

Memo

To: Mayor Dunn and Members of the Council
From: Travis Torrez, MCP, Building Official
CC: Scott Lambers, Richard Coleman, Gene Hunter
Date: January 21, 2020
Re: Proposed 2018 Code Adoption

After a 12 month evaluation, Community Development and the Fire Department would like to recommend the adoption of the following Building/Fire Codes (as amended).

- 2018 International Building Code
- 2017 National Electrical Code
- 2018 International Plumbing Code
- 2018 International Mechanical Code
- 2018 International Fuel Gas Code
- 2018 International Existing Building Code
- 2018 International Energy Conservation Code
- 2018 International Residential Code for One & Two Family Dwellings
- 2018 International Swimming Pool and Spa Code
- 2018 International Property Maintenance Code
- 2018 International Fire Code

Vetting Process

In an effort to have consistency amongst different municipalities, and at the urging of local administrators, the Johnson County Code Committee was formed in 2012 prior to the 2012 Code Adoption. Seeing the benefit of this process, the Johnson County Code Committee replicated those efforts with the 2018 Codes.

- Johnson County Code Committee – Group of area Building Officials from Leawood, Olathe, Shawnee, Lenexa, Gardner, Prairie Village, Merriam, DeSoto, and Johnson County Unincorporated working together to evaluate all 2018 code changes with the purpose of reaching more consistent standards throughout jurisdictions. The committee members met

monthly throughout 2018, and have been in constant communication over key code adoption items throughout 2019.

- Home Builder's Association – The Kansas City Home Builder's Association was active in the local discussions through the Johnson County Code Committee and the Johnson County Building Official meetings. The HBA provided input, and their suggested changes were considered and in some cases accepted by the committee.

Other Jurisdictions

Lenexa, Olathe, Shawnee, DeSoto, Lawrence, and Lee's Summit have already adopted the 2018 Codes with amendments.

Johnson County, Prairie Village, Merriam, and Gardner are all on a similar adoption timeline as Leawood, with plans to go before Governing Body in early 2020. Overland Park is still evaluating the 2018 Codes.

Significant Changes from 2012 to 2018

Most of the changes to the existing amendments were to match code sections or code language that changed in the model codes between 2012 and 2018. We try to have that language match with the exception of what we intend to amend.

Some other minor changes were recommended by code or legal staff to better match formatting across all codes, or to match current policies and procedures.

The following Significant Changes document includes a summary of the significant amendments that are being proposed with the 2018 Code Adoption.

Additional Storm Shelter information has been provided as well. In summary – the ICC-500 is based on and was developed in partnership with FEMA and incorporates and essentially codifies the FEMA-361 requirements. The FEMA-361 is actually a little more stringent than the ICC-500, but they are very similar (comparison matrix attached). The cost impact summary of providing storm shelters is also provided and can increase the cost of construction for the area of the storm shelter from 5-32 percent.

Significant Changes

<u>Code Section</u>	<u>Summary</u>
Article 1 - Administration	
	No significant changes to current amendments proposed
Article 2 - Building Code	
4-201	Kansas State Statute now only requires one official copy of each code book
4-226A (IBC 305.2.3)	Matched Leawood Development Ordinance in allowing 6 or fewer children in home daycares. Model code would make more than 5 a commercial occupancy
4-226B (IBC 423.2)	Added requirements for fixed seating and first aid kits to be provided for storm shelters
IBC 423	Model Code now requires storm shelters in Group E schools, emergency operation centers, fire, and police stations - no amendment proposed.
4-226C (IBC 429)	Storm Shelters have previously been required for Apartments. Proposing to add other facilities where individuals may reside - Assisted Living Facilities, Nursing Homes, Hotels, Hospitals, and similar occupancies - Lenexa and Olathe have adopted similar requirements to what Leawood staff is proposing. Shawnee and DeSoto did not add any occupancies to the model code. Other jurisdictions pending. See additional info on Storm Shelters attached.
4-227A (IBC 903.3)	Making it clear that nail guards are required for fire-sprinkler piping similar to other plastic plumbing systems
4-243	Duties of Structure Moving Permittee moved to Article 7 - Existing Building Code - Section 4-707
Article 3 - Electrical Code	
	No significant changes to current amendments proposed
Article 4 - Plumbing Code	
	No significant changes to current amendments proposed
Article 5 - Mechanical Code	
	No significant changes to current amendments proposed
Article 6 - Fuel Gas Code	
	No significant changes to current amendments proposed
Article 7 - Existing Building Code	
4-701	The section of the IBC that addressed Existing Buildings has been eliminated by the ICC and released in it's own code book making it necessary to adopt the Existing Building Code for repairs, reconstruction and additions to existing buildings.

