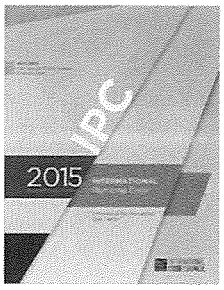
AFFORDABILITY IMPACT STATEMENT

NEIGHBORHOOD HOUSING AND COMMUNITY DEVELOPMENT
INTERNATIONAL RESIDENTIAL CODE (2015) PLUMBING AMENDMENTS

PROPOSED CODE AMENDMENT:	PROPOSED CHANGES WOULD AMEND CHAPTER 25-12-241 OF THE LAND DEVELOPMENT CODE BY UPDATING THE GOVERNING INTERNATIONAL RESIDENTIAL CODE (IRC) FROM THE 2012 VERSION TO THE 2015 VERSION. THE PROPOSED CHANGES WOULD REMOVE OR RELAX SPECIFIC REQUIREMENTS AND STANDARDS WITHIN IRC (2015) AND PROVIDE LOCAL AMENDMENTS TO THAT EFFECT.
IMPACT ON IMPLEMENTATION OF IMAGINE AUSTIN VISION, GOALS AND PRIORITIES	☐ POSITIVE ☐ NEGATIVE ☒ NEUTRAL
LAND USE / ZONING OPPORTUNITIES FOR AFFORDABLE HOUSING DEVELOPMENT	☐ POSITIVE ☐ NEGATIVE ☒ NEUTRAL NO IMPACT FORESEEN.
IMPACT ON COST OF DEVELOPMENT	☒ POSITIVE ☐ NEGATIVE ☐ NEUTRAL THE PROPOSED CHANGES WOULD REMOVE OR RELAX IRC PLUMBING STANDARDS POTENTIALLY LESSENING MAINTENANCE AND/OR RETROFIT COSTS FOR HOMEOWNERS.
IMPACT ON PRODUCTION OF AFFORDABLE HOUSING	☐ POSITIVE ☐ NEGATIVE ☒ NEUTRAL NO IMPACT FORESEEN.
PROPOSED CHANGES IMPACTING HOUSING AFFORDABILITY:	THE REMOVAL OR RELAXATION OF IRC (2015) PLUMBING STANDARDS AND REQUIREMENTS AND THEIR REPLACEMENT BY LESS STRINGENT LOCAL STANDARDS AND REQUIREMENTS.
ALTERNATIVE LANGUAGE TO MAXIMIZE AFFORDABLE HOUSING OPPORTUNITIES:	NONE.
OTHER HOUSING POLICY CONSIDERATIONS:	NONE.
DATE PREPARED:	05/02/2017

DIRECTOR'S SIGNATURE: RM Copic for Rosie Truelove



Helping Build a Greener Tomorrow

The International Plumbing Code (IPC)

The 2015 edition of the **IPC** incorporates additional sustainable methods including new innovative provisions for the replacement of underground sewers with minimal disruption for pipes up to six inches in diameter via the "pipe bursting method." This new provision will provide relief for our nation's failing sewer infrastructure that is contaminating our water table. Chapter 13, "Gray Water Recycling Systems," has been replaced with a broader new chapter entitled "Non-potable Water Systems." It includes updates to the gray water provisions and new requirements for rainwater harvesting systems and systems utilizing reclaimed water for non-potable applications. These provisions are correlated with the International Green Construction Code (IgCC). Requirements related to subsurface landscape irrigation systems that were previously found in the "Gray Water Recycling Systems Chapter" were updated and relocated to a new chapter entitled "Subsurface Landscape Irrigation Systems." These provisions are correlated with the IgCC. At Ford Field (the Detroit Lions' stadium) in Michigan, the use of Air Admittance Valves saved $263,416.00 in construction costs, helped improve the indoor air quality, and protected the environment by reducing sewer gas emissions.

There are more than 10 methods of venting drainage system in the **IPC**. This presents a toolbox of design options that provide more flexibility and lower cost. Smarter designs limit the environmental impact not only in new plumbing systems but also in the renovation of existing systems allowing for quicker completion of jobs and greater convenience for the consumer and building owners.

Other benefits of the 2015 IPC include:

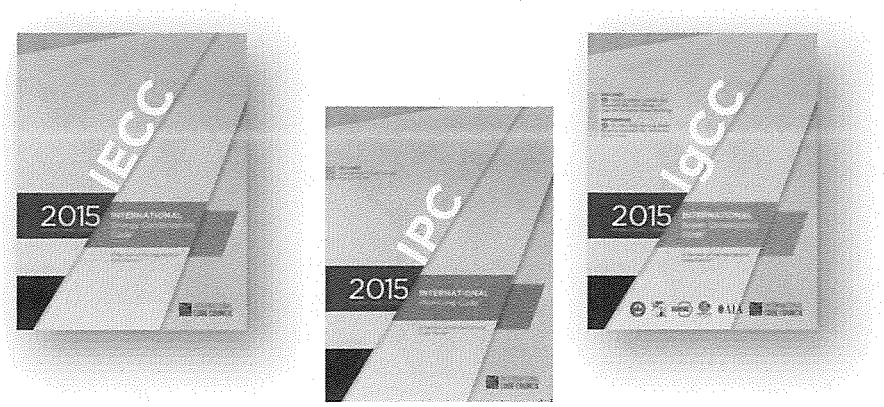
- The allowance for "Horizontal Wet Venting" with any combination of fixtures within two bathroom groups allows the engineer and plumber additional options that other model codes do not.
- Allowing for "Waste Stack Venting," another proven method that allows the designer to reduce costs.
- Allowing for "Circuit Venting," used to vent batteries of fixture.
- The **IPC** does not limit the use of "Combination Waste and Vent Systems" to situations where structural conditions preclude the installation of conventional systems.

