

# ENVIRONMENTAL SERVICES CONSTRUCTION CHANGE ORDER REVIEW

*PROGRAM EVALUATION AND AUDIT*



OCTOBER 26, 2016

# INTRODUCTION

## *Background*

The Metropolitan Council (the Council) Environmental Services (ES) Division operates seven waste water treatment plants (WWTP), 61 lift stations, 190 meter stations, 21 rain gauge stations and 600 miles of interceptor pipes throughout the seven county metropolitan area 24 hours a day, seven days a week, 365 days a year. The seven WWTP, ranging in size from 2.5 million gallons per day (mg/d) at the Hastings WWTP to 250 mg/d at the Metropolitan WWTP in St. Paul, treat almost 265 million gallons of waste water daily. The Blue Lake WWTP (BL WWTP), located in Shakopee, treats about 30 million mg/d, has a current capacity of 32 mg/d and will expand to 40 mg/d when construction is complete. It treats waste water from 29 surrounding communities.

To maintain adequate capacity for growth, to connect existing facilities with previously unconnected communities and to maintain its facilities, ES has identified and the Council has adopted a Capital Improvement Plan of \$579 million for the six year period 2011-2016 of which \$187 million has been authorized for the construction of the following improvements to the BL WWTP:

- Replacing the existing gaseous chemical effluent disinfection system with liquid chemical disinfection;
- Modifying the existing secondary treatment facilities to remove phosphorus;
- Rehabilitation of facilities nearing the end of their useful life;
- Improvements to the solids processing facilities and odor control;
- Adding anaerobic sludge digestion to supplement the existing sludge dryer for reliability and capacity;
- Energy recovery for dryer use;
- Improvements to plant utility systems, including standby power;
- Staged expansion of the plant's capacity.

The Council's ES Division awards contracts for professional engineering services and for construction activities. A detailed description of these contracts and their award process was provided in a previous audit report entitled "Environmental Services Professional Services and Construction Contracts," which also provided the results of our review of professional engineering services contracts. This report is the result of our review of construction activities and the construction contract administration process beginning with those documents provided by the winning contractor (Contractor) in its formal bid, through the one-year warranty period following completion of the project. Early in this process, a Notice to Proceed letter is sent to the Contractor authorizing it to begin work and identifying the Council's authorized representative (CAR) who is responsible for administering the contract.

A project manager (PM), CAR and assistant CAR (ACAR) are assigned to each ES construction project. The PM manages engineering requirements of the project, including approving change orders related to the scope of the contract. The PM is also the interface between the CAR and the engineering consulting firm that developed the drawings and specifications for the project.

The CAR and ACAR administer the contract to ensure that the associated project is built according to contract specifications. In this role, they negotiate and, within their signature authority level, approve contract change orders.

This review of ES construction change orders is consistent with the Thrive MSP 2040 stewardship outcome regarding “responsibly managing our region’s finite resources,” and associated principles of collaboration (“providing ... technical assistance and enhanced information to support ... decision-making”); accountability (“providing clear, easily accessible information and deploying the Council’s authority”); and Integration (“intentional combining of related activities to achieve more effective results, leveraging multiple policy tools to address complex regional challenges and opportunities.”)

## *Assurances*

This audit was conducted in accordance with the Institute of Internal Auditors’ International Standards for the Professional Practice of Internal Auditing and the U. S. Government Accountability Office’s Government Auditing Standards.

## *Scope*

This review was limited to reviewing ES documents for compliance with requirements that provide guidance on managing construction contract change orders:

- Work Instruction (WI) 507.07.05, CHANGE ORDERS, rev. 5 (5/13/15);
- Work Instruction 507.03.06, ARCHITECTURAL/ENGINEERING CONTRACT MANAGEMENT, rev. 1 (3-12-12);
- Council Procurement Policy 3-4-3;
- Council Procurement Procedure 3-4-3a, rev. 14 (2-9-15);
- ES Change Order Summary Form.

