2021 International Residential Code®
Significant Changes

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John is the Technical Manager/ Education and an Instructor for the International Code Council (ICC). A certified Master Code Professional and Certified Fire Marshal; he has forty-five (45) other certifications, including thirty-six (36) from the ICC. Having earned a B.S. in Engineering from the University of Delaware, he has also studied Architecture at Georgia Tech and completed courses in Emergency Management and Fire Prevention at the National Emergency Training Center.

Formerly the Director of the Department of Permits and Inspections for Frederick County Maryland, he is an ICC Honorary Member, has served on the ICC- Evaluations Services (ICC- ES) Board of Directors, the ICC Code Correlating Committee, the Board of Directors for BOCA International, Inc., Maryland’s Governor’s Smart Code Strategy Group, Chaired the ICC Board for International Professional Standards and is an Honorary Member and Past President of the Maryland Building Officials Association.

He currently teaches ICC administrative, building, residential, existing building, permit technician, property maintenance, zoning, green building, fire, wildland/urban interface, energy courses, and is a contract instructor at the Dept. of Homeland Security, United States Fire Administration, National Fire Academy, Emmitsburg, MD. He received the ICC Educator of the Year award in 2010.

#ICCLEARNLIVE
Identify changes between the 2018 and 2021 IRC

Apply code requirements to design, plan submittals and/or inspection.
OBJECTIVES

- Identify the differences between 2018 and 2021 codes.
- Determine if the change is an addition, deletion, modification or clarification.
- Identify changes in format and technical requirements.
- Explain the intent and application of the changes.
Topics:

- Administration, Chapters 1
- Definitions, Chapter 2
- Building Planning, Chapter 3
- Footings and Foundations, Chapter 4
- Floors, Chapter 5
- Wall Construction, Chapter 6
- Wall Coverings, Chapter 7
- Roof-Ceiling Construction, Chapter 8
Selection of Topics

Provisions addressed based primarily on:

• Frequency of application
• Special significance
• Change in application
Marginal Markings within the International Residential Code

- **Solid vertical lines** in the margins within the body of the code indicate a technical change from the requirements of the 2018 edition.

- **Deletion indicators in the form of an arrow** are provided in the margin where an entire section, paragraph, exception or table has been deleted or an item in a list of items or a table has been deleted.

- **A single asterisk** [*] placed in the margin indicates that text or a table has been relocated within the code.

- **A double asterisk** [**] placed in the margin indicates that the text or table immediately following it has been relocated there from elsewhere in the code.
Letter Designations in Front of Section Numbers

- In each code development cycle, proposed changes to the code are considered at the Code Development Hearings.
- Proposed changes to a code section that has a number beginning with a letter in brackets are considered by a different code development committee.
- The content of sections in this code that begin with a letter designation is maintained by another code development committee:
Letter Designations in Front of Section Numbers

[A] = Administrative Code Development Committee;

[E] = International Energy Conservation Code Development Committee;

[EB] = International Existing Building Code Development Committee;

[F] = International Fire Code Development Committee;

[FG] = International Fuel Gas Code Development Committee;

[M] = International Mechanical Code Development Committee; and

Course Icons

Addition
Deletion
Modification
Clarification
Tips

Guide to a successful class:

- Slides contain some text and iconic images to help you learn.
- Text and commentary is in the handout.
- Follow along in the course handout.
- Ask Questions, ask questions, ASK QUESTIONS!!!!
R102.7.1 Additions, Alterations or Repairs

- 2021 Code: **R102.7.1 Additions, alterations or repairs.** Additions, alterations or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with the requirements of this code, unless otherwise stated. Additions, alterations, repairs and relocations shall not cause an existing structure to become unsafe or adversely affect the performance of the building. less compliant with the provisions of this code than the existing building or structure was prior to the addition, alteration or repair. An existing building together with its additions shall comply with the height limits of this code. Where the alteration causes the use or occupancy to be changed to one not within the scope of this code, the provisions of the International Existing Building Code shall apply.
2021 International Residential Code® - Chapter 2: Definitions
R202 Definitions

• Grade Floor Emergency Escape and Rescue Opening

• GRADE FLOOR EMERGENCY ESCAPE AND RESCUE OPENING. A window or other An emergency escape and rescue opening located such that the sill height bottom of the clear opening (or height of the bottom of the clear opening) is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening. (See also “Emergency escape and rescue opening.”)
R202 Definitions

- Townhouse

- **TOWNHOUSE.** A single-family dwelling unit constructed in a group of building that contains three or more attached townhouse units, in which each unit extends from foundation to roof and with a yard or public way on not less than two sides.

