

# 2021 Washington State Energy Code (WSEC) Residential Significant Changes: Space Heating

**BEGINNING JULY 1, 2023**



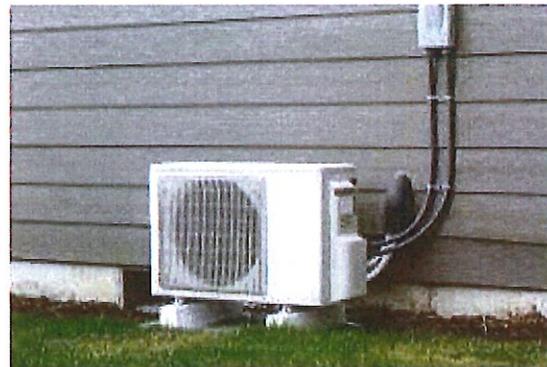
**In new construction, primary heating must be provided by a heat pump system. Both ducted and ductless systems are acceptable.**

*Some exceptions apply, see 2021 WSEC Section R403.13*

**Supplementary heating may be provided by other system types.**

*Some control requirements apply, see 2021 WSEC Section R403.1.2.*

In existing buildings (retrofits, replacements, and additions), new and replaced heating equipment must be a heat pump, except that existing heating equipment (such as a gas furnace) may be replaced like-in-kind so long as the size of the equipment is not greater than the existing.



Air conditioners may be added to existing systems so long as heating equipment is not being replaced.

*For full code text, see 2021 WSEC Section R503.1.2*



**In new or existing buildings, this change does not prohibit gas supply from being provided to homes. This change does not ban the use of gas or propane for cooking appliances or decorative gas fireplaces.**

This handout summarizes one significant change in the 2021 Washington State Energy Code (WSEC) for those buildings defined in the code as *Residential Buildings*. See complete code text for details.

# 2021 Washington State Energy Code (WSEC) Residential Significant Changes: Water Heating

**BEGINNING JULY 1, 2023**

In new construction, primary water heating must be provided by a heat pump system. Both unitary heat pump water heaters (HPWHs) and split systems are acceptable.

Some exceptions apply. For example, homes with less than 1,000 square feet of conditioned floor area may be served by other water heating system types.

**Supplementary** heating for heat pump water heating systems may be provided by other system types.

Also, water heaters must now be installed within the conditioned space of the home unless it has a system efficiency of 2.0 UEF or better.

*For complete code text, exceptions, and control requirements, see 2021 WSEC Section R403.5.7*



In existing buildings, other water heating system types may be replaced like-in-kind so long as the rated capacity of the equipment is not greater than the existing.

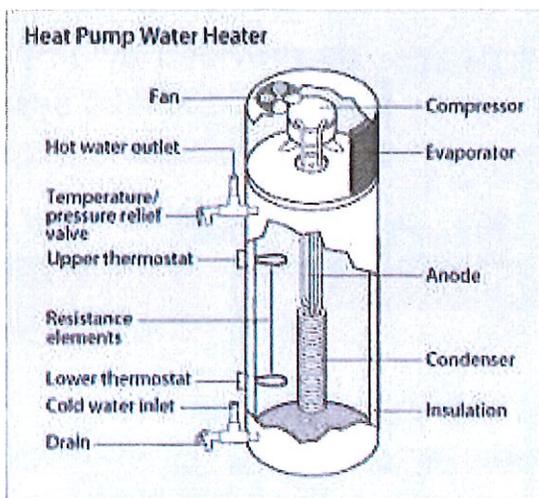
*For full code text, see 2021 WSEC Section R503.1.3*

*Figure 2 Examples of water heater types that can be replaced like-in-kind. Source [Estimating Costs and Efficiency of Storage, Demand, and Heat Pump Water Heaters](#) | Department of Energy*

In new or existing buildings, this change does not prohibit gas supply from being provided to homes. This change does not ban the use of gas or propane for cooking appliances or decorative gas fireplaces.