Waterless urinals are allowed in the other model codes, but require the installation of a water distribution line rough-in to the urinal location in the event of a retrofit. It is highly *unusual* and *impractical* to provide for the future failures of a plumbing system. The water piping also negates much of the savings gained by installing these fixtures. Water pipe sizing in the **IPC** is generally smaller for the same number and type of fixtures. If installed under the appropriate code, the waterless urinal is not only a great water conservation tool, but is also considered by most health agencies to be more sanitary than a standard urinal because it is a non-touch device.

The introduction of siphonic roof drainage technology into the **IPC** provides typical savings of *20%* to *45%* from reduced pipe diameters, significantly less below grade drainage, and reduced trenching requirements. Horizontal pipes are installed flat level, without grade, which eases coordination with other trades. The environmental benefits include routing to harvesting, retention, and reclamation systems. There is less ground disturbance, fewer raw materials, etc.

This document is just a sample of the environmental benefits and cost savings that are possible by using the 2015 **IPC**.

Updated 7/20/15 - For more information, please contact Lee Clifton at [redacted]



Helping Build a Greener Tomorrow
The International Plumbing Code (IPC)

The **IPC** is the only plumbing code that correlates with the International Energy Conservation Code (IECC). The IECC is the most widely adopted energy code in the world. The introduction of this code marked the beginning of the green movement in the code arena.

The International Code Council was involved with green initiatives and sustainability long before it captured mainstream attention with other organizations. The plumbing provisions within the **IPC** are the most widely adopted, sustainable-minded provisions in the world.

The **IPC** for many years has incorporated innovative technologies like waterless urinals and detail engineered designs allowing for the installation of smaller, more precise water and drainage systems, which result in the saving of millions of gallons of water and the installation of countless miles of conduit materials.

Other benefits of the 2015 IPC include:

- Compared to other plumbing codes, the dimensions of the drain waste and vent pipe are generally smaller for the same number and types of fixtures.
- The wide selection of venting options result in less piping needed to accomplish tasks.
- Vent terminals can terminate through outside walls versus through the roof, thereby reducing vent-piping length.

- Air admittance valve venting options that can significantly reduce the length of vent piping to outdoor terminals. The Detroit Lion Stadium in Michigan had a cost savings of over $263,416.00 in construction costs and the use of air admittance valves helped preserve indoor air quality. Using air admittance valves helps save the environment by reducing sewer gas emissions.
- There are more than 10 methods of venting drainage systems in the IPC that present a tool box of design options, which can result in cost reductions. Smarter designs limit the impact of unnecessary high cost.
    - The allowance for "Horizontal Wet Venting" with any combination of fixtures within two bathroom groups allows for additional options that other model codes do not.
    - The IPC allows "Waste Stack Venting," another proven method that allows the designer to reduce the cost.
    - The IPC allows "Circuit Venting," used to vent batteries of fixture.
    - The IPC does not limit the use of "Combination Waste and Vent Systems" to situations where structural conditions preclude the installation of conventional systems.
    - The IPC allows for fewer roof penetrations. With fewer roof penetrations in the building envelope, there is less opportunity of radiating heat out of the building, thus saving money and reducing the energy lost through leakage.
    - Side wall vent penetrations provides added flexibility and reduces the likelihood of frost over.
    - The IPC venting methods, as a collection of choices, enables flexibility of design and allows older structures in the eastern US more design flexibility. This lowers renovation costs and allows quicker time of completion on jobs resulting in greater convenience for consumers.

- Waterless urinals are allowed in the other model codes, but requires the installation of a water distribution line rough-in to the urinal location in case of a retrofit. It is highly unusual and impractical to provide for future failures of a plumbing system. The water piping also negates much of the savings from installing these fixtures. Water pipe sizing is generally smaller for the same number and type of fixtures. The waterless urinal is not

only a great water conservation tool, but is also considered by most health agencies to be more sanitary than a standard urinal because it is a non-touch device.

- The introduction of siphonic roof drainage technology into the 2012 IPC provides a typical savings of 20% to 45% from reduced pipe diameters, significantly less below grade drainage and reduced trenching requirements. Horizontal pipes are installed on flat level, without grade, which eases coordination with other trades. The environmental benefits include routing to harvesting, retention, and reclamation systems. There is less ground disturbance, fewer raw materials, etc.

