

NIAGARA



THE BENEFITS OF IMPLEMENTING WATER CONSERVATION STANDARDS BY BUILDING BEYOND CODE



1200 Lakeside Parkway, Suite 450 Flower Mound, TX 75028 Toll-Free:<u>888.733.0197</u> Email: <u>https://niagaracorp.com/support/contact</u> / Web: https://niagaracorp.com/

ABOUT NIAGARA



Niagara is an internationally recognized manufacturing company, with a mission to create water-efficient plumbing products that <u>work better</u> and <u>waste</u> <u>nothing.</u>

Without sacrificing comfort and increasing performance, we have reinvented the flush for a <u>high-</u> power, low-maintenance, no <u>waste toilet.</u>

Awards Niagara Conservation has received:

Niagara Wins EPA's 2021 WaterSense® Excellence Award For Its Dedication in Helping Customers and Businesses Save Water October 11, 2021 18:17 ET



Niagara Wins 2021 SEAL Business Sustainability Award for Sabre Product Line Niagara is the first and only plumbing manufacturer to have won this award December 21, 2021 09:38 ET



Contents

- Current Water Usage & Standards
- Water Efficiency Requirements in Building Codes and Standards for Toilets
- Voluntary Green Building Rating Systems & Requirements for GPF
- Specifying Toilets Beyond Code Regulations
- Case Studies
- Summary and Resources



INTRODUCTION: CURRENT WATER USAGE AND STANDARDS

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US Drought Monitor Map: https://droughtmonitor.unl.edu/

- Just 3% of the worlds water is freshwater, but much of this is unusable.
- In reality, only 1% of all the world's water fit for human consumption without treatment.
- It is suggested that 70% of all counties in the U.S. may face water shortages by 2050.



United States and Puerto Rico Author(s): Brad Pugh, NOAA/CPC







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Regionally many of the same areas remain in Drought conditions. However, this IS a National issue.



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Domestic Water Usage Patterns

- Surveys indicate that most Americans seriously underestimate how much water they use each day.
- Toilets and their leaks account for about 30% of household water and showers and taps can use another 40%. Toilet Flushing is the LARGEST indoor water use!
- According to the EPA, the average American uses around 88 gallons per day per person or 10,500 gallons a month for a family of four.



Current U.S. Water Usage Standards

BEFORE 1980 7.0 GPF FROM 1980-1992 **3.5 GPF** FROM 1992-94 **1.6 GPF** FROM 2006-07 1.28 GPF TODAY **0.8 GPF**

- Current national water efficiency standards for toilets are <u>27 years old</u>. The Energy Policy Act (EPAct) set national water efficiency standards for plumbing products in 1994 when water availability was less of an issue.
- New toilets manufactured in the U.S. can't exceed 1.6 gallons per flush (GPF). Prior to that toilets used as much as 7 GPF.
- The current baseline for an efficient toilet is considered to be 1.28 GPF.

Water Efficient Fixture Performance Standards

- Today's efficient toilets use 1.28 GPF and ultra low flow or ultra highefficiency toilets (UHETs), can use as little as <u>0.8 GPF.</u>
- The EPA WaterSense label is applied to independently certified toilets that meet rigorous performance and efficiency standards.
- A WaterSense toilet uses 20% less water than the national standard or 1.28 GPF and <u>must flush at least 350g (12 oz.) of waste in a single flush</u>.
- If every inefficient toilet in the U.S. was replaced by a WaterSense model it would save <u>360 billion gallons of water annually</u>, the amount that flows over Niagara Falls every 9 days.
- And that is JUST utilizing the WaterSense Standards NOT an Ultra High Efficient Toilet that EXCEEDS current standards!



* for drainage issues related to the EPA act see Section 5, Selecting a Beyond the Code Toilet

Current State Water Usage Standards



- Some states have implemented their own regulations that limit GPF of toilets.
- California, Texas, Maryland, Georgia, Washington, Colorado, and New York, have all already implemented state regulations that limit the GPF of toilets to 1.28 GPF.
- Standards will and should increasingly tighten across the country as water and sewage costs continuously rise, and as water accessibility and availability becomes more difficult.
- <u>Current standards should be exceeded</u>, not simply met, if for no other reason than to manage water usage and utility costs.

