

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Conservation Audits of Denver Public Libraries

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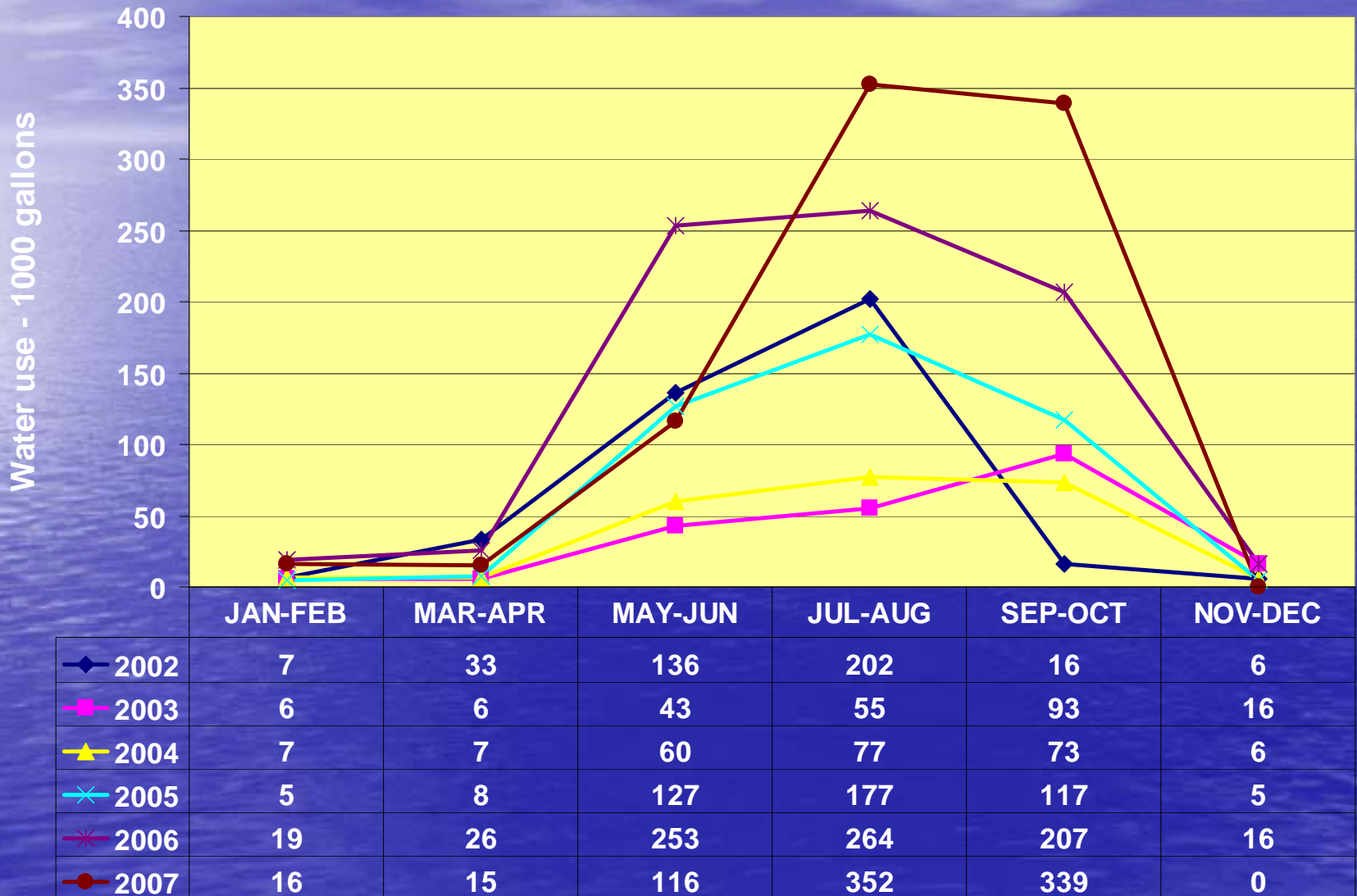
Denver Library Facilities

- 22 branches – 18 irrigation audits
- Serve 3,800,000 customers annually
- 5,441 customer days per year
- 227,787 ft² irrigated area
- Total water use – 11,580 kgal in 2006
- Irrigation – 6,392 kgal in 2006 (58%)