LEED identifies plumbing as approximately 12% of an energy efficient design. If plumbing is tasked with water conservation, water collection, air quality and the heating of water, which is ranked as the #1 or #2 user of energy depending on the zone Plumbing is a very real part of green design. More plumbing does not always make for a better building, especially if your design is to be cost effective or ecologically efficient. A plumbing design should meet the minimum safe standards. When a design exceeds that minimum safe standard it becomes economically infeasible and ecologically unsound. Most would agree that sewer gasses are not desirable in any occupancy; however, neither are the phthalates and dioxins produced by the off-gassing of PVC, which increases proportionately with the increase of unnecessary plumbing. An excessive plumbing design will also create greater health hazards for the public in the form of air pollution from the off -gassing during the manufacturing of the excess PVC and PEX pipe, also during the recycling of both. Neither PEX nor PVC pipe are conducive to recycling.
One can see that there is very little if any advantage to exceeding the minimum safe standards when the "big picture" is taken into account.

The IPC is not just a code. It's a part of a complete building safety system, providing an integral component necessary to stay current with the latest building safety technologies while meeting the public health, sanitation, and safety requirements necessary for the built environment. The IPC is a performance based code. It's very flexible in its approach to green building issues and encourages innovative design, much more so than any other plumbing code.

The 2015 edition of the IPC incorporates additional sustainable methods. New innovative provisions for the replacement of underground sewers with minimal disruption for pipes up to six inches in diameter via the "pipe bursting method" have been added to the code. This new

provision will provide relief for our nation's failing sewer infrastructure that is contaminating our water table. Chapter 13, "Gray Water Recycling Systems," has been replaced with a broader new chapter entitled "Non-potable Water Systems." It includes updates to the gray water provisions and new requirements for rainwater harvesting systems and systems utilizing reclaimed water for non-potable applications. These provisions are correlated with the International Green Construction Code (IgCC). Requirements related to subsurface landscape irrigation systems that were previously found in the "Gray Water Recycling Systems" Chapter were updated and relocated to a new chapter entitled "Subsurface Landscape Irrigation Systems." These provisions are correlated with the IgCC.

The code development process has been the key to the IPC's success.By leaving the final determination of code provisions in the hands of public safety officials who, with no vested financial interest, can legitimately represent the public interest in an advanced, safe and sustainable code. The principles that have made this work are openness, transparency, balance of interests, due process, an appeals process and consensus.

A Proven Legacy of Leadership in Plumbing Code Development

This table illustrates the leadership role the **International Plumbing Code** has taken in the adoption of new and safe technology and materials in comparison to the conservative "other model code". Note: **BOCA**, **SBCCI, CABO** represent ICC legacy codes combined to make the International Code. The dates are when the actual technology was adopted into the code.

PVC – DWV		
	BOCA	1968
	SBCCI	1968
	IAPMO	1973
CPVC		
	BOCA	1975
	SBCCI	1977
	UPC	1981
PEX		
	CABO	1992
	BOCA	1993

SBCCI	1994
IPC	1995
UPC	2000

Air Admittance Valves

IPC	1997
UPC	N/A

Horizontal Wet Venting

IPC	2006
UPC	2009 (limited application)

Nonwater Supply Urinals

IPC	2006
UPC	2009 (limited application)

Fuel Gas Provisions NFPA 54 (Water Heaters)

IFGC	1997
UPC	2003

Flood Hazard Requirements

IPC	2003
UPC	2006 (TIA 05)

Ductile Iron Water Pipe

IPC	2003
UPC	2006

Siphonic Roof Drainage Systems

IPC	2012
UPC	N/A

Single Stack Venting System

IPC	2012
UPC	N/A

Replacement of Underground Sewers by Pipe Bursting Methods

IPC	2015
UPC	Installation Standard Only

The 2015 IgCC has recently been updated and is available now. It is the only green code that correlates with the full suite of ICC codes. The IPC has laid the foundation for the safe application of sustainable building provisions and its progressive and green provisions enables and enhances many of the water related IgCC provisions. The IgCC has many references to the IPC and is correlated with the IgCC and IECC making it an extreme value to the code user.

The IPC has a greener future and we hope you decide to go in that direction. Please let us know if the Plumbing, Mechanical, and Fuel Gas (PMG) Group of ICC can be of further help.

