Sanitary/Domestic Uses

Often overlooked are the water and cost savings achievable in the domestic water usage by commercial and industrial facilities. While water efficiency measures should begin with the highest water use operations such as cooling, cleaning, rinsing, heating, etc., many facilities miss the easy improvements that can be made in domestic water devices such as toilets, urinals, sink faucets and showers. Domestic water use at industrial and commercial facilities may range from a few percent at a food processing industry to more than 50 percent in an office setting. Average daily domestic demands in commercial/industrial settings range between 20 and 35 gallons per day per employee, and a savings of 25 to 35 percent in this domestic usage is readily achievable.

N.C. Division of Pollution Prevention and Environmental Assistance
1639 Mail Service Center
Raleigh, NC 27699-1639
(919) 715-6500
(800) 763-0136
Toilets

Americans consume almost 4.8 billion gallons of water daily by flushing toilets and urinals. In a business office setting, toilet water usage alone can account for approximately one-third of all water used. A number of water efficiency options exist for toilets in most facilities constructed before 1994 that have not been renovated recently.

The three major types of toilets include gravity flush, flush valve and pressurized tank type. Dual flush toilets also are gaining in market share. Pre-1977 gravity toilets will consume five to seven gallons per flush. Pre-1977 flush valve toilets use 4.5 to 5.0 gallons per flush. Gravity and flush valve style toilets manufactured between 1977 and the mid-1990s mostly use 3.5 gallons per flush. High efficiency toilets began appearing on the market in the mid 2000s. HETs use less than 1.3 gallons per flush.

### Typical Water Consumption for Toilets

<table>
<thead>
<tr>
<th>Years Manufactured</th>
<th>Gravity Tank Style</th>
<th>Flush Valve Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-1977</td>
<td>5.0-7.0 gpf</td>
<td>4.5-5.0 gpf</td>
</tr>
<tr>
<td>1977 to mid 1990s</td>
<td>3.5 (some 5.0 gpf)</td>
<td>3.5 gpf</td>
</tr>
<tr>
<td>Mid 1990s</td>
<td>1.6 gpf maximum</td>
<td>1.6 gpf maximum</td>
</tr>
<tr>
<td>2003+ best in class</td>
<td>1.3 gpf maximum</td>
<td>1.3 gpf maximum</td>
</tr>
</tbody>
</table>

### Code Compliant 1.6 Gallons Per Flush Toilet

In the 1990s, toilet manufacturers introduced ultra-low-flush toilets that use 1.6 gallons per flush. Federal regulations require that all toilets manufactured after Jan. 1, 1994, consume no more than 1.6 gpf. Some of the original ULF models encountered performance problems, but more recent models have improved designs and performance.

### High-Efficiency Toilets

The most efficient commercial toilet on the market is the high efficiency toilet. HETs use less than 1.28 gallons per flush. This performance is achieved by an improved flush and fixture design. Early user satisfaction studies show positive customer feedback. HETs combine high efficiency with advanced design for high performance. Manufacturers are striving to avoid the issues experienced with some of the first-generation 1.6 gpf models. Since 2003, most manufacturers have offered HET toilets. In 2007, the EPA WaterSense program began performance qualifying HETs and other water fixtures with the WaterSense label. An HET replacement program offers the highest water savings potential. Facility owners should be aware...
of factors that will make the HET or ULF toilet replacement program successful (See Figure 4-5 on p. 33).

HETs are available in the following configurations:
- Single-flush, tank-type gravity toilets
- Dual-flush, tank-type gravity toilets
- Dual-flush, tank-type flush valve toilets
- Tank-type pressure-assisted toilets
- Battery-powered, sensor-activated dual-flush toilets

**Dual-Flush Toilets**

Dual-flush toilets employ a dual-action flush valve or two-button system; one for a full flush (1.6 gpf to eliminate solid waste) and the second button for a reduced flush (1.1 gpf for liquid waste). An electronic sensor-activated dual-flush unit also is available, in which the sensor activates the appropriate flush, depending on the length of time the user remains seated. Dual flush retrofit valves are available for existing 1.6 and 3.5 gpf units. Dual flush technology has been popular in Australia and Europe for the past 20 years.

