

Audit Follow-Up

As of September 30, 2010



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Water Infrastructure

(Report #0919 issued September 30, 2009)

Report #1105

January 20, 2011

Summary

Five of the eight action plan steps due for completion as of September 30, 2010, have been completed or substantially completed. Actions are still on-going to complete another one of the eight steps. Upon completion of that step, the remaining two steps can then be 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 September 30, 2010. (Those eight action plan steps include three steps that were initially due to be completed for the six-month follow up period ending March 31, 2010, but were not completed as of that date.) During this follow-up period, Underground Utilities substantially completed five of those eight steps and continued previously-initiated actions to complete another one of those eight steps. As reported in our prior follow up report for the period ending March 31, 2010, completion of the remaining two steps remains contingent on completion of that initiated step.

Actions completed in the six-month period addressed by this follow-up engagement included:

- Determining that additional work was necessary to capture and record complete and accurate hydrant attribute data in the City's GIS (Geographical Information System); and establishing and implementing a plan to capture and record that data for hydrants in areas previously surveyed and areas yet to be surveyed.
- Revising standard Mobile Work Management System reports to reflect the "actual" problem and not just the "reported" problem.
- Generated and made available to management a standard report that shows and categorizes all Mobile Work Management System work orders that have been outstanding for a period in excess of 10 days.

- Developed and placed into operation a standard checklist for UG Utilities managers to use in ensuring “in-house” infrastructure additions (i.e., by City crews) are done properly.
- Developed and placed into operation a standard checklist for UG Utilities managers to use in ensuring infrastructure installed by the City’s contractor is done properly.

The three action plan steps 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 period and continued during the current follow up period.

We commend Underground Utilities and Utility Supply Center staffs for their efforts to continue to address action plan steps during this follow-up period. We also appreciate the cooperation and assistance provided by those staffs 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;
- 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 #1105

This is our second 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 September 30, 2010. 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 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, 21 were due for completion no later than September 30, 2010. Of those 21 action plan steps due for completion by that date, 16 were initially due for completion as of March 31, 2010, and the remaining 5 were due as of September 30,

2010. As shown below in Table 1, Underground Utilities has substantially completed or resolved 18 of those 21 action plan steps. Actions are in

progress to complete another one of the 21 steps. Upon completion of that step, the remaining two steps can then be completed.

**Table 1
Action Plan Steps from Audit Report #0919
Due as of September 30, 2010, and Current Status**

Action Plan Steps Due as of September 30, 2010	Current Status
Ensure critical and useful component attributes are tracked in GIS	
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ❖ In response to the audit finding and recommendation, Underground (UG) Utilities GIS staff conducted site reviews of a sample of hydrants in areas where the data cleansing efforts (manual observations and measurements to ensure and enhance the accuracy of UG Utilities infrastructure data and depictions in the City’s GIS) had been completed. Those site reviews <u>confirmed</u> that the incomplete/inaccurate hydrant data as reflected in GIS was <u>not</u> isolated and that actions should be taken to capture and record accurate and complete hydrant data in the GIS, including areas where the GIS data cleansing efforts had been previously completed. Further analysis by UG Utilities GIS staff showed the incorrect and inaccurate hydrant data was primarily attributable to instances where inconsistent/incomplete data was placed on survey drawings that were used as the source for the initial recording of the hydrant data in the GIS. Many of those survey drawings were prepared by private developers when building new subdivisions. <p>To address this issue, UG Utilities has taken (is taking) the following steps:</p> <ul style="list-style-type: none"> – Identify areas where the most inaccurate and incomplete hydrant data as recorded in GIS likely exists (e.g., subdivisions built by private developers and areas with significant construction). Send GIS crews to those identified areas and

