Prepared for:

Texas Association of Clean Water Agencies San Antonio, Texas

CMAR Preconstruction Service Expectations

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Presentation Topics

- 1 Texas experience with CMAR
- 2 Preconstruction service expectations
- 3 The "Big 7" preconstruction service tasks
- 4 Summary and recommendation

Texas experience with CMAR



In 2011, Texas promulgated statutes for the CMAR project delivery method

- Early project results were mixed
 » Some CMAR projects morphed into DB projects
 - »Selection criteria resulted in "price based" CMAR awards
- Today's projects
 - »Good but sometimes inconsistent results



02

Preconstruction service expectations



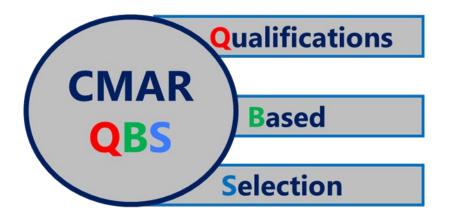
Every CMAR project will have both typical and unique expectations for the preconstruction phase

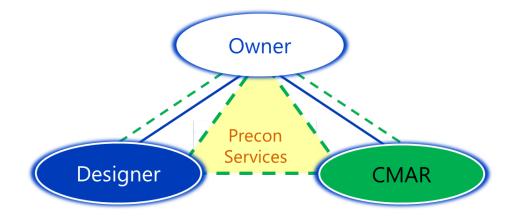
- Typical
 - » Team member collaboration
 - » Balanced risk profile
 - »Cost certainty
 - » Shorter project schedule» Final GMP within the budget

• Unique

» Engaging a "dream" team
» Meeting specific project goals
» Coordinating with other projects
» Shifting of specific risks

CMAR delivery is flexible and easily accommodates most preconstruction expectations



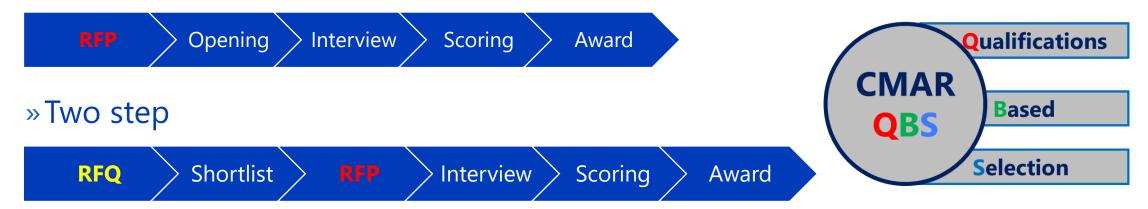




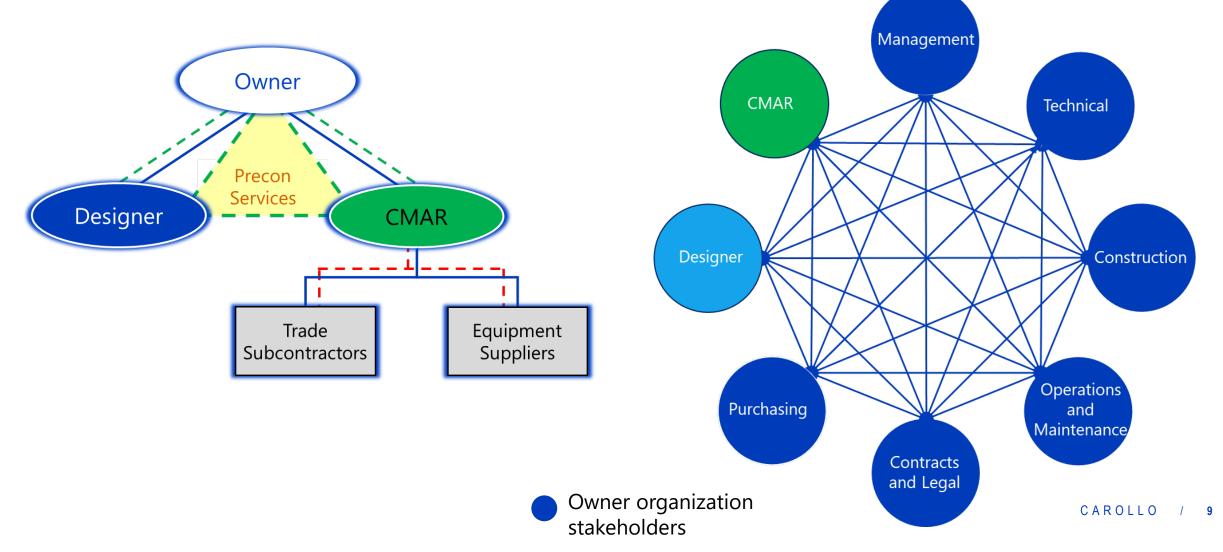


1 - QBS process is focused on selecting the best contractor and initiating early project team collaboration

