Construction Project Management (e-Builder) Audit
October 2012

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Office of the City Auditor

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Executive Summary

Business processes for capital improvement projects (CIP) are now standardized across construction departments

Single source of reporting on CIP projects

Easier access, better document control and elimination of duplicate entries

Opportunities for Improvement

Utilization of Schedule Module

Consolidated audit trail for project cost over- and under-runs

Include all voter-authorized projects in e-Builder

Source Code escrow

As part of the FY2012 Annual Audit Plan, the City Auditor's Office conducted an audit of e-Builder, the City's recently purchased web-based capital program and construction project management software. The audit was conducted in accordance with generally accepted government auditing standards, except for peer review. 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.

The objectives of the audit were to determine whether:

- data migrated to e-Builder was complete;
- project budgets recorded within e-Builder were accurate;
- internal controls relating to process workflows and system access were adequate;
- project cost under-runs were reallocated to authorized projects;
- projects delays were adequately captured within e-Builder;
- the interface between e-Builder and Lawson operated as intended;
- reporting to executive management and/or the City Council was adequate; and
- the disaster recovery and continuity plan is adequate.

Implementation of the e-Builder software has resulted in several efficiencies. Project information is now stored in one centralized location. Since e-Builder is web-based, it is easier for project team members to access project information. Also, document control and accountability have been enhanced.

Documents are stored within and retrieved from the software; built-in workflow processes exist to ensure proper project review and approval; project tasks are assigned to project team members; and activity is tracked based on system user i.d. The e-Builder software has also eliminated the need for dual entries and has standardized processes across departments responsible for administering capital projects.

Data migrated to e-Builder was generally complete. An adequate separation of duties and supervisory approval at the necessary authorization levels were noted within process workflows incorporated into the e-Builder software. Audit testing also indicated that the interface between e-Builder and Lawson operated as intended.

The City Auditor's Office noted significant project cost under-runs that appeared to be the result of timing delays (e.g., multi-year gap between when the cost estimate is made for the bond election/capital budget process and the actual bid award date), contract contingencies and performance bonuses. Project costs under-runs, which are retained within the original fund, were reallocated to offset on-going projects that had or were expected to exceed the established project budget. When project cost under-runs are used to help fund other projects, departmental Staff Reports note the project fund source by that fund (e.g., Drainage Utility Revenue Bonds, Street Bond Fund, Storm Water Utility Fund and Water Bond Fund). However, Staff Reports make no reference that additional funds were made available due to project cost under-runs. Audit results indicated that City Council approval was obtained for projects to which cost under-runs were reallocated.

Eleven projects were identified within e-Builder as having cost under-runs in excess of $100,000. The total cost under-runs for these 11 projects were approximately $5.6 million. It should be noted that since some cost under-runs are transferred directly to other projects (see Finding #2 of this report), the number of projects with cost under-runs in excess of $100,000 could possibly exceed the 11 that were identified during this audit. There is currently no process for communicating project cost under- or over-runs to executive management and/or the City Council.

Although project delays were documented in narrative form, e-Builder was not utilized to maximize reporting the timeliness of construction management projects. Also, the e-Builder scheduling module that provides a graphical perspective of project activities is available but was not being used by the City.

Although the number of capital projects managed within e-Builder is considered substantial (more than $400 million in budgeted funds and balances remaining from project cost under-runs), source code for the e-Builder software has not been placed in an escrow account. Consequently, if e-Builder, Inc. ceases to do business, goes bankrupt, etc., the City is currently unable to maintain the software on which the capital project data resides.

Audit Scope and Methodology

Documentation, correspondence and transactions since the e-Builder implementation were included in the scope of this audit. The audit was conducted in accordance with generally accepted government auditing standards, except for peer review. The following methodology was used in completing the audit.

- Interviewed staff involved in the system implementation, as well as those involved in inputting data and/or tracking capital projects within e-Builder
- Reviewed bond propositions, capital budgets and City Council agendas for project authorizations
- Reviewed project data captured within e-Builder and Lawson
- Observed project bid tabs
- Reviewed payments submitted to e-Builder

While annual capital budgets were reviewed to ensure proper capital project authorization, this audit did not include a review of the City's capital budget process.

