

FOLLOW-UP REPORT

Department of Transportation & Infrastructure
and Technology Services

Public Works Asset Management Software Applications

NOVEMBER 2021



TIMOTHY M. O'BRIEN, CPA
DENVER AUDITOR

OFFICE OF THE AUDITOR
AUDIT SERVICES DIVISION, CITY AND COUNTY OF DENVER

Audit Team

Jared Miller, CFE, CISA, CDPSE, Information Systems Audit Manager
Karin Doughty, CISA, CDPSE, Lead Information Systems Auditor
Rob Farol Jr., CIA, CGAP, Senior Auditor

Audit Management

Timothy M. O'Brien, CPA, Auditor
Valerie Walling, CPA, Deputy Auditor
Dawn Wiseman, CRMA, Audit Director

Audit Committee

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Office of the Auditor

201 West Colfax Avenue, #705
Denver CO, 80202
(720) 913-5000 | Fax (720) 913-5253

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City and County of Denver



TIMOTHY M. O'BRIEN, CPA
AUDITOR

201 West Colfax Avenue, #705, Denver, Colorado 80202
(720) 913-5000 | Fax (720) 913-5253 | www.denverauditor.org

AUDITOR'S LETTER

November 4, 2021

In keeping with generally accepted government auditing standards and Auditor's Office policy, as authorized by city ordinance, the Audit Services Division has a responsibility to monitor and follow up on audit recommendations to ensure city agencies address audit findings through appropriate corrective action and to aid us in planning future audits.

In our follow-up effort for the "Public Works Asset Management Software Applications" audit report issued in January 2020, we determined the Department of Public Works – now the Department of Transportation & Infrastructure – fully implemented nine of 15 recommendations it agreed to in the original audit report. The city's Technology Services agency fully implemented five of 10 recommendations it agreed to in the original audit report and partially implemented another three recommendations.

Despite the two agencies' efforts, auditors determined the risks associated with the audit team's initial findings have not been fully mitigated. As a result, the Audit Services Division may revisit these risk areas in future audits to ensure the city takes appropriate corrective action.

The Highlights page in this report provides background and summary information about the original audit and the completed follow-up effort. Following the Highlights page is a detailed implementation status update for each recommendation.

I would like to express our sincere appreciation to the personnel at the Department of Infrastructure & Transportation and at Technology Services who assisted us throughout the audit and the follow-up process. For any questions, please feel free to contact me at 720-913-5000.

Denver Auditor's Office

A handwritten signature in black ink, appearing to read "Timothy M. O'Brien".

Timothy M. O'Brien, CPA
Auditor



Public Works Asset Management Software Applications

NOVEMBER 2021

Objective

To evaluate the design and the operating effectiveness of the information technology general controls, specific application controls, and financial reporting for infrastructure assets tracked in the Cartegraph and dTIMS asset management systems. Also, to assess the shared responsibility between the Department of Transportation & Infrastructure, formerly known as the Department of Public Works, and the city's Technology Services agency to define and implement information technology general controls.

Background

The Department of Transportation & Infrastructure uses asset management application software to track and report on the city's \$2.8 billion investment in streets, alleys, traffic signals, sewers, and other related infrastructure assets it manages. The city's Technology Services agency provides technical support.

ORIGINAL REPORT HIGHLIGHTS

The Lack of Formal Citywide Policies for Information Technology Processes to Guide Agency Procedures Created Cybersecurity and Operational Risks

Technology Services did not have the explicit authority to create and enforce citywide information technology policies. The lack of documented information technology controls placed the Department of Transportation & Infrastructure's asset data at risk. The lack of a formal citywide best practice for spreadsheet controls resulted in errors in Transportation & Infrastructure's fixed asset accounting and reporting data.

Poor Vendor Oversight Put Asset Management Data at Risk

There was no effective review of cloud-based vendors' information technology general controls. Transportation & Infrastructure did not obtain and review vendors' insurance coverage for dTIMS and Cartegraph.

The City's Contracting Process Failed to Include Technology Services' Required Review and Approval of a Technology Purchase

Technology Services did not review the Cartegraph contract, which resulted in the city purchasing unneeded licenses. The Cartegraph contract did not clearly specify who is responsible for backup of city data in line with best practices.

