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Water Auditing and it's Benefits

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Growth Trends

- 1/2 of homes that will exist in 2030 have not yet been built
- Studies show new homes are using 12-60% more water than their existing counterparts
- High water use is not just a function of high-end homes

Source: MADickinson presentation AWWA Water Conservation Workshop, January 2007.





Water Conservation Goals

- 1.Reduce water loss.
- 2.Minimize outdoor water use and waste.
- 3.Maximize in-house efficiency.
- 4.Adopt conservation-oriented rate structures.
- 5.Adjust management practices to minimize water use.

Water Audit Phase

1. Where does water go?
2. How much water?
3. Look at all areas of water consumption
4. Create water balance
5. Develop strong Measurement and Verification Protocol

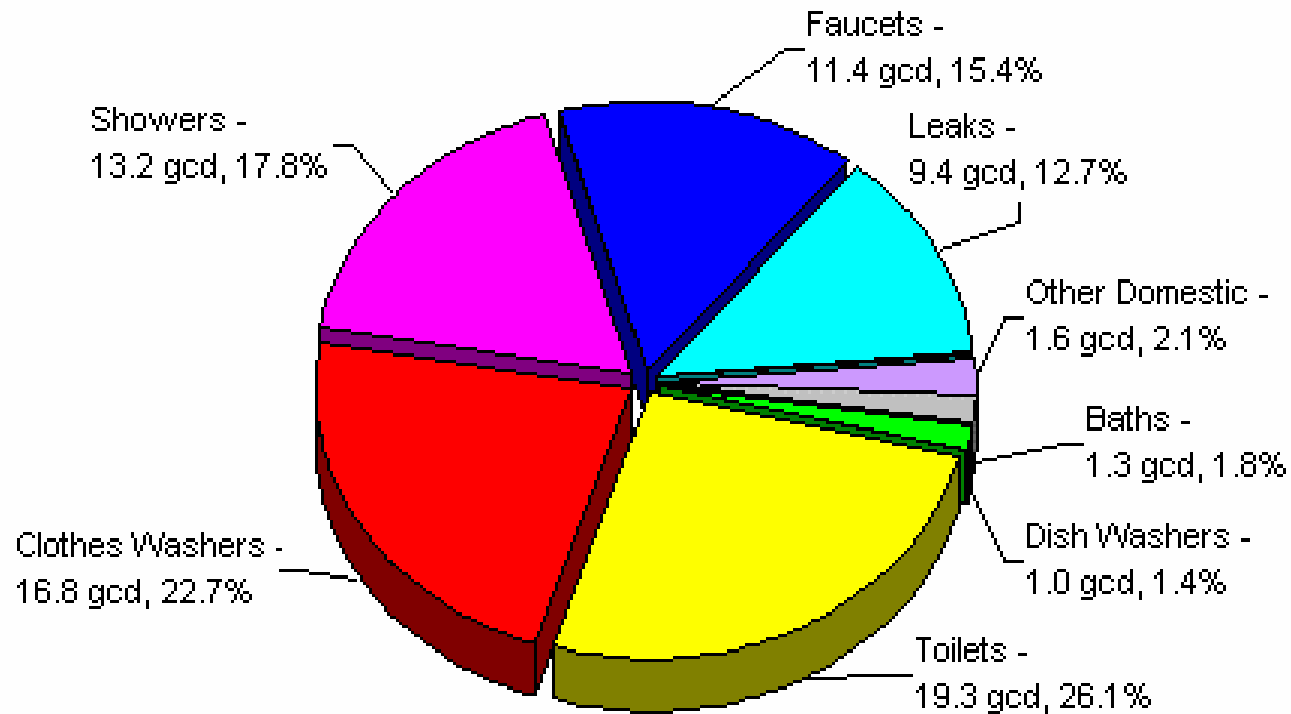
Data Collection & Measurements

- *Measure water flows of fixtures - Micro Weir*
- *T-5 or Water Extraction for Toilets*
- *Temperature recorders*
- *Ultrasonic flow meter*
- *Meter master unit to attach to water meter*
- *Leak detection equipment / correlators*