Background

On December 15, 2009, the City Council authorized the execution of a five-year contract with e-Builder, Inc. for the purchase and maintenance of software to track capital improvement projects (CIP). Prior to the software procurement, the City used an outdated mainframe application, a series of Excel spreadsheets and Access databases to manage and track capital projects. Additionally, the Lawson financial software (implemented by the City in February 2006) did not interface with the mainframe application, resulting in the need to duplicate entries for each transaction -- one entry within the mainframe and the other within Lawson.

The recently-acquired web-based capital program management and construction project management software (named e-Builder) was purchased to budget, plan and manage construction projects administered by the Parks and Recreation, Public Works and Transportation and Water Utilities departments. Projects tracked within the e-Builder software include water, sewer, drainage, road and park projects.

While total payments for the software purchase and implementation did not exceed City Council authorization, total payments exceeded the e-Builder quote ($451,136) by approximately $49,000, as presented in the following chart. The annual firewall maintenance fee, modifications and additional integration with Lawson appear to have contributed to the $49,000 variance.

e-Builder Quote	$451,136.00
Project Budget	
e-Builder Quote/Response	$451,136.00
Contingency	120,000.00
Total Project Budget	**$571,136.00**
e-Builder Payments	
Initial Project Scope	$437,043.82
Contingency	
Scope Changes	34,825.00
VPN Service	6,410.96
Green Sheet Report	5,212.50
Green Sheet Report Change	2,100.00
Purchase Order Close-Out Automation	4,375.00
General Invoices	9,975.00
Total Payments	**$499,942.28**
Council Authorization **	**$536,370.00**
**-includes contingency	

Sources: Catalyst; Lawson Financial System; Staff Reports

Active design and construction projects administered by Parks, Public Works and Water Utilities were migrated into the e-Builder software as of April 5, 2011. Management purposely did not migrate projects that were near completion or were not being pursued.

The following chart shows the number of active, inactive and completed projects managed via e-Builder as of September 5, 2012. As noted, the total budget for these projects exceeds $370 million. In addition, project cost under-runs totaling more than $32 million (across all funds tracked in e-Builder) existed within miscellaneous e-Builder project accounts. The $32 million represents project cost under-runs that were transferred to miscellaneous project accounts to help subsidize projects that are expected to exceed project budget.

Summary of Active, Completed and Inactive Projects As of September 5, 2012					
User Department	Administering Department	Active Projects	Completed Projects	Inactive Projects	Total Budget
Aviation	Public Works (Construction Management Division)	1	0	0	$8,787
Finance	Public Works (Construction Management Division)	1	0	0	30,340
Fire	Public Works (Construction Management Division)	2	1	0	4,605,501
Library	Public Works (Construction Management Division)	2	0	0	1,264,589
Parks & Recreation	Public Works (Construction Management Division)	5	0	0	5,087,787
Planning	Public Works (Construction Management Division)	1	0	0	32,623
Public Works	Public Works (Construction Management Division)	2	0	0	2,602,263
Water	Public Works (Construction Management Division)	1	0	0	41,000
Parks & Recreation	Parks and Recreation	37	6	0	29,292,237
Public Works	Public Works	80	5	3	215,952,065
Water Utilities	Water Utilities	66	1	0	113,141,559
TOTALS:		198	13	3	$372,058,751

Source: e-Builder

Summary of Account Balances within Miscellaneous Accounts (as of 9/20/2012)		
User Department	Miscellaneous Fund	Amount
Water Utilities	Misc Project (Water Utilities)	$ 21,264,375
Public Works & Transportation	Misc Non-Arbitrage Street	7,271,238
Public Works & Transportation	Misc Street Bond Funds	2,566,819
Public Works & Transportation	Traffic Miscellaneous	410,585
Parks & Recreation	Misc Park Non-Arbitrage	216,047
Public Works & Transportation	Misc Drainage Funds	193,151
Parks & Recreation	Misc Park Arbitrage	122,485
TOTAL:		$32,044,700

Source: e-Builder

The e-Builder software provides a platform where the City's project managers, inspectors, etc. can enter information that can be accessed, reviewed (real-time) and summarized via reports, project detail and dashboards. e-Builder interfaces with the City's financial system (Lawson) and GIS. The GIS component allows mapping of projects within the e-Builder software and is used to provide a map for automated Green Sheets, which are used within the annual capital budget document.

