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# 2018 International Model Codes Review

May 15, 2018

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# Technical Advisory Group review of the 2018 International Model Building Codes

## Introduction

The Minnesota Legislature requires the Commissioner of the Department of Labor and Industry to review the International Model Building Codes every six years for their potential adoption as amended for use in Minnesota, beginning with the 2018 edition of the model codes.<sup>1</sup> The Commissioner must consult with the Construction Codes Advisory Council (CCAC).<sup>2</sup> The CCAC reviews the new model codes in order to provide recommendations to the Commissioner for their adoption and recommendations for revisions to current Minnesota Rules.<sup>3</sup> To facilitate their review of the model codes, the CCAC appointed ten Technical Advisory Groups (TAGs) and their members to review the 2015 and 2018 International Model Building Codes (I-codes), compare them to the current Minnesota rules, which largely adopt the 2012 I-codes as amended for use in Minnesota, and report their findings.

Each TAG conducted open meetings to allow the public to attend and participate in the review and discussion about changes in the 2015 and the 2018 I-codes. As a result, TAG members and the public identified concerns and drafted code change proposals to address those concerns. The TAG members and the public also discussed and identified any significant issues raised by those proposals.

Many of these code change proposals were editorial, such as renumbering Minnesota rule parts to align with the 2018 I-codes or deleting code sections from Minnesota rules that are no longer necessary because the 2018 I-codes have adopted similar language. These types of changes recommended by TAG members do not present meaningful or substantive changes to the provisions of the 2018 I-codes or current Minnesota rules.

This report highlights some of the more significant changes in the 2018 I-codes and those code change proposals that TAG members recommend to the CCAC.

The appendixes discuss code change proposals that TAG members could not agree to recommend to the CCAC, code change proposals that were not reviewed, and the membership of the TAGs.

- Appendix A describes areas of concern with the residential provisions of the 2018 International Energy Conservation Code (IECC) and the 2012 IECC as adopted by Minnesota Rules chapter 1322.
- Appendix B summarizes code change proposals TAG members did not agree to recommend to the CCAC, but identify areas of concern with the provisions of the 2018 I-codes or current Minnesota code provisions and suggest modifications.

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<sup>1</sup> See [Minnesota Statutes Section 326B.106](#).

<sup>2</sup> See [Minnesota Statutes Section 326B.106, subdivision 1](#).

<sup>3</sup> See [Minnesota Statutes Section 326B.07](#).

- Appendix C describes code change proposals that TAG members were unable to review because they were received after the final meeting date.
- Appendix D lists the TAGs, their members and the organizations they represent.

## **TAG recommendations**

### **Building Code Administration TAG (Chapter 1300)**

Building Code Administration TAG members met four times to review Minnesota Rules chapter 1300, which contains the administrative provisions of the Minnesota State Building Code. TAG members received nine code change proposals. The Building Code Administration TAG members were in agreement to recommend to the CCAC the following significant code change proposal as an amendment to Minnesota Rules chapter 1300.

#### ***Recommended code changes***

- Amend existing Minnesota Rules, parts 1300.0070 and 1300.0120, to add a definition of electrical substation facilities and to exempt substation facilities from the requirement to obtain a permit and inspection by a building official for substation foundations and fencing and equipment enclosures within electric substations that are affixed with an Interstate Industrialized Building Commission (IIBC) label. Local units of government have inconsistently enforced permitting and inspection requirements for electrical substations. The code change will promote uniform enforcement and is consistent with existing exemptions from permitting requirements for public utility towers and poles.

### **Commercial Building Code TAG (Chapter 1305)**

The Commercial Building Code TAG members met seven times to review the 2018 International Building Code (IBC) and Minnesota Rules, chapter 1305, which adopts the 2012 IBC with amendments. TAG members received 64 code change proposals. The Commercial Building Code TAG members were in agreement that the 2018 IBC should be adopted and recommend the following significant code change proposals as amendments to modify the 2018 IBC.

#### ***Recommended code changes***

- Modify section 423.3 of the 2018 IBC to identify specific counties where tornado winds may exceed 250 mph rather than relying on the ICC-500 map that does not clearly identify landmarks and boundaries.
  - The 2018 IBC requires Group E occupancies located in areas where tornado winds may exceed 250 mph to have a storm shelter. This is a new requirement that includes all K-12 schools. This will increase the cost of construction for Group E occupancies, yet it will improve safety.
- Modify section 503.1.4.1 of the 2018 IBC to add exceptions that allow walls more than 48 inches in height above an occupied roof when the occupied roof qualifies as a story or there is access to a standpipe. Allowing taller walls will provide more wind cover on occupied roofs without compromising safety.

- Amend existing Minnesota Rules, part 1305.0603, to modify IBC code section 603.1 to increase the allowable wood construction above a roof deck in Type I and Type II construction from 24 inches to 48 inches. Increasing the allowance to 48 inches will provide for significantly easier installation of certain roof systems.
- Modify section 706.1 of the 2018 IBC to retain the 2012 IBC provision that allows each portion of a building separated by one or more fire walls to be considered a separate building. The 2018 IBC eliminated this provision, which affects how the number of control areas in a building is determined and where an automatic sprinkler system is required.
- Modify section 1904 of the 2018 IBC to require bonded reinforcing and pre-stressed steel in concrete to be epoxy coated or hot dipped galvanized where it is not protected by an impermeable barrier and is located in Exposure Class F3 or Exposure Class C2. This provision is not included in the recognized standards for concrete design and construction and is necessary for safe construction.
  - The Structural Tag members were in agreement to recommend this code change proposal.
- Modify section 3111 of the 2018 IBC so rooftop solar panel installation requirements are based on the roof slope, rather than building occupancy. TAG members also agreed to modify other provisions in this section, including the criteria for roof access points, incorporating requirements listed in the fire code for access pathways and rapid shut-down equipment.

### ***Significant changes to the 2018 IBC***

- The 2018 IBC added section 428 that allows laboratory suites instead of control areas in higher education laboratories. The change increases the number of laboratory suites allowed for each floor and permits them to be on higher floors of the building. Higher education laboratory suites may also have a higher percentage of the maximum allowable quantities of hazardous materials. A two-hour fire barrier is required for horizontal fire separation between laboratory suites, which provides more fire protection than is required for control areas. TAG members were in agreement that section 428 should not be modified.