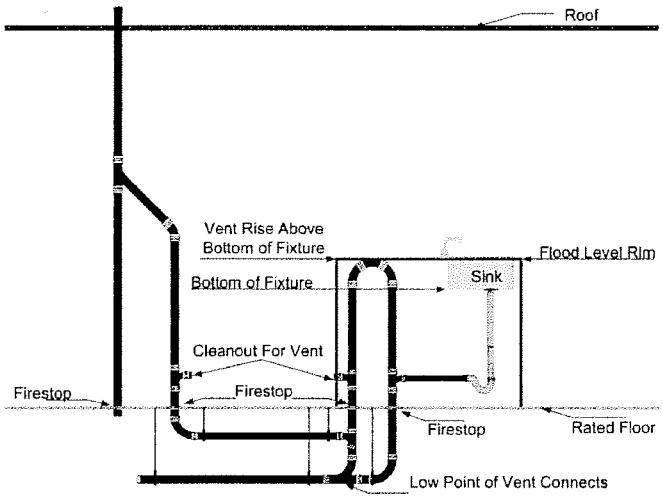
For more information, please contact Lee Clifton at lclifton@iccsafe.org

The 2015 International Plumbing Code (IPC)
Cost Effective Design & Construction

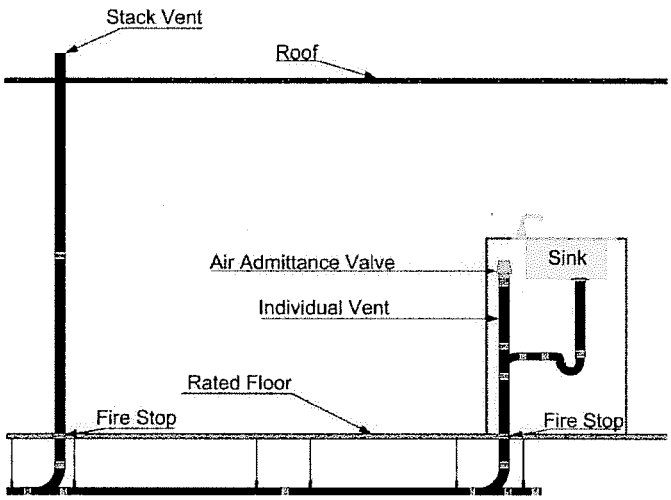
The Use of an Air Admittance Valve Does Make a Big Difference

The 2015 *International Plumbing Code* (IPC) Venting Design Options are material and time efficient. These features along with its proven modern innovative technologies allow the designer and installer to provide a cost effective installation.

The Traditional Island Vent (UPC Section 909)



Air Admittance-Individual Vent (IPC Section 918)



UPC Section 909—Traditional Vent (Cast Iron)	
Material Cost w/tax	$447.00
Sub (Core Drilling) x 4	200.00
Fire Stop x 4	80.00
Labor Plus Over/Prof	886.00
Misc.	50.00
Total Cost	**1,663.00**

IPC Section 918—Air Admittance Valve (Cast Iron)	
Material Cost w/tax	$216.00
Sub (Core Drilling) x 2	100.00
Fire Stop x 2	40.00
Labor Plus Over/Prof	443.00
Misc.	25.00
Total Cost	**824.00***

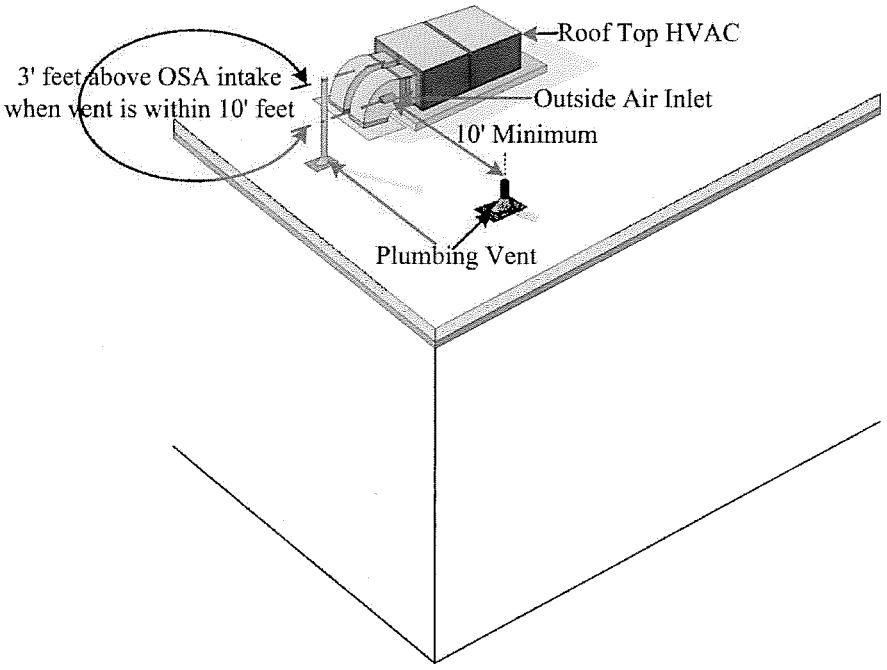
Cost analysis provided by Associates Plumbing Incorporated of Columbia, Maryland

