

Construction Management at Risk: An Innovative Project Delivery Method at Stormwater Treatment Area in the Everglades, Florida

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Abstract

The traditional method of contracting for the construction of a residential or commercial development, infrastructure, schools, and government facilities has been the “low bid” approach. There are other project delivery methods which have been successfully utilized in the State of Florida. Design/Build is the most widely understood alternative project delivery method and is currently successfully employed in many construction projects throughout Florida and the world.

A need to mix the best of both of these project delivery methods and provide greater owner interaction in the design and construction process lead to the development of the Construction Management at Risk (CM@Risk) project delivery method. The purpose of this paper is to familiarize the audience with the CM at Risk process. First it compares its benefits with the traditional and design/build approaches. Then, the paper explores the benefits of the CM@Risk project delivery method for the construction of Stormwater Treatment Area 3/4 (STA 3/4), the largest of the STAs in the Everglades Construction Project.

Low Bid Project Delivery Method

The traditional low bid method of project delivery has the owner hiring the A/E after the conceptualization of the project. The design team conducts site investigations, prepares the preliminary design alternatives, and completes the design. After owner approval, the design team prepares bid documents and assists the owner in selection of a contractor to construct the project.

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The contractor selects his subcontractors and proceeds to construct the project from an interpretation of the plans and as clarified through “Requests for Information” to the owner and the architect/engineer. The traditional process requires the selection of the contractor based solely on the low bid and ability to meet the bid qualifications, e.g., M/WBE contract goals, bond and insurance requirements, etc. The bid price is the lowest price that the owner will get and usually escalates due to plan interpretations and errors, changing site conditions, and owner modifications to the project due to contractor phasing, material selection, and construction methodology. However, the low bid approach does not select contractors on the basis of qualifications or proven ability to perform on previous similar projects.

Design/Build Project Delivery Method

The Design/Build method of project delivery has been employed on numerous projects and has a proven record of success. This delivery method requires the owner to have a clear understanding of the project goals and the aesthetic and functional construction details. The process mixes the low bid and the qualifications of the contractor– A/E firm into the selection process. The owner’s ability to select from various designs at the bidding process reduces the time required to complete the project. The owner’s involvement in the design is limited, but quality of construction can be improved through the selection process.

CM at Risk Project Delivery Method

The CM@Risk delivery method has some of the benefits of the Design/Build method (improved quality based on qualifications of the design – build team, and fast-track construction capability). The CM@Risk process is based on team building between the owner, the design architect/engineer, and the contractor-construction manager from the beginning of the project conceptual design through the final construction and operation or occupancy of the facility. The team approach provides for input from all of the team members throughout the design and the construction phases.

This method of delivery provides for flexibility in the implementation of design changes late in the design process without impacting construction schedules and final delivery dates. The ability of the CM to input constructability reviews, construction phasing, material availability, and cost estimating throughout the design process reduces the probable occurrences of change orders, project construction delays, and increased project costs due to contractor identification of these elements in the design phase instead of the construction phase.

CM at Risk –The Process and The Benefits

The selection of the architect/engineer is the initial step in the project. The CM@Risk method of construction develops a team comprising of the owner, the

design team, and the CM/contractor. This team is established in the early stages of the project. Team building through partnering is a key element in the project's success. The A/E firm is contracted through project completion, which includes site investigations, alternative analyses, cost estimates, detailed design, construction bid documents, and construction management services.

The selection of the CM/contractor is similar to that under which the design consultant was selected. The CM submits a response to the owner's Request for Proposals. The response highlights the CM's personnel to be assigned to the project, previous experience on projects similar to the one being advertised, financial resources (Some state law requires the CM to have liquid assets equaling 1/20th of the construction value), local office to service the project, and the CM's approach to the project. The CM is contracted for the design phase to conduct document review, constructability reviews, cost estimating and scheduling. The negotiated compensation is based on actual hours, overhead and profit.

At 50% to 75 % detail design documents complete stage, the CM negotiates a Guaranteed Maximum Price (GMP) for the entire project. The GMP is composed of work, overhead, profit, and a contingency (usually 2 – 5%). The contingency goes back to the owner if it is not required for the project. The owner and the A/E are directly involved in the determination of the GMP through cost estimating at the 30%, 60%, and 90% design levels. The interaction of the CM with the design consultant during the design phase of the project enables the CM to input cost and construction details that should improve the GMP calculations and attain the project goals.

The subcontractors are pre-qualified by the CM using the pool of contractors pre-qualified by the owner, with the goal of meeting the M/WBE goals of the contract and to have quality contractors in the specialty areas required to complete the project. The subcontractors are encouraged to participate in the design phase through periodic updates by the CM and communicate on the construction details. This interchange of ideas provides team building with the subcontractor pool and reduces the risk by the subcontractor when they are required to bid on the project. The CM's tasks include the development of separate trade bid packages to meet the overall project schedule.

The construction of the project is the responsibility of the CM and the subcontractors selected through the pre-qualification low bid process. The reduction of the possibility of bid protests through the CM selection and the pre-qualification of the subcontractors, and the reduction of Request For Information's and change orders due to CM and subcontractor review involvement in the design phase are significant benefits to the CM at Risk project delivery method.

The implementation of the CM at Risk allows the fast tracking of the project if it is required to meet financial, legal or legislative time schedules. After a GMP is negotiated and the detailed design is completed for critical elements of the project, selected stand-alone elements of the project can be put on a fast track for construction. The CM Team (Owner, Consultant, and CM/contractor) has the ability to selectively complete designs, bid packages, and construction management teams necessary to meet the goals of the project.

