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***Wastewater Diversion Force Main
and Gravity Main Sewer Contract
Audit
(Eagle Mountain Lake Drainage Basin to
Big Fossil Creek Drainage Basin)***

September 17, 2021



**City of Fort Worth
Department of Internal Audit**

200 Texas Street
Fort Worth, Texas 76102

Audit Staff

Patrice Randle, City Auditor

Brian Burkland, Assistant City Auditor

Nicole Lugo, Senior Auditor

William Mafi, Senior Auditor





The Wastewater Diversion (Eagle Mountain Lake Drainage Basin to Big Fossil Creek Drainage Basin) Force Main and Gravity Main Sewer Contract Audit was conducted as part of the Department of Internal Audit's Fiscal Year 2021 Annual Audit Plan.

Audit Objectives

The objectives of this audit were to:

- determine whether the project was completed in accordance with contract terms; and,
- ensure compliance with applicable legislation.

Audit Scope

Our audit included a review of the project from April 22, 2019 (project commencement date) through November 13, 2020 (approval date of latest pay estimate). Activity beyond this period was reviewed as deemed necessary.

Opportunities for Improvement

Verification of quantities billed

Concrete compliant with concrete testing standards

Coordination of projects

Executive Summary

As part of the Fiscal Year 2021 Annual Audit Plan, the Department of Internal Audit conducted a Wastewater Diversion (Eagle Mountain Lake Drainage Basin to Big Fossil Creek Drainage Basin) Force Main and Gravity Main Sewer Contract Audit. To complete work associated with this contract (City Secretary Contract No. 52094), the City of Fort Worth contracted with Mountain Cascade of Texas, LLC.

Based on our test results, Mountain Cascade of Texas, LLC complied with applicable legislation. Internal Audit determined compliance with insurance and bonding requirements, as well as the City's 7 % Minority Business Enterprise requirement. Mountain Cascade of Texas, LLC also complied with applicable wage rate requirements.

The project commenced on April 22, 2019, and was to be completed by January 27, 2020 (280 days). However, as of June 2021, the project had not been completed. Internal Audit was informed that the delayed completion was because a permit was obtained for the wrong-sized pipe, and efforts to resolve the issue were taking longer than expected. It should be noted that a June 27, 2020 contract completion date was established after two change orders (for an additional 152 days) to the initial January 2020 completion date.

Internal Audit concluded that the City was billed for more concrete than was actually received. For example, Internal Audit measured 4,712 square yards of concrete. However, the City was billed (and paid) for 4,848 square yards of concrete. At \$77.55 per square yard, the City was overcharged \$10,546.80.

During audit observations, we observed cracked concrete manholes. Additionally, project documentation noted instances where concrete used for the project did not meet concrete testing standards used by a third-party tester. The Water Department indicated that the final payment to the contractor would be withheld until the deficiencies were corrected at project close-out.

We also concluded that a lack of project coordination resulted in additional costs. In order to complete contracted work, additional costs (approximately \$524,000.00) were incurred after Mountain Cascade of Texas, LLC was required to dig up, and replace, a road that had recently been constructed by another City contractor. These audit findings are discussed in further detail within the [Detailed Audit Findings](#) section of this report.

Table of Contents

Background..... 1

Objectives 2

Scope..... 2

Methodology..... 2

Audit Results..... 4

Overall Risk Evaluation..... 5

Detailed Audit Findings..... 6

Acknowledgements..... 11



Background

The City of Fort Worth Water Department is responsible for the City's Sanitary Sewer Overflow Initiative Program. The \$8,230,694.27 wastewater diversion project (from Eagle Mountain Lake Drainage Basin to Big Fossil Creek Drainage Basin) is part of the referenced program, and was included in the Water Department's Fiscal Year 2018-2022 Five-Year Capital Improvement Plan.

In reference to this project (#C01309), a notice to bidders was published in the Fort Worth Star-Telegram on December 20, 2018 and December 27, 2018. The project was for wastewater diversion from the Eagle Mountain Lake Basin to the Big Fossil Creek Drainage Basin Force Main and Gravity Sewer.