The City's policies and procedures are flowcharted (mapped) within e-Builder. Mapping these workflow processes within e-Builder results in built-in controls that help ensure proper review and approval throughout the project. The three user departments (Parks, Public Works and Water) are responsible for managing the overall project design -- through construction. This includes distributing bid documents, overseeing the contract, authorizing vendor payments, etc. Internal Audit results indicated that user departments also document bid tab information within the e-Builder software. The City's Budget Office staff is responsible for approving budget transfers, adding appropriations for new capital projects, adding accounts to activities assigned to each project, etc.

Benefits associated with the implementation of e-Builder include the elimination of duplicate entries, standardization of capital improvement project business processes across construction departments, and single source of reporting on CIP projects. Each month, a capital projects update report is submitted to the City Council.

The following solution components are included in e-Builder.

- Project Calendar
- Document Management
- Contact Management
- Form Management
- Process Management
- Cost Manager
- Schedule Management
- Reports and Dashboards

Management indicated that e-Builder has released a new Planning Module which is intended to expand project planning capabilities. The City of Arlington plans to assist in the module development.

Detailed Audit Findings

1.   The e-Builder project scheduling software component is not being utilized.

Converting from a system that managed capital projects via an outdated mainframe, Excel spreadsheets and Access databases to a web-based capital program management and construction project management software has provided improvements to the City's capital projects process. However, the system is not currently being used to its full potential which could result in better capital project management.

It is beneficial to capital project stakeholders, and the City as a whole, to maximize the utilization of resources that are available and improve service delivery. For projects to be delivered on time, on budget, and within the predefined scope that was agreed upon at the beginning of each project, accurate and reliable project information must be readily available to help ensure that timely and informed decisions are made by management. Although a project Schedule Module is available within the e-Builder software, it is not being used as intended. Management indicated that when implementing e-Builder, they focused on the financials (including the interfaces), with intentions to implement the Scheduling Module next.

Management currently documents the status of its capital projects within the project details section of the software. For example, the percentage of completion and the extent and cause of project delays were noted within a narrative section of the project details rather than within a component of the e-Builder Schedule Module. Noting such information within the project details helps ensure that pertinent project information is captured within the system. However, limiting such information to a narrative field somewhat negates a benefit of the software.

The e-Builder website states that their Schedule Module allows users to track performance against a baseline, while the system automatically updates the critical path as schedule changes and/or tasks are completed. The website goes on to state that the Schedule Module has integrated Gantt views and reports that give a graphical perspective of project activities (completed, percent complete, behind, etc.) including project milestones that give an accurate forecast of project completion dates and an early-warning system to alert the user of potential issues.

The ability to produce system-generated charts and other reports summarizing project status and the impact of project challenges is an improvement obtained from the system. However, limited use of the software negatively impacts capital project delivery improvements that have been made available via the e-Builder software procurement.

Recommendation:

Directors of those departments utilizing the e-Builder software should continue their efforts to fully implement the e-Builder Schedule Module so the City can take advantage of capital project delivery improvements made possible via implementation of e-Builder.

Management's Response:

Concur. Additional training was recently held on the Schedule Module and schedules are being developed for all active projects.

>   *Target Date:*   December 31, 2012
>
>   *Responsibility:*   Managers of all user groups within the three user departments

2.   There is no consolidated audit trail when project cost under-runs are transferred to help fund other projects.

Projects that are completed below budget are considered to have cost under-runs, while projects that are completed beyond the allocated budget are considered to have cost over-runs.

Changes in project scope and cost differences result in project cost under- or over-runs. Project cost under-runs (cost savings) are used to help subsidize the funding of other projects that have or are expected to exceed budget. When projects are closed out under budget, the cost under-run is either transferred to a "miscellaneous" account that has been established within the same fund or it is transferred directly to another project that has been authorized from within the same funding source. Project cost under-runs transferred to a miscellaneous project account are held in that miscellaneous account until needed to help fund other projects authorized from within the same funding source. It should be noted that e-Builder will not allow a commitment to be exceeded. Therefore, when project cost under-runs are transferred between projects, the budget for the project with the cost under-run is decreased by the transfer amount, while the budget for the project with the cost over-run is increased by the transfer amount.

