CMGC Design and Construction Phase Report

For

County RD 193 MP 2.1; Bitter Creek Bridge F-LC19(13)

PIN No. 8096

Prepared by

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For

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Of

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Purpose

This report gives a description of the design and construction phases of F-LC19(13), County RD 193 MP 2.1; Bitter Creek Bridge, located in Grand County, Utah. Due to the limited size and budget of this CMGC project, UDOT has opted to combine the reporting process of the project. The report is intended to fulfill the Design and Construction Phase requirements outlined in the updated Memorandum of Understanding (MOU) between the Utah Department of Transportation (UDOT) and the Federal Highway Administration (FHWA) for Alternative Contracting Process – SEP 14; Construction Manager / General Contractor (CMGC) dated January 20, 2010. The MOU requires the following information be provided about the project:

Design Phase

- A discussion of how acquiring the services of a contractor during the design phase assisted the team and improved constructability and quality.
- A discussion of the selection process of the Contractor in the design phase.
- A detailed comparison of the UDOT prepared ICE and the negotiated price for construction.
- A discussion of each of the evaluation criteria.

Construction Phase

- The evaluation criteria applicable to the project.
- The innovations used and an analysis of their savings.
- Comparative analysis between the project final cost and the Independent Cost Estimate (ICE).
- Project data that will aide in the formulation of the Annual Report of all projects to be submitted to FHWA.

The MOU identifies the Evaluation Criteria to be used when assessing the contractor's involvement in the design phase as follows:

- Design and Constructability
- Innovation
- Project Schedule
- Risk
- Learning opportunities
- Environmental Stewardship
- Benefit to the Public

The MOU states that "all seven criteria do not need to be considered," thus this report only focuses on the criteria most relevant the project. Furthermore, UDOT has outlined additional information that is required in this report for internal evaluation. This information includes a comparison of schedule, cost performance and observations of those involved concerning the successes and difficulties associated with the CMGC process.

Project Overview

CMGC Streamlined Process

In an attempt to streamline the CMGC process and make this delivery method more accessible to projects with smaller budgets, UDOT delivered the Bitter Creek Bridge project via a streamlined CMGC process which made the following changes to the selection process:

- Design was further developed prior to the selection of the Contractor.
- A complete list of bid items was provided in the RFP for preliminary pricing.
- Evaluation of the proposals was weighted more heavily on lowest price than in the past.
- Size and complexity of the proposal was reduced to ensure that small contractors could compete without a large investment in proposal preparation.

In the past CMGC has been utilized to procure the contractor's services for large projects. It was assumed that the added costs of using the contractor's expertise could only be justified on large projects. However, the Bitter Creek Bridge project was unique in the fact that the reconstruction of the small structure was beyond the local agency's budget and retrofitting the existing bridge would be very dependent on the means and methods of a given contractor. Producing a bidding package for the bridge retrofit as a low cost bid and still maintain confidence the lowest bidder could actually perform the scope of work required was questionable. The Department needed to award the project to a capable contractor and still maintain an affordable price. This was achieved by selecting the contractor on both qualification and lowest price.

To ensure that pricing was controlled, UDOT changed two principle elements of their traditional selection process: the level of design was more complete at the time of the RFP and scoring was intentionally weighted more towards the lowest price.

UDOT developed the design to approximately 90% prior to the RFP to provide a complete bid list for the RFP process. This allowed the proposers to give a total price for the project during selection. Traditionally, CMGC projects are designed to about the 30% design level prior to contractor selection so the contractor can input on Risk and Innovation measures. For the Bitter

Creek Bridge project it was determined that the primary risk was to ensure that the contractor could perform the required retrofit in-place without adversely damaging the existing structure. Due to the remote location it was felt that traditional risks of ROW, utilities, and MOT were not applicable. The RFP still required the contractor to review the design and suggest any innovations that might reduce costs of the initial design and avoid change orders after award.

During previous selection processes for CMGC services, qualifications were weighted more heavily than the pricing components (typically 70/30 split respectively). This was done to ensure that low bid pricing techniques were not used to override the qualifications that UDOT desired for these specialized projects. Recently UDOT administration felt that CMGC projects have not achieved the economic benefits of the current economy and approved a change in the evaluation of proposers based on qualifications. For the CMGC Streamlined Process scoring was weighted more on the contractor's pricing information and less on qualifications.

Finally, the requirements of the proposals themselves were greatly reduced. This effort was done knowing that the project budget could not warrant a large effort preparing the RFP. The technical proposal was limited to 5 pages total and no color submittals were allowed. By reducing the RFP submittal requirements, smaller companies could compete with their larger counterparts.

Table 1 - Project Summary Information

Project Type:	Rural Bridge Retrofit
Project Number:	F-LC19(13)
PIN:	8096
Funding Source:	Federal, local government

Project Introduction

The following project description was provided in the RFP:

> The Bitter Creek Bridge project is a remotely located bridge on a low traffic rural road in Grand County, Utah. The bridge is located approximately 40 miles from Grand Junction, Colorado and 70 miles from Green River, Utah. It is located on County Road 193 at MP 2.1. The Bitter Creek is not a continually flowing river. It flows during runoff and storms. There has been a posted weight limit of 5 tons. The bridge deck has been narrowed to one lane across the bridge to allow only one vehicle at a time on the structure. There is a bypass road that has been constructed to go around the bridge but it goes directly through the creek bed. It was designed to be used by trucks that are too large for the bridge structure. This bypass road is able to be used when the creek bed is dry. The other bypass is by using I-70 and going around the project. The project began as a bridge

replacement but after being inspected by UDOT structures, it was determined that a [rehabilitation] would extend the life of the bridge and avoid the cost of replacement.

