Audit Follow-Up

As of March 31, 2011

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Water Infrastructure

(Report #0919 issued September 30, 2009)

Report #1115 **July 14, 2011**

Summary

Five of the eight action plan steps due for completion as of March 31, 2011, have been completed or otherwise resolved. Actions are on-going to complete the other three steps. Another step due for completion subsequent to March 31, 2011, also has been completed.

In audit report #0919 we noted that, overall, Underground Utilities adequately accounts for and maintains the City's water infrastructure. We reported adequate processes, for the most part, were in place to ensure new infrastructure is properly designed and installed, and to ensure replacements and expansions are adequately planned and funded. As noted, several of those processes were the result of recent improvements and enhancements initiated by Underground Utilities. We also identified issues indicative of the need for further improvements and enhancements. Accordingly, recommendations were made that related to:

- Physically accounting for and tracking infrastructure components;
- Maintaining infrastructure;
- Designing, constructing, and installing new infrastructure; and
- Planning infrastructure replacements.

Forty-two action plan steps were developed to address the identified issues. Of those 42 steps, eight were due for completion during the six-month follow up period ending March 31, 2011. (Those eight action plan steps include three steps that were initially due to be completed for the six-month follow up periods ending March 31, 2010, and September 30, 2010, but were not completed as of those dates.) During this follow-up period, Underground Utilities completed or resolved five of those eight steps and continued previously-initiated actions to complete the three other steps. Another step due for completion after March 31, 2011, also has been completed.

Actions completed or resolved as determined by this follow-up engagement included:

- Water wells and water storage tanks and their related attributes are now tracked in the City's GIS (Geographical Information System).
- Underground Utilities management subsequently determined it will not be efficient to track privately-owned backflow control valves in the City's GIS. Accordingly, that action plan step is no longer applicable.
- The Mobile Work Management System is now used to document manual flushes of water mains and the quantities of water used during those flushes.
- Written procedures and documents were established that address (1) fire hydrant inspections, (2) flushing of water mains, and (3) standard reports that are (or can be) generated periodically from the Mobile Work Management System.
- Development of a plan for replacement of the City's downtown water infrastructure was finalized and approved by the City Commission as part of the Master Water Plan Update.
- A capital project was established and initial steps taken to replace the City's downtown water infrastructure.

The three action plan steps due and not yet completed pertain to the determination and entry of complete attribute specifications (for various water infrastructure components) into the PeopleSoft Financials System and ensuring subsequent term contracts contain appropriate provisions to help

ensure acquisition of proper components. Efforts to complete these three action plan steps were initiated during the prior follow up periods and continued during the current follow up period.

We appreciate the cooperation and assistance provided by Underground Utilities staff during this audit follow-up.

Scope, Objectives, and Methodology

We conducted this audit follow-up in accordance with the International Standards for the Professional Practice of Internal Auditing and Generally Accepted Government Auditing Standards. Those standards require we plan and perform the audit follow-up to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit follow-up objectives.

Report #0919

The scope of report #0919 included a review of Underground Utilities' processes established to install (construct), maintain, and account for the City's water infrastructure. The objectives were to determine whether:

- Adequate and complete records were maintained to enable Underground Utilities to effectively and efficiently track, monitor, and manage the City's potable water system (water) infrastructure;
- The Underground Utilities had a process in place to ensure the City's water infrastructure is appropriately maintained in accordance with industry standards and state regulations;
- The Underground Utilities had a process in place to ensure additions and changes (expansions, relocations, and replacements) are properly designed, constructed, and installed;
- The Underground Utilities had a process in place for planning, funding, and providing for replacement of certain water infrastructure components at the end of their useful service lives; and
- The Underground Utilities had an adequate process in place for planning and funding water infrastructure expansion due to City growth and increased demand.

The audit focused on programs and processes in effect during the time of our initial audit fieldwork in winter and spring 2009.

Report #1115

This is our third follow-up on action plan steps identified in audit report #0919. The purpose of this follow up is to report on the progress and status of efforts to complete action plan steps due for completion as of March 31, 2011. To determine the status of the action plan steps, we interviewed staff, made observations, and reviewed relevant documentation.