***As much as 50% cost savings can be attained.**

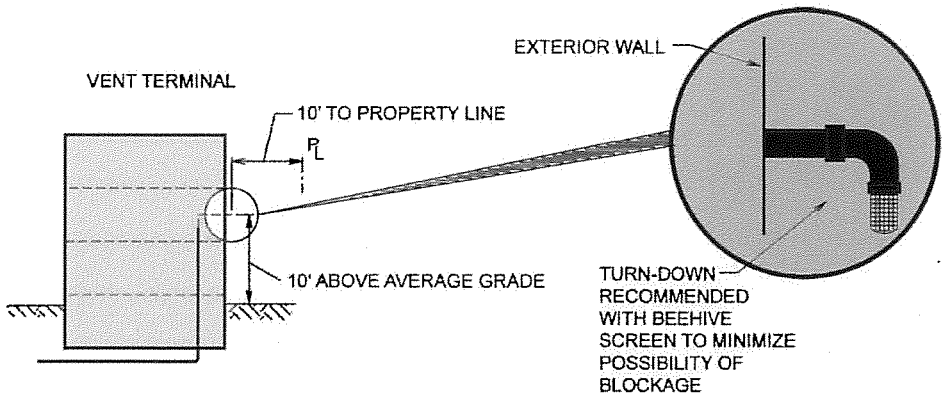
Vent Terminal Alternative

A Side wall vent terminal is an alternative to roof penetrations that can result in significant cost savings and a more aesthetically pleasing installation. For example, a sidewall vent may be preferred to penetrating membrane built-up, slate or tile roofs. Such roof penetrations are difficult to make leak proof and can be more expensive requiring added labor and material cost. Side wall penetrations can be useful in avoiding mechanical air intakes like those shown in the top drawing.

The 2015 IPC offers many design options that the designer, builder and plumbing contractor can consider.



Traditional Method



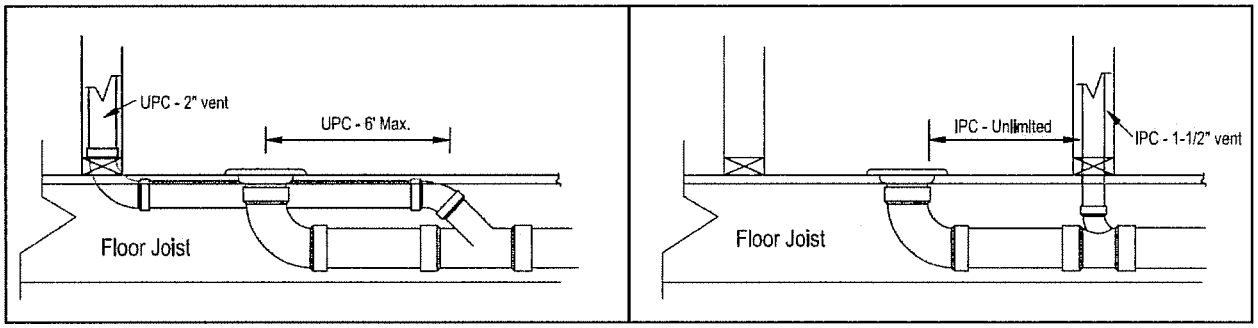
Alternative IPC Side Wall Vent Terminal

The 2015 International Plumbing Code (IPC) Cost Effective Design & Construction

Drainage Design that Offers Cost Savings

The 2015 *International Plumbing Code* (IPC) Water Closet Installation Design for Floor Joist Installation

- IPC design advantage for water closet venting
- A better fit in a floor joist space



UPC

Considerations

- Difficult to fit in floor cavity
- 6' maximum trap arm length
- Wye must roll up at least 45°
- LT 90 difficult to drill hole for
- 2" vent required
- Difficult to provide fall for pipe
- ¼" per foot fall required

Fitting List

- 1 – 2" LT 90
- 1 – 2" ST 45
- 1 – 3" x 2" WYE
- 1 – 3" Closet bend
- 1 – 3" Closet flange

IPC

Considerations

- Easier to fit in floor cavity
- Trap arm length not limited
- Adequate room for fall in most cases
- 1½" vent allowed
- ⅛" per foot fall required (3" and larger)

Fitting List

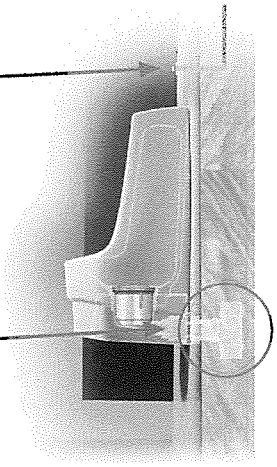
- 1 – 3" x 1½" SanTee
- 1 – 3" Closet bend
- 1 – 3" Closet flange

The 2015 IPC offers many design options that the designer, builder and plumbing contractor can consider.