**Gravity Flush Toilets**

Gravity flush toilets are the most common of all toilets. Gravity flush toilets most likely are found in medium- to light-use business applications.

Water efficiency options for gravity flush toilets include improved maintenance, retrofit and replacement options.

*For a maintenance checklist, see Figure 4-2.*

**Toilet Displacement Bag**

Retrofit options of gravity flush systems are most effective on units that consume more than 3.5 gpf (pre-1980s models). For toilets that consume 3.5 gpf or less, some retrofit options may hamper toilet performance or increase maintenance cost. Most retrofit options are available for less than $20.

Displacement devices, including bags or bottles, can reduce water flow by approximately 0.75 gpf. They function by displacing flush water stored in the tank. The devices are inexpensive and easy to install, but do require regular maintenance. Bricks or other friable objects should never be used
as displacement devices because granular contaminants can prevent proper closure of the flapper and damage flow valves.

Toilet dams are flexible inserts placed in a toilet tank to keep 0.5 to 1 gallon out of each flush cycle. Dams will last five to six years. A plumber should be consulted before installing such devices.

Early closure flapper valves replace the existing flush valve in the tank. These devices are adjustable to optimize performance and can save 0.5 to 2 gpf. Early closing flappers are inexpensive and usually can be installed in 10 to 15 minutes, barring other problems with the toilet’s mechanisms.

Dual-flush adapters allow users to use a standard flush for solids removal or a modified smaller flush for liquid and paper. Dual-flush adapters have been more popular in Europe than the United States. Dual-flush adapters can save between 0.6 to 1.2 gpf. For this retrofit option, facility managers should provide user instructions about the proper use of these dual-flush systems.

**Replacements**

Replacing older commodes with HET or 1.6 gpf models will provide the most water savings. Most HET or 1.6-gpf replacements will offer a payback period of less than three years. Facilities may achieve quicker payback in these situations:

- Experience high water and/or sewer costs.
- Have a relatively high number of users per toilet.
- Currently use high water-consuming (5 to 7 gpf) toilets.

See Figure 4.3 for typical simple payback periods for 1.3 gpf toilet retrofits.

**Flush Valve (Flushometer) Toilets**

Flush valve, or flushometer, toilets use water line pressure to flush waste into the sanitary sewer system. They consist of a valve and a toilet bowl fixture. Most commercial/industrial facilities use flush valve toilets, especially in higher-use areas. (For maintenance checklist, see Figure 4.2.)

---

**FIGURE 4-3**

![Graph showing payback for 1.3 gpf commercial toilet replacements](image-url)
Flush Valve (Flushometer) Toilet

Retrofits

An economical watersaving opportunity exists to retrofit 1.6 gpf flush valve toilets with a dual flush valve. The valve is actuated upwards to flush liquid waste and downward to flush solids. These valves cost as little as $40 and offer a 20 percent water savings with a simple payback in three to four years in an office setting.

For 3.5 gpf flush valve toilets, valve inserts are available that can reduce flush volumes by 0.5 to 1 gpf. Some of these devices consist of plastic orifices, perforated with holes in a wheel and spoke pattern. Others actually replace the existing valve mechanisms of a 5 gpf


The Energy Policy Act established water efficiency plumbing standards for certain plumbing devices. Prior to 1992, many states and municipalities concerned about water conservation were setting unique standards, which created difficulty for manufacturers and distributors trying to meet these numerous standards. The Energy Policy Act created a set of unified national standards.