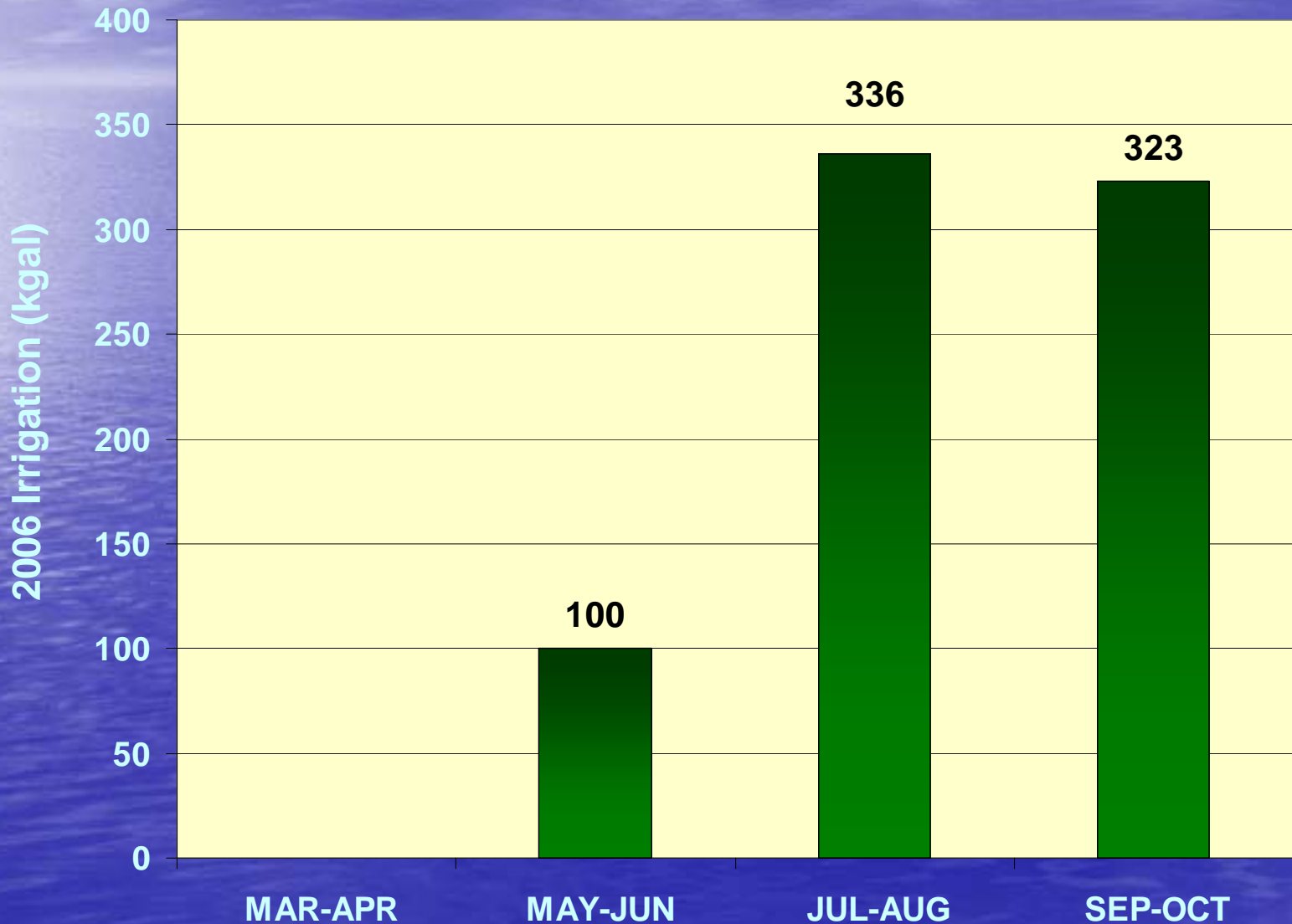
Data Analysis and Auditing Methodology

- Determining indoor and outdoor consumption using average winter consumption (AWC)
- Data logging
- Flow trace analysis
- Aerial photography
- Site visits