4-705 (IEBC 1106.1)	Model Code requires storm shelters to be provided for significant additions to existing facilities in Group E Schools. We are proposing to require the same for occupancies where individuals reside - Apartments, Assisted Living Facilities, Nursing Homes, Hotels, Hospitals and similar occupancies.
4-706 (IEBC 1106.1.1)	Changed title of the section to make it clear that this requirement is only for Group E occupancies, as was intended by the model code.

Article 8 - Energy Conservation Code

	No significant changes to current amendments proposed. Residential Energy requirements are codified in the Residential Code and contain the exact same provisions as those in the Energy Conservation Code.
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Article 9 - Residential Code

4-939D (IRC R306.5)	Porta-johns were specifically required in instances during construction in the last code update. Adding requirements for the placement of porta-johns during construction.
4-952A (IRC R801.3)	Changing roof drain discharge requirements from 5 feet to 3 feet to alleviate violations of city code which requires discharge a minimum of 10 feet from property lines.
4-954A (IRC R908.7)	Making it clear that duplexes and townhomes must have matching roofs for the entire building
4-9555A (IRC 1101.13.1)	Minimum Home Energy Rating Score for Energy Code compliance changed from 85 to 80 (the lower the score, the more energy efficient the home)
4-955B (IRC N1102.4.1.2)	Blower Door Test to verify tightness of home is now required - to match policy established in 2015.
IRC 3901.9	Model Code now requires convenience GFCI outlets in each vehicle bay in a garage.
IRC 3902.16	Model Code has expanded Arc-fault protection requirements to include kitchen and laundry areas
4-964 Deleted	Swimming Pool and Hot Tub Barrier requirements have been moved by the ICC from the appendix of the IRC to the International Swimming Pool and Spa Code. This requirement will now be amended in that code - Section 4-1004.

Article 10 - Swimming Pool, Spa, and Hot Tub Code

4-1001	The section of the IBC and IRC that addressed Swimming Pools has been eliminated by the ICC and released in it's own code book making it necessary to adopt the International Swimming Pool and Spa Code.
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4-1005 and 4-1006 (ISPSC 305.2.5 and 305.2.6)	Proposing to allow fences with a minimum 44" top to top between horizontals (model code requires 45"). Want to allow more fence profiles for owner's especially since a 48" fence is the max height permitted for a fence prior to pool construction in Leawood. Many single rail steel fence profiles do not meet the 45" rule, but would meet a 44" rule.
4-1006 (ISPSC 305.2.6)	Proposing to allow fences with a minimum 32" top to top between horizontals where an automatic pool cover is provided for the pool or a lockable safety cover is provided for the spa. The model code would actually allow a pool or spa with listed covers without any fence - we have amended the code to not permit that for safety reasons, but feel this will give owner's another option to choose if their existing fence meets relatively safe barrier requirements <u>and</u> they are providing listed covers which is very common.
4-1007 (ISPSC 305.4)	Proposing to eliminate the new requirement that requires alarms on house windows that communicate with a pool or spa area, and also to allow different alarm systems for doors that communicate with pool or spa areas.