Home with old toilets

Typical Single Family Home Water Use

- Without Conservation -



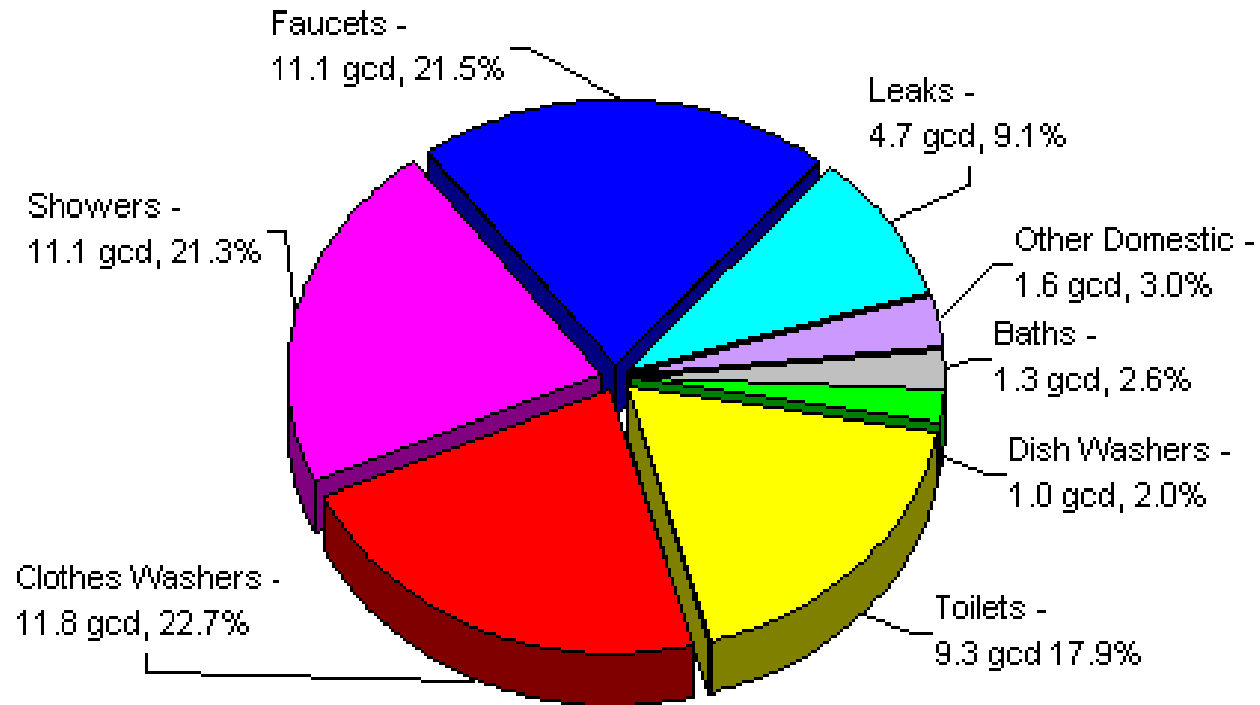
Total: 74.0 gallons per capita per day (gpd)