The Price of Water has increased Nationally.

THE PRICE OF WATER: 2015

Combined water, sewer and stormwater prices for households in 30 major U.S. cities.



Water prices pay for treating, pumping, and delivering water, while sewer prices cover the cost of cleansing the water that goes down the drain. **Sewer** prices are often higher than water prices because more energy and chemicals are required for treatment. Following the Clean Water Act, the federal government gave grants for new treatment plants during the 1970s and 1980s. Over the past three decades, however, new spending has been cut for local sewer infrastructure. **Stormwater** fees are not included in every city's monthly bill. Some cities use general tax revenues to pay for projects to reduce polluted runoff from streets and parking lots. However, these projects must then compete for funds with other departments like police and schools.



Rates current as of April 1, 2015. Monthly bill calculated for a family of four using 100 gallons per person per day. Source: Circle of Blue research, based on utility water rates.

\$300

\$200

\$100

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The Fiscal Benefits of Exceeding Standards



Here is a GREAT example of why to exceed the CURRENT STANDARDS:

- The U.S. Water Alliance notes that water costs can consume 4 –19% of monthly household income for low-income families and that water affordability has reached a crisis level in many U.S. communities.
- The affordability of Water and Wastewater Service in Twelve U.S. cities noted that the combined price of water and sewerage increased by an average of 80% between 2010 and 2018
- Federal aid to public water utilities has plummeted while maintenance, environmental and health threats, etc. continue to escalate.
- <u>An unaffordable water/sewerage cost is</u> <u>considered to be anything above 4.0% of</u> <u>income.</u> The need to spend more than that on water directly affects the need to spend on essentials such as healthy food, clothes, or medicine for low-income families.

60.0

45.0 30.0

15.0

12/08 01/11

NOI Actual Water Charges in Cleveland, Ohio

City of Cleveland Division of Water	Customer Name:	DORCHESTER VILLAGE	
1201 Lakeside Avenue		REORGANIZATION 9331009647	
Cleveland, OH 44114	Account Number:		
	Service Address:	135 CHESTNUT LN	
	RICHMOND HEIGHTS OH 44143-1001		
Save time and pay online. Easily and securely pay your bill and manage your account at my.clevelandwater.com.	Due Date:	December 29, 2021	
USAGE COMPARISON		Page 1 of 2	
	Account Summary as o	f Dec 09, 2021	
Your Monthly Usage (in 1,000 cubic foot (MCF) increments)	Previous Balance	19,824.86	
90.0	Payments Received	-19,824.86	
75.0	Balance Forward	0.00	

	-					
-11	- 3-	-				
-88				_		
m	0.000		-	-	1000 1100	1000

Balance Forward	0.00	
Your current Bill has 2 Charges:	2 023 02	
	1.756.62	
Total Amount Due:	3,780,54	

Total /	Amount	Due:	
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Meter Number	Previous Meter Read		Current Meter Read			Usage/Consumption	
	Date	Read	Туре	Date	Read	Туре	
B-12700983	11/08/2021	5326	ACTUAL	12/07/2021	5359.1	ACTUAL	33.1 MCF



O Cleveland Water Current Charges

www.clevelandwater.com | Billing Questions: 216.664.3130 | Emergency: 216.664.3060

Having trouble making payments? We're here to help. Learn about programs that can lower the cost of your bill and payment plans that can help you manage your balance by calling us at 216-664-3130 or visiting clevelandwater.com/discount-programs.

Fixed Charge - 11-09-2021 to 12-07-2021	61.35
Water - 0.200 MCF at \$34.96 for first 0.200 MCF	6.99
Water - 32.900 MCF at \$59.44 per additional MCF	1955.58
Cleveland Water Total	2,023.92

- Cleveland, OH has a disproportionate amount of families in Low-Income Housing with High Water & Sewer Cost.
- This directly affects the quality of life of your LOCAL residents!
- There are groups like NOI Enhancers that are utilizing Niagara products in their sales to the benefit of not just our mutual customers but the families residing in and around THIS community.