- Two QBS procurement processes
 - »One step



2 - Contract and communication lines are designed to promote collaboration



3 - Competition and transparency of all project costs promotes trust and confidence

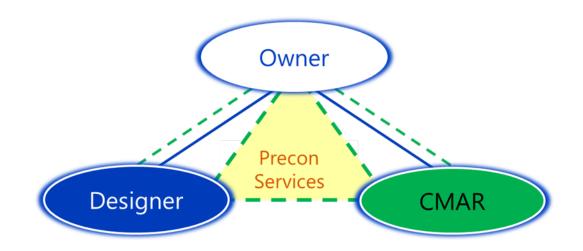
- Buyout process is completely "Open Book"
- Construction cost competition for all work
- Owner makes Best Value decisions





4 - Reduced project risk benefits all members of the CMAR project team

- For this delivery method:
 - »All project team members are subject to risk
 - » Risk management is a team effort







Even if you have a great CMAR Team, do these 4 benefits just automatically happen?

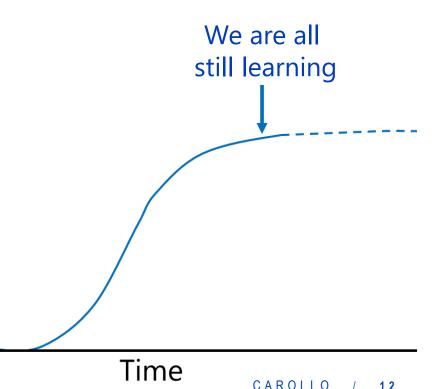
The 4 benefits don't automatically happen
 »There is no standard approach to CMAR delivery
 »Expectations and goals not well established
 »Varying team/team member experience









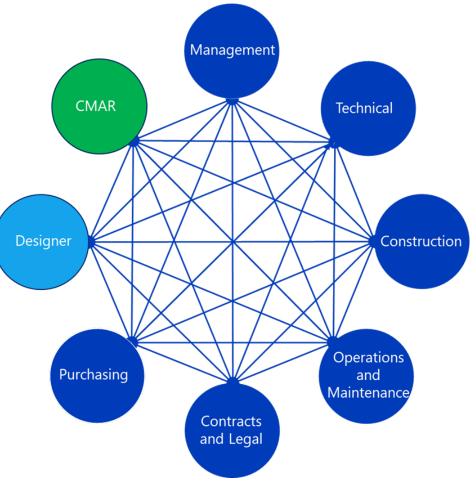


The "Big 7" preconstruction services tasks



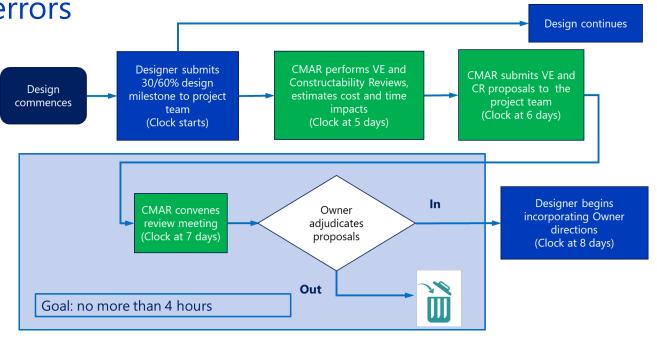
CMAR project delivery benefits rely on the successful completion of 7 key preconstruction activities

- 1. Design reviews
- 2. Site investigations
- 3. Formal approach to risk management
- 4. Cost model development & management
- 5. Early out work packages
- 6. CMAR procurement plan implementation
- 7. Training workshops



1 – Design reviews drive innovation and efficiency

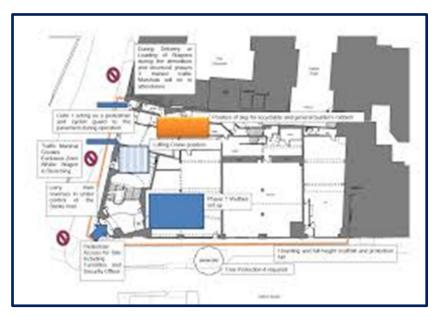
- Review types
 - » Value engineering and constructability
- Review purposes
 - »Identify: savings, risks, design errors
 - » Improve constructability
- Review processes vary
 » Finite duration 8 workdays
 » Focus on needle movers