Presented by WaterWiser - © 1998 American Water Works

Home with new toilets

Typical Single Family Home Water Use

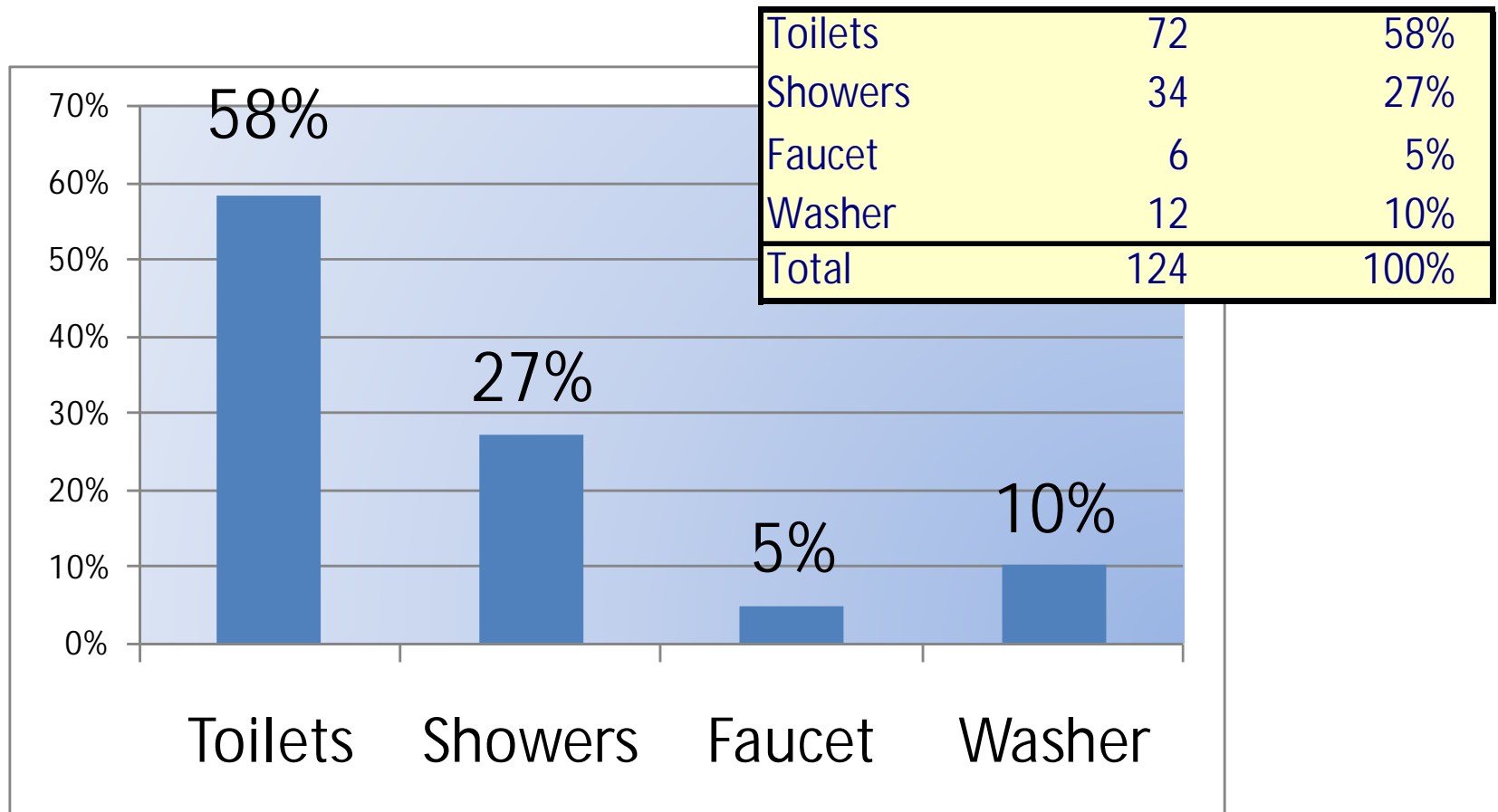
- With Conservation -



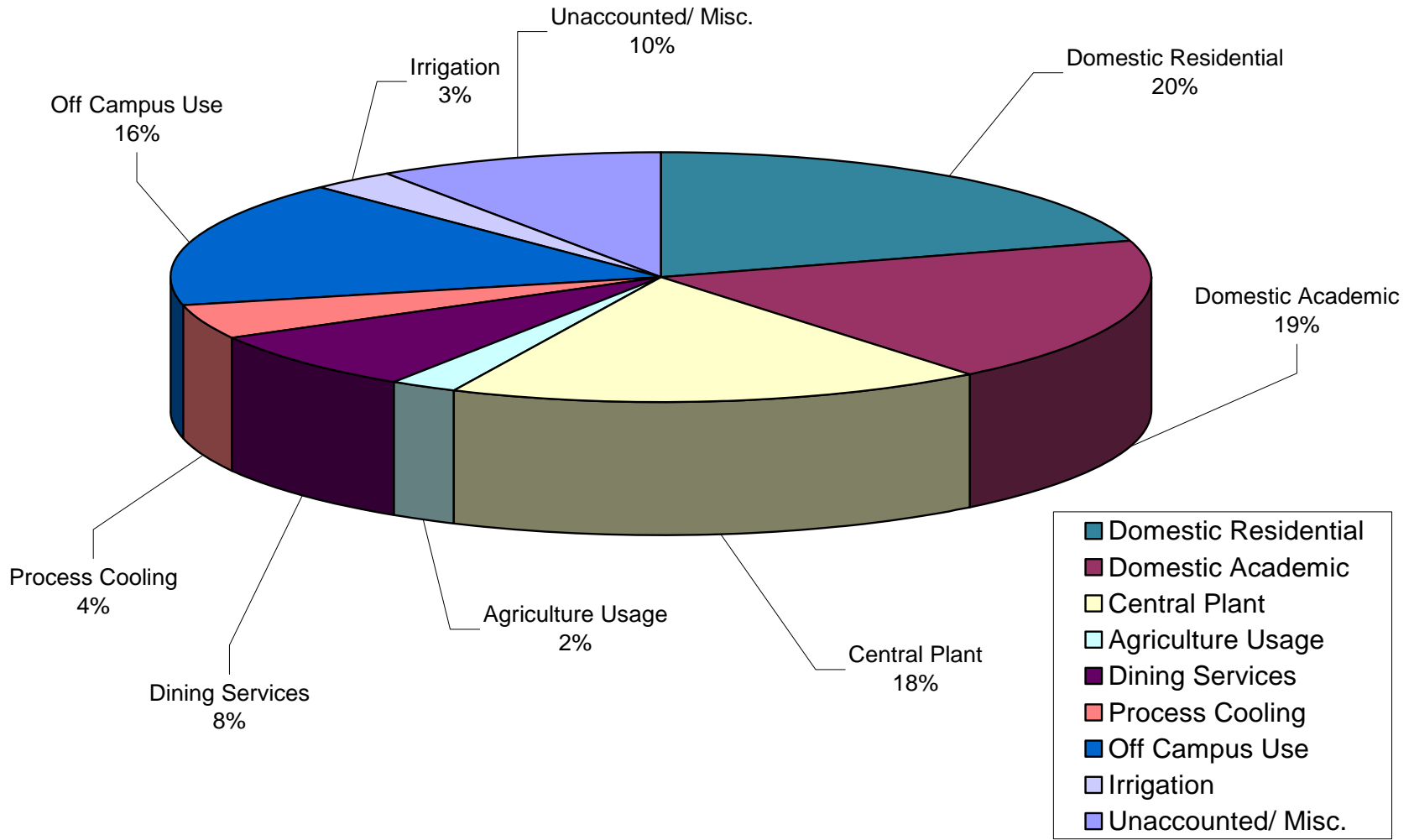
Total: 51.9 gallons per capita per day (gcd)

Presented by WaterWiser - © 1998 American Water Works

Eastern Correctional Prison: MD



University of Connecticut



9 major users of water at UConn

Area		Gallons / year
Domestic Residential	20%	101,237,206
Domestic Academic	19%	94,000,000
Central Plant	18%	87,921,168
Agriculture Usage	2%	12,000,000
Dining Services	8%	38,320,065
Process Cooling	4%	21,500,000
Off Campus Use	16%	81,820,755
Irrigation	3%	13,357,126
Unaccounted/ Misc.	10%	47,696,680
Total	100%	497,853,000