Technology Services Should Have Expanded its Existing Business Relationship Management Program to Include the Public Works Department to Provide Better Customer Service

Technology Services failed to respond to requests from Transportation & Infrastructure to ensure appropriate security processes were established.

Technology Services had not communicated the process for updating citywide geographic information system data.

The Public Works Department Did Not Have a Formal Strategy for Asset Management

Transportation & Infrastructure identified the need to expand its asset management plan but lacked a comprehensive asset management plan.



14

FULLY IMPLEMENTED



3

PARTIALLY IMPLEMENTED



8

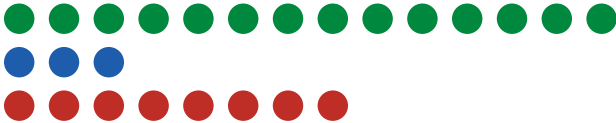
NOT IMPLEMENTED

Nov. 4, 2021

Action Since Audit Report

Public Works Asset Management Software Applications

25 recommendations proposed in January 2020



FULLY IMPLEMENTED 14



PARTIALLY IMPLEMENTED 3



NOT IMPLEMENTED 8

Responsibility for implementing our recommendations fell on both the Department of Transportation & Infrastructure and the city's Technology Services agency.

Transportation & Infrastructure fully implemented nine recommendations made to it in the original audit report, but six others have yet to be fully implemented or acted upon. There remains a lingering risk that data could be lost due to poor backup management of the Cartegraph signals, signage, and fiber optic asset management system. This risk will continue until both Transportation & Infrastructure and Technology Services choose to consolidate all data into a single enterprise system.

In addition, if the department continues to not review service organization controls reports, circumstances between the city's vendor and web host may change that could compromise city data. Additionally, Technology Services may not implement suggested complementary controls recommended for the city.

Meanwhile, Technology Services fully implemented five recommendations made to it in the original audit report, but another five have yet to be fully implemented or acted upon. Lingering risks surrounding the lack of a service-level agreement between Technology Services and Transportation & Infrastructure and the lack of dTIMS password controls integration with a single sign-on system could be mitigated by both agencies' plan to consolidate asset management into a single enterprise system within the next year.

FINDING 1 | The Lack of Formal Citywide Policies for Information Technology Processes to Guide Agency Procedures Creates Cybersecurity and Operational Risks

Recommendation 1.1



**FULLY
IMPLEMENTED**

UPDATE NECESSARY LAWS – The Technology Services agency should have the necessary laws updated as soon as possible to enable the agency to establish and enforce standardized citywide information technology policies.

AGENCY ACTION

Original target date for completion: April 15, 2020

Technology Services released an updated Executive Order No. 18 on Jan. 13, 2021. The new order grants Technology Services the authority to:¹

- Administer, manage, and sustain technology services for all agencies that operate on the city’s network.
- Organize and direct information technology activities and personnel on the network, including reassigning staff classified as information technology personnel.
- Develop, implement, and make available policies for users of the network and for technology best practices across the City and County of Denver.
- Have sole authority to block the procurement or deployment of technology or to disable technology identified as a risk to the network or that is incompatible with existing technology.
- Have authority to – and be required to – review and approve all acquisitions of technology.

The executive order defines the “network” as “hardware and software components and systems that support the digital services for Users including connectivity, email, storage, cybersecurity, and all other digital technology.” Meanwhile, it describes “technology” as being “software, hardware, or cloud service that connects to the Network.”²

These updates give Technology Services the necessary authority to have a more centralized approach in managing the city’s network. Therefore, the recommendation has been fully implemented.

¹ Exec. Order No. 18, City and County of Denver (2021), accessed Sept. 30, 2021, https://www.denvergov.org/files/assets/public/executive-orders/documents/18_technology_services_agency.pdf, 1.

² Exec. Order No. 18.

Recommendation 1.2



**PARTIALLY
IMPLEMENTED**

CREATE INFORMATION TECHNOLOGY POLICIES – When the laws are updated as noted in Recommendation 1.1, the Technology Services agency should create citywide information technology policies and establish the means to ensure all city agencies are complying with these policies.

AGENCY ACTION

Original target date for completion: July 15, 2020

Technology Services developed a project plan to complete its 16 critical security controls. It included a schedule for developing, editing, and approving each of the critical controls. According to the plan and the city’s chief information security officer, the project is to be completed by the end of 2021, even though this was originally targeted for July 2020.