Figure 1 - Remote Nature of Bitter Creek Bridge Escalated All Bid Prices

The existing bridge had several difficulties associated with the work. First the bridge is located in a remote location with no housing, water source or material supplies in the immediate area. The existing girders were cast-in-place and parabolically haunched making the process of jacking, concrete patching, and composite wrapping more difficult on site. Finally the work was time sensitive to avoid spring runoff. The rehabilitation work mentioned required the following processes:

- Repairing the beam ends and replacing seized bearings as necessary to extend the life of the bridge.
- Rehabilitating the surface of the structure to prevent further damage and prolong bridge life.
- Upgrading the outdated safety features associated with the bridge.

Figure 2 – Parabolically Haunched Girders Required Specialized Jacking Efforts Prior to Repairs - Bitter Creek Bridge

Project Goals

The project goals were determined in accordance with the overall Department Themes:

- Get a Good Price
- Encourage Innovation
- Accelerate Delivery
- Decrease and Minimize MOT

Success on this Project will require balance of the following desirable outcomes which relate to the Department's overall themes (listed in order of priority):

- Cost & Quality- Provide the best value solution that stays within budget and provides the longest extension of bridge life to equal or exceed 50 years
- Schedule- Construction may begin as early as July and should be completed by October.

Design Costs

The project was awarded to Gerber Construction and received their Notice to Proceed with design phase services on May 17, 2011. The delay in award was due primarily to environmental clearances required by the FHWA.

Horrocks Engineers was the principal designer of the project and ICE services were performed by PBS&J Engineering. Table 2 shows the associated design costs for services rendered by each of the team.

Table 2 - Design Costs

Designer's Fee (Name)	$90,293.70
CMGC Design Fee	$8,560.00
ICE Preparer's Fee	$17,688.86
Total Design Costs	$116,542.56
CMGC fee as a Percent of Total:	7.3%

*Note based on contract amounts.

Bid Pricing

Unlike previous projects, the selection process was focused more on the prices that were provided during the proposal stage. The RFP listed all of the bid items that were anticipated on the project with associated quantities. This enabled the selection process to control the overall bid pricing and also give a better idea of what this unique project required. Due to the remote location of the bridge and the small quantities required by the project, it was anticipated that the pricing would be much higher than state average pricing. Comparing Gerber's proposal pricing with the state average pricing for the quantities provided in the proposal suggested that the ratio of final price to state averages would be 2.19 (See Appendix B Table 10). Figure 3 compares the competitive bidding prices given in the proposal stage by the three proposers. Despite this high ratio, it can be seen that Gerber's proposed price was much lower than the other two proposers.

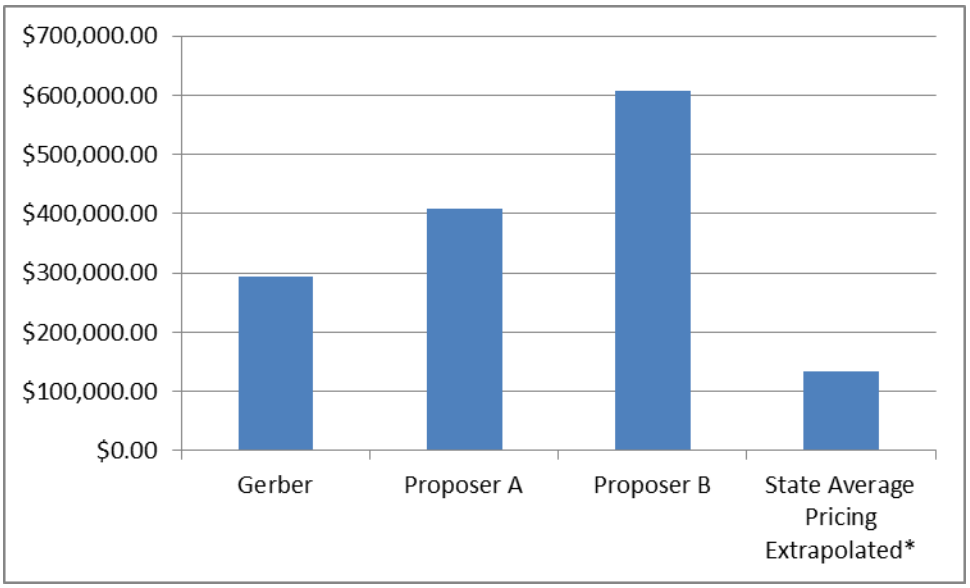

Figure 3 -Price Comparison of Proposers on Bitter Creek Bridge Retrofit (*see Table 10 in Appendix B)

At bid opening (August 3, 2011) the final bid was $291,726 which was well below the Engineer's Estimate and the Independent Cost Estimate.

Table 3 - Final Bid Price Performance

Description	Amounts
Proposed Price	$294,918.00
Bid Price	$291,726.00
Independent Cost Estimate (ICE)	$296,966.10
Engineer's Estimate (EE)	$338,495.00
% Difference between Bid and ICE	-1.8%
% Difference between Bid and EE	-13.8%

Applicability of the CMGC Process

Because the Bitter Creek Bridge was an in place retrofit, the majority of the cost was dependent on means and methods of the contractor. Traditional design processes could not anticipate the methods that would be best used by the contractors. For this reason the Department determined that CMGC would be the best delivery method to address the issues surrounding the Bitter Creek Bridge.