### **Commercial Building Code and Fire Code Compatibility TAG (Chapters 1305 and 7511)**

Commercial Building Code and Fire Code Compatibility TAG members met six times to review the 2018 IBC for compatibility with the 2018 International Fire Code (IFC). TAG members also reviewed Minnesota Rules, chapter 1305, which adopts the 2012 IBC with amendments and Minnesota Rules, chapter 7511, which adopts the 2012 IFC with amendments. The Commercial Building Code and Fire Code Compatibility TAG members were in agreement that the 2018 IBC should be adopted and recommend the following significant code change proposals as amendments to modify the 2018 IBC to ensure its compatibility with the proposed modifications to the 2018 IFC.

### ***Recommended code changes***

- Modify section 706.3 of the 2018 IBC to allow fire-retardant-treated wood to be used as framing materials within the fire walls of Type III and Type IV construction where the fire resistance rating is two-

hours or less. Currently, combustible materials are not allowed in fire walls of Type III and Type IV construction even though the remainder of the interior framing can be made of wood. As a result, the interior frame shrinks, but the fire wall does not. This creates difficulties for builders and designers.

- Modify section 806.2 of the 2018 IBC to increase the amount of allowable combustible materials for interior finishes from 10 percent to 20 percent of the wall or ceiling area. The exception for ceiling suspended combustible fabric partitions in Groups B and M occupancies is expanded to include Groups A and E occupancies. These changes will allow schools and school gymnasiums to meet the interior finishes requirements.
- Modify section 903.2.9 of the 2018 IBC to add an exception from automatic sprinkler system requirements for Group S-1 occupancies used to store upholstered furniture and mattresses when the building is one-story and all the storage spaces can be accessed directly from the exterior.
- Modify section 907.2.3 of the 2018 IBC to allow Group E occupancies protected throughout with an automatic sprinkler system or fire alarm system with corridor smoke detection to have manual fire alarm boxes located only in the main office and custodial areas. This will improve school security by preventing active shooters from drawing out victims by activating a manual alarm box in an unsecured location.
- Modify Exception # 1 of 2018 IBC section 2603.5.5 to exempt all one-story buildings from vertical and lateral fire propagation testing requirements for foam plastics used in exterior wall assemblies. Section 2603.5.5 requires wall assemblies to be tested in accordance with NFPA 285, which is expensive and specific to the assembly. Lateral fire propagation is a minor concern for one-story buildings and exempting all one-story buildings from the testing requirements will reduce construction costs while maintaining building durability and safety.
- Modify section 2603.5.5 of the 2018 IBC to add an exception that allows foam plastics to be used in wall assemblies on buildings up to four stories in height where the building has an automatic sprinkler system required by NFPA 13, the wall assembly containing foam plastic does not exceed 40 feet above the finished grade, the foam thickness is not more than 4 inches, and the foam is covered with a foil face if there is an air space of more than 1 inch. Additionally, the building must have a fire access apparatus road that allows emergency responders access to the wall assembly. Foams plastics are an economical option for insulation and allowing their use will decrease building costs while maintaining building durability and safety.

## **Elevators and Related Devices Code TAG (Chapter 1307)**

Elevators and Related Devices Code TAG members met twice to review chapter 30 of the 2018 IBC and recent versions of the American Society of Mechanical Engineers (ASME) standards that Minnesota Rules, chapter 1307 has adopted by reference. TAG members did not receive any code change proposals and its review focused on the following new requirements.

- Inclusion of ANSI MH29.1 *Safety Requirements for Industrial Scissor Lifts* as a referenced standard in chapter 30 of the IBC. ANSI MH29.1 is a new referenced standard in the IBC and was added at the request of the scissor lift industry to have a uniform standard for the inspection of industrial scissor lifts.

- Chapter 30 of the IBC improves elevator safety by requiring elevators to be equipped with an emergency communication system for the deaf, hard of hearing and speech impaired. The emergency communication systems must be a visual, text-based and video-based interactive system.

The Elevators and Related Devices Code TAG members were in agreement that chapter 30 of the 2018 IBC should be adopted along with the latest versions of the previously adopted ASME standards. TAG members agreed to keep the current amendments to Minnesota Rules chapter 1307 without changes.

## **Residential Code TAG (Chapter 1309)**

Residential Building Code TAG members met five times to review the 2018 International Residential Code (IRC) and Minnesota Rules, chapter 1309, which adopts the 2012 IRC with amendments. TAG members received 38 code change proposals. The Residential Building Code TAG members were in agreement that the 2018 IRC should be adopted and recommend the following significant code change proposals as amendments:

### ***Recommended code changes***

- Amend existing Minnesota Rules, part 1309.0010, subpart 2, to also adopt appendix Q of the 2018 IRC. Appendix Q defines tiny houses as dwelling units having a floor area of 400 square feet or less. Appendix Q requires tiny houses to be constructed to code provisions, but with allowances for lofts, access to lofts, headroom, guards, and emergency escape and rescue openings. Tiny houses have become a popular option because they are more affordable and have less environmental impact.
- Amend existing Minnesota Rules, part 1309.0202, to add a definition for “transient use” to clarify that single- and two-family dwellings and townhouses constructed for transient use are required to have a state license and must be constructed as Group R occupancies in compliance with Minnesota Rules chapter 1305.
- Modify section R310.6 of the 2018 IRC to exempt new sleeping rooms added to existing basements that are undergoing alterations or repairs from emergency escape and rescue opening requirements where the basement and first floor are equipped with an NFPA 13D automatic fire sprinkler system or an automatic fire sprinkler system that meets the requirements of section P2904 of the 2018 IRC.<sup>4</sup>
- Modify section R314 of the 2018 IRC to exempt existing dwellings undergoing alteration and repair from the requirement to install interconnected battery-powered smoke alarms, interconnected hard-wired smoke alarms or hard-wired smoke alarms. This is consistent with the 2018 IRC requirements for carbon monoxide alarms. Smoke alarms and carbon monoxide alarms that are interconnected and hard-wired will only be required in existing dwellings undergoing alterations or repairs if the interior wall or ceiling finishes are removed.
  - Consistent requirements for smoke alarms and carbon monoxide alarms will promote uniform enforcement.
  - Allowing battery-powered smoke and carbon monoxide alarms that are not interconnected will reduce costs for homeowners making improvements to their property.