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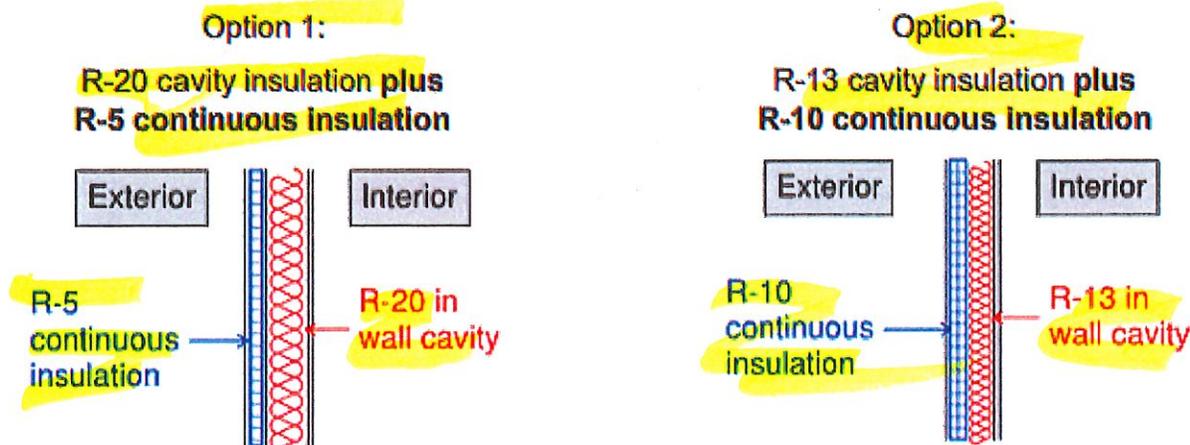
*Figure 1 Heat pump water heater diagram.*

*Source [Heat Pump Water Heaters](#) | Department of Energy*

# 2021 Washington State Energy Code (WSEC) Residential Significant Changes: Wall Insulation

## BEGINNING JULY 1, 2023

The previous edition of the energy code (the 2018 WSEC) required R-21 cavity insulation only in walls. In the 2021 WSEC, a typical wood framed wall assembly now requires continuous insulation in addition to cavity insulation. There are two prescriptive options:



Continuous insulation is often rigid foam but could be other materials such as mineral wool or cork. Intermediate framing remains required.

### Why continuous insulation?

Wood is much more conductive than insulation, so the wood studs in a wall allow for a path of least resistance for heat transfer, called a "thermal bridge". Wood framing can make up close to ¼ of the wall area, so this thermal bridging effect can be a major contributor to heat loss in the building, resulting in higher energy use required for space heating (and cooling) and lower occupant comfort. For full code text, see 2021 WSEC Table R402.1.3 & Section 402.2.1

### Installation Considerations

- Continuous insulation must be installed in accordance with manufacturer's installation instructions
- The manufacturer's R-value mark must be readily observable for inspection. Depending on the project, an additional exterior inspection may be required to achieve this.
- Installation of cladding over continuous insulation will require special care in selection and installation of fasteners.

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# 2021 Washington State Energy Code (WSEC) Residential Significant Changes: Ceiling & Attic Insulation

**BEGINNING JULY 1, 2023**

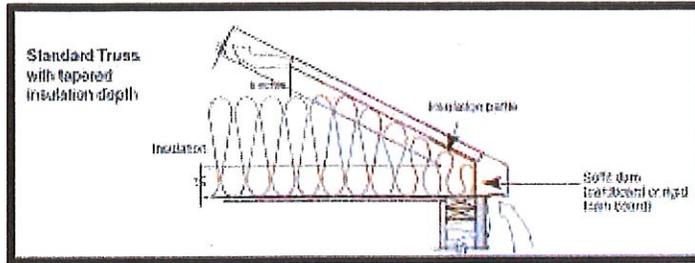


Figure 1 Standard truss with attic space. Source: [Attic Eave Minimum Insulation | Building America Solution Center \(bnrl.gov\)](#)

## If raised-heel trusses are provided

Insulation now needs to meet **R-49**, increased from R-38. This applies to roofs with a raised heel that allows the insulation to extend uncompressed over the top plate of the exterior wall.