Background

The City's Water Utility was established in 1907. Effective April 1, 2008, the water, sewer, gas, and stormwater utility functions were consolidated into a new City department, Underground Utilities. At the time of our initial audit, the City's water infrastructure was comprised of:

- 27 active production wells;
- 8 elevated storage tanks;
- 1,224 miles of water mains;
- 73,440 water laterals (representing pipe sections connecting water mains to residential or commercial premises or to fire hydrants);
- 6,949 fire hydrants;
- 24,489 system and control valves (excluding valves on individual service lines); and
- Other miscellaneous components comprised of various fittings (e.g., bends, caps, sleeves, taps, etc.).

Traditionally, water infrastructure expansion and replacement has been performed by a combination of City crews, City contractors, and private developers. For example, City crews or contractors hired by the City may be used to install new water infrastructure as part of a road infrastructure project. On the other hand, a private developer may have water infrastructure installed when building a new neighborhood. Upon completion of that new development (neighborhood), the City will take ownership of that infrastructure.

Several Underground Utilities divisions perform functions pertaining to water infrastructure, including:

- Constructions and Operations;
- Gas Operations and Regulatory Compliance (helps maintain water valves in addition to gas valves);
- Water Quality;
- Water Resources Engineering (WRE); and
- Business and Technology Development.

There are two major software applications used to help track, maintain, and manage the City's water infrastructure: (1) Geographic Information System (GIS) and (2) Mobile Work Management System.

The primary authorities that control and regulate the City's water distribution system infrastructure are the Florida Department of Environmental Protection (FDEP) and Northwest Florida Water Management District.

Costs incurred under capital projects established for the City's water infrastructure in fiscal year 2008 totaled $9.1 million.

Previous Conditions and Current Status

In report #0919, we noted that, overall, Underground Utilities adequately accounts for and maintains the City's water infrastructure. We also identified issues indicative of the need for further improvements and enhancements.

Forty-two action plan steps were developed to address the identified issues. Of those 42 steps, 26 were due for completion no later than March 31, 2011. As shown below in Table 1, Underground Utilities has completed or resolved 23 of those 26 action plan steps. Actions are in progress to complete the other three steps. As also shown in Table 1, an additional action plan step due for completion subsequent to March 31, 2011 has been completed.

Table 1
Action Plan Steps from Audit Report #0919
Due as of March 31, 2011, and Current Status

Action Plan Steps Due as of March 31, 2011	Current Status
Ensure critical and useful component attributes are tracked in GIS	
• Efforts will be enhanced to capture and record accurate and complete fire hydrant attribute data in connection with the on-going "GIS data cleansing" project.	✓ Completed in a prior period.
• Staff will revisit a sample of hydrants previously surveyed during the "GIS data cleansing" project to ascertain if the audit findings, relating to incomplete/inaccurate recording of data for surveyed hydrants, were isolated or representative of work completed to date. If representative of work completed to date, hydrants will be resurveyed to capture and record accurate and complete data in the GIS.	✓ Completed in a prior period.
Ensure efficient tracking of all infrastructure components	
• The GIS will be used as the primary record to account for and track critical and useful attributes for water wells and storage tanks.	✓ As recommended in the initial audit, Underground Utilities is now tracking water wells and water storage tanks and their related attributes in the GIS.
• The GIS will be used as the primary record to account for and track privately-owned backflow control valves.	✓ Certain City water utility customers must install backflow control valves on their premises to preclude undesirable water from flowing back