Duke University – Res Life

East = 35 gpd

West = 50 gpd

Central = 110 gpd



Domestic Measures

- 1. Toilets***
- 2. Showers and Tubs***
- 3. Faucets***
- 4. Flow Controls***
- 5. Washers***



Fixture	Current Standards	EPA WaterSense goal
Toilets	1.60	1.28
Urinals	1.00	0.5
Showerhead	2.50	1.5 - 2.0
Sink faucet residential	2.20	1.0 - 1.5
Lavatory faucet public	0.50	0.5

Data Collection & Measurements

- *Measure water flows of fixtures - Micro Weir*
- *T-5 or Water Extraction for Toilets*
- *Temperature recorders*
- *Controlotron Ultrasonic Meter*
- *Meter master unit to attach to water meter*
- *Leak detection equipment / Correlators*

Flushometer Toilets





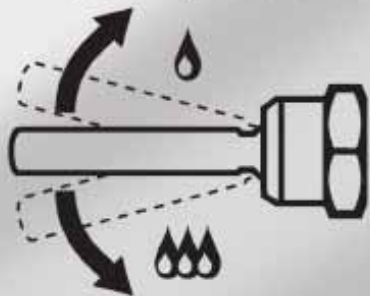


Audit gallons per flush

valve type	# of seconds in flush cycle	flow rate gallons per minute	gallons per flush
toilet 1	4	25	1.7
toilet 2	8	25	3.3
toilet 3	11	25	4.6
urinal 1	4	15	1.0
urinal 2	6	15	1.5
urinal 3	10	15	2.5

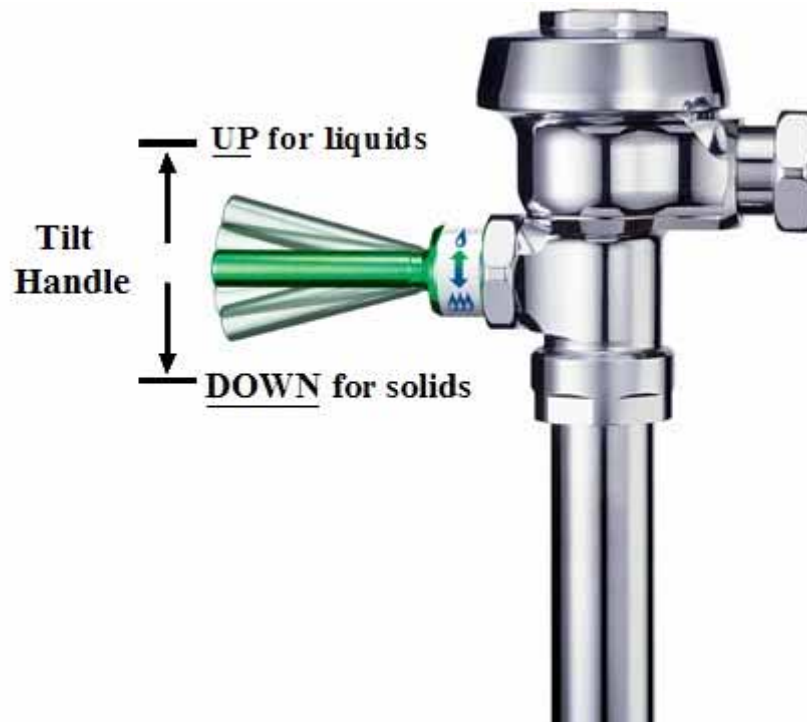
Water Saving Dual-Flush Handle

UP for liquid waste



DOWN for solid waste

SLOAN.



