



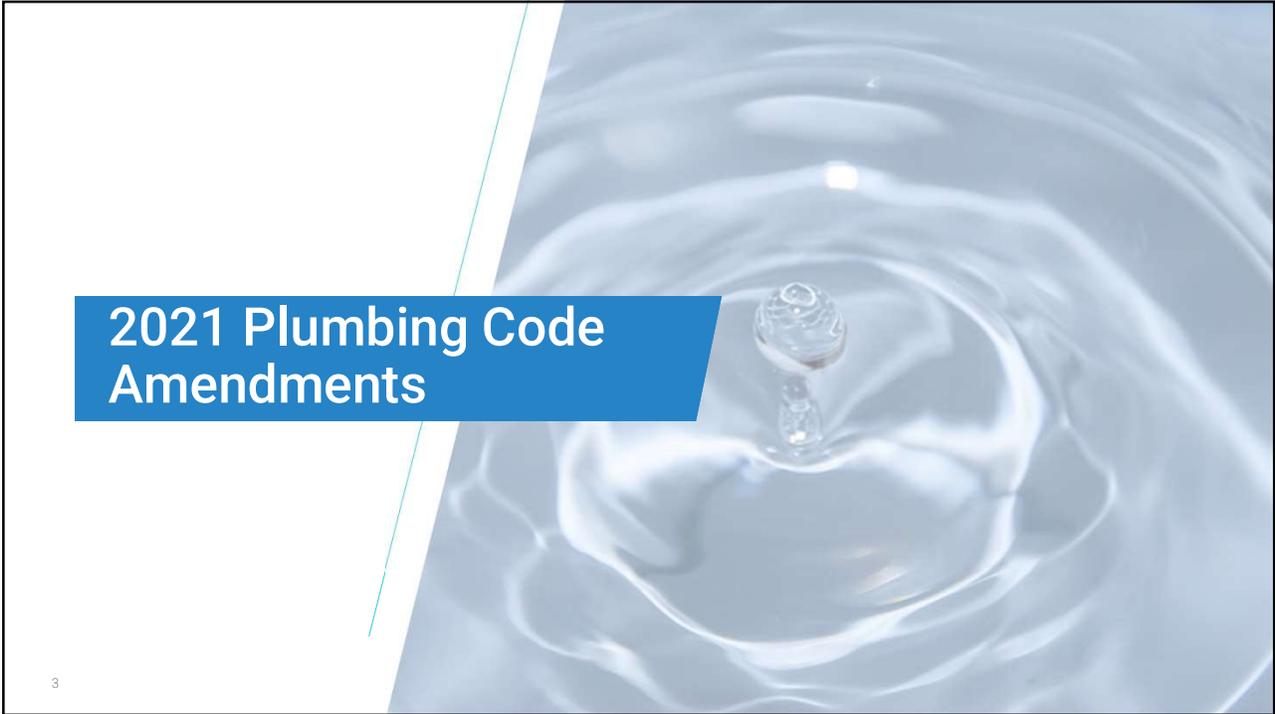
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Overview

- 2021 Plumbing Code Amendments
- Key Plumbing Design Requirements
 - Commercial
 - Residential
- What Information is Required in the Construction Documents?
- Water Service Permits
- Summary and Contact Info



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  **Substantive Plumbing Code Amendments**

1. Expand recognition of PVC drain pipe for residential occupancies in low- and mid-rise buildings.

Allows PVC and other materials for residential occupancies in buildings up to 60 feet in building height.

Includes building sewer. (ASTM D2321)

No change in materials for taller buildings and non-residential occupancies.

A photograph of a female plumber wearing a black hard hat, safety glasses, and an orange high-visibility vest over a black jacket. She is standing in a construction or utility setting, holding a large white PVC pipe that is supported by a red metal stand.

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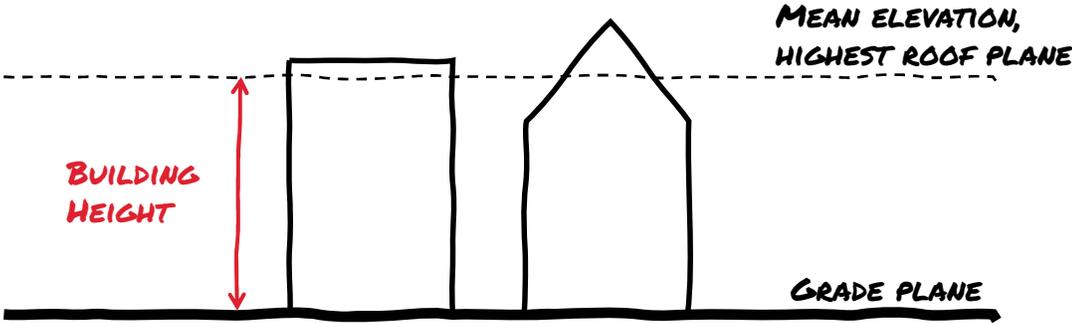
  **5 Steps for Checking Materials and Installation Requirements for DWV Pipe**

1. Determine building height.
2. Identify areas of “residential occupancy.”
3. Identify recognized pipe material standards.
4. Check for pipe protection and support (*notes*).
5. Check for penetration firestopping (*notes*).