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<sup>4</sup> R310.6 of the 2018 IRC does not require emergency escape openings where there are alterations or repairs to existing basements that do not add new sleeping rooms. This is consistent with the department’s division opinion #2008-02. See [https://www.dli.mn.gov/ccld/PDF/bc\\_opinion\\_division\\_2008\\_02\\_egress.pdf](https://www.dli.mn.gov/ccld/PDF/bc_opinion_division_2008_02_egress.pdf).

- Amend existing Minnesota Rules, part 1309.0402, to modify 2018 IRC Table R402.2 by adding a footnote to clarify that concrete with a compressive strength of 5,000 psi is not required for the post footing of decks and porches, wood foundations, slab-on-grade foundation walls, and footings for floating slabs. The proposal maintains the current Minnesota amendment that requires concrete to have a compressive strength of 5,000 psi where used for footings of concrete or masonry block foundation walls that enclose basements or crawl spaces. Concrete with a compressive strength of 5,000 psi for foundation walls prevents capillary moisture from entering basements or crawl spaces.
  - The Structural TAG received a code change proposal to eliminate the current Minnesota requirement that footings be constructed with concrete having a compressive strength of 5,000 psi. The Structural TAG members supported the proposal because concrete having a compressive strength of 5,000 psi is not structurally necessary and may not improve foundation durability. However, the structural TAG group did not evaluate the proposal based upon the need to prevent capillary moisture transport.
- Amend existing Minnesota Rules, part 1309.0401, to delete Tables R404.1.1 (5), R404.1.1(6) and R404.1.1(7), and eliminate the prescriptive requirements for cantilevered foundation walls up to seven feet tall and retaining up to seven feet of unbalanced fill. Section R404.1 of the 2018 IRC is modified to add prescriptive requirements for lookout basements that have cantilevered foundation walls with unbalanced fill.
  - The Structural TAG members support this proposal.

## **Existing Building Code TAG (Chapter 1311)**

The Existing Building Code TAG members met six times to review the 2018 International Existing Building Code (IEBC) and Minnesota Rules, chapter 1311, which adopts the 2012 IEBC with amendments. TAG members received 18 code change proposals. The Existing Building Code TAG members recommend adopting the 2018 IEBC with the following significant proposed code changes.

### ***Recommended code changes***

- Amend existing Minnesota Rules, part 1311.0407, subpart 2, to modify Table 407.1 to include more occupancy group classifications and relative hazard risk levels. The table assesses relative hazard risks with various occupancy classifications. A footnote is also added to the table to clarify that IRC occupancies are only included to determine relative hazard level when residential structures are converted to non-residential uses. The table is useful for building officials when determining if a design that presents a change of occupancy will also present a change in relative hazard level.
- Modify section 1106.1 of the 2018 IEBC to identify specific counties where tornado winds may exceed 250 mph, rather than relying on the ICC-500 map that does not clearly identify landmarks and boundaries.
  - The 2018 IEBC requires additions to existing Group E occupancies located in areas where shelter design wind speed for tornados is 250 mph to have a storm shelter that may accommodate the occupant capacity for the addition. This is a new requirement that includes all K-12 schools. This will increase the cost of construction for additions to Group E occupancies, yet will improve safety.



## Energy Code TAG (Chapters 1322 and 1323)

The Energy Code TAG members met six times to review the 2018 IECC provisions for residential and commercial building energy efficiency and Minnesota Rules chapters 1322 and 1323, which adopts the 2012 IECC with amendments. TAG members received 17 code change proposals. The Energy Code TAG members were in agreement that the 2018 IECC provisions for commercial buildings should be adopted with amendments. Some TAG members did not agree to recommend adoption of the 2018 IECC residential provisions to the CCAC. Appendix A describes Energy Code TAG members' concerns with the residential provisions of both the current Minnesota Residential Energy Code and the 2018 IECC.

## Accessibility Code TAG (Chapter 1341)

The Accessibility Code TAG members met four times to review chapter 11 of the 2018 IBC, section 305 of the 2018 IEBC, and Minnesota Rules, chapter 1341. TAG members received six code change proposals. The Accessibility Code TAG members were in agreement to recommend adoption of chapter 11 of the 2018 IBC and section 305 of the 2018 IEBC, with the following significant code change proposals recommended as amendments.

### *Recommended code changes*

- Modify section 1103.2.8 of the 2018 IBC to eliminate a new exemption from accessibility requirements for raised or lowered areas in places of religious worship that are used for the performance of religious ceremonies and are less than 300 square feet in area and located seven inches or more above or below the finished floor.<sup>5</sup> The exemption may be interpreted overly broadly to exempt raised and lowered areas that are used primarily by clergy, but that are also used by the congregation and the public and should therefore meet accessibility requirements. Additionally, section 1103.2.2 of the 2018 IBC already provides an exemption for employee work areas that are less than 300 square feet in area and located seven inches or more above or below the finished floor.
- Amend existing Minnesota Rules, part 1341.0011, subpart 6, to modify code section 1107.5.2 to increase the required percentage of accessible sleeping rooms in Group I-2 nursing homes from 10 percent to 50 percent. This is consistent with the 2018 IBC requirement that 50 percent of sleeping rooms be accessible in Group I-2 nursing homes. This proposal will increase building costs, but addresses a need identified by the Minnesota Department of Health (MDH) for more accessible sleeping rooms.
- Amend existing Minnesota Rules, part 1341.011, subpart 6, to modify 2018 IBC code section 1107.6.2.2 to clarify a current Minnesota rule requirement that for Group R-2 occupancies, other than apartment houses, monasteries, and convents, only one accessible bedroom in a dwelling or sleeping unit may be counted towards the number of required accessible bedrooms. Dwelling units with an accessible bedroom must have accessible common areas.

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<sup>5</sup> The federal Americans with Disabilities Act of 1990 excludes religious organizations and entities from accessibility requirements. See [Title 42 of United State Code, section 12187](#).

