

City of Austin



**A Report to the
Austin City Council**

Mayor
Lee Leffingwell

Mayor Pro Tem
Sheryl Cole

Council Members
Chris Riley
Mike Martinez
Kathie Tovo
Laura Morrison
Bill Spelman

**Office of the
City Auditor**

City Auditor
Kenneth J. Mory
CPA, CIA, CISA, CRMA

Deputy City Auditor
Corrie E. Stokes
CIA, CGAP, CFE

AUDIT REPORT

Construction Cost Management for Water Treatment Plant 4 Audit

November 2012



REPORT SUMMARY

The Contract Manager at Risk agreement does not guarantee that costs to the City will be limited to the Construction Cost Limitation (CCL) of \$359 million. Project management has initiated cost containment strategies; however, these have not been sufficient to keep costs within the approved CCL. In addition, through value engineering and deferrals, the preliminary plant design concept has been modified and certain components of the plant have been redesigned or downsized.

TABLE OF CONTENTS

BACKGROUND 1

OBJECTIVE, SCOPE, AND METHODOLOGY..... 2

AUDIT RESULTS..... 3

Appendices

Appendix A: Management Response 7

Appendix B: Comparison of Initial Cost Estimates to Contract Amounts 8

Appendix C: WTP4 Planned Capacities With Deferrals and Value Engineering Changes 9

Exhibits

Exhibit 1: CM’s Obligations Relating to WTP4 Project Costs 4

Exhibit 2: Cost Reductions from Allowable Value Engineering Details 5

Exhibit 3: Cost Reductions from Deferral Details 5

Exhibit 4: Total Difference from Original Estimate, Including Deferrals and Allowable Value Engineering Adjustments 6

GOVERNMENT AUDITING STANDARDS COMPLIANCE

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

AUDIT TEAM

Walton Persons, CPA, CICA, Assistant City Auditor
Henry Katumwa, CGAP, CICA, Auditor-in-Charge
Charles Holder, CPA, Auditor
Neha Sharma, CPA, Chartered Accountant, CIA, CISA, Auditor

Office of the City Auditor
Austin City Hall
phone: (512)974-2805
email: oca_auditor@austintexas.gov
website: <http://www.austintexas.gov/auditor>

Copies of our audit reports are available at <http://www.austintexas.gov/auditor/reports>



November 2012



Audit Report Highlights

Why We Did This Audit

This audit was conducted as part of the Office of the City Auditor's Fiscal Year 2012 Strategic Audit Plan.

What We Recommend

We have not issued any recommendations for this audit.



For more information on this or any of our reports, email oca_auditor@austintexas.gov

CONSTRUCTION COST MANAGEMENT FOR WATER TREATMENT PLANT 4 AUDIT

Mayor and Council,

I am pleased to present this audit on Construction Costs Management for Water Treatment Plant 4.

BACKGROUND

On November 11, 2009, the City of Austin signed a Construction Manager at Risk (CMAR) agreement with MWH Constructors, Inc. for the construction of Water Treatment Plant 4 (WTP4). The agreement provided for a Construction Cost Limitation (CCL) of \$359 million.

At a September 26, 2012 Audit and Finance Committee meeting, Austin Water Utility (AWU) management indicated that they plan to request an increase in the CCL of approximately \$15.5 million, bringing the project cost to about \$374 million, a 4.3% increase.

OBJECTIVE AND SCOPE

The objective of the audit was to determine if AWU can provide reasonable assurance that WTP4 will be delivered on budget.

The audit scope included project information related to WTP4 budget, scope, and schedule for construction, as provided for by the CMAR agreement.

WHAT WE FOUND

We found that the structure of the CMAR agreement does not guarantee that the cost to the City for WTP4 will be limited to the CCL of \$359 million. Instead, the agreement limits the City's cost at the individual construction contract level, where Guaranteed Maximum Prices (GMP) are set for each work package. Contractors agree to complete each work package at no more than their GMP or the Construction Manager is responsible for the additional costs. However, even at the individual GMP level, change orders for unexpected complications can increase the cost to the City.

Project management has initiated cost containment strategies; however, these have not been sufficient to keep the plant cost within the approved CCL. As of September 30, 2012, approximately \$354 million has been encumbered. Three remaining contracts, with an initial estimated cost of \$19.7 million, have not yet been awarded.