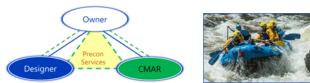


2 – Site investigations confirm existing conditions

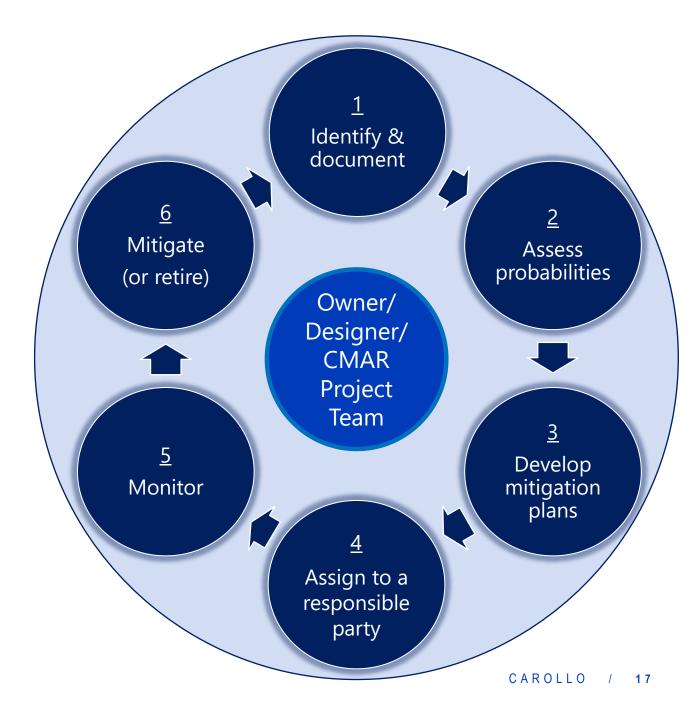
- Examples:
 - »Underground utility locates»Existing facility condition assessments
- Scoping is a collective exercise
- CMAR performs the investigations
- Results inform design and construction approach







- 3 Formal approach to Risk Management
 - Risk management begins early in the project
 - Risk register is regularly updated
 - Risk Register helps identify cost and schedule trends

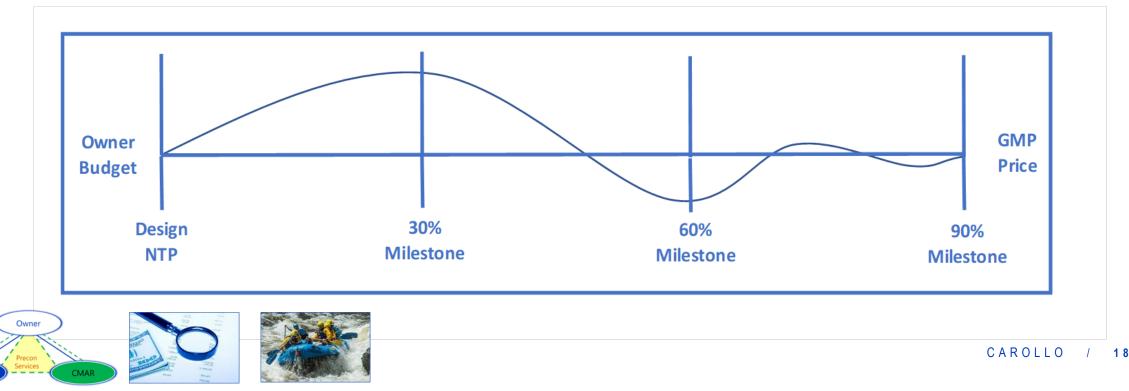




4 – Cost modeling helps keep the project scope within the Owner's budget

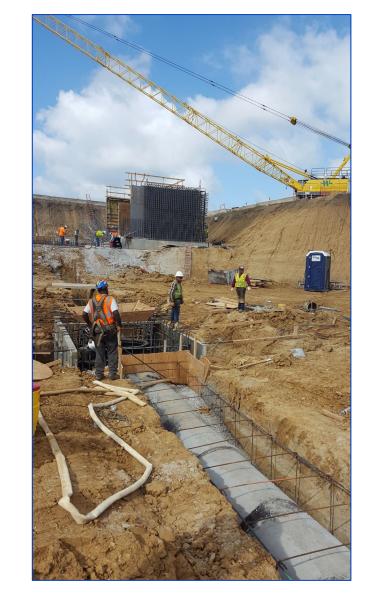
- Two independent estimates
- Each estimate utilizes a common basis
 - » WBS, crew compositions, labor rates, etc.