	<p>determine/capture complete and accurate hydrant data and make appropriate corrections to the GIS. This step will include areas that had been previously covered by the cleansing efforts.</p> <ul style="list-style-type: none"> - Instruct crews conducting the GIS data cleansing efforts to determine and capture complete and accurate hydrant data (i.e., areas not yet covered) so that GIS staff can make appropriate corrections in the GIS. - Revise the Mobile Work Order System to include certain hydrant attributes (manufacture year and bonnet color) so maintenance crews can contribute to increasing GIS accuracy after each work order is complete. Train maintenance crews for this procedure. - Enhance the process for reviewing and ensuring the accuracy of survey drawings submitted by private surveyors and developers. <p>These steps are indicative of management’s commitment to ensure the accuracy and completeness of hydrant data recorded in the GIS.</p>
<p>Ensure efficient tracking of all infrastructure components</p>	
<ul style="list-style-type: none"> • All automatic flush stands will be added to and reflected in GIS. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<p>Ensure proper, logical, consistent, and informative data in the Mobile Work Management System</p>	
<ul style="list-style-type: none"> • The 6,066 invalid preventive maintenance fire hydrant work orders will be deleted from the Mobile Work Management System. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<p>Ensure appropriate and useful managerial reports from the Mobile Work Management System</p>	
<ul style="list-style-type: none"> • Current reports produced for water and hydrant repairs will be revised to reflect the “actual” problem. 	<ul style="list-style-type: none"> ✓ Standard reports showing the status of work orders for water and hydrant repairs were revised to reflect the “actual” problem and not just the “reported” problem. This revision should enhance the usefulness of those reports for UG Utilities management.

<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ✓ UG Utilities has generated a standard report showing all work orders that have been outstanding for a period in excess of 10 days. Work orders on that report are categorized by work order type (water repair, sewer repair, gas maintenance, etc.). The report shows the date the work orders were scheduled (created), date and time of last status change, and assigned employee. This report is available to UG Utilities managers that oversee the repair and maintenance processes for UG Utilities operations. As of the date of our fieldwork (12-7-2010), the report showed 1,480 outstanding work orders. While most of those are relatively recent work orders (i.e., created in the fall of 2010), we noted several dated back to earlier years. Those outstanding work orders dating back to earlier years are not significant in relation to total system work orders created to date (i.e., they represent less than 0.1% of the almost 900,000 work orders created to date). While this action plan step is considered substantially complete, we nonetheless recommend applicable UG Utilities managers review those work orders from earlier years and take appropriate actions (e.g., complete or delete them as applicable).
<p>Ensure tracking of maintenance activities</p>	
<ul style="list-style-type: none"> • The Mobile Work Management System will be used to schedule, document, and monitor sandblasting and painting of fire hydrants. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<p>Ensure availability of backup engines and generators at City wells</p>	
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<p>Ensure proper and consistent maintenance of wells and storage tanks</p>	
<ul style="list-style-type: none"> • Prospective vendors will be required to provide proof of licensure status when submitting their proposals in response to requests for services. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.

<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<p>Ensure appropriate safety measures are implemented</p>	
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<p>Ensure appropriate infrastructure additions</p>	
<ul style="list-style-type: none"> • Plans and processes requiring proper involvement by the Water Resources 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. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<p>Ensure appropriate inspections are performed and documented</p>	
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<ul style="list-style-type: none"> • WRE inspectors will better document, in their inspector logbooks, the resolution of identified problems. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<ul style="list-style-type: none"> • A standard inspection form/checklist will be developed and used for “in house” infrastructure additions. That form will be 	<ul style="list-style-type: none"> ✓ A standard inspection form/checklist has been developed and placed into use to assist UG Utilities managers in ensuring “in-house”

