



OLATHE FIRE DEPARTMENT

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MEMORANDUM:

Olathe Fire Department – Community Risk Reduction Section Building Codes Division

TO: Michael Wilkes, City Manager
Jeff DeGraffenreid, Fire Chief

FROM: Mark Wassom, Assistant Chief / Chief Building Official

DATE: April 10, 2019

SUBJECT: **2018 Building Codes Adoption – Cursory Cost Analysis**

Introduction:

The Building Codes Division presented information pertaining to the adoption and amendment of the 2018 International Codes, with the exception of the 2018 Energy Conservation Code (IECC). The IECC is proposed to remain as the 2012 Edition. During this presentation, several questions were raised pertaining to the cost of adopting new codes.

Estimating the cost of code changes is incredibly difficult due to the large number of variables and unique features of each and every project. The City would not have the resources to perform a comprehensive study individually, but several different organizations prepare reports on different subjects within the codes. A large portion of our permitting and construction work is residential; therefore we can utilize documents prepared by the National Association of Home Builders for residential construction. We will separately send two documents to the City Council pertaining to residential cost in the 2018 codes. One covers single family residences and the other covers multi-family townhome and apartment projects.

The documents do a good job of summarizing cost comparisons for many conditions found in residential construction. In reviewing these documents, we can find examples of things that cost more in newer codes, but we also find many examples of things that cost less with the new requirements. We know that new code requirements are often related to fire and life safety. It is important to recognize that building officials, builders and trade associations involved in the code revision process also propose many changes that will result in cost savings to builders and home/building owners. Changes in technology, materials, construction methods and general construction process and philosophy can result in cost savings in newer codes. Staff has also made a concerted effort to coordinate proposed changes with the local industry to minimize costs in code amendments. Compromises in energy codes especially save a significant amount of construction cost.

Analysis of the cost estimates for the overall changes in codes from 2012 to 2018 editions are too complex, so we will rely upon the research of trade associations. This document will focus on the cost impacts of the proposed amendments to the model codes. We will outline several subjects and describe the cost impacts of these changes.

Cost Analysis of Significant Changes:

1) International Building Code (IBC)

- a) **107.1.1 – Plans for one- and two-family dwellings will require architect and engineer seals for designs.**
 - i) The majority of plans we receive are already stamped by engineers/architects due to performance based structural designs. For those that do not, we believe this would cost \$200-\$1,000 additional during design of the home, depending upon the size and complexity of the design.
- b) **107.2.9 – Code footprint drawings are required for certain occupancies where required by the State Fire Marshal's Office.**
 - i) This is already required by the State; therefore, this does not have a cost impact.
- c) **423.5 – Storm shelter areas are required for R-1, R-2, R-3, R-4 residential, I-1 and I-2 institutional occupancies.**
 - i) Basements and rooms commonly provided below the front steps in residential buildings are considered to provide the required storm protection, therefore additional storm shelters will not be required. This requirement will primarily impact townhomes and apartments.
 - ii) Modular storm shelters for individual dwelling units that will shelter 5-6 persons range from \$4,900 to \$5,600 installed (tornadotoughshelters.com). Shelters that are built into the home during construction would likely be lower cost as they would be integrated into the structure as it is built.
 - iii) We are not able to estimate the cost for sheltering in an apartment or hospital environment as it would be highly dependent upon building features and design. Integration of a storm shelter will add cost to these projects.
- d) **[F] 903.2.9(6) – The threshold for fire sprinkler protection for S-1 mini storage reduced to 2,500 SF.**
 - i) The cost for dry-pipe fire sprinkler systems is frequently estimated at \$2.50 to \$5.00 per square foot. These systems will be relatively simple in layout and piping but will require a heated room for riser equipment that is not currently in most designs. A lot of cost is in the service tap and trenching for the underground mains. Projects with multiple small buildings would benefit from an economy of scale and duplicated design, therefore square foot cost would go down. Cost is also dependent upon building size. Cost per square foot goes down as building size increases.
- e) **[F] 903.3.1.2.1 – Sprinkler protection shall be provided for balconies and decks of multi-family dwelling buildings, regardless of construction type.**
 - i) This is already common practice because it is currently required for apartment buildings of combustible construction. That is the predominate construction type in this area. We would estimate that adding these sprinklers would be approximately \$200 - \$500 per head for the rare projects that don't already have them.

