

# COMMERCIAL SUCCESS! Irrigation Inspection Program Produces 19% Water Reduction

Gail Donaldson  
Water Conservation Manager  
City of Allen  
305 Century Parkway  
Allen, TX 75013  
[gdonaldson@cityofallen.org](mailto:gdonaldson@cityofallen.org)

## **Abstract**

*In 2008, the City of Allen mandated the Commercial Irrigation Inspection Program which required all Commercial water account holders to have their landscape irrigation system inspected and audited by Certified Landscape Irrigation Auditors once every three years, at their expense. The program was phased in from January 2009 so that by the end of 2012 all commercial accounts had been audited at least once, and 1/3 of the accounts had completed their second inspection. While not all accounts consumption was reduced, in some accounts the consumption was reduced by as much as 60% from before audits. The total water consumed by commercial property accounts was reduced by 19% from comparing 2008 to 2010 consumption reports. Both were normal climatic and water usage years with no drought conditions or water restrictions in place. This presentation will highlight the Allen Land Development Code, where the inspection program is controlled by ordinance; the commercial account holder response to the requirements; the findings of the inspection reports performed by Certified Landscape Irrigation Auditors; and the comparisons of consumption reductions in normal climatic years versus drought conditions.*

## **Introduction**

The North Texas area experienced a severe drought in 2005-2006 that sent all the area municipalities and water providers into drought contingency response plans with restrictions for outdoor water use as well as other conservation measures due to critical water supply issues. The City of Allen was in a growth period with residential and commercial developments in their starting phases. The population was around 65,000 this year. City leaders brought forth in their strategic planning session several different water conservation measures and strategies that would help with growth, while still conserving water. In these sessions, the Land Development Code was discussed to include more landscape and irrigation plan requirements, specific plant lists and a requirement for all commercial properties to have an irrigation inspection that includes an audit of the system specified by the guidelines set forth by the Irrigation Association. This inspection requirement was for all new and existing commercial properties to have a recurring inspection every three years and report the findings to the city using forms. (appendix A) Along

with these requirements added to the Land Development Code, the City leaders created a Water Conservation division of the Community Services (Public Works) department and position of Water Conservation Manager. The position was open in November of 2007, and Gail Donaldson was hired.

Changes to the Land Development Code were passed through City Council in March of 2008, with full implementation to begin January 1, 2009. This date coincided with the State of Texas mandate of HB 1656 requiring municipalities to implement a landscape and irrigation ordinance requiring all irrigation plans to be reviewed before permit issue, and installation inspections of the systems prior to use. For all commercial irrigation installations, this also includes the inspection requiring an audit. A full audit of the system with one catch-can audit of the largest turfgrass zone (a representative zone) for each controller on the property must be performed at installation, and repeated every three years. The code was amended in March of 2010. The current code is written as follows:

**Sec. 7.05.6. Irrigation plan requirements.**

1.
  - No person shall install an irrigation system in the city without first having obtained a permit authorizing such installation from the office of the city's department of building and code compliance. In addition to the permit fee established by the city and such other information as may be required by the chief building official, an application installation of an irrigation system must be accompanied by a full set of plans setting forth the design and operation parameters of the irrigation system to be installed, which plans must comply with this [section 7.05.6](#)
2.
  - The city shall provide the applicant with an irrigation system plan review checklist, shall evaluate the appropriateness of the irrigation system plan, and shall approve the plans or approve the plans subject to stipulations. Irrigation plans must comply with all State of Texas design and installation requirements including, but not limited to, applicable provisions of V.T.C.A., Administrative Code tit. 30, ch. 344. In addition, the installation and operation of all irrigation systems must comply with the requirements of the city's water conservation ordinance, as amended, as described in the Code of Ordinances section 14-14.1.
3.
  - In addition to the provisions of V.T.C.A., Administrative Code tit. 30, ch. 344, as amended, all new irrigation systems shall meet the following requirements:
    - a.
      - The irrigation plan shall be sealed by a licensed irrigator or Texas registered landscape architect.
    - b.
      - The system must include an automatic controller and sensors that prevent the operation of irrigation during rainfall or in freezing weather.