5

  **Step 1 Building Height**

A broader range of plumbing materials is allowed in residential occupancies in buildings up to **60 feet** in building height.



The diagram shows two building outlines on a wavy line representing the ground level. A horizontal dashed line is drawn across the top of the buildings, labeled 'MEAN ELEVATION, HIGHEST ROOF PLANE'. A horizontal solid line is drawn along the ground level, labeled 'GRADE PLANE'. A red vertical double-headed arrow is positioned between the dashed line and the ground level for the first building, labeled 'BUILDING HEIGHT'.

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Step 1 Building Height

Building height must be indicated on the construction documents for new construction. Building height can be determined by a design professional for rehab work.

EXCEPTIONS FOR:

- DORMERS
- MECHANICAL/ROOFTOP ACCESS PENTHOUSES
- PARAPET WALLS
- ROOF INSULATION

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Step 2 Residential Occupancy

RESIDENTIAL OCCUPANCY. A building or portion of a building classified as a Group I-1 or R occupancy in accordance with the Chicago Building Code together with areas of the same building providing amenities primarily for residents and their guests.

IF ENTIRELY RESIDENTIAL:

- ABOVE-GROUND
- UNDERGROUND
- BUILDING SEWER

PUBLIC SEWER

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Step 2 Residential Occupancy

RESIDENTIAL OCCUPANCY. A building or portion of a building classified as a Group I-1 or R occupancy in accordance with the Chicago Building Code together with areas of the same building providing amenities primarily for residents and their guests.

OK:

- RESIDENT PARKING
- LOUNGE/Common AREA
- RESIDENT FITNESS CTR
- RESIDENT STORAGE
- MANAGEMENT OFFICE
- RESIDENT SERVICES

NOT OK:

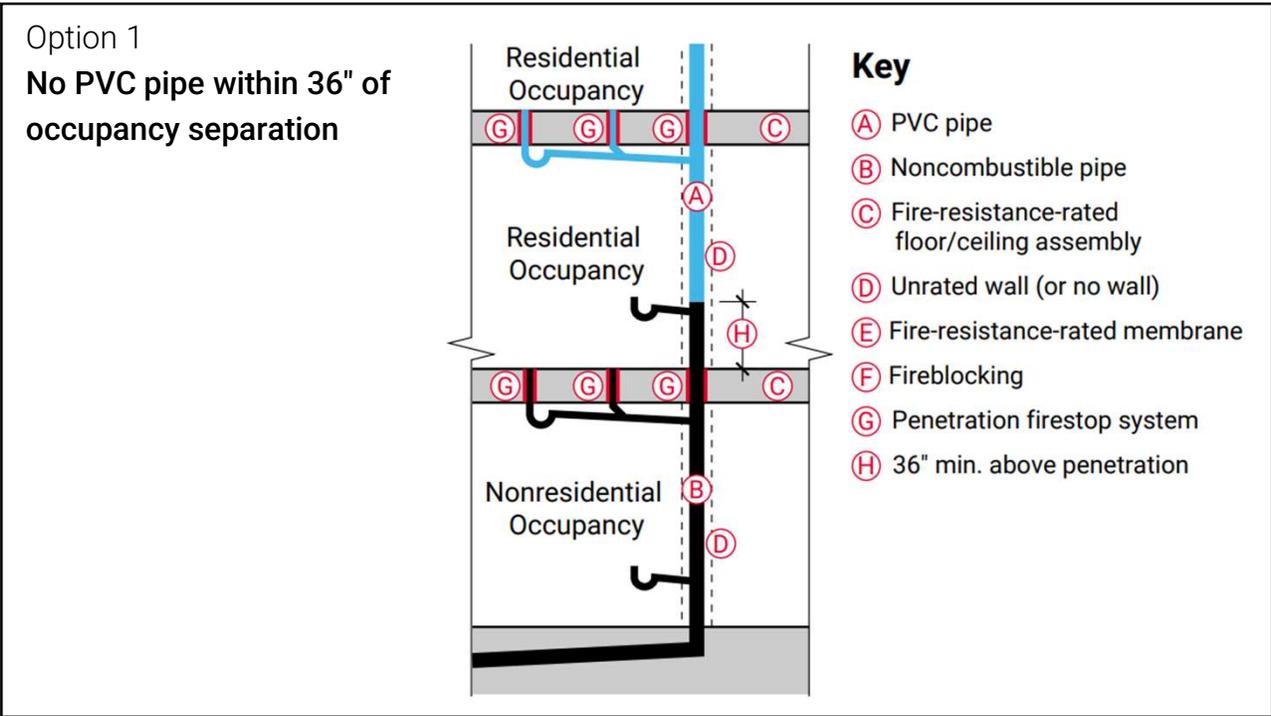
- PUBLIC PARKING
- PUBLIC GYM
- PUBLIC STORAGE
- RETAIL OPEN TO PUBLIC
- "GRAY" OR "WHITE" BOX