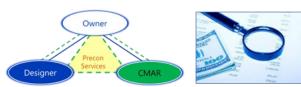
- Reconcile estimate costs line-by-line
- Compare results with the budget
- Adjust scope, as needed



5 – Early out subcontract and equipment work packages may impact the traditional design process

- Typical design impacts:
 - » Long lead equipment procurement
 - » Early work packages requiring partial IFC designs
 - Site prep, underground utilities, foundations
- Engage the CMAR early, understand their:
 - » Construction and buyout approach
- Assess the impact on design efficiency and effort
- Adjust the design scope of services, as applicable





6 – Implementing the CMAR procurement plan requires Designer support

- CMAR premarketing efforts
- Developing technical content for: » RFB's and RFCSP's » Equipment RFQ's
- CMAR's bidding process
- Selection committee membership
- GMP negotiations

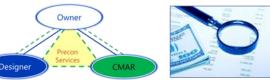
Sunshine Water Treatment Expansion Project CMAR Procurement and Buyout Plan

1. CMAR's Approach to Project Procurement

- 1.1. Introduction
- 1.2. Purpose of the Procurement Plan
- 1.3. Buyout Strategy
- 1.4. Procurement Practices
 - 1.4.1. Development of Work Areas and Subcontract Packages
 - 1.4.2. Identification of Proposed Self-Perform Work Packages
 - 1.4.3. Competitive Bidding process

2. The Project

- 2.1. Work Area Identification
- 2.2. Subcontractor Work Package Descriptions
- 2.3. Equipment and Material Purchase Package Descriptions
- 3. Receipt and Evaluation of Proposals and Quotations
 - 3.1. Subcontractor Work Packages
 - 3.1.1. RFSCP Openings
 - 3.1.2. CSP Evaluations
 - 3.2. Equipment Purchase Packages
 - 3.2.1. Quotation Openings
 - 3.2.2. Quotation Evaluations
 - 3.3. Scoring Approach
- 4. Schedule
 - 4.1. Procurement Milestone Schedules



7 – Training workshops educate, inform and set expectations

- CMAR procurement
- CMAR contract development
- Risk management approach
- CMAR competitive bidding process
- Selection committee responsibilities
- GMP development and negotiation
- Project partnering

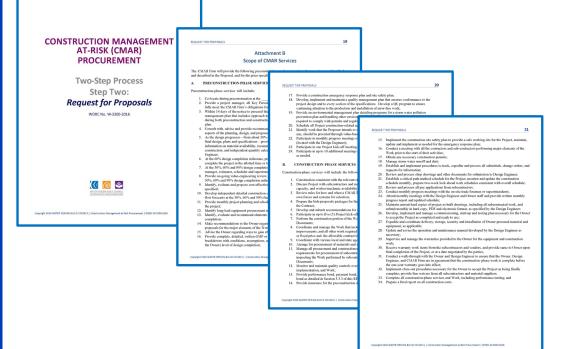






Successfully completing these 7 tasks requires coordinating the scope of services with the Designer and CMAR

• 2016 state of the practice for W/WW preconstruction services scope



• The upside

»An early attempt at a standardized scope

- Limitations
 - »Summary task descriptions»Only addressed the CMAR's scope services
- But it was a start....

Aligning the Designer and CMAR preconstruction scopes of work provides clarity and establishes responsibilities

- For each project milestone and preconstruction task, provide:
 - » Task narratives
 - »Subtask descriptions
 - Scope of services required
 - Entity leading the task
 - Entities supporting or contributing
 - Level of effort expected
 - » Deliverable identification
 - Description of work product
 - Completion date(s)
 - Format (paper, digital, other)



An aligned preconstruction services scope will be comprehensive and clearly set expectations