	into the City's system in the event of an accident or catastrophe. Examples are customers with swimming pools or irrigation systems. The backflow control valves are privately-owned and are not considered part of the City's infrastructure. Those valves must be checked annually to ensure they are operational. The Underground Utility's Water Quality Division is responsible for tracking those valves and ensuring customers have the required annual inspections. In the initial audit we noted there are approximately 13,700 privately-owned backflow control valves. While the Water Quality Division uses a separate Access database to identify and track those valves and the annual inspections, we recommended in the initial audit that consideration be given to using the City's GIS as the primary record for tracking those valves and the related inspections. Reasons for that recommendation include (1) efficiencies from use of a single system as most other water infrastructure is tracked in the GIS, (2) ability to pictorially display the valves through the GIS, and (3) controls and procedures/requirements applicable to the GIS would help ensure data integrity and accuracy of recorded information. Underground Utilities explored this recommendation and determined that it is not a preferred alternative as (1) the valves are privately-owned and not part of the City's infrastructure and (2) those privately-owned valves are susceptible to constant changes due to irrigation system installations or removals, new pool construction, and other facility renovations and demolitions. Management determined updating and revising the GIS for those changes would likely be less efficient than revising and updating the current Access database. Accordingly, management has determined the privately-owned valves will not be tracked in the City's GIS.
• All automatic flush stands will be added to and reflected in GIS.	✓ Completed in a prior period.
Ensure proper, logical, consistent, and informative data in the Mobile Work Management System	
• The 6,066 invalid preventive maintenance fire hydrant work orders will be deleted from the Mobile Work Management System.	✓ Completed in a prior period.

Ensure appropriate and useful managerial reports from the Mobile Work Management System	
• Current reports produced for water and hydrant repairs will be revised to reflect the "actual" problem.	✓ Completed in a prior period.
• A determination will be made as to what represents an "excessive period" for a work order to remain open in the system without any recorded activity. Periodic reports will be generated reflecting work orders that have been outstanding for the defined excessive period. Based on review of those reports, appropriate actions will be taken to ensure work is completed, the system is updated to reflect completed work, and/or invalid work orders are deleted.	✓ Completed in a prior period.
Ensure tracking of maintenance activities	
• The Mobile Work Management System will be used to schedule, document, and monitor sandblasting and painting of fire hydrants.	✓ Completed in a prior period.
• The Mobile Work Management System will be used to document manual flushes of water mains and the quantities of water used during those flushes.	✓ As recommended in the initial audit, Underground Utilities staff revised the Mobile Work Management System (MWMS) such that manual flushes of water mains are now documented in that system as well as the quantity of water used during those flushes. This was accomplished by Underground Utilities through modifications to the work orders used for (1) water repairs (i.e., now allows staff to document whether flushes were performed and applicable factors necessary for the system to calculate the quantity of water flushed) and (2) hydrant inspections (i.e., now allows staff to document reasons flush performed [e.g., water quality issues or as part of routine maintenance] and applicable factors necessary for the system to calculate the quantity of water flushed). A report generated from the system at our request showed approximately 6.4 million gallons of water had been used in manual flushes conducted over the last six months.
Ensure consistent and proper maintenance activities	
• Written procedures will be established that address (1) fire hydrant inspections, (2) flushing of water mains, and (3) standard reports that should be generated periodically from the Mobile Work Management System.	✓ As recommended in the initial audit, Underground Utilities staff developed written procedures/documents that address (1) fire hydrant inspections, (2) manual flushing of water mains, and (3) standard reports generated from the Mobile Work Management System. The reports available from the Mobile Work

	Management System and their characteristics (e.g., description, frequency of generation, staff designated to receive the reports) were documented prior to the initiation of our audit follow up efforts in April/May 2011. The written procedures for fire hydrant inspections and manual flushing of water mains were prepared and completed in June 2011, subsequent to our follow up fieldwork and after additional discussions with applicable Underground Utilities staff. We found the written procedures overall appropriate and adequate. While we consider this action plan step completed and resolved for audit follow up purposes, we identified certain areas that we recommend those prepared procedures be revised to also address. Those areas were discussed with applicable Underground Utilities staff.
Ensure availability of backup engines and generators at City wells	
• A contract will be executed with a vendor to provide for timely responses (i.e., within two hours) in instances where backup engines and generators at applicable City wells are not functional. The contract will include provisions for rental of equipment as needed.	✓ Completed in a prior period.
Ensure proper and consistent maintenance of wells and storage tanks	
• Prospective vendors will be required to provide proof of licensure status when submitting their proposals in response to requests for services.	✓ Completed in a prior period.
• Written procedures will be established that address (1) annual calibrations of water well meters, (2) exercising well backup equipment, (3) staffing water wells, (4) periodically inspecting, cleaning, and painting storage tanks, and (5) documenting various maintenance activities.	✓ Completed in a prior period.
Ensure appropriate safety measures are implemented	
• Discussions will be held with the Aviation Department, and the Federal Aviation Administration (FAA) if needed, to ascertain if aviation lights are appropriate for each of the City's elevated storage tanks. If a determination is made that lights are needed for certain tanks currently without such lights, a plan will be developed to install the appropriate lights.	✓ Completed in a prior period.
Ensure appropriate infrastructure additions	
• Plans and processes requiring proper involvement by the Water Resources	✓ Completed in a prior period.