- Project bids were received and opened on January 24, 2019, with seven bids ranging from \$7,497,947.00 to \$10,108,260.00.
- On March 5, 2019, the City awarded the contract to Mountain Cascade of Texas, LLC in the amount of \$7,497,947.00.
- The contract had an anticipated start date of April 22, 2019.
 - The work was to be completed in 280 calendar days, or by January 27, 2020.
 - Mountain Cascade of Texas, LLC was later authorized to increase the contract term by 152 calendar days. The 152-calendar day increase resulted in a contract completion date of June 27, 2020, or 432 calendar days.
- On April 7, 2020, the Mayor and City Council approved a \$732,747.27 change order that increased the contract from \$7,497,947.00 to \$8,230,694.27, to cover additional costs of removing and repaving a roadway constructed over the project area.
- The Minority Business Enterprise (MBE) subcontracting requirement was 7%.



Objectives

The objectives of this audit were to:

- determine whether the project was completed in accordance with contract terms; and,
- ensure compliance with applicable legislation.

Scope

Our audit included a review of the project from April 22, 2019 (project commencement date) through November 13, 2020 (approval date of latest pay estimate). Activity beyond this period was reviewed as deemed necessary.

Methodology

To achieve the audit objectives, the Department of Internal Audit performed the following:

- interviewed Water Department project management and inspection staff;
- reviewed the Water Department's capital project delivery, change orders, contractor payment and project inspection processes;
- reviewed the City's bidding and contract award process for compliance with applicable law and City policy;
- verified that the contractor complied with insurance and bonding requirements;
- determined whether change orders were necessary and compliant with applicable law and City policy;
- reviewed Concrete Test Reports to determine compliance with concrete testing requirements;
- performed site visits to ensure that the City actually received quantities billed by the contractor;
- verified that payments made to the contractor were approved by management, and were based on agreed-upon unit prices, as stated in the contract;
- determined whether the 5% retainage was correctly computed and recorded;
- reviewed MBE compliance documents prepared by the City's Department of Diversity and Inclusion;
- verified contractor compliance with wage requirements specified within the General Conditions; and,
- evaluated internal controls related to related to construction projects.

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.

Chapter XXVIII of the Fort Worth City Charter established the City of Fort Worth’s Department of Internal Audit. Our department was established independent of management, reporting directly to the Fort Worth City Council. We utilized the Committee of Sponsoring Organizations of the Treadway Commission (COSO) framework when evaluating internal controls. The following internal control components and corresponding principles were considered significant to the audit objectives.

Internal Control Component	Principles
Control Environment	Managerial oversight, integrity, ethics and responsibility; staff recruitment, development, retention, performance and accountability
Risk Assessment	Clearly-defined objectives to identify risks, define risk tolerances, and implement necessary controls (e.g., written policies and procedures)
Control Activities	Policies, procedures and systems
Information and Communication	Communicate the necessary quality information
Monitoring	Monitor and evaluate the effectiveness of internal controls



Audit Results

Based on our test results, Mountain Cascade of Texas, LLC complied with insurance and bonding requirements specified within the contract. The City paid Mountain Cascade of Texas, LLC \$7,145,077.00 for work completed on this project. Mountain Cascade of Texas, LLC, in return, paid \$786,463.00 (or 11.01%) to MBEs, thus complying with the City's 7 % MBE requirement. Also, contractor payment files indicated that Mountain Cascade of Texas, LLC paid its staff in accordance with applicable wage rate requirements.

We concluded that the project completion was delayed. The project commenced in April 2019, and was to be completed by June 27, 2020. However, as of June 2021, the project had not been completed. Internal Audit was informed that the delayed completion was because a permit was obtained for a smaller sized casing pipe than was needed. As a result, a resubmittal of the railway permit was required, which led to significant project delays.

Based on our observations at the worksite, the City was billed for more concrete than was actually provided by the contractor. Internal Audit's measurements totaled 4,712 square yards. However, the City paid for 4,848 square yards of concrete. At \$77.55 per square yard, the City was overcharged \$10,546.80. We observed that pay estimates #2 through #22 did not have Certificates for Payment. Certified pay estimates would have included the signature of a City representative, certifying that work billed to the City had been completed by the contractor.