- c. All non-turf landscape areas shall be designed with drip irrigation and/or pressure compensating tubing (no above-ground spray).
  - d. All landscaped areas (including areas of turf-grass), regardless of size, located between the sidewalk and curb/pavement edge for any development shall be designed with drip irrigation and/or pressure compensating tubing (no above-ground spray).
  - e. All drip irrigation and/or pressure compensating tubing shall be designed and installed according to manufacturer's specifications. For subsurface installation, application rate shall not exceed .21 inches per hour.
  - f. Turfgrass areas utilizing irrigation rotors are to be designed and installed using low-angle nozzles.
  - g. Irrigation heads shall be installed to provide maximum distribution uniformity. The system shall be designed and installed to provide a distribution uniformity of 63 percent  $DU_{LQ}$  or better.
  - h. The irrigation design shall prevent overspray on impervious surfaces and excessive runoff.
  - i. Irrigation systems that vary from the standards of this Code and are designed to minimize water usage may be reviewed and approved by the city, provided, however, the design and installation requirements must at all times comply with V.T.C.A., Administrative Code tit. 30, ch. 344, as amended.
4. New irrigation systems for non-single family developments installed in landscaped areas (including turfgrass) that are less than ten feet in width and adjacent to impervious surfaces, or installed in landscape islands with an area of 200 square feet or less shall be designed with drip irrigation and/or pressure compensating tubing (no above-ground spray).
5. All new irrigation systems for single-family homes shall have separate zones for a drip system (drip irrigation and/or pressure compensating tubing) around the foundation.
6. **A certified landscape irrigation auditor shall conduct the following required irrigation audits and inspections:**
- a. Installation audit and inspection: Immediately following installation, an irrigation system audit and inspection shall be required for all new irrigation systems. For new developments, documentation of the audit and inspection shall be submitted to the city prior to issuing a certificate of

occupancy. The audit and inspection must include an evaluation of the system distribution uniformity and actual zone precipitation rate. The audit shall be performed according to the latest edition of the Recommended Audit Guidelines, published by the Irrigation Association, 6540 Arlington Boulevard, Falls Church, Virginia 22042-6638. Distribution uniformity shall be measured on the largest turfgrass area zone of the irrigation system. Forms for submission and documentation of audit and inspection information shall be made available by the city.

b.

Recurring inspections: An irrigation system audit and inspection shall be required for all irrigation systems, new and existing, in non-single-family developments and shall be submitted to the city once every three years and shall be conducted in the same manner as set forth in subparagraph a., above, regarding the installation audit and inspection. The city shall establish a timeline and procedures for all developments to submit irrigation system audit and inspection documentation to the city for review. Forms for submission and documentation of inspection information shall be made available by the city.

7.

When existing irrigation systems are expanded by more than 25 percent (25 percent of the land area covered by the system); or more than 25 percent (25 percent of the land area covered by the system) of the irrigation system is replaced, the portion being expanded or replaced shall meet the requirements of this Code.

*(Ord. No. 2721-3-08, § 1(Exh. A), 3-25-2008; Ord. No. 2900-3-10, § 10, 3-23-2010)*

## **Implementation**

The building and code division of Community Development department are responsible for all irrigation permits, plan review, and irrigation installation inspection. They collect the commercial irrigation audit forms at time of inspection. The hiring and cost of irrigation audits is responsibility of commercial property owners, for the installation and recurring inspections. These forms are sent to Water Conservation division of Community Services (Public Works) and are recorded in a database, and put in a three year rotation schedule for recurring audits. Every three years, the properties will come due for inspection and audit. This inspection is for all non-single family water accounts. These all have separate irrigation water meters (required), and will include multi-family apartments, shopping centers, office buildings, warehouse, storage rental, and Home Owner Association common areas including pools and parks.

For the existing commercial properties, a notice was sent out January 1, 2009 to all property owners of the passing of the ordinance and requirements. In order to implement most effectively, it was decided to split the current properties by installation dates with all the oldest properties to be inspected and audited in 2009. At this time, there were around 600 total existing commercial properties. The first group included 250 properties for inspection, that notice was sent in February to this group with due date of inspection June 30.

## **Progression**

The audit forms began to come in the month of May. Several included detailed reports from the auditors with pictures of what was found at these properties. The auditors worked with the landscape management companies to make repairs necessary for the audit to be completed. Most of these properties had irrigation systems in total disrepair wasting thousands of gallons with each run time. Broken heads, broken pipes, misaligned, sunken and improper nozzles were found on 90% of the properties. This was no surprise, as irrigation systems simply were being overlooked by landscape management companies all this time, as there was never a requirement for these systems to be inspected. Calls from commercial property owners who were due for this inspection began to increase concerned about the expense they had to endure for this new requirement. Several were extremely angry because irrigation repair costs occurred that they had not previously been budgeted for. These costs had to be paid, as they could not comply with the inspection without the repairs. This is the entire intent of this program, as it is not the audit in itself that reduces consumption; it is the repair to the system that reduces. Most commercial companies waste thousands to million gallons of water each year due to use of poorly maintained irrigation systems. In each City, you can drive in the early hours of the morning (between midnight and 6 am) and drive through miles of streets covered with water due to these poorly maintained irrigation systems.