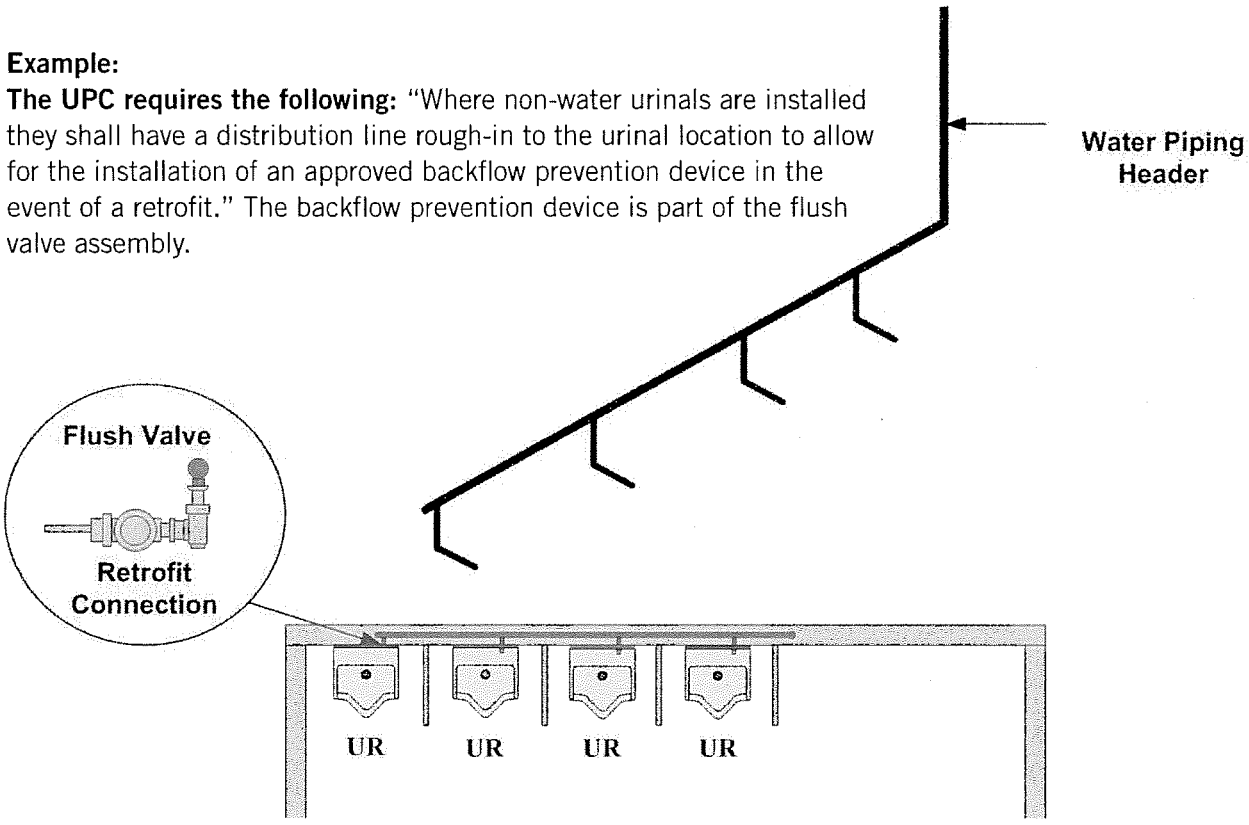
Waterless Urinals Installations

The IPC does not require a water distribution line rough-in to the urinal location for a flush valve installation in the event of a retrofit. There are other plumbing codes that mandate this.

Only a portion of the required vent and waste piping is shown.



Example:
The UPC requires the following: "Where non-water urinals are installed they shall have a distribution line rough-in to the urinal location to allow for the installation of an approved backflow prevention device in the event of a retrofit." The backflow prevention device is part of the flush valve assembly.



The result of this requirement is a significant increase in the cost of installation of a waterless urinal.

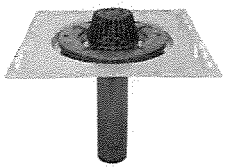
- Additional piping serving header
- In this example four future stub outs for flush valves would have to be included.
- Water service and water meter could need to be increased in size to accommodate anticipated demand.

The 2015 IPC offers many design options that the designer, builder and plumbing contractor can consider.

The 2015 International Plumbing Code (IPC) Cost Effective Design & Construction

Siphonic Roof Drainage Design

The 2015 *International Plumbing Code* (IPC) Chapter 11, Section 1107 requires siphonic roof drainage systems when utilized to be designed in accordance with ASME A112.6.9 and ASPE 45.



The high flow capacities and velocities in siphonic systems can be advantages to the designer, resulting in flexibility in the placement of stacks, smaller pipe diameters providing equivalent flow rates, no pitch requirement of piping to induce flow, and easier coordination of piping with other building elements. Conventional systems operate on a different hydraulic principle than siphonic systems.

Key Benefits:

- Cost effective with typical savings of **20% to 45%**
- Horizontal pipes are installed flat level, without grade (eases coordination with other trades)
- Small bore pipework reduces space taken up and imposes less load on the structure
- Provides ten times more flow capacity than an equivalently sized gravity system on a single story building.
- Drainage below the floor of the building can be eliminated
- Fewer roof penetrations due to high performance roof drains

Example:

A traditional roof drain covers a tributary area of **7,840 square feet** at a rainfall intensity of **3.25** inches per hour. According to IPC 2015, Chapter 11, Table 1106.2(1) the required roof drain outlet size and connected drain pipe size would be **5 inches**. A five inch drain with polyethylene dome and the first ten feet of 5 inch pipe with 1 inch insulation covering would cost about **$840.00**.
A siphonic system design covering the same roof area and rainfall intensity requires a **3 inch** drain. A three inch siphonic drain and the first ten feet of 3 inch pipe with 1 inch insulation covering would cost about **$610.00**.