CMGC Selection Committees

The Oversight and Selection Committees outlined in the RFP are noted below:

Table 4 - CMGC Oversight Committee

Name	Title	Organization/Firm
Nathan Lee	Region Director	UDOT Region 4
Randy Park	Project Development Director	UDOT Project Development
Bryan Adams	Engineer for Construction	UDOT Project Development

Table 5 - Selection Committee Members

Name	Title	Organization/Firm
Rustin Anderson	Project Manager	UDOT Region 4
Mark Wright	County Engineer	Grand County
Stan Adams	Deputy Construction Engineer	UDOT Project Development
Rudy Alder	Innovative Contract Engineer	UDOT Project Development
Steve Ogden	District Engineer	UDOT Region 4
Eric Wells	Granite Construction	AGC Representative
Dave Nazare	HNTB engineering	ACEC Representative
Bill Jackson (non-voting)	Road Supervisor	Grand County
Mike Seng (non-voting)	Construction Oversight Engineer	UDOT Region 4
Justin Jar (non-voting)	Structures Engineer	UDOT Structures

Evaluation/Selection Criteria

The scoring criteria that was used to evaluate the proposers was clearly stated in the RFP and is provided below:

Table 6 Selection Criteria and Point Distribution - CMGC Bitter Creek Bridge

Criteria	Maximum Points	Purpose
Contractor Capability	10	Declaration of the contractor's key personnel and their associated experience pertaining to the scope of work.
Project Approach	20	Explanation of the contractor's plan to achieve the project stated goals for both budget and schedule.
Price Submission	25	Declared the contractor's GMP based on the bid list presented in the RFP. Scoring for this section did not penalize low bidders.
Approach to Price	45	Evaluation of the contractor's ability to justify the price given in the Price Submission above. This also includes the contractor's plan to track innovations and risk and mitigate negative impacts to both cost and schedule.
Total Points	100	

Selection Base on Price

Traditionally UDOT has awarded the most points to the proposer that had the average price of all proposers and both the low bidders and high bidders were penalized. It was also typical for the selection process to base 70% of the scoring on qualification based criteria and only 30% associated with the pricing information provided. This was done because original CMGC selection process was focused the best qualified contractor and pricing reduction was assumed to be achieved during the design process. The Bitter Creek Bridge project was the first CMGC project where the proposal scoring eliminated the penalty associated with the low bidder. However, the low bidder did not get more points than the average priced bidder. As previously mentioned, 70% of the scoring was dedicated to the price and 30% was reserved for qualification based criteria.

The team attributed the CMGC process for a smooth transition from design to construction. The UDOT Project Manager and Designer felt that a traditional design bid build approach would have resulted in a very difficult transition. This is due to the fact the so much of the project was based on contractormeans and methods. In fact the UDOT Project Manager felt that traditional processes would have become an iterative bid process because initial bidding would have been

so varied and carried a substantial amount of risk which would have pushed the price beyond the current budget.

Innovative Process

Risks and innovations were not the primary focus of the Bitter Creek Bridge project. The Department's focus on involving the contractor was to provide input on means and methods and thereby help control the risk of how the project proceeded. The design was 90% complete when the contractor selection process proceeded. The contractor's role was reduced to design review and suggestions of alternatives to the given design.

There were three bid items that the contractor's influence helped to reduce cost. These items included: Expansion joint, waterproofing of the bridge deck, slope protection.

Expansion Joint

During the selection process the contractor followed UDOT's standard specification and bid a strip seal expansion joint. However, after selection the designer specified a much less expensive gland type expansion joint. The contractor admitted that there was substantial savings in the alternative proposed by the designers and reduced their overall bid by $19,000.

Deck Waterproofing

One risk that was identified had to do with the condition of the bridge deck underneath the current pavement overlay on the bridge. If the deck had significant pitting or potholes, full deck replacement would be very expensive. The contractor requested that a site investigation be done to remove a small portion of the paving so that the decking could be inspected. It was determined that the deck did not show significant pitting or potholes. If the deck only had isolated issues of concern, structural pothole patching could be used to address the deck. The team proceeded with this assumption. However, under current UDOT specifications, the application of waterproofing membranes must meet critical smoothness requirements that would be difficult to achieve on this bridge deck. The contractor researched the possible materials allowed by UDOT and found a manufacturer whose specifications for application were less stringent than UDOT's and worked with the designer to modify the current specification thereby mitigating this risk.

Slope Repair

Slope repair was not included in the original bid list because the design team, Grand County, and UDOT wanted to have input from the contractor to determine first, their budget and second

what alternatives were available. With the contractor on board the team solidified their budget and specified the slope repair they could afford.

The overall bid was $3,200 less than the prices provided by the contractor at selection despite the fact that over $25,000 worth of work was added during the design phase. Items added included Dust Control and Watering, Slope Repair, and an Expansion Joint Modification. This input resulted in a higher quality product with no additional time added to the contract.

Innovative Issues

During the interview process the designer and Resident Engineer pointed out an issue of concern. Because of the remote location having ready mixed concrete delivered to the sight would have been difficult. Despite this fact the contractor never proposed a solution and the design proceeded without addressing the issue. Once the project was bid, the contractor revealed any concrete would be provided via a small mixer on-site. Because the concrete required would be very small loads for curb repair and very small patching the contractor felt that this method was reasonable. However, this process did not meet the current specifications of the project and required the Resident Engineer to work with County, State, and Federal officials to get the process approved. This issue could have been addressed simply in design and the design team felt that the contractor was not forthright with the planned method. They attributed this miscommunication to the contractor's lack of experience with CMGC and not comfortable providing full disclosure to the design.

Analysis of Performance

This section will address the total cost associated with the contract. CMGC enables the project managers more control of project budget. For this reason when comparing change orders and overruns it is important to combine the two cost categories into a combined impact.

Change Orders/Overruns

Very few change orders resulted in the project. There was approximately a 2% increase in the project due to change orders and overruns as shown in Tables 7 and 8 below.

