

# DESIGN-BUILD POST CONSTRUCTION REVIEW B-3463, B-3647 & B-3648 Final Report



**Location:** B-3463 Bridge 171 on SR 2819 over S Buffalo Creek (Design-Build)  
B-3647 Bridge 172 on SR 2770 over N Buffalo Creek (Design-Build)  
B-3648 Bridge 158 on SR 2784 over N Buffalo Creek (Construction  
and Inspection)

**Division:** 7 **County:** Guilford

**Type of Work:** Grading, Drainage, Structures, Paving, Pavement Markings  
and Construction Engineering Inspection (CEI)

**Type of Contract:** Design-Build

**Actual Completion Date:** May 27, 2005

**Prepared by:** Jennifer Evans, PE  
Alternative Contracts, Constructability Engineer

## POST CONSTRUCTION REVIEW

**TIP #:** B-3463, B-3647 and B-3648      **COUNTY:** Guilford      **DIVISION:** 7

**FEDERAL AID #:** BRZ-2819(2)

**DESCRIPTION:** TIP B-3463 is the replacement of Bridge #171 over South Buffalo Creek on SR 2819.  
TIP B-3647 is the replacement of Bridge #172 over North Buffalo Creek on SR 2770.  
TIP B-3648 is the replacement of Bridge #158 on SR 2784 over North Buffalo Creek.

### WORK REQUIRED:

The general scope of work consisted of completion of final roadway and structure design and construction of the Bridge #171 replacement and approaches over South Buffalo Creek on SR 2819 and the Bridge #172 replacement and approaches over North Buffalo Creek on SR 2770. Work on the replacement of Bridge #158 on SR 2784 over North Buffalo Creek was limited to the construction and CEI work. The Design-Build team was required to work with the Division 7 Office and the Construction Unit during the construction to keep the public informed of lane closures, construction progress, etc. Preliminary plans for Bridge #171 and Bridge #172 were provided to the team. It was the team's responsibility to review and complete these designs. NCDOT assumed no responsibility as to the accuracy of these designs. Any additional SUE work required for the replacements was the responsibility of the Design-Build team. Bridge and foundation design was the responsibility of the Design-Build team but Structure Recommendations were provided by NCDOT. No Design Exceptions were allowed. All erosion control designs and Traffic Control Plans were also developed by the Design-Build team for Bridges #171 and #172.

Right of Way, all utility conflicts and utility construction plans were the responsibility of the Design-Build Team for Bridges #171 and #172.

The Design-Build Team was responsible for CEI work for all three bridge replacements.

NCDOT provided Geotechnical investigations for the roadway and structures, full electronic surveys, final pavement design and drainage design to the Design-Build Team for Bridges #171 and #172. Complete sealed design plans for B-3648 were provided by NCDOT.

Environmental permits were obtained by NCDOT.

**GENERAL CONTRACT INFORMATION**

<b>DATE RFQ ADVERTISED</b>	5/1/2003	<b>NO. RFQ'S REQUESTED</b>	29
<b>DATE SOQ'S RECEIVED</b>	5/22/2003	<b>NO. OF SOQ'S RECEIVED</b>	10
<b>NO. TEAMS SHORT LISTED</b>	3	<b>TECHNICAL SCORE OF SELECTED TEAM</b>	84
<b>TECHNICAL SCORES OF UNSELECTED TEAMS</b>	88 89	<b>QUALITY ADJUSTED PRICE OF SELECTED TEAM</b>	\$3,681,252.24
<b>QUALITY CREDIT OF SELECTED TEAM</b>	11.67%	<b>LETTING DATE</b>	9/16/2003
<b>AWARD DATE</b>	10/9/2003	<b>AWARD METHOD</b>	Best Value
<b>CONTRACT AMOUNT</b>	\$4,037,624.61	<b>ENGINEER'S ESTIMATE</b>	\$3,846,500.00
<b>NCDOT PROJECT COMPL. DATE</b>	10/15/2005	<b>DESIGN-BUILD TEAM PROPOSED COMPL. DATE</b>	6/15/2005
<b>REVISED CONTRACT COMPL. DATE</b>	N/A	<b>ACTUAL PROJECT COMPLETION DATE</b>	5/27/05

**CONTRACTOR:** Smith-Rowe, Inc.

**DESIGN FIRM:** HNTB North Carolina P.C.

**CEI FIRM:** Terracon/Titan

**COMMENTS:**

The post construction review of this project consisted of a site visit as well as interviews with the design firm, the construction contractor, the CEI firm and NCDOT Resident's Office. The following comments and/or recommendations were received and discussed during the review:

**1. Design-Build Team Constructability Reviews/Partnering**

No formal constructability reviews by Design-Build Team members and NCDOT were conducted during the design and construction phases of the project. In addition, no formal partnering workshops were held throughout the course of this project. This seemed to be appropriate for this job based on the smaller size and limited complexity of designs; however, it may have been helpful in clarifying roles and expectations for team members new to the Design-Build process.