As of Sept. 7, 2021, Technology Services staff acknowledged only four of the 16 policies were completed and published on the city’s intranet – which is an internal, private website used for collaboration among city employees. We noted another nine policies had been revised in 2021 and await approval by the policy work group, which Technology Services considers the final step. Two others have not been revised since November 2020 and one has not yet been drafted.

Despite delays in meeting its original implementation date, Technology Services provided us with a project plan evidencing a targeted completion date by the end of 2021 and the agency has made significant progress in updating and revising new agencywide policies.

We found sufficient work has been completed so far through the work group to warrant a partial implementation of this recommendation. The remaining 12 draft policies still need to be approved by the work group and be approved by Technology Services management by the end of the year.

Recommendation 1.3



**NOT
IMPLEMENTED**

DEVELOP USER ACCESS PROCESS – The Department of Public Works, with guidance from the Technology Services agency, should develop a formal process as soon as possible to grant, change, and remove user system access.

AGENCY ACTION

Original target date for completion: June 30, 2020

The Department of Transportation & Infrastructure, formerly called the Department of Public Works, created a draft policy that:

- Establishes a formal process to grant, change, and remove users' access privileges for asset management systems.
- Defines the roles and responsibilities of system administrators and subject-matter experts.
- Specifies a periodic review of system access privileges to ensure access remains appropriate.

On Dec. 31, 2020, the draft was submitted to the department's operations coordinator for final review and approval. However, as the project to select and deploy a new enterprise asset management application has progressed, department management decided in January 2021 that user access policies should be part of a larger effort to fully document policies and procedures for the designated application.

This project to consolidate asset management includes two work groups — program development and technology — which are tasked with developing policies and procedures as well as ensuring oversight for compliance.

Although Transportation & Infrastructure developed a draft policy for user access, the policy has not been finalized and implemented. In addition, the department is waiting for the enterprise asset management application to be implemented before using the new policies and procedures. Therefore, the recommendation is not implemented.

Recommendation 1.4

DEVELOP ADMINISTRATOR USER REVIEW PROCESS – The Department of Public Works, with guidance from the Technology Services agency, should develop a formal process as soon as possible for approving administrator user accounts.



**NOT
IMPLEMENTED**

AGENCY ACTION

As discussed in the agency action for Recommendation 1.3, the Department of Transportation & Infrastructure, formerly called the Department of Public Works, created a draft policy that includes a periodic review of system access privileges to ensure access remains appropriate.

Although the draft was submitted to the department's operations coordinator for final review and approval in December 2020, we determined the department is not performing reviews at this time. As noted in Recommendation 1.3, department management decided periodic review policies will be included with policies and procedures for the forthcoming enterprise application.

Because Transportation & Infrastructure's draft policy for user access — including administrator access — has not been finalized and because staff

are not performing reviews, the recommendation is not implemented.

Recommendation 1.5

DEVELOP AN ACCESS REMOVAL PROCESS – The Department of Public Works should develop a process to notify Workday administrators to remove user access for all users, including unpaid interns, when their employment or internship is completed.



**NOT
IMPLEMENTED**

AGENCY ACTION

Original target date for completion: June 30, 2020

As discussed in the agency action for Recommendation 1.3, the Department of Transportation & Infrastructure, formerly called the Department of Public Works, created a draft policy that establishes a formal process to grant, change, and remove users' access privileges for asset management systems.

The forthcoming new enterprise asset management application will use the city's Active Directory credentials, and access removal will be administered through SupportNow. These steps, once implemented, will address the issues we identified regarding network access by unpaid interns.

Because Transportation & Infrastructure's draft policy for user access has not been finalized and because the department is waiting for the implementation of the new enterprise asset management application before using the new policies and procedures, this recommendation is not implemented.

Recommendation 1.6

DEVELOP USER ACCESS REVIEW – The Department of Public Works, working with the Technology Services agency, should develop a process as soon as possible to establish periodic user access review listings to ensure user access remains appropriate for all applications and that appropriate segregation of duties is maintained.



**NOT
IMPLEMENTED**

AGENCY ACTION

Original target date for completion: June 30, 2020

As discussed in the agency action for Recommendation 1.3, the Department of Transportation & Infrastructure, formerly called the Department of Public Works, created a draft policy that establishes a formal process to grant, change, and remove users' access privileges for asset management systems.