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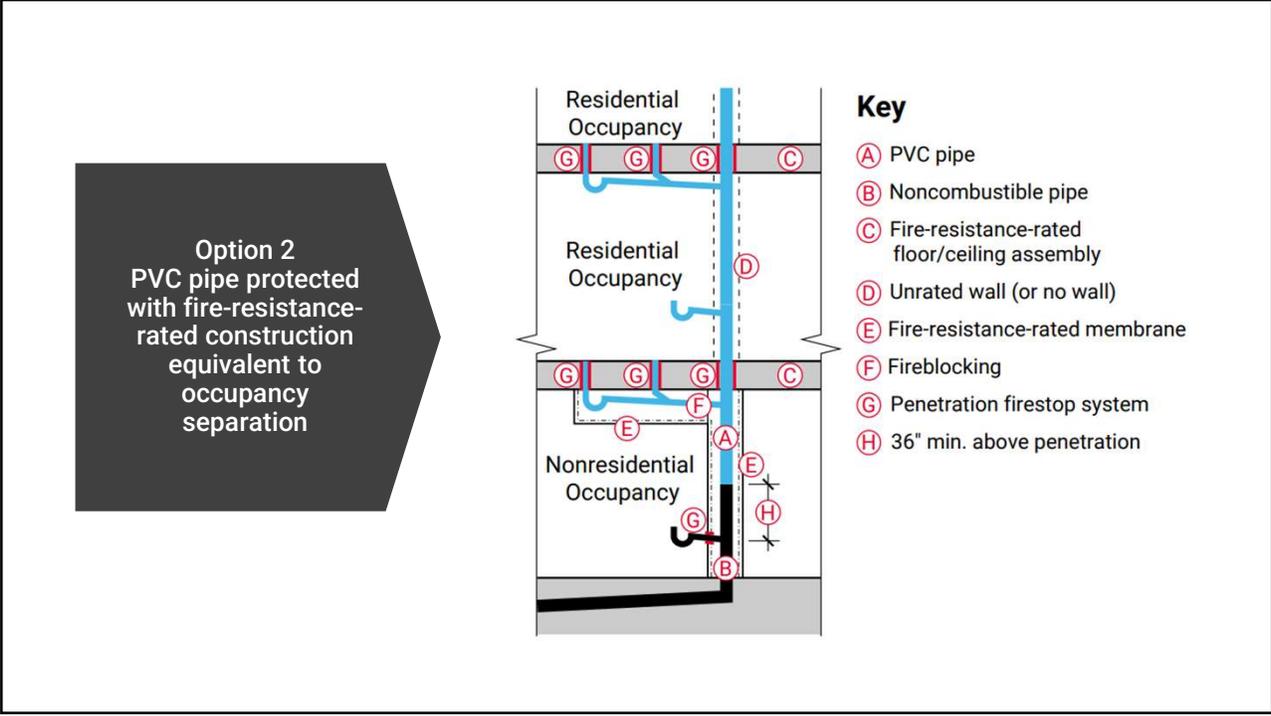
Step 2 Residential Occupancy

18-29-702.1.1 Mixed-occupancy buildings. Where the plumbing system in a mixed-occupancy building uses both combustible and noncombustible drainage and vent pipe materials . . . the noncombustible pipe material shall extend as least **4 inches** beyond the fire-resistance-rated assembly separating the residential occupancy from other areas of the building that are not eligible to use combustible pipe materials.

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Step 3 Recognized Materials

**Table 18-29-702.1
Above-ground Drainage and Vent Pipe**

Material	Standard
Cast-iron pipe, hub and spigot ^a	ASTM A74; ASTM A888; CISPI 301
Cast-iron pipe, hub and spigot ^b	
Cast-iron pipe, hubless ^a	
Copper or copper-alloy pipe	ASTM B42; ASTM B43; ASTM B302
Copper or copper-alloy tubing (Type K, L or M)	ASTM B75; ASTM B88; ASTM B251; ASTM B306
Copper or copper-alloy tubing (Type DWV) ^a	
Galvanized steel pipe	ASTM A53
Polyvinyl chloride (PVC) plastic pipe in IPS diameters, including Schedule 40, DR 22 (PS 200) and DR 24 (PS 140), with a solid wall ^a	ASTM D2665; CSA B181.2
Polyvinyl chloride (PVC) plastic pipe with a 3.25-inch O.D. and a solid wall ^a	ASTM D2949
Stainless steel drainage systems, Types 304 and 316L	ASME A112.3.1

For SI: 1 inch = 25.4 mm.

a. Limited to areas of residential occupancy in buildings with a building height not exceeding 60 feet (18.3 m).

b. Lead and oakum joints only.