## Mechanical and Fuel Gas Code TAG (Chapter 1346)

The Mechanical and Fuel Gas Code TAG members met six times to review the 2018 International Mechanical Code (IMC), 2018 International Fuel Gas Code (IFGC), and Minnesota Rules chapter 1346, which adopts the 2012 IMC and 2012 IFGC with amendments. TAG members received 18 code change proposals. The Mechanical and Fuel Gas Code TAG members support adoption of the 2018 IMC and 2018 IFGC with the following significant code change proposals as amendments:

### ***Recommended code changes***

- Modify section 303.3.1 of the 2018 IFGC to allow direct-vent gas fireplaces and decorative appliances to be installed inside smoke compartments containing dwelling units and sleeping rooms in Group I-1 and I-2, Condition 2 occupancies. This change is consistent with MDH and Minnesota State Fire Marshal (SFM) requirements for Group I-1 and I-2, Condition 2 occupancies.
- Amend existing Minnesota Rules, part 1346.0050, to delete sections 506, 507, 508, and 509 of the 2018 IMC and adopt the 2018 edition of NFPA 96 *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations* and the 2016 edition of ASHRAE 154 *Standard for Ventilation in Commercial Cooking* by reference. NFPA 96 and ASHRAE 154 have clearer requirements for ventilation and fire protection of commercial kitchens than the IMC. They are also consistent with the SFM requirements for commercial kitchens.
- Modify section 306 of the 2018 IFGC and section 304.11 of the 2018 IMC to provide a courtesy reference to Occupational Safety and Health Act (OSHA) requirements for roof guards.
- Amend existing Minnesota Rules, part 1346.0401, subpart 1, to modify code sections 401.1 and 401.2 of the 2018 IMC to require the ventilation in residential dwellings to meet the requirements of Minnesota Rules chapter 1322 or ASHRAE 62.2 *Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings*.
- Modify section 604.3 of the 2018 IMC to add an exception to allow medium density polyurethane spray foam to cover duct construction without a thermal or ignition barrier. The ducts must be located in the floor assembly over the unconditioned space of IRC 1, 2 or 3 dwellings.
- Amend existing Minnesota Rules chapter 1346 to require battery-powered or hard-wired carbon monoxide alarms to be installed in rooms with fuel burning appliances that produce carbon monoxide and are used to control environmental conditions.

## Conclusion

1. TAG members reviewed the 2018 I-codes and, with the exception of the 2018 IECC residential provisions, recommend the adoption of the 2018 I-codes in Minnesota.
2. TAG members reviewed and recommend adoption of code change proposals that modify the 2018 I-codes or amend an existing Minnesota code provision as described in this report to promote consistency among the building codes, to ensure uniform safety standards and to accommodate Minnesota's climatic conditions.

## Appendix A

### Energy Code

The Energy Code TAG members reviewed the residential provisions of the 2015 IECC, 2018 IECC and the current Minnesota Residential Energy Code in Minnesota Rules, chapter 1322, which incorporates by reference the 2012 IECC, as amended. Some TAG members support adopting the 2018 IECC residential provisions and some TAG members did not support adopting the 2018 IECC residential provisions.

TAG members also reviewed code change proposals to amend specific provisions of the current Minnesota Residential Energy Code. Members reviewed three code change proposals with different suggestions for modifying insulation requirements for above-grade walls in residential dwellings. TAG members did not agree to recommend any of the proposals. They also did not agree on other proposals that identify areas of concern with the foundation slip sheet requirement and the performance option of the current Minnesota Residential Energy Code.

*Concerns related to retaining the 2012 IECC residential provisions and not adopting the 2018 IECC residential provisions:*

- Residential construction may fall behind in terms of methods, technology and materials used to improve energy efficiency.
- There may be inconsistencies for code users if other 2018 I-codes affecting residential construction are adopted and the 2018 IECC residential provisions are not adopted.

*Concerns related to adoption of the 2018 IECC residential provisions<sup>6</sup>*

- The 2018 IECC when compared to the 2012 IECC might not provide significant energy or cost savings.
  - The U.S. Department of Energy (DOE) compared the 2015 IECC and 2012 IECC for energy and cost savings. Their evaluation determined an average household in Minnesota constructed to the specifications of the 2015 IECC rather than the 2012 IECC would have an average cost savings of \$118.92 over 30 years.<sup>7</sup>
    - The DOE has not yet completed an evaluation comparing the 2018 IECC residential provisions to the 2015 IECC residential provisions as applied to an average household in Minnesota constructed to the specifications of the model code. The energy and cost savings are anticipated to be similar to those of the 2015 IECC.

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<sup>6</sup> The Commissioner may not adopt any of the model energy code's residential provisions until a study is performed that addresses, at a minimum, "air quality, building durability, moisture, enforcement, enforceability cost benefit, and liability." Moreover, an affirmative recommendation by the Construction Codes Advisory Council is also required. See [Minnesota Statute Section 326B.118](#).

<sup>7</sup> Vrushali V. Mendon, et al., "Cost-Effectiveness Analysis of the Residential Provisions of the 2015 IECC for Minnesota," United States Department of Energy (2016), <https://www.osti.gov/servlets/purl/1343205>.

- In contrast, the DOE determined that a home in Minnesota, built to the specifications of the 2012 IECC residential provisions, provided homeowners an average of \$9,873 in cost savings over 30 years when compared to the 2006 IECC residential provisions that had been previously adopted by Minnesota Rules chapter 1322.<sup>8</sup>
- The 2018 IECC residential provisions require foundations to have R-15 continuous insulation, which will increase the costs of constructing new homes. The current Minnesota amendments to the 2012 IECC include an exception that allows R-10 insulation to be used.<sup>9</sup>