Engineering (WRE) Division for "in-house" infrastructure additions will be finalized. A standard checklist will be developed to verify and document proper involvement by WRE staff.	
Ensure appropriate inspections are performed and documented	
• A standard inspection form/checklist will be developed and used by WRE inspectors to formally document their final inspection and approval of new infrastructure additions installed by contractors and private developers. Areas specified in the audit report will be addressed on that form/checklist. The completed form/checklist will be signed and dated by the applicable inspector and the supervising WRE senior engineer.	✓ Completed in a prior period.
• WRE inspectors will better document, in their inspector logbooks, the resolution of identified problems.	✓ Completed in a prior period.
• A standard inspection form/checklist will be developed and used for "in house" infrastructure additions. That form will be used to document staff's assertions as to (1) use of proper materials and installation methods, (2) performance of required pressure tests, and (3) conduct of required disinfections and water quality tests. This form/checklist will also be used to document the results of the required pressure and water quality results.	✓ Completed in a prior period.
• A process will be developed to inspect infrastructure additions installed by the contractor on behalf of the City. Once developed, that process will address (1) use of proper materials and installation methods, (2) performance of required pressure tests and related results, and (3) conduct of required disinfections and water quality tests and related results.	✓ Completed in a prior period.
Ensure projects are permitted as required	
• Each applicable project will be self-permitted in accordance with the delegation order issued by the FDEP. A copy of the applicable self-permit will be attached to and retained with project records.	✓ Completed in a prior period.
Ensure acquisition of appropriate materials and components	
• Attribute specifications in the PeopleSoft Financials System for each approved water infrastructure material and component will refer to the Underground Utilities' "Standard	o In our two prior follow up reports, we noted complete and accurate attribute specifications for fire hydrants had been entered into the City's PeopleSoft Financials System. We also noted

Specifications for the Design and Construction of Water and Wastewater Facilities."	attribute specifications as recorded in the PeopleSoft Financials System for other items (mains, gate valves, and copper pipe) were still incomplete, but efforts were ongoing to identify and enter complete attribute specifications for those (and all other water and sewer) items. Our current review showed complete attribute specifications still have not been entered into the PeopleSoft Financials System for the various water infrastructure materials and components. As addressed in the following action plan step, Underground Utilities staff is in the process of initiating the development of a request for proposals (RFP) for many of the water and sewer materials and components. Plans are for that RFP and eventual contract to include updated component/material attribute specifications so as to help ensure only appropriate items are acquired and installed as part of the City's water and sewer infrastructure. Underground Utilities staff indicated the PeopleSoft Financials System will be updated with the correct and complete attribute specifications as part of this overall process to establish new contracts for water (and sewer) infrastructure materials and components. We will continue to follow up on this action plan step in our subsequent follow up engagements.
• Subsequent purchase contracts for water infrastructure components will refer to the complete specifications established in the Underground Utilities' "Standard Specifications for the Design and Construction of Water and Wastewater Facilities."	o In the two prior follow up reports, we noted existing term contracts for water infrastructure components had expired (April 2010) and new contracts had not been executed. We reported new contracts would not be executed until complete and accurate item attribute specifications had been determined and provided (including input of those specifications into PeopleSoft Financials as addressed in the previous action plan step within this table). In our current review, we determined Underground Utilities staff was in the process of initiating the development of a request for proposals (RFP) for new contracts for many of the water and sewer infrastructure materials and components. Staff stated their intentions are to execute an "alliance contract," whereby vendors provide applicable material and components that meet the item specifications determined and provided by the Underground Utilities Water Engineering Resources (WRE) Division. Under the alliance contract concept, the contracted vendors will maintain applicable materials and components (meeting the defined attribute specifications) in