Gravity Toilets

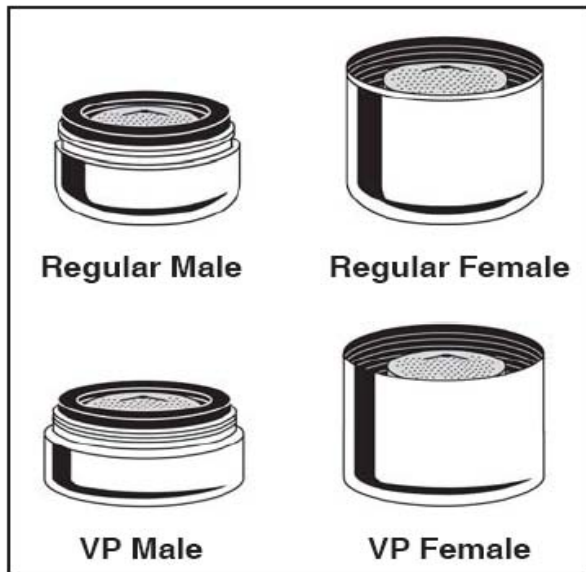




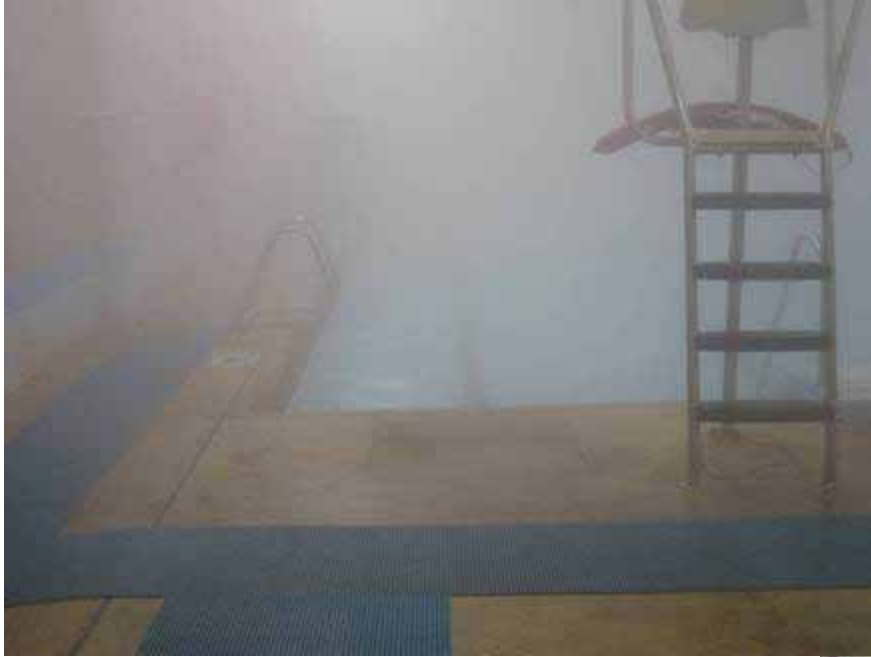
Pressure Assist Toilets



Aerators / Flow Controls



Pools



Cooling Towers





Mechanical Systems

- 1. Steam trap upgrades***
- 2. Condensate recovery***
- 3. Water re-circulating systems***
- 4. Pressure Regulating Valves (PRV's)***



Dining

- 1. Pre-rinse sprayers - 1.2 gpm not 4.0+gpm***
- 2. Garbage Disposals / Pulpers***
- 3. Life-cycle on Dishwashers***
- 4. Ice machines***
- 5. Steamers***

Water cooled vs air cooled Ice Machines

Per 100 lbs.	water use (gal)	electricity use (kwh)
Water cooled	145	4.3
air cooled	18	5.3
difference	127	1.0
\$ (+ or -)	\$ 0.54	\$ 0.10
water cost	\$ 4.25	
kwh cost	\$ 0.10	