- Townhouse Unit

- **TOWNHOUSE UNIT.** A single-family dwelling unit in a townhouse that extends from foundation to roof and that has a yard or public way on not less than two sides.
2021 International Residential Code® -
Chapter 3:
Building Planning
Figure R301.2(5)A Ultimate Design Wind Speeds

Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation is permitted between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).
6. Location-specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed
R301.2.2.6 Irregular buildings

8. **Hillside Light-Frame Construction.** Conditions in which all of the following apply:

8.1  The grade slope exceeds 1 vertical in 5 horizontal where averaged across the full length of any side of the dwelling, and

8.2  The tallest cripple wall clear height exceeds 7'-0", or where a post and beam system occurs at the dwelling perimeter, the post and beam system tallest post clear height exceeds 7'-0".

8.3  Of the total plan area below the lowest framed floor, whether open or enclosed, less than 50% is living space having interior wall finishes conforming to Section R702.
R302.2.2 Common Walls

- 2021 Code: **R302.2.2 Common walls.** Common walls separating townhouses shall be assigned a fire-resistance rating in accordance with Item 1 or 2, and shall comply with Sections 302.2.3 through 302.2.5. and shall be rated for fire exposure from both sides. Common walls shall extend to and be tight against the exterior sheathing of the exterior walls, or the inside face of exterior walls without stud cavities, and the underside of the roof sheathing. The common wall shared by two townhouses shall be constructed without plumbing or mechanical equipment, ducts or vents, other than water-filled fire sprinkler piping, in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.
R302.2.2 Common Walls

2021 Code: **R302.2.2 Common walls**

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code.

2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code.

**Exception:** Common walls are permitted to extend to and be tight against the inside of the exterior walls if the cavity between the end of the common wall and the exterior sheathing is filled with a minimum of two two-inch nominal thickness wood studs.
R302.2.2 Common Walls
R302.3 Two-Family Dwellings

2021 Code: **R302.3 Two-family dwellings.** Dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code. Such separation shall be provided regardless of whether a lot line exists between the two dwelling units or not. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

**Exceptions:**

1. A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, NFPA 13.
R302.4.1 Through Penetrations

• Exceptions:

• 2. The annular space created by the penetration of water-filled fire sprinkler piping, provided that the annular space is filled using a material complying with R302.4.2 Membrane penetrations. Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.
R302.5.1 Opening Protection

2021 Code: **R302.5.1 Opening protection.** Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1 3/8 inches (35 mm) in thickness, solid or honeycomb-core steel doors not less than 1 3/8 inches (mm) thick, or 20-minute fire-rated doors. Doors shall be self-latching and equipped with a self-closing or an automatic-closing device.
R303.1 Habitable Rooms

Exceptions:

1. The **for habitable rooms other than kitchens, the** glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical ventilation system or a mechanical ventilation system capable of producing 0.35 air changes per hour in the habitable rooms is installed in accordance with Section M1505.

2. For kitchens, the glazed areas need not be openable where the opening is not required by Section R310 and a local exhaust system is installed in accordance with Section M1505.

2.3. The glazed areas need not be installed in rooms where Exception 1 is satisfied and artificial light is provided that is capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

3.4. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural ventilation if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.
R305.1 Minimum Height

Exceptions:

1. For rooms with sloped ceilings, the required floor area of the room shall have a ceiling height of not less than 5 feet (1524 mm) and not less than 50 percent of the required floor area shall have a ceiling height of not less than 7 feet (2134 mm).

2. The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a ceiling height of not less than 6 feet 8 inches (2032 mm) above an area of not less than 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

3. Beams, girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor.

4. Beams and girders spaced apart not less than 36 inches in clear finished width shall project not more than 78 inches from the finished floor.
2021 Code: **R308.4.5 Glazing and wet surfaces.** Glazing in walls, enclosures or fences containing or facing adjacent to hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface shall be considered to be a hazardous location. This shall apply to single glazing and each pane in multiple glazing.

