



Ohio Board of Building Standards

Classroom Barricade Forum Report

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6606 Tussing Road, P.O. Box 4009, Reynoldsburg, Ohio, 43068-9009
(614) 644-2613 Fax (614) 644-3147
800-750-0750 (TTY/TDD)

dic.bbs@com.state.oh.us
<http://www.com.ohio.gov/dico/BBS.aspx>

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Executive Summary

In response to former Director of Commerce Andre Porter's request, the Ohio Board of Building Standards (Board) conducted an examination of Ohio's current building and fire codes and considered whether they needed to be changed to address emerging threats to public safety, including the possibility of an active shooter in schools.

The Board is a fifteen-member body composed of one attorney, two architects, two engineers (mechanical and structural), a fire service representative, a public member, a construction materials specialist, a general contractor, two energy experts (conservation and renewable), two residential contractors, an industrialized unit manufacturer, and a mayor of a municipality enforcing the building code. The Board is charged by the legislature with promulgating Ohio's construction codes to provide standards and requirements for construction materials, to make residential and non-residential buildings safe and sanitary, and to do so in terms of performance objectives that establish minimum requirements for the health, safety, and welfare of building occupants without preferential treatment for types of materials, products, or methods of construction.

The Board held two hearings to receive documentation and heard testimony from state education and public safety agency representatives, industry experts, building code officials, fire service, the public, and product manufacturers and had barricade device representatives describe or demonstrate their secondary locking/barricade devices. Hearings were held on April 17, 2015 and June 5, 2015.

Of particular interest was testimony from former Chardon City Schools Superintendent Joseph Bergant. Mr. Bergant presented a first-hand account of Chardon's experience, lessons learned, and recommendations from the 2012 shooting at Chardon High School. The Board also received timely and valuable information when it obtained a copy of the final report of the Sandy Hook Advisory Commission, commissioned to investigate the 2012 Newtown, Connecticut shooting. The report included a review of policies and practices in place at the time and recommendations to reduce the probability of another such tragedy.

After examination of current Ohio codes and standards, review of Board and staff research, and in consideration of the testimony presented at the hearings, the Board makes the following determination: We do not recommend any change to the current building and fire codes at this time.

History and Background

The Ohio Board of Building Standards (Board), created by Revised Code § 3781.07, is comprised of fifteen members appointed by the Governor and confirmed by the Senate. The Board is charged with the duty to formulate and adopt rules of the Ohio Administrative Code (OAC) governing the erection, construction, repair, alteration, and maintenance of all buildings or classes of buildings specified in Revised Code § 3781.06 known as the Ohio Building Code, Ohio Mechanical Code, Ohio Plumbing Code, and the Residential Code of Ohio. The Board certifies county, township and municipal building departments and their personnel to enforce these codes. The Board is also responsible for formulation of rules governing the construction and approval of industrialized units; the installation of equipment; the installation, repair, and operation of boilers and unfired pressure vessels; and the rules governing the design, construction, repair, alteration and maintenance of elevators. Revised Code § 3781.11 requires that the rules of the Board shall:

- For nonresidential buildings, *provide uniform minimum standards and requirements*, and for residential buildings, provide standards and requirements that are uniform throughout the state, *for construction and construction materials, including construction of industrialized units, to make residential and nonresidential buildings safe and sanitary* as defined in section 3781.06 of the Revised Code;
- Formulate such standards and requirements, *so far as may be practicable, in terms of performance objectives, so as to make adequate performance for the use intended the test of acceptability*;
- Permit, to the fullest extent feasible, the use of materials and technical methods, devices, and improvements, including the use of industrialized units which tend to reduce the cost of construction and erection *without affecting minimum requirements for the health, safety, and security of the occupants or users of buildings* or industrialized units and *without preferential treatment* of types or classes of materials or products or methods of construction;
- Encourage, so far as may be practicable, *the standardization of construction practices, methods, equipment, material, and techniques, including methods employed to produce industrialized units* [emphasis added].

Further, RC § 3781.10(C) specifies that only after thorough review and testing, the Board shall determine by rule that any particular fixture, device, material, process of manufacture, manufactured unit or component, or method of manufacture, system, or method of construction complies with the performance standards adopted by the Board pursuant to RC § 3781.11.

The Board lacks the resources to properly review and test materials and devices for performance. However, it has adopted rules related to product testing, review and recognition in OAC 4101:1-1-01. These provisions set forth the process for product testing, review and recognition and are consistent with national product testing and accreditation programs¹. They ensure consistent and objective evaluation of products to be used in building construction and ensure they are safe for their intended purpose and have

¹ See Appendix A. OBC Figure 114.2 Organization of Board Recognized Bodies and Certification Programs.

predictable performance. A product that is evaluated through the process can be used for its intended purpose anywhere in Ohio.