This review was limited to change orders negotiated on projects covered by construction contracts executed during the period May 2011 through January 2015.

## *Methodology*

In order to review construction contract change orders, we interviewed council personnel, reviewed relevant policies, procedures, and work instructions; and reviewed electronic files for change orders for a sample of ES contracts.

To select contracts for review, the Council’s Contracts and Procurement database was reviewed for all construction contracts entered into for the period from May 2011 through January 2015. This period includes 63 contracts for which 383 change orders were executed. In order to select a sample of change orders for review, audit divided the 63 contracts into four strata.

- Strata I – contracts valued at greater than \$10 million,
- Strata II – contracts between \$1 million and \$10 million
- Strata III – contracts valued at less than \$1 million.
- Strata IV – all change orders over \$100,000 in value regardless of contract value.

To select change orders from these contracts, random samples were selected from strata 1, 2, and 3 and a 100% judgmental sample from strata 4. A total of 146 change orders were selected for final review. A summary of type of change order by strata is provided below. (See Table 1) <sup>1</sup>

**Table 1: Change Order Type, Number and Value by Sample Strata**

CO Type	Strata I		Strata II		Strata III		Strata IV		Total All Samples	
	#	\$	#	\$	#	\$	#	\$	#	\$
Differing Site	9	142,781	8	119,718	4	29,350	1	186,524	22	478,373
Scope	16	215,624	14	202,966	4	29,699	17	71,911	51	520,200
Time Extension	3	0	11	0	5	0	0	0	19	0
Design Error	7	129,182	2	48,940	1	6,464	0	0	10	184,586
Design Omission	7	120,299	1	7,290	0	0	0	0	8	127,589
Unit Price CO	1	94,086	0	0	4	(88,628)	12	(3,111,839)	17	(3,106,381)
Other	7	50,000	8	(5,000)	0	0	4	883,499	19	928,499
	<b>50</b>	<b>751,972</b>	<b>44</b>	<b>373,914</b>	<b>18</b>	<b>(23,115)</b>	<b>34</b>	<b>(1,969,905)</b>	<b>146</b>	<b>(867,134)</b>

Selected change orders were reviewed for adherence to Council policies, procedures, and work instructions; and to ensure that each change order is properly documented. This review checked to ensure that:

1. Change orders were within limits prescribed by procurement policy, and if not, that proper procurement procedures were followed.
2. Change orders followed the proscribed review process including review and signature by all relevant managers.
3. Review documentation folder to ensure that all required documentation is in the proper folders. These documents include:
  - a. Change order summary;
  - b. Serial or record memo;
  - c. Change order;
  - d. Other required documentation from policies, procedures, and work instructions

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<sup>1</sup> One contract was added to our analysis based on reference from Contracts and Procurement. This contract was only reviewed for adherence to procurement limits and was not fully reviewed like other change orders in our sample.

# OBSERVATIONS

The majority of change orders reviewed for this audit were sufficiently documented and staff adhered to relevant policies, procures and work instructions. Of the change orders reviewed, about 85%—were found to generally follow procurement policies, written ES work instructions and procedures; and audit was able to validate that change order folders contained the required documentation. Overall, these findings are promising. ES management indicated that they have tightened up their processes in response to four construction audits since 2006. For example, in response to a past audit, now both an assistant manager and a manager review change orders.

However, among the remaining 15% of change orders, audit identified issues with several procedural and documentation issues. In addition, through the course of this review, audit identified several areas where ES could update work instructions to better reflect industry standards.

## Improper Procurement Procedure

In one instance, a change order was signed without sufficient signing authority. In this instance, a final quantity adjustment of unit price items resulted in a deductive change order. A senior manager was out of the office and had properly delegated his signing authority to another manager who signed the change order. According to the senior manager, the manager misunderstood the signing authority and incorrectly signed the change order. The deduction of \$90,845.18 exceeded \$50,000 in signing authority for the senior manager. ES staff acknowledges this was a misunderstanding. Based on our sample, this example seems to be an isolated incident.