Although the draft was submitted to the department's operations coordinator for final review and approval in December 2020, we confirmed staff are not performing the access reviews. The department is waiting for the implementation of its new enterprise asset management application before using the new policies and procedures.

Therefore, this recommendation is not implemented.

Recommendation 1.7

DEVELOP SUCCESSION PLAN – The Department of Public Works, with guidance from the Technology Services agency, should ensure there is a succession plan as soon as possible for all system administrator roles.



**FULLY
IMPLEMENTED**

AGENCY ACTION

Original target date for completion: March 31, 2020

The Department of Transportation & Infrastructure revised the business plan for its Office of Asset Management to add succession planning. As part of this, the department restructured the Office of Asset Management to move subject-matter experts and system administrators for asset management applications under a single engineering specialist. The succession plan specifies that each asset management subject-matter expert should cross-train on at least one other application.

Since the department revised the business plan, it has made significant progress in moving to a new enterprise asset management application. The department evaluated each existing application before selecting AssetWorks, and Technology Services is negotiating a contract with the vendor. Department management said the project has helped the subject-matter experts to become more familiar with each other's applications as they reviewed the application data. After the various systems are consolidated into AssetWorks, the vendor will train up to five system administrators.

Transportation & Infrastructure added a succession plan to its business plan and made changes to reporting structures to support cross-training and collaboration between system administrators. In addition, the asset consolidation plan will include training for multiple system administrators. Therefore, this recommendation is fully implemented.

Recommendation 1.8

CREATE SPREADSHEET BEST PRACTICE – When the laws are updated as noted in Recommendation 1.1, the Technology Services agency should establish standard citywide best practices for key spreadsheet controls that



**FULLY
IMPLEMENTED**

address the following areas:

1. Change controls – develop controls to highlight changes made to the spreadsheet calculations or reporting.
2. Version control – set up automated version control of all files when they are updated to allow tracking of changes made.
3. Access control – restrict users’ access to the folders where the critical files are stored and set up password protection of individual files.
4. Input controls – set up “checksum” totals to confirm the accuracy of data entered, and lock cells with formulas to prevent them from being accidentally changed.
5. Documentation – create documentation for each spreadsheet to describe its purpose, methodology, source of data, and outputs.
6. Backups – ensure folders where spreadsheets are stored are regularly backed up to a different location.

AGENCY ACTION

Original target date for completion: April 15, 2020

On the city’s intranet, Technology Services last updated the four spreadsheet controls guidance documents in April 2020 – which cover change and version controls and access and input controls, including documentation and backups. This guidance was featured in the Denver Employee Bulletin for three consecutive weeks in late May and early June 2020.

The inclusion of the guidance on the city’s intranet satisfies the recommendation. Therefore, it is fully implemented.

Recommendation 1.9

IMPLEMENT SPREADSHEET CONTROLS – Working with the Technology Services agency, the Department of Public Works should, as soon as possible, move to a solution with appropriate information technology controls or implement spreadsheet control procedures that address the following areas:

1. Change controls – develop controls to highlight changes made to the spreadsheet calculations or reporting.
2. Version control – set up automated version control of all files when they are updated to allow tracking of changes made.
3. Access control – restrict users’ access to the folders where the critical files are stored and set up password protection of individual files.



**NOT
IMPLEMENTED**

4. Input controls – set up “checksum” totals to confirm the accuracy of data entered, and lock cells with formulas to prevent them from being accidentally changed.
5. Documentation – create documentation for each spreadsheet to describe its purpose, methodology, source of data, and outputs.
6. Backups – ensure folders where spreadsheets are stored are regularly backed up to a different location.

AGENCY ACTION

Original target date for completion: 180 days after completion of Recommendation 1.8

We learned the Department of Transportation & Infrastructure’s accounting director was not aware that Technology Services created spreadsheet best practices. After we made them aware of this through our audit follow-up in 2021, the accounting director scheduled meetings to educate staff.

Meanwhile, the department has been working with Technology Services to implement an enterprise asset management application that has the functionality and necessary controls to replace the need for spreadsheets to manage capital assets. Technology Services is still negotiating a contract with the application vendor.

Although the department has not implemented spreadsheet controls, it has made significant progress toward choosing a solution with appropriate information technology controls. However, because a solution has not been implemented and the department was unaware of Technology Services’ spreadsheet best practices, we consider this recommendation not implemented.