### ***Code proposals addressing the insulation requirements for above-grade walls***

- TAG members received three code change proposals to amend existing Minn. R. part 1322.0402, subpart 1, to change the insulation requirements for above-grade walls in residential buildings in Table R402.1.1. Currently, southern Minnesota builders have the option of using R13+5 continuous and cavity insulation or R-20 cavity insulation for the wall assembly. The northern portion of the state is required to use R-21 cavity insulation. TAG members did not reach an agreement to recommend any of the following proposals:
  - The first code change proposal was to adopt the 2018 IECC provisions for above-grade walls, which eliminates the option of using only cavity insulation and requires cavity and continuous insulation of R20+5 or R13+10 for residential buildings throughout the state.<sup>10</sup>
    - Continuous insulation is an effective way to reduce building energy use by preventing thermal bridging through framing components.
    - Builders might lack familiarity with continuous insulation and the proper installation of this type of insulation and its flashings. Flashing systems are required to be installed in the windows, doors and other openings. Improper installation of flashing systems can result in water and moisture infiltration into wall assemblies, which negatively affects building durability.
    - Energy savings do not offset the increased cost of materials, window jam extensions, and additional flashing.
  - The second code change proposal was to allow builders in northern Minnesota to have the option of using R13+5 continuous and cavity insulation for above-grade walls.
  - The third code change proposal was to allow an R-23 cavity only insulation option for northern and southern Minnesota.
    - The R-23 insulation is more expensive than the R-21 insulation that is currently required and may not provide sufficient energy savings for the additional cost.

### ***Other code change proposals***

- Amend Minnesota Rules, part 1322.0402, subpart 2, to modify code section R402.1.1.3 to eliminate separate requirements for exterior non-draining foundation insulation. This eliminates the requirement for a 6-mil polyethylene slip sheet to cover the entire exterior of the foundation surface. The slip sheet is

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<sup>8</sup> Robert G. Lucas, et al., “Minnesota Energy and Cost Savings for New Single- and Multifamily Homes: 2009 and 2012 IECC as Compared to the Minnesota Residential Energy Code,” United States Department of Energy (2016): <https://www.osti.gov/servlets/purl/1043121>.

<sup>9</sup> See [Minnesota Rule 1322.0402, subpart 3, code section R402.2.8](#).

<sup>10</sup> A study must be performed before any part of the model code is adopted. See [Minnesota Statutes, section 326B.118](#).

not required by the I-codes, but a study performed prior to the adoption of the 2012 IECC residential provisions determined that a slip sheet is necessary due to Minnesota's freezing and thawing conditions that can cause structural damage to the foundation wall.<sup>11</sup> The slip sheet is a waterproof barrier that prevents exterior water from entering the foundation insulation and freezing. It also prevents soil from freezing to the foundation exterior insulation.

- Amend Minnesota Rules, chapter 1322, to adopt section R406 of the 2018 IECC that establishes the criteria for compliance when an Energy Rating Index (ERI) analysis is performed.<sup>12</sup> Section R406 provides a uniform performance option for determining if a residential building is compliant with energy efficiency requirements. Below are specific areas of concern related to the adoption of section R406.
  - A performance option allows flexibility in how a structure meets energy efficiency requirements by allowing the builder to make tradeoffs in energy conservation methods.
  - Section R406 is tailored towards the *Home Energy Rating System* (HERS) Index rather than allowing other ERIs to be used to determine compliance.
  - Section R405 of the 2012 IECC as adopted by Minnesota Rules chapter 1322 already allows the use of a simulated performance alternative (option) that recognizes computer modeling and software tools to determine compliance.

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<sup>11</sup> Prior to Minnesota's adoption of the 2012 IECC with amendments, Dr. Louise Goldberg from the University of Minnesota performed the study required by Minn. Stat. § 326B.118. For the results and conclusions of Dr. Goldberg's research see, [http://www.dli.mn.gov/CCLD/rm/PDF/1309\\_pub\\_energy.pdf](http://www.dli.mn.gov/CCLD/rm/PDF/1309_pub_energy.pdf).

TAG members were presented with research that disputed that Minnesota's freezing and thawing conditions necessitated a slip sheet covering the exterior of non-draining foundation insulation. For this research see, Jay Crandell, et al., "Frost-Protected Shallow Foundations Phase II - Final Report," United States Department of Housing and Urban Development, (June 1994), <https://www.huduser.gov/Publications/PDF/frost.pdf>.

Jay H. Crandell, "Below-Ground Performance of Rigid Polystyrene Foam Insulation: Review of Effective Thermal Resistivity Values Used In ASCE Standard 32-01 – Design and Construction of Frost-Protected Shallow Foundations," *Journal of Cold Regions Engineering* 24, no. 2 (2010): <https://ascelibrary.org/doi/10.1061/%28ASCE%29CR.1943-5495.0000012>.

<sup>12</sup> A study must be performed before any part of the model code is adopted. See [Minnesota Statutes, section 326B.118](#).

## Appendix B

TAG members did not agree to recommend all code change proposals they reviewed. Although TAG members did not agree to recommend the following code change proposals, the CCAC should be aware of the concerns they identify.

### Building Code Administration

#### *Other code change proposals*

- Amend existing Minnesota Rules, chapter 1300, to move the provision that allows a municipality to establish fees for permits that are commensurate with services provided by a municipal Department of Building Safety from Minnesota Rules, part 1300.0160 Fees, to Minnesota Rules, part 1300.0090, which establishes municipal Departments of Building Safety. The proposed change would also require the building official to determine fees in addition to the existing requirement that municipalities do so.
  - The proposal was intended to mitigate issues related to municipalities failing to use fees generated by permits to fund Departments of Building Safety and not consulting with the building official prior to determining fees. However, building officials do not have the statutory authority to establish fees for permits and moving the fee provision will not clarify the intended use of permit fees.

### Commercial Building Code

#### *Other code change proposals*

- Modify section 1209 of the 2018 IBC to clarify privacy requirements where toilet fixtures are located in toilet rooms not separated by sex, to require single user/family assisted bathing and changing areas except where bathing and changing areas are separated by sex, and to establish privacy requirements for changing areas.
- Modify section 2902 of the 2018 IBC to revise toilet facilities and fixture requirements based upon separation by sex, add requirements for baby changing stations and eliminate the bathing fixture requirement for daycare facilities.
- Modify section 2902.2 of the 2018 IBC to require all single-use toilet facilities and family or assisted use toilet facilities to not be separated by sex.
  - Although these proposals identify areas that are not addressed by the 2018 IBC, the conditions are not unique to Minnesota.

