Code Amendment Proposal Form
For public amendments proposed to the 2018 editions of the International Codes

Instructions: Upload this form and all accompanying documentation at www.denvergov.org/BuildingCode. If you are submitting your proposal on a separate sheet, make sure it includes all information requested below.

All proposals must be received by April 26, 2019.

CONTACT INFORMATION

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Organization: Structural Engineers Association of Colorado – Denver Building Department Liaison Committee

I hereby grant and assign to City and County of Denver all rights in copyright I may have in any authorship contributions I make to City and County of Denver in connection with this proposal. I understand that I will have no rights in any City and County of Denver publications that use such contributions in the form submitted by me or another similar form and certify that such contributions are not protected by the copyright of any other person or entity.

Signature: Gregory R. Kingsley

AMENDMENT PROPOSAL

Please use a separate form for each proposal.

1) Code(s) associated with this proposal. Please use acronym: DBC-IFC
If you submitted a separate coordination change to another code, please indicate which code: DBC-IBC

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Code Name</th>
<th>Acronym</th>
<th>Code Name</th>
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</thead>
<tbody>
<tr>
<td>DBC-xxxx</td>
<td>Denver Building Code-xxxx (code) amendments (e.g., DBC-IBC, DBC-IIEC)</td>
<td>IFGC</td>
<td>International Fuel Gas Code</td>
</tr>
<tr>
<td>IEBC</td>
<td>International Existing Building Code</td>
<td>IMC</td>
<td>International Mechanical Code</td>
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<tr>
<td>IECC</td>
<td>International Energy Conservation Code</td>
<td>IPC</td>
<td>International Plumbing Code</td>
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</tbody>
</table>

2) Please check here if a separate graphic file is provided: ☒
Graphics may also be embedded within your proposal below.

3) Use this template to submit your proposal or attach a separate file, but please include all items requested below in your proposal. The only formatting needed is BOLDING, STRIKEOUT AND UNDERLINING. Please do not provide additional formatting such as tabs, columns, etc., as this will be done by CPD.
Appendix Adoption Status
(new) Appendix P: Tall Wood Buildings

This proposal adds a new Appendix P: Tall Wood Buildings to the DBC-IFC. The appendix is comprised of already-approved upcoming revisions to the 2021 International Fire Code (IFC). The intent of this proposal is not to make changes to the base 2018 IFC language, but rather to keep the changes confined to an appendix to the DBC-IFC. The reason for this is that the proposed changes will automatically become a part of the base code at the time of Denver’s next IFC code adoption, at which time the DBC-IFC can be brought up to date easily by the removal of the appendix.

It is recommended that the text of the appendix remain as shown in this proposal, with underlines and strikeouts, to clarify where the language in the appendix differs from the base code. The appendix addresses the following sections of the IFC:

- Chapter 7
  - Section 701.6
- Chapter 9
  - Section 914.3.1.2
- Chapter 33
  - (new) Section 3308.4

This proposal is intended to be included in Denver’s codes in conjunction with Denver Building Code – International Building Code (DBC-IBC) Appendix U, presented in “Public-Code-Amendment-Proposal-Form tall wood_DBC-IBC_190501.docx”. The IBC and IFC changes are comprehensive and complementary proposals that should be adopted together.

Note: If the proposal is for a new section, indicate (new).

Proposal:

Add new text as follows:

APPENDICES
APPENDIX ADOPTION STATUS

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>TITLE</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Tall Wood Buildings</td>
<td>Added</td>
</tr>
</tbody>
</table>

Add new text as follows:

IFC APPENDIX P
TALL WOOD BUILDINGS

P101
GENERAL

P101.1 Purpose. The purpose of this appendix is to provide criteria for three new mass timber construction types: Type IV-A, Type IV-B, and Type IV-C. These building types expand the allowable use of mass timber construction to larger areas and greater heights than allowed for Type IV-HT construction.
**P101.2 Scope.** The provisions in this appendix are in addition to or replace the sections in the 2018 International Fire Code where Types IV-A, IV-B, and IV-C construction are used. Where building Types IV-A, IV-B, or IV-C are not used, this appendix does not apply.