FINDING 2 | Poor Vendor Oversight Puts Asset Management Data at Risk

Recommendation 2.1

IMPLEMENT VENDOR MANAGEMENT SYSTEM – The Technology Services agency should continue to implement the ServiceNow Vendor Management module to fully document the review process and schedule recurring reviews for System and Organization Controls for Service Organizations, or SOC, reports. The agency should follow up with the vendor on control gaps identified in the report.



FULLY IMPLEMENTED

AGENCY ACTION

Original target date for completion: Dec. 31, 2020

In December 2020, Technology Services committed to using ServiceNow as the repository for security reviews conducted by its information security team. The team reviews documentation and results, including service organization controls reports.

The team continues to focus its security reviews on city vendors that need to be compliant with the requirements of regulated data such as payment card industry standards, laws governing the safekeeping and use of personally identifiable information, records in the Criminal Justice Information System, and data protected by the Health Information Portability and Accountability Act, as well as other regulated or sensitive data.

During our follow-up, we reviewed a vendor master file from ServiceNow, which showed Technology Services staff have conducted recurring reviews for some major applications since the end of our original audit.

The agency has continued to use its ServiceNow application to house information regarding its staff’s reviews of city vendors working with sensitive data, and the agency appears to be conducting recurring reviews of service organization controls reports, when available, or other equivalent security reports. Therefore, we consider this recommendation fully implemented.

Recommendation 2.2

IMPLEMENT PERIODIC CLOUD-BASED VENDOR SECURITY REVIEWS – The Technology Services agency should implement a process to review cloud-based vendors’ ongoing adherence to the City and County of Denver cloud security controls. If gaps in the vendors’ security controls are identified,



**PARTIALLY
IMPLEMENTED**

Technology Services should implement sufficient additional controls to mitigate the lack of security or decommission the noncompliant vendor service until the security issues can be adequately addressed.

AGENCY ACTION

Original target date for completion: Dec. 31, 2020

Technology Services' information security team does not use specific criteria from the Cloud Security Alliance when evaluating controls of cloud-based providers.³ The information security team focuses its efforts only on vendors with sensitive data – such as criminal justice information, personal health information, and personally identifiable information – to ensure private data stays protected and is protected in compliance with applicable laws, regulations, and standards. These vendors include on-site, cloud-based services like Workday, the city's financial and human resources application, as well as non-cloud-based services.

Updated cloud security controls are being woven into 16 high-priority controls as mentioned in Recommendation 1.2, which are to be completed by the end of 2021. However, because the policies have not been completed and published on the ServiceNow platform, this recommendation is only partially implemented.

Recommendation 2.3



**FULLY
IMPLEMENTED**

OBTAIN SYSTEM AND ORGANIZATION CONTROLS FOR SERVICE

ORGANIZATIONS REPORTS – The Department of Public Works should obtain its vendors' System and Organization Controls for Service Organizations, or SOC, reports or other attestation documentation and review to determine whether backups are scheduled and tested on a periodic basis. The department should follow up with the vendor on control gaps identified in the report and mitigate any risks identified.

AGENCY ACTION

Original target date for completion: Oct. 30, 2020

The Department of Transportation & Infrastructure obtained service organization controls reports from the vendors identified in the original audit. In both instances, the reports were issued by the vendor's web hosting providers.

³ The Cloud Security Alliance provides fundamental security principles to cloud vendors to help ensure a secure cloud environment.

Transportation & Infrastructure management requested guidance from Technology Services on reviewing the service organization controls reports. Technology Services' governance and compliance analyst reviewed the reports for backups, change management, and disaster recovery practices. The analyst reported no concerns.

In addition, we learned the draft contract for the enterprise asset management application contains a provision requiring the vendor to provide an annual service organization controls report.

Although the recommendation called for Transportation & Infrastructure staff to conduct the review, the Technology Services review mitigates the risk identified in the recommendation. Therefore, we consider this recommendation fully implemented.

Recommendation 2.4

REVIEW VENDOR DISASTER RECOVERY CONTROLS – The Department of Public Works should obtain the vendor System and Organization Controls for Service Organizations, or SOC, reports or other attestation documentation and review the disaster recovery information contained in these reports to ensure the vendors' disaster recovery processes meet Public Works' needs. The department should follow up with the vendor on control gaps identified in the report and mitigate any risks identified.