Example of Billing Analysis



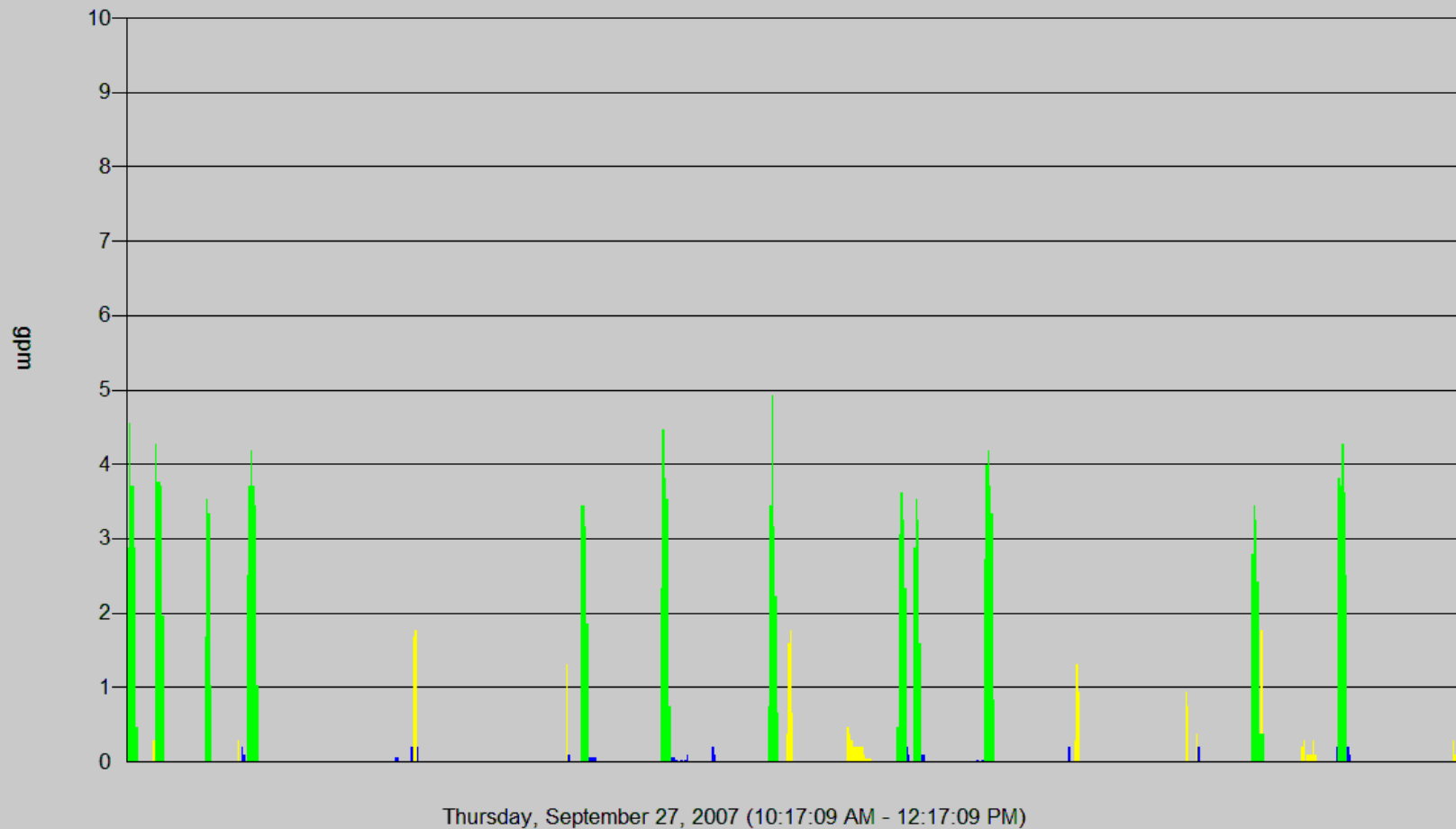
Determining Irrigation Usage



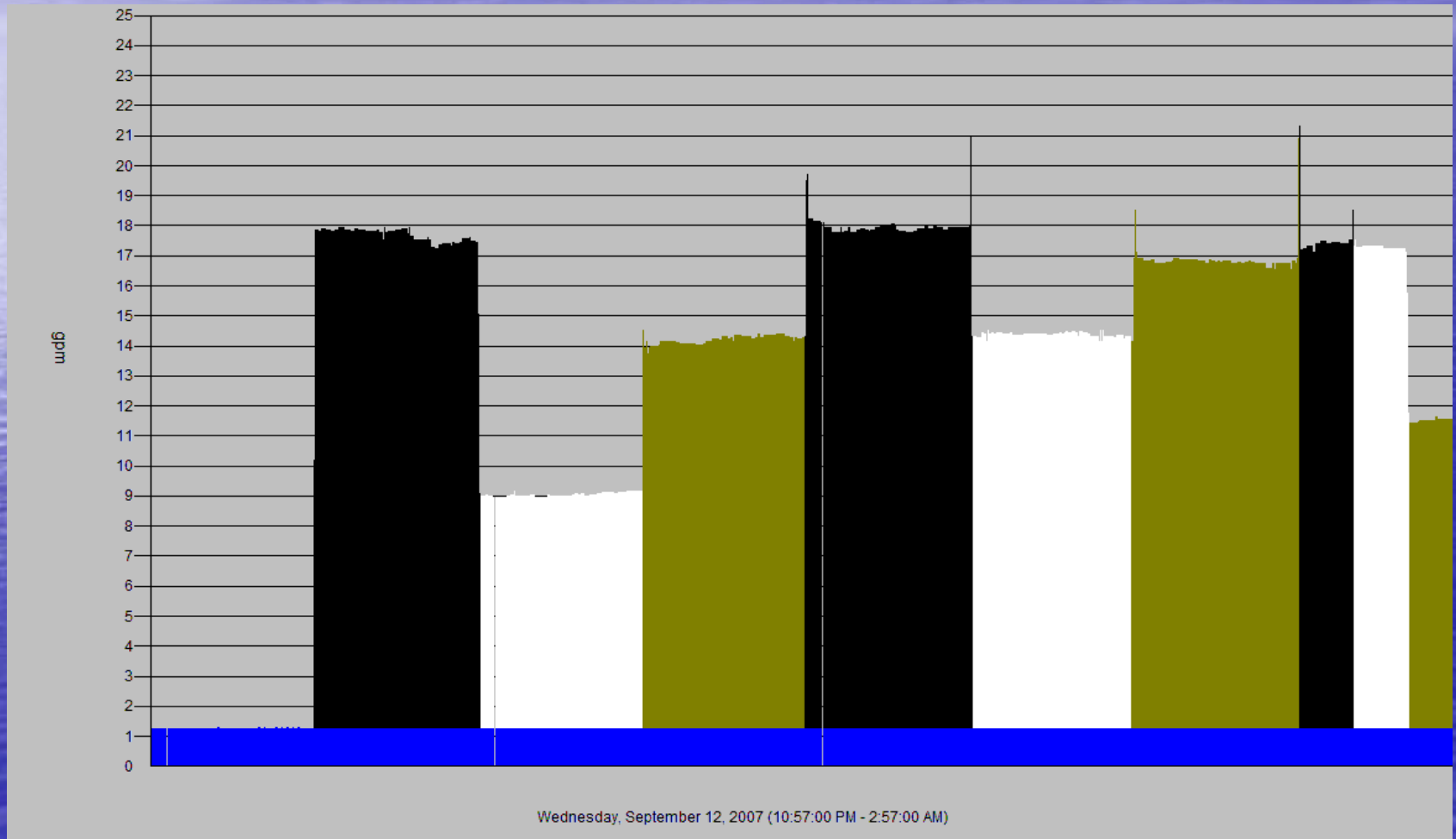
Determining Irrigated Area



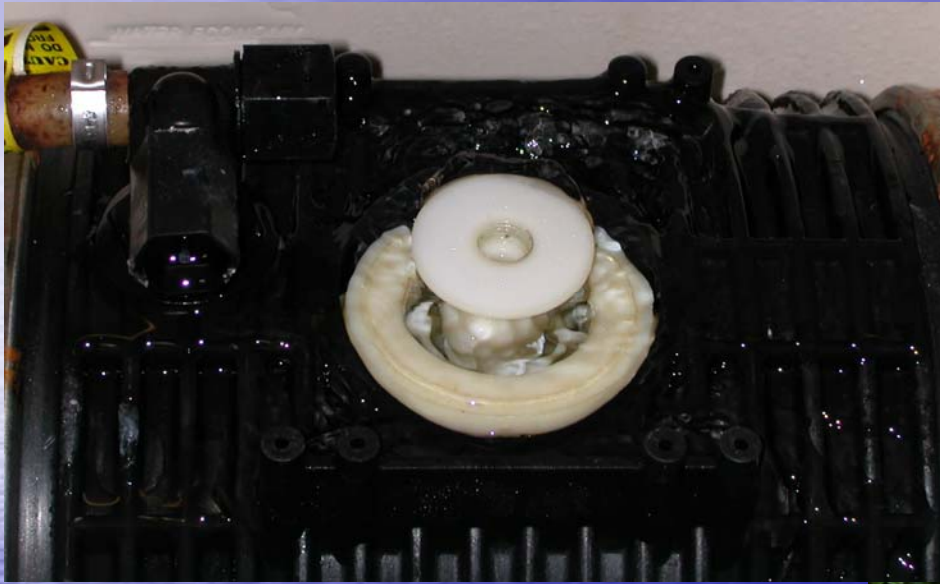
Indoor Water Use in Trace Wizard Software



Irrigation Trace Wizard Analysis



Site Visits



Recommended Retrofits # of Fixtures (all sites)

Faucet aerator	Leak	Urinal	Toilet	Other	Irrigation
105	15	8	21	5	15

Most of the recommended water savings came from irrigation efficiency improvements.