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Step 4 Pipe Support and Protection

Notes on drawings for:

- Protection against contact: 18-29-305.1
- Protection against freezing: 18-29-305.6
- Shield plates required: 18-29-305.8
- Pipe material exposed within a plenum: 18-29-307.6
- Hangar spacing: 18-29-308.5

Stud Protection
NS - When piping is closer than 1/2" from the edge of the stud, a protection plate is required.

Stud Repair
SS/HSS - When notching exceeds guidelines outlined in the code (see drawing to left), a suitable stud shall then be installed with the approval of the Building Official or Designer.

NOTE: Distance between center line of supply line and center line of vent pipe must be a minimum of 5/8" to provide adequate space for the HSS and NS.
(NOTE: A minimum distance of 3/4" between pipes is required when using the NS2.)

SIMPSON Strong-Tie

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Step 5 Penetration Firestopping

When pipe (combustible or noncombustible) penetrates a wall, floor, or ceiling required to have a fire-resistance rating, that penetration must be protected to prevent the spread of fire in accordance with Section 714 of the Chicago Building Code. (ASTM E814 or UL 1479)



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Substantive Plumbing Code Amendments

2.

Adopt provisions for optional all-gender restrooms.

Based on best practices from Vancouver (2014) and Denver (2019).

Requires enhanced privacy in individual stalls.

Will be among first in US to adopt clear requirements not requiring variance or "looking the other way."



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Common Areas of Noncompliance

Notes on drawings for:

- Bedding and Backfill for PVC U.G: ASTM D2321
- Fire rated partitions: 708.4
- "Existing" water service size is inconsistent.
- Common Errors: incorrect address, incomplete isometric drawings ,copy and paste.
- Commercial Laundry Requirements:
Sewer Regulations, 18-29-1003.9, 18-29-412.4
- Subsoil drainpipe material: 18-29-1102.5

https://www.charlottepipe.com/uploads/documents/technical/VE_PVCUnderground2015.pdf



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Substantive Plumbing Code Amendments

3.

Align terminology for minimum plumbing fixtures with 2019 Building Code and provide relief for very small occupancies.

Makes terminology consistent with 2019 Chicago Building Code and pre-2019 practices.

Provides relief for spaces with 30 or fewer occupants.



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Minimum Plumbing Fixture and Toilet Facility Requirements

- Three types of toilet facilities
 - Single-user toilet room
 - Separate (male/female) facilities
 - Nonseparate facilities (all gender)
- Determine occupant load
 - Start with occupant load for egress
 - Separate rule for Mercantile (Group M) [\(18-29-403.1.1, ex. 3\)](#)
 - Reduce: nonsimultaneous use or access controls
- Determine occupancy and use for **Table 18-29-403.1**

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Minimum Plumbing Fixture and Toilet Facility Requirements

- Separate facilities (male / female)
 - Fixtures / partitions
 - Accessibility (5% each type)
 - Signage
 - Door locks
 - Access / location

MEN WOMEN

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★ Minimum Plumbing Fixture and Toilet Facility Requirements

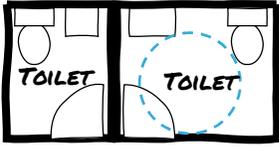
- Single-user toilet rooms (Family / assisted use)
 - Fixtures
 - Accessibility (50% per cluster)
 - Signage
 - Enclosure (privacy)



Restroom



Accessible Restroom



HALLWAY



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★ Minimum Plumbing Fixture and Toilet Facility Requirements

- Single-user toilet rooms (Family / assisted use)
 - Fixtures
 - Accessibility (50% per cluster)
 - Signage
 - Enclosure (privacy)



Restroom



Accessible Restroom



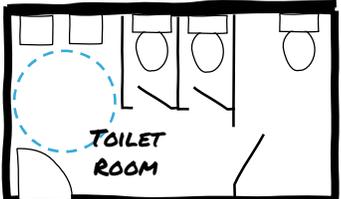
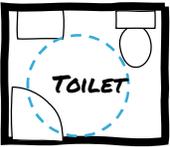
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★ Minimum Plumbing Fixture and Toilet Facility Requirements

- Nonseparate facilities
 - Fixtures / partitions
 - Enhanced privacy at partitions
 - Accessibility (5% each type)
 - Signage
 - Door locks
 - Proximity to single-user toilet room