## **Results**

By September, all but 52 of the properties selected had submitted their forms. Reports from auditors indicated that every property they inspected had several repairs needed before they could complete the audit. Less than 1% of the reports indicated distribution uniformity (DU) above .50, and many reported DU less than .18.

Water consumption average (total consumption divided by number of accounts) pre-audit year 2008-09 for commercial accounts was 904,386. At the end of water year 2009-10, total water consumption average was 724,431. Both years, the climate was normal, no water restrictions. The only difference was 1/3 of the commercial irrigation accounts, and the oldest irrigation systems in the City were required to be inspected and audited. Most of these systems needed several repairs and could account for this 19% water reduction.

When looking at individual accounts that were inspected, 85% of these dropped consumption pre and post audit. Around 5% of the accounts increased consumption, the remainder accounts stayed approximately the same. Some accounts decreased consumption by as much as 60% from what was discovered during this inspection process. One small restaurant account in town had seven irrigation zones wired to the controller. As the inspector was going through the zones, he could not determine where zone seven was located. Zone seven had run time programmed similar to all the other zones. While speaking with the manager, the restaurant had expanded its parking lot two years prior. The irrigation inspector discovered zone 7 valve near the expanded parking lot. The valve was still operating every time the controller was set to run. The pipe had been cut and was openly flowing water under the parking lot. The water had caused erosion of the parking lot and the manager admitted having several concrete repairs those two years, but had never discovered they had an irrigation valve flowing water every week. Several reports of water leaks to the main thoroughfare in front of the restaurant had been investigated, as with several pothole repairs to this street over these two years. Since no chlorine was ever detected in

the water that came in the street, it was thought by city crews there must be a nearby spring causing the water (a natural occurrence in this area). This find during this inspection not only saved water, but also the repair costs of the parking lot at the restaurant, and the street repairs. Since this repair, the restaurant reduced water consumption 60%, and the city has not had street pothole repair in this area.

After many complaints by small commercial account holders, the ordinance was amended in 2012 to exempt all commercial properties that use less than 20,000 gallons consumption in one year. In 2012, no accounts were exempt. In 2013, five commercial accounts that were due for inspection used less than 20,000 gallons for the year.

After the first year of implementation, the City has received favorable comments from the certified landscape irrigation auditors, and many landscape companies have changed commercial contracts to include monthly irrigation system checks to stay on top of all repairs. Since doing this, those accounts that come due for their inspection do not spend much on repair, and the auditors can perform the audits without wait time for repairs. Many of the managers of these accounts said the water cost savings more than paid for the repairs made, and after seeing this the first year have gone to monthly irrigation inspections (without audit), to insure they are not wasting water through broken irrigation equipment.

As of 2013, 93% of commercial accounts have complied with the requirement and no fines have been issued. Water consumption is still down overall from 2008 consumption rates.

The 2010-11 year, we were beginning a new drought period. The summer of 2011 was highest temperatures, lowest rainfall in the century, however, mandatory water restrictions did not go into effect until August 18. Average water consumption in commercial accounts through August still remained 10% below 2008.

For the 2011-2012 year, we were in Stage two mandatory restrictions of twice per week watering for 6 months, and Stage 3 mandatory restrictions of once per week watering or less for 6 months. The average water consumption was 26% below average consumption of 2008. As of July, 2013 we remain in mandatory water restrictions and consumption averages remain 26% or more below the 2008 figures.

## **Conclusion**

Most commercial properties have landscape maintenance contracts with everything from the large corporate landscape firms, to small one man operations of a truck and lawn mower. Texas requires any person who repairs, sells, consults, designs, install, etc. an irrigation system to be licensed. The license is managed through Texas Commission on Environmental Quality (TCEQ). Because of this license requirement, the smaller commercial properties that use one man operators for landscape maintenance are less likely to employ Texas licensed Irrigator, and thus more likely to not implement monthly irrigation system checks. These are normally the accounts that will benefit from this inspection, yearly inspections would be better.