Effective Jan. 1, 1994, federal standards set for maximum water usage are:

<table>
<thead>
<tr>
<th>Device</th>
<th>Maximum Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilets</td>
<td>1.6 gpf</td>
</tr>
<tr>
<td>Urinals</td>
<td>1 gpf</td>
</tr>
<tr>
<td>Showerheads</td>
<td>2.5 gpm @ 80 psi or 2.2 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory Faucets</td>
<td>2.5 gpm @ 80 psi or 2.2 gpm @ 60 psi</td>
</tr>
<tr>
<td>Kitchen Faucets</td>
<td>2.5 gpm @ 80 psi or 2.2 gpm @ 60 psi</td>
</tr>
</tbody>
</table>

The energy efficiency standard was established to:
- Preserve and protect water supply sources, both surface and groundwater.
- Ensure water availability for all beneficial uses.
- Reduce water and energy costs.
- Regulate and standardize plumbing fixture trade.
- Protect health and the environment.

The American Water Works Association estimates nationwide savings of 6.5 billion gallons per day will be achieved by the year 2025 through these standards.

As of the date of this publication, several trade associations and local jurisdictions have proposed further water conservation fixture standards. Revisions to these federal requirements are expected over the next five years.
unit with a 3.5 gpf valve without changing the toilet bowl fixture. Do not retrofit ultra-low valves (1.6 gpf) without changing a fixture bowl.

Replacements

Replacing inefficient units with a HET or ultra low (1.6 gpf) flush valve mechanism and toilet bowl will result in the maximum water savings. It is important to note that both the low-flow valves and bowls should be replaced simultaneously. A 1.6 gpf valve must be used with an appropriately designed 1.6 gpf bowl, or the unit will not perform adequately.

Pressurized Tanks

System Toilets

An effective commercially-designed toilet currently on the market is the pressurized tank toilet. These units perform very well at removing waste, but also are more costly. These toilets use water line pressure to compress air in a specially sealed tank in the toilet. When flushed, the compressed air greatly increases the flush water force. Noise was a complaint with early models, but present models are markedly quieter.

Figure 4-4 shows examples of water savings from implemented ULF retrofit programs in both public and commercial settings.

Other options:

Composting Toilets

Where sewers or septic tanks are not available, composting and incinerating toilets are available. Before purchasing any of these toilets, make sure building inspection programs can approve such toilet systems.

Urinals

It is estimated that about 80 percent of America’s 12 million urinals are old and inefficient. The typical water consumption for older urinals is 2 to 3 gpf. Current federal standards require all urinals to use no more than 1 gpf. Urinals can have a flushometer value or water tanks for both washdown and trough urinals.

High-Efficiency Urinals

Newer models that can significantly reduce water consumption are now available. A high-efficiency urinal is now defined as a urinal

<table>
<thead>
<tr>
<th>Commercial/ Business Sector</th>
<th>Est. Water Savings (gpd per toilet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale</td>
<td>57</td>
</tr>
<tr>
<td>Food Stores</td>
<td>48</td>
</tr>
<tr>
<td>Restaurants</td>
<td>47</td>
</tr>
<tr>
<td>Retail</td>
<td>37</td>
</tr>
<tr>
<td>Automotive</td>
<td>36</td>
</tr>
<tr>
<td>Multiple Use</td>
<td>29</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>23</td>
</tr>
<tr>
<td>Health Care</td>
<td>21</td>
</tr>
<tr>
<td>Office</td>
<td>20</td>
</tr>
<tr>
<td>Hotel/Motel</td>
<td>16</td>
</tr>
</tbody>
</table>

Making a toilet replacement project successful

Below are factors to consider when installing new ULF or HET fixtures:

- Replace highest use toilets first – highest use toilets will provide quickest payback.
- Carefully choose toilet type depending on use level and the potential for misuse.
- Know your sewer infrastructure. Older cast iron types with a larger diameter (4” and 6”) may have more problems transporting waste with 1.6 or 1.3 gallons. Substandard wastewater pipe grading should be addressed before installing water efficient toilets. All toilets, regardless of flush volume, will experience problems with sewer drains compromised by root intrusion, sagging or broken lines, or solids build-up. Very long commercial/industrial drain line runs can be more problematic with UFL/HET replacements if no other wastewater sources discharge near the toilet. Make sure the building’s water pressure is adequate if switching from a gravity type to flushometer or pressurized tank toilets. Usually, 25 to 35 psi or more at the toilet is required for pressure dependant systems.
- ULF toilets cannot be used as trash cans. If flushing trash is a problem at the facility, employee education with the new toilet installation is necessary.
- Ask for references from building manager, plumbers or other users who have installed the manufactured products.
- Base decisions on the current models. Many design improvements continue to be made.
- Listen to noise levels of the model you are considering.
- A high cost does not automatically mean better performance.
- Ask about guarantees and returns especially for future leak problems.
- Choose a licensed plumber or contractor.
- Plan for the legal disposal of old toilets. Consult your local solid waste authority for recycling options or disposal requirements.

Use Satisfaction

Some owners of early 1.6 ULF toilets reported dissatisfaction. Many improvements have been made in the 1.6 gpf toilet design to address these issues. It is important to remember that 1.6 gpf units are finely-tuned design systems that require proper use. The type of toilet should be chosen carefully for its level of use and application. Educating employees not to flush trash and of the importance of water efficiency will go a long way in improving user satisfaction. Actual customer satisfaction surveys conducted in Santa Rosa, Calif.; Denver, Colo.; and New York City had a high customer satisfaction rate for customers installing ULF toilets. Less than 10 percent reported any dissatisfaction.
fixture with a flush volume of 0.5 gpf or less, including waterless units.

Some manufacturers are offering urinals that use as little as one pint (0.125 gallon) per flush. Flush mechanisms for these urinals include standard manual flushometer units, hands-free hardwired sensor-operated units and hands-free battery-powered sensor-operated units.

**Waterless Urinals**

Waterless urinals can save time and money and conserve significant amounts of water. The waterless urinal involves a vitreous china or stainless steel fixture and a replaceable oil-filled cartridge that traps odors.

Progressive public facilities, businesses and new high-performance LEED buildings have been demonstrating this technology in North Carolina. Waterless systems are more economical to purchase and install than flush urinals because they have no flushing mechanism. Waterless urinals offer the savings of flush water and sewer charges, but these operational savings are balanced with the cost of cartridges for the drain which typically are replaced every 7,000 uses.

Cleaning crews must have training on proper cleaning and cartridge replacement procedures for units to function as designed. Waterless urinals are not without controversy, and further research is needed to better understand long-range impact and wide application of their use. Retrofit applications which were not installed perfectly vertical have been problematic. Pilot trials are suggested.

**Washout and Washdown Urinals**

**Replacement options**

Some models can be retrofitted to use less water per flush by replacing a part in the flush

---

**CASE STUDY**

Urinal Timer Adjustment

The Asheville Civic Center has several large banks of urinals to handle restroom traffic during large events. Sensors had been installed to continuously flush all urinals when the restroom doors were open. This system lead to excess water use. After a water audit by the Waste Reduction Partners program, a two-minute delay timer was added to the sensor so the urinals could not flush more frequently than every two minutes. This simple change saved almost 90 percent of urinal water use and reduced water consumption by 600,000 gallons per year.

**CASE STUDY**

Install Water-Saving Fixtures

The University of North Carolina at Chapel Hill installed 300 water-free urinals in new buildings on campus, and retrofitted 30 older buildings with dual flush toilets. The installation of these 300 units is expected to save the university 12 million gallons of water annually. In high-use areas, water-free urinals will save at least 40,000 gallons per unit per year. Additionally, low flow showerheads and faucets have been installed in all new resident halls for additional water conservation savings.
valve or float levels in tanks. Make sure any retrofit will continue to allow adequate removal of liquid waste. Again, bowls and flush valves need to be compatible in design use to function properly. Installing new models that use 1.0 gpf can achieve the maximum water savings for urinals.