Informal reviews and communications occurred as necessary throughout the project but more structured meetings with minutes may have been helpful to the project.

## **2. Public Involvement**

No Public involvement was included in the scope of this Design-Build project due to the size and rural location of the project. There was no project website for this job. This was not perceived as a problem and seemed appropriate for this job.

One short-listed team offered a website, meeting and newsletters but that team was not selected.

## **3. Innovative Designs or Materials**

The Design-Build Team considered several design changes that they considered innovative. The considered design changes included a permanent re-alignment of McLeansville Road at Bridge 171 in lieu of constructing a temporary detour bridge. While eliminating the detour structure would have been a considerable cost reduction, the redesign and preparation of a new environmental document, etc. created too much of a schedule risk to consider this option. In addition, this option was not considered in the original document because the alignment created would have been less desirable than the near-tangent alignment that exists. To remain competitive and on schedule they chose to hold close to what was provided by NCDOT.

The Design-Build Team also explored using a phased construction scenario at this location. This would require the use of a signalized one-lane bridge permitting two-lane traffic at a controlled interval. The team did not feel this would be acceptable to NCDOT at that time. In addition, they explored using the superstructure of Bridge #172 temporarily as part of the detour structure for Bridge #171. The proximity of the two sites and the similar structures supported this idea but the risk involved in obtaining NCDOT approval outweighed the advantages.

In reviewing the short-listed teams' technical proposals, there were discussions about eliminating the on-site detour and using precast caps and columns. Due to costs involved and/or additional time required, the team did not implement those innovations.

## **4. RFP/Technical Proposal**

The various RFP requirements related to scope of work, question submittals, response times and clarity were discussed with project personnel and the Design-Build Team. Generally everyone agreed that the RFP requirements and response times to the questions were

adequate. The following comments arose concerning wording of the RFP.

- The addition of the bridge replacement B-3648 at the last minute may have caused some confusion. Sealed plans were provided by NCDOT for that bridge replacement and the RFP clearly stated that services provided for this project include "Construction Services – necessary to build and ensure workmanship of the designed facility." The contractor used plans provided by NCDOT to estimate the lump sum cost for this portion of the project. The quantity of drilled shafts in rock ended up being more than anticipated by NCDOT plans. The Resident's office did not pay for additional work based on the written disclaimer in the RFP stating that the Department assumes no responsibility as to the accuracy of designs or quantities shown. The contractor felt since the Department provided sealed plans they should have paid for the additional rock. *Recently the Proposal Form for all Design-Build contracts has been revised to clarify this issue. The Proposal Form wording establishes that for standard design-build projects the Design-Build Team shall "hold the Department harmless for any additional costs and all claims against the Department or State which may arise due to errors or omissions of the Department in furnishing the preliminary project designs and information". When sealed plans are provided to the team by the Department additional wording will be added in the Design-Build Scope of Work stating that the Department will stand behind sealed designs furnished on the project.*
- As stated in the Roadway portion of the RFP, the Emergency Management Service (EMS) required the on-site detour structure at Bridge #171. Some project personnel felt this seemed expensive and unnecessary, especially with the availability of a good off-site detour. The use of the off-site detour would have added less than one mile to the travel distance. *It is recommended the need for providing an on-site detour be revisited with the EMS Coordinator for the area when very short off-site detours are available. Often standard form letter responses are provided to NCDOT requests for information made during the planning and environmental study process that does not address actual site conditions or requirements.*
- At the pre-RFP meeting with short-listed firms, direct questions are often not answered and the Design-Build Team may be unsure if the revisions to the final RFP are in response to their questions or not. It was recommended that direct answers should be provided

to the Teams' questions. *On recent Design-Build projects the Teams have been given the option of turning in their questions to the Department in advance of the meeting. This allows the Department to research and prepare answers for most questions. This practice makes the meeting more productive and should be continued on future projects. In addition, a second Question and Answer session is now used for large projects following issuance of the Final RFP.*

