridor, is the largest road construction project in state history, the largest project under way in the western United States and one of the three largest projects in the country.

The state-funded I-15 Corridor Expansion Project, also known as I-15 CORE, is even more impressive when you consider that the project scope has grown, but the budget hasn't. The Utah Department of Transportation, along with program management consultant HNTB, was able to double the number of reconstructed miles, add three more interchanges and trim two years off the required schedule — all staying within the state-funded budget of $1.725 billion.

The I-15 CORE project will:

- Add a total of 24 miles in both directions.
- Extend the high occupancy toll (HOT) lane a total of five miles in both directions.
- Rebuild and reconfigure 10 freeway interchanges.
- Replace 59 aging bridges.

"The combination of construction being on sale because of the slow economy, along with the very proactive procurement strategy led by HNTB, resulted in the state getting a better, more extensive project than earlier estimates predicted," said Dal Hawks, UDOT project director.

HNTB brings more than 50 years of program management consulting experience and a comprehensive range of services to the project. Among its core competencies are a fixed-price/best-design procurement strategy and a rigorous set of project controls.

PROCUREMENT STRATEGY DELIVERS GREATEST VALUE

After UDOT tapped HNTB to provide program management consulting services, the state legislature cut the budget for the project. Instead of having $2.63 billion, the agency was now working with $1.725 billion. Knowing UDOT's goal was to deliver the highest value project possible to the public, HNTB recommended the agency change its procurement strategy from a standard, design-build approach to a federally accepted fixed-price/best-design procurement to help stretch state dollars and give taxpayers more for their money. Under this approach, the UDOT team established the design-build contract value at $1.1 billion and defined acceptable design parameters. Then they encouraged the three competing design-build proposers to be creative and innovative as they individually developed their proposals and defined specifically their scope, schedule and approach to how they would handle traffic during construction.

"Because we set the price, the design-build teams were able to really focus their creative energy on meeting the goals of the project that were most important to us," Hawks said.

The unique procurement strategy fostered fierce competition among design-build teams, who battled to deliver the greatest value for the price by proposing innovative concepts, economies of scale and optimized schedules. UDOT scored each proposal based on recommended improvements, traffic management during construction and schedule completion.

Provo River Constructors was chosen for the job. The team's winning proposal included:

- Using 40-year concrete pavement along the entire corridor.
- Adding approximately 12 miles of travel lanes in addition to the 12 required.
- Keeping the current number of traffic lanes open during the majority of construction.
- Delivering the project by December 2012, two years earlier than required.

"This is the first time UDOT has procured a project of this size using the fixed-price/best-design method," Hawks said. "It has allowed us to meet our goals at the highest level possible."

The project is expected to meet traffic demands through 2030.

Collaborative Delivery

HNTB's PMC services for the I-15 CORE project include:

- Procurement
- Risk analysis and Monte Carlo assessment
- Project controls/systems
- Baseline survey control
- Preliminary design
- Utility investigation
- Master utility agreements
- Right-of-way acquisition
- Third-party agreements
- Contract administration
- Design and construction oversight and auditing
- Project management
- Safety oversight
- Communication and public outreach
- Quality oversight
- Human resources
- Funding scenarios

A program management consultant touches every aspect of a large transportation program. HNTB uses project controls to deliver the greatest value and make sure budgets and schedules are on pace to complete each phase of the program within the client's expectations.

PROJECT CONTROLS ELEVATE PROJECT MANAGEMENT

To monitor all the moving parts of the immense project, HNTB instituted a set of project controls to proactively manage schedules, costs and documents.

"Project controls help us identify an issue and address it before it becomes a legitimate concern that negatively impacts the budget or schedule," said John Bourne, HNTB program manager.

QualityMatters!, a customized audit and quality-tracking tool designed by HNTB, was intended for immediate use on the I-15 CORE project but is applicable to other design-build or public-private partnership projects. QualityMatters! encompasses three distinct quality management systems:

1. Requirements management system (RMS) was used to develop the request for proposals and procurement documents. HNTB's goal was to clearly, concisely communicate contract requirements so they are enforceable, understandable and measurable.

"Engineers write requirements in terms that they understand, but contract language, such as *anticipate, expect, maximize* and *consider,* aren't measurable or enforceable," Bourne said. "The requirements management system helped us draft contract language that is clear to the people who would be conducting the oversight and clear to the people who are writing proposals for the project so that when they are building the work, there are fewer opportunities for disagreement."

HNTB also insisted on a consistent structure for the requests for proposals. So, the firm created a requirements breakdown structure — or list of requirements by functional groups, organized consistently in the RFP. In addition, each of the RFP's 19 technical sections was organized the same way, starting with general information, then standards and requirements. Armed with a user-friendly RFP, design-build teams better understood the contract requirements and, for that reason, did not add unnecessary dollars to cover risks.

"Plus, once you administer the contract, with its many thousands of requirements, the owner and the design-builder want to be able to consistently confirm that requirements are being met," Bourne said. "This RFP structure makes that task easier and helps eliminate conflicting requirements in different RFP sections."

