

Addressing Infrastructure Challenges Using the CMAR Method: How Fremont, Ohio Found Success with the Construction Management-at-Risk Delivery Method

Substantial reduction of state and federal funding for public infrastructure projects is the new reality facing municipalities and utilities, including the City of Fremont in rural northwest Ohio. Fremont's Water Pollution Control Center (WPCC) was built in 1949 and aging rapidly – the sewer treatment plant and storm drainage system were no longer adequate to support the town's population and was becoming a pollution risk to the nearby Sandusky River. Driven by increased federal- and state-mandated environmental protection pressure and the desire to provide updated services to residents, Fremont turned to an alternative project delivery method, known as construction management at-risk (CMAR).

The CMAR delivery method has become a go-to choice for large-scale infrastructure projects thanks to start-to-finish collaboration between the agency/owner, the design firm and the CMAR firm. The CMAR firm serves as a consultant during the design phase, then acts as the general contractor during the construction phase.

This article will provide a number of practical suggestions for building an effective working relationship between public officials and contractor representatives when considering the CMAR method.

The Challenge

The City of Fremont is located in rural northwest Ohio. The Sandusky River travels through the heart of the city, before emptying into Lake Erie. The river has important recreation and economic value to the community and is a spawning area for Lake Erie Walleye game fish. It's also the source for Fremont's drinking water and the destination for its treated wastewater and combined sewer overflow (CSO) discharges.

Like many parts of the country, Fremont relied on an aging and increasingly ineffective wastewater and storm water collection system with many sections originally constructed more than 100 years ago. The city-owned wastewater treatment plant, the Water Pollution Control Center (WPCC), was constructed in 1949, with the last significant upgrade being in 1988. This combined sewer system conveys dry weather flow to the WPCC at approximately 6 million gallons per day (mgd). The plant was sized to effectively process the dry weather flow, but during heavy rain or snowmelt the combined raw sewage and storm water volume far exceeded the collection system and plant capacities, causing a regular overflow of this discharge into the Sandusky River – this occurred 70 times in 2013 alone.

In 2012, Fremont's Water Pollution Control Center was in major need of upgrades:

Constructed in
1948



Combined
sewer system

Managed
6 MILLION
gallons per day

Last updated in
1988

Sized effectively for dry weather flow, but...



Not able to handle heavy rain or snowmelt



Not in compliance with EPA requirements for CSO-related pollution

Pollutants from these CSO discharges can include bacteria and other pathogens, organic loading, solids, floatable debris and nutrients. Yearly summer algae blooms in Lake Erie fed by farm runoff and nutrients released from the aging waste water collection and treatment systems were identified as a significant environmental threat.

Under the Clean Water Act, the Environmental Protection Agency (EPA) issued a policy in 1994 requiring municipalities to make improvements to reduce or eliminate this type of CSO-related pollution. The implementation and enforcement of this policy was furthered by the National Pollutant Discharge Elimination System (NPDES) permit program administered by state environmental agencies, including the Ohio EPA.

After years of sidestepping compliance, in 2012, the state and federal agencies required Fremont to take action by imposing NPDES discharge permit requirements that the liquids treatment phase of the WPCCC be re-built by the end of 2015 and other costly long-term control plan improvements to the collection system be completed by 2028.

Because no long-term asset management plan for

water and sewer systems had previously been developed, Fremont faced a number of hurdles.

Paying for the project was a significant challenge. Diminished presence by manufacturing companies that had previously driven the locally economy had negatively impacted Fremont's income tax base, which had helped subsidize water and sewer operations. State allocations for infrastructure projects had also been reduced substantially. Further complicating funding, Fremont's construction of a new reservoir to store water taken from the Sandusky River went tens of millions of dollars over the initial project budget by the time it was completed at the end of 2012.