<p>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.</p>	<p>(i.e., by City crews) infrastructure additions are done properly. Among other things, the checklist allows for assertions that proper materials and installation methods were used and that required pressure tests, disinfections, and water quality tests were performed. Results of required tests are included with the completed checklists.</p>
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ✓ A standard inspection form/checklist has been developed and placed into use to assist UG Utilities managers in ensuring infrastructure additions by the City’s contractor are done properly. Among other things, the checklist allows for assertions that proper materials and installation methods were used and that required pressure tests, disinfections, and water quality tests were performed. Results of required tests are included with the completed checklists.
<p>Ensure projects are permitted as required</p>	
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ✓ Completed in a prior period.
<p>Ensure acquisition of appropriate materials and components</p>	
<ul style="list-style-type: none"> • Attribute specifications in the PeopleSoft Financials System for each approved water infrastructure material and component will refer to the Underground Utilities’ “Standard Specifications for the Design and Construction of Water and Wastewater Facilities.” 	<ul style="list-style-type: none"> ○ In the prior follow up report we noted that, while complete and accurate attribute specifications for fire hydrants had been entered into the PeopleSoft Financials System, specifications for other items (PVC mains, ductile iron mains, gate valves, and copper pipe) were still incomplete. We also reported that UG Utilities was in the process of determining appropriate materials and components to include in the PeopleSoft Financials System and the related attributes for those items. In response to our request for the current status of this action plan step, UG Utilities management responded this process was still on-going (for both water and sewer infrastructure items). This was confirmed by staff in the Utility Services warehouse. We will continue to follow up on this action plan step in our future follow up engagements.

<ul style="list-style-type: none"> • 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.” 	<ul style="list-style-type: none"> ♣ In the prior follow up report we noted that new term contracts would not be executed for water infrastructure components until complete and accurate attribute specifications had been determined and provided (i.e., for input into the PeopleSoft Financials System), as indicated in the previous action plan step. As of this follow up period, this process had not been completed (see previous action plan step). Accordingly, new term contracts have not yet been negotiated and executed. This was confirmed by staff in the Utility Services warehouse. We will continue to follow up on this action plan step in our future follow up engagements.
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> ♣ As noted above in the previous action plan step, new term contracts have not yet been negotiated and executed for water infrastructure items. This was confirmed by staff in the Utility Services warehouse. Until the process for negotiating those contracts starts, this action step will not be completed. We will continue to follow up on this action plan step in our future follow up engagements.
<p>Ensure replacement of deteriorated and older infrastructure</p>	
<ul style="list-style-type: none"> • 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.” 	<ul style="list-style-type: none"> ✓ Completed in a prior period.

Table Legend:

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| <ul style="list-style-type: none"> • Issue to be addressed from the original audit. | <ul style="list-style-type: none"> ✓ Issue addressed and resolved. ❖ Significant and substantial actions taken to resolve issue – responsibility for finalization of action step turned over to management. ○ Action initiated but not completed. ♣ Issue to be addressed and resolved after completion of a related action plan step. |
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Conclusion

Table 1 above shows 18 of the 21 action plan steps due for completion as of September 30, 2010, have been substantially completed. The three action plan steps 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.

Significant actions to be completed in future periods 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 (three steps).
- Using GIS as the primary record to account for critical attributes of water wells, storage tanks, and privately owned backflow control valves (three steps).
- 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).
- Using the Mobile Work Management System to document manual flushes of water mains and the quantities of water used during those flushes (one step).

- Additional monitoring of valve maintenance activities and efforts to ensure valves are exercised at prescribed frequencies (two steps).
- Establishing written procedures for maintenance activities relating to valves, fire hydrants, and mains (two steps).
- Finalizing and initiating the downtown water infrastructure replacement plan (two steps).
- Resuming the hydrant replacement program (two steps).

We commend Underground Utilities and Utility Supply Center staffs for their efforts to continue to address action plan steps during this follow-up period. We also appreciate the cooperation and assistance provided by those staffs during this audit follow-up.

Appointed Official's Response

City Manager:

I am pleased to see that the action plan steps have been substantially completed. The results of this audit are positive and indicate that our Underground Utilities department had processes in place to insure a safe and reliable potable water service to all our residences. The most important factor is the obvious commitment to utilize technology to enhance customer service and boost staff's efficiency and effectiveness. I would like to thank the audit staff for their thorough analysis, and the Underground Utilities staff collaborative effort to implement the action plan.

Copies of this audit follow-up #1105 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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