**FULLY
IMPLEMENTED**

AGENCY ACTION

Original target date for completion: Oct. 30, 2020

As discussed in Recommendation 2.4, the Department of Transportation & Infrastructure obtained service organization controls reports from the vendors identified in the original audit. Transportation & Infrastructure management requested guidance from Technology Services on reviewing the reports. Technology Services' governance and compliance analyst reviewed the reports for backups, change management, and disaster recovery practices and reported no concerns.

Although the recommendation called for Transportation & Infrastructure staff to conduct the review, the Technology Services review mitigates the risk identified in the recommendation. Therefore, we consider this recommendation fully implemented.

Recommendation 2.5

REVIEW VENDOR CHANGE MANAGEMENT CONTROLS – The Department of Public Works should obtain the vendors' System and Organization Controls for Service Organizations, or SOC, reports or other attestation



**FULLY
IMPLEMENTED**

documentation and review the change management information contained in these reports to ensure the vendors' change management controls meets Public Works' needs. The department should follow up with the vendors on control gaps identified in the report and mitigate any risks identified.

AGENCY ACTION

Original target date for completion: Oct. 30, 2020

As discussed in Recommendation 2.4, the Department of Transportation & Infrastructure obtained service organization controls reports from the vendors identified in the original audit. Transportation & Infrastructure management requested guidance from Technology Services on reviewing the reports. Technology Services' governance and compliance analyst reviewed the reports for backups, change management, and disaster recovery practices and reported no concerns.

Although the recommendation called for Transportation & Infrastructure staff to conduct the review, the Technology Services review mitigates the risk identified in the recommendation. Therefore, we consider this recommendation fully implemented.

Recommendation 2.6



**NOT
IMPLEMENTED**

IMPLEMENT COMPLEMENTARY USER CONTROLS – The Department of Public Works should ensure it evaluates the complementary user controls as identified in each vendor's System and Organization Controls for Service Organizations, or SOC, report and implements those controls that are feasible.

AGENCY ACTION

Original target date for completion: 180 days after receipt of SOC Reports

In general, entities should review complementary user controls contained in service organization controls reports to decide whether additional security controls are required to protect data.

The web hosting providers for Cartegraph and dTIMS provided Transportation & Infrastructure with copies of their service organization controls reports. However, we found that neither Transportation & Infrastructure nor Technology Services reviewed the complementary user controls section included in the reports.

Transportation & Infrastructure staff were not aware that the reports included a section for complementary user controls. They said they believed

the Technology Services review for Recommendations 2.3, 2.4, and 2.5 — which found no issues — met the requirement for a review of additional controls.

However, a lingering risk remains if these service organization controls reports are not reviewed in the future. If circumstances between the city’s vendor and its web host change, city data may be compromised. Additionally, Technology Services may miss complementary controls recommended for the city.

Therefore, we consider this recommendation not implemented.

Recommendation 2.7

REVIEW INSURANCE COVERAGE – The Department of Public Works should develop a process to receive, track, and review all insurance coverage certificates from technology vendors to ensure they are maintaining compliance with the city’s insurance requirements.



**FULLY
IMPLEMENTED**

AGENCY ACTION

Original target date for completion: June 30, 2020

Contract administrators in the Department of Transportation & Infrastructure are capturing insurance coverage and policy dates in the Salesforce application. They can run reports to identify those nearing expiration, and then they can contact the respective vendors to obtain updated ACORD certificates of insurance.

We verified the noncompliant vendor identified in the original audit now complies with insurance requirements. Therefore, the recommendation is fully implemented.

FINDING 3 | The City’s Contracting Process Failed to Include Technology Services’ Required Review and Approval of a Technology Purchase

Recommendation 3.1



**PARTIALLY
IMPLEMENTED**

IMPROVE CONTRACTING PROCESS – The Technology Services agency should work with all parties involved in the contracting process to improve the contract routing and approval process to ensure Technology Services is included in all technology purchases.

AGENCY ACTION

Original target date for completion: July 15, 2020

Technology Services’ deputy chief information officer said the updates to Executive Order No. 18 provide the “teeth” the agency needs to enforce compliance with policies and procedures — including the required routing of all technology purchases by city agencies.

Both the chief information officer and their deputy acknowledged Denver International Airport still operates as its own entity and continues not to require contract approval through Technology Services. The chief information officer said personnel in the airport’s Business Technologies division evaluate the airport’s technology purchases.