## Commercial Building Code and Fire Code Compatibility

### *Other code change proposals*

- Modify section 412.3.6 of the 2018 IBC to extend the exception from foam-based fire suppression system requirements for Group II hangers used to store transient aircraft for 90 days or less to all Group II hangers used for the storage of private aircraft.
  - Longer-term storage of aircraft does not pose any additional hazards. However, it does increase the potential that maintenance will be improperly performed in a Group II storage hanger and increase fire risks. Additionally, Minnesota Rules, part 1300.0110, subpart 12, grants building officials the discretion to allow longer-term storage of aircraft at airports that demonstrate strict enforcement policies.
- Modify section 414.2 of the 2018 IBC to expand the control area exception for higher education laboratories to research and development laboratories in Group B occupancies and hospital laboratories in Group I-2 occupancies.
  - The proposed change could allow potentially dangerous research and development laboratories to exist at higher stories in buildings and have greater quantities of hazardous materials.
- Modify Table 504.4 of the 2018 IBC to keep the 2012 IBC provisions that allow buildings with Type IV construction in Group S-2 occupancies to have up to five stories in buildings without an automatic sprinkler system or up to six stories in buildings with an automatic sprinkler system. The 2018 IBC allows construction of up to four stories for buildings without an automatic sprinkler system and up to five stories in buildings with an automatic sprinkler system.
  - The reduction in allowable stories was made in the 2015 IBC and is included in the 2018 IBC. TAG members agreed the change in the number of allowable stories was a deliberate decision by the International Code Council and not an error. Additionally, increasing the number of allowable stories would not address conditions unique to Minnesota.
- Modify Table 506.2 of the 2018 IBC to increase the allowable area factor in Type II construction in Group I-3 occupancies from 45,000 square feet to 60,000 square feet for one-story buildings equipped with an automatic sprinkler system.
  - The reduction in allowable area was made in the 2015 IBC and is included in the 2018 IBC. TAG members agreed the reduction was a deliberate decision by the ICC and not an error. Increasing the allowable area would not address conditions unique to Minnesota.

## Residential Building Code

### *Other code change proposals*

- Amend Minnesota Rules, part 1309.0313, to modify 2018 IRC section R313 to require all new one- and two-family dwellings and all new townhouses to have automatic fire sprinkler systems installed. One- and two-family dwellings and townhouses with attached garages would also be required to have sprinkler heads in the attached garage. The code change proposal deletes the existing automatic sprinkler system requirement for covered patios, covered decks, covered porches, and similar structures.



Below describes specific areas of concern related to requiring automatic fire sprinkler systems in one- and two-family dwellings and townhouses:

- The IRC has required automatic sprinkler systems be installed in one- and two-family dwellings and townhouses since the 2009 edition.<sup>13</sup>
- Automatic sprinkler systems save lives and property by controlling fires. The death and injury rates are lower in properties with automatic sprinkler systems when compared to properties without them.<sup>14</sup>
- Alternatively, functioning smoke detectors provide early warning of a fire, allowing occupants to escape the dwelling or townhouse. Minnesota Rules, parts 1309.0313 and 1309.0314, require that smoke alarms be added to existing dwellings when alterations are made unless the placement of smoke alarms already meets residential code requirements. Alterations include window and door replacement. This is more stringent than the 2018 IRC, which has a similar requirement, but specifically excludes window and door installation as alterations that require installation of additional smoke alarms.
- Installing automatic fire sprinkler systems in all one- and two-family dwellings and townhouses will increase costs for builders and homeowners. There are concerns about the increasing costs of new construction dwellings without a correlating demonstrated need.<sup>15</sup>
- Amend Minnesota Rules, part 1309.0310, to modify 2018 IRC section R310.1.5 to require subsequent window replacements to be located within the original rough framed opening or original window frame opening in order to prevent the opening size from being reduced due to multiple replacements of the same window.<sup>16</sup>

## Existing Building Code

### *Other code change proposals*

- Modify sections 809 and 904 of the 2018 IEBC to change the automatic sprinkler system requirements for building work areas undergoing level 2 or level 3 alterations. Below is an overview about the proposed changes:

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<sup>13</sup> The only states requiring automatic fire sprinkler systems to be installed in all new one- and two-family dwellings are Maryland and California. Washington, D.C. also requires automatic fire sprinkler systems to be installed in all new one- and two-family dwellings. “Fire Sprinkler Requirements,” NFPA, 2018, <https://www.nfpa.org/Public-Education/Campaigns/Fire-Sprinkler-Initiative/Legislation-and-adoption/Sprinkler-requirements>.

<sup>14</sup> Marty Ahrens “U.S. Experience with Sprinklers,” NFPA, July 2017, <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics/Fire-Protection-Systems/ossprinklers.pdf>.

<sup>15</sup> Bob Shaw and Tad Vezner “Why do Twin Cities homes cost so much? We went to find out,” *Pioneer Press*, April 17, 2017, <https://www.twincities.com/2017/04/16/twin-cities-housing-costs/>.

“Governor Mark Dayton Establishes New Task Force on Affordable Housing,” Office of Governor Mark Dayton, last modified December 21, 2017, <https://mn.gov/governor/blog/?id=1055-321636>.

<sup>16</sup> TAG members were in agreement to recommend a code change proposal that deletes [Minnesota Rules, part 1309.0310, R310.1.5 Replacement Windows](#), because the 2018 IRC has adopted the same language making the current amendment unnecessary.



- Modify section 803 of the 2018 IEBC to require an automatic sprinkler system to be installed where work areas of buildings are 1) undergoing level 2 alterations, 2) listed in table 903.2.11.6 of the 2018 IBC, and 3) have exits or corridors shared by more than one tenant or serving an occupant load greater than 30. An automatic sprinkler system is not required if sufficient municipal water supply is unavailable without the installation of a new fire pump.
- Modify section 904 of the 2018 IEBC to require an automatic sprinkler system to be installed where buildings are undergoing level 3 alterations with work areas that are more than 50 percent of the floor area, have Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, or S-1 occupancies, have exits or corridors shared by more than one tenant or serving an occupant load greater than 30, and where the IBC requires the work area to have an automatic sprinkler system. If there is insufficient municipal water supply for the installation of an automatic sprinkler system, then an automatic smoke detection system may be installed instead.
- Modify section 904 of the 2018 IEBC to require windowless stories undergoing level 3 alterations to install automatic sprinkler systems in work areas where the IBC requires automatic sprinkler systems to be installed and there is sufficient municipal water supply for an automatic sprinkler system.
  - The TAG members do not recommend this code change proposal because the new 2018 provision was submitted to the ICC Code Committee during the development of the 2018 IEBC and approved through the ICC process, with modifications. The code change proposal submitted to the TAG reverses the new 2018 provision as modified by the ICC. TAG members unanimously agreed the code change proposal did not address any conditions that are unique to Minnesota.