It is the mandated requirement of this inspection program that continues to reduce demands for our commercial accounts, as without the mandate most of the systems would go neglected and in disrepair wasting much of our water supply. Most of our large commercial accounts have landscape companies that are now performing regular maintenance on the irrigation systems, and

have therefore continued to keep their irrigation usage lower. The requirement of irrigation system plan review, and installation inspections have reduced the amount of poor design and installed systems in our new buildings. As of July, 2013, we have over 939 commercial accounts-over 300 new accounts- buildings, shopping centers, HOA's, and multi-family units, and each of these have been installed with more efficient irrigation equipment that help to reduce the overall water usage in their water accounts. By inspecting at installation, most of these new systems are meeting a DU of .63 or greater, improving the water efficiency of irrigation systems. By mandating the inspection be performed by licensed irrigators who are also certified landscape irrigation auditors validates the reports. Those irrigators that have gone through the certification program understand the need for efficiency in an irrigation system, and most value water conservation efforts, and consistently provide trustworthy reports. Many go above the City requirements and offer full water management solutions for these commercial properties with detailed reports for corrections or retrofits to the systems that will save water, with details on the return on investment due to water savings.

The implementation of this program has dropped overall water consumption in our commercial accounts. The total water consumption by this class account is over 500 million gallons a year-even a 10 percent saving is significant enough to implement. The only item that might improve the existing program would be to require the smaller accounts that do not implement irrigation system checks in their maintenance to report annually, instead of every three years. In the continual search for effective water conservation efforts, this is one that does reduce water consumption with very little investment on a municipality. Any municipality could easily add this requirement in their code, and most could use the existing city database software systems to administer the program. The administration time could be incorporated within any customer service representative type position in water services, or building and code and is well worth it when faced with critical water shortages and the need to reduce consumption.

## APPENDIX A





Irrigation Inspection Form

Please return completed form to address listed on the bottom of page.

Property Information:

Name of Property: \_\_\_\_\_

Address of Property: \_\_\_\_\_

Allen, Texas Zip: \_\_\_\_\_

Water utility account number: \_\_\_\_\_

Responsible Party ( Person with decision making authority regarding property)

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_ Zip: \_\_\_\_\_

Phone number: \_\_\_\_\_

Email: \_\_\_\_\_

Information of person conducting irrigation system inspection:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_ Zip: \_\_\_\_\_

Phone number: \_\_\_\_\_ TX LI # \_\_\_\_\_

Email: \_\_\_\_\_

\*Certified Irrigation auditor with: \_\_\_\_ Texas A&M \_\_\_\_ Irrigation Association

**\* A copy of certification document from either Texas A&M or the Irrigation Association must be on file. If this is your first time to perform an audit, enclose one copy with this form. If licensed irrigator is found to be falsifying information, a report will be made to TCEQ.**



Irrigation Inspection Form Page 2

Meter Size: \_\_\_\_\_ Meter Number: \_\_\_\_\_ Irrigation only? YES NO

Controller Information\* (Brand, model):  
\_\_\_\_\_

Cross Connection Control device (Brand, type, size): \_\_\_\_\_

Rain/ Freeze Sensor Brand: \_\_\_\_\_ Working? YES NO

TOTAL Number of zones: \_\_\_\_\_ Irrigation day program (circle all days) M T W Th F S Su

Type of irrigation on controller (all that apply): Spray Rotor Bubblers Drip

**System Analysis:** All sunken, clogged, misaligned, broken, blocked, or otherwise problem heads have been corrected to maximize efficiency **before** this system analysis was performed. All zones are in most efficient working order and a zone was chosen that most represents the irrigation coverage of 60% of the property turfgrass area. Pressure reading was performed on at least one irrigation head in the zone. An IA method catch-can test was performed to determine PR and DU and results are recorded below. (*Do not audit drip zones*)

**Representative Zone information:**

Soil Type: \_\_\_\_\_ Plant Type(s): \_\_\_\_\_

Zone # \_\_\_\_\_ Type of irrigation heads (circle one): Spray Rotor Number of heads: \_\_\_\_\_

Nozzle type (specialty nozzle?): \_\_\_\_\_

Number of start times for zone: \_\_\_\_\_ Minutes programmed \_\_\_\_\_

Actual Pressure reading (on irrigation head) \_\_\_\_\_ psi

Precipitation Rate (PR): \_\_\_\_\_ Inches per Hour

Distribution Uniformity (DU<sub>LQ</sub>): \_\_\_\_\_

Signature of Certified Irrigation Auditor: \_\_\_\_\_ (include copy of certificate from either Texas A&M or Irrigation Association if not on file)

Date: \_\_\_\_\_

***\*If property has more than one controller, use additional form for each controller. A minimum of one zone per controller must be audited.***