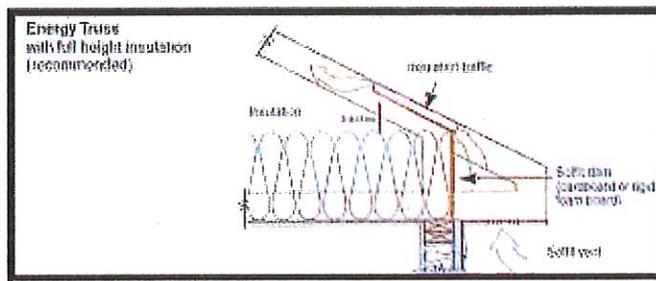


Figure 2 Raised heel (energy) truss with attic space. Source: [Attic Eave Minimum Insulation | Building America Solution Center \(bnrl.gov\)](#)

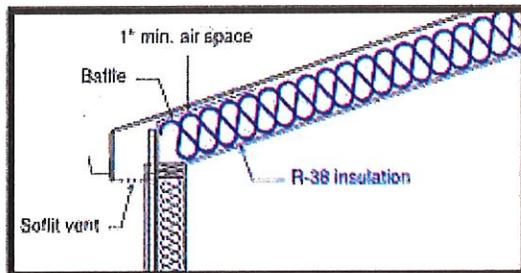


Figure 3 Single rafter-vaulted ceiling

## For single rafter- joist-vaulted ceilings

Insulation requirement remains **R-38**, if the full insulation depth extends uncompressed over the top plate of the exterior wall.

*For full code text regarding attic insulation requirements, see 2021 WSEC Table R402.1.3 & Section 402.2.1*

Where an addition greater than 150 square feet adjoins existing ceilings with attic spaces, the existing attic spaces need to have insulation upgraded to meet the new requirements. For full code text regarding additions, see 2021 WSEC Section R502.3.1.1

**Reminder:** The required R-value is averaged over the entire attic. For blown or sprayed insulation an **insulation certificate** must be left on the job site immediately after insulation installation. The certificate must indicate the installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed.

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## Ceilings with attic spaces

Insulation now needs to meet **R-60**, increased from R-49. This applies to standard trusses or standard rafter and top plate construction where insulation tapers over the eaves.

# 2021 Washington State Energy Code (WSEC) Residential Significant Changes: Air Leakage

**BEGINNING JULY 1, 2023**



In new construction of single-family homes, duplexes, and townhouses the air leakage rate must be tested and be a maximum of 4.0 air changes per hour (ACH), reduced from 5.0 ACH in the previous code edition.

For full code text, including testing procedures, see 2021 WSEC Section R402.4

Figure 1 Blower door test (Source: [Technically Speaking: What the Blower Door Test Tells You](#) / Building Performance Institute, Inc. ([bpihomeowner.org](#))).

Electrical and communication outlet boxes installed in the building thermal envelope must now be:

- Tested in accordance with NEMA OS 4, *Requirements for Air-Sealed Boxes for Electrical and Communication Applications*
- Have an air leakage rate of not greater than 2.0 cubic feet per minute

To demonstrate this, these boxes must be marked "NEMA OS 4" or "OS 4" and be installed per the manufacturer's instructions and with any supplied components required to achieve compliance with NEMA OS 4.

For full code text, see 2021 WSEC Section R402.4.6

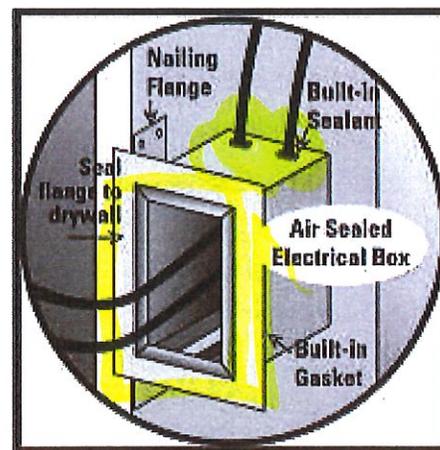
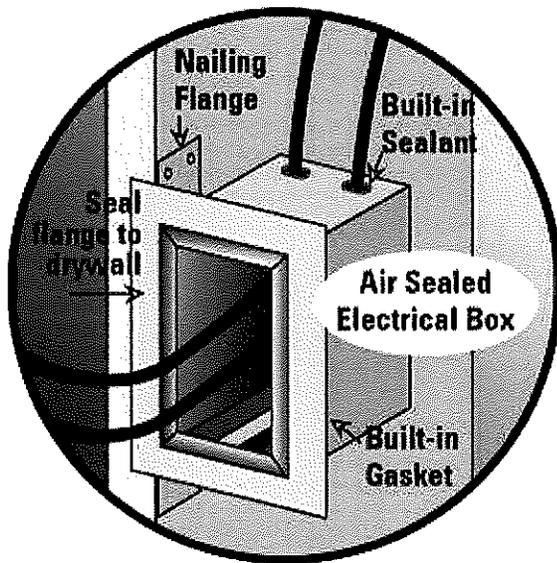


Figure 2 Air Sealed Electrical box (Source: [Air Sealing Electrical Wiring](#) / Building America Solution Center ([pnnl.gov](#))).