Through value engineering and deferrals, the preliminary plant design concept has been modified and certain components of the plant have been redesigned or downsized. Based on management's assertions, the plant will be capable of meeting its planned initial treatment capacity. These changes may lead to increased costs in the future.

We appreciate the cooperation and assistance we received from Public Works Department and AWU staff during this audit.


Kenneth J. Mory

BACKGROUND

On November 11, 2009, the City of Austin signed a CMAR agreement with MWH Constructors, Inc. for the construction of WTP4. The agreement provided for a CCL of \$359 million. Approximately \$354 million has been encumbered on the project as of September 30, 2012.

At a September 26, 2012 Audit and Finance Committee meeting, Austin Water Utility (AWU) management indicated that they plan to request an increase in the CCL of approximately \$15.5 million, bringing the project cost to about \$374 million, a 4.3% increase. AWU management states that it needs the additional funding to meet the cost of the remaining construction contracts required to complete the project.

Generally, CMAR agreements commit a construction manager to delivering a project within a GMP. The CM acts as a consultant to the owner in the development and design phases and as a general contractor during the construction phase. When a construction manager is bound to a GMP, they must manage and control construction costs to not exceed the GMP, or be responsible for overages. The WTP4 project is comprised of 13 GMPs.

WTP4 is designed to have an initial capacity of 50 million gallons per day (MGD), with the potential of expanding to a maximum capacity of 300 MGD. The plant is scheduled to be operational in 2014. AWU is the owner of the project and the Public Works Department is overseeing the plant construction.

OBJECTIVE, SCOPE, AND METHODOLOGY

The audit of the Construction Cost Management of Water Treatment Plant 4 was conducted as part of the Office of City Auditor's Fiscal Year (FY) 2012 Strategic Audit Plan, as presented to the City Council Audit and Finance Committee.

Objective

The objective of this audit was to determine if AWU can provide reasonable assurance that Water Treatment Plant 4 will be delivered on budget.

Scope

The audit scope included project information relating to the WTP4 budget, scope, and schedule for construction, as provided for by the CMAR agreement. This audit was focused on providing transparency and accountability regarding the cost estimates and revisions to these estimates caused by changes made or proposed by management to the original project design and cost estimates. In reconciling these differences, OCA has not made any judgments as to the appropriateness of any of management's decisions. OCA neither has the expertise nor did it acquire outside expertise necessary to evaluate these management decisions; an independent engineer's assessment would be required to accomplish this and is outside the scope of this audit. As a result, we are also unable to provide assurance as to whether the additional amount requested to complete the project would be sufficient.

Methodology

To accomplish our audit objectives, we performed the following steps:

- Interviewed key City staff responsible for monitoring the WTP4 project.
- Selected and tested a judgment sample of change orders to determine compliance with established change order processes and procedures.
- Reviewed documentation obtained from the Public Works Department and AWU relating to our audit objectives.
- Reviewed sections of the CMAR agreement applicable to our audit objectives.
- Considered risk of fraud, waste, and abuse.
- Considered Information Technology risks.

AUDIT RESULTS

The Construction Manager at Risk (CMAR) agreement has been used for reviewing costs and making decisions regarding the construction of the WTP4 to control costs. The construction manager (CM) is responsible for ensuring that contracts awarded through the bid process do not exceed the Guaranteed Maximum Price (GMP) for each work package of the project. The CMAR agreement does not ensure that the final aggregate total of all GMPs stays within the \$359 million Construction Cost Limitation (CCL) for the project.

According to project management's assertions, initial estimates for construction costs were based on engineering estimates made in 2009 and certain decisions were made for environmental and community impact reasons that increased the project cost. Since that time, construction bid awards have been higher than the original estimates, and the original plant design concept has been modified to control costs.

Finding 1: The WTP4 Construction Manager at Risk agreement does not guarantee that WTP4 will be constructed within the Council-authorized amount of \$359 million.

In 2009, Council approved the CMAR agreement and authorized a CCL of \$359 million for the WTP4 project.¹ The CMAR agreement breaks the construction work into work packages. Potential subcontractors bid on one or more work packages. Subcontractors awarded a contract agree to a GMP for the work and the individual GMP amounts in aggregate constitute the total contract amount of the overall project GMP.