Chapter 8, Article 5 - Property Maintenance

	No significant changes proposed to current amendments
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FEMA P-361 VS FEMA P-320

FEMA P-361 provides design and construction guidance for community and residential safe rooms primarily intended for registered design professionals, whereas FEMA P-320 (2014) provides residential and small business safe room guidance specifically aimed at homeowners, builders, and contractors, though it can also be used by registered design professionals and local officials. FEMA P-320 includes prescriptive site-built safe room design drawings developed using the design criteria presented in FEMA P-361.

A copy of FEMA P-320 may be downloaded from:

www.fema.gov/safe-room-resources/fema-p-320-taking-shelter-storm-building-safe-room-your-home-or-small-business.

A1.2.2 Development of ICC 500

Using the first edition of FEMA P-361 (2000) as guidance, the ICC, in partnership with FEMA and the NSSA, formed a national committee that developed and released a consensus standard to codify the design and construction requirements of tornado and hurricane shelters. This standard, the ICC 500, was completed in the summer of 2008 and updated in 2014.

Since 2009, the IBC and IRC have incorporated ICC 500 by reference to regulate the design and construction of buildings, or portions thereof, designated as storm shelters to provide life-safety protection from tornadoes and hurricanes. Under the 2009, 2012, and 2015 IBC and IRC, whenever storm shelters are constructed, whether stand alone or part of a structure, the ICC 500 standard must be met. In addition, Sections 423.3 and 423.4 of the 2015 IBC requires ICC 500 storm shelters to be incorporated when any of the following are constructed: K-12 school buildings with an occupant load of 50 or more; 911 call stations; fire, rescue, ambulance, and police stations; and emergency operation centers. The requirement applies only in the 250 mile per hour (mph) tornado wind speed zone (see Figure B3-1 for wind speed zone details), and some exceptions are allowed.

The purpose and scope of the ICC 500 are:

ICC 500, Section 101.1 Purpose. The purpose of this standard is to establish minimum requirements to safeguard the public health, safety, and general welfare relative to the design, construction, and installation of storm shelters constructed for protection from high winds associated with tornadoes and hurricanes. This standard is intended for adoption by government agencies and organizations for use in conjunction with model codes to achieve uniformity in the technical design and construction of storm shelters.

ICC 500, Section 101.2 Scope. This standard applies to the design, construction, installation, and inspection of storm shelters constructed for protection from high winds associated with tornadoes and hurricanes. Storm shelters may be separate detached buildings or rooms and areas within buildings. Shelters designed and constructed to this standard shall be designated as either hurricane shelters, tornado shelters, or combined hurricane and tornado shelters.

A1.2.3 ICC 500 Comparison with FEMA P-361

Although similar, FEMA P-361 and ICC 500 have important differences between the requirements and criteria described in each, as well as in the terminology used.

- The purpose and scope of ICC 500 is to establish minimum requirements for the design, construction, installation, and inspection of storm shelters that provide life safety.

- The purpose and scope of FEMA P-361 is to provide guidance—including emergency management considerations – for safe rooms that provide near-absolute protection.



SAFE ROOMS AND STORM SHELTERS

FEMA defines “safe rooms” as buildings or portions thereof that comply with the criteria described in this publication.

ICC 500 defines “storm shelters” as buildings or portions thereof that comply with ICC 500.

Though similar, there are important differences. All safe room criteria in FEMA P-361 meet the storm shelter requirements of the ICC 500, but FEMA P-361 includes a few design and performance criteria that are more conservative than those in the ICC 500.

Refer to Section A1.3 for definitions and terminology.

From a technical standpoint, the ICC 500 successfully standardizes and codifies much of the design guidance provided in the 2000 edition of FEMA P-361. However, some of the criteria in FEMA P-361 were modified during the consensus process that produced the ICC 500. FEMA acknowledges the rationale behind some of the changes and has accepted the new criteria with some exceptions, all of which are described in Part B of this publication and summarized in Table D-1 in Appendix D.