**P102 AMENDMENTS TO THE INTERNATIONAL FIRE CODE**

**CHAPTER 7 FIRE AND SMOKE PROTECTION FEATURES**

Revise as follows:

**701.6 Owner’s responsibility.** The owner shall maintain an inventory of all required fire-resistance-rated construction, construction installed to resist the passage of smoke and the construction included in Sections 703 through 707 and Section 602.4.1 and 602.4.2 of the International Building Code. Such construction shall be visually inspected by the owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. Where concealed, such elements shall not be required to be visually inspected by the owner unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.

**CHAPTER 9 FIRE PROTECTION AND LIFE SAFETY SYSTEMS**

Revise as follows:

**914.3.1.2 Water supply to required fire pumps.** In all buildings that are more than 420 feet (128 m) in building height, and buildings of Type IV-A and IV-B construction that are more than 120 feet in building height, required fire pumps shall be supplied by connections to not fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

*Exception:* Two connections to the same main shall be permitted provided that the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through not fewer than one of the connections.

**CHAPTER 33 FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION**

Add new text as follows:

**3308.4 Fire safety requirements for buildings of Types IV-A, IV-B, and IV-C construction.** Buildings of Types IV-A, IV-B, and IV-C construction designed to be greater than six stories above grade plane shall comply with the following requirements during construction unless otherwise approved by the fire code official.

1. Standpipes shall be provided in accordance with Section 3313.
2. A water supply for fire department operations, as approved by the fire code official and the fire chief.
3. Where building construction exceeds six stories above grade plane, at least one layer of noncombustible protection where required by Section 602.4 of the International Building Code shall be installed on all building elements more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor levels.

*Exception:* Shafts and vertical exit enclosures shall not be considered a part of the active mass timber construction.

4. Where building construction exceeds six stories above grade plane required exterior wall coverings shall be installed on all floor levels more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor level.

*Exception:* Shafts and vertical exit enclosures shall not be considered a part of the active mass timber construction.

*Note:* Show the proposal using *strikeout*, *underline* format. At the start of each section, give one of the following instructions:

- Revise as follows:
- Add new text as follows:
Supporting Information:

**Purpose:**
The purpose of this submittal is to allow use of three new mass timber construction types in Denver: Type IV-A, Type IV-B, and Type IV-C. These building types – already approved by International Code Council (ICC) for incorporation into the 2021 International Building Code (IBC) and International Fire Code (IFC) – expand the allowable use of mass timber construction to larger areas and greater heights than previously allowed. (“Mass timber” refers to large, solid wood structural components, generally built up from smaller trees.)

This proposal includes International Fire Code (IFC) provisions. The corresponding Appendix U International Building Code (IBC) provisions can be found in “Public-Code-Amendment-Proposal-Form_tall wood_DBC-IBC_190501.docx”. Both the IBC and IFC provisions are complementary and are intended to be added and adopted together as appendices to the Denver Codes.

**Reasons:**
The primary reasons why Denver should include the new IV-A, IV-B, and IV-C building types into the 2019 Denver Building Code are:

1) To support Denver’s stated commitment to the environment through its 2020 Sustainability Goals [1], its 80x50 Climate Action Plan [2], and its commitment to creating a healthier city to live in [3]. The proposal amendments accomplish this by influencing all aspects of the mass timber supply chain from forest management to building construction.

2) To promote a symbiotic relationship between the city of Denver and regional forests, resulting in healthier forests, less forest fire risk, healthier watersheds, and job opportunities.

3) To aid the Denver Building Department in responding efficiently and effectively to Denver’s ongoing and growing market demand for mass timber structures.

4) To allow Denver citizens to take advantage of code provisions already accepted at the national level for the 2021 International codes and stay on the forefront of construction technology.

**Denver’s Commitment to the Environment:** The City of Denver has shown continued commitment to leading the nation in environmental protection, as evidenced by Denver’s 2020 Sustainability Goals [1], the Denver 80x50 Climate Action Plan [2], and the adoption of the International Green Construction Codes (IGCC) [4]. Mass timber construction supports these and similar goals, as timber is a completely renewable, ideally local material; when harvested from well-managed forests, it is easily the most sustainable structural building material available.