WATER EFFICIENCY IN BUILDING CODES & STANDARDS

Water Efficiency and Building Codes

- The Uniform Plumbing Code, published by (IAPMO), is a model code that governs the installation and inspection of plumbing systems. <u>Under the UPC, GPF is restricted to 1.6 or less.</u>
- The International Plumbing Code (IPC), developed by the ICC, sets minimum regulations for plumbing systems and components to protect life, health and safety of building occupants and the public. <u>The</u> <u>2021 version restricts GPF to 1.28.</u>
- The International Residential Code (IRC), also developed by the ICC, establishes minimum regulations for one and two family dwellings and limits toilet GPF to 1.6.



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Water Efficiency and Building Codes and Standards

The International Green Construction Code (IgCC) was developed to "be the single, most effective way to deliver sustainable, resilient, high-performance buildings."

It provides minimum requirements intended to reduce the negative impacts and increase the positive impacts of the built environment.

It identifies **maximum flow rates** for fittings and fixtures and requires compliance with **a two step performance-based method** for determining fixture and fitting flow rates.

- **Step 1**: Determine an approximate total daily water use based on the occupant load of the building.
- **Step 2**: Enter reduced fixture flow rates/volumes so that the total design water use is at least 20% less than the total reference water use.



ANSI/ASHRAE/USGBC/IES Standard 189.1

The ANSI/ASHRAE/USGBC/IES Standard 189.1, Standard for the Design of High-Performance Green Buildings, is an **alternate compliance path for the IgCC.**

In order to meet this standard, builders and developers may adhere to one of two compliance path options for toilets:

A. <u>A prescriptive path</u> which states that water closets may not use more than <u>1.28 GPF.</u>

B. <u>A performance path</u> which states calculations shall be done in accordance with generally accepted engineering standards and handbooks acceptable to the Authority Housing Jurisdiction.

ANSI/ASHRAE/ICC/USGBC/IES Addendum a to ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017

Standard for the Design of High-Performance Green Buildings

Except Low-Rise Residential Buildings

The Complete Technical Content of the International Green Construction Code ®

Approved by the ASHRAE Standards Committee on June 26, 2019; by the ASHRAE Board of Directors on August 1, 2019; by the International Code Council on July 15, 2019; by the USGBC Board of Directors on August 6, 2019; by the IES Board of Directors on July 19, 2019; and by the American National Standards Institute on August 26, 2019.

These addenda were approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Instructions for how to submit a change can be found on the ASTRAE[®] weste (https://www.astrae.org/continuous-maintenance).

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ASME Standards & Line Carry in the Built Environment

- ASME (the American Society of Mechanical Engineers) also produces standards related to many aspects of mechanical engineering.
- One specific code of note is A112.19.2, which covers the requirements for plumbing fixtures, especially in regard to performance & drainage systems in the built environment for LINE CARRY.
- Under ASME A112.19.2, all plumbing fixtures <u>must</u> <u>flush waste beyond a 40' minimum</u>. Testing is carried out by IAPMO (the International Association of Plumbing & Mechanical Officials) and does not test beyond 60'.

Image: The Drainline Transport of Solid Waste in Buildings by the Plumbing Efficiency Research Coalition



VOLUNTARY GREEN BUILDING RATING SYSTEMS/UPGRADING FOR EFFICIENCY

San - House

Voluntary Green Building Programs & Their Benefits

- Various existing green building standards require builders and developers to adhere to <u>WaterSense standards at a</u> <u>minimum</u>, but some offer additional incentives for utilizing greater efficiency in building products.
- These standards have also demonstrated the potential financial savings attributable to green practices. LEED, the
 most widely used system in the world, notes that between 2015 and 2018 buildings certified by them saved \$1.2B
 in energy, \$149.5M in water, \$715M in maintenance, and \$44.2M in waste.
- Other incentives for using sustainable building materials come in the form of rebate programs for consumers and builders. Many localities, depending on region and water scarcity, offer rebates when ultra-high-efficiency products are utilized.