This situation required Fremont to implement a plan for substantial yearly increases in water and sewer rates for local residents, who have median household income 30 percent below the state average. An Ohio EPA Sewer and Water Rate Survey showed a 20 percent increase in Fremont's annual residential water rates from 2010 to 2011 and a nearly 30 percent hike in sewer rates over the same period.

Expansion and enhancement of the WPCC became the focus for a newly elected city administration and city council. The project would become the largest public project ever undertaken by the city.

The Solution

With a matter of just a couple years to meet regulatory requirements and significant budget concerns, Fremont established project parameters: 1) they needed a construction management partner to oversee design through construction completion, 2) they wanted separate contracts to handle design and construction as a means to improve project oversight, 3) they wanted a procurement process that was quick and supported selection of locally-based subcontractors and suppliers, and 4) they needed a guaranteed maximum prices to avoid cost overruns.

The construction management-at-risk (CMAR) delivery method was identified as the best approach to meet the city's desired parameters. As compared to the more traditional design-bid-build delivery method, CMAR relies on heavy collaboration between the agency/owner, design firm and construction firm resulting in well-managed or reduced costs and timely project completion. CMAR has become a go-to choice for large-scale infrastructure projects – in fact, within the last 10 years, 54 percent of all major water and wastewater project agency/owners are trying an alternative delivery method, like CMAR. According to a survey by R.W. Beck (Acquired by SAIC in 2009), 96 percent of owners would select an alternative delivery method again.

Fremont was the first statutory law city in Ohio to utilize the CMAR method on a water pollution control center. Since 2011, most public authorities in Ohio, including municipal corporations, townships, school districts and counties, are permitted to use the CMAR method of planning and constructing public works projects. Under state law, the CMAR contractor is selected in accordance with a competitive and open process based on the value they can bring to all phases of a project. The process is initiated with a broadly distributed request for qualifications (RFQ) and the application of a scoring process in reviewing proposals received from responding companies after having multiple meetings.

As a result of the selection process, Fremont chose Colorado-based MWH Constructors (MWHC) as the CMAR contractor for the WPCC project.

Realizing the Benefits of the CMAR Method

Fremont's project success described below was largely due to a willingness among local officials to engage in the design and planning of the project and the development of a close working relationship with the design firm and MWHC. A few examples of how this was accomplished, recommendations or best practices and key learnings from the WPCC project are included below:

“Open Book” Collaboration

The CMAR method fosters a transparent procurement process and cost expenditures. Communication is facilitated by the “open-book” nature of the parties' relationship, where

information concerning the costs, risks and available design and material alternatives associated with the project are jointly known and managed by the parties throughout the project. Because the agency/owner, design firm and CMAR contractor work in informed collaboration, the costs of project components are clearly determined and known by all parties. If the cost of a project component seems likely to increase, the CMAR contractor is in a better position to explain the reasons for the expenditure and offer alternatives that will meet the wants or needs of the agency/owner while minimizing a charge to the contingency built into the GMP. Fremont and MWHC provided regular updates regarding project status to the city council and with the public via local news outlets.

Key Benefits of the Construction Management-at-Risk Delivery Method

- ☑ Greater transparency and collaboration between firms, leading to efficiencies in design and constructability reviews, cost tracking and development, value engineering and sequencing and scheduling
- ☑ Accelerated schedules and cost savings thanks to early input from the construction firm during the design phase
- ☑ Increased local economic impact by allowing participation by locally-based vendors, consultants, designers, contractors and labor

Although the CMAR process is designed for success, the “open book” collaboration also allows for easy dissolution of the contract should services be unsatisfactory, determined not to be needed or the cost is exceeding what the agency/owner can afford. With the contract structured in preconstruction and construction phases, the agency/owner can use its increased knowledge of project costs and risks to make this decision at reviews that typically occur at 30 percent, 60 percent and 90 percent of project design, during the procurement process and when a GMP is negotiated for each phase of the project.