	stock, or otherwise ensure the items are immediately available, such that Underground Utilities staff can acquire and obtain the items at any time (24 hours a day, seven days a week). Under this arrangement, Underground Utilities anticipates it may no longer be necessary for the City's Utility Supply Center (centralized warehouse) to also purchase and maintain those items in inventory. (Note: Some water and sewer infrastructure materials and components not covered by the alliance contract will still be maintained and acquired by the City's Utility Supply Center.) We will continue to follow up on this action plan step in our subsequent follow up engagements.
• Subsequent purchase contracts for water infrastructure components will require suppliers to submit documentation (shop drawings/material submittals) to demonstrate their materials comply with City specifications.	o As noted above in the previous action plan step, new contracts for water infrastructure materials and components have not yet been executed. Accordingly, this action plan step cannot be completed until the process of negotiating such contracts starts. However, as also noted above, Underground Utilities staff is in the process of initiating the development of a request for proposals (RFP) for new contracts for water and sewer infrastructure materials and components. As part of that RFP development and subsequent contracting process, Underground Utilities staff should ensure contractors are required to provide adequate documentation to allow verification by Underground Utilities staff that acquired items comply with the City's attribute specifications as determined by the WRE division. We will continue to follow up on this action plan step in our subsequent follow up engagements.
Ensure replacement of deteriorated and older infrastructure	
• A plan will be developed for replacement of the City's downtown water infrastructure. That plan will (1) define the downtown area, (2) specify the locations within that area for which the infrastructure should be replaced, (3) project the costs of replacement, (4) identify funding to be used for replacement, (5) identify the most efficient and appropriate replacement methods, and (6) include a schedule and timeframe for completing the replacement.	✓ In our initial follow up on this audit (report #1018), we noted Underground Utilities amended an existing contract for the City's Master Water Plan Update for the contractor to "evaluate the downtown Tallahassee water service area to identify the most critical water mains and valves and develop a strategy for replacing those critical water distribution assets." Subsequent to our initial follow up engagement, the contractor completed and provided a plan to the City. That plan (1) defined the downtown area that was evaluated; (2) identified the type and size components (valves and mains) that should be replaced; (3) specified methods to use in identifying individual components that should be replaced or rehabilitated; (4) identified efficient

	methods to use to replace the applicable components; (5) estimated costs and provided a time schedule for completing the replacement and rehabilitation; and (6) identified potential sources (e.g., federal grants and loans) for funding the replacement/rehabilitation. Underground Utilities incorporated applicable information from that study into the City's 2030 Water Master Plan Update. That master plan update was approved by the City Commission August 25, 2010. It shows that approximately $15.3 million will be needed over the next 13 years (2011 through 2023) to complete the downtown water infrastructure replacement and rehabilitation.
• To the extent funding is available, the current contract with Malcolm Pirnie for the update to the City's Master Water Plan will be amended to include assistance in development of a "downtown water infrastructure replacement plan."	✓ Completed in a prior period.
• To the extent funding is available, the downtown water infrastructure improvements will be initiated in accordance with the plan developed pursuant to the previous action plan steps. (NOTE: This step was due for completion after March 31, 2011.)	✓ As noted above, Underground Utilities developed and obtained approval of a plan for replacing the City's downtown water infrastructure. In October 2010 (subsequent to City Commission approval of the plan), Underground Utilities established and opened a capital project for funding and accounting for that replacement. Initial funding provided for that project totaled $820,000. Plans are to provide additional funding as needed throughout the anticipated 13-year life of the project. As of the end of our follow up fieldwork in June 2011, several significant actions had been taken to initiate the replacement of the downtown water infrastructure. Those actions included: – Identifying and selecting a method for inserting <u>replacement valves</u> (1) on mains with "old" and/or "faulty" valves and (2) in strategic locations on other mains in the downtown area such that selected areas could be isolated as needed during replacement activities. – Selected the initial area within the defined downtown location for replacement and hired an engineering design firm to prepare a replacement plan for that area. That initial area is the All Saints neighborhood, located south of West Gaines Street and between South Monroe and Macomb Streets. As of