Audit identified two examples of contracts where ES failed to identify that the cumulative total of change orders had surpassed 10% of the contract value.

According to Council Procurement Procedure 3-4-3a,

*Change orders that increase the total amount of the construction contract by more than 10% of the original contract value must be signed by staff with sufficient Signature Authority.”*

Further, Work Instruction 507.07.05, CHANGE ORDERS, states that;

*If the cumulative total change order amount to date on the project will exceed the delegated change order authority of the General Manager prior approval from the Council must be obtained. The delegated change order authority of the General Manager by Council policy is 10% of the initial award amount for construction and design-build contracts.*

- *For construction contracts under \$2,500,000, the Regional Administrator has authority to exceed the 10% change order limit, provided that such a request is accompanied by a sole source procurement form.*
- *For construction contracts over \$2,500,000, additional delegated change order authority requires specific Council authorization, as well as approval of this work as a sole source procurement.*

These procurement procedure policies changed in 2013. Previously, procurement procedures allowed change orders within 5% or \$50,000 without additional action. According to ES managers, they were not made aware of the policy change until June of 2015. In the interim, at least two contracts were allowed to exceed the 10% threshold without the new policy being followed. Both of the contracts identified were less than \$2,500,000 so additional funds could have been authorized by the regional administrator provided the request was accompanied by a sole source procurement form.

- Contract 1 – Original contract value was \$57,100. Two change orders were executed for a cumulative increase of \$9,829. These change orders increased to the total contract value to \$66,929, or 17% greater than the original contract.
- Contract 22 – Original contract value was \$274,800. Thirteen change orders were executed for a cumulative increase of \$45,105. These change orders increased to the total contract value to \$319,905, or 14% greater than the original contract.

In both cases, although the contracts exceeded the 10% threshold, they both changed by less than \$50,000, so they would not have exceeded the previous \$50,000 limit on cumulative change orders. The likely cause of these errors was the ES Change Order Summary Form that is used by project managers to communicate the revised cumulative contract amount was compared to the original contract amount. From the time the procurement policy changed in October, 2013; until June, 2015; this form was not updated to reflect the revised policy. Managers finally revised the form to reflect the change in procurement policy in June 2015.

The new procurement policy is generally less restrictive than the old policy. However, by eliminating the \$50,000 limit in cumulative change orders as an alternative, the 10% threshold is met for small contracts at a relatively low dollar amount. For instance, given the \$57,100 original value of the first example contract above, cumulative change orders of \$5,710 would meet the 10% threshold. For larger contracts, change orders could equal \$100,000 or more before meeting the same threshold.

## Documentation Issues

For many change orders, audit found that independent cost estimates for change orders were missing, lacked a date, or had a date that followed the receipt of the contractors cost proposal. According to Work Instruction 507.07.05:

*The CAR will evaluate the Contractor's proposal for reasonableness. The Contractor's proposed costs will be compared to the MCES's independent cost estimate. The CAR will hold negotiating sessions as appropriate to clarify the scope of work and resolve cost differences. CAR is not obligated to attempt to resolve minor cost differences. However, the record memo must provide a sound rationale for any difference between the MCES's estimate and the agreed-upon price. Negotiations must be thoroughly documented by Record Memo. The Manager Construction Services may be involved in negotiations, as appropriate.*

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2 This example was not part of our original sample. It was provided by procurement staff as an example of ES not following the 10% policy.

According to ES managers, “the work instruction 507.07.05 does not specifically require dating the estimate or dating it before the date of contractor’s estimate. For simple change orders it may be dated before contractor’s proposal date, but for more involved change orders MCEs estimate may be dated the same date when the Record Memo is written, at the completion of price negotiations.” As a best practice, to ensure an independent cost estimate, it should be completed and dated prior to review of a contractors estimate. Without this assurance, proper documentation of “sound rationale between the MCEs’s estimate and the agreed-upon price” could be compromised.

