From the AIA-NJ Taskforce on Lightweight Construction—

AIA New Jersey

Building Design with Lightweight-Framed Construction and the Health, Safety, and Welfare of the Public

Summary of action plan

The overall purpose of this white paper is to assist legislators, regulators, and building code professionals by making recommendations for adjustments to the current building codes in the State of New Jersey as it relates to lightweight wood framed multi-unit residential buildings. This building type is identified in the code as **Residential Use Group R2** buildings that are constructed with lightweight wood framed structural systems construction type Five-A and Five B.

Summary of action items

The AIA-NJ Taskforce on Lightweight Construction is **not** recommending formal legislative action at this time. The recommendation is for the normal building code change process, established by the International Code Council, to proceed and review the herein change recommendations. Through that process, the implications of what is recommended will be thoroughly reviewed with all industry stakeholders including building code professionals, fire code professionals, building science professionals, building construction professionals, building material manufacturers, building product manufacturers, architectural and engineering design professionals, etc.

The next code change process to be completed in 2018 is currently underway. In the time between now and 2018, the AIA-NJ Taskforce on Lightweight Construction is recommending that the New Jersey Department of Community Affairs (DCA), Construction Code Element, through the Division of Codes and Standards Code Development, review these recommendations for regulatory adjustments to the current building code. This DCA review would review and assess the urgency of any changes required, in their opinion, necessary now, to protect the health safety and welfare of the public in the interim. In the time between now and 2018, changes would be made through the normal DCA regulatory change process.

AIA-NJ Taskforce on Lightweight Construction White Paper includes a summary of building code change recommendations.

The main points are further summarized here.

- **Hourly fire ratings** - Adjustments to the required hourly ratings to better protect wood frame building elements. These adjustments would be achieved mostly by deleting exceptions existing in the current code.
- **Fire Sprinklers** - Adjustments to suppression system requirements to improve fire sprinkler coverage of concealed spaces such as attics and crawl spaces.
- **Identifying markings** - Adjustments to require additional color coding and stenciled markings on building elements intended to control the spread of fire. This will aid inspectors and warn future maintenance workers and installers not to make inappropriate penetrations in these walls or ceilings.
- **Special Inspectors** - Adjustments to require Special Inspectors to verify that building elements, intended to control the spread of fire, are properly installed and secured in place.

Please refer to the full text of the White Paper for specific code section language.

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Introduction

This white paper has been developed by the AIA-NJ Taskforce on Lightweight Construction. AIA-NJ is a component of the American Institute of Architects whose member architects are from New Jersey.

Lightweight Construction

After the Avalon Bay Edgewater, NJ fire in January 2015, the American Institute of Architects New Jersey Chapter (AIA-NJ) decided to create a Taskforce to address concerns regarding lightweight construction. This taskforce was convened by AIA-NJ President Kimberly Bunn AIA and chaired by President-Elect Justin A. Mihalik AIA for the purpose of educating the public and our elected leaders on these lightweight building materials and how they are used in multi-family residential construction as currently required by the Building Code. The taskforce seeks to clarify current building codes and make recommendations on potential improvements to the codes and construction practices as they relate to these materials.

As professional building designers, architects are designing buildings to the standards set forth in the building codes. Protecting the health, safety, and welfare of the public that call these buildings “home” is of paramount importance to our elected leaders and the architectural profession.

Architects realize that eliminating or severely restricting the use of traditional building materials can have far-reaching economic effects for New Jersey. Safe housing and especially affordable housing is a balance between construction time, material availability, labor, design, and regulatory factors. Changes to this balance can have a ripple effect on many interrelated economic sectors.

Justin A. Mihalik interviewed by Al Jazeera America

The use of lightweight wood-framed building materials dates back to the earliest settlements and is a renewable and abundant resource. Modern forestry techniques now produce environmentally sustainable wood-based building products. Improved manufacturing techniques produce stronger engineered wood-based products. The safe use of these wood-based framing products is of great concern for elected officials, architects, and the public at large.

In a building fire event, the building materials, fire protection systems, and construction methods are designed to slow the spread of the fire to give ample time for occupants to safely exit the building to a public area away from the fire. Building materials, fire protection systems, and construction methods can also delay the spread of the fire, allowing time for fire service to arrive, assess, set equipment, and safely extinguish the fire. Saving lives and the safety of fire service members is the primary concern; however, the prospect of excessive property damage has become an important secondary concern.