	the end of our follow up fieldwork, the contracted firm had provided the initial concept plans for replacing the applicable water infrastructure. Planned activities include replacing old 6-inch cast iron mains with 8-inch PVC or ductile iron mains. In addition to replacing old and worn mains (cast iron), the new mains will increase connectivity of the water supply in that neighborhood to the City's potable water system and also provide for a water supply adequate to address additional demand anticipated based on projected growth in that neighborhood (i.e., in connection with the Gaines Street Revitalization). Once the final plans are developed and provided by the contracted firm, Underground Utilities will prepare an appropriate bid solicitation document (e.g., Request for Proposals or Invitation to Bid) and request proposals/bids from applicable construction firms. Underground Utilities engineering staff indicate that the next area within the defined downtown location where replacement will likely occur is the area along the eastern portion of Pensacola Street (e.g., Civic Center, FSU law school, Kleman Plaza). Subsequent areas will be designated and prioritized as the replacement project develops and continues. Because of these actions, responsibility for ensuring the successful completion of this project is turned over to Underground Utilities management.

Table Legend:

- Issue to be addressed from the original audit.
- ✓ Issue addressed and resolved.
- o Action initiated but not completed.

Conclusion

Table 1 above shows 24 action plan steps have been completed or resolved. Twenty three of those completed steps were due for completion as of March 31, 2011, and the other one was due for completion subsequent to that date. As also shown in Table 1, there were three action plan steps due but not yet completed. Those three steps pertain to the determination and entry of complete attribute specifications (for various water infrastructure components) into the PeopleSoft Financials System and ensuring subsequent term contracts contain appropriate provisions to help ensure acquisition of proper components. Efforts to complete those three steps continue.

In addition to the three steps in progress but not completed, there are 15 other action plan steps due to be completed in future periods. Those 15 action plan steps include:

- Establishing a quality control process to ensure all new infrastructure additions are added to GIS (one step).
- Implementing procedures requiring private developers to submit As-Built drawings (formal drawings reflecting added components) for all water infrastructure additions (one step).
- Identifying and designating critical and useful attributes to be captured and recorded in GIS for new infrastructure additions (two steps).
- Identifying and recording installation dates for existing water infrastructure components (one step).
- Developing a process to timely remove "virtual" water meters (i.e., temporary depictions of meters) in the GIS when the actual meters are installed (one step).
- Making various revisions to the Mobile Work Management System to provide for proper, logical, consistent, informative, and useful data (includes revisions to the work order process and report process) (four steps).
- Additional monitoring of valve maintenance activities and enhancing existing efforts and systems to ensure valves are exercised at prescribed frequencies (two steps).
- Enhancing written procedures for the exercising of water isolation valves to define valves to be exercised and the number of those valves (one step).
- Resuming the hydrant replacement program (two steps).

We will address Underground Utilities efforts in completing those actions in our subsequent follow up engagements.

We appreciate the cooperation and assistance provided by Underground Utilities staff during this audit follow-up.

Appointed Official's Response

City Manager:

I am very pleased with the results of this audit. The report reflects management's commitment to ensure the reliability of the Water Infrastructure by using technology to improve efficiency and effectiveness. The most important factor is the obvious commitment to enhanced customer service and staff's collaborative effort to implement the action plan. I thank the audit staff for their thorough analysis.

Copies of this audit follow-up #1115 or audit report #0919 may be obtained from the City Auditor's website (http://talgov.com/auditing/index.cfm) or via request by telephone (850 / 891-8397), by FAX (850 / 891-0912), by mail or in person (Office of the City Auditor, 300 S. Adams Street, Mail Box A-22, Tallahassee, FL 32301-1731), or by e-mail (auditors@talgov.com).

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