This handout summarizes one significant change in the 2021 Washington State Energy Code (WSEC) for those buildings defined in the code as *Residential Buildings*. See complete code text for details.

# Air-tight electrical boxes have built-in gaskets and self-sealing wire holes



Reference: [Air Barriers - Airtight Drywall Approach, Info-401](https://www.buildingscience.com/documents/information-sheets/air-barriers-airtight-drywall-approach)  
(<https://www.buildingscience.com/documents/information-sheets/air-barriers-airtight-drywall-approach>)

Author(s): Lstiburek

Organization(s): Building Science Corporation, BSC

Brochure about creating an air barrier by sealing drywall assemblies.

# 2021 Washington State Energy Code (WSEC) Residential Significant Changes: Lighting

## BEGINNING JULY 1, 2023

In new construction, interior lighting in most spaces must now be controlled with either:

- a dimmer,
- an occupant sensor control, or
- other control that is installed or built into the fixture.

These controls are not required in bathrooms or hallways, or lighting that is specifically designed for safety or security.

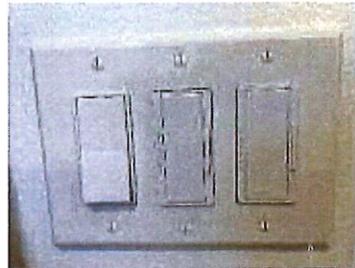


Figure 1 Dimmer capability for lighting on the middle and right switch (left switch controls a local exhaust fan).



Also, the requirement for *high-efficiency* interior lighting now applies to all lighting in the home, including kitchen appliance lighting fixtures, up from 90% of lighting in the last code edition.

Where more than 30 watts of exterior lighting is installed, it must now:

- have a manual on/off switch which permits automatic shut-off actions,
- be automatically shut off when sufficient daylight is present, and
- if controls can override automatic shut-off actions, the override must be capable of automatically resetting to its normal operation within 24 hours

For full code text, see 2021 WSEC Section R404



Figure 2 Image of a home with exterior lighting that would need to have automatic lighting controls.

In existing buildings (alterations and additions), new lighting must be *high-efficiency*, unless the alteration affects less than 10% of existing luminaries. The lighting controls specified above for new construction are not required.

For full code text, see 2021 WSEC Section R503.1.4

This handout summarizes one significant change in the 2021 Washington State Energy Code (WSEC) for those buildings defined in the code as *Residential Buildings*. See complete code text for details.

# 2021 Washington State Energy Code (WSEC) Residential Significant Changes: Additional Energy Efficiency Requirements

## BEGINNING JULY 1, 2023

The Additional Energy Efficiency Requirements section of the energy code (WSEC Section R406) goes beyond the base (prescriptive) code requirements and sets a minimum number of credits projects must achieve based on the project size. This section of the code is not new, however multiple changes are made to this section in the 2021 WSEC.

### Changes to required credit values (Section R406.3):

- Additions with a cumulative total of less than 150 square feet of conditioned floor area are now exempt from obtaining additional energy efficiency credits
- Minimum credit values required adjusted for most project types, based on adjustments made in the base code language



Once the required number of credits is determined for a project, the home's heating system type is given positive or negative credits in the Fuel Normalization Table (Table R06.2). Credits are awarded to create a base equalization between fuels used to define the equivalent carbon emissions of the heating system types.

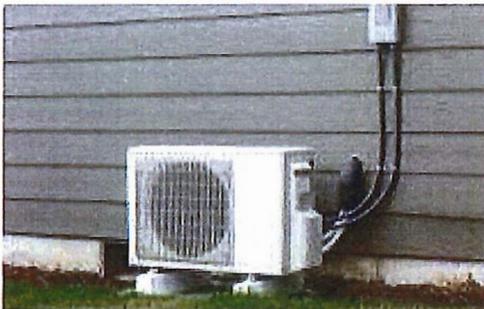


Figure 1 Ductless heat pump outside compressor.  
Image source: [Ductless \(Mini-Split\) Heat Pumps](#),  
[Building America Solution Center \(bamf.gov\)](#)

### Changes to heating system types (Table R406.2):

- Supplemental heating type is now considered
- Credits adjusted for most heating system types

After the heating system is evaluated, then the project must select options from a menu that includes seven categories and incorporate those energy efficient elements into the project design. The seven categories remain the same, though options within the categories are modified.