- The Design firm suggested Technical Proposal scores need to be revised to be more responsive to RFP requirements. Presently the project award is primarily based on lowest cost. The additional costs of increased design, warranties, innovations, etc. do not factor into award enough to justify the increase in price. *The quality credit for this project was 25%. The credit can be adjusted on a project by project basis to reflect the importance the technical scoring has versus the bid price. The current budget situation does not support a large increase in the quality credit on Design-Build projects.*

## **5. Plans/Project Submittals**

In general, the Design-Build Team considered the submittal process and review times satisfactory. It was noted that the details NCDOT staff required the team to submit for reviews varied substantially depending on the reviewer. The design firm recommended that NCDOT consider reviewing the plans included in the Technical Proposal and providing comments to the Design-Build Team as soon as the project is awarded. *One function of the Design-Build group is to facilitate plan review and provide consistency across projects so improvement in this area should be seen on current and future projects.*

## **6. Right of Way/Utilities**

No specific problems with acquiring right of way were identified.

The Design-Build Team did experience problems establishing prior rights for utility relocations. The Design-Build Team had difficulty getting information from utility owners pertaining to the status of prior rights. Duke Power and Southern Bell had lines that were currently inside the NCDOT right of way. The Team assumed that the utilities were there by encroachment. This turned out to be an incorrect assumption that led to the design firm, acquisition firm and the contractor sharing in covering the cost of these relocations. This resulted in expenses over \$100,000 that had not been factored into the bid.

The design firm added that the only parties involved that seemed to have a clear understanding of prior rights and who had them were NCDOT and utility companies. *Utilities are now being handled as pass-through costs. The cost of relocation coordination is included in the bid price but actual relocation costs are paid to the Team through supplemental agreement to reduce the risk to the Team.*

The Design-Build Team made the following recommendations for improvement:

- Condemnation significantly increases right of way services cost. To avoid costs associated with these unknown risks, NCDOT should consider having a cost adjustment factor that would apply to parcels that have to be condemned.
- NCDOT should provide information in the RFP indicating utility firms that have valid rights of way. Utility companies are very reluctant to provide right of way data and relocation costs to multiple Design-Build teams and the information given may vary between teams depending on which person is contacted within the utility company. *On current design-build projects, NCDOT is organizing meetings between the utility companies and the Design-Build Teams prior to submission of the Price Proposal. In addition, lists of utility owners and contact names are being compiled and given to the Teams.*

## **7. Construction**

Overall, the construction of the bridges went smoothly.

The Resident's office did briefly discuss the phasing of these three bridge replacement projects in the field. Bridge #172 was part of the proposed detour route for Bridge #158. The Design-Build Team specifically discussed this phasing in the Technical Proposal and discussed the necessary completion of #158 before working on #172. The Resident stated that they had to make the Design-Build Team complete Bridge #158 on Dick's Mill Road before they would allow them to begin on Bridge #172 on Huffine Mill Road. There was some resistance to the Resident's office requiring the Design-Build Team to follow commitments made in their Technical Proposal.



The existing structure at Bridge #158 was an 80' long pony truss structure. This structure was removed from the project and is now located in the Guilford County Bridge Maintenance Yard. As part of the Historic Bridge Reuse Program, the bridge is being stored there in hopes of potential reuse. The bridge, which has extensive lead paint, will remain in the maintenance yard until finding a new owner.

## **8. Administration**

The project was accepted May 27, 2005, which is before the Design-Build team's proposed completion date of June 15, 2005 and nearly five months before the NCDOT proposed completion date of October 15, 2005. Because of this early completion, no liquidated damages were assessed on this job. There were no supplemental agreements on this project. The final amount paid to the Design-Build Team for the project was \$4,037,624.61.

The DBE goal for this project was 10% of the construction cost. The team planned on using DBE subcontractors to do 7.5% of the construction work. A good faith effort was submitted since the 10% goal was not met.

The Resident's office indicated that Hicams supported this project sufficiently. A CEI firm was used for this project so only Quality Assurance inspections were done by NCDOT. "As-Built" plans have been received by the Resident's office and forwarded to Raleigh with the final estimate.