That's a savings of $233.00 per drain and ten feet of branch piping or almost 28 percent less than a traditional design.

Example Calculations	
0.5900 cfs	
3.2500 in/hr	
0.2708 ft/hr	
0.0001 ft/sec	
Pipe designed at 52% full	
7842.4615 sf	
5.0000 inch	$843.00 per 10 ft
3.0000 inch	$610.00 per 10 ft
	Save $233.00 per 10 ft
	27.6% Savings

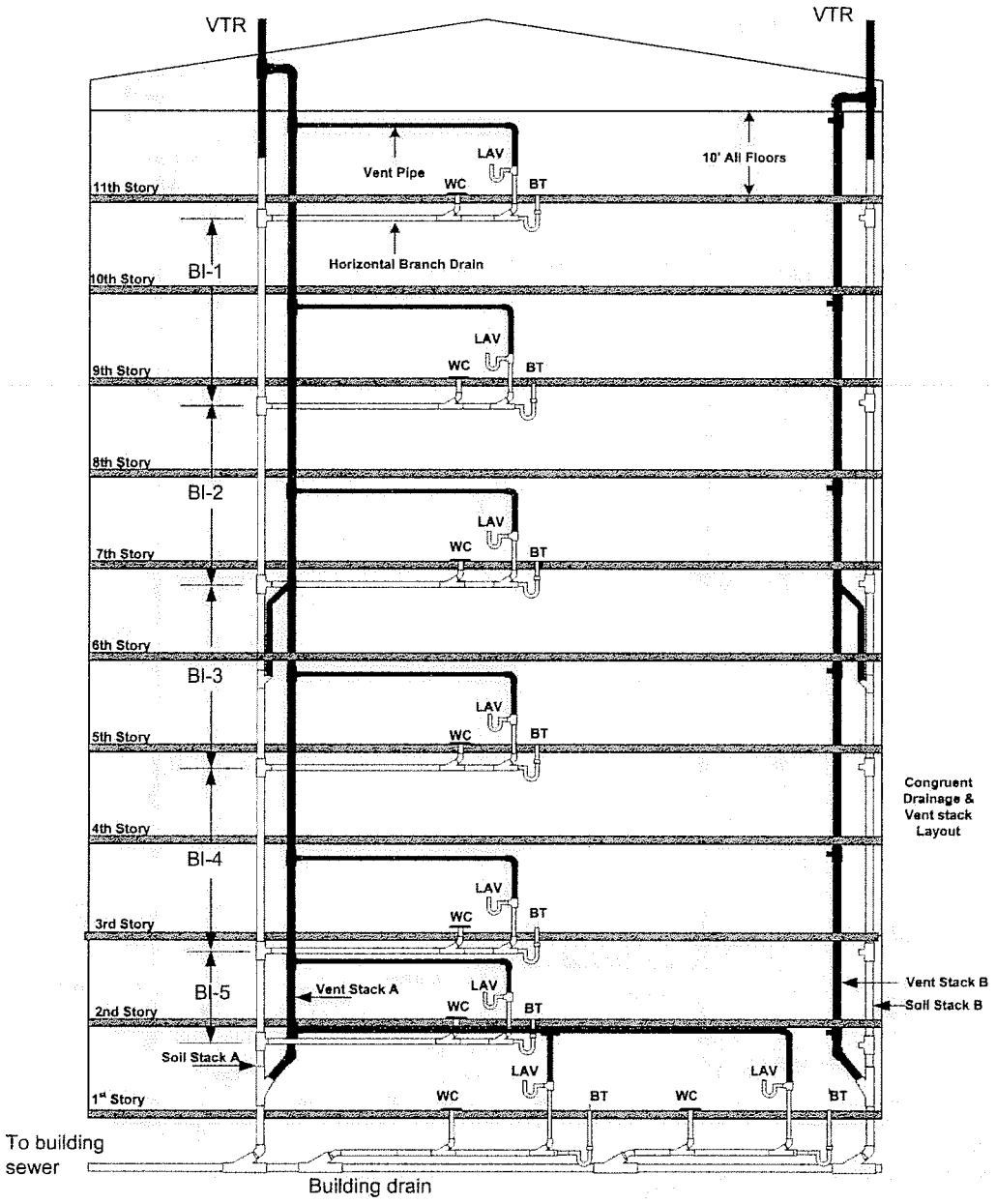
Based on R. S. Means Construction Cost Data 2005. These cost calculations are examples from real world applications; your cost may be different. These costs are given for illustration only.