Table 7 Change Order Information - CMGC Bitter Creek Bridge

	Change Orders 1	Change Orders 2	Total Anticipated[1]	Total Actual Cost[2]
Description:	EAST BENT WALL REPAIR	GUARDRAIL CREW REMOBILIZATION		
Amount Anticipated:	$5,000.00	$3,436.17	**$8,436.17**	
Actual Costs:	$5,000.00	$3,436.17		**$8,436.17**
Change Order Classification:	Change of work on site	Change of work on site		
Planned/Unplanned:	Unplanned	Unplanned		
Responsible Party:	Structures	Traffic		

Notes:
1. Amount Anticipated is reported from the C-100 form.
2. Actual Cost is total of bid items added via change order in the final payment ledger.
3. Refer to Table 8 below for overrun/change order analysis

Table 8 Change Order and Overrun/Underrun Comparison - CMGC Bitter Creek Bridge

	Overruns/Underruns as Percent of Original Bid	Change Orders as Percent of the Original Bid	Total Change to Contract
Bitter Creek Bridge (Single phase)	-0.88%	2.89%	2.01%
6 year average Design Bid Build[1]	-4.80%	14.60%	9.80%

Notes:
1. 5 year average includes all federally funded projects from 2005 to 2011 3rd quarter.

Final Cost Comparison of ICE

When the final cost was compared to the initial ICE estimate the amounts were essentially the same (see Figure 4). The final construction costs were below the initial values proposed in the selection process and 12% less than the Engineer's Estimate. The Department was successful in controlling the price of the project.

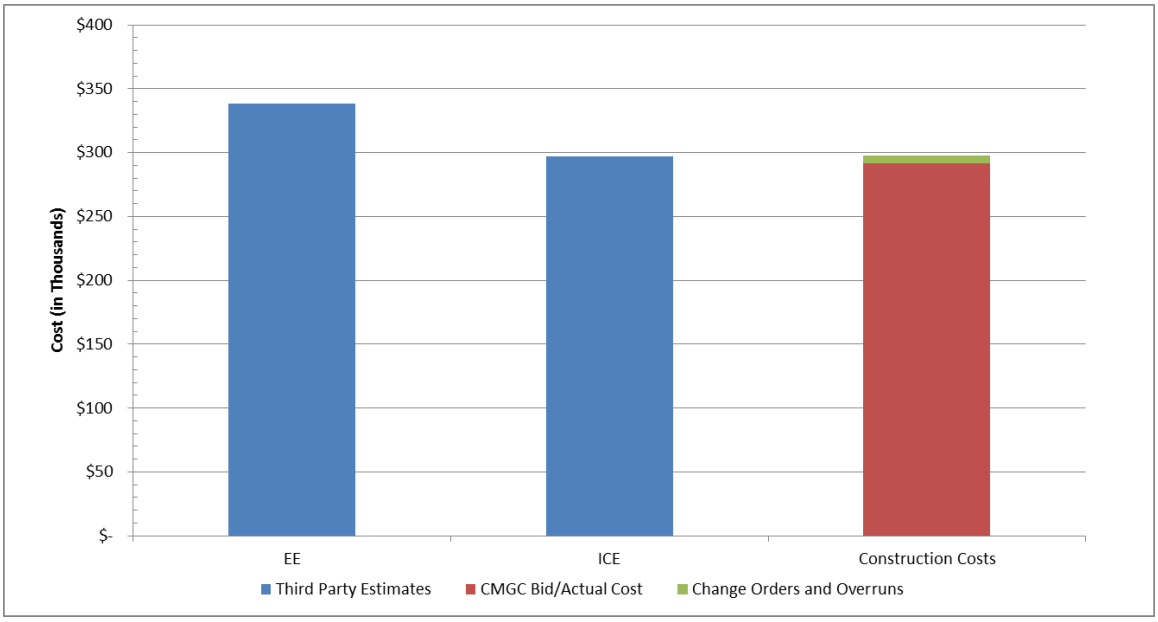

Figure 4 Final Costs vs. Estimated Costs of Project – CMGC Bitter Creek Bridge

F-LC19(13)	**Bitter** Creek Bridge Rehab	**349**	**10 - ROADWAY**	**Traffic Control**
F-LC19(13)	Bitter Creek Bridge Rehab	349	10 - ROADWAY	Dust Control and Watering (Est. Qty 20
F-LC19(13)	Bitter Creek Bridge Rehab	349	10 - ROADWAY	Slope Repair
F-LC19(13)	Bitter Creek Bridge Rehab	349	10 - ROADWAY	Remove Guardrail (Est. Qty 110 ft)
F-LC19(13)	Bitter Creek Bridge Rehab	349	10 - ROADWAY	Remove Asphalt Pavement (Est. Qty 290 s
F-LC19(13)		**Bitter Creek** Bridge Rehab	**349**	10 - ROADWAY

Remove Asphalt Pav

F-LC19(13)	Bitter Creek Bridge Rehab	349	10 - ROADWAY	Untreated Base Course (Plan Quantity) (
F-LC19(13)	Bitter Creek Bridge Rehab	349	10 - ROADWAY	HMA - 1/2 inch (Est. Qty 170 ton)
F-LC19(13)		**Bitter Creek** Bridge Rehab	**349**	10 - ROADWAY
F-LC19(13)	**Bitter** Creek Bridge Rehab	**349**	10 - ROADWAY	W-Beam Guardrail 84 inch Wood Post (Est
F-LC19(13)	Bitter Creek Bridge Rehab	349	10 - ROADWAY	Crash Cushion Type G (Est. Qty 2 each)
F-LC19(13)	Bitter Creek Bridge Rehab			
F-LC19(13)	Bitter Creek Bridge Rehab			
F-LC19(13)	Bitter Creek Bridge Rehab			

349	10 - 20	STR
350	20 - STRUCT	

Table 9 shows the final costs associated with the Bitter Creek Bridge project along with CMGC project averages to date (see *Construction Manager General Contractor Utah DOT Annual Report 2011*). It should be noted that the Pre-construction Phase fees are much higher than traditional CMGC projects at UDOT. This is due to the relatively small size of the construction project. This is also true for the Construction Engineering Fees. Federal projects often require the same amount of planning, coordination, review, and oversight as all projects regardless of their budgets.