Within e-Builder, there is an audit trail of each transaction made within the system. In instances where reallocations are made directly to the "miscellaneous" project account, a consolidated audit trail exists to support the project cost under-run and the reallocation of those funds. However, when reallocations are made directly to another project, the user has to access each e-Builder project in order to determine how much was reallocated and from which projects. Direct transfers from one project to another are more difficult to track, as noted in the following examples.

- During our audit testing, the City Auditor's Office noted a $900,000 transfer from the Shady Park and San Ramon Drainage Improvements project to a miscellaneous account. An observation of the miscellaneous account, alone, would imply that the Shady Park and San Ramon Drainage project had a cost under-run of $900,000. However, further review of the Shady Park and San Ramon Drainage project indicated that an additional $438,085 was transferred directly to four other projects. If all of the project cost under-runs had been transferred directly to the miscellaneous account (before being reallocated), a $1.3M under-run would have been identified when reviewing the miscellaneous project account.

- The City Auditor's Office also noted a direct transfer of $1,088.65 from the Rolling Meadows project to the 2009 Sidewalk Program. In addition, there was a direct transfer of

$216,111.06 from the Gibbins Road Sidewalk (Randol Mill Road to Six Flags Street) project to the 2009 Sidewalk Program. These project cost under-runs totaled $217,199.71. Management indicated that their practice is to keep cost under-runs associated with sidewalk projects separate from other project cost under-runs that are posted to a "miscellaneous" project account. Since the Sidewalk Program project account functions as a miscellaneous account, the City Auditor's Office did not consider this practice unreasonable as related to sidewalk projects.

Reallocating project cost under-runs directly from one project to another requires less staff time than it would to transfer project cost under-runs directly to the miscellaneous account and then to other projects. However, this methodology makes it more time-consuming to identify the dollar magnitude of project cost under-runs and over-runs.

Consolidated audit trails would enhance the ability to monitor and analyze project cost under- and over-runs. Under the current practice, if management were asked to provide total project cost under- or over-runs over a certain period, information would need to be obtained from each project file. On the other hand, if all project cost under- and over-runs were made via established miscellaneous accounts, the single point of reference would be limited to transactions within the miscellaneous accounts.

Recommendation:

Directors of those departments utilizing the e-Builder software should require that project cost under-runs be transferred directly to the established miscellaneous account before being transferred to other projects that are expected to exceed budget. Sidewalk project cost under-runs should continue to be posted directly to the account that functions as a miscellaneous sidewalk projects account.

Management's Response:

Concur. This recommendation will become standard operating procedure.

> *Target Date:*   December 31, 2012
>
> *Responsibility:*   Managers of all user groups within the three user departments

3. Project cost over- and under-runs are not routinely reported.

As noted in the preceding finding, changes in project scope and cost differences result in project costs under- or over-runs. Management indicated that when projecting project costs, cost factors are included to allow for time delays between the bond election and when the funds are sold. Management also indicated that as project details are further defined (e.g., design and details are developed) and actual vendor bids are obtained, the actual project cost may or may not exceed the amount that was presented for Council as a part of the capital budget. In most cases, City Council approval of construction change orders is not necessary because contingencies (generally 5% of the construction contract estimate) and performance bonuses (generally $500 per day) are included in project estimates. Although management indicated that performance

bonuses are often not utilized, published materials indicate that early completion bonuses are a best practice in construction projects.

Project cost under-runs, which are retained within the original fund, were reallocated to offset on-going projects that had or were expected to exceed the established project budget. When project cost under-runs are used to help fund other projects, departmental Staff Reports note the project fund source by that fund (e.g., Drainage Utility Revenue Bonds, Street Bond Fund, Storm Water Utility Fund and Water Bond Fund). However, departmental Staff Reports make no reference that additional funds were made available due to project cost under-runs. Also, there is no reporting of project cost under- and/or over-runs to executive management or City Council.

Routine reporting helps provide a general idea of how effective operations are being managed. In reference to capital projects, users would be in a position to identify the extent of funding made available to pursue additional projects (and vice versa) due to project cost under- and over-runs. Users could also be informed as to the reason for the project costs under- or over-run (e.g., performance bonus not earned).

Recommendation:

Departments should specifically state (within Staff Reports) when and if the recommended funding for projects being considered by the City Council is made available from cost under-runs associated with one or more other projects.