IF 2 S.W.C. 200 MAX

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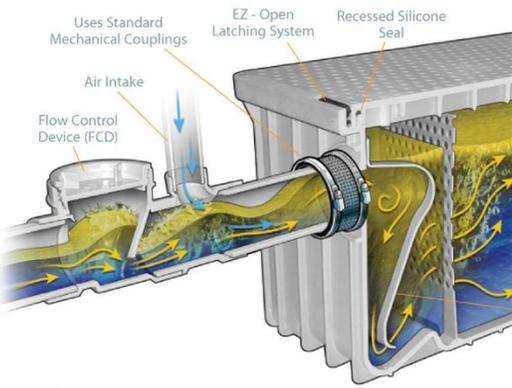
★ Substantive Plumbing Code Amendments

4.

Align requirements for protecting sewer system from grease with national standards.

Modernizes requirements for commercial food establishments, consistent with current national standards.

Eliminates requirement for multi-family residential grease basins, which is no longer supported by building science.



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  **Substantive Plumbing Code Amendments**

5. Clarify requirements for water-conserving plumbing fixtures.

Clarifies inconsistent water usage requirements.

Consistent with 2016 amendment, all fixtures that are subject to US EPA's WaterSense standard will be required to meet this standard.



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  **Substantive Plumbing Code Amendments**

6. Strengthen and clarify requirements to protect drinking water.

Restates commitment to enforcing lead-free standards in new plumbing in clearer language.

Clarifies requirements for installation of copper water pipe and allowances for short lengths of flexible non-metallic hose at connection points.



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Substantive Plumbing Code Amendments

7.

Adopt the latest technical standards for plumbing fixture performance and safety.

Recognizes newer designs of faucets, toilets, showerheads, hot water heaters, steam generators, etc. without special approvals.



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Substantive Plumbing Code Amendments

8.

Align with state (IDPH) requirements for public swimming pool safety.

Defers to state for highly-specialized technical requirements for public swimming pools.

Eliminates overlapping and inconsistent regulations for private residential swimming pools.



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Substantive Plumbing Code Amendments

9.

Water-Hammer

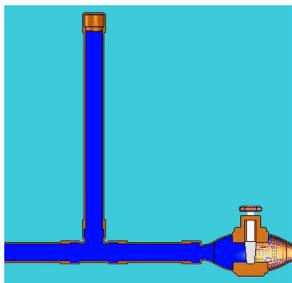
An air chamber or water hammer arrestor shall be installed where quick closing valves are utilized installed.

Air chambers and air chambers in a riser shall be a maximum of 12" in length and the same diameter of the fixture supply

Air chambers installed in a riser shall also be maximum of 12" in length.

Plumbing and Drainage Institute has issued PDI-WH201 (2017) Standard -- guidance on locating water hammer arrestors for greatest efficacy within plumbing system.

Code does not require access panels, but some manufacturers might.



Sioux Chief animation of waterlogged air chamber

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Trade License Amendments

10.

Streamline drainlayer license administration.

Consolidates responsibility for training, licensing, renewal and discipline in Department of Buildings.

Simplifies licensing provisions by not requiring highly-trained plumbers to obtain an additional license.

Transitions from calendar year license to rolling 365-day license. (2023)



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Audience Q&A Session

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Plumbing Design Basics

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Commercial: Drinking Fountains and Service Sinks

- 18-29-403.1 Minimum number of fixtures
- 18-29-403.5 Drinking fountain location
- 18-29-410.1 Approval
- 18-29-410.3 Accessible drinking fountains
- 18-29-410.4 Substitution
- 18-29-410.5 Prohibited locations



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Commercial: Drinking Fountains and Service Sinks

- Table 18-29-403.1 sets baseline requirements
- Section 18-29-410.4 allows for substitution:
 - Not required where food or drink is served to the public for on-site consumption and drinking water in a container is provided free of charge.
 - Commercially sealed bottled drinking water or a water dispenser and disposable containers may be substituted for the required drinking fountains provided that drinking water in a container is available to employees and to the public free of charge.

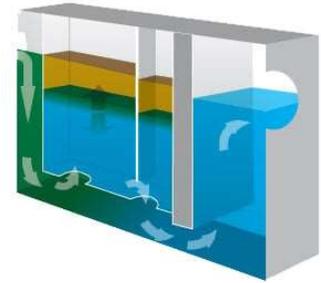


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Commercial: Grease Interceptors

18-29-418.2.1 Facilities with no range oven

Sinks installed in lunchrooms, pantries, break rooms and other similar facilities where no range or oven is installed shall not be required to have a grease interceptor. Installation of a microwave oven in such facilities shall require the installation of a grease interceptor.