FEMA regularly reviews its safe room design criteria and believes some issues related to the design wind speed for residential tornado safe rooms, flood hazards, and operating a safe room warrant a more conservative approach than the one agreed upon in the ICC 500 consensus standard process. FEMA’s recommendations and best practices related to these topics are described in FEMA P-361. In addition to the technical differences between ICC 500 and FEMA P-361, users should note that FEMA P-361:

- Defines a safe room differently than ICC 500 defines a storm shelter (refer to text box above and Section A1.3)
- Includes best practices, while ICC 500 is a minimum standard
- Includes operational issues and concerns not addressed by ICC 500
- Includes guidance for emerging issues and concerns from lessons learned by FEMA from assessment conducted after extreme-wind events

A1.2.4 FEMA Safe Room Grant Funding Program

FEMA is committed to the development of design and construction criteria and guidance for safe rooms and continues to advocate designing and constructing safe rooms as evidenced by its continuing support of safe room initiatives through several grant programs.

As of January 2015, FEMA grant programs have provided approximately \$984 million in Federal funds towards the design and construction of nearly 25,000 residential and 2,000 community safe rooms in 25 States and Territories.



HMA UNIFIED GUIDANCE

The FEMA HMA Unified Guidance is updated periodically. For information on FEMA grant programs and safe room eligibility, download the most current policy HMA Unified Guidance from: www.fema.gov/hazard-mitigation-assistance.

A1.3 Safe Room Terminology

The terms “safe room” and “storm shelter” have been used interchangeably in past publications, guidance documents, and other shelter-related materials. However, to distinguish between shelters that meet the ICC 500

APPENDIX D

Comparison Matrix of Differences Between ICC 500 Requirements and FEMA Recommended Criteria

ICC 500 REFERENCE	ICC 500 REQUIREMENTS FOR STORM SHELTERS	FEMA RECOMMENDED CRITERIA FOR SAFE ROOMS ^(a)
Section 107.1 General	Where required by the authority having jurisdiction, construction documents shall be prepared. Such documents shall contain information as required by the applicable building code and this section.	For all safe rooms construction documents shall be prepared and maintained. Such documents shall contain information as required by the applicable building code and this section.
Section 107.2.1 Design Information	For the areas of a building designed for occupancy as a storm shelter, the following information shall be provided within the construction documents: 2. A statement that the wind design conforms to the provisions of the <i>ICC/NSSA Standard for the Design and Construction of Storm Shelters</i> , with the edition year specified.	2. A statement that the wind design conforms to the provisions of the ICC/NSSA Standard for the Design and Construction of Storm Shelters, with the edition year specified and to the provisions of FEMA P-361, with the edition year specified.
Section 304.2 Design Wind Speed	For tornado shelters, the design wind speed shall be in accordance with Figure 304.2(1). For hurricane shelters, the design wind speed shall be in accordance with Figure 304.2(2). ^(b)	For all residential safe rooms, the design wind speed shall be 250 mph, regardless of location.