## Appendix C

The department continued to receive code change proposals after TAG members had completed their meetings and review of the I-codes. TAG members were unable to review and discuss these code change proposals and consequently cannot provide a recommendation to the CCAC. The following code change proposals suggest significant changes to 2018 I-code provisions or a current Minnesota Rule provision and may require CCAC review.

### Commercial Building Code

#### *Code change proposals not reviewed by TAG members*

- Modify section 308.5.1 of the 2018 IBC to change the age threshold for child day-care facilities from 30 months or less to 36 months or less. Currently MDH sets the threshold for child day-care facilities at 36 months of age and there are conflicts between the state building code and MDH requirements. Changing the threshold to three years of age or less will create consistency among Minnesota state agency requirements and reduce overall construction and remodeling costs.
  - Department staff do not recommend this change because the Minnesota Department of Human Services age threshold for child day facilities is 33 months of age. Changing the occupancy classification threshold from 30 months to 36 months would result in many day-care facilities currently classified as Group E occupancies to be reclassified as Group I-4 occupancies.
- Modify the requirements related to the evacuation of hazardous vapors and gases from laboratories using fume hood systems. The code change proposal specifically proposes changes to the 2018 IBC sections and Minnesota rule part described below:
  - Modify section 713.4 of the 2018 IBC to add an exception to allow shaft enclosures used for hazardous fume hood exhaust systems serving only one control area or one higher education laboratory suite to be rated according to the control area separation requirement, higher education laboratory suite separation requirement, or shaft rating requirement. This allows a shaft used for hazardous exhaust to extend from a sub-basement higher education laboratory through the sixth story of a building and have one-hour fire resistance rated construction.
    - Department staff do not recommend this change because it potentially allows for significant safety reductions without being offset by additional safety measures. This change would allow a shaft used for hazardous exhaust to extend from a sub-basement higher education laboratory through the sixth story of a building and have one-hour fire resistance rated construction instead of two-hour fire protection.
  - Modify section 713.11 of the 2018 IBC to allow shafts that originate from a single control area or higher education laboratory suite to not be enclosed at the bottom of the building, provided the duct penetration into the shafts is draft stopped around the perimeter.
    - Department staff recommend this change because it is consistent with other exceptions for shaft protection in the 2018 IBC.
  - Amend Minnesota Rules, part 1305.0717, to modify 2018 IBC section 717.5.3 to exempt manifolded hazardous fume hood exhaust systems from the fire damper requirement where the

manifolded hazardous fume hood exhaust systems originate in the same control area or higher education laboratory suite. Additionally, laboratory ventilation systems are not required to be installed in compliance with chapters one to four, seven, and eight of the NFPA 45.

- Department staff support the exemption from the fire damper requirement for manifolded hazardous fume hood exhaust systems that originate in the same control area or higher education laboratory suite. However, department staff do not support the exemption from NFPA 45 requirements for Laboratory Unit Hazard Classification, Explosion Hazard Protection, and Laboratory Ventilating Systems and Hood Requirements.
- Modify section 1510.1.1 of the 2018 IBC to expand area limitations on rooftop penthouses used for mechanical systems in conjunction with laboratory exhaust systems from one-third to two-thirds of the area of the supporting roof deck.
  - Department staff recommend the change that expands the allowable area for non-occupied penthouse space above the roof.

## Appendix D

The CCAC appointed ten TAGs and their members to review the 2015 and 2018 International Model Building Codes (I-codes), compare them to the current Minnesota rules, which largely adopt the 2012 I-codes as amended for use in Minnesota. The members of the TAG were appointed to represent associations with experience with each of the model codes. Below is a list of TAG members and the organizations they represent.

### Building Code Administration TAG

| TAG representation            | Member              | Employer                    | Association  |
|-------------------------------|---------------------|-----------------------------|--|
| DLI staff                     | Scott McKown        | DLI                         | Construction Codes and Licensing Division (CCLD)   |
|                               | Doug Nord           | DLI                         | CCLD   |
| Municipal building official   | Tom Bakken          | City of Hastings            | Association of Minnesota Building Officials (AMBO) |
|                               | James Williamette   | City of St. Paul            | AMBO   |
| Residential building industry | Mike Swanson        | JMS Custom Homes            | Builders Association of the Twin Cities (BATC)     |
|                               | Kurt Welker         | Welker Custom Homes         | Builders Association of Minnesota (BAMN)           |
| Local unit of government      | Jennifer DeJournett | Three Rivers Park District  | CCAC   |
|                               | Pamela Whitmore     | League of MN Cities (“LMC”) | LMC  |

### Commercial Building Code TAG

| TAG representation           | Member       | Employer             | Association   |
|------------------------------|--------------|----------------------|---|
| DLI staff                    | Greg Metz    | DLI                  | CCLD  |
|                              | Scott McKown | DLI                  | CCLD  |
| Municipal building official  | Jerry Norman | City of Rochester    | AMBO  |
| Municipal fire code official | Ben Foster   | City of Minneapolis  | Fire Marshals Association of Minnesota (FMAM)           |
| Licensed architect           | Gerhard Guth | HGA Architects, Inc. | American Institute of Architects Minnesota (MNAIA)/CCAC |

### Commercial Building Code and Fire Code Compatibility TAG

| <b>TAG representation</b>           | <b>Member</b>    | <b>Employer</b>           | <b>Association</b> |
|-------------------------------------|------------------|---------------------------|--------------------|
| <b>DLI staff</b>                    | Greg Metz        | DLI                       | CCLD               |
|                                     | Scott McKown     | DLI                       | CCLD               |
| <b>Municipal building official</b>  | Jerry Norman     | City of Rochester         | AMBO               |
|                                     | Scott Anderson   | City of Minneapolis       | AMBO               |
| <b>Municipal fire code official</b> | Angie Wiese      | City of St. Paul          | FMAM               |
| <b>State Fire Marshal</b>           | Forrest Williams | State Fire Marshal Office |                    |
| <b>Licensed architect</b>           | David Leschak    | David Leschak Architects  | MNAIA              |