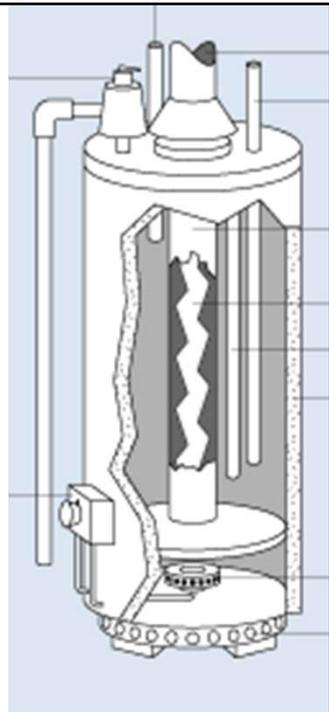
35

Commercial: Hot Water Heaters

- 18-29-504.8 Required pan
- 18-29-504.7.1 Discharge
- 18-29-504.7.3 Materials
- 18-29-504.7.2 Location
- 18-29-504.8.2 Pan drain termination

($\frac{3}{4}$ " minimum)

** Required for ALL tank type water heaters above grade.



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Commercial: Hot Water Heaters

FLOOR DRAIN. A receptacle fitted with a strainer or grate, a trap or seal, and connected to the plumbing or drainage system.

WASTE RECEPTOR. A floor sink, standpipe, hub drain or floor drain that receives the discharge of one or more indirect waste pipes.

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Commercial: Indirect Wastes

- 18-29-802.1 Where required
- 18-29-802.1.4 Non-potable clear-water waste
- 18-29-607.1.1 Temperature limiting means
- 18-29-501.8.1 Instantaneous water heaters
- 18-29-802.1.7 Sinks
- 18-29-802.3 Maximum length of 15'
- 18-29-802.1.5 Minimum size of 1"



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Residential: Storm Drainage

- 18-29-1101.2.1 Roof drainage and downspouts, exceptions 1 and 2
- 18-29-1104.2 Combining storm with sanitary drainage
- 18-29-412.4.2 Sanitary waste drainage (see Area Drain under Article 2 definitions)
- 18-29-702.1 Above-ground drainage and vent pipe
- Subsoil drainpipe material: 18-29-1102.5



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Residential: Design Considerations

- 18-29-711.3.2 Suds pressure zone
- 18-29-712.3.2 Sump pit: material



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Residential: Showers

- 18-29-417.1 Showers approval
- 18-29-417.4.4 Water temperature safety
- 18-29-424.4 Shower valves
- 18-29-607.1.2 Shower compartments and shower/bath combinations



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Information Required on Construction Documents

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Required Information

- Construction documents must show the size and location of all water distribution, sewerage, and drain pipes and the location and type of all plumbing fixtures within the building (within or serving the work area for rehabilitation work).
- Construction documents should include calculations or schedules to show that the minimum number and type of toilet facilities and plumbing fixtures will be provided.

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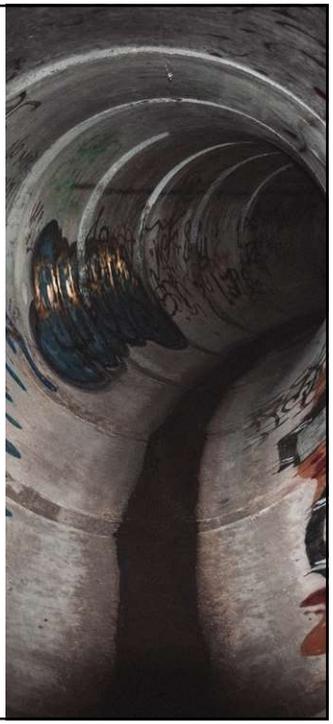


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Sewer Separation Reuse of Existing

- 18-29-603.2 & 18-29-603.2.1
- Illinois EPA regulations (Title 35)
- 18-29-301.3 / 18-29-703.4- connections to drainage system / reuse of existing building drains and sewers.
- If there is a conflict with the main sewer, DWM adjustment and or sewer replacement might be applicable