Management's Response:

Concur. Staff will coordinate and include consistent verbiage in Staff Reports pertaining to capital projects*.*

> *Target Date:*   December 31, 2012
>
> *Responsibility:*   Directors of the three user departments

Recommendation:

Departments utilizing the e-Builder software should determine whether City Council and/or executive management would consider it beneficial to receive routine reports of project cost over- and under-runs.

Management's Response:

Concur. Staff will coordinate with executive management to determine need and content of reporting.

> *Target Date:*   December 31, 2012
>
> *Responsibility:*   Directors of the three user departments

4. e-Builder is not utilized to account for all projects authorized by Arlington citizens and the City Council.

There should be proper reporting and accounting for projects that are specifically listed and approved within a bond election.

The City's current practice is to add projects in e-Builder when the first phase is included in a capital budget. However, with this practice, multiple years may pass before projects initiated late in a bond election cycle are entered. If the project is not started, it is not tracked within e-Builder.

The City Auditor's Office concluded that better internal control is established if projects, listed as support for bond election ballots and approved by Arlington voters, are input into e-Builder as "proposed". Upon bond sale and inclusion in the capital budget, these projects could then be given a project number and be reclassified from "proposed" to "active." Canceled projects could be reclassified from "proposed" to "canceled," with the reason for cancellation noted.

By including all projects within e-Builder, a centralized location is established to identify all authorized City projects and their project status. The centralized location will also help prevent any oversights, identify actions taken that require City Council briefing, and provide a means by which listings of projects that have been authorized but not started, authorized but cancelled, etc. may be provided as deemed necessary.

Recommendation:

Directors of those departments utilizing the e-Builder software should include, within e-Builder, all capital projects that have been authorized by Arlington voters and note such projects as "proposed" until the project is ready to be started.

Management's Response:

Concur. Starting with the most recent bond election which is still active (2008 Bond Election), all projects referenced in the election materials for Proposition 1 - Parks and Recreation and Proposition 2 - Streets and Traffic will be included within e-Builder. This practice will continue with subsequent bond elections.

> *Target Date:*   December 31, 2012
>
> *Responsibility:*   Parks Planning Manager
> Engineering Operations Manager
> Traffic Engineering Manager

5. Source code escrow was not established as required by the contract.

As discussed in the Background section of this report, the e-Builder software is used to budget, plan and manage construction projects administered by the Parks and Recreation, Public Works and Transportation, and Water Utilities departments. Total project budgets and project cost

under-runs within e-Builder exceed $400 million. The dollar magnitude of e-Builder projects, combined with the support documentation captured (e.g., correspondence between the contractor and City, bid tabs, notes regarding contract problem issues, etc.), contributes to the criticality of e-Builder within the City of Arlington.

Section 2.3 of the e-Builder Service Agreement states that e-Builder, Inc. agrees to place the source code for e-Builder software in an escrow account. In a source code escrow arrangement, the source code and documentation are held in escrow to ensure that the City is able to maintain the software in case the vendor ceases to do business, goes bankrupt, etc.

Audit results indicate non-compliance with the "source code in escrow" contract requirement. Management indicated that the City worked on getting an escrow account as part of a disaster recovery/business continuity plan. However, the escrow account was never established. There is, therefore, no escrow account in which the e-Builder source code can be placed. Without the source escrow, the City risks a discontinuance of service and loss of capital project information should e-Builder, Inc. cease to exist. Although the interface between e-Builder and Lawson will allow the City to obtain financial information regarding capital projects, other project information such as correspondence between the contractor and vendors, project notes made by City inspectors and project managers, etc. would no longer be available to staff.

Recommendation:

The Chief Information Officer should ensure that an escrow account is established to allow the e-Builder source code to be placed, as required by the contract.

Management's Response:

Concur. The Chief Information Officer will purchase quarterly software escrow for e-Builder software with data backup for the City of Arlington, in accordance with the terms and conditions of the "Two-Party (Master) Agreement" between e-Builder and Escrow Associates, LLC, as amended with execution of "Rider C" the Beneficiary Addition Form. The cost for this service will be $6,000 per year plus a one-time set up fee of $1,000. The initial invoice will be prorated to coincide with license billing for an estimated invoice of $2,500. Payment will be due on the anniversary date of each year, with a 30-day notice required for termination.

> *Target Date:*   January 15, 2013
>
> *Responsibility:*   Dennis John, Chief Information Officer