APPENDICES

ICC 500 REFERENCE	ICC 500 REQUIREMENTS FOR STORM SHELTERS	FEMA RECOMMENDED CRITERIA FOR SAFE ROOMS ^(a)
<p>Section 401.1.1 Minimum floor elevation of community shelters</p>	<p>The lowest floor used for the occupied shelter and occupant support areas of a community shelter shall be elevated to the higher of the elevations determined by:</p> <ol style="list-style-type: none"> 1. The flood elevation, including coastal wave effects, having a 0.2 percent annual chance of being equaled or exceeded in any given year; or 2. The flood elevation corresponding to the highest recorded flood elevation if a flood hazard study has not been conducted for the area; or 3. The maximum flood elevation associated with any modeled hurricane category including coastal wave effects; or 4. The minimum elevation of the lowest floor required by the authority having jurisdiction for the location where the shelter is installed; or 5. Two feet above the flood elevation having a 1 percent annual chance of being equaled or exceeded in any given year. <p><u>Exception:</u> Items no. 1 and 3 shall not apply to shelters designed, constructed, designated, and used only as tornado shelters.</p>	<p>The lowest floor used for the occupied safe room and occupant support areas of a community safe room shall be elevated to or above the higher of the elevations determined by:</p> <ol style="list-style-type: none"> 1. The flood elevation, including coastal wave effects, having a 0.2 percent annual chance of being equaled or exceeded in any given year^(c); or 2. The flood elevation corresponding to the highest recorded flood elevation if a flood hazard study has not been conducted for the area; or 3. The maximum flood elevation associated with any modeled hurricane category including coastal wave effects; or 4. The minimum elevation of the lowest floor required by the authority having jurisdiction for the location where the safe room is installed; or 5. Two feet above the flood elevation having a 1 percent annual chance of being equaled or exceeded in any given year.^(c) <p><u>Exception:</u> Item 3 (only) shall not apply to safe rooms designed, constructed, designated and used only as tornado safe rooms.</p>
<p>Section 401.1.2 Minimum floor elevation of residential shelters</p>	<p>The lowest floor used for the occupied shelter area of a residential shelter shall be elevated to the higher of the elevations determined by:</p> <ol style="list-style-type: none"> 1. The flood elevation, including coastal wave effects, having a 0.2-percent annual chance of being equaled or exceeded in any given year; or 2. The flood elevation corresponding to the highest recorded flood elevation if a flood hazard study has not been conducted for the area; or 3. The maximum flood elevation associated with any modeled hurricane category, including coastal wave effects; or 4. The minimum elevation of the lowest floor required by the authority having jurisdiction for the location where the shelter is installed. <p><u>Exception:</u> Items 1 and 3 shall not apply to shelters designed, constructed, designated, and used only as tornado shelters.</p>	<p>The lowest floor used for the occupied residential safe room shall be elevated to the higher of the elevations determined by:</p> <ol style="list-style-type: none"> 1. The flood elevation, including coastal wave effects, having a 0.2 percent annual chance of being equaled or exceeded in any given year^(c); or 2. The flood elevation corresponding to the highest recorded flood elevation if a flood hazard study has not been conducted for the area; or 3. Not Applicable^(d) 4. The minimum elevation of the lowest floor required by the authority having jurisdiction for the location where the shelter is installed. 5. The flood elevation having a 1 percent annual chance of being equaled or exceeded in any given year.^(c) <p><u>Exception:</u> Item 1 (only) shall not apply to safe rooms designed, constructed, designated, and used only as tornado safe rooms.</p>

APPENDICES

ICC 500 REFERENCE	ICC 500 REQUIREMENTS FOR STORM SHELTERS	FEMA RECOMMENDED CRITERIA FOR SAFE ROOMS ^(a)
Section 404.1 Community Shelter Siting	<p>Community shelters shall be located outside of the following high-risk flood hazard areas:</p> <ol style="list-style-type: none"> 1. Flood hazard areas subject to high-velocity wave action (V zones) 2. Floodways <p>Exception: Community shelters shall be permitted in flood hazard areas subject to high-velocity wave action (V zones) where permitted by the Board of Appeals in accordance with the provisions of the International Building Code.</p>	<p>Community safe rooms shall be located outside of the following high-risk flood hazard areas:</p> <ol style="list-style-type: none"> 1. Flood hazard areas subject to high-velocity wave action (V zones) and Coastal A zones^(d) 2. Floodways <p>Exception: Community safe rooms shall be permitted in flood hazard areas subject to high-velocity wave action (V zones) and Coastal A zones^(d) where permitted by the Board of Appeals in accordance with the provisions of the International Building Code and after completing the 8-step Decision Process for Executive Order (EO) 11988, as amended, and as provided by Title 44 of the Code of Federal Regulations Part 9.6, Decision-Making Process.</p>
Residential Shelter Siting	<i>[ICC 500 does not provide restrictions for siting residential shelters in flood hazard areas]</i>	<p>Residential safe rooms shall be located outside of the following high-risk flood hazard areas:</p> <ol style="list-style-type: none"> 1. Flood hazard areas subject to high-velocity wave action (V zones) and Coastal A zones^(e); 2. Floodways; 3. Any areas subject to storm surge inundation associated with any modeled hurricane category, including coastal wave effects.
Section 702.4 First aid kit	A first aid kit shall be supplied in all tornado shelters with a shelter occupant load of greater than 50.	A first aid kit rated for the number of safe room occupants, as listed in the construction documents , shall be supplied in all tornado safe rooms.
Section 703.7 First aid kit	A first aid kit shall be supplied in all community hurricane shelters.	A first aid kit rated for the number of safe room occupants, as listed in the construction documents , shall be supplied in all hurricane safe rooms.

