

# **CartêGraph System Follow-Up Audit February 2009**

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# CartêGraph System Follow-Up Audit



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## *Executive Summary*

*Thirteen of 22 recommendations have been fully implemented*

### *Fully Implemented*

- *Locking down completed work orders*
- *Data field controls*
- *Remote access to CartêGraph*

### *Partially Implemented*

- *Improving the integrity of warehouse material data*

### *Not Implemented*

- *Audit trails*
- *Disaster recovery plan*

The City Auditor's Office has completed a follow-up to the November 2007 CartêGraph System Audit. The follow-up audit was conducted 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. The objective of the follow-up was to determine the implementation status of prior audit recommendations.

The follow-up audit indicated that 13 recommendations were fully implemented, two were partially implemented and seven recommendations were not implemented.

Management implemented recommendations related to data security, including limiting the ability to alter closed work orders and establishing data field controls that require mandatory data entry. The Public Works and Transportation Department has established system reports to identify incomplete work order data. Management has also resolved remote access connectivity issues.

Public Works management has partially implemented controls to prevent closure of work orders without labor/material information and improve the integrity of warehouse material data.

Six of the seven recommendations not implemented relate to audit trails. Management's implementation of these six recommendations is dependent on future CartêGraph upgrades. Management has communicated the need for audit trails to the system vendor. However, the current version of CartêGraph is not capable of creating audit trails. A disaster recovery plan was also not implemented.

## ***Audit Scope and Methodology***

The City Auditor's Office reviewed CartêGraph activity from January 2008 to November 2008. The following methodology was used in completing the audit.

- Reviewed policies and procedures
- Interviewed Public Works management staff
- Examined new methodology in place as a result of the initial audit recommendations
- Conducted limited testing of new implementations
- Conducted limited inventory counts and value verifications

## ***Status of Prior Audit Recommendations***

### ***Recommendation:***

The Public Works Director should require that the Information Systems Coordinator establish data field controls where applicable.

### ***Management Response:***

*Not all fields are required for data entry, at this time. Currently, only the "Department" and "Assigned To" fields are required, which prevents work orders from falling through the cracks. The Information Systems Coordinator will work with the CartêGraph Steering Committee to determine which fields must always be entered before a work order is closed, without making the system too cumbersome for the user.*

*In the Materials recordset, there are two primary fields used to identify the material item. Those two fields will be required, and the Information Systems Coordinator will build in a message to remind the user to enter the price quote for new items.*

*As an added measure, the Operations Support Services Division is currently drafting a business process requiring regular inventory and invoice/price reconciliations to ensure data has been appropriately entered.*

*Target Date: June 1, 2008*  
*Responsibility: Information Systems Coordinator*  
*CartêGraph Steering Committee*  
*CartêGraph Users*

### ***Implementation Status:***

Fully Implemented. The Information Systems Coordinator has introduced data field controls, which require mandatory data entry for work orders, based on the activity code. The system now requires users to input data in the labor and material fields.

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### ***Recommendation:***

The Public Works Director should require that the Information Systems Coordinator disallow alterations to system-generated work order numbers.

### ***Management's Response:***

*The CartêGraph system sets the work order number field to be alterable by default. The Information Systems Coordinator has now locked down the work order number field to be read-only.*

*Target Date: Completed*  
*Responsibility: Information Systems Coordinator*

**Implementation Status:**

Fully Implemented. The Information Systems Coordinator has locked out the work order number field, disallowing alterations to the system-generated work order number.

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**Recommendation:**

The Public Works Director should require that alterations to closed and completed work orders be restricted to the system administrator.

**Management Response:**

*CartêGraph Systems is currently in the process of developing a customized script to restrict user alterations to closed work orders. This security modification was initiated in April 2007.*

*Target Date: February 28, 2008*  
*Responsibility: Information Systems Coordinator*  
*CartêGraph Systems*

**Implementation Status:**

Fully Implemented. The Information System Coordinator has limited the ability to alter closed work orders to the CartêGraph System Administrator and Pavement Systems Analyst. The System Administrator and Pavement Systems Analyst are capable of granting individual work order alteration rights to management, after verifying the need to amend closed work orders.