### Elevators and Related Devices Code TAG

| <b>TAG representation</b>                      | <b>Member</b> | <b>Employer</b>     | <b>Association</b>                              |
|--|---------------|---------------------|---|
| <b>DLI staff</b>                               | Bill Reinke   | DLI                 | CCLD  |
|  | Tim Warren    | DLI                 | CCLD  |
| <b>Municipal building official</b>             | David Fisher  | City of Edina       | AMBO  |
| <b>Municipal elevator inspector</b>            | John Roche    | City of St. Paul    |   |
| <b>Municipal fire code official</b>            | Chris Fuller  | City of St. Anthony | FMAM  |
| <b>Commercial building owners and managers</b> | Tom Erdman    | Zeller Realty       | Building Owners and Managers Association (BOMA) |

### Residential Code TAG

| <b>TAG representation</b>            | <b>Member</b>   | <b>Employer</b>                          | <b>Association</b> |
|--------------------------------------|-----------------|--|--------------------|
| <b>DLI staff</b>                     | Richard Lockrem | DLI                                      | CCLD               |
|                                      | Paul Swett      | DLI                                      | CCLD               |
| <b>Municipal building official</b>   | Jerry Backlund  | City of Hastings                         | AMBO               |
| <b>Residential building industry</b> | Mike Paradise   | Bigelow Homes, LLC                       | BAMN/CCAC          |
|                                      | Brent Nygaard   | Lennar                                   | BATC               |
| <b>Affordable housing advocate</b>   | Curt Bennett    | Greater Metropolitan Housing Corporation |                    |

### Existing Building Code TAG

| <b>TAG representation</b>                      | <b>Member</b>    | <b>Employer</b>                                 | <b>Association</b> |
|--|------------------|---|--------------------|
| <b>DLI staff</b>                               | Mike Bunnell     | DLI   | CCLD               |
|  | Greg Metz        | DLI   | CCLD               |
| <b>Municipal building official</b>             | Steve Ubl        | City of St. Paul                                | AMBO               |
| <b>Licensed architect</b>                      | Vincent DiGiorno | Krech, O'Brien, Mueller & Associates Architects | MNAIA              |
| <b>Municipal fire code official</b>            | Michael Post     | City of St. Cloud                               | FMAM               |
| <b>Commercial building owners and managers</b> | Tom Erdman       | Zeller Realty                                   | BOMA               |

### Energy Code TAG

| <b>TAG representation</b>              | <b>Member</b> | <b>Employer</b>                   | <b>Association</b>   |
|--|---------------|-----------------------------------|--|
| <b>DLI staff</b>                       | Don Sivigny   | DLI                               | CCLD   |
|  | Chris Meier   | DLI                               | CCLD   |
| <b>Municipal building official</b>     | Ann Jacklitch | City of Maple Grove               | AMBO   |
| <b>Residential building industry</b>   | Ed VonThoma   | Building Knowledge                | BAMN   |
|  | Ross Anderson | The Energy Network                | BATC   |
| <b>Commercial building industry</b>    | John Smith    | Michaud Cooley Erickson           | American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) |
| <b>Energy conservation association</b> | Russ Landry   | Center for Energy and Environment |  |
|  | Ben Rabe      | Fresh Energy                      |  |

### Accessibility Code TAG

| <b>TAG representation</b>                      | <b>Member</b>        | <b>Employer</b>             | <b>Association</b> |
|--|----------------------|-----------------------------|--------------------|
| <b>DLI staff</b>                               | Karen Gridley        | DLI                         | CCLD               |
|  | Ryan Rehn            | DLI                         | CCLD               |
| <b>Municipal building official</b>             | Lee Gladitsch        | City of St. Cloud           |                    |
| <b>Licensed architect</b>                      | Gerhard Guth         | HGA Architects, Inc.        | MNAIA/CCAC         |
| <b>State council on disability</b>             | Margot Imdieke Cross | State Council on Disability |                    |
| <b>Commercial building owners and managers</b> | Jason Nerison        | Zeller Realty               | BOMA               |

### Mechanical and Fuel Gas Code TAG

| <b>TAG representation</b>             | <b>Member</b>      | <b>Employer</b>                            | <b>Association</b>   |
|---------------------------------------|--------------------|--|--|
| <b>DLI staff</b>                      | Chris Meier (lead) | DLI  | CCLD   |
|                                       | Don Sivigny        | DLI  | CCLD   |
| <b>Municipal building official</b>    | John Rued          | City of Monticello                         |  |
| <b>Municipal mechanical inspector</b> | Joseph Strohmeyer  | City of Minneapolis                        | Minnesota Association of Plumbing and Mechanical Officials (MAPMO) |
|                                       | Jared Ellingson    | University of Minnesota                    | MAPMO  |
| <b>Mechanical contractor</b>          | Todd Landon        | Spriggs Plumbing, Heating & Process Piping | MMCA   |
| <b>Licensed engineer</b>              | John Smith         | Michaud Cooley Erickson                    | ASHRAE   |

### Structural TAG

| <b>TAG representation</b>                  | <b>Member</b>  | <b>Employer</b>                        | <b>Association</b>                                   |
|--|----------------|--|--|
| <b>DLI staff</b>                           | Dan Kelsey     | DLI                                    | CCLD   |
|  | Scott Erickson | DLI                                    | CCLD   |
| <b>Municipal building official</b>         | Kyle Dimler    | City of Hutchinson                     | AMBO   |
| <b>Municipal structural plans examiner</b> | Randy Johnson  | City of Rochester                      | AMBO   |
| <b>Residential building industry</b>       | Craig Oswell   | Oswell Engineering and Consulting, LLC | BAMN   |
|  | Mike Barden    | Pulte Group                            | BATC   |
| <b>Licensed engineer</b>                   | Ron LaMere     | BKBM Engineers                         | Minnesota Structural Engineering Association (MNSEA) |