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 in set in set				undated on a month	by basis in accordance with the					1.7 Monthly Project Reports	CMAR shall identify and track project developments requiring timely resolution on an Issues Log.
 in set in set	CNAR					besign milescone. specific is			incorporating the results of the review meeting.		Generally, the Log will identify the issue, the party responsible for resolving the issue, and the
 in set in set						 P&IDs / Control Strategi 			Tool 4.14 Construction Decomposite Disaster		timeline required for issue resolution. The issues Log shall be maintained through both the
 in set in set				will be incorporated	d into the CMAR's GMP Property	 Resident Resident store 		and 6.2.		constructability review spreadsheet	preconstruction and construction phases.
 in set in set	-tion			ha				Task 1.10.3 Weekly Design Progress Mee			
 in set in set				Task 1.7 Project Reporting		 Structural and Architect 				1.11 Safety Plan	
 in set in set	- nCTILICUS	Phase shall begin upon acceptance and execution of the CMAP	Task 1.5 Contract Management and Administration	By the 10 th day of th	he month CMAB will researce	Civil and Yard Piping					
 in set in set	Duccousting	The sector sector is the feature start for the sector is a feature start of the sector is a sector is	This task involves managing the Preconstruct								phase. The Rak Register shall be used to establish the project contingency budget.
 in set in set	DIPLOT							address project specific issue		1.13 Cost Model Merro	Task 3.2 30% Design Value Engineering and Constructability Review
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 in set in set	CCONFU									Final Construction Procurement Plan	improving the design while maintaining the designs intent.
 in set in set						50% design milestone.					CMAR shall perform an initial Value Engineering and Constructability Review on the 30%
 in set in set			Task 1.4 Project Management System			Design Progress Value Engin					design deliverables and current 3D model. Value Engineering or Constructability comments
 in set in set		Task 2 - Permitting Assistance	CMAR shall implement a web-based project r					confirmation of facility as-builts, and assessm		Task 2 - Permitting Assistance	
 in set in set	icos	Task 3 - 30% Design Review	preconstruction and construction phases of t					CMAR will develop a colory class suitable for			positive or negative benefits, as well as an order of magnitude assessment of the impact to the
 in set in set	$C \propto 1/1000$	Task 4 - Site Investigations		at a						The purpose of Task 2 is to support EPW and their Engli	project cost and schedule. The CMAR will submit the spreadsheet to EPW and the Engineer for
 in set in set	CEI VIS-		licenses as are required to support the project							Task 2.1 Engineers Permitting Plan	review and evaluation.
 in set in set					I days of Notice to Proceed.						
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H11 More Megerangement manufactor Marine Marin Marine Marine Marine Marine Marine Marine Marine Ma						members not based in El Pa				Permitting Assis	The CMAR will incorporate EPW approved modifications resulting from this review into the
111 In the state data the state dat	- · · · · · · · · · · · · · · · · · · ·	stakeholders. Services to be provided by the CMURCare detaile	ed in requirements. Additionally, the plan will iden			virtual meeting. The forum					
With Standard rade from Standarad rade from Standarad rade from Standard rade from Standard rade		Task 1.1 Develop the Project Management Plan	Engineer staff. The draft plan will be submitte	for submit minutes for	r each progress meeting.	in pdf format. Models will b			EPW's comments within 7 days of the workshop.		cost and schedule.
$ \frac{1}{1} 1$					Meetings	depending on alignment wit			Project Management		Total 2.2 All states Product Markets and
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Task 3.3.2 30% Design Workshop DW-2		additional borings if preded beyond those	Exhibit 2.1 Contractors Precons	Exhibit 2.1 Contractors Precons	Exhibit 2.1 Contractors Pre				
Workshop DW-2 will be convened to formally the results of the CMAP(s 30% design review t	Task 4.2	this task will include two meetings/site visi Subsurface Utility Verifications	Site Investigation Del	The CMAR will incorporate EPW approved modify Design Evolution Log to record design modification	comments, CMAR will convene a meeting (n	Exhibit 2.1 Contractors Preco	Exhibit 2.1 Contractors Preconstru	Exhibit 2.1 Contractors Pro	
Task 1.1.1 10% Desim Workshop DW-1	1406 9.2	CMAR shall assist the Engineer in field verif	Task Deliverable	cost and schedule.	comments on the Plan. CMAR will submit a within 7 days of the review meeting,	Engineering and Constructability Review comm project scope and design.	6.2 Milestone value engineering and constructability review spreadsheet	workshop (not longer than 4 hours) to preve	Exhibit 2.1 Contractors Preconstruction Services
Within three weeks of DW-2, the Engineer wil		boundaries of the site work areas. CMAR sl subsurface utility verification services. CMA	4.1 Site plan illustrating locations for proposed additional soil borings	Task 5.3 60% Design Workshops	60% Design Review	The CMAR will incorporate EPW approved mo Design Evolution Los to record design modific	Updated Design Evolution Log 6.3 99/5 Design review comments	workshop is to 1) familiarize EPW with the p selection of trade subcontractor bids and su	Task 8.3 GMP Proposal Reconciliation