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**Recommendation:**

The Public Works Director should request that all work order activity after closure be logged into an audit trail and periodically reviewed by appropriate management.

**Management Response:**

*After the custom script is completed, the Information Systems Coordinator will develop custom archive reports that show edits made on closed work orders.*

*Target Date: July 1, 2008*  
*Responsibility: Information Systems Coordinator*

**Implementation Status:**

Not Implemented. Although an audit trail has not been created to identify edits on closed work orders, the Information Systems Coordinator has introduced compensating controls. Users are no longer allowed to edit closed work orders and only the System Administrator can grant access to closed work orders, on an individual basis.

**Recommendation:**

The Public Works Director should establish operational controls to prevent work order duplication.

**Management Response:**

*It is not unusual to have duplicated work orders in the system, as multiple citizens may call in to report a single problem. The business process for field operations personnel to handle duplicate work orders is to tie all duplicate work orders together into one project work order. We will continue to provide training for field operations on this business process. As an added measure, we will also begin the process of implementing a tool in the request system to allow the user to lookup similar issues in nearby vicinities.*

*Target Date: July 1, 2008  
Responsibility: Information Systems Coordinator  
Asset Analyst*

**Implementation Status:**

Fully Implemented. The Information Systems Coordinator has developed a citizen call library, which is a listing of citizens who call in work orders. One module in CartêGraph, CALLdirector, is capable of using the location information from the library to identify duplicate work orders. The Information Systems Coordinator has also developed a work order tie-in methodology to identify duplicate work orders.

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**Recommendation:**

The Public Works Director should require that the system administrator establish a field in the work order data entry process to clearly identify administrative work orders. The new field should be used to lock out material and equipment usage data entry, which an administrative work order should not have.

**Management Response:**

*Currently, there is a form for users to enter administrative work orders. This form does not allow the user to enter equipment or materials in the work order. However, some users use the regular work order form that does not prevent data entry in the equipment and material recordsets. Public Works will comply with this statement through additional user training on the administrative work order form. Also, the Information Systems Coordinator will remove the 217 (Other) activity code to prevent users from using this activity for administrative work orders.*

*Target Date: July 1, 2008  
Responsibility: Information Systems Coordinator  
CartêGraph Steering Committee*

**Implementation Status:**

Fully Implemented. The Information Systems Coordinator has established 15 new activity codes for administrative work orders. Generic activity codes are no longer used.

**Recommendation:**

The Public Works Director should require routine inventory reconciliations.

**Management Response:**

*The Operations Support Division has been performing inventory reconciliations since January 2007. Process documentation detailing inventory reconciliations plans and schedules is in development.*

*Target Date: Completed*  
*Responsibility: Field Operations Warehouse*  
*Operations Support Services*

**Implementation Status:**

Fully Implemented. The Field Operations Warehouse staff has begun conducting routine inventory reconciliations. The inventory reconciliation frequency is outlined in the department's standard operating procedures.

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**Recommendation:**

The Public Works Director should require that the Information System Coordinator enable the audit trail to capture changes made to material values. Management should periodically review inventory value changes and document the review process.

**Management Response:**

*The CartêGraph system by design reports archive information on primary recordsets, but does not report edits made on sub-recordsets tied to the primary recordsets such as material prices. Public Works is in the process of obtaining a quote from CartêGraph Systems for a modification to allow this type of archive reporting.*

*Target Date: December 31, 2008*  
*Responsibility: CartêGraph Systems*  
*Information Systems Coordinator*

**Implementation Status:**

Not Implemented. The Information Systems Coordinator is in the process of obtaining assistance from the CartêGraph vendor to transfer data from sub-recordsets to an audit trail. Audit trail capacity in CartêGraph is expected in future product upgrades.

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**Recommendation:**

The Public Works Director should require that the Information Systems Coordinator establish internal controls in CartêGraph that would help prevent closure of work orders without the required labor and material data.