Impact to Schedule

The original goal was that the project would start in July and finish by October 2011. This goal was stated in the RFP and was a focus of the team. Figure 5 shows that this while the overall time to finish the project was reduced, the project started in September and finished in

December 2011. This delay was due to environmental clearances required by the FHWA prior to awarding the design phase of the CMGC contract.

The environmental clearances (a categorical exclusion) needed to be achieved prior to bringing the contractor on board by federal rule. Looking back at the matter, team discussed this issue and felt that having the contractor on board in design may have helped the environmental documentation by providing a better idea of what the impacted area would be (See comments from interviews in Appendix A).

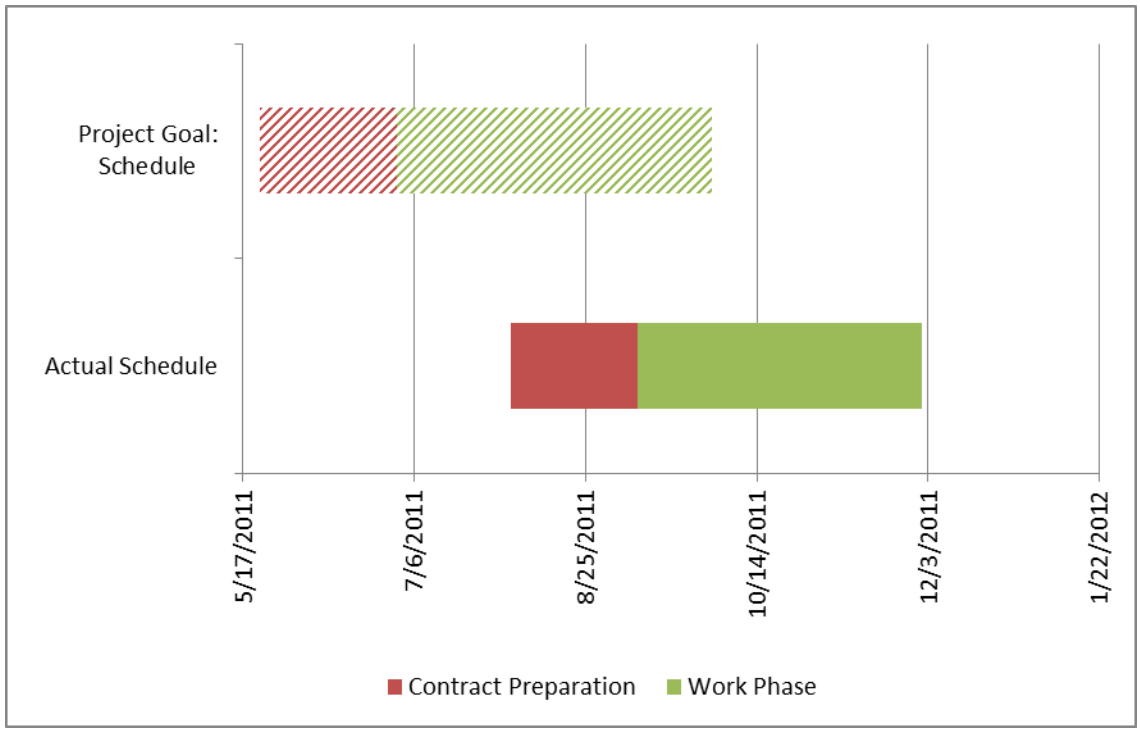

Figure 5 Desired Schedule vs. Actual Project Schedule - Bitter Creek Bridge

Lessons Learned

After construction completion the UDOT Project Manager, the Resident Engineer, and the Designer were interviewed concerning the performance of the project (See Appendix A). During the interviews the following key issues were identified as "Lessons Learned":

- A full cost preliminary design was not needed at the time of selection. This drove up the cost of the design and was not necessary. 30% design with best estimate on bid items and quantities would have been sufficient to advertise.
- Team should have openly discussed the source of concrete prior to bid so that proper adjustments could have been made during the design stage.

- The contractor's lack of experience with CMGC was a barrier at first.
- A partnering meeting about roles of CMGC and expectations of each team member is important.
- Having the contractor on board providing design services during the Environmental clearance process is of merit for CMGC projects.

Conclusion

The remote Bitter Creek Bridge project was a unique type project that periodically plagues roadway agencies. The rehabilitation of a substantially damaged structure in a remote location is often difficult work with very little room for error. The complexities of the girder shape made this project particularly difficult to bid without knowing the means and methods that were available. For this reason UDOT used the CMGC process to ensure that a contractor was brought on board that was experienced in this type of work.

The selection process illustrated a large discrepancy in bid prices. The final selection was awarded to Gerber Construction with their first CMGC project. Due to environmental clearance issues within the Department the project did not meet the original construction schedule. However, the team felt that the final product was not only of superior quality but also cost the department less than originally proposed amount even though scope was added after selection. The Bitter Creek Bridge project is a strong illustration of how a CMGC project can keep and maintain the original budget, minimize iterative bidding due to project risk, and build partnering between the owner and contractor.