Contract Cost

CMAR contractor proposals should include firm costs for preconstruction services and the administration of the construction phase of the project under a CMAR contract form that is being used for the project. There will also be a contingency amount and a contractor’s fee typically expressed in percentages of the final construction costs. From this, the proposals will then include a projected overall project cost. Several states have forms that are required to be used so the information is presented in a uniform manner for the objective evaluation and ranking of proposals.

Due to the uncertainties present at the 30 percent design stage hiring of the CMAR contractor and opportunities available to reduce the cost using the CMAR method, the initial construction phase cost used in the CMAR contract may be quite different from the final cost of the project. This

initial cost will need only be the best educated guess and a balance between the interests of the agency/owner and contractor.

Fremont adopted a strategy of keeping this initial cost low as a goal to work toward in the preconstruction phase. The City anticipated that in the process of completing the project design various alternatives and treatment components would be explored. It expected that a good CMAR contractor would provide input regarding constructability issues and, based on experience, work with the city and design firm to develop available alternatives for achieving desired performance at a lower cost.

In Fremont, initial projections by city officials and the design firm put the WPCC estimated total cost of construction at \$57 million based on the incomplete 30 percent design and the proposal received from MWHC. This amount was then used as the construction phase cost in the CMAR contract with MWHC.

Educating key stakeholders on how this process works is key. An agency's governing board or city council may view the 30% cost estimate number as the project "budget," instead of a what can be an effective negotiating number. They must appreciate that development of the GMP by the agency/owner and contractor only after the plans and specifications have been completed is a principal advantage of the CMAR management method over the traditional methods. If possible, the proposed GMP amendment should be prepared by the contractor after subcontractors have been selected through the procurement process. This will reduce the risk to all parties and the contingency amount included in the GMP amendment.

Procurement Planning

The procurement plan is an essential tool in the preconstruction phase, serving as a central source for managing project costs and reducing uncertainty in eventual negotiation of the GMP amendment(s). A well-developed plan will have a number of bid packages for the procurement of labor and materials. These packages are provided to subcontractor firms that have been pre-qualified by the CMAR contractor. It is a best practice, and required under the law in several states, that if the CMAR contractor wishes to self-perform any work, it must compete in the bidding process.

Additionally, if the scope of the preconstruction services includes the development of the procurement plan and bidding, the contractors submitting proposals will have an incentive to keep the contingency percentage lower. The parties will have to agree on whether and how to share contingency funds left over after the construction phase has been closed out.

Fremont found greater success with smaller bid packages, providing more effective control of project costs and expanding the pool of subcontractor firms available to compete to provide services or materials at more competitive prices. On a number of occasions, after discussing the

details of bids received for a project component with the City, MWHC revised the bid package and solicited new bids to explore potential cost savings.

Cost Savings

In the case of Fremont's WPCC project, collaboration led to savings of \$5.5 million during the design phase and more than \$500,000 in the construction phase – this was accomplished by MWHC participating in value engineering workshops, creating updated schedules and cost estimates, conducting constructability reviews, preparing all front-end bidding documents and regular communications with the complete team.

One of MWHC's initial tasks was to use 30 percent of the design documents and create a projection of additional necessary work and project components to provide a construction cost estimate. From this work, it was determined that the project was on track to be substantially more expensive than the \$57 million project cost estimate. In response, further value engineering sessions with the agency/owner and design firm were conducted to adjust the design to lower the cost occurred at 60 percent and 90 percent of project design. This process yielded the cost savings noted above.

Notable cost saving items during preconstruction contributed to the savings include:

- Combining the return activated sludge (RAS) thickening facility and dewatering facility into one unit. As a result, MWHC was able to eliminate a building and a centrifuge saving approximately \$1 million.
- Changing the administration building to a pre-engineered structure with a savings of approximately \$500,000.