- f) **[F] 903.3.1.2.1 – Sprinkler protection, or other measures required for combustible attics of multi-family dwelling buildings, regardless of height.**
 - i) This requirement will be difficult to estimate since building designs can vary greatly in layout and complexity. New systems and design methods are available that can make attic projection very simple with only a single pipe down the center. Other more complex roofs may have more complex designs. We would estimate a dry-pipe sprinkler system in an attic to be approximately \$2.50 / square foot for piping. The system will also require a dry-valve and compressor that will cost approximately \$6,000.
- g) **903.3.1.2.4 – Sprinkler protection for attached garages in multi-family residential.**
 - i) Adding a dry-barrel sprinkler to an attached garage would be estimated at \$200 - \$500 per sprinkler / unit. Most attached garages in townhomes and apartments can be protected with a single sprinkler per garage bay.
- h) **903.3.1.3.1 – Sprinkler protection for attached garages in townhomes.**
 - i) Adding a dry-barrel sprinkler to an attached garage would be estimated at \$200 - \$500 per sprinkler / unit. Most attached garages in townhomes and apartments can be protected with a single sprinkler per garage bay.
- i) **903.3.5.3 – Main control valve for fire sprinkler systems.**
 - i) This will only affect projects that have the backflow preventer for the fire sprinkler system outside the building in a vault. It will allow the fire department to turn off sprinkler systems more quickly once the fire is out to reduce water damage. The cost of this additional valve is approximately \$600.
- j) **903.4.3 – Floor control valves for sprinkler systems in 3 or more story buildings.**
 - i) Adding a floor control valve assembly would add approximately \$1,000 per floor. These are currently required for buildings generally 7 stories and higher. The valves would be added to buildings from 3-7 stories.
- k) **3001.6 – Elevator certificates will be required for occupancy and annual inspections. Additional requirements for permits and fees have been deleted.**
 - i) This change reduces costs for our businesses. They were previously required to pay a \$30 annual fee per elevator. This change will remove that fee and will allow all elevator inspection certificates to be uploaded through our inspection reporting system (Compliance Engine) for \$12 per building (not per elevator).

2) International Residential Code (IRC)

- a) **R303.4 – Modification of mechanical ventilation requirements.**
 - i) This existing amendment lowers builder and consumer cost as compared to the prescriptive code. This change is estimated to save consumers approximately \$650, in addition to avoiding the cost of operating ventilation on an ongoing basis. Estimates of annual ventilation power cost are approximately \$100/year.