**Management Response:**

*It is acceptable to have no material costs because many work orders only require a field inspection, a follow-up call, or are administrative in nature. However, in order to comply with this recommendation the CartêGraph Steering Committee will identify which activities (such as pothole repairs, micro-seal, and new sign installation) would always require labor and materials. Once these activities are identified, the Information Systems Coordinator will build in system controls to ensure materials and labor are entered for these work orders.*

*Target Date: December 31, 2008  
Responsibility: CartêGraph Steering Committee  
Information Systems Coordinator*

**Implementation Status:**

Partially Implemented. The Information Systems Coordinator has introduced adequate controls to ensure inclusion of material costs in closed work orders. However, Internal Audit observed 26 work orders in calendar year 2008 that were completed and closed without labor hours. The System Coordinator had created a report that would identify work orders without labor charges so that crew chiefs could review and make any necessary changes. However, an erroneous report script failed to properly identify the work orders without labor hours. As a result, work orders were not reviewed by the crew chiefs. The erroneous report was corrected during audit fieldwork, as a result of Internal Audit inquiries.

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**Recommendation:**

The Public Works Director should require that management review available reports in CartêGraph that would identify existing incomplete work order data.

**Management Response:**

*The Information Systems Coordinator will create a report that will list closed work orders with no labor costs for supervisors. Supervisors will be required to review these reports regularly to identify incomplete work orders.*

*Target Date: December 31, 2007  
Responsibility: Information Systems Coordinator  
Public Works Field Operations Managers*

**Implementation Status:**

Fully Implemented. The Information Systems Coordinator has introduced system reports to identify incomplete work order data. They include reports to identify work orders without labor and materials and a report that identifies street segments with incomplete data. Management routinely reviews these reports.

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**Recommendation:**

The Public Works Director should improve the integrity of material data in CartêGraph by:

- Verifying values
- Retaining documents to support values of inventory items
- Retiring obsolete inventory items
- Monitoring audit trails to ensure that retired items are properly classified
- Segregating Street and Traffic Division inventory within CartêGraph
- Improving managerial oversight of inventory activity

***Management Response:***

*The Operations Support Services division is currently developing business processes for managing and streamlining warehouse activities. To comply with this statement, the completed business processes will address the operational improvement points made in this recommendation.*

*Target Date: December 31, 2007*  
*Responsibility: Field Operations Warehouse*  
*Operations Support Services*

***Implementation Status:***

Partially Implemented. The Information Systems Coordinator has introduced a methodology to identify inventory currently in use, segregate street and traffic division inventory in CartêGraph, and verify values. However, Internal Audit's examination of a sample of 11 inventory items identified discrepancies in on-hand quantities and/or lack of documentation to support inventory values. Audit trails to record inventory transactions are expected in future product upgrades.

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***Recommendation:***

The Public Works Director should require that the Information Systems Coordinator establish monitoring tools to identify incomplete data in the PAVEMENTview module.

***Management Response:***

*The Pavement Asset Analyst will create a report showing which street segments do not have complete data such as street names, condition ratings, and pavement type. The Pavement Asset Analyst will run this report routinely.*

*Target Date: December 31, 2007*  
*Responsibility: Pavement Asset Analyst*  
*Information Systems Coordinator*

***Implementation Status:***

Fully Implemented. The Information Systems Coordinator has introduced periodic reports that list pavement segments with incomplete data. The Pavement Analyst utilizes the report to correct segment data errors.

**Recommendation:**

The Public Works Director should require that the system administrator enhance current audit trails by including alterations to street surface scores and segment deletions. Changes to scores and segment deletions should be routinely reviewed for appropriateness and documented.