In addition, several copies of change orders that were provided as documentation were unsigned. ES managers told us that the actual signed copy of the change order was likely in paper storage. Audit was satisfied based on other documentation and the relatively low frequency of this omission that proper procedures were followed. As such, we did not request that staff invest time to find the signed copies in paper storage.

## Design Errors and Omissions

### *Design Errors and Omission Change Orders in Scope*

For each change order, ES staff assesses the reason for the change order using the ES Change Order Evaluation Sheet. On this form, ES staff chooses from:

- Differing Site Condition;
- Scope Change;
- Time Extension;
- Design Error;
- Design Omission;
- Quantity Reconciliation.

This sheet also provides detailed criteria on which the staff is to base the change order classification. Among these classification, design errors and omissions require staff to potentially complete additional analysis to determine whether the errors or omission could have been the result of negligence by the design consultant.

According to the ES Work Instruction on Architectural and Engineering (A&E) Contract Management;

*Within the industry - it is generally perceived that Project Change Orders will be in the range of 0-6% of construction costs. Errors and Omissions will occur from 0-3%, with Scope and Differing Site Conditions from 0-3%. As a starting point for projects without extenuating circumstances it is reasonable to establish a threshold for design errors at 1%, meaning that design errors totaling 1% of construction costs are deemed acceptable. Design errors totaling above 1% will be evaluated by ES as to negligence by the design consultant.*

Audits’ review of change orders identified several examples of change orders that were labeled by ES staff and approved by ES management as “Scope Change”, but review of the content and narrative in the supporting documentation best met the ES change order criteria for “design error” or “design omission.” Examples include change orders that were required because designs omitted a key function, required redesign to avoid an unacceptable practice, and required changes to meet applicable national standards or state requirements. If change orders are not categorized correctly, managers have an incomplete picture of the cumulative effect of design errors and/or omission for a project or projects. This incomplete information could affect the total cost of change order design



errors and keep a project from reaching the 1% threshold at which the project is evaluated for design errors.

Based on audits' review of change orders, 18 change orders were necessary as a result of a design error (10) or omission (8). The 10 change orders that were the result of a design error ranged in cost from about \$500 to \$50,000. Of the five contracts affected by these 10 change orders, the cumulative effect on the total price of the contract ranged from .19% to .67%. Based on the change orders we reviewed, none of the contracts exceeded the 1% threshold that would trigger the required ES review for negligence.

### ***Other Council Practice and Industry Standards***

There are other examples from around the Council and across the industry to provide guidance on when to review a design error and omission

Other divisions of the Council have differing policies about reviewing errors and omissions. For instance, the Light Rail Project Offices check all change orders. Controls personnel and Council design staff review all Type 3 and Type 4 change orders to identify cause. Those that are identified as positively due to consultant design error or omission are then evaluated for their level of impact.

For change orders at Metro Transit, staff are required to fill out a change order classification form to determine "cause" for the needed change order. This form is reviewed by a manager, project manager and lead project manager, and then a meeting is scheduled to further review. For change orders based on an "error", a meeting is scheduled either as soon as possible or within a quarter depending on the whether the change orders is valued at more or less than \$15,000. Meetings for "omissions/ambiguities" are scheduled at the end of the project for projects with a duration of less than six months; every six months for projects with a duration greater than six months.

MnDOT does not consider the percentage as a prerequisite to evaluating a change order.

*There is, however, no set formula for determining damages, and MnDOT reserves all rights to include all relevant factors (including but not limited to costs related to project delay) in its calculation of damages. There is no minimum or threshold amount of damages required to trigger efforts to recover such damages, however, the department should consider the cost of obtaining a recovery of damages when deciding whether or not to pursue such recovery.*

As the American Institute of Architects states;

*It depends—on factors like project complexity (the same glitch that amounts to 1% of a large project could be 10% of a small one), time fee constraints, risk vs. reward considerations, etc., all of which must be negotiated between owner and architect to suit the unique circumstances of their mutual undertake. Generally, greater perfection means more risk, so more design effort, more time—and more fee—will likely be required. The key is to have the owner provide funds in their budget to cover a reasonable allowance for inevitable mid-course corrections. Any unused funds remain with the owner.*

Contract managers across the Council provided audit with a variety of viewpoints about design error and omissions change orders, see below:

- The range in change order review policies results in confusion among consultants that conduct business across divisions at the Council.