The CMAR agreement obligates the CM to the contract amounts awarded to subcontractors at the agreed upon GMP. The CM is responsible for ensuring that each subcontractor stays within the GMP amount. The CM monitors the project and proposes cost containment strategies to stay within the CCL of \$359 million. Exhibit 1 shows the current structure of the project as it relates to the CM's key obligations relating to project costs.

As of September 30, 2012, the aggregate GMP amounts are approaching the \$359 million CCL, with three more contracts still to be awarded. The aggregate amounts of the existing GMPs have been higher than originally estimated, as shown in Appendix B. According to management, the total costs governed by the CMAR agreement will exceed the CCL of \$359 million if and when all GMPs are awarded.

¹ The CCL included in the CMAR agreement was based on a Class 3 estimate, as defined by the Association for the Advancement of Cost Engineering International Forecasting System. The range of accuracy for a Class 3 estimate is +30% to -15%.

EXHIBIT 1
CM's Obligations Relating to WTP4 Project Costs

<p>WTP4 Council-authorized CCL - \$359 million Construction phase work is divided into work packages/individual GMP contracts. Individual GMP amounts will in aggregate constitute the entire project GMP.</p> <p><u>Key CM cost containment responsibilities listed in the CMAR agreement:</u></p> <ul style="list-style-type: none">▪ Perform constructability reviews▪ Propose value engineering solutions to reduce costs▪ Prepare cost management reports▪ Prepare cost estimates▪ Evaluate contractor bids	<p>Guaranteed Maximum Price</p> <p>CM is responsible for performing tasks indicated under the CCL amount. In addition, the CM is solely responsible for all costs that would cause the overall GMP to be exceeded.</p>
---	--

SOURCE: OCA review of the CMAR agreement

Finding 2: Project management initiated cost containment strategies; however, these have not been sufficient to keep the plant cost within the approved CCL of \$359 million.

The CMAR agreement allows project management to make changes through value engineering in order to ensure that construction costs do not exceed the CCL of \$359 million. Project management has a process in place to evaluate and approve the components changed through the value engineering process. We reviewed a sample of 10 change orders out of 64 that have been initiated. Based on our review, the approval process complies with the terms of the CMAR agreement. We did not test management's assertions on the appropriateness or impact to plant capacity and longevity of these changes.

Based on our review, project management has made several value engineer changes that have resulted in cost reductions. In addition, project management has deferred certain phases/components to contain costs. Exhibits 2 and 3 show cost reductions from value engineering and deferrals. Based on our review:

- Value engineering resulted in a cost reduction of approximately \$24 million to date.
- Certain plant components/phases have been deferred until future capacity is required, which resulted in a cost reduction of approximately \$20 million to date.

EXHIBIT 2

Cost Reductions from Allowable Value Engineering Details

Value Engineering Details	Amount
Allow alternate pipe materials for tunnel carrier	\$ 7,620,000
Remove 3 finished water pumps	6,500,000
Revise allowable excavation technique at raw water intake	2,000,000
Eliminate concrete fill at WTP4 and Jollyville shafts	1,830,400
Eliminate permanent concrete liner and backfill for shaft	1,200,100
Eliminate roads and retaining wall along southern clear well boundary	765,000
Allow flowable fill (in addition to cellular fill) for pipe grouting	731,500
Remove redundant Bullick Hollow ductbank	700,000
Raw water intake alternative foundation design	539,995
Other redesign	2,272,252
Total Value Engineering	\$ 24,159,247

SOURCE: OCA analysis of data provided by Public Works Department and survey of project management

EXHIBIT 3

Cost Reductions from Deferral Details

Deferral Details	Amount
Forest Ridge water main line	\$ 15,900,000
Delete two of seven pump shafts at RWPS	1,838,589
Filter to waste and back wash pipe	775,000
Delete one wash water decant basin (180,000 gallon)	472,000
Delete one sludge holding tank	331,786
Other deferrals	419,400
Total Deferrals	\$19,736,775

SOURCE: OCA analysis of data provided by Public Works Department and survey of project management

In the past three years, the construction manager has executed 10 construction contracts, encumbering approximately \$354 million (99%) of the authorized CCL. Three remaining contracts, with an initial estimated cost of \$19.7 million (the revised estimated cost is \$18.5 million plus contingencies of \$0.4 million), have not yet been awarded. Exhibit 4 provides a comparison of the original project cost estimates to the estimated cost to complete construction.