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<p>LEGEND</p> <ol style="list-style-type: none"> 1. USE SELECT GRANULAR SUBGRADE AND SHIMMERS (SHOULDS) TO ONE (1) FOOT OVER TOP OF EXISTING PIPE AND USE SELECT GRANULAR SUBGRADE TO AND COMPACT THE LENGTH OF 1' FEET. 2. USE 1" FEET OF WOOD OR METAL FOR CURBS OF PROPOSED SEWER AND TOP EDGE OF CURB. <p>NOTE: THE LENGTH NECESSARY TO PROVIDE TO TOP OF SHIMMER IS SHOWN PERPENDICULAR TO THE DRAINING SEWER PIPE.</p> <p>SHIMMER ON SHIMMERS (SHOULDS) FOR WOOD AND TOP EDGE CONSTRUCTION IN ALUMINUM AND STEEL.</p>	<p>LEGEND</p> <ol style="list-style-type: none"> 1. USE SELECT GRANULAR SUBGRADE AND SHIMMERS (SHOULDS) TO ONE (1) FOOT OVER TOP OF EXISTING PIPE AND USE SELECT GRANULAR SUBGRADE TO AND COMPACT THE LENGTH OF 1' FEET IN EACH SIDE OF WOOD PIPE. 2. USE 1" FEET OF WOOD OR METAL FOR CURBS OF PROPOSED SEWER AND TOP EDGE OF CURB. <p>NOTE: THE LENGTH NECESSARY TO PROVIDE TO TOP OF SHIMMER IS SHOWN PERPENDICULAR TO THE DRAINING SEWER PIPE.</p> <p>SHIMMER ON SHIMMERS (SHOULDS) FOR WOOD AND TOP EDGE CONSTRUCTION IN ALUMINUM AND STEEL.</p>	<p>LEGEND</p> <ol style="list-style-type: none"> 1. USE SELECT GRANULAR SUBGRADE AND SHIMMERS (SHOULDS) TO ONE (1) FOOT OVER TOP OF WOOD PIPE AND USE SELECT GRANULAR SUBGRADE TO AND COMPACT THE LENGTH OF 1' FEET. 2. USE 1" FEET OF WOOD OR METAL FOR CURBS OF PROPOSED SEWER AND TOP EDGE OF CURB. <p>NOTE: THE LENGTH NECESSARY TO PROVIDE TO TOP OF SHIMMER IS SHOWN PERPENDICULAR TO THE DRAINING SEWER PIPE.</p> <p>SHIMMER ON SHIMMERS (SHOULDS) FOR WOOD AND TOP EDGE CONSTRUCTION IN ALUMINUM AND STEEL.</p>	
<p>LEGEND</p> <ol style="list-style-type: none"> 1. REMOVE EXISTING CURB AND EXISTING WOOD PIPE TO PROVIDE SPACE TO SUPPORT OF SEWER FRANCH. <p>SHIMMER ON SHIMMERS (SHOULDS) FOR WOOD AND TOP EDGE CONSTRUCTION IN ALUMINUM AND STEEL.</p>	<p>NOT ALLOWED W/OUT WOOD OR METAL</p> <p>SHIMMER ON SHIMMERS (SHOULDS) FOR WOOD AND TOP EDGE CONSTRUCTION IN ALUMINUM AND STEEL.</p>	<p>LEGEND</p> <ol style="list-style-type: none"> 1. USE SELECT GRANULAR SUBGRADE AND SHIMMERS (SHOULDS) TO ONE (1) FOOT OVER TOP OF WOOD PIPE AND USE SELECT GRANULAR SUBGRADE TO AND COMPACT THE LENGTH OF 1' FEET. 2. USE 1" FEET OF WOOD OR METAL FOR CURBS OF PROPOSED SEWER AND TOP EDGE OF CURB. <p>NOTE: THE LENGTH NECESSARY TO PROVIDE TO TOP OF SHIMMER IS SHOWN PERPENDICULAR TO THE DRAINING SEWER PIPE.</p> <p>SHIMMER ON SHIMMERS (SHOULDS) FOR WOOD AND TOP EDGE CONSTRUCTION IN ALUMINUM AND STEEL.</p>	<p>FLAT VIEW</p> <p>FOR 6\"/> </p>
<p>TECHNICAL GUIDANCE MANUAL WATER AND SEWER SEPARATION REQUIREMENTS (PER IEPA)</p>			
			<p>7/1/15 STEN. ENG. NO. 41 PAGE NO. 42</p>

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Tap Requirements For Self-Certification & Developer Services

- Plans must be submitted to plan desk
- Fire letter must be received
- Flow test approved
- 18-29-603.3.4 metering requirements
- Work order issued pending DWM Bureau of Engineering Services (BES) review



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Water Service Sizing - Reuse

- Procedures for Calculating the Minimum Sizing of the Water Supply System (see Appendix A)
- Reuse of a fire-only service is not allowed
- Reuse of any water service needs to be approved by Chief Plumbing Inspector

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Water Service Sizing

- 18-29-604.3 Water distribution system design criteria
- Table 18-29-604.3: Water Distribution Systems Design Criteria Required Capacity at Fixture Supply Pipe Outlets
- 18-29-604.6 Variable street pressures set by the Department of Water Management (30 psi)

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Water Service Sizing

Step 1
 Compute the total number of Water Supply Fixture Units from **Table 18-29-604.10.1**

Plumbing Chart LB1					
	# of				
	Fixtures		WSFU		Total
Water closet	5	X	3	=	15
Lavatory	7	X	1	=	7
Bathtub/shower	5	X	2	=	10
Kitchen sink	1	X	2	=	2
Dishwasher	1	X	2	=	2
Washing machine	2	X	2	=	4
Bidet	1	X	2	=	2
Total # of Fixtures	22				Total WSFU 42

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Water Service Sizing

Step 2

- Using **Table 18-29-604.10.2**, convert the total water demand from fixture units to gallons per minute (predominantly for flush tanks).
- Total # WSFU = 42 = 24.3 gpm

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Water Service Sizing

Step 3

- Determine the elevation of the highest fixture. This result is the loss in static pressure in pounds per square inch (psi). Measure from the top plate of the floor.