Special Note: Monitoring toilet usage patterns may indicate that replacing a toilet with a less water intensive urinal is possible.

Showerheads

Showerhead replacement or modification represents another water efficiency area that is cost effective. Most conventional showerheads use three to seven gpm at 60 psi water pressure. Current standards require showerheads to use no more than 2.5 gpm. These new water-efficient showerheads come in many different models and features and typically perform very well. Water efficient showerheads also reduce energy consumption related to hot water generation.

EPA, through its WaterSense program, is currently developing specifications to establish a maximum flow rate between 1.5 and 2 gpm at a pressure of 80 psi. This flow rate represents a 20- to 40-percent reduction over the current 2.5 gpm rate.

CASE STUDY

Reduce Consumption

ASMO North Carolina in Statesville substantially reduced city water consumption for potable/domestic use. The facility upgraded all bathrooms with waterless urinals, low flow toilets and motion sensor sinks. The company is now saving 2.7 million gallons of water per year, or an estimated $16,700 in annual water and sewer cost.

Showerhead

Behavioral Modifications

- Encourage users to take shorter showers (10 minute maximum). User awareness is important, especially in institutional settings. Shower timers are available with settings for 5, 8 and 11 minutes.
- Check regularly for leaks, and institute a program to require users or employees to inform maintenance about leaks.

Plumbing Modifications

Avoid retrofitting old showerheads with flow restrictors or flow control values. Such restrictors normally produce user complaints. New, high-performance showerheads are economical, easy to install and designed for water efficiency and performance.

Replacement Options

The best water efficiency option is to purchase new 2.5 gpm or less showerheads. Excellent performing showerheads can be purchased with flow rates at 1.5 gpm. The products vary in price, from $3 to $48. Good single-setting showerheads can be purchased for less than $10. The newer code compliant showerheads have a narrower spray area and a greater mix of air and water than conventional showerheads. Wide arrays of spray patterns are available, including adjustable massage action. Fixed and flexible position models also are available.
Faucets

Older conventional faucet flow rates can range from three to five gpm. A leaking faucet dripping one drip per second can waste 36 gallons of water a day. Federal guidelines mandate that all lavatory and kitchen faucet and replacement aerators manufactured after Jan. 1, 1994, consume no more than 2.2 gpm. For a “public” lavatory faucet, the American Society of Mechanical Engineers sets forth a standard of a maximum of 0.5 gpm.

Modification

- Adjust flow valves to the faucet. Keep in mind this modification can also be easily changed by users.
- Check regularly for leaks.
- Use aerators for faucet flow controllers on existing faucets. Aerators screw onto the faucet head and add air to the water flow while reducing water flow. They are available at common ratings of 0.5, 0.75, and 1.0 gpm. Flow rates as low as 0.5 are adequate for hand wetting purposes in a bathroom setting. Higher flow rate kitchen aerators deliver water at 2 to 2.5 gpm for more general washing purposes. Aerators cost $5 to $10 installed and typically yield a payback within a few months.
- Install flow restrictors. Flow restrictors can be installed in the hot and cold water feed lines to the faucet. Common flow rate designs include 0.5, 0.75, 1 and 1.5 gpm. Flow restrictors can be used where aerators cannot be used or where there is faucet abuse (aerator removal is problematic). Flow restrictors can be installed for less than $25 and also yield a payback within months.

Replacements

Any new faucet purchase must have a flow rate less than 2.2 gpm. ASME specifies 0.5 gpm lavatory faucets for public restrooms. Many types of faucet and water control systems are available for commercial faucets. These include:

- Automatic shutoff – once the handle is released, valve shuts off. This style is not typically recommended since users can wash only one hand at a time.
- Metered shutoff – once the lever is depressed, the faucet delivers a water flow for a pre-set time period (e.g., five to 20 seconds), then automatically shuts off. Federal guidelines require that meter faucets use no more than 0.25 gallon per cycle.