EXHIBIT 4
Total Difference from Original Estimate, Including Deferrals
and Allowable Value Engineering Adjustments (\$ millions)

Amount encumbered as of September 30, 2012	\$	354.0	<div style="border: 1px solid black; padding: 5px;"> <p><u>Net of:</u></p> <p>Value eng. \$ 24.2 M</p> <p>Deferrals \$ 19.7 M</p> <p>Total \$ 43.9 M</p> </div>
Add: Initial estimate for remaining construction	\$	19.7	
Total estimated cost of construction governed by CMAR agreement		373.7	
Less: CCL based on preliminary design		-359.0	
Difference from original estimate	\$	14.7	
Additional Requested Amount	\$	15.5	

SOURCE: OCA analysis of WTP4 project status reports

AWU management indicated that they plan to request an increase in the CCL of \$15.5 million, bringing the project cost to about \$374 million, a 4.3% increase. However, management also stated that allowances and contingencies may result in additional savings. See Appendix B for a comparison of initial cost estimates to actual contract amounts.

Based on the September 2012 Monthly Project Status Report prepared by AWU, 3 of the 13 initial GMP work packages that have not yet been awarded are:

- GMP 3H – Bullick Hollow Road Ductbank
- GMP 3I – Filter Backwash Pump Station
- GMP 4 – WTP4 and Raw Water Pump Service Site Finishes

The initial estimated cost for the three GMPs is \$19.7 million. However, contracts for these GMPs have not yet been executed.

Finding 3: Through value engineering and deferrals, the preliminary plant design concept has been modified and certain components of the plant have been redesigned or downsized.

The first phase of WTP4 was planned for a capacity of 50 million gallons per day (MGD), with the potential for a maximum capacity of 300 MGD. Based on management’s assertions, the plant will be capable of meeting its planned initial treatment capacity. However, based on project management decisions, certain components on the original plant design have been changed through the value engineering process or deferred.

The original plant design had specific treatment capacity requirements measured in MGD limits for various components. For instance, according to project management the electric ductbank was designed to deliver enough redundant power to enable the plant to operate at full capacity of 300 MGD. After the redesign, through the value engineering process, project management asserts that it is now capable of delivering enough redundant power to pump 150 MGD. Refer to Appendix C for some of the WTP4 deferrals.

APPENDIX A

MANAGEMENT RESPONSE

Management reviewed and provided comments regarding drafts of this report. Since we did not issue recommendations, management is not required to provide an action plan. Management concurred with the findings in this report and elected not to include a written response.

APPENDIX B

COMPARISON OF INITIAL COST ESTIMATES TO CONTRACT AMOUNTS (IN \$MILLIONS)

Project Phase	Initial Estimate	Contract Amount ²	Variance
General Conditions (GC / Fee / Pre-Construction)	51.8	54.9	(3.1)
GMP 1 - Raw Water Intake & Tunnels	55.7	63.2	(7.5)
GMP 2 - Raw Water Pump Station	12.9	18.5	(5.6)
GMP 3A - Early Out Procurement	7.0	6.8	0.2
GMP 3B - Clearwells & Clarifiers	14.5	14.5	0.0
GMP 3C - WTP4 Walls, Conveyances & Filters	14.2	18.0	(3.8)
GMP 3D - WTP4 Washwater, Solids Handling & Chemical Bldg	16.0	19.6	(3.6)
GMP 3E - WTP4 Electrical, I&C, Yardpiping & Ductbank	37.1	42.0	(4.9)
GMP 3F - Lime Building and Balance of Clearwell	4.7	8.1	(3.4)
GMP 3G - Admin Bldg and Maintenance Bldg	4.8	5.4	(0.6)
GMP 5 - Transmission Main System: ³			
Jollyville Transmission Main	77.5	85.6	(8.1)
Forest Ridge Transmission Main	15.9	0.0	15.9
TOTAL	\$312.1	\$336.6	(\$24.5)