Jaggaer, the city’s digital procurement software, includes a checkbox that must be marked when an agency purchases technology. This routes technology purchases through Technology Services’ information technology managers before any business and financial approvers. When the checkbox is used by the airport for technology purchases, Technology Services’ contract administrators are made aware of the purchase but they do not route the purchase contract through Technology Services’ approvers.

The policies and procedures for Technology Services’ contract management process are outdated, as they reference the previous procurement system of Alfresco, which is now used only for storing executed agreements and other important documents related to contracted services.

The update of the executive order and Technology Services’ new approval routing in Jaggaer brings Technology Services closer to a well-documented process for procuring technology and technology services. However, the agency still needs to update its policies and procedures to reflect current business processes.

Therefore, we conclude this recommendation is only partially implemented.

Recommendation 3.2



**FULLY
IMPLEMENTED**

CLARIFY CONTRACT LANGUAGE – The Department of Public Works should clarify the Cartegraph contract language regarding the responsibility for performing backups and for how frequently those backups should occur.

AGENCY ACTION

Original target date for completion: Oct. 30, 2020

On Sept. 1, 2021, we reviewed contract amendments to determine whether language was added to clarify the responsibility for performing backups. However, the contract language had still not been modified despite the department agreeing to do so by October 2020.

When department staff realized amendments had not been made, they contacted us about creating a memorandum of understanding for the Cartegraph contract. On Sept. 22, 2021, Transportation & Infrastructure provided an executed memorandum of understanding with Cartegraph dated Sept. 9, 2021, which clarified the responsibility for backups. According to the department, the memorandum will accompany and correspond to any future agreements involving Cartegraph.

Based on this review, we originally concluded the recommendation was not implemented. However, the memorandum does mitigate the risk by establishing clear responsibility for backups going forward for Cartegraph-related contracts. As such, we consider the recommendation fully implemented.

FINDING 4 | Technology Services Should Expand its Existing Business Relationship Management Program to Include the Public Works Department to Provide Better Customer Service

Recommendation 4.1



**FULLY
IMPLEMENTED**

IMPROVE CUSTOMER SERVICE – The Technology Services agency should improve its customer service for the Department of Public Works’ technology issues.

AGENCY ACTION

Original target date for completion: Immediately (The original audit report was published in January 2020.)

Technology Services’ business relationship management program was canceled during the COVID-19 pandemic because of budget cuts. However, Technology Services has been working closely with the Department of Transportation & Infrastructure to ensure the department complies with the updated Executive Order No. 18.

Collaboration efforts between Technology Services and Transportation & Infrastructure included moving two staff members from Transportation & Infrastructure into Technology Services for better administration and desktop support. These employees are supported by the standard ServiceNow process and have obtained additional knowledge and expertise. Technology Services’ deputy chief information officer said this has resulted in better support of Transportation & Infrastructure.

Technology Services also used a former team member to lead an effort to consolidate Transportation & Infrastructure’s asset management systems from four to one. Transportation & Infrastructure also started a strategic initiative committee that both the deputy chief information officer and chief information officer sit on. As the two agencies improved their collaboration, average customer satisfaction scores generally increased throughout 2020 and the first quarter of 2021.

The transfer of two employees, the collaboration to consolidate multiple systems into one asset management system, and the open participation by Technology Services executives in Transportation & Infrastructure’s strategic initiatives appears to be improving customer service. Therefore, we consider this recommendation fully implemented.

Recommendation 4.2



**NOT
IMPLEMENTED**

ESTABLISH SERVICE-LEVEL AGREEMENTS – The Technology Services agency should establish and communicate a standard process with expected response times and escalation path for handling customer requests and disagreements.

AGENCY ACTION

Original target date for completion: March 31, 2020

During our follow-up, Technology Services' chief information officer said Technology Services' agreement to the recommendation – to provide service-level agreements between city agencies – was made in error.

The chief information officer said service-level agreements do not allow management the flexibility to prioritize and improve service levels across all agencies. To maintain the flexibility required to manage the city's technology needs effectively, economically, and efficiently, the chief information officer ultimately decided not to implement this recommendation.