- Requiring an investigation of each design error and omissions change order can be cumbersome.
- The decision to investigate a change order should be considered in the context of the potential value of the change order to the Council against the staff time involved with investigating it.
- A proposed alternative solution could be to assess the design error and omissions change order at the end of the contract in a broader context. Potentially, in some cases, rather than pursue monetary value, the design error or omission could be noted for considerations on future projects with the same consultants.
- Managers agreed that following up on consultant errors and omissions is important, but the approach must be reasonable given the on-going relationships we have with many of these contactors.

## CONCLUSIONS

ES management has improved change order processes over the past few years. However, these findings indicate that there is still room for some improvement. Throughout this report, we've identified areas where ES change order policies and procedures could be improved to better align with best practices, industry standards, or other Council divisions. In addition, we found several examples of non-compliance with Council procurement policy. These examples were limited, and for contracts that were small, so these errors did not significantly expose the Council. ES management has already taken action to resolve the underlying problems behind some of our findings, but other steps could improve the change order process further.

# RECOMMENDATIONS

Program Evaluation and Audit recommendations are categorized according to the level of risk they pose for the Council. The categories are:

- **Essential** – Steps must be taken to avoid the emergence of critical risks to the Council or to add great value to the Council and its programs. Essential recommendations are tracked through the Audit Database and status is reported twice annually to the Council's Audit Committee.
- **Significant** – Adds value to programs or initiatives of the Council, but is not necessary to avoid major control risks or other critical risk exposures. Significant recommendations are also tracked with status reports to the Council's Audit Committee.
- **Considerations** – Recommendation would be beneficial, but may be subject to being set aside in favor of higher priority activities for the Council, or may require collaboration with another program area or division. Considerations are not tracked or reported. Their implementation is solely at the hands of management.
- **Verbal Recommendation** – An issue was found that bears mentioning, but is not sufficient to constitute a control risk or other repercussions to warrant inclusion in the written report. Verbal recommendations are documented in the file, but are not tracked or reported regularly.

Audit has four recommendations for ES Management, all of which support the three *Thrive MSP 2040* principles of integration, collaboration, and accountability.

1. **(Significant) – ES management should review training and information dissemination practices to ensure that employees fully understand and comply with construction contract procedures and work instructions.** Although ES staff generally abides by procedures regarding contract amendments, this report highlights a few examples where some staff misunderstood policies or procedures, or where not aware of policies and procedures.

**Management Response:** *Currently, Construction Services unit within ES uses monthly CAR/Safety meetings to address a possible training topic. Future meetings will focus on addressing the specific examples presented in the audit where some staff misunderstood policies or procedures. In addition to these monthly meetings, Construction Services also conducts a yearly Recognition/Training meeting which provides another avenue for necessary training and information dissemination to all staff. To ensure that staff is comprehending and understanding policies and procedures our principal contract administrators (CARs) currently have a performance goal that their supervision and direction is in conformance with Council policies, work instructions, and labor agreements. Although contract administrators (ACARs) currently do not have a specific performance goal addressing their compliance with Council policies and work instructions, it will be added to their next year's performance goals.*

**Staff Responsible:** *Manager and Assistant Managers, Construction Services as providing training and information dissemination. All staff as to compliance.*

**Time Table:** *Immediate as to training and information dissemination. Next year as to adding a performance goal for contract administrators.*

2. **(Significant) – ES should amend work instructions to ensure that independent cost estimates are completed and dated prior to receipt of contractor price proposals.** This step would help ensure that CARs are able to provide an independent estimate of the reasonableness of a cost proposal without the evaluation being tainted by the contractor’s version. This effort would be consistent with the Thrive Stewardship Outcome.