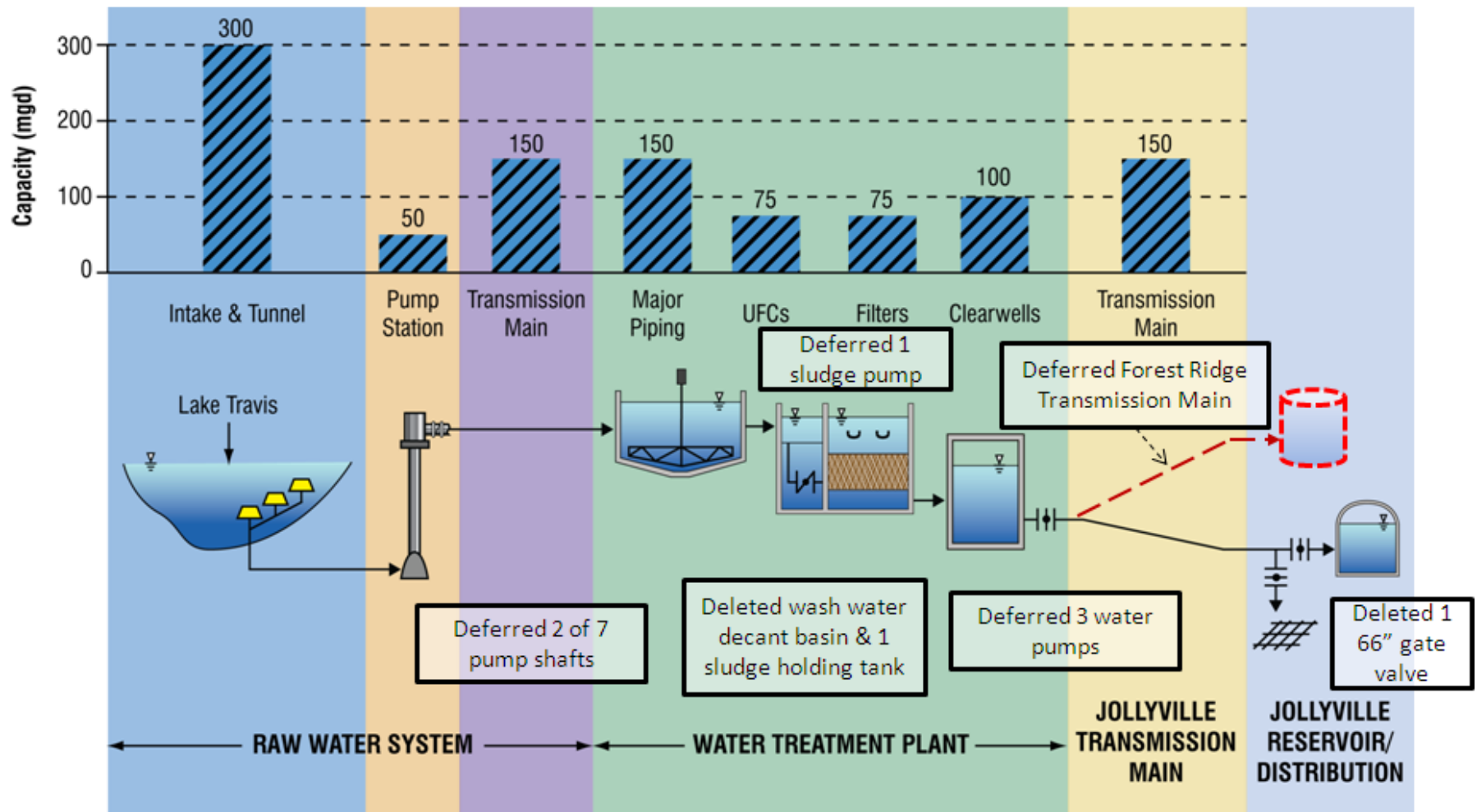
SOURCE: OCA analysis of the WTP4 project status reports

² Contract amounts do not include construction contingencies and allowances. The encumbered amount of \$354 million is equal to the total contracted amount plus related contingencies and allowances

³ The transmission main system, as initially designed, included two transmission mains: the Jollyville Transmission Main and the Forest Ridge Transmission Main. Construction of the Forest Ridge Transmission Main has been deferred by project management.

APPENDIX C

WTP4 PLANNED CAPACITIES WITH DEFERRALS & VALUE ENGINEERING CHANGES



SOURCE: WTP4 project management, modified by OCA analysis to reflect significant value engineering changes and deferrals.