Air Admittance Valves in Multi-Story Buildings—Part 2 of 2

Vent System without AAVs, *Costly*
17% More Material*
54% More Labor Hours*

Installation Disadvantaged—Codes such as the UPC limit to 1 bathroom group on a horizontal wet vent system. *This increases the cost of installation.*

**See IPS Corp Report # 12S0211E1 for High-rise 10 story, 45 unit, residential building as a typical example.*



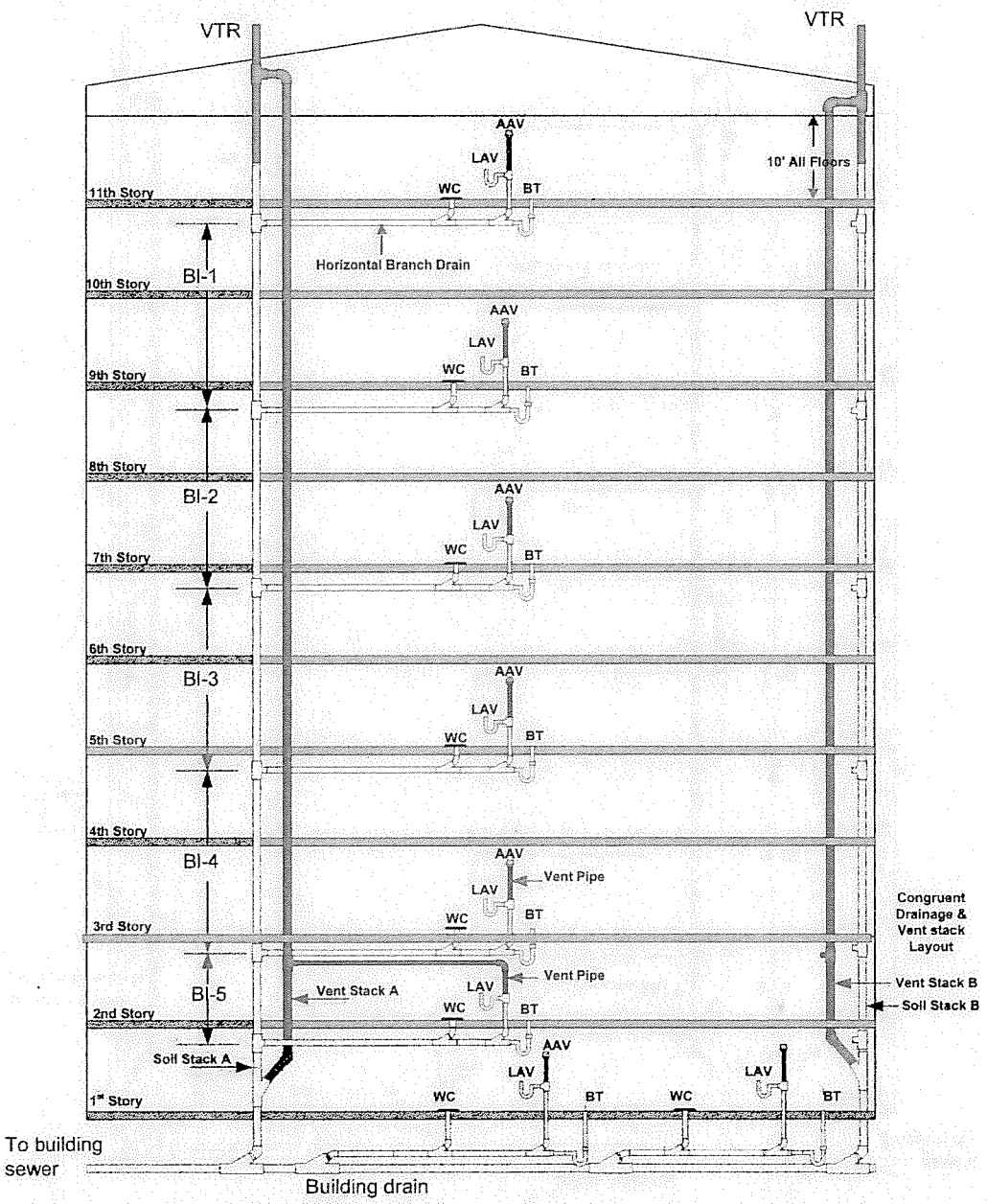
Note: Horizontal branch drain, vent pipe & AAV's serving bathrooms and connecting to vent & soil stack B are not shown but have an identical layout of those shown connectng to vent & soil stack A.

Air Admittance Valves in Multi-Story Buildings—Part 1 of 2

IPC Vent System using AAVs, *Cost Effective*
17% Less Material*
54% Less Labor Hours*

IPC Cost Advantage Multiplier—2 full bathroom groups allowed on IPC horizontal wet vent systems. *This doubles the IPC installation advantage.*

**See IPS Corp Report # 12S0211E1 for High-rise 10 story, 45 unit, residential building as a typical example.*



Note: Horizontal branch drain, vent pipe & AAV's serving bathrooms and connecting to vent & soil stack B are not shown but have an identical layout of those shown connectng to vent & soil stack A.