Infrared and Ultrasonic Sensors

“Electric eye” sensors are available for a number of plumbing applications, including lavatory faucets, urinals and toilets. These devices deliver a metered flow only when the fixture is in use. For faucets, both the flow rate and activation time can be adjusted. The “no-touch” activation also is helpful to prevent the spread of disease and useful for users with disabilities. Sensored faucets, too, need to be checked for leaks and clogged flow controllers because of any water impurities. An infrared sensored faucet or urinal/toilet controls can be purchased for about $200.
### Water Efficiency Upgrade Summary: Domestic Applications

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Existing Style/Flow Rates</th>
<th>Ages</th>
<th>Water Efficiency Options/ Water Saving Estimates</th>
<th>Installed Cost ($)</th>
<th>Typical Payback (years)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toilets</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Flushometer - 1.6 gpf</td>
<td>Post 1994</td>
<td>Install dual flush valve. Saves 20% (0.3 gpf average savings).</td>
<td>$50-$80</td>
<td>3-4</td>
<td>User education suggested. Consider HET for new applications.</td>
</tr>
<tr>
<td></td>
<td>Flushometer - 3.5 gpf</td>
<td>1977 to early 1990s</td>
<td>• Install new HET or 1.6 gpf UFL models. Saves 1.9-2.2 gpf. • Consider valve inserts. Save 0.5 gpf.</td>
<td>$200-$300</td>
<td>2.0-4.5</td>
<td>Must change both bowl and valve. Usually not recommended by OEM.</td>
</tr>
<tr>
<td></td>
<td>Flushometer - 4.5 gpf</td>
<td>Pre-1980s</td>
<td>Install 3.5 gpf valve retrofit with no change to china bowl. Saves 1.0 gpf. Examine dual flush valves.</td>
<td>$25-$40</td>
<td>0.7-1</td>
<td>Flusher valves used in commercial high use areas.</td>
</tr>
<tr>
<td><strong>Toilets</strong>&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Tanks-type gravity - 1.6 gpf</td>
<td>Post 1994</td>
<td>• Currently code compliant. • Consider HET for replacements or new applications.</td>
<td>$150-$300</td>
<td>&gt;10</td>
<td>Look for EPA WaterSense labeled HETs.</td>
</tr>
<tr>
<td></td>
<td>Tanks-type gravity - 3.5 gpf</td>
<td>1977 to mid-1990</td>
<td>Install HET or 1.6 gpf gravity/pressurized flush models. Saves 1.9-2.2 gpf.</td>
<td>$150-$300</td>
<td>1.1-3</td>
<td>Displacement devices/dams not typically recommended for 3.5 gpf units. Adjustable for quality performance.</td>
</tr>
<tr>
<td></td>
<td>Tanks-type gravity - 5-7 gpf</td>
<td>Pre-1980 devices</td>
<td>Install HET or 1.6 gravity flush or pressurized flush models. Consider early closing flapper. Saves 0.5-1.0 gpf.</td>
<td>&lt;$20</td>
<td>0.5-1</td>
<td>Consider pressurized tank systems for high use areas. Do not use bricks. Loose granules inhibit flapper performance.</td>
</tr>
<tr>
<td><strong>Urinals</strong>&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Flushometer - 1.0 gpf</td>
<td>Post 1994</td>
<td>Consider HEU at time of replacement. Saves 0.5 gpf.</td>
<td>$200-$450</td>
<td>&gt;7</td>
<td>Urinals available as low as 0.125 gpf.</td>
</tr>
<tr>
<td></td>
<td>Flushometer - 1.6 gpf</td>
<td></td>
<td>Install repair valves to 1.0 or 0.5 gpf for non-pooling styles. Saves 0.6-1.1 gpf.</td>
<td>$20-$40</td>
<td>0.5-1.3</td>
<td>For non-pooling styles.</td>
</tr>
<tr>
<td></td>
<td>Flushometer - 3.0 gpf</td>
<td></td>
<td>Replace urinal fixture and retrofit valves to 1.0 gpf or HEU. Saves 2.0 gpf.</td>
<td>$200-$450</td>
<td>1.8-5.6</td>
<td></td>
</tr>
<tr>
<td><strong>Showerheads</strong>&lt;sup&gt;4&lt;/sup&gt;</td>
<td>2.5 gpm</td>
<td>Post mid-1990s</td>
<td>• Replace with lower flow showerheads available down to 1.5 gpm. Saves 1.0 gpm.</td>
<td>&lt;$35</td>
<td>0.6-1.3</td>
<td>Energy savings can be two times water savings.</td>
</tr>
<tr>
<td></td>
<td>3-5 gpm</td>
<td>Post 1980</td>
<td>• Install 2.5 gpm or lower showerheads.</td>
<td>$25-$35</td>
<td>0.4-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-8 gpm</td>
<td>Pre-1980 devices</td>
<td>• Install 2.5 gpm showerheads.</td>
<td>$25-$35</td>
<td>&lt;0.2</td>
<td></td>
</tr>
<tr>
<td><strong>Kitchen Faucets</strong>&lt;sup&gt;5&lt;/sup&gt;</td>
<td>2.2 gpm</td>
<td>Post 1994</td>
<td>• Code compliant - best available for flow and pot filling needs • Install aerators to reduce flow to 2.5 gpm.</td>
<td>N/A</td>
<td>N/A</td>
<td>No less than 2.5 gpm for kitchen applications. Note energy savings.</td>
</tr>
<tr>
<td></td>
<td>3-7 gpm</td>
<td>Pre-1980 devices</td>
<td></td>
<td>$5-$10</td>
<td>0.2-2</td>
<td></td>
</tr>
<tr>
<td><strong>Lavatory Faucets</strong>&lt;sup&gt;6&lt;/sup&gt;</td>
<td>2.2 gpm</td>
<td>Post 1994</td>
<td>Install 0.5 faucet aerators for public restroom applications.</td>
<td>$5-$10</td>
<td>0.05-0.7</td>
<td>Note energy savings. Consider sensor-controlled or metered. 0.5 gpm aerators are industry standards for public restrooms.</td>
</tr>
<tr>
<td></td>
<td>3-7 gpm</td>
<td>Pre-1980 devices</td>
<td>Install aerators to reduce flow to 1.0 gpm or as little as 0.5 gpm.</td>
<td>$5-$10</td>
<td>&lt;0.3</td>
<td></td>
</tr>
</tbody>
</table>