During audit site visits, we also observed cracked concrete around manholes. Project documentation noted instances where concrete used for the project did not meet testing standards used by the third party testing company. The Water Department indicated that the final payment to the contractor would be withheld until the deficiencies were corrected at project close-out.

One Concrete Test Report noted that concrete was poured, although the concrete (sampled on 8/29/2019) did not conform to concrete testing standards. Internal Audit saw no construction logs to signify the City inspector's oversight of project activity, from the project's commencement date (April 2019) through January 10, 2021. The first day on which project activity was logged was on January 11, 2021. Internal Audit was informed that there had been turnover with the assigned project manager.

We also concluded that a lack of project coordination resulted in additional costs. The additional costs (approximately \$524,000.00) resulted after Mountain Cascade of Texas, LLC was required to dig-up a road that had recently been constructed by another contractor.



Overall Risk Evaluation

High	Medium	Low
Not verifying invoice accuracy prior to payment authorization		
Project constructed with materials not meeting established standards		
Lack of coordination between projects		



Detailed Audit Findings

1. The City was overcharged \$10,546.80 for 136 square yards of concrete that was not received.

Internal Audit noted that the City was billed the total square yards that were included in the vendor's bid, versus the amount of concrete used. The City was billed for 4,848 square yards of concrete, although Internal Audit's concrete measurements totaled only 4,712 square yards. The City was, therefore, overcharged \$10,546.80 $[(4,848 - 4,712) \times \$77.55 \text{ per square yard}]$, without detection. Internal Audit concluded that although Water Department staff authorized vendor payments, Water staff did not verify that the invoices were valid.

Based on our test results, pay estimates #2 through #22 did not include a section for City staff to certify the City's payments. For example, the pay estimates did not show the signor's attestation that: 1) the billed work was completed; 2) the quality of work was in accordance with the contract documents; and, 3) the contractor was entitled to payment in the amount billed.

Although Internal Audit observed a Transportation and Public Works Department policy stating that the City Inspector was responsible for verifying installed and final quantities billed on each invoice, the Water Department did not have a similar written policy governing its capital projects. Instead, the Water Department's documented process required that the City inspector prepare and submit pay estimates, the Project Manager approve and sign pay estimates, and Water Administration check for errors.

Since Water Administration personnel would not be aware of quantities actually completed by the contractor, Internal Audit concluded that the Water Administration's review would have been limited to checking invoices for calculation accuracy and completeness. The Water Department's documented process did not reference verifying that all work billed to the City was performed by the vendor. It should be noted, however, that the City's General Accounts Payable Guidelines state that departments are responsible for verifying invoice quantities and amounts.

Recommendation 1A: *The Water Department Director should require that staff confirm that the City received the services and quantities billed by the contractor, prior to authorizing vendor payment.*

Auditee's Response: Concur. Inspectors are trained to field verify quantities prior to approving contractor payments. Management oversight of this process will be enhanced in the future with the hiring of a Senior Capital Project Officer, included in the FY 22 budget, whose responsibilities will include oversight of the construction inspection team.

Target Implementation Date: Re-training to begin by September 30, 2021

Responsibility: Tony Sholola, Assistant Director over Capital Delivery

Applicable Department Head: Chris Harder, Water Department Director

Applicable Assistant City Manager: Dana Burghdoff

Recommendation 1B: *The Water Department Director, in conjunction with the Chief Financial Officer and the City Attorney, should require that the \$10,546.80 overpayment be withheld from the*



City's final payment to Mountain Cascade of Texas, LLC, or that Mountain Cascade of Texas, LLC refund \$10,546.80 to the City of Fort Worth.

Auditee's Response: Concur. As this project is on-going, adjustments will be made to the final payment amount to reflect the field verified concrete paving quantity.

Target Implementation Date: Prior to Final Payment of construction contract

Responsibility: Tony Sholola, Assistant Director over Capital Delivery

Applicable Department Head: Chris Harder, Water Department Director

Applicable Assistant City Manager: Dana Burghdoff

2. The City paid for concrete work that did not meet quality testing standards.

The City of Fort Worth (CFW) contracted with Chellia Consultants, Inc. (also known as HVJ Associates) to provide independent concrete testing services. HVJ's test records (which were documented within the City's contract document management system, BIM360) indicated that 25 of 75 concrete samples did not meet testing standards. HVJ Associates documented their test results in Concrete Test Reports that were provided to the City.