### Change to the options menu (Table R406.3):

- Options extensively revised to reflect changes in base code
- Each 0.5 credit is equivalent to a 600 kWh energy savings
- Some options were eliminated due to the fact they are now a part of the base code requirements



# 2021 International Residential Code (IRC) Significant Changes: Electric Vehicle Charging

**BEGINNING JULY 1, 2023**

New construction projects which create dwelling units *and* include an attached garage or attached carport will now need to **provide one 40-amp dedicated 208/240-volt branch circuit for each dwelling unit, intended for future electric vehicle charging**. This circuit may terminate in electric vehicle charging equipment; however, a junction box or receptacle outlet is also acceptable.



For full code text, see 2021 IRC Section [R309.6](#) (WA Amendment)



Figure 1 Electrical panel image. Source: [How to Install a 240-Volt Circuit Breaker \(thespruce.com\)](#)

While electric vehicles can be charged by a standard household outlet (120-volt), this "Level 1 Charging" provides about 2-5 miles of range per hour, so a full charge can take up to 24 hours. The 240-volt circuit will allow for faster charging, known as "Level 2 Charging". Level 2 charging provides about 10-25 miles of range per hour, so a full charge can take as little as 3-10 hours. For the average driver, Level 2 charging will allow them to fully charge overnight.

Installing the capability for Level 2 charging at the time of initial construction is a cost-effective way to prepare a home to be ready for an electric vehicle. This type of circuit is the same type of wiring as an electric stove or clothes dryer and can easily be installed by a professional electrician.

*This handout summarizes one significant change in the 2021 International Residential Code (IRC). See complete code text for details.*

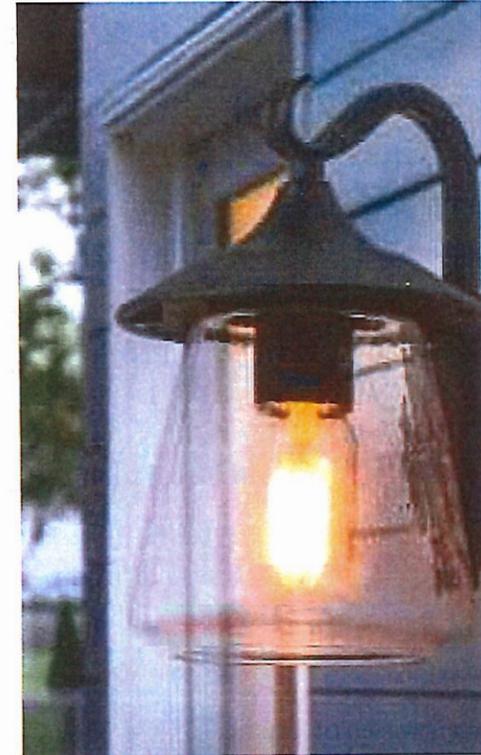
# 2021 International Energy Conservation Code

## **R404.2 – Interior lighting controls**

- Code revision requires occupant sensors or dimmers – NCTCOG amendment deletes this requirement

## **R404.3 – Exterior lighting controls**

- Requires daylight sensor plus a manual on/off switch



# 2021 International Building Code

## Table 508.4 – Required separation of occupancies

- Simplified table:

TABLE 508.4 REQUIRED SEPARATION OF OCCUPANCIES (HOURS)<sup>f</sup>

| OCCUPANCY                    | A, E |    | I-1 <sup>a</sup> , I-3, I-4 |    | I-2 |    | R <sup>a</sup> |                | F-2, S-2 <sup>b</sup> , U |                | B <sup>e</sup> , F-1, M, S-1 |    | H-1 |    | H-2 |    | H-3, H-4       |    |
|------------------------------|------|----|-----------------------------|----|-----|----|----------------|----------------|---------------------------|----------------|------------------------------|----|-----|----|-----|----|----------------|----|
|                              | S    | NS | S                           | NS | S   | NS | S              | NS             | S                         | NS             | S                            | NS | S   | NS | S   | NS | S              | NS |
| A, E                         | N    | N  | 1                           | 2  | 2   | NP | 1              | 2              | N                         | 1              | 1                            | 2  | NP  | NP | 3   | 4  | 2              | 3  |
| I-1 <sup>a</sup> , I-3, I-4  | 1    | 2  | N                           | N  | 2   | NP | 1              | NP             | 1                         | 2              | 1                            | 2  | NP  | NP | 3   | NP | 2              | NP |
| I-2                          | 2    | NP | 2                           | NP | N   | N  | 2              | NP             | 2                         | NP             | 2                            | NP | NP  | NP | 3   | NP | 2              | NP |
| R <sup>a</sup>               | 1    | 2  | 1                           | NP | 2   | NP | N              | N              | 1 <sup>c</sup>            | 2 <sup>c</sup> | 1                            | 2  | NP  | NP | 3   | NP | 2              | NP |
| F-2, S-2 <sup>b</sup> , U    | N    | 1  | 1                           | 2  | 2   | NP | 1 <sup>c</sup> | 2 <sup>c</sup> | N                         | N              | 1                            | 2  | NP  | NP | 3   | 4  | 2              | 3  |
| B <sup>e</sup> , F-1, M, S-1 | 1    | 2  | 1                           | 2  | 2   | NP | 1              | 2              | 1                         | 2              | N                            | N  | NP  | NP | 2   | 3  | 1              | 2  |
| H-1                          | NP   | NP | NP                          | NP | NP  | NP | NP             | NP             | NP                        | NP             | NP                           | NP | N   | NP | NP  | NP | NP             | NP |
| H-2                          | 3    | 4  | 3                           | NP | 3   | NP | 3              | NP             | 3                         | 4              | 2                            | 3  | NP  | NP | N   | NP | 1              | NP |
| H-3, H-4                     | 2    | 3  | 2                           | NP | 2   | NP | 2              | NP             | 2                         | 3              | 1                            | 2  | NP  | NP | 1   | NP | 1 <sup>d</sup> | NP |
| H-5                          | 2    | NP | 2                           | NP | 2   | NP | 2              | NP             | 2                         | NP             | 1                            | NP | NP  | NP | 1   | NP | 1              | NP |

Significant Changes to the 2021 International Codes & Amendments

# 2021 International Residential Code



## 609.4.1 – Garage doors

- New section requires permanent label from manufacturer identifying the manufacturer, model or series number, positive and negative design wind pressure ratings, reference installation instruction drawings, and applicable test standard.

Significant Changes to the 2021 International Codes & Amendments

# 2021 International Residential Code



## 2447.2 – Commercial cooking appliances

- Commercial cooking appliances are not allowed in residential (previous exception allowing engineer's design has been eliminated)

Significant Changes to the 2021 International Codes & Amendments

**CLOTHES DRYER EXHAUST VENT  
IMPROPER TERMINATION:  
ADJACENT TO WALL  
< 3 FT to WINDOW ?**



## 1502.3 – Dryer vent termina

- Minimum clearance between duct termination and building openings, including vented
- Per manufacturer's specs, in any direction if not spec

# 2021 International Residential Code



## 314.3 – Smoke alarm locations

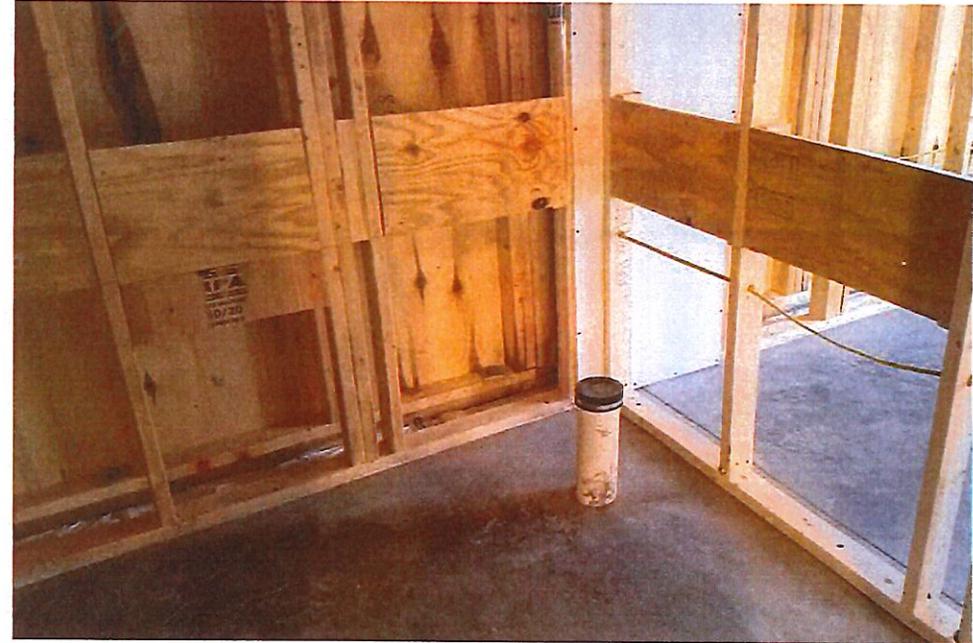
- If the change in ceiling height between a hallway and an adjacent room is 6 in. or more, a smoke detector is required on the higher ceiling