**Management Response:**

*The CartêGraph system by design reports archive information on primary recordsets, but does not report edits made on sub-recordsets tied to the primary recordsets such as street segment deletions and surface scores. Public Works is in the process of obtaining a quote from CartêGraph Systems for a modification to allow this type of archive reporting.*

*Target Date: December 31, 2008  
Responsibility: CartêGraph Systems  
Information Systems Coordinator*

**Implementation Status:**

Not Implemented. Functionality to extract data from sub-recordsets is not available in the current version of CartêGraph. The current CartêGraph version is planned to be upgraded in April 2009. In the meantime, the Information Systems Coordinator has created a report to identify changes to street segments. The Pavement Analyst uses the report to review and confirm segment score changes. The report currently does not identify deleted segments or the user ID of the party changing the street segment score. Upon creating the ability to extract data from sub-recordsets, a record of activity related to street segment changes can be generated and examined.

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**Recommendation:**

The Public Works Director should ensure that all street segments outside the City of Arlington limits be excluded during future street surface analysis.

**Management Response:**

*At the time of the first survey, the official City Street GIS layer contained some streets that were not owned by the City. As the most reliable source of GIS information the City had at the time, that information was provided to the vendor who completed the pavement survey. The Pavement Asset Analyst has since gone through the data to clearly flag the City-owned streets. To comply with this finding, the current data of only City-owned streets will be provided to the vendor for the next survey, currently planned for Summer 2008.*

*Target Date: June 1, 2008  
Responsibility: Information Systems Coordinator*

**Implementation Status:**

Fully Implemented. The Information Systems Coordinator has taken steps to exclude non-Arlington owned streets from pavement analysis. Internal Audit reviewed a sample of pavement segments analyzed in 2008 and found no exceptions.

**Recommendation:**

The Public Works Director should ensure that the Information Systems Coordinator revokes access to CartêGraph for terminated employees, based on notification from the Human Resources and Information Technology Departments.

**Management Response:**

*The Public Works Accounts Analyst sends Vacancy Reports to the Information Systems Coordinator on a regular basis. The Information Systems Coordinator reviews these reports for any changes that are necessary in CartêGraph. Future enhancements include integration with the Lawson system for immediate notification of personnel changes. To track employment changes for temporary employees, the Information Systems Coordinator will create a report of all temporary employees for field supervisors to run on a regular basis. The supervisor will review the report to determine which temporary employee(s) are no longer on contract with the City.*

*Target Date: January 31, 2008, additional enhancements planned  
Responsibility: Information Systems Coordinator*

**Implementation Status:**

Fully Implemented. The Information Systems Coordinator reviews the vacancy report generated by Public Works staff to revoke system access of departed employees. Internal Audit reviewed a sample of current CartêGraph users and noted that all were current City employees.

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**Recommendation:**

The Public Works Director should request that the CartêGraph vendor enhance the system by including an audit trail of all security related activity. Management should routinely monitor activity listed in the audit trail.

**Management Response:**

*Currently, the ability to change security settings for CartêGraph users is limited to two people: the Information Systems Coordinator and the Pavement Asset Analyst. The Information Systems Coordinator will recommend that CartêGraph Systems enhance the software to track security changes on the database.*

*Target Date: January 31, 2008  
Responsibility: CartêGraph Systems*

**Implementation Status:**

Not Implemented. System functionality to extract data from sub-recordset to audit trails does not exist in the current version of CartêGraph. The audit trails are expected to be functional in version 8 of CartêGraph, which is expected to be implemented in April 2009. In the meantime, the Information Systems Coordinator has limited security related activity to the CartêGraph System Administrator.

**Recommendation:**

The Public Works Director should request that the CartêGraph vendor enhance the system by including all deleted activity in an audit trail. Management should monitor the audit trail on a routine basis.

**Management Response:**

*Currently, the ability to delete any record in CartêGraph is limited to two people: the Information Systems Coordinator and the Pavement Asset Analyst. The Information Systems Coordinator will recommend that CartêGraph Systems enhance the software to track system deletions.*

*Target Date: January 31, 2008  
Responsibility: CartêGraph Systems*

**Implementation Status:**

Not Implemented. The ability to record delete activity in an audit trail is not available in the current version of CartêGraph. However, the Information Systems Coordinator has limited the capability to delete data to the System Administrator and Pavement Analyst.