- Internal Audit observed a 9/5/2019 Concrete Test Report that noted nonconformance for concrete sampled on 8/29/2019. The report indicated that HVJ Associates notified Mountain Cascade of Texas, LLC and the City inspector regarding the test results. The Concrete Test Report also indicated that Mountain Cascade of Texas, LLC proceeded to pour, although nonconformance was noted.

In another Concrete Test Report, dated 9/11/2020 (for an 8/13/2020 concrete sample), HVJ Associates indicated that the compressive strength at 28 days did not conform to the required strength of 4500 per square inch (psi). The Water Department's practice is to test concrete, progressively, to determine whether the concrete eventually met the psi compression strength standard by the 56th day. Tests are conducted on the date the concrete is poured, at seven days, at 28 days and again, at 56 days.

Part 3, Section 3.7.C.8 of the Cast-In-Place Concrete section of the standard construction specification documents states that the strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength test equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

Internal Audit reviewed the CFW's concrete mix designs, which provided standards for concrete strength, air content, and slump (consistency). We then compared the City's concrete mix designs to HVJ Associates' testing standards. Based on our review of the HVJ Associates' reports and CFW pre-approved concrete strength standards, 12 sample pours failed the pounds psi strength testing. Based on our review of City accounts payable records, the City paid HVJ Associates \$43,211.75 for concrete testing.

- Internal Audit concluded that BIM360, which is designated to track CFW construction projects, was underutilized. We saw no construction log to signify the City Inspector’s oversight of project activity from the project’s commencement date (April 2019) through January 10, 2021. The first day on which activity for this project was logged was on January 11, 2021.

Internal Audit was informed that there had been turnover with the assigned project manager. Records supporting activity logged by former City staff were not located or provided to Internal Audit.

Internal Audit also observed that Water Department staff did not load construction documents into BIM360 that would reflect adequate project management. As an example, no records were saved (within BIM360) to show the inspector’s measurements or calculation sheets, or documentation to support discussions that resulted in construction change orders, etc.

- Internal Audit randomly sampled five (of 26) manholes to observe workmanship quality. Based on our site inspections, four of the five sampled manholes had cracked concrete surrounding the lids. The Water Department indicated that the work would eventually be corrected at project close-out, by withholding the final payment, which includes retention.



Location ID: Station 83



Location ID: Station 14



Location ID: Station 121

Source: Auditor Photo (March 29, 2021 and June 23, 2021)

The American Society for Testing and Materials International’s website states that their cement and concrete standards are instrumental in the evaluation and testing of concrete, cement and aggregates. The website further states that their standards allow laboratories all over the world to test and evaluate concrete mixtures to ensure strength and safety. Sound business practice would require compliance with such standards to help ensure safety. Basins that are built with substandard concrete could result in safety issues, unanticipated failures, additional maintenance costs, etc.

Recommendation 2A: *The Water Department Director should require that Mountain Cascade of Texas, LLC replace the work that was completed with substandard concrete, prior to authorizing the final pay estimate.*

Auditee’s Response: Concur. Coordination with the contractor, concrete supplier and engineer will occur, first to determine the root cause of any concrete defects, to verify in-place concrete properties through additional field testing, and to determine the best path forward. No work will be accepted that does not meet the engineering design requirements.

Target Implementation Date: September – October 2021

Responsibility: Tony Sholola, Assistant Director over Capital Delivery

Applicable Department Head: Chris Harder, Water Department Director



Applicable Assistant City Manager: Dana Burghdoff

Recommendation 2B: *The Water Department Director should require that project inspectors remain actively involved in managing on-going construction, including but not limited to, reviewing and promptly responding to concrete testing results.*

Auditee’s Response: Concur. Third party material and concrete testing results need to be shared with the engineer, inspector, city project manager and contractor. Normally, the process for distribution of third party testing results are incorporated into the pre-construction meeting agenda. The document management system, which all parties have access to, is generally utilized as the medium for this communication. Both project managers and inspectors will be instructed on the critical nature of establishing this reporting and communication process at the pre-construction meeting.