**Exception:** Glazing that is more than 60 inches (1524 mm), measured horizontally and in a straight line, from the water’s edge of a bathtub, hot tub, spa, whirlpool or swimming pool or from the edge of a shower, sauna or steam room.
R310.1 Emergency Escape and Rescue Opening Required

2021 Code: **R310.1 Emergency escape and rescue opening required.** Basements, habitable attics and every sleeping room shall have not less than one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court **having a minimum width of 36 inches** that opens to a public way.

**Exceptions:**

3. A yard shall not be required to open directly into a public way where the yard opens to an unobstructed path from the yard to the public way. Such path shall have a width of not less than 36 in. (914 mm).
R310.1 Emergency Escape and Rescue Opening Required

2021 Code: **R310.1.1 Operational constraints and opening control devices.** Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools, or special knowledge. Window opening control devices and fall prevention devices complying with ASTM F2090 shall be permitted for use on windows serving as a required emergency escape and rescue opening and shall be not more than 70" (177.8 cm) above the finished floor shall comply with ASTM F2090.
R310.2.2 R310.2.3 Window sill height. Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than the bottom of the clear opening not greater than 44 inches (1118 mm) above the floor; where the sill height is below grade, it shall be provided with a window well in accordance with Section R310.2.3.
R310.4 Area Wells

- **R310.4.2.2 Steps.** Steps shall have an inside width of at least 12 inches (305 mm), a minimum tread depth of 5 inches (127 mm) and a maximum riser height of 18 inches (457 mm) for the full height of the area well.
R310.9.1 Existing Emergency Escape and Rescue Openings

R310.9.1 Existing Emergency escape and rescue openings. Where a change of occupancy would require emergency escape and rescue opening in accordance with Section 310.1, operable windows serving as the emergency escape and rescue opening shall comply with the following:

1. An existing operable window shall provide a minimum net clear opening of 4 square feet (0.38 m²) with a minimum net clear opening height of 22 inches (559 mm) and a minimum net clear opening width of 20 inches (508 mm).
R310.9.1 Existing Emergency Escape and Rescue Openings

R310.9.1 Existing Emergency escape and rescue openings. Where a change of occupancy would require emergency escape and rescue opening in accordance with Section 310.1, operable windows serving as the emergency escape and rescue opening shall comply with the following:

2. A replacement window where such window complies with both of the following:

   2.1 The replacement window meets the size requirements in Item 1.

   2.2 The replacement window is the manufacturer’s largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
R311.7 Stairways, R311.8 Ramps

**R311.7 Stairways.** Where required by this code or provided, stairways shall comply with this section.

**Exceptions:**

1. Stairways not within or attached to a building, porch or deck
2. Stairways leading to non-habitable attics
3. Stairways that lead to crawl spaces.

**R311.8 Ramps.** Where required by this code or provided, ramps shall comply with this section.

**Exception:** Ramps not within or attached to a building, porch or deck.
R311.7.7 Stairway Walking Surface

2021 Code: **R311.7.7 Stairway walking surface.** The walking surface of treads and landings of stairways shall be sloped not steeper than one unit vertical in 48 inches units horizontal (2-percent slope).

**Exception:** Where the surface of a landing is required elsewhere in the code to drain surface water, the walking surface of the landing shall be sloped not steeper than 1 unit vertical in 20 units horizontal (5-percent slope) in the direction of travel.
R314.3 Location

- 2021 Code: **R314.3 Location.** Smoke alarms shall be installed in the following locations:

- 5. In dwelling units where the ceiling height of a room open to a hallway serving bedrooms exceeds that of the hallway by 24 inches (610 mm) or more smoke alarms shall be installed in the hallway and in the room open to the hallway.

- **R314.3.1 Installation near cooking appliances.**

- 4. Smoke alarms listed and marked “helps reduce cooking nuisance alarms” shall not be installed less than 6 feet (1828 mm) horizontally from a permanently installed cooking appliance.
R315.2.2 Alterations, Repairs and Additions

• 2021 Code: R315.2.2 Alterations, repairs and additions.