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**Recommendation:**

The Public Works Director should seek assistance from the vendor to enable the Information Systems Coordinator to build reports based on critical activity. Selected critical activity reports should then be reviewed by management on a routine basis.

**Management Response:**

*Currently, the ability to make changes to database security settings and other critical activity on the back-end of the CartêGraph database is limited to two people: the Information Systems Coordinator and the Pavement Asset Analyst. If CartêGraph Systems makes the recommended changes in their system to allow for security tracking on the database, the Information Systems Coordinator or CartêGraph Systems can build a critical activity report that can be routinely reviewed by management.*

*Target Date: January 31, 2008  
Responsibility: Information Systems Coordinator  
CartêGraph Systems*

**Implementation Status:**

Not Implemented. Public Works staff indicated that the ability to create critical activity reports was suggested as a desired feature to the vendor. Public Works management is in the process of determining if the cost associated with the enhancement is warranted.

**Recommendation:**

The Public Works Director should coordinate with the Information Technology Department to resolve connectivity issues.

**Management Response:**

*The CartêGraph Phase II project focus is wireless access that would allow field users the ability to enter work orders in the field. However, technology like wireless hotspots and Virtual Private Network (VPN) has not proven to be sufficient to allow users to work in the field. After Public Works deployed wireless testers with one crew, it was determined that the remote access feature was cumbersome, and the project was put on hold. A Wireless Technology Steering Committee has been formed by IT, and is troubleshooting and testing various wireless projects. When IT develops a wireless solution that functions well, Public Works will deploy a new round of field testers.*

*Target Date: December 31, 2008  
Responsibility: Information Systems Coordinator  
Information Technology*

**Implementation Status:**

Fully Implemented. The Information Systems Coordinator has introduced VPN access with a wireless card to access CartêGraph remotely. Internal Audit observed CartêGraph remote access and found no exceptions.

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**Recommendation:**

The Public Works Director should coordinate with the Information Technology Department to ensure that an effective disaster recovery and business continuity plan, based on prioritized tasks and objectives, is established. The plan should be tested and the results documented on a routine basis.

**Management Response:**

*In order to comply with this recommendation, the Information Systems Coordinator has scheduled a disaster recovery and business continuity plan to be completed as part of the FY 2007-2008 Work Plan for the PWT Information Systems Division. Provided IT is able to comply with the work plan schedule, this project should be completed by the end of FY 2008.*

*Target Date: September 30, 2008  
Responsibility: Information Systems Coordinator  
Information Technology*

**Implementation Status:**

Not Implemented. The Information Systems Coordinator is still in the process of drafting a business recovery plan with assistance from the City's Information Technology Department staff.

**Recommendation:**

The Public Works Director should require that the Information Systems Coordinator track CartêGraph downtime and the causes of downtime.

**Management Response:**

*In order to comply with this recommendation, the Information Systems Coordinator and Support Systems Specialist will work together to develop a database or spreadsheet of system downtime. This will be included as part of a Quarterly Reporting Program for the department.*

*Target Date: March 31, 2008*  
*Responsibility: Information Systems Coordinator*  
*Support Systems Specialist*

**Implementation Status:**

Fully Implemented. The Information Systems Coordinator now maintains a spreadsheet that records system downtime.

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**Recommendation:**

The Public Works Director should require that the Information Systems Coordinator track maintenance requests made to the CartêGraph vendor.

**Management Response:**

*CartêGraph Systems recently moved to a new customer service system for which all support tickets are tracked by number. The Information Systems Coordinator will work with CartêGraph Systems to obtain regular reports of the support tickets and resolutions that have been completed for the City of Arlington.*

*Target Date: June 1, 2008*  
*Responsibility: Information Systems Coordinator*  
*Support Systems Specialist*

**Implementation Status:**

Fully Implemented. The City Auditor's Office noted that the Information Systems Coordinator has introduced a methodology to track maintenance work orders assigned to the CartêGraph vendor.