2. Verification management system (VMS) allows the owner to audit the design-builder against the contract requirements and commitments made in their proposal that exceed RFP requirements. The VMS combines the RFP requirements and the proposal commitments into a searchable database from which audit checklists can be developed by the owner's team to confirm contract requirements have been met.

The VMS is an internet-based, customized SharePoint application that allows the owner and contractor to interact entirely online as audits are conducted. Audits are initiated by CORE construction oversight staff and assigned to their Provo River Constructors counterparts. Audits cover both the contractor's established processes (such as their quality management plan) and products (such as final design drawings or constructed work). Email alerts with embedded links to audit forms notify both parties when action or approval is required at each step of the resolution process. All non-conformances identified in an audit must be addressed and resolved to the satisfaction of the owner before subsequent work can be completed or payment is made. (*continued*)

CORE FACTS

What does it take to build one of the nation's largest road reconstruction projects?

9,000 orange barrels

2 million cubic yards of roadway excavation

7.5 million tons of aggregate/granular material

3.75 million square yards of asphalt paving

96 million pounds of structural and reinforcing steel

Nearly **1,000** men and women directly employed on the project with an anticipated **2,000** or more directly employed at the height of the construction

More than **520,000** employee hours on the project since the start of construction

"You can do the best job in the world translating expectations into requirements and making those requirements clear, understandable and verifiable — but if there are no consequences for noncompliance, it's all for naught," Bourne said. "In some cases, those consequences are nonpayment or liquidated damages."

"QualityMatters! gives us a targeted auditing approach that ties directly back to the contract requirements and proposal commitments," Hawks said. "So, we can have confidence that the design-builder is meeting all of those requirements."

In addition, an "opportunity for improvement" (OFI) comment may be identified by an auditor that, if incorporated, may potentially improve a process or system. While only a suggestion, all OFI comments must be addressed by the design-builder. "Ninety-five percent of the OFI comments we make are accepted by the design-builder because we involved auditing early in the design process," Bourne said. "If they disagree with a suggestion, then we need to determine if it's something we believe is best for the project and want to push for."

3. Acceptance management system (AMS) facilitates efficient project closeout by identifying and confirming that work has been performed and accepted as it is completed rather than waiting until the end of the project.

The AMS is essentially a giant automated checklist that combines audit findings from VMS, results of the contractor's quality assurance testing and items from a Sharepoint-based project punch list to track each geographic work zone's readiness for opening and acceptance. Once all requirements have been met, all submittals have been recorded, all non-conformances have been resolved and all punch list items closed out, the AMS tracks the work zone's status and days of remaining warranty.

"The system allows us to work hand-in-hand with the design-builder, eating the elephant in pieces rather than all at once," Bourne said. "At project closeout, there are no surprises and we can get the facility turned over to the owner more efficiently with significantly less cost and frustration to the design-builder."

The acceptance management system expedites the commissioning process by identifying and resolving issues early and eliminating those issues that can crop up at the end of the project.

"From the time the budget was established and we laid out our procurement schedule in early 2009, we have hit every targeted deadline. That's a tough thing to do, especially on large public works projects," Hawks said. "I attribute our success to having the right team, the right approach and the right controls. HNTB and their partner companies have not only met but exceeded UDOT's expectations." ■

CONTACT:

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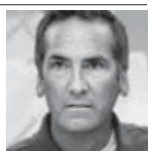
HNTB's I-15 CORE PMC team

Member: **John Bourne**
Title: Program manager
Role: Bourne oversees and manages the project team, which consists of approximately 100 consultants in engineering, financial analysis, procurement, contract administration, public information, quality, right-of-way, utility, cost estimation and risk analysis, design and construction oversight and auditing and compliance verification and reporting.
Importance: As part of a demanding political and technical project, a program manager develops, organizes and streamlines work to ensure the client is being properly supported with the appropriate and necessary technical expertise.

Member: **Julia Wilkins**
Title: Deputy program manager
Role: Wilkins manages and oversees the systems, document control, safety, business and finance, human resources and administrative functions for the program. She also provides general support to the program manager.
Importance: On a project of this magnitude, overseeing and managing these functions is essential to ensuring design-builder compliance with contract requirements.

Member: **Doug Calder**
Title: Quality manager
Role: Calder develops, implements and maintains quality management systems and procedures to ensure I-15 CORE meets and exceeds UDOT's requirements and expectations.
Importance: Establishing and continually improving quality management best practices ensures that contract requirements are met, due diligence is performed and UDOT not only gets what it is paying for, but also receives additional value beyond the contract requirements.



Member: **Clint Ells**
Title: Contract administration manager
Role: Ells oversees the project controls and contract administration, which consist of schedule management, cost and budget management, risk management, change management, project correspondence and workflow.
Importance: Project controls and contract administration have a direct impact on budget, scope and schedule. Oversight and management of these areas is essential to ensure compliance with contract requirements and proposal commitment.

Member: **Pete Marshall**
Title: Information technology systems manager
Role: Marshall develops and maintains IT systems and solutions for automating project workflows and processes, including project controls that monitor the contractor's performance.
Importance: Customized project controls tools add value to the project. They allow the oversight team to focus on the contractor's key activities to ensure all contract requirements, including proposal commitments, are achieved.

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