CM@Risk is an integrated concept that needs to be reflected in the owner's contracts with the CM Team. The process requires the communication and coordination of the entire team throughout the design, construction, and certification/start-up phases of the project. The CM@Risk and the Design/Build project delivery methods are being used as the preferred method by many school systems in the State of Florida.

The State of Florida has continuous construction activities underway for its numerous agencies, departments, commissions, and legislative organizations. The Department of Management Services (DMS), Division of Building Construction, has the responsibility to manage the construction for these entities. About 10 years ago, they looked for a better method of project delivery than the "low bid" method, the State standard, and the project delivery method required under the State procurement laws. DMS is assisting these local government entities in the CM@Risk or Design/Build project delivery systems. DMS is providing training to the construction management staffs of the local school boards, cities, and counties so they can implement these project delivery systems on future projects.

CM at Risk – Application to STA 3/4 Design and Construction

The CM@Risk process is a delivery system which has the opportunities to meet the Program goals of STA 3/4. The CM@Risk delivery system is like a three-legged stool with the project being the seat and the three legs being the CM Team. All three components are necessary to support the project goals. All three legs must support their share of the stool weight and function as a single Team.

The CM@Risk delivery method reduces the real time required to complete the project from conception to completion. Time and dollars are saved in the solicitation of contractors and the reduced uncertainties encountered with the CM process when compared to the traditional delivery method of "low bid".

The application of the CM at Risk delivery method for the STA is compared in table 1.

STA requirement	CM @ Risk benefit	Traditional approach
Construction of the STA by 1 Oct 2003 – in operation – which requires a 6 – 12 month grow-in period for the cattails to develop	Allows fast tracking - component construction as the detail design is complete and the bid packages are developed	Provides for opportunities to bid elements separately – but requires the management of numerous prime contractors
Design and peer review of the 30%, 60%, & 90% detail designs are required to ensure quality and constructability	CM is contracted to fulfill the peer review and the constructability review with significant input to schedule and construction phasing	A separate peer review consultant is hired to conduct the reviews at the designated phases – contractors are not part of the review - a construction phasing plan is not possible without the contractor (s) on board
Construction bid protests have been a major concern for the attainment of project schedules in other STAs	The CM is hired through the CCNA process based on qualifications and is on board throughout the design and construction phases –	There is no control of the bid protest possibility with this delivery method – the contractor is not on board until the detail design is complete and the bid packages are advertised
Construction dollars are limited for the project – control of design and construction costs are essential to the successful completion of the project	The GMP for the project is negotiated in the 75% design phase and is fixed for the entire project – it will not be exceeded without the owner requesting a change order	The low bid price for each of the construction contracts can not be determined – except through the cost estimates – until the actual elements are bid. These are the lowest construction price – contractor cost increases due to changing site conditions and plan interpretations are more likely under this delivery method
The design requirements need to include the flexibility to include the implementation of supplemental technology to attain the 10 ppb concentration of phosphorus	The CM method provides the flexibility to implement the supplemental technology late in the design process and during the construction	The traditional method will not provide the opportunity to modify the design late in the design process and into construction – without the contractor fully involved in the design process the ability to implement changes in the construction methodology or schedule are limited
Significant elements of the previous STA construction can be implemented economically such as the operation of an on-site batch plant, the direct contracting with a blaster to ensure standardized economic application and technical quality, and the requirement of single design cross sections for specific levees	Economic and technical requirements of the project can be instituted in the design and the construction phasing with the CM as peer review role and as the prime contractor – subcontractors will have the same understanding of the construction phasing through the pre-qualification process	Options for these contract elements can be alternatives in the bid process – but final selection of the methodology and phasing are the responsibility of the low bidder – the owner in the past has resisted the opportunity to require construction methods – indicating that the bids would reflect the limited contracting environment
Minority and women owned business opportunities are written into the projects through contract percentage goals of M/WBE participation	Enhancement of the opportunities to include mentoring of the M/WBEs is an attractive element of the CM role in the construction of the STA – improved performance of the M/WBE firms can be identified in past CM delivery methods for projects – increased monitoring and upfront owner involvement	The contract goal for M/WBE participation is the only opportunity for program enhancement within the low bid process – pre-qualification of the M/WBE subcontractors is not an option under the current process of certification and prime contractor selection of these companies
Value engineering can be a critical element of the design process to enable the contract to proceed with the highest quality and within the approved schedule	Value engineering is accomplished during the design process which minimizes the possibilities of project delay due to value engineering after the design is completed and the contractor has started construction	Value engineering can only be a contractor input after the contract is awarded and the contractor and subcontractors have started construction – delays in production can be the result of cost savings at this late phase in the project

Table 1. Application of the CM at Risk Delivery Method for the STAs

Summary

The application of CM @ Risk for the construction of STA 3/4 is considered an alternative project delivery method that provides opportunities for time and cost savings. The selection of the CM/contractor will allow selection of the most qualified CM/contractor who will assume roles of peer reviewer and construction manager.

The time required by certain aspects of this delivery method and the opportunities to reduce the time for construction through fast tracking and construction sequencing provide the buffer needed to meet the deadline.

This method also provides the opportunity to be flexible for the implementation of supplemental technology, should the research provide clear direction as to the technically feasible and cost effective alternative. Although the same facility or project was not constructed using both the traditional and the CM @ Risk methods, a cost comparison could be accomplished. Costs in terms of initial, operational, and maintenance would tend to favor the CM quality and reject the low bid traditional method of project delivery.

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