Mass timber structures provide additional environmental benefits, including carbon capture, reduced construction waste, and less pollution. Mass timber structures sequester carbon for the lifetime of the structure, reducing the amount of carbon dioxide released into the atmosphere, thereby reducing global climate change. As a prefabricated construction material, mass timber creates little construction waste, and it is delivered to the site ready to be installed, resulting in less pollution from large vehicles and less traffic congestion due to construction activities.

**Symbiotic Relationship Between Denver and Regional Forests:** The relationship between the City of Denver and regional forests is critical to the quality of life and economic health of the city. Recent history of wildfires has made Front Range residents keenly aware of the impact of intense fires. Fire risk is reduced by judicious thinning of smaller trees from the forest which improves the resilience of remaining trees by decreasing competition for water and nutrients and improving their ability to resist and recover from fires, insects, and disease. Healthy local forests also help provide clean, safe, affordable water to Denver residents [5]. After the Hayman Fire (2002) and the Buffalo Creek Fire (1996), Denver Water spent tens of millions of dollars to mitigate impacts to the city’s water supply from increased siltation and runoff [6]. Reduced wildfires mean healthy local watersheds [7].

The larger mass timber structures allowed in this proposal will create a market for forest products that in turn provides a commercial demand for precisely those small- and medium-sized trees that need to be removed from the forests to maintain their health. Commercial demand creates job opportunities in forest management and in local mass timber manufacturing facilities.
**Aiding the Denver Building Department:** High-rise mass timber structures have sparked the interest and imagination of local developers and designers. Without code support of this structure type, we anticipate numerous Administrative Modification Requests on an individual project basis until the time when the ICC approved tall wood provisions are eventually (and inevitably) adopted. Denver may choose to refuse such requests outright; however, considering rapid acceptance of these provisions elsewhere throughout the country – the States of Washington [8] and Oregon [9] have already adopted them – it will be difficult to defend this position. Acceptance of these provisions as part of the 2019 Denver Building Code can avoid the need for most time-consuming Administrative Modification Requests associated with mass timber.

**Allow Denver to take advantage of code provisions:** The proposed code provisions have already been approved by the International Code Council (ICC) committee and will be included in the 2021 International codes [10]. Many jurisdictions are working to adopt these provisions early. Colorado is already recognized nationally as an area with an especially strong activity in the pursuit of taller mass timber structures. Early adoption would confirm Denver’s reputation as a leader in forward-thinking technologies and environmental responsibility.

Denver is currently dealing with a labor shortage in the construction field. Mass timber requires significantly less labor than traditional building materials. Additionally, because mass timber is a prefabricated system, construction of these buildings takes a fraction of the time than for other materials. Mass timber construction is also very quiet.

Understandably, one concern with large wood buildings is that they would be susceptible to fires; however, the ICC Tall Wood committee addressed this issue directly, including doing many full-scale mass timber fire tests [11], concluding that mass timber provides excellent, predictable fire-performance. Even so, the proposed provisions relating to fire prevention were framed more conservatively than those required of conventional building materials, even explicitly addressing fire safety requirements during construction. Consequently, the proposed tall wood buildings are at least as safe from fire as, and in some cases safer than, buildings of comparable size and height in the current code [12].

**Substantiation:**

The proposed mass timber provisions, which include both new code language and the revision of existing language, have been fully vetted and approved by the International Code Committee through Group A Committee Action Hearings [10].

The International Code Council (ICC) Ad Hoc Committee on Tall Wood Buildings created (14) separate proposals [10]:
- G108-18 – AM: Main proposal describing new mass timber construction types and requirements
- FS5-18 – AS: Determining contribution of noncombustible materials to fire resistance by testing
- FS81-18 – AM: Prescriptive method for using noncombustible materials to achieve fire resistance
- FS6-18 – AMPC-1: Sealing of adjoining mass timber elements
- FS73-18 – AS: Mass timber as acceptable fire blocking
- G28-18 – AS: Redundant water supply for tall mass timber buildings
- F88-18 – AS: Provisions requiring owner to maintain building for fire resistance
- F266-18 – AMPC-1: Fire safety during construction
- G75-18 – AM: Allowable height in feet
- G80-18 – AS: Allowable height in stories
- G84-18 – AS: Allowable areas
- G146-18 – AS: Assigning the designation “HT” to existing Type IV requirements in Chapter 31
- G152-18 – AS: Assigning the designation “HT” to existing Type IV requirements in Appendix D
- G89-18 – AM: Minimum noncombustible protection for fire barriers

These (14) proposals are attached for reference in their original form.