Water and \$\$ Savings

- 4,841 – kgal annually
- \$17,548 – annual savings
- \$121,643 – present worth of savings
- \$9,751 - cost of recommended measures
- **12.5 - benefit/cost ratio**

Irrigation Savings

- 3,397 – kgal annually
- \$11,623 – annual savings
- \$81,635 – present worth of savings
- \$6,552 – cost of recommended measures
- **12.5 – benefit/cost ratio**

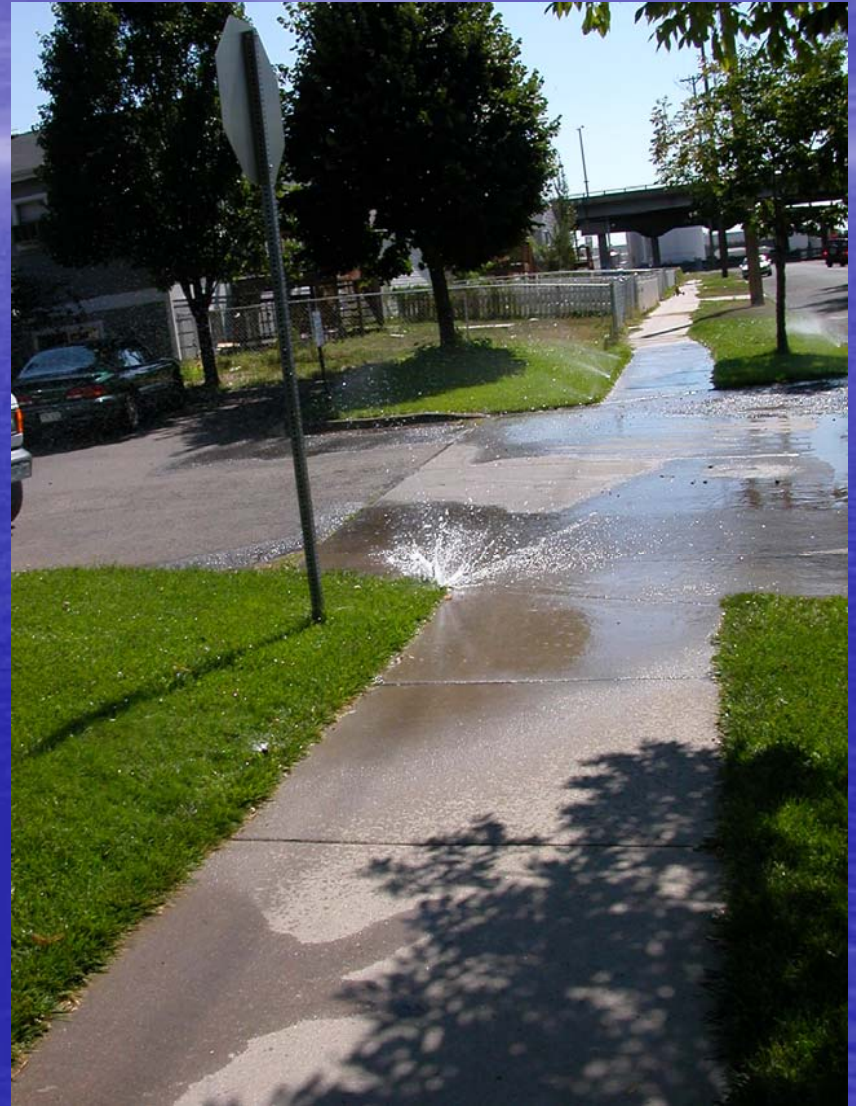
Problems Impacting Water Use

- Limited staff – 13 maintenance personnel
- Vandalism
 - nearby schools
 - back flow preventer theft
- Lack of training of ancillary personnel
- Inadequate irrigation scheduling

Irrigation Line Breaks



Irrigation System Leaks



Misplaced and Misaligned Heads



Solutions and Recommendations

- Utilize controller percent adjust feature
- Improve staff training
- Track billing data
- Make irrigation upgrades w/landscape upgrade
- Schedule routine maintenance

Questions?

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