Irrigation Use

Athletic Field and Buidling Names	Estimate Irrigated Area (acres)	Irrigation Weeks per Season	Gallons Used per Year	Gallons Required
Morrone Soccer	2.18	14	961,270	475,503
Practice Soccer	3.77	14	830,833	821,962
J.O. Christian Baseball	2.57	21	818,182	560,173
Conn. Softball Stadium	0.64	18	307,482	138,614
Memorial Football	1.88	22	940,898	409,010
Sherman Astro Turf Field	1.81	21	6,329,687	0
Two Practice Football	4.74	18	2,987,800	1,033,673
Lodewick Visitors Center	0.34	24	180,975	74,785
Total	18		13,357,126	3,513,721

Distribution Uniformity

Athletic Field and Buidling Names	Estimate Irrigated Area (acres)	Average Precip. (in/hr)	DU	Hour:Minute Apply 1/2 Inch Depth Irrigation Water
Morrone Soccer	2.18	0.29	30%	1 hour 44 minutes
Practice Soccer	3.77	0.29	30%	1 hour 44 minutes
J.O. Christian Baseball	2.57	0.57	76%	53 minutes
Conn. Softball Stadium	0.64	0.66	71%	45 minutes
Memorial Football	1.88	0.28	13%	1 hour 49 minutes
Sherman Astro Turf Field	1.81	0.34	53%	1 hour 28 minutes
Two Practice Football	4.74	0.43	83%	1 hour 10 minutes
Lodewick Visitors Center	0.34	0.27	40%	1 hour 51 minutes



The Distribution Uniformity (DU) at Morrone Field was very low – thus requiring much more water to keep the grass alive. Notice how there are just two sprays one for short distance and one for long distance.



I-40 Rotors on Morrone Field were size 41 nozzles they do best when the pressures are around 70 psi. This field at 40 psi.
Change the 41 nozzle to an 40 nozzle.

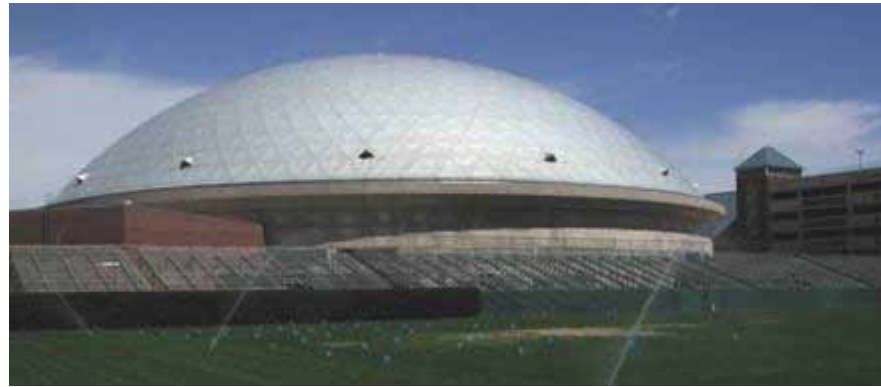


Distribution uniformity improved by over 40% by simply changing to a nozzle that matches the pressure delivered

Irrigation must do's

- Replace irrigation controllers with smart controllers.
- Replace or repair all broken and misdirected spray heads.
- Install Evapo Transpiration (ET) system or
- Install soil moisture sensor devices and related soil moisture sensor controllers.
- Consider sub-surface irrigation system.