Because the original proposals were written specifically to be utilized as a comprehensive package, the proposals for Denver amendments include all (14) proposals organized as two appendices: one to the IBC and one to the IFC. The text in this proposal is taken directly from the ICC approved code changes without modification [10].

Adoption of these proposals in Denver is supported by the Colorado State Forest Service, the Colorado Timber Industry Association, the Colorado Chapter of the International Code Council, and the American Forest Foundation. Letters of support from these groups are attached for review.

**Bibliography:**
The proposed appendices allow tall mass timber construction beyond the current 6 stories to 9, 12, and 18 stories by introducing three new construction types created specifically for mass timber: Type IV-A, Type IV-B, and Type IV-C. Mass timber construction to date, including in Denver (e.g. Platte Fifteen), has been shown to be cost competitive with conventional materials, especially in taller buildings. With development and a growing supply chain, construction costs could be further

### Note:
This section MUST include these items:

- **Purpose:** State the purpose of the proposed amendment to physical, environmental, and customary characteristics that are specific to the City and County of Denver (e.g., clarify the code; revise outdated material; substitute new or revised material for physical, environmental and customary characteristics; add new requirements to the code; delete current requirements, etc. to reflect physical, environmental and customary characteristics that are specific to the City and County of Denver)

- **Reasons:** Clearly justify the change to current code provisions, stating why the proposal is necessary to reflect physical, environmental, and customary characteristics that are specific to the City and County of Denver. Proposals that add or delete requirements shall be supported by a logical explanation that clearly shows why the current code does not reflect physical, environmental and customary characteristics that are specific to the City and County of Denver and explains how such proposal will improve the code.

- **Substantiation:** Substantiate the proposed amendment based on technical information and substantiation. Substantiation provided which is reviewed and determined as not germane to the technical issues addressed in the proposed amendment shall be identified as such.

- **Bibliography:** Include a bibliography when substantiating material is associated with the amendment proposal. The proponent shall make the substantiating materials available for review.

### Referenced Standards:

APA ANSI/APA PRG 320-18: *Standard for Performance-rated Cross-laminated Timber*


### Impact:
The proposed appendices allow tall mass timber construction beyond the current 6 stories to 9, 12, and 18 stories by introducing three new construction types created specifically for mass timber: Type IV-A, Type IV-B, and Type IV-C. Mass timber construction to date, including in Denver (e.g. Platte Fifteen), has been shown to be cost competitive with conventional materials, especially in taller buildings. With development and a growing supply chain, construction costs could be further

### Note:
List any new referenced standards that are proposed to be referenced in the code.
reduced. With support of design-assist from producers and free support from trade organizations like WoodWorks, the design community would be well supported through the change. In the long term, demand for mass timber products could result in new forest product industry in Colorado, to the benefit of forest health. Finally, it is hoped that early adoption of the 2021 code changes will have a beneficial impact on the workload of the Denver Building and Fire Departments.

**Note:** Discuss the impact of this proposal in this section AND indicate the impact of this amendment proposal for each of the following:
- The effect of the proposal on the cost of construction:  
  - ☐ Increase
  - ☐ Reduce
  - ☒ No Effect
- The effect of the proposal on the cost of design:  
  - ☐ Increase
  - ☐ Reduce
  - ☒ No Effect
- Is the proposal more or less restrictive than the I-codes:  
  - ☐ More
  - ☐ Less
  - ☒ Same

**Departmental Impact:** (To be filled out by CPD staff)

**Note:** CITY STAFF ONLY. Discuss the impact of this proposal in this section AND indicate the impact of this amendment proposal for each of the following:
- The effect of the proposal on the cost of review:  
  - ☐ Increase
  - ☐ Reduce
  - ☐ No Effect
- The effect of the proposal on the cost of enforcement/inspection:  
  - ☐ Increase
  - ☐ Reduce
  - ☐ No Effect