resolutions to the CMAR and EPW's 30% desig		meetings/site visits/investigations. Enginee documentation of the findings with a mem	4.2 Merro and site plan illustrating utility verification locations and findings	Three Design Workshops are to be conducted with design documents. Each workshop is to be schedu	Task Deliverable 5.1 Updated Design Evolution Log	cost and schedule.	6.4 90% Class 2 cost estimate	Task 7.5 Negotiation of the GMP Proposal	Based on the results of the 100% design review workshop, CMAR will revise the GMP Proposal, as required.
Task 3.4 30% Cost Estimate		determine if the utility verifications identify	4.3 Annotated record drawings 4.4 Facility Condition Assessment Plan	Task 5.3.1 60% Design Workshop DW-4	Updated issues Log Updated Risk Register	Task 6.3 90% Design Workshops (DW-7, DW-8, DW-9)	6.5 90% Class 2 cost estimate update Updated Design Evolution Log	Within 14 days of the GMP Proposal Preserv	100% Design Review Deliverables
CMAR will prepare a Class 4 cost estimate on the 30% established by the Association for the Advancement o		project. Verification of Av-Built Conditions	Technical Memo Meeting minutes	Workshop DW-4 will be held as soon as the documents. At this workshop the Engineer	5.2 Milestone value engineering and constructabilit review survaduheet	Three Design Workshops are to be conducted a design documents. Each workshop is to be sche	Task 7 - GMP Pronosal Prevaration	series of meetings to negotiate the GMP Pro GMP Deliver	Task Deliverable Quantity Media 8.1 Undated Desize Synthesizer (2010) 8.1 Undated Desizer Synthesizer (2010) 8.1 Undated Desizer
Practice 198-97. The CMAR will prepare the estimate submit to the Engineer and EPW for review. The 30% of	Task 4.3	Verification of As-Built Conditions CMAR shall assist Engineer in the validation	4.5 Draft MOPO Plan(s) Final MOPO Plan(s)	the CMAR. Within two weeks after the con summary of review comments focused on	Updated Design Evolution Log 5.3 (60%) Design review comments	Task 6.3.1 90% Design Workshop DW-7	CMAR will develop and negotiate the GMP proposal in accordance wit	Task Delverable	Updated Issues Log 8 Hard copies and 1 digital PDF file Updated Risk Besiter 8 Hard copies and 1 digital PDF file
changes identified on the Design Evolution Log.		identify constructability issues which may i participate in up to four on site meetings (s		coordination, and issues, if any, related to	5.4 60% Class 3 cost estimate	Workshop DW-7 will be held as soon as t documents. At this workshop the Entitiee	Plan. This task includes utilizing the 90% design documents for bidding packages, and requesting binding guotations for equipment and mate	7.1 Minutes from GMP Workshop 1 7.2 Undated Construction Procurement Plan	8.2 100% design review comments 1 Hard copy and 1 digital PDF file 8.3 Reconciled GMP Proposal 1 Hard copy and 1 digital PDF file
Task 3.5 30% Cost Estimate Presentation and Reconciliation CMAR will convene a meeting with the Engineer and E		and document as-built conditions through	Task 5 - 60% Design Review Task 5.1 Design Coordination	Task 5.3.2 60% Design Workshop DW-5	5.5 60% Class 3 cost estimate update Updated Design Evolution Log	the CMAR. Within two weeks after the or summary of review comments focused o	in accordance with the Construction Procurement Plan and Construct	7.3 Bid schedule Bid and solicitation advertisement/s)	1 Hard copy and 1 oppose 1 Hard copy and 1 oppose 1
CMAR will econore a meeting with the Lingneer and a and reconcile cost elements that appear to be misalig CMAR will ereware and submit a revised Class 4 entim	Task 4.4	Facility Condition Assessments	As the design is advanced from the 30% to 60% de	Warkshop DW-5 will be convened to recei	5.6 Revised Construction Procurement Plan	coordination, and issues, if any, related to	CMAR will develop the GMP proposal based on CMAR's recommendat and quotations for equipment and permanent materials. CMAR's reco	Bid and solicitation request(s) 7.4 GMP Proposal	
CMAIL will prepare and submit a revised Class 4 estim reconciliation review as well as an updated Design Eve		Several facilities are known to be in poor of While Engineer has identified and perform	Engineer through informal interaction, cooperation communication, CMAR will address day to day ma	present the results of the CMAR's 60% des		Task 6.3.2 90% Design Workshop DW-8	documented in an open book format. CMAR recommendations for aw oriteria. Examples of non-cost criteria include subcontractor/vendor g	7.5 Negotiated GMP Proposal	
30% Design Review Deliverab		poor condition, CMAR shall perform a mon extent of the rehabilitation limits, as well a	constructability, cost, maintenance of plant operat coordination, risk identification and their planned	Task 5.3.3 60% Design Workshop DW-6	Task 6 - 90% Design Review	Workshop DW-8 will be convened to forr review to the Engineer and EPW.	of subcontract and purchase order terms, and other risk factors.	Task 8 - 100% Design Review	
Task Deliverable C 3.1 Initial Design Evolution Log		rehabilitation measures to be put into plac ensure safety for CMAR, EPW and Engineer	and EPW seek support.	Within three weeks of DW-6, the Engineer resolutions to the CMAR and EPW's 60% d	Task 6.1 Design Coordination As the design is advanced from the 60% to 9	Task 6.3.3 90% Design Workshop DW-9	The GMP Proposal format will be developed consistent with the requi Contract.	Task 8 is focused on supporting EPW and Engineer in prepar	
Initial Issues Log Initial Risk Register		Within one week after completion of site o	Through this interaction, CMAR will actively update Issues Log, and Fink Register, and provide formal u	Task 5.4 60% Cost Estimate	As the design is advanced from the MAN to Engineer through informal interaction, coop communication. CMAR will address day to-	Within three weeks of DW-9, the Engine to the CMAR and EPW's 90% design revie	Task 7.1 GMP Workshop 1	project permitting and construction. Additionally, review co with the GMP Proposal, as required.	