People who safely escape a fire event can face extended time away from their homes as well as the loss of pets, irreplaceable personal items, and property. Insurance payments aside, this speaks to the very essence of what it means to live in a building and feel safe, protected, and secure.

The task force examined the current use of these materials and methods in order to recommend potential building design and construction method improvements. This can lead to added safety for the public and fire service. It can also extend the building fire resistance to reduce damage in a fire event.

The AIA- NJ Taskforce convened multiple times in the spring, summer, and fall of 2015. An overview of lightweight construction was undertaken. Since the Avalon Bay Edgewater, NJ fire was an apartment complex with many displaced residents, the overview focused on multi-family residential buildings (R-2 use group defined in the NJ building code, Type VA and VB construction). Taskforce members then divided the overview into parts that were further analyzed by individual members to formulate specific recommendations. These more detailed recommendations were thoroughly discussed and refined by the taskforce as a whole.

Justin A. Mihalik interviewed by News 12 New Jersey

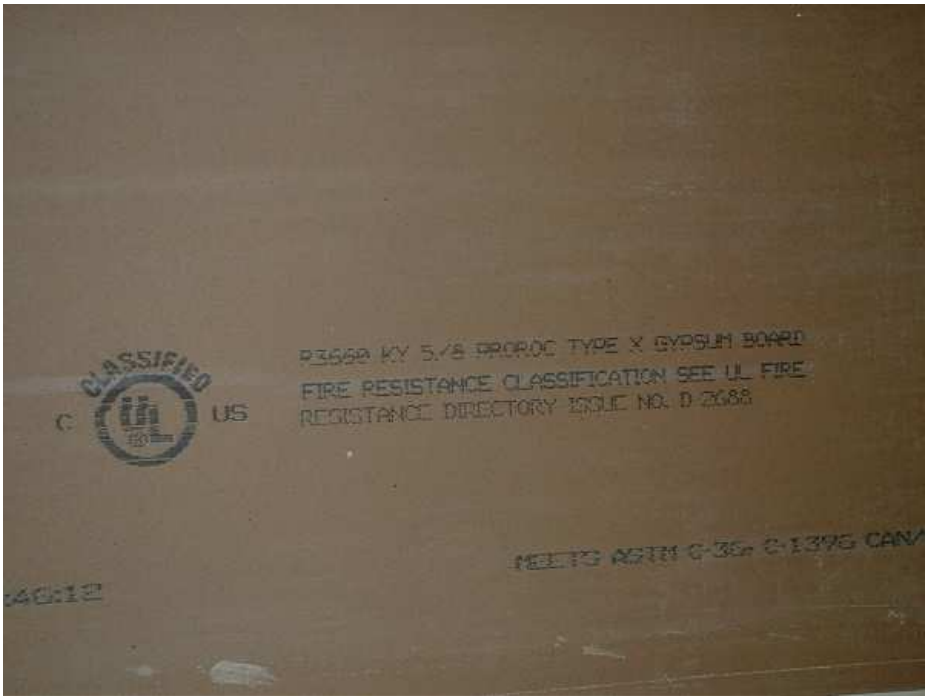
Strategies and Added Protection

The taskforce looked at a variety of ways to increase the time that materials would resist damage from a fire event. These fall into 3 categories as follows: protection, suppression, and inspection.

Protection

The protection category encloses and protects building assemblies from fire for a specified period of time. These assemblies are commonly known as walls, floors, and ceilings that have a fire rating, expressed as a function of time. The term “1 hour” or “2 hour” wall is an example of such a rating. These fire ratings are established by testing organizations that perform, record, and certify scientific tests on actual materials and assemblies under real fire conditions. Increasing the protection time can allow fire service more time to extinguish the fire with reduced building damage in a fire event.

Fire door label



Manufacturer labeling displaying fire rating.

Required wall markings above ceilings.