Appendix A - Interview Notes

CMGC Interview Questions

UDOT Project Manager:	Rustin Anderson P.E., UDOT
Contractor Project Manager:	Brandon Gerber, Gerber Construction (not attending)
Resident Engineer:	Dave Dillman, Horrocks
Pre-Construction Engineering:	Mike Dobry, Horrocks
Conductors of the interview:	Rudy Alder, UDOT
	Dallas Wall, WCEC

Project Description:	**Bitter Creek Bridge**
Pin:	8096
Project Phase:	Construction
Engineer's Estimate:	**$338,495.00**
Total Cost to Construct:	**$297,601.97**
Anticipated construction time:	**55 days**
Actual Construction Time:	**53 days**
Substantial Completion date:	8-30-2011

Constructability

How was constructability improved by involvement of the contractor in design?	• Expansion Joint – The winning proposal was bid according to the standard specification which required a strip seal expansion joint. However, the actual design called for a gland compression joint which is less expensive. When this was discussed prior to bidding the contractor pointed out that there were additional savings associated with that bid item that is why the price was reduced in the final bid (Mike). • Paint Striping? The proposal had a bid item for paint striping. Because the approaches on the bridge were not striped, it was deemed that this could be removed (Dave). • Slope Protection? The level of slope protection was not included in the original advertisement because the team wanted to have the County's input as to what level protection was required and what could fit within the available budget since this item could vary drastically depending on what was to be

	specified. It was deemed that once the contractor was selected they could talk openly about cost and method to make an informed decision (Rustin). • Slope Repair? Based on the original budget, it was determined to just provide slope repair in the final bid rather than adding slope protection (Mike)
How did ideas incorporated by the contractor into the design to overcome constructability issues get followed through in the field?	• Experience on this project was key to success. Because of the unique nature of the work normally, this project would be bid and then the Department would re-evaluate the methods assumed and the project would have to be bid again. Because of CMGC we avoided iterative bidding while the department tried to learn what was going to work and we were able to choose a qualified contractor and still control the price. Significant issues included how the jacking of the girders would be achieved, how to deal with the remote access, what type of equipment would be necessary, how was the water proofing going to be applied if the deck was significantly damaged, and how was the fiber wrapping going to be achieved.(Rustin, Mike, Dave) • Under a traditional design bid build process, most contractors would not have spent an appropriate amount of time on site prior to bidding because of the remote location and the small budget of the project. This would have led to a construction atmosphere that was ripe with problems (Rustin).

Project Schedule

Was the construction schedule shortened by the design effort? By how much?	• Not really, however the discussion of risk helped the team to plan for risks that may have delayed the schedule luckily none of them occurred (Mike). • Federal oversight was not familiar with the project resulting in additional time by the designer to address concerns of FHWA that did not pertain to the project (Mike). • FHWA input cost the project more time to get the project closed out and finished (Dave).

Risk

How did the team identify, evaluate, and track project risk?	• The project was so small that risks were tracked on an in-formal spread sheet matrix that calculated possible costs of contingencies and delays (Mike)
Which contractor suggestions helped you to reduce risk and control cost?	• The contractor asked the county to expose a small part of the deck so they could verify the condition (Mike). • One thing they did not do was point out that concrete would need to be mixed on site. This caused significant stress to the team once the project proceeded (Dave). • The contractor gave input on the writing of the special provision for the water proofing treatment that followed the manufacturer's recommendations but deviated from the current standard specification (Dave).

Change Orders

What change orders were unexpected and occurred because of design oversights or unseen risk?	• Change order number 1 dealt with repair of a section of the foundation that was buried and was not realized until the slope repair started (Dave). • Change order number 2 was due to delayed response from UDOT pertaining to instructions required on site (Dave).
What change orders were anticipated and occurred to meet design or scope?	• None.
How did having a contractor involved in design help to reduce change orders?	• Because the department could have had no way to determine methodology a standard contract could have led to change order pertaining to time and cost (Rustin).

Lessons Learned

What did you learn in the CM/GC process?	• Design – full cost preliminary design was not needed at the time of selection. This drove up the cost of the design and was not necessary. 30% would have been enough or at least to a level where all of the bid items could have been

	identified but not a fully developed design (Mike) • Team should have openly discussed the source of concrete prior to bid so that proper adjustments could have been made. I think that the contractor did not want to discuss this because they did not believe we would allow it which just shows the inexperience with CMGC (Dave). • The contractor's lack of experience with CMGC was shown as they were uncomfortable showing all information we requested up front (Rustin). • CMGC has a learning curve not only for the Department but also for contractors (Rustin). • Rudy's presentation during the partnering meeting about roles of CMGC was very valuable and the team referred to it often to help try and break down some of the traditional barriers (Mike). • Length of time to develop the RPF impacted the time of design (Rustin). • Federal requirements need to let CMGC design move forward prior to environmental clearances if environmental is Categorically Excluded (Rudy)

General Notes/Other Items

How would you rate the CMGC process now that the project is completed?	• Having the contractor knowing the expectation of them led to a much smoother project. The quality was better because there was a real discussion of how much time was required to do the work (Dave). • We hit the ground running with an easier transition from design to construction (Dave).

Appendix B – Bid Items List; Pricing Analysis

Table 9 State Average Pricing Results at Selection – (Anticipates Final Cost of Project)

