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Irrigation Water Savings]

System Tune Ups and Irrigation Controllers

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The Root of all Evil...

- Most of us are well aware that water treatment plants, distribution piping, pumps, etc., are typically designed to meet peak demands
- Most of us are also aware that peak demands tend to occur during the summer months after extended periods of hot and dry weather
- We also know the primary cause of peak demands is that scourge known as:
 - **Irrigation!!**

Why Water Efficiency?

- Many North American water agencies spread message that lawns need 1-inch of water per week (includes rainfall and irrigation)
- Of course, during dry periods there is no rainfall – so entire 1-inch must be supplied via irrigation
- Message implies - “if people would only irrigate 1” per week we would eliminate peak demand problems”
- But is this really the case???

Irrigation Manual



- In 2008 the OWWA developed an ***Outdoor Water Use Manual*** to identify effective ways to reduce peak day demands
- Since the primary cause of peak day demands is irrigation, the manual focused on ways to reduce irrigation

Interesting and Unexpected -]

- Research revealed some interesting and unexpected results -
- First – we wanted to quantify the potential water savings if homeowners limited irrigation to 1-inch per week
- Needed to evaluate “where are we now” before we can determine “how low can we go”



How much are people in Canada irrigating now?



Data Analysis

- Looked at data from different sources
 - Gross billing data
 - Single-family billing data
 - DMA monitoring data
 - Individual household monitoring
 - Hose-bibb metering

Surprise!

- The surprising results were the same for ALL data sets analyzed -
- The average single-family home was applying about 8-10 mm (about 1/3 of an inch) of irrigation per week to their lawns/gardens
- The average homeowner was applying far less than the target of 1 inch per week!!
 - 9mm actual vs. >25mm expected

Where on Earth?

- From where did the “1-inch / week” message originate?
- If homeowners followed message and applied 1-inch / week demands would **INCREASE!**
- Average residential irrigation ~ 9mm (in the GTA)
 - some homes apply more, some apply less
- Need to re-think messaging
- Need to re-evaluate potential savings

Hose Draggers not a Problem

- Research identified that many homes with automatic irrigation systems apply > 1-inch / week
- In some cases, 3 or 4 inches per week
- Typically at night so not noticed by homeowner
 - obvious physical evidence if under-watering
 - no similar evidence if over-watering
- Message that too much water harms your lawn is questionable (i.e., 4" / week doesn't damage lawn).

Automatic = Bad

Big = Bad

- So - average homeowner in Canada applies less than 1-inch / week
- But - many homes with automatic irrigation systems apply more than 1-inch / week
- And - volume of irrigation is a function of application rate and area being irrigated, i.e., bigger lawns require more water!!
- So – what about CII properties that are large AND have automatic irrigation systems???

Non-Residential Irrigation

- In 2009 Region of Peel began a study to evaluate the potential to reduce irrigation demands in non-residential facilities (CII) with large properties and automatic irrigation systems
- Water billing data used to identify sites with large summer to winter water use ratios
- Selected suitable sites and installed sub-meters and data logging equipment to determine current level of irrigation
- But how to determine potential for water savings?
 - How much irrigation **should** these sites use?

What we Need to Know About Irrigation Controllers

- Automatic irrigation systems use controllers to turn on and off irrigation in each zone
- The zones should be designed to apply the proper irrigation volume, rate, and schedule
- There is little reason that one zone should receive 2 inches/week and the very next zone (of the same plant material and slope, etc.) should receive 4 inches.
- Decided to determine potential for water savings based on depth of irrigation per week in each zone.

Irrigation System Audits

- System Audits were performed at participating sites (SMART Watering Systems-Irrigation Specialists)
- Looked at type of spray heads, nozzles, etc., type of controller, irrigation schedule, type of landscape material, etc.
- Two levels of potential water savings:
 1. Continue to use standard timer but optimize irrigation system, i.e., install proper spray heads/nozzles, properly adjust irrigations schedule, repair leaks, etc.).
 2. Install a weather-based “smart” controller system.

Estimated vs. Actual

- Once potential for savings was estimated, sub-meters were installed on the irrigation systems
- Actual flows to each zone was data logged
- Scheduling information from the controller was recorded and incorporated in the analysis
- Calculated how much water each zone would receive per week (based on flow rate and schedule)
- Compared depth of irrigation on a zone-by-zone basis and on a site-by-site basis (more or less than 1-inch per week)

Potential for Savings

- Determined inches/week for each zone
- Many zones were only applying about 12mm / week (1/2") but grass was green
- Many single-family homes were applying only 9mm / week (via monitoring)
- Decided to set baseline at 12 mm (1/2") per week for CII sites using standard controller systems (many zones set at this irrigation rate)

System Change Options

- Water savings options included:
 - System Improvements
 - Fixing leaks and broken heads
 - Adjusting schedule of each zone to apply ½” per week
 - System Upgrades
 - Install Smart weather-based controller and reduce further to 0.30-inches per week
 - Install Central Control system and reduce further to 0.25-inches per week
- System efficiencies would be realized through both system improvements and upgrades

Table 1 - Zone Summary

										Potential Savings, m ³ /yr		
Zone Number	Area, m ²	Landscape Type	Flow rate, L/min	run time min/cycle	cycles/week	mm/week	inches/week	m ³ /year	Leak Observed	Hardware Savings ¹	Additional w/ Smart Controller ²	Additional w/ Central Controller ³
1	180	MIXED	80	30	3	40	1.58	144		98	18	23
2	101	SHRUBS	100	15	3	45	1.76	90		64	10	13
3	180	TURF	63	15	3	16	0.62	57		11	18	23
4	814	TURF	149	30	3	16	0.65	268	✓	61	83	103
5	1,231	TURF	209	30	3	15	0.60	376	✓	64	125	156
6	1,255	TURF	211	30	3	15	0.60	380	✓	61	128	159
7	2,123	TURF	202	30	3	9	0.34	364			40	94
8	1,958	TURF	143	30	3	7	0.26	257				9
9	485	TURF	155	15	3	14	0.57	140		16	49	62
10	83	TURF/TREES	85	15	3	46	1.81	77		55	8	11
11	44	TURF/TREES	119	15	3	123	4.84	107		96	4	6
12	575	TURF/TREES	124	15	3	10	0.38	112			24	39
13	649	TURF/TREES	163	15	3	11	0.44	147			48	64
14	1,612	TURF	78	30	3	4	0.17	140				
15	1,644	TURF/TREES	180	30	3	10	0.39	324			73	115

Total Annual Irrigation Demand, m³/year = 2,982

Total Estimated Annual Savings, m³/year = 527 629 876

Percentage Savings = 18% 21% 29%



Pilot Status

- Phase I - Summer of 2010
 - Pilot Project launched
 - Pre monitoring and analysis
 - Recommendations to facilities
- Phase II – Summer 2011
 - Implementation of recommendations
 - Post monitoring and analysis
 - Rebate structure determined
- Results

Thank You

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