**Management Response:** *The work instructions will be revised to specifically clarify the requirement to prepare these estimates prior to receipt of contractor price proposals. The estimate form has been updated to retain the original date that the ES estimate was prepared. As the iteration process continues to arrive at an agreed to price between the ES estimate and the contractor estimate, revised dates will also be retained on the form.*

**Staff Responsible:** *Manager and Assistant Managers, Construction Services as to updating the work instructions. All staff as to compliance.*

**Time Table:** *As previously stated, the estimate form has already been updated. The work instruction was updated on September 15, 2016. This recommendation has been satisfied.*

3. **(Significant) - ES Management should review practices to:**
- a. **Determine that ES change order “type” criteria encompass the full range of reasons for a change order.**
  - b. **Require ES staff to select which specific criterion is used to determine why the “reason” is selected on each relevant form.**
  - c. **Coordinate with other divisions of the Council to review change order procedures to assure consistent treatment of design errors and omissions across the Council.**

**Management Response:** *Regarding the first two bullets above: A peer review group of ES engineering and construction managers will be appointed by the assistant general manager, Technical Services to: (1) clarify the criteria for classifying change orders (scope change, differing site condition, omission, error); (2) review change order classifications on a regular basis (monthly or quarterly) and revise the preliminary determinations as necessary; and (3) revise work instructions accordingly.*

*Regarding the third bullet above: ES will perform this review with other designated divisions of the Council. Work instructions will be updated accordingly, to reflect any determined changes.*

**Staff Responsible:** *Manager and Assistant Managers, Construction Services*

**Time Table:** *Completed by end of first quarter 2017.*

4. **(Significant) – ES management should consider an annual review to update work instructions and procedures to reflect changes in Council-wide policies, procedures and other documents.** This could also be an opportunity to further collaborate with staff at other divisions to update each other on current procurement conditions and practices.

**Management Response:** *ES will formally institute this annual review with the understanding that a condition may arise that requires an immediate revision to ES work instructions and/or procedures.*

**Staff Responsible:** *Manager and Assistant Managers, Construction Services.*

**Time Table:** *Our first annual review can take place in December 2016.*

**Metropolitan Council  
Program Evaluation & Audit  
Environmental Services Construction Change Order Review**

**Exhibit I: Change Order Definitions**

**Differing Site Conditions (DSC)**

- Subsurface or latent physical conditions at the site differing materially from those indicated in the Contract Documents.
- Scope identified in the contract documents but unclear enough that the contractor cannot determine the quantity of work until construction is underway (only applies to lump sum type items).
- Work that is required to be changed due to improper location or absence on record drawings.

**Scope Change**

- Changes requested from MCES engineering, operations, maintenance and other MCES programs to change the design from the approved design.
- Changes required by code inspections that are local interpretations and not known during design.

**Time Extension**

- A time extension is a request for more time to complete some or all of the work.

**Design Error**

- Design errors are mistakes made in calculations, typos, transferring information between drawings, inconsistencies between drawings and specifications that result in changes to the contract that warrant a change order.
- Design not in compliance (Xcel, Council, City, County, State & Federal) with applicable codes.
- Design not functioning as intended. Failure after construction is complete due to inadequate design.
- Design not in agreement with MCES project specific direction.

**Design Omission**

- Design omissions are scope items that are missing. For example, if the drawings do not show wire and conduit it is an omission, if the drawings show wire and conduit to the wrong place it is an error.
- Design features that were discussed and approved during design and not included in the contract documents.

**Quantity Reconcile**

- The CAR continually monitors unit price quantities and upon completion of work on such contracts, a final change order is written to adjust the estimated to the actual quantity of materials used.

**Source (the above six CO types): MCES Work Instruction 507-07-05, Change Orders, pp. 5,7,8, dated April 25, 2014**

**Other**

- Temporary Conditions, claims, conformed documents, cancelled change orders, allowance adjustments & warranties.

**Unknown**

- Type of change orders could not be determined after reviewing all available documentation.



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