Cost-effective solution for Fremont WCCC

A total savings of
**\$5.5
MILLION**
during the design phase



\$500,000
during the construction phase

Another cost savings opportunity is the agency/owner's insistence that the CMAR contractor employ a quality control/quality assurance program (QC/QA) that requires input from the complete project team throughout the project. This allows for a reduction in the scope of the design firm's construction phase services. Rather than the normal construction phase services, Fremont and the design firm developed a scope of work that supplemented the MWHC QC/QA program, while allowing the design firm to meet its legal responsibilities. Also, once construction commences, the CMAR contractor is constantly involved in the oversight of the subcontract companies, helping to manage costs and solve problems as they arise. The effect of this collaborative approach produced a further savings to the city of \$1 million

Agency/Owner Involvement

Establishing a highly collaborative environment is key for all project partners, but especially for the start-to-finish success of the agency/owner. Agency/owner personnel directly involved throughout the CMAR hiring, preconstruction and construction phases of a project provide a number of advantages and, as in the case of the WCCC project, are essential if the plant must remain operational during construction.

Early formation of the internal agency/owner working group allows a variety of personnel to have input in the selection of the design firm and provides an opportunity for a broad understanding of the project. The people who are operating the water treatment plant, wastewater treatment facility or are responsible for maintaining other infrastructure assets best know the needs of their agency and can better anticipate the impact of construction on existing facilities. In-house engineering personnel can quickly provide needed technical input. Senior management is aware of the overall financial needs of the agency and various alternatives for funding the project.

Economic Impact

The CMAR method provided Fremont with a boost to the local economy by reinvesting project dollars into local construction service providers and suppliers. Local participation in the project also led to an increase in income tax revenue collected by the city from the local companies.

MWHC designed bid packages and reached out to local companies in the pre-qualification process to maximize the opportunity for local companies to participate in the project. More than 50

percent of the WPCC project cost was spent on local companies. The concrete, masonry, mechanical, plumbing, HVAC and administration building electrical work were all provided by local contractors based in Fremont. This resulted in more than \$30 million being returned to the local economy, a significant impact to a town the size of Fremont. Additionally, the CMAR approach allowed 10 percent, or approximately \$5.8 million, of the project to be performed by EDGE minority and women-owned contractors.

Addressing Challenges During Construction

As with most major construction projects, costs typically increase due to unforeseen events during construction that could delay work on the project while the design and engineer firm work through a solution to the problem. In the CMAR approach, the contractor has the advantage of being familiar with the site, possessing design/engineering expertise and an already established relationship with the design firm for the project to not slow down the process. The CMAR contractor can also rearrange work schedules to allocate resources to another site area while a design fix is planned for the problem component.

During construction of the WPCC project, a large portion of the new influent line conflicted with the existing potable water feed for the existing plant. Because the potable water needed to remain operational in the existing facilities, MWHC developed a plan to install the new feed earlier than scheduled. This allowed the team more time to take the old line out of service and demolish some of the facilities in a later phase in order to install the new influent line. Valves in the new water main allowed the line to be energized one piece at a time.

The Home Stretch

To date, Fremont's WPCC project has met the state and federal EPA regulatory requirements in keeping with the mandates despite significant hurdles like an extremely harsh winter in 2014. The liquids treatment portion of the project went on-line in February 2016 after MWHC developed and executed a comprehensive startup plan. MWHC trained city staff on the operation of plant equipment and computer systems. The entire project is expected to be completed in January 2017.

[Insert Austin WTP4 case study from last year's Economics of Water report?]

Fremont had great success with the WPCC project as a result of the CMAR delivery method, and numerous lessons learned:

Establish relationships with knowledgeable partners – The success of a CMAR project is dependent on experienced design and construction teams that have demonstrated a willingness to collaborate.

Manage the contingency budget in all phases of the project – Ensure all project components are subject to competitive bidding before agreeing on a GMP for each phase to minimize risk of unforeseen costs.

Continuous, open communications with project partners and the local community –
From the bidding process to the regular budget updates delivered via local newspapers, ensuring all stakeholders understand the process, next steps and the overall status of the project is key to staying ahead of project problems.

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