				Gerber		SAP from 2-24-10 to 2-23-11	
item_seq	item_desc	Units	item_qty	Unit Price	Amount	Unit Price	Amount
1	Mobilization	lump sum	1	$ 37,000.00	$ 37,000.00		$ -
2	Traffic Control	lump sum	1	$ 18,000.00	$ 18,000.00		$ -
3	Remove Guardrail	ft	110	$ 6.00	$ 660.00	$ 1.84	$ 202.40
4	Remove Asphalt Pavement	sq yd	290	$ 21.00	$ 6,090.00	$ 2.17	$ 629.30
5	Remove Asphalt Pavement (structure)	sq yd	540	$ 7.00	$ 3,780.00		$ -
6	Untreated Base Course	cu yd	90	$ 70.00	$ 6,300.00	$ 23.24	$ 2,091.60
7	HMA - 1/2 inch	ton	170	$ 180.00	$ 30,600.00	$ 67.08	$ 11,403.60
8	4 Inch Pavement Marking Tape - Yellow	ft	570	$ 1.50	$ 855.00	$ 2.13	$ 1,214.10
9	W-Beam Guardrail Transition Element	each	2	$ 3,700.00	$ 7,400.00	$ 2,024.99	$ 4,049.98
10	W-Beam Guardrail 84 inch Wood Post	ft	65	$ 29.00	$ 1,885.00	$ 17.21	$ 1,118.65
11	Crash Cushion Type G	each	2	$ 3,900.00	$ 7,800.00	$ 2,244.73	$ 4,489.46
12	Remove Sign Less Than 20 Square Feet	each	20	$ 90.00	$ 1,800.00	$ 72.77	$ 1,455.40
13	Beam End Repair	each	4	$ 22,000.00	$ 88,000.00		$ -
14	Curb Surface Repair	ft	215	$ 38.00	$ 8,170.00		$ -
15	Curb Sealing	ft	355	$ 4.00	$ 1,420.00		$ -
16	Backwall Sealing	sq ft	1060	$ 4.00	$ 4,240.00		$ -
17	Structural Pothole Patching	sq ft	240	$ 30.00	$ 7,200.00	$ 11.91	$ 2,858.40
18	Replace Abutment Bearings	each	8	$ 1,800.00	$ 14,400.00		$ -
19	Expansion Joint	ft	62	$ 620.00	$ 38,440.00		$ -
20	Waterproofing Membrane	sq ft	4854	$ 2.00	$ 9,708.00	$ 1.51	$ 7,329.54
21	Relief Joint Crack Sealing	ft	26	$ 45.00	$ 1,170.00	$ 13.90	$ 361.40
				Total	$ 294,918.00		
				Total of Items With State Average Price Match:	$ 81,468.00		$ 37,203.83
				Percent of Cost with State Average Price Match:	27.6%		
				Average Pricing Extrapolated:	$ 134,731.75	= (37203.83) / (0.276)	
				Anticipated Pricing Ratio		2.19	

Table 10 State Average Price Comparison at Bid Opening

		F-LC19(13); COUNTY RD 193 MP 2.1, BITTER CREEK BRIDGE; Rehabilitation Structure # 019033D			Engineer's Estimate		GERBER CONSTRUCTION, INC.		Independent Cost Estimate (PBS&J)		State Average Prices from 07-03-2010 to 07-02-2011	
item_seq	item_num	item_desc	Units	item_qty	item_price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1	12850010	Mobilization	lump sum	1	$ 40,000.00	$ 40,000.00	$ 39,000.00	$ 39,000.00	$ 33,600.00	$ 33,600.00		$ -
2	15540005	Traffic Control	lump sum	1	$ 20,000.00	$ 20,000.00	$ 18,000.00	$ 18,000.00	$ 11,560.00	$ 11,560.00		$ -
3	01572002P	Dust Control and Watering (Est. Qty 20 1000 gal)	1000 gal	20	$ 150.00	$ 3,000.00	$ 125.00	$ 2,500.00	$ 89.00	$ 1,780.00	$ 10.92	$ 218.40
4	02056001P	Slope Repair	lump sum	1	$ 6,000.00	$ 6,000.00	$ 5,000.00	$ 5,000.00	$ 4,070.00	$ 4,070.00		$ -
5	02221007P	Remove Guardrail (Est. Qty 110 ft)	ft	110	$ 5.45	$ 600.00	$ 5.91	$ 650.00	$ 6.20	$ 682.00	$ 1.94	$ 213.40
6	02221015P	Remove Asphalt Pavement (Est. Qty 290 sq yd)	sq yd	290	$ 10.34	$ 3,000.00	$ 20.69	$ 6,000.00	$ 14.00	$ 4,060.00	$ 1.79	$ 519.10
7	02221016P	Remove Asphalt Pavement (Structure) (Est. Qty 520 sq yd)	sq yd	520	$ 10.00	$ 5,200.00	$ 7.12	$ 3,700.00	$ 8.00	$ 4,160.00		$ -
8	02721002P	Untreated Base Course (Plan Quantity) (Est. Qty 90 cu yd)	cu yd	90	$ 100.00	$ 9,000.00	$ 70.00	$ 6,300.00	$ 78.10	$ 7,029.00	$ 22.72	$ 2,044.80
9	02741005P	HMA - 1/2 inch (Est. Qty 170 ton)	ton	170	$ 205.88	$ 35,000.00	$ 180.00	$ 30,600.00	$ 180.00	$ 30,600.00	$ 71.31	$ 12,122.70
10	02841003P	W-Beam Guardrail Transition Element (Est. Qty 2 each)	each	2	$ 4,000.00	$ 8,000.00	$ 3,700.00	$ 7,400.00	$ 4,720.00	$ 9,440.00	$ 2,203.72	$ 4,407.44
11	02841008P	W-Beam Guardrail 84 inch Wood Post (Est. Qty 75 ft)	ft	75	$ 33.33	$ 2,500.00	$ 24.67	$ 1,850.00	$ 59.50	$ 4,462.50	$ 18.71	$ 1,403.25
12	02843003P	Crash Cushion Type G (Est. Qty 2 each)	each	2	$ 4,000.00	$ 8,000.00	$ 3,900.00	$ 7,800.00	$ 5,303.00	$ 10,606.00	$ 2,612.19	$ 5,224.38
13	02891027P	Remove Sign Less Than 20 Square Feet (Est. Qty 25 each)	each	2	$ 2,000.00	$ 4,000.00	$ 900.00	$ 1,800.00	$ 257.50	$ 515.00	$ 77.47	$ 154.94
14	03924007P	Beam End Repair (Est. Qty 4 each)	each	4	$ 25,000.00	$ 100,000.00	$ 21,000.00	$ 84,000.00	$ 24,500.00	$ 98,000.00		$ -
15	03924008P	Curb Surface Repair	foot	227	$ 35.00	$ 7,945.00	$ 38.00	$ 8,626.00	$ 72.50	$ 16,457.50		$ -
16	03924009P	Curb Sealing (Est. Qty 349 ft)	ft	349	$ 3.01	$ 1,050.00	$ 4.30	$ 1,500.00	$ 4.20	$ 1,465.80		$ -
17	03924010P	Back wall Sealing (Est. Qty 1,038 sq ft)	sq ft	1038	$ 5.00	$ 5,190.00	$ 4.09	$ 4,250.00	$ 5.10	$ 5,293.80		$ -
18	39340010	Structural Pothole Patching	sq ft	240	$ 40.00	$ 9,600.00	$ 30.00	$ 7,200.00	$ 58.50	$ 14,040.00	$ 13.12	$ 3,148.80
19	05822001*	Replace Abutment Bearings (Est. Qty 8 each)	each	8	$ 2,000.00	$ 16,000.00	$ 2,281.25	$ 18,250.00	$ 995.00	$ 7,960.00		$ -
20	05831001P	Expansion Joint Modification (Est. Qty 52 ft)	ft	52	$ 650.00	$ 33,800.00	$ 346.15	$ 18,000.00	$ 240.00	$ 12,480.00	$ 762.82	$ 39,666.64
21	05832001*	Expansion Joint (Est. Qty 56 ft)	ft	56	$ 80.00	$ 4,480.00	$ 25.00	$ 1,400.00	$ 51.00	$ 2,856.00		$ -
22	07105001P	Waterproofing Membrane (Est. Qty 4,870 sq ft)	sq ft	4870	$ 3.00	$ 14,610.00	$ 3.39	$ 16,500.00	$ 2.95	$ 14,366.50	$ 1.54	$ 7,499.80
23	07922001P	Relief Joint Crack Sealing (Est. Qty 38 ft)	ft	38	$ 40.00	$ 1,520.00	$ 36.84	$ 1,400.00	$ 39.00	$ 1,482.00	$ 14.10	$ 535.80
						$ 338,495.00		$ 291,726.00		$ 296,966.10		
						Total that had matching items		$ 108,000.00				$ 77,159.45
						Number of bid items with match		13				
						Percent of bid items with match		56.5%				
						Percent of cost with match		37.0%				
						Silver Standard Ratio		1.40				
						percent for mob		13.4%				
						percent for traffic control		6.2%				