Due to untimely seeding and erosion control issues, the Resident was required to shut down the contractor at one point in the project. The Resident felt this should have been the responsibility of the CEI firm. When questioning the CEI firm about this issue, it seems they felt a need for NCDOT's assistance with shutting the project down. The CEI firm stated that they did not have a clause in their contract with the contractor that prevented them from stopping work. *Some past subcontracts between CEI firms and the general contractor had contained wording disallowing the CEI firm to stop work. This issue has been addressed in the RFP by adding the following wording, "The contract between the Design-Build Team and the private engineering firm performing the construction inspection shall in no way preclude the private engineering firm from stopping work on the project."*



**9. Erosion Control**

The Resident's office did not feel the CEI firm was performing their inspections on a weekly basis or after storm events as required. There were issues with the CEI firm enforcing NCDOT Roadside Environmental Unit's recommendations.

**10. Safety**

Overall the bridges built by the Design-Build Team appear properly protected and of adequate width. No safety concerns were expressed and a field inspection did not reveal any areas of concerns.



B-3463 Bridge No. 171 on SR 2819 over S Buffalo Creek

**11. Warranty**

A twelve-month guarantee was required for this project. Individual Design-Build Teams could offer additional warranties for extra credit towards their technical score. The Smith-Rowe Design-Build team did not choose to offer an additional warranty.

One short-listed team discussed an additional 5-year warranty on the prestressed concrete cored slabs but that team was not selected.

## 12. **General**

The clustering of these three (3) bridge replacements together was an effective way to deliver these projects. By securing one contractor for the construction of the close proximity projects, potential conflicts were eliminated. In addition, cost savings in mobilization may have been realized. Consideration should be given to combining future bridge replacement projects that fall within close proximity to one another.

### **SUMMARY**

The following comments and recommendations are made to assist the NCDOT in improving its Design-Build process and conventional project delivery.

- NCDOT should continue to cluster future bridge replacement projects together. TIP let dates and geographic locations should be considered when developing clusters. This recommendation should apply to both Design-Build and Design-Bid-Build projects.
- The decision to include partnering and public involvement work in the Design-Build team's scope of work should be dependent on project size, location, complexity, etc. When there are problems, however, scheduled, structured meetings with minutes should be conducted until resolution.
- When NCDOT provides preliminary designs, permits, etc. and expects a tight time frame at lowest cost, innovations that are considered may not be included. Some Design-Build Teams do not risk the time and money involved and stay closer to the original design. *Currently, Design-Build Teams are encouraged to take advantage of the two Question and Answer sessions and Design-Build email to ask questions. This enables the Department to handle their concerns and gives the Department full benefit of their innovations.*
- When adding additional scope of work to a project at the last minute, the entire package should be reviewed carefully with the expanded scope of work in mind. This is especially important when NCDOT is supplying plans.
- The role of the Technical Proposal needs to be clarified in relation to the contract. Clarification needs to be provided to the Resident and the teams about what NCDOT can and can not require of the Design-Build team concerning commitments made in the Technical Proposal. *This has been done recently with additional wording added to the RFP. Specifically, it is made clear that all contents of the Technical Proposal are contractually binding.*

- If a Resident has issues with any component of the Design-Build Team, the NCDOT Construction Unit and Alternate Delivery Systems Unit staff should be made aware of these issues. While the issues may not lead to removal from the bid list, etc., it is important information for the short-listing and selection process on future projects. It may be beneficial for the Department to create a standard form for the Residents to use to report these events.
- NCDOT should consider having a cost adjustment factor that would apply to parcels that have to be condemned to cover additional costs associated with this process that are otherwise unknown at the time of bidding.
- NCDOT should continue to gather and provide more access to information on utilities to the teams during the bidding process. Utility companies are reluctant to provide right of way and relocation data to the teams and the information may vary between teams. *On current Design-Build projects, NCDOT is organizing meetings between the utility companies and the Design-Build Teams prior to submission of the Price Proposal. In addition, lists of utility owners and contact names are being compiled and given to the Teams.*
- NCDOT should continue to stress the importance of the relationship between the contractor and the CEI firm on Design-Build projects. The commitments and expectations should be addressed in the Technical Proposal, presentation, partnering meeting, and the preconstruction meeting.
- Future projects will require a dedicated inspector for erosion control to strengthen that aspect of the program.
- The Department should consider including procedures that would allow a Design-Build Team to get preliminary approval on certain aspects of a project. This would encourage innovation by the Teams while reducing fears that they may be found non-responsive if an idea is unacceptable to the Department.
- The Work Zone Traffic Control and Alternate Delivery Units should be involved in the project and NEPA document development to ensure on-site and off-site detours specified, closely evaluating project cost versus public travel inconvenience.