Water service to grade	5'-0"
Grade to first floor	5'-5 3/4"
First floor to second floor	12'-0"
Second floor to third floor	11'-5"
Shower	5'-0"
Total	38'-10 3/4"

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Water Service Sizing

Step 4

- Multiply this elevation in feet by 0.434. The result is the loss in static pressure in pounds per square inch (psi).
- Highest fixture, which is the shower, temperature-controlled, is at 38' $10\text{-}3/4" \times 0.434 = 16 \text{ psi}$

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Water Service Sizing

Step 5

- Refers to water supply servicing inside buildings. This step is not needed for water sizing.

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Water Service Sizing

Step 6

- Compute the pressure loss through the meter. For pressure losses, consult the manufacturer's data.
- **Note:** City of Chicago Department of Water Management states a 3 psi loss.

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Water Service Sizing

Step 7

- Compute the available pressure to overcome friction in the piping system. First compute all losses. Determine the working pressure at the highest fixture per:
- **Table 18-29-604.3** *Water Distribution System Design Criteria Required Capacities at Fixture Supply Pipe Outlets*

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Water Service Sizing

Step 8

Note: For shower, temperature controlled use the fixed figure of 20 psi.

Height loss	16 psi
Working pressure at highest fixture	20 psi
Meter loss	<u>3 psi</u>
Total loss	39 psi

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Water Service Sizing

Step 9

Compute the developed length of the basic circuit of piping from the main in the street, the house pump, the outlet side of the pressure valve or other source of supply pressure to the highest and farthest outlet. Per the City of Chicago Department of Water Management, the distance from the water main to the property line is always 25'.

Highest fixture	38'-10 3/4"
Length of building	70'-0"
Setback to water main	<u>25'-0"</u>
Developed length	133'-10 3/4"

6
0

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Water Service Sizing

Step 8

- For equivalent length run (or ELR), see *Table 18-29-604.10.3 Allowance in Equivalent Length of Pipe for Friction loss in Valves and Threaded Fittings*.
- Note: City of Chicago, Department of Water states the ELR in copper fittings = 1.3 and in galvanized fittings = 1.5. Department of Water uses galvanized fittings.
- Multiply developed length by ELR for galvanized fittings:
 $133' 10\text{-}3/4" \times 1.5 = 200'$

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1

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Water Service Sizing

Step 9

- City of Chicago Department of Water states that water working pressure in city water mains is 30 psi. Take the total pressure loss in the building (Step 6) and subtract it from the working pressure in the water main (30 psi).

$$30 \text{ psi} - 39 \text{ psi} = -9 \text{ psi}$$

- Two ways to proceed: one for positive results and one for negative results.

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Water Service Sizing

Step 10: Positive Results

- Take the developed length by ELR (Step 8). Divide the outcome of Step 9 by this number and multiply by 100 (for 100' of developed length). The resulting positive working pressure does not require a water pressure booster for your system.
- (Working pressure) - (Developed length by ELR x 100)
 $9/200 = .045 \times 100 = 4.5$

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Water Service Sizing

Step 10: Negative Results

- In this example, the result is a negative working pressure (-9), which indicates that you require a water pressure booster system per: **18-29-604.7 Inadequate water pressure**

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Water Service Sizing

Step 10: Negative Results

- Take the outcome of Step 2 (water demand from fixture units to gallons total per minute) and the outcome of Step 9 (working pressure).
- Per 18-29-604.10.1.2 **Size of Piping** the velocity of flow and the service shall not exceed 8 feet per second velocity

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Water Service Sizing

Step 10: Negative Results

- Use a friction loss chart for smooth copper pipe. Take 24.3 gpm on the left or right side of the chart. Go to velocity of 8 feet per second, which is the longest line on the chart running diagonally across. Put into cross hairs velocity of 8 feet per second and 24.3 gpm and your service size will be one of the numbers on the left hand side.
- In this example, a 1" service pipe would result in too great a velocity so a 1 ½" service is required with a 24.3 gpm booster

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Summary

- Review the plumbing requirements for each project.
- Provide required plumbing information with construction documents.
- Follow the guidelines discussed for important issues where they apply.

Feel free to call with questions

312-744-7060
bpermits@cityofchicago.org
patrick.gross@cityofchicago.org

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