Significant Changes to the 2021 International Codes & Amendments

# 2021 International Residential Code

## 307.3 & 307.4 - Blocking

- Amended by NCTCOG
- Blocking for future handicap grab bars required around at least one ground floor toilet





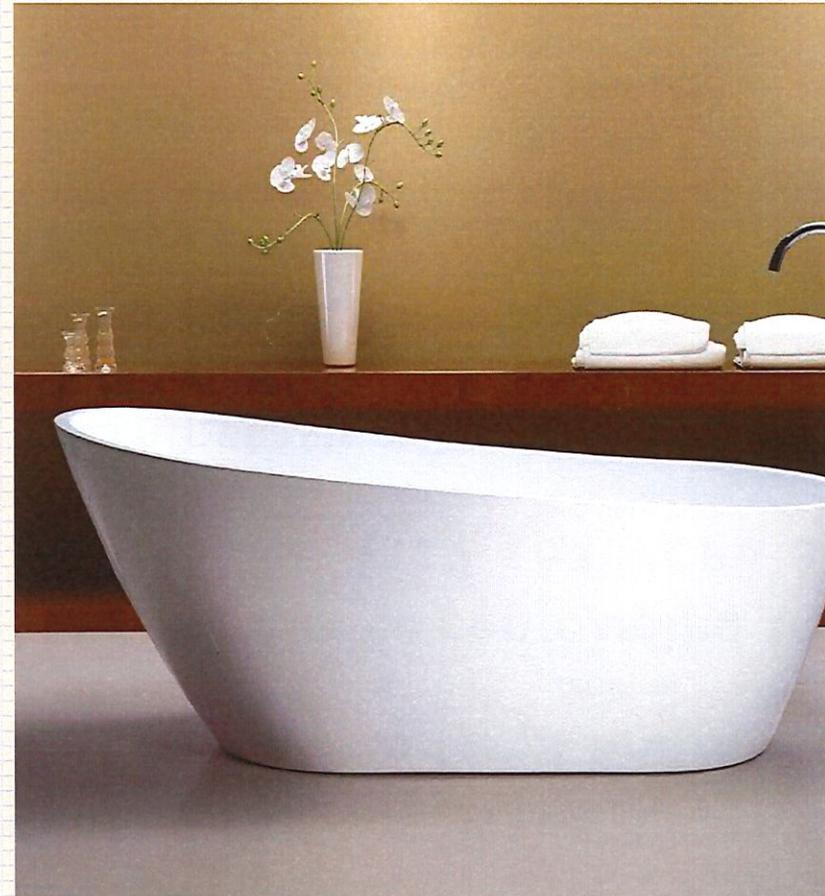
## 717/718 – Relining/rehabilitation of building sewers and building drains

- Addresses new technologies for relining sewer pipes as a means of repair, but must follow procedure

# 2021 International Plumbing Code

## 407.2 – Bathtub overflows

- **Overflow drains are no longer required on bathtubs; preventing the overflow is the user's responsibility**



# 2021 International Existing Building Code



## Smoke & Carbon Monoxide Alarms

- 307 – Smoke alarms required retroactively for anything other than Level 1 work
- 308 – Carbon monoxide detectors required, with a few exceptions:
  - Level 1 work
  - Plumbing/mechanical work not involving gas appliances
  - Exterior surfaces only