"LEED[®] is the <u>preeminent</u> <u>program</u> for the design, construction, maintenance, and operations of high-performance green buildings."

The ICC National Green Building Standard



The ICC National Green Building Standard (NGBS) encourages increased environmental and health performance in residences and residential portions of buildings.

Points are awarded for varying levels of efficiency & residential buildings can attain 1-4 performance levels – **Bronze, Silver, Gold or Emerald**.

The there are three different compliance paths to meet this standard:

- The prescriptive path
- Innovative practices
- Performance path.

SELECTING A BEYOND THE CODE TOILET

Selecting a Beyond the Code Toilet



There are several criteria to be considered for selecting a beyond the code toilet:

- Water efficiency
- Aesthetic appearance
- Quiet operation
- Flush technology, and
- Flush performance.

How effective, waterefficient, and reliable a toilet is depends on its:



Gravity Assist Flushing



https://1tomplumber.com/how-to-fix-an-intermittently-running-toilet/

Pressure Assist Flushing



NOISE-

TANK

valve

noise.

CANCELLING

Submerged fill

cancels out the

FLAPPERLESS

No leaks, no

running,

no worries.

About the Instructor Vacuum Assist Flushing

Inside the Tank



AIR TRANSFER TUBE Air in transfer tube pressurizes trapway, creating a vacuumassisted flush.



Sponsor

Ask an Expert

RIM WASH 360-degree rim wash for superior cleaning.

RIM JET Circular water motion cleans bowl with every flush.

Inside the Bowl

TRAPWAY + WATER SURFACE

Pressurized air from the transfer tube is exerted into the trapway, forcing water in the bowl to rise creating a large water spot.



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Example: Vacuum-Assist, Ultra-High-Efficiency Toilet – Single Flush

FILLING

1.Water fills the tank and inner chamber, forcing air to the top of the chamber and down the transfer tube.

2. Air is forced through the transfer tube into the trapway exerting positive pressure on the water in the bowl. This pressurizes the trapway and creates a larger water surface area in the bowl.



FLUSHING

1. Flush button is depressed.

2. Inside the inner chamber, the exiting flush water creates a vacuum that depressurizes the trapway.

3. This depressurization creates the suction force that pulls the wastewater into the trapway initiating the siphonic flush action.

4. Water empties from the tank cleansing the bowl and flushing waste down the trapway.

5. The trapway is completely filled producing an ultra-high-efficient flush.



Performance Testing

- MaP[™] is a Maximum Performance scale
- About MaP <u>www.MaP-testing.com</u>

IMPORTANT: MaP scores represent the number of grams of solid waste (soybean paste and toilet paper) that a particular toilet can flush and remove completely from the fixture in a SINGLE FLUSH. Essentially, the MaP test is a <u>TEST TO FAILURE</u>. MaP Testing is an INDEPENDENT testing program <u>not affiliated with nor</u> <u>controlled by any manufacturer or group.</u>

- Since its development and release in 2003, MaP Testing has been a major driving force in the improvement of toilet flush performance in North America.
- MaP PREMIUM labelled toilets:
 - WaterSense certified
 - flush with no more than 1.06 GPF
 - MaP rating of at least 600g
- This is more than 170% of current WaterSense requirement and 3 times normal demand upon a typical toilet
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Some fixtures are "high performance". Some fixtures are "high efficiency". MaP PREMIUM is BOTH!! Ę

Performance Testing of Drainline Carry

PERC (The Plumbing Efficiency Research Coalition) undertook a scientific study to gain a better understanding of **the drainline carry issue** and noted that these components were key variables in determining whether drain lines might be predisposed to clog:

- Types of toilet paper and materials used when flushing
- Pipe Slope
- Pipe Diameter
- Longer Pipe Runs in Non-Residential Applications
- Flush Volume



About the Instructor

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Line Carry utilizing Vacuum Assist Flushing Technology:



LINE CARRY STANDARDS

ASME standards A112.19.2/CSA B45.1 & A112.19.14 dictate that all toilets MUST have a minimum average carry distance of 40 ft. Official certification testing is performed by IAPMO and does not test drainline carry beyond 60 ft.