---

1. Based on 2006 average N.C. water and sewer rates of $6.76 per 1,000 gallons.
2. Payback estimated for one shift operation. Divide payback by two and three for two- and three-shift operations, respectively.
3. Cost estimates are based on approximate installed cost using internal maintenance. Actual cost and payback period may vary. Options based on widely available equipment believed not to reduce service quality or reliability. Faucet costs reflect aerator cost only, not entire fixture.
4. Urinal savings based on two uses per day per male employee.
5. Showerhead savings based on two eight-minute showers per work day and include energy savings.
6. Kitchen faucet saving based on three minutes of use per day.
7. Lavatory faucet use based on 10 seconds of use per restroom visit.
Water Spigots

Self-closing commercial valves are available for water spigots, like those installed in public areas. Shut-off cycles from four to 25 seconds typically are available.

Pressure Reducing Valves

Facilities should consider using a pressure-regulating valve when water line pressure is higher than 50 to 60 psi. Lowering excessively high-line pressure helps reduce the formation of leaks and will lower water flows from spigots, hoses, faucets and water feed lines. A pressure reduction of 15 psi from 80 to 65 psi will reduce water flow by about 10 percent without sacrificing water service. A reduction from 80 to 50 psi will correspond to about a 25 percent water use reduction in light commercial settings.