- b) **R313.1 – Automatic fire sprinkler systems are required in multi-family dwelling units with 3 or more units. This will apply to townhome projects with 3 or more units.**
- i) We have estimates ranging from approximately \$7,000 - \$8,000 per unit for fire sprinklers in townhomes. Since the entire building is provided with a single service entrance and riser, the cost would go down per unit for larger buildings.
 - ii) The addition of fire sprinklers, however, provides other allowances that help to offset the cost. Examples are:
 - (1) The reduction of the fire wall fire resistance rating from 2-hours to 1-hour. In the NAHB analysis for an average design, the end townhouse (with a single fire wall) has a reduction of approximately \$2,550 and the mid-unit (two fire walls) has a reduction of approximately \$5,100.
 - (2) There is a potential reduction in the number of egress windows in the basement, for residences that have more than one bedroom in the basement. Without sprinklers, an escape window is required in each bedroom. In a sprinklered residence, only one is required for the entire basement. Each escape window eliminated is estimated to reduce cost by \$1,555.
 - (3) Elimination of additional protection for wood I-joists and trusses. This has been estimated to add an average of \$500-\$600 that would be saved if the townhome was provided with fire sprinklers.
 - (4) Additional allowances are permitted for fire department access, fire flow and the quantity of fire hydrants for sprinklered townhome developments.
 - iii) With these allowances and exceptions gained by providing fire sprinklers, the cost of the fire sprinkler system is nearly offset. Additional savings are commonly available for the owners in reductions of insurance premiums. Common reductions are 10%-15%. The gains in fire protection and life safety provided by the fire sprinkler system are significant.
- c) **R319 – Illumination of address numbers is required.**
- i) This requirement simply states that street address numbers are to be placed near exterior lighting fixtures that are already required. They are not required to be illuminated at all times; they are to be illuminated when the homeowner turns the exterior lights on. This amendment only stipulates the arrangement of components that are already provided, therefore there is no cost impact.
- d) **R323.2 – A storm shelter area or basement is required in residential occupancies.**
- i) Basements and rooms commonly provided below the front steps in residential buildings are considered to provide the required storm protection, therefore additional storm shelters will not be required. This requirement will primarily impact townhomes and apartments.
 - ii) Modular storm shelters for individual dwelling units that will shelter 5-6 persons range from \$4,900 to \$5,600 installed (tornadotoughshelters.com). Shelters that are built into the home during construction would likely be lower cost as they would be integrated into the structure as it is built.
- e) **N1101.13 – Home Energy Rating System (HERS) energy code compliance method rating modified from 85 to 80.**
- i) Allowing the use of the Home Energy Rating System is a cost saving, performance-based design approach that the City placed into the 2012 codes before it was adopted nationally. It is now in the 2018 codes, although at a much lower score. We have modified the passing score consistently across the metro Kansas City area in cooperation with the local construction industry. The average

HERS rating for homes using this method averaged approximately 76 last year. Improvements in energy efficiency are often consumer driven, therefore performance typically exceeds requirements. This change in the HERS score is not expected to have a cost impact since most homes already rate below this number.

- f) **E3902.2, E3902.5 – Additional exceptions are provided for GFCI electrical receptacles.**
 - i) This change is estimated to save consumers approximately \$25 for each GFCI outlet avoided.

3) International Existing Building Code (IEBC)

- a) No significant changes

4) International Plumbing Code (IPC)

- a) **403.1 – Exceptions are added for service sinks; reducing the number of occupancies where they are required.**
 - i) This change will eliminate service sinks for some small occupancies. The cost savings is estimated at \$500.
- b) **410.4 – Provisions are added allowing more substitutions for drinking fountains.**
 - i) This change will allow reductions in the number of drinking fountains. Each drinking fountain is estimated to cost approximately \$2300 installed, therefore reducing the number required can result in significant savings.

5) International Mechanical Code (IMC)

- a) No significant changes.

6) International Fuel Gas Code (IFGC)

- a) No significant changes.

7) National Electrical Code (NEC)

- a) **210.8(A)(2) and 210.8(A)(5) – Additional exceptions are provided for GFCI receptacles in basements and garages.**
 - i) This change is estimated to save consumers approximately \$25 for each GFCI outlet avoided.

8) International Energy Conservation Code (IECC)

- a) The Energy Code will remain as the 2012 Edition at this time. Only minor changes are proposed, and the intent is to maintain current approach. There is a cost savings in the decision to not adopt the 2018 energy code.

9) International Swimming Pool and Spa Code (ISPSC)

- a) **305.4 – An additional provision is provided permitting the use of a home security system in lieu of a separate alarm for doors and windows leading to a pool area.**

- i) This will provide an additional option for those that already have a home security system. It does not change the requirement for door and window alarms, therefore there is no increased cost over current requirements. In some cases, there could be a cost reduction if some homeowners utilize their alarm system rather than purchasing an additional alarm system.