3.2 Milestone value engineering and constructability review spreadsheet		technical memo describing the types and e repair or replacement, as required. CMAR v	Engineer and EPW.	CMAR will prepare a Class 3 cost estimate on the 6 established by the Association for the Advancement	constructability, cost, maintenance of plant	to the CMAK and EPW's 50% design reve Task 6.4 90% Cost Estimate	Following completion of the 60% design milestone, Cl (not loncer than 4 hours) with EPW and Ensineer. This	Task 8.1 Design Coordination	
Updated Design Evolution Log 3.3 30% Design review comments		with EPW and Engineer to present the com questions.	Task 5.2 60% Design Milestone Value Engineering and Cons CMAR shall perform a Value Engineering and Con	established by the Association for the Advancement Practice 19R-97. The CMAR will prepare the estima suberit to the Engineer and EPW for review.	coordination, risk identification and their pl and EPW seek support.	CMAR will prepare a Class 2 cost estimate on th	CMAR's approach to competitive bidding of the work, receiving, evaluating and recommending bids and out	As the design is advanced from the 90% to 3 Engineer through informal interaction, coop	
3.4 30% Class 4 cost estimate 3.5 30% Class 4 cost estimate update	Task 4.5	Plant Operations Interface	deliverables and current 3D model. Value Enginee from this review shall be recorded in a spreadshe	Submit to the Engineer and EPW for review. Task 5.5 60% Cost Estimate Reconciliation	Through this interaction, CMAR will actively hours Los. and Risk Resister, and provide for	established by the Association for the Advance Practice 198-97. The CMAR will presare the est	GMP.	communication. CMAR will address day-to- communicability. cost, maintenance of plant	
Updated Design Evolution Log		CMAR will conduct two workshops with EP MOPO Plans needed to facilitate project co	regative benefits, as well as an order of magnitud cost and schedule. The OMAR will submit the spre	CMAR will convene a meeting with the Engineer at	Engineer and EPW.	submit to the Engineer and EPW for review.	Task 7.2 Implement the Construction Procurement Plan CMAR will undate the Construction Procurement Plan	coordination, risk identification and their pla and EPW seek support.	
Task 4 - Site Investigations		and submit to EPW and Engineer for review	cost and schedule. The CMAX will submit the spre and evaluation.	and reconcile cost elements that appear to be mis CMAR will prepare and submit a revised Class 3 est	Task 6.2 Value Engineering and Constructability Revi	Task 6.5 90% Cost Estimate Reconciliation CMAR will convene a meeting with the Engineer	bidding the project. CMAR will use the 90% design do	Through this interaction, CMAR will actively	
CMAR shall coordinate with the Engineer and EPW to identify field inv development, prepare risk mitigation plans, and gathering information		EPW and Engineer will present their writte Comments will be resolved at the worksho	Within three weeks of the CMAR's submission to meeting (not to exceed two hours) to receive inge	reconcilation review as well as an updated Design	CMAR shall perform a Value Engineering at deliverables and current 3D model. Value E	and reconcile cost elements that appear to be a	provided in the trade subcontract bid documents, and quotations.	Issues Log, and Fisk Register, and provide fo Engineer and EPW.	
Maintenance of Plant Operations (MOPO) Plans during construction.		EPW and Engineer review and approval. Fin GMP Proposal.	Engineer on the CMAK's review comments. At this Engineering and Constructability Review comment	Task 5.6 Construction Procurement Planning CMAR will update the initial Construction Procurem	from this review shall be recorded in a spro negative benefits, as well as an order of ma	CMAR will prepare and submit a revised Class 2 reconciliation review as well as an updated Des	Task 7.3 Competitive Bidding	Task 8.2 100% Design Review	
Task 4.1 Geotechnical Investigations If additional protechnical investigations are deemed			project scope and design.	milestone. Revisions to the Plan will reflect the re- subcontractor, vendor and susplice present liferation	cost and schedule. The CMAR will submit th and evaluation.	90% Design Review De	CMAR will conduct the competitive bidding process in Procurement Plan. CMAR shall follow the bidding requ	CMAR will identify impacts to the project so advancement of the design from the 90% to	
If additional protechnical invistigations are deemed Engineer on the locations and number of soils boring				revised Plan shall be submitted to EPW for review completion of the 60% Design Workshop. EPW will	Within three weeks of the CMAR's submiss	Task Deliverable 6.1 Updated Design Evolution Log	Procurement Plan if they elect to compete for trade so Task 7.4 GMP Workshop 2. Provided Persentation	documented in the Design Evolution Log. 10 Log will be submitted to the Engineer and E	
Page 9 of 17		Page 10 of		7 calendar days of CMAR's submission. Within 7 ca	meeting (not to exceed two hours) to receil Engineer on the CMAR's review comments.	Updated Issues Log Updated Risk Register	Task 7.4 GMP Workshop 2, Proposal Presentation CMAR will develop the GMP proposal in accordance w	CMAR will schedule a workshop (lasting no	
			Page 11 of 17	Page 12 of 17	Page 13 of		Contract. Within 21 days after receipt of bids and quo	present and discuss the results of the 200%	
						Page 14 of 17	Page 15 of 17	Page 16 of	
								14ge 200	Page 17 of 17