***Bolded text** denotes differences between the ICC 500 Requirement and the FEMA Recommended Criteria.

Table notes:

- (a) Table only lists differences between FEMA P-361 and referenced ICC 500 Chapter. All ICC 500 requirements not listed in the table should also be met in their entirety.
- (b) ICC 500 tornado wind speeds for all storm shelters range from 130 mph to 250 mph. ICC 500 hurricane wind speeds for all storm shelters range from 160 mph to 235 mph.
- (c) Where an approximate or detailed flood hazard study has been completed but the 1-percent- and/or 0.2-percent-annual-chance flood elevations have not been determined, those elevations should be obtained from the authority having jurisdiction or determined in accordance with accepted hydrologic and hydraulic engineering practices used to define Special Flood Hazard Areas.
- (d) Not applicable because residential safe rooms should not be located in areas subject to storm surge inundation associated with any modeled hurricane category; refer to Residential Shelter Siting with respect to flood hazards in this table.
- (e) Coastal A Zones are defined as the area landward of Zone V or landward of an open coast without mapped Zone V. The inland limit of the Coastal A Zone is the Limit of Moderate Wave Action if delineated on a Flood Insurance Rate Map or designated by the authority having jurisdiction.

consistent with current FEMA guidance for a maximum five minute walk time to reach the tornado shelter.

Cost Impact: This proposal will increase the cost of construction.

The most recent information on costs is available in FEMA P-361, *Design and Construction Guidance for Community Safe Rooms (Second Edition, August, 2008)*. All of the values described below related to cost come from that publication. It should be noted that tornado shelters designed and constructed in accordance with FEMA P-361 guidelines are called safe rooms. FEMA's safe room guidelines are similar to ICC 500, but there are some differences. Where there are differences, in all cases, FEMA requirements are *more* stringent than ICC 500, as documented on page 1-2 of FEMA P-361, which states "All safe room criteria in this publication meet or exceed the shelter requirements of ICC 500." Shelters built to ICC 500 would therefore cost less, but there is no data available to quantify that cost reduction.

FEMA 361 describes safe room costs for new building projects as follows. "For large new building projects, however, the percent increase in the overall project cost is quite small. For example, many safe rooms protecting 200 to 300 occupants being constructed as part of a new school have added only 1 to 2 percent to the total project cost when the safe room was included in the design process at the beginning of the project."

Based on review of 36 safe room grant applications from 2008, the average safe room cost per square foot for projects considered technically feasible and effective for providing protection was \$188/sf. From more expanded grant application data from years 2005 to 2008, the percent increase in building cost to harden a portion of a building to meet the safe room requirements ranged from 5-32 percent (cost increase per square foot of the safe room area being hardened). More information on safe room costs can be found in Chapter 2 of FEMA P-361.

Costs for storm shelters are anticipated to decrease as their use becomes more widespread. The adoption of requirements for storm shelters in tornado prone areas for Group E Occupancies and first responder facilities in the 2015 IBC will lead to installation of many more storm shelters than are currently being built. Subsequently, shelters will become less of a specialty item from a design and construction standpoint.⁵ As the market expands for specialty products needed in shelters, like tornado resistant doors, windows and shutters, economies of scale and new manufacturers joining the industry will also lead to cost reductions.

⁵ Previous studies have shown that the premium for new-technology introduction costs disappear once the designer is satisfied with the technology's performance, the technology enters full implementation, and its application has become routine. See for example Ehlen, Mark A., and Harold E. Marshall. 1996. *The Economics of New-Technology Materials: A Case Study of FRP Bridge Decking*. NISTIR 5864. Gaithersburg, MD: National Institute of Standards and Technology.