Niagara toilets meet and exceed a 40 ft. minimum standard.





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Performance Testing Results EXCEED Federal Standards



The ROI of Building Beyond Code with UHET Toilets



 Water and Sewer rates are steadily increasing and vary nationally. However, <u>the</u> <u>Return on Investment for UHET</u> <u>installations are easily recognized in less</u> <u>than 1 Year per toilet installed.</u>

One ROI estimate suggests that:

- "replacing a 3GPF toilet with a <u>1.28GPF</u> toilet reduces a home's water usage for toilets by over 50%, from 17,520 gallons annually to 7,475 gallons. <u>The dollar</u> <u>savings is equal to \$159.54 per year,</u> (depending on water rates), resulting in a <u>simple payback of 0.55 years.</u>
- This represents an ROI over 20 years of 3,625%."

Impact Fees for NEW CONSTRUCTION continue to rise.

Why Are Water Tap Fees So High: What Are Your Options

By: Lindsay Reed



Water tap fees can be a major line item on your construction budget. What is a water tap fee and what impacts the total cost?

Water tap fees can range from several hundred to tens of thousands of dollars. These fees are largely determined by the size of the water line and your geography. The scarcity of water and the difficulty in delivering it can result in higher costs.

- Owners / Builders / Developers can mitigate the cost of Impact Fees on New Construction by specifying Ultra High Efficient Toilets and fixtures into their building plans.
- Lessens the impact on the existing infrastructure and many local municipalities are lower these impact fees by hundreds of thousands of dollars if Ultra High Efficient Toilets and fixtures are specified.

CASE STUDIES

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The Reserve at Stone Creek



Stone Mountain, GA



32% Water Reduction



880 Units





\$352K Investment, \$40K per month savings with an 8.8 Month Return on Investment!!!

740 South Olive Street, Los Angeles







35% Water Reduction



309 Units





\$123K Investment, \$2,500 per month savings and a 12 month Return on Investment!

Parma Heights, Ohio: 375% ROI Monthly for Ownership.

AERATORS

OLD VS NEW

SAVINGS



NOI ENHANCEMENTS WATER-SAVING KITS HELP PARMA HEIGHTS APARTMENT **REDUCE YEARLY WATER BILL BY 41%**

Executive Towers lowered their yearly water usage by 40% with yearly savings of \$76,626.21.

Ownership of **Executive Towers** estimates that the property value has increase 16 times the annual savings – that's \$1.3M!

- Monthly savings of approximately \$6,385.52 and a ROI of just over 11 Months!!!
- This allows for Ownership to make further improvements.

SUMMARY AND RESOURCES



Summary: This is a LOCAL issue!!!

- Water scarcity and accessibility is not just a global and US issue but a **LOCAL** issue!!!
- The costs and energy requirements to source, pump, and treat water are high and many localities must spend a considerable portion of their budgets on water related issues. These expenses are generally passed down in the form of water and sewer charges which directly affect Low-Income Housing and their residents. Which <u>leads to spending on water and sewer costs vs other essential necessities</u> <u>such as food and medicine.</u>
- Numerous projects have demonstrated considerable savings of water and utility costs as well as a high degree of user satisfaction with the implementation of high or ultra high efficiency toilet technology <u>that</u> <u>exceeds current codes and standards.</u>
- These technologies that <u>go beyond the current codes</u>, not only provide immediate benefits but also contribute significantly to the <u>long-term sustainability of communities</u> and the availability and affordability of Water for families at ALL levels of income.
- Owners and Residents can now capitalize on the financial benefits of <u>going beyond code</u> by conserving water with Ultra High Efficient Toilet installations with <u>fast ROI's and very low maintenance</u>.

Resources

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