Suppression

The suppression category suppresses the spread of a fire. One such suppression method uses water piped through fire sprinklers. Piping is installed in a grid system throughout the building with water outlets or "heads" that can sense the fire and turn on the flow of water. The water flow reduces and suppresses the spread of the fire by saturating the building materials and contents, such as furniture and clothing. Like the protection category, suppression slows the spread of fire allowing fire service to determine how best to contain and extinguish the fire. Increasing the number of sprinkler heads or making the sprinkler system more effective can also help reduce building damage in a fire event.

Image of a residential type fire sprinkler head and pipe (NFPA 13R system)

Inspection

The taskforce looked at construction assemblies and materials such as fire rated separation walls and fire rated gypsum board and how they may be more easily identified in the field by workers, municipal inspectors, and third party inspectors. Color coding of certain materials or identifying stenciled signage can increase the appropriate use of required fire resistive materials and make them easier to identify during inspections. Additionally, the sequence of inspections plays a critical role in confirming that openings are not made in fire rated assemblies prior to the completion of inspections and issuance of a Certificate of Occupancy.

The taskforce reviewed each section of the relevant code to determine potential improvements to the protection strategy. Protection improvements are generally achieved by increasing the hourly fire rating of covering materials, such as layers of gypsum board, on the building elements that require protection. Improving how and where penetrations are made or reducing penetrations adds to protection. Reducing the number of code "exceptions" will improve protection. Additionally, dividing the building interior into smaller protected compartments will also improve protection and the performance of a building during a fire event. These approaches are reflected in the taskforce code recommendations.

The taskforce also reviewed each section of the relevant code to determine potential improvements in the suppression strategy. Suppression improvements are generally achieved by increasing the area covered by fire suppression systems such as fire sprinklers. Extending suppression into areas of the building currently not required by code, such as attics and crawl spaces, provides additional suppression in areas where fire could spread unnoticed. As sprinkler heads deploy in concealed areas, alarm systems will alert fire service earlier. Although fire alarms are placed in areas such as attics and crawl spaces, they are not placed inside of wall, floor or ceiling assemblies. As was learned by the observations of fire personnel at the Avalon Bay complex, fire spread throughout the floor assembly without burning through the assembly to set off alarms. Suppression system requirements are expressed in the taskforce code recommendations.

Taskforce recommendations for change are herein listed below.

Summary of Building Code Change Recommendations

International Code Council, International Building Code, (IBC – New Jersey version)
The following is a compilation of the AIA- New Jersey Taskforce recommended building code changes for Use Group R-2, Type VA and VB construction, Multifamily buildings designed and built with lightweight construction materials and methods.

1. Table 601 Fire-Resistance Rating Requirements for Building Elements
Recommendations:

a. The taskforce recommends that Type VA construction for all building elements other than nonbearing walls and partitions interior be required to have a minimum of 1 hour fire-resistance rating. The code allows for this rating to be zero if a sprinkler system is installed. Therefore, this exception should be removed.

2. Section 703 Fire-Resistance Ratings and Fire Tests
IBC 703.6- MARKING AND IDENTIFICATIONS
Recommendations:

a. The taskforce recommends that certified third party inspections be required to ensure that fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations are properly identified with signs or stenciling. The code currently does not require this.

3. Section 706 Fire Walls
IBC 706.1- FIRE WALLS
Recommendations:

a. The taskforce recommends that fire walls in Type V construction be held to a 3 hour fire-resistance rating. The code allows this to be reduced to 2 hour for Type V construction.
b. The taskforce recommends that openings in fire walls be limited to 156 sf. The code allows this to be increased as long as the buildings on both sides of the firewalls are sprinklered.
c. The taskforce recommends that type “C” or type “X” gypsum board be marked, stenciled or color coded for easy identification by inspectors. The code currently does not require this.

4. Section 707 Fire Barriers
IBC 707.1- FIRE BARRIERS
Recommendations:

a. The taskforce recommends that openings in fire barriers be limited to 156 sf. The code allows this to be increased as long as the buildings on both sides of the firewalls are sprinklered.
b. The taskforce recommends that type “C” or type “X” gypsum board be marked, stenciled or color coded for easy identification by inspectors. The code currently does not require this.