Appendix C – Risk and Innovation Matrices

#	Items resulting in Project Scope Increases	Cost	# of Days affecting Project Schedule	Betterment or Overly Conservative(Yes/No)	Comments
1	Change in Price of Oil	TBD	n/a	No	Price of oil has risen significantly since bid. It is anticipated that there will be an increase in the price of HMA.

BITTER CREEK - RISK MANAGEMENT MATRIX

#	Risk	Design Package	Respon. Owner / Contractor	Total Possible Risk	Schedule Risk In Days	Risk Mitigation Plan	Mitigation Cost Savings	Eliminated	Accepted	Total Possible To Risk Pool	Percent Probability	Cost Model Risk Pool	Notes
1	Jacking of Bridge using Diaphragms/Abutments	n/a	Contractor	$10,000+	10 days	Verify capacity of beams and diaphragms for jacking purposes.	$10,000+	Yes	Yes	$0	Low		Design team will calculate amount that bridge can be jacked without damage.
2	Surface pitting of concrete deck beneath asphalt overlay	n/a	Owner	$5,000	2 days	1st Option is to use the innovation of using a polymer overlay for waterproofing. This would eliminate the risk. Otherwise, this risk must be accepted.	$5,000	Yes	Yes	$0	High		Because of the poor condition of the asphalt, water will have been pooled on the deck creating "pitting" or surface damage which must be repaired prior to use of a waterproofing membrane. Grand County will remove a portion of the existing overlay and photo for contractor so they can better estimate the amount of deck pitting.
3	Condition of steel nosing at expansion joint is unknown	n/a	Owner	See Notes	4 days	If compression seal joint system is used, there is a possibility that the steel nosings will need to be replaced dependent on condition of existing noses.	$1,500	Yes	Yes	$0	50%		Additional risk is negligible. Project was bid with strip seal joints which would cover nosing repairs if a compression seal is used.
4	Full Depth Deck Repair	n/a	Owner		4-8 days	Conditions of deck is unknown until asphalt removal is complete.	$10,000	Yes	Yes	$0	Low		Judging from what is visible on the underside of the deck, there is some staining indicating water has been penetrating and saturating the deck. We feel the risk is low on this item.

BITTER CREEK BRIDGE - INNOVATIONS MATRIX (Decision Matrix)

RFI	Date	Issue	Team Innovations / Recommendations	Constructability Issues (Minimize future change orders)	Project Cost Savings	Schedule Savings In Days
	5/25/2011	Waterproofing of Deck	Use a polymer overlay instead of waterproof membrane/asphalt paving.	If we were to use a polymer overlay, this would eliminate the risk of the needing a change order to resurface the deck if there is pitting or surface damage present. We feel there is a good chance of surface damage that will require repair prior to using a waterproofing membrane.	$3.00/SF of Approx. $14,500	2 days
	5/25/2011	Strip Seal vs. Compression Seal	Use a compression seal in the expansion joint rather than a strip seal joint replacement.	In the bidding process, the expansion joint item called out specification number 05832. The only system allowed by this specification is a strip seal. This is an expensive system requiring the complete removal and replacment of steel rails wich would require the removal of concrete deck and approach slab to be able to pour the new steel joint system in place. After discussions with the manufacturers, existing condition are not ideal for a strip seal joint. If we provide a compression seal with a steel plate to cover will provide the best option for this bridge.	$460/LF or Approx. $28,520	4 days