Rainwater Harvesting

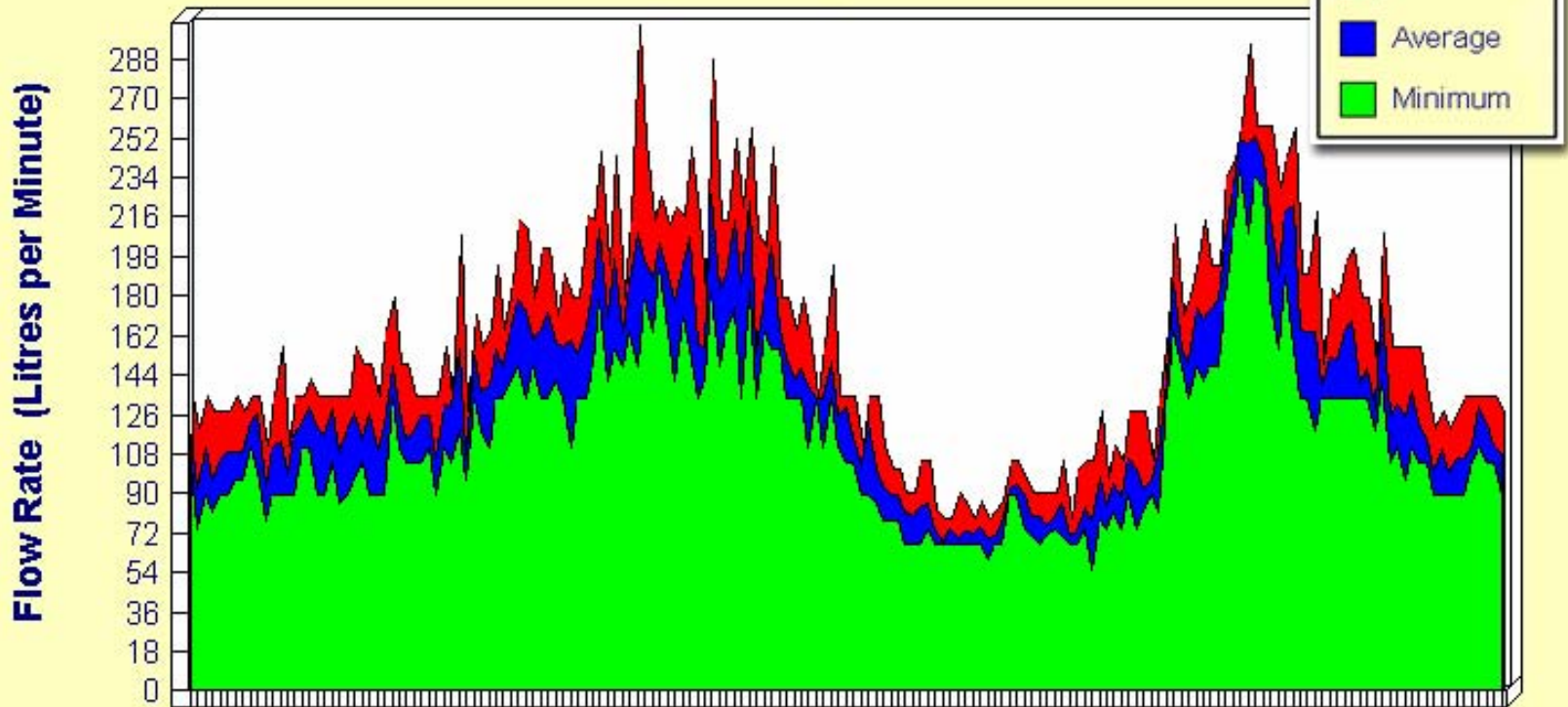


Rainwater harvesting - based on data collected rainwater harvesting (cistern and rooftop methods) have the potential of harvesting 2.8 million gallons of water per year.

Monitoring: Ultrasonic Meters



Virginia Square Plaza



4/21/2003 12:47:22 PM to 4/22/2003 12:15:22 PM
8 Minute Intervals



Electronic Sound Equipment





To stay informed:

- www.epa.gov/WaterSense
- www.allianceforwaterefficiency.org
- www.cuwcc.org/products_tech.lasso

SINCE WATER IS THE LIFE-BLOOD ON THIS PLANET, THIS MUST BE A TEMPLE OF SOME SORT... LET'S STICK AROUND AND SEE HOW THEY SHOW THEIR RESPECT...



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Thank you,
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