5. Section 709 Fire Partitions

IBC 709.1- FIRE PARTITIONS

Recommendations:

a. 709.3 Fire Resistance Rating
   1. The taskforce recommends that the fire-resistance rating be a minimum of 1 hour. The code allows this to be decreased to ½ hour fire-resistance rating.
   2. The taskforce recommends that type "C" or type "X" gypsum board be marked, stenciled or color coded for easy identification by inspectors. The code currently does not require this.

b. 709.4 Continuity
   1. The taskforce recommends that fireblocking or draftstopping be required at the partition line in Group R-2 buildings that do not exceed four stories above grade plane. The code currently allows fireblocking or draftstopping not to be required at the partition line provided that the attic space is subdivided per the code.
   2. The taskforce recommends that the attic space be subdivided into smaller areas than required by the code in order to limit the area for a fire to spread. The code currently requires the attic space to be subdivided into areas not exceeding 3,000 sf or every two dwellings units, whichever is smaller.

6. Section 712 Horizontal Assemblies

IBC 712.3- FIRE-RESISTANCE RATING

Recommendations:

a. 712.3 Fire-Resistance Rating: The taskforce recommends that the fire-resistance rating of floor and roof assemblies not be less than 1 hour. The code allows the fire-resistance rating to be reduced to ½ hour when buildings are equipped with a sprinkler system.

b. 712.4 Continuity: The taskforce recommends that the supporting construction of horizontal assemblies have the same fire-resistance rating as the horizontal assembly. The code allows the supporting construction to not be rated in Type VB construction.

7. Section 713 Penetrations

IBC 713.4.1.1.2- THROUGH-PENETRATION FIRESTOP SYSTEM

Recommendations:

a. The taskforce recommends that certified third party inspections be required of all penetrations before and after walls and ceilings have been closed. The code currently does not require this.

8. Section 717 Concealed Spaces

Recommendations:

a. 717.2 Fireblocking- The taskforce recommends that a certified third party inspection be required. The code currently does not require this.
b. 717.2.1.4 Fireblocking Integrity- The taskforce recommends that a certified third party inspection be required. The code currently does not require this.
c. 717.2.2 Concealed Wall Spaces- The taskforce recommends that a certified third party inspection be required to inspect fire blocking. The code currently does not require this.
d. 717.2.3 Connections Between Horizontal and Vertical Spaces- The taskforce recommends that a certified third party inspection be required to inspect fire blocking. The code currently does not require this.
e. 717.4 Draftstopping In Attics- The taskforce recommends that a certified third party inspection be required to inspect the draftstopping. The code currently does not require this.

9. Section 903 Automatic Sprinkler Systems

Recommendations:

a. The taskforce recommends that sprinklers by required in attics and crawl spaces when using an NFPA 13R system. Currently NFPA 13R sprinklers are not required in attics, crawl spaces and other incidental spaces within the dwelling unit.

10. Section 1018 Corridors

IBC TABLE 1018.1 CORRIDOR FIRE-RESISTANCE RATING

Recommendations:

a. The taskforce recommends that corridors be required to have a fire-resistance rating of 1 hour. Currently the code allows for corridors to have a ½ hour minimum fire-resistance rating. Standard construction of a typical wall can easily meet a 1 hour fire-resistance rating.

11. Section 1022 Exit Enclosures

Recommendations:

a. The taskforce recommends that exit enclosures connecting less than four stories be required to have a fire-resistance rating of 2 hours. The code currently allows for a 1 hour fire-resistance rating.

12. Section 1023 Exit Passageways

IBC 1023.3 CONSTRUCTION

Recommendations:

a. The taskforce recommends that exit passageway enclosures be required to have a fire-resistance rating of 2 hours. The code currently allows for a 1 hour fire-resistance rating.

These recommendations are respectfully submitted by the AIA New Jersey Taskforce on Lightweight Construction for consideration by the public at large, our elected leaders, code enforcement leaders, the building industry, construction contracting industry, and our architect colleagues.

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About AIA and AIA New Jersey

Founded in 1857, the American Institute of Architects (AIA) is the professional organization that helps architects serve the public's needs and builds awareness of the role of architects and architecture in American society. Headquartered in Washington, D.C., its 300 plus local chapters represent 87,000 licensed architects and allied professionals. The organization's local chapter, AIA New Jersey, has served as the voice of the architecture profession in the Garden State since 1900. Based in Trenton, AIA New Jersey has 2,000 members in six local sections.