Recommendation 4.3



**NOT
IMPLEMENTED**

IMPROVE DTIMS PASSWORD SETTINGS – The Technology Services agency should work with the Department of Public Works to ensure dTIMS meets password security requirements as soon as possible by integrating dTIMS into the city's active directory or ensuring that a vendor-provided solution meets Technology Services' requirements.

AGENCY ACTION

Original target date for completion: March 15, 2020

Technology Services' project management director said that dTIMS, Transportation & Infrastructure's asset management software, was not integrated into the city's Active Directory for two reasons:

- A single sign-on solution from SailPoint will replace the Oracle Identity Manager.
- A new consolidating system, AssetWorks, will integrate at least four Transportation & Infrastructure applications into a single system, potentially resulting in the discontinued use of dTIMS.

The single sign-on project is expected to go live in January 2022. Also, Technology Services is negotiating a contract with AssetWorks and expects to have an implementation project plan by the fourth quarter of 2021.

The department continues to use dTIMS without integrated password controls. Although the department is planning on using an enterprise application that will provide this functionality, this recommendation has not been implemented.

Recommendation 4.4

COMMUNICATE UPDATE PROCESS – The Technology Services agency should, as soon as possible, communicate its process to the Department of Public Works for updating the city’s geographic information system database.



**FULLY
IMPLEMENTED**

AGENCY ACTION

Original target date for completion: Jan. 31, 2020

Transportation & Infrastructure and Technology Services met in January 2020 to discuss how Transportation & Infrastructure should update geographic information system data in the city’s database, and Technology Services explained its processes to Transportation & Infrastructure staff.

Therefore, we consider this recommendation fully implemented.

FINDING 5 | The Public Works Department Does Not Have a Formal Strategy for Asset Management

Recommendation 5.1

FORMALIZE ASSET MANAGEMENT STRATEGY – The Department of Public Works should continue its efforts to develop an asset management strategy by formalizing its asset management approach and:

- Developing a comprehensive charter.
- Creating specific deliverables and objectives.
- Identifying a business case and requirements.
- Conducting an analysis of stakeholder needs.



**FULLY
IMPLEMENTED**

AGENCY ACTION

Original target date for completion: Sept. 30, 2020

In February 2020, the Department of Transportation & Infrastructure revised its Office of Asset Management business plan to emphasize the need to consolidate the asset management applications and reduce the number of systems in use.

Staff subject-matter experts for the various asset management applications were reorganized to report to the Office of Asset Management to develop uniform procedures for an asset management application. In addition, the revised plan emphasized the creation of a data repository. The department anticipated that, through these efforts, there would be opportunities to consolidate asset management applications.

Transportation & Infrastructure — in conjunction with Technology Services — assessed each of the agencies' asset management applications to identify which applications provided the best functionality for consolidation. The results of this effort were presented to the project team in November 2020.

The department has since been working closely with Technology Services to move to an enterprise asset management application. As a result, we consider this recommendation fully implemented.

Recommendation 5.2



**FULLY
IMPLEMENTED**

CONSULT WITH THE CHIEF DATA OFFICER – The Department of Public Works should continue its efforts to develop an asset management strategy by consulting with the chief data officer to leverage their experience in developing data standards to ensure consistency between the various asset management platforms.

AGENCY ACTION

Original target date for completion: Ongoing

The Department of Transportation & Infrastructure has been meeting regularly with Technology Services' chief data officer to collaborate on data strategy and forecast data needs. We reviewed meeting minutes and calendar schedules provided by the department, which showed monthly data check-ins over a four-month period and which included the chief data officer.

As a result, we consider this recommendation fully implemented.

Recommendation 5.3



**FULLY
IMPLEMENTED**

ENGAGE TECHNOLOGY SERVICES – The Department of Public Works should continue its efforts to develop an asset management strategy by engaging the Technology Services agency as soon as possible to assist with the asset management initiative to ensure information technology and project management best practices are followed.

AGENCY ACTION

Original target date for completion: Sept. 30, 2020

Transportation & Infrastructure made significant progress toward adopting an enterprise asset management application. It submitted a project request to Technology Services in February 2021, and Transportation & Infrastructure and Technology Services have been working closely to ensure the solution will meet requirements for both asset management functionality and technology.

Therefore, we consider this recommendation fully implemented.

Office of the Auditor

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201 West Colfax Avenue #705

Denver CO, 80202

(720) 913-5000 | Fax (720) 913-5253

www.denverauditor.org

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