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Summary and recommendation



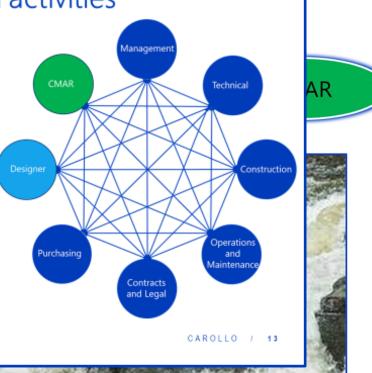
Summary - CMAR delivery is flexible and can accommodate most preconstruction expectations

CMAR delivery method benefits rely on the successful completion of 7 key preconstruction activities

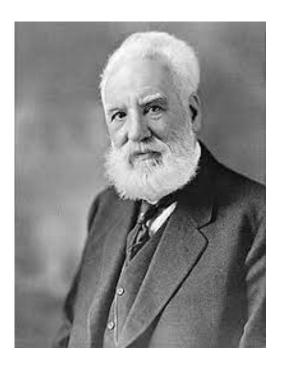
- 1. Design reviews
- 2. Site investigations
- 3. Formal approach to risk management
- 4. Cost model development & management
- 5. Early out work packages

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- 6. CMAR procurement plan implementation
- 7. Training workshops



Recommendation



"Before anything else, preparation is the key to success."

- Alexander Graham Bell

Planning for CMAR Projects

- Begin with developing an aligned precon scope
- Include this scope in Designer and CMAR procurements
- Refine both scopes during CMAR negotiations considering:
 - »CMAR's construction approach
 - »CMAR's buyout strategy
 - » Project team training needs
- Actively manage the preconstruction scope