• Exceptions:

• 2. Installation, alteration or repairs of plumbing or non-fuel-fired mechanical systems.
R317.1 Location Required

• 2021 Code: **R317.1 Location required.** Protection of wood and wood-based products from decay shall be provided in the following locations by the use of naturally durable wood or wood that is preservative-treated in accordance with AWPA U1.

• Replaces current language in R317.1.4 Wood Columns with Section 2304.12.2.2 of the IBC.
R320 Accessibility

• **R202 Definitions:**
  - Live/Work Unit
  - Sleeping Unit

• **R320.2 Live/work units.** In live/work units, the nonresidential portion shall be accessible in accordance with Sections 419.7 and 419.9 of the International Building Code. In a structure where there are four or more live/work units, the dwelling portion of the live/work unit shall comply with Section 1107.6.2.1 of the International Building Code.
R324.3 Photovoltaic Systems
R324.5 BIPV Systems

• Standards included for equipment listings
• Clarifies the references to the NFPA 70 code.
• Delineates the relationship between the electrical code sections and firefighter operations.
R326 Habitable Attics

R326.3 Story Above Grade Plane. A habitable attic shall be considered a story above grade plane.

**Exception:** A habitable attic shall not be considered to be a story above grade plane provided that the habitable attic meets all of the following:

1. The aggregate area of the habitable attic is not greater than one-third of the floor area of the story below or is not greater than one-half of the floor area of the story below where the habitable attic is located within a dwelling unit equipped with a fire sprinkler system in accordance with Section P2904.

2. The occupiable space is enclosed by the roof assembly above, knee walls, if applicable, on the sides and the floor-ceiling assembly below.

3. The floor of the habitable attic does not extend beyond the exterior walls of the story below.
R326 Habitable Attics

- **R326.4 Located above a third story.** Where a habitable attic is located above a third story, the dwelling unit or townhouse unit shall be equipped with a fire sprinkler system in accordance with Section P2904.
**R408.8 Under-floor Vapor Retarder**

**R408.8 Under-floor Vapor Retarder.** In Climate Zones 1A, 2A, and 3A below the warm-humid line, a continuous Class I or II vapor retarder shall be provided on the exposed face of air permeable insulation installed between the floor joists and exposed to the grade in the under-floor space. The vapor retarder shall have a maximum water vapor permeance of 1.5 perms when tested in accordance with Procedure B of ASTM E96.

**Exception:** The vapor retarder shall not be required in unvented crawl spaces constructed in accordance with Section R408.3
2021 International Residential Code® - Chapter 5: Floors
R507.10 Exterior Guards

**R507.10 Exterior guards.** Guards shall be constructed to meet the requirements of Section R301.5, R312 and this section.

**R507.10.1 Support of guards.** Where guards are supported on deck framing, guard loads shall be transferred to the deck framing with a continuous load path to the deck joists.

**R507.10.1.1 Guards supported by side of deck framing.** Where guards are connected to the interior or exterior side of a deck joist or beam, the joist or beam shall be connected to the adjacent joists to prevent rotation of the joist or beam. Connections relying only on fasteners in end grain withdrawal are not permitted.
R507.10 Exterior Guards

**R507.10.1.2 Guards supported on top of deck framing.** Where guards are mounted on top of the decking, the guards shall be connected to the deck framing or blocking and installed in accordance with manufacturer's instructions to transfer the guard loads to the adjacent joists.

**R507.10.2 Wood guards.** 4x4 wood posts supporting guard loads applied at the top of the guard shall not be notched at the connection to the supporting structure.

**R507.10.3 Plastic composite guards.** Plastic composite guards shall comply with the provisions of Section R507.2.2.

**R507.10.4 Other guards.** Other guards shall be in accordance with manufacturer's instructions or in accordance with accepted engineering principles.
2021 International Residential Code® -
Chapter 6:
Wall Construction
R602.10.1.2 Location of Braced Wall Line

Offsets along a Location of braced wall line. Where braced wall panels along a braced wall line fall in a single line, the braced wall line shall be located at those braced wall panels.

Exterior walls parallel to a braced wall line shall be offset not more than 4 feet (1219 mm) from the designated braced wall line location as shown in Figure R602.10.1.1.