10) International Property Maintenance Code (IPMC)

- a) No technical changes are proposed, and there are no significant changes in the standard, therefore this does not have a cost impact.

11) International Fire Code (IFC)

- i) **105.6 – Operational permit requirements are modified. New operational permits are required for Special Amusement Buildings and Mobile Food Preparation Vehicles.**
 - (1) This will add permits for mobile food trucks and special amusement buildings. Fees are not established for these permits at this time, however similar annual permits are currently \$100 per year. These fees will need to be considered and set in the comprehensive fee schedule next year.
- b) **308.1.4 – Open flame cooking appliances prohibited on combustible balconies and decks in multi-family occupancies. Gas cooking appliances are permitted when fire sprinklers are provided.**
 - i) This amendment will provide greater flexibility for use of gas grills when balconies are protected by sprinklers. There is no cost impact to the building or consumer.
- c) **407.5, 407.6 – HMMP and HMIS are required for facilities requiring a hazardous materials permit.**
 - i) These plans will be required to be presented during design/permit application for hazardous materials facilities. Cost will depend upon complexity, but we would estimate engineering consultant costs for this document to be \$500 - \$2,500.
- d) **1103.5.1 – Group A-2 retroactive fire sprinkler requirements. Date of compliance is set at December 31, 2020.**
 - i) Adding fire sprinklers to an existing facility could range from \$3.00 to \$5.00 per square foot. Our amendment simply sets the effective date farther into the future. At this time, we are working to identify locations in our City where this will apply.
- e) **1103.5.3 – Group I-2 retroactive fire sprinkler requirements. Date of compliance is set at December 31, 2020.**
 - i) Adding fire sprinklers to an existing facility could range from \$3.00 to \$5.00 per square foot. Our amendment simply sets the effective date farther into the future. At this time, we are working to identify locations in our City where this will apply.
- f) **3310.1 – Fire access is required during construction before combustible construction commences.**
 - i) This amendment should not have a cost impact but may modify the sequence in which construction projects will follow. It requires the roadways and paved surfaces to be constructed at the beginning of the project rather than late in the project.
- g) **Appendix D – fire apparatus turnaround requirements for cul-de-sacs reduced to 78-foot diameter.**
 - i) Change in cul-de-sac diameter has been estimated to save \$18,000 in construction costs.

Other amendments reducing costs for builders/owners:

- a) Revisions to foundation requirements by allowing the Johnson County Foundation Standard.
- b) Existing energy conservation amendments reduce construction and consumer cost. The Kansas City HBA has estimated that amendments pertaining to Residential Codes save the consumer approximately \$6,100 per home. These modifications include, but are not limited to:
 - i) Reduction in exterior wall thickness and insulation.
 - ii) Removal of mandatory commissioning requirements.
 - iii) Removal of mandatory mechanical system testing.
 - iv) Removal of mandatory air leakage testing (although this is performed under the voluntary HERS design performance design method).
 - v) Modification of mechanical ventilation requirements.
 - vi) Permitting the continued use of building cavities for return air.
- c) Removal of retroactive photoluminescent exit path marking materials.
- d) Modification of crowd manager requirements.

This memo was intended to summarize the cost impact of the significant amendments proposed in the codes. As you can see, some will result in increased cost while others will actually reduce cost of construction. As mentioned previously, we will also send the Council two documents outlining the cost impacts of the codes overall for residential construction. Please remember though, these documents will address the code as written and will not address the amendments that we have implemented, both existing and new, that relieve some of the requirements and associated costs based upon our local construction practices.

Staff will provide this report and hold a discussion session to address further questions at the April 16 Council meeting. We then plan to return on May 6th for a vote on these proposed adoptions and amendments. Please do not hesitate to contact me if you require any further information on these proposals.

Sincerely,



Mark S. Wassom, P.E., FM, CBO
Assistant Chief of Community Risk Reduction / Chief Building Official