Target Implementation Date: September 30, 2021

Responsibility: Tony Sholola, Assistant Director over Capital Delivery

Applicable Department Head: Chris Harder, Water Department Director

Applicable Assistant City Manager: Dana Burghdoff

Recommendation 2C: *The Water Director should require that project activity is properly logged and retained within the appropriate construction software (e.g., BIMS360).*

Auditee’s Response: Concur. Management will reinforce this requirement with both inspection and project management staff and develop reporting process to regularly verify this is being performed.

Target Implementation Date: September – October 2021

Responsibility: Tony Sholola, Assistant Director over Capital Delivery

Applicable Department Head: Chris Harder, Water Department Director

Applicable Assistant City Manager: Dana Burghdoff

3. Lack of project coordination resulted in additional project delays and construction costs.

CFW project #C01309 (Wastewater Diversion Drainage Basin project, from east of Eagle Mountain Lake to Big Fossil Creek), and CFW project #C101617 (Phase 4 of the Twin Mills project) were in progress around the same time, and in the same area of Fort Worth. However, lack of project coordination resulted in the City incurring an additional \$524,153.16.

Contractor	Project No.	Project Description	Bid Advertised	Contract Signed	Construction Start Date	Construction Completion Date
D. R. Horton Texas, LTD	101617	Twin Mills		12/27/2018	01/29/2019	11/15/2019
Mountain Cascade of Texas, LLC	01309	Water Basin	12/20/2018 & 12/27/2018	03/19/2019	04/22/2019	Not Completed as of audit fieldwork

Source: City Secretary contract; City procurement and accounts payable records



Based on our review of supporting documents and discussions with Water Department staff, D. R. Horton Texas, LTD constructed public infrastructure improvements on a section of Park Drive that was also included within Mountain Cascade of Texas, LLC's scope of work. D.R. Horton partially constructed the roadway (Park Drive), in which a 36-inch gravity sewer line was to be installed. To complete work associated with the CFW's contract, Mountain Cascade of Texas, LLC had to remove, and later replace, that section of Park Drive.

Change order #2, dated April 7, 2020, provided an additional 100 calendar days and an additional \$732,747.27 to address the Park Drive paving rework. Internal Audit considered \$208,594.11 of the \$732,747.27 to be non-duplicative; however, the remaining \$524,153.16 (\$732,747.27 – \$208,594.11) could have been avoided if the two projects had been better coordinated. The \$208,594.11 consisted of \$42,959.11 for a gas line relocation, and \$165,635.00 from D.R. Horton (to the CFW) for Mountain Cascade of Texas, LLC to finish paving the section of Park Drive that was not completed by D. R. Horton.

The 4th edition of the Standard for Program Management, which is published by the Project Management Institute (PMI), states that program management focuses on the coordinated and effective delivery of benefits derived from the pursuit of a group of projects and other programs whose outcomes are related. The PMI further states that during the delivery phase, communication within the program management function helps ensure that the activities of program components are appropriately coordinated and fully aligned with the program's intent to deliver organizational benefits.

Recommendation 3: *The Water Department Director should require that project managers routinely review assigned construction projects to identify potential overlapping of services (e.g., different projects being completed in the same geographical area) to allow for better planning and management of construction projects.*

Auditee's Response: Concur. Project managers will be reminded of the need to actively coordinate with development staff to minimize the potential for conflicts with developer initiated projects. Development staff will need to be regularly briefed on the locations of capital projects so they can notify both developers and developer's engineers of the need to coordinate with city capital projects. Over the last year, both project managers and water development engineering staff have participated in monthly project status meetings where this communication occurs.

Target Implementation Date: September 30, 2021

Responsibility: Tony Sholola, Assistant Director over Capital Delivery

Applicable Department Head: Chris Harder, Water Department Director

Applicable Assistant City Manager: Dana Burghdoff



Acknowledgements

The Department of Internal Audit would like to thank the Water Department for their cooperation and assistance during this audit.