Interior walls used as bracing shall be offset not more than 4 feet (1219 mm) from a braced wall line through the interior of the building as shown in Figure R602.10.1.1.
Table R602.10.3(1) Wall Bracing - Wind Speed

- Table R602.10.3(1) Bracing Requirements Based on Wind Speed

<table>
<thead>
<tr>
<th>Ultimate Design Wind Speed (mph)</th>
<th>Story Location</th>
<th>MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINEa</th>
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<td>Braced Wall Line&lt;sup&gt;b&lt;/sup&gt;</td>
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</table>
R609.4.1 Garage Door Labeling

- **R609.4.1 Garage door labeling.** Garage doors shall be labeled with a permanent label provided by the garage door manufacturer. The label shall identify the garage door manufacturer, the garage door model/series number, the positive and negative design wind pressure rating, the installation instruction drawing reference number, and the applicable test standard.
2021 International Residential Code® - Chapter 7: Wall Coverings
R704 Soffits

- **R704.1 General wind limitations.**
- **R704.2 Soffit installation where the design wind pressure is 30 psf or less.**
- **R704.2.1 Vinyl soffit panels.**
- **R704.2.2 Fiber-cement soffit panels**

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**Single Span Vinyl Soffit Panel**

**Double Span Vinyl Soffit Panel**
R703.7.3 Water-Resistive Barriers

R703.7.3.1 Dry Climates. In dry (B) climate zones indicated in Figure N1101.7, water-resistive barriers shall comply with one of the following:

1. The water-resistive barrier shall be two layers of 10-minute Grade D paper or have a water resistance equal to or greater than two layers of a water-resistive barrier complying with ASTM E2556, Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane. Flashing installed in accordance with Section R703.4 and intended to drain to the water-resistive barrier, shall be directed between the layers.

2. The water-resistive barrier shall be 60-minute Grade D paper or have a water resistance equal to or greater than one layer of a water-resistive barrier complying with ASTM E2556, Type II. The water-resistive barrier shall be separated from the stucco by a layer of foam plastic insulating sheathing or other non-water-absorbing layer or a designed drainage space.
R703.7.3 Water-Resistive Barriers

R703.7.3.2 Moist or marine climates. In the moist (A) or marine (C) climate zones indicated in Figure N1101.7, water-resistive barriers shall comply with one of the following:

1. In addition to complying with Section R703.7.3.1, a space or drainage material not less than 3/16 inch (5 mm) in depth shall be added to the exterior side of the water-resistive barrier.

2. In addition to complying with Section R703.7.3.1 Item 2, drainage on the exterior side of the water-resistive barrier shall have a drainage efficiency of not less than 90%, as measured in accordance with ASTM E2273 or Annex A2 of ASTM E2925.
R703.11.2 Installation over Foam Plastic Sheathing

- Table R703.11.2 Required Minimum Wind Load Design Pressure Rating for Vinyl Siding Installed Over Foam Plastic Sheathing Alone.

<table>
<thead>
<tr>
<th>ULTIMATE DESIGN WIND SPEED (MPH)</th>
<th>ADJUSTED MINIMUM DESIGN WIND PRESSURE (ASD) (PSF)(^a)(^b) Case 1: With interior gypsum wallboard(^d)</th>
<th>Case 2: Without interior gypsum wallboard(^d)</th>
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<tr>
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<td>See footnote d (^d)</td>
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2021 International Residential Code® -
Chapter 8:
Roof-Ceiling Construction
R802.6 Bearing. The ends of each rafter or ceiling joist shall have not less than 1-1/2 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on masonry or concrete. The bearing on masonry or concrete shall be direct, or a sill plate of 2-inch (51 mm) minimum nominal thickness shall be provided under the rafter or ceiling joist. The sill plate shall provide a minimum nominal bearing area of 48 square inches (30 865 mm). Where the roof pitch is greater than or equal to 3:12 (25% slope), and ceiling joists or rafter ties are connected to rafters to provide a continuous tension tie in accordance with Section R802.5.2, vertical bearing of the top of the rafter against the ridge board shall satisfy this bearing requirement.
Discussion and Final Reflection
Discussion Activity
Final Reflection

This slide will help the learner to reflect on the day and what they will take back to the job and apply.

**What?** What happened and what was observed in the training?

**So what?** What did you learn? What difference did this training make?

**Now what?** How will you do things differently back on the job as a result of this training?
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