In early 2013, both the Ohio State Fire Marshal (SFM) and the Board were contacted by a classroom barricade manufacturer and school district interested in installing secondary locking/barricade devices in K-12 classrooms in the event of an active shooter. The device had not been tested or evaluated in accordance with OAC 4101:1-1-01 and, more importantly, its intended use would result in restricting egress. Recognizing that K-12 schools were looking for options to keep students safe, the Board and SFM issued a joint advisory statement on egress in educational occupancies to fire code officials, building code officials and school system superintendents on February 20, 2013². The advisory statement was intended to guide school districts and code officials as they explored options to enhance their school safety plans.

Generally, the building code does not prohibit any specific device, product or method of construction. It does, however, set forth performance standards that any device, product or method of construction must meet to be used in any regulated building. Door operation requirements in Ohio Building Code (OBC) § 1008.1.9 (OAC 4101:1-10-01) maintains three principles of performance: (1) egress doors should be readily openable from the egress side without the use of key or special knowledge; (2) door handles, pulls, latches, locks and other operating devices on doors shall not require tight grasping, tight pinching or twisting of the wrist to operate; and (3) the unlatching of any door shall not require more than one operation. These functions are critical to ensure that occupants of any building can evacuate quickly and safely in the event of a fire or other emergency. These performance criteria are central to the Board's evaluation on this topic.

On December 17, 2014, the Licking County Building Code Department issued an Adjudication Order to Southwest Licking Schools (SWLS) as a result of the school submitting an application for certificate of plan approval requesting use of a secondary locking/barricade device on classroom doors within its district. The Order denied the use of the device, stating:

Door operations for egress doors shall comply with the Ohio Building Code section 1008. Egress doors shall be readily openable from the egress side without the use of key or special knowledge or effort. The ---- device you have proposed is not in compliance with the code. (Ref. OBC Section 1008.1.9).

In January 2015, SWLS filed an appeal of that Order to the Ohio Board of Building Appeals (OBBA), requesting the use of a secondary locking/barricade device in active threat situations on classroom doors. On February 23, 2015, OBBA conducted a hearing on that Order; and after hearing testimony from the building department, school and parents, OBBA upheld the Order issued by the building department

² See Appendix B.

denying the use of the secondary locking/barricade device on classroom doors³. Unfortunately, SWLS, through its parent organization had already purchased the secondary locking/barricade devices which had been determined by the OBBA to be non-compliant with OBC § 1008. As the SWLS matter was being heard, the Board also became aware of other secondary locking/barricade devices being considered by school districts or already deployed in schools that also may not comply with the OBC.

With this increasing interest by school administrations and parent groups to utilize secondary locking/barricade devices, former Director of Commerce Andre Porter asked Board Chair Gerald Holland to study the building code issues that have been raised by the use of classroom barricade devices in schools in an active shooter situation⁴. In response to Director Porter's request, Chairman Holland convened a forum on classroom barricade devices to hear testimony from school, building, fire and public safety professionals, as well as the public⁵. The forum consisted of two days of testimony, April 17, 2015 and June 5, 2015. Afterwards, the Board assigned the matter to the Board's Code Committee to prepare the Board's recommendation and report. The Board's Code Committee is comprised of members of the Board appointed by the Chair. It provides general oversight of the Board's rule promulgation and code development activities. The Committee also reviews proposed rule changes and petitions for code changes and makes recommendations to the Board for action. The Code Committee met on June 18, 2015 and July 7, 2015 to discuss the code language, research and testimony presented. The findings and determinations included in this report are the recommendation of the Code Committee as approved by the Board at its July 24, 2015 meeting.

³ See Appendix C.

⁴ See Appendix D.

⁵ See Appendix E.

Discussion

Evolution of Safety Issues & Code Requirements

Ohio has been a leader in the development of codes and standards that have provided a solid basis for the construction of safe and sanitary buildings and structures. Regrettably, these improvements have occasionally come from real-life tragedies, which can, and historically have, become the impetus to analyze and amend the construction codes we use today to provide a safe built environment for our citizens.

The Collinwood, Ohio school fire on March 4, 1908, was one of several high-fatality fires (175 lives lost) in the first half the Twentieth Century that gradually changed public sentiment and led to demands that these types of disasters be prevented. That fire was reported internationally and produced in the public a desire for improvements in school building safety systems.

In 1911, three years after the Collinwood fire, the Ohio legislature adopted the *Ohio State Building Code* which included provisions specific to School Buildings. These requirements specified types of construction; provisions based upon building heights; requirements for means of egress; and requirements for stairway enclosures with self-closing fire doors, exit doors and windows, fire extinguishers, fire hoses, and fire alarms. These provisions in the Ohio code were broadly applied not only to public, parochial, and private schools, but to colleges, academies, seminaries, libraries, museums, and art galleries as well. The 1911 *Ohio State Building Code*, Section 25 of Title 3, provided that:

Doors from halls to rooms and cloak rooms shall have no locks upon same, but shall be equipped with knob latches only. If locks are desired, the same style locks as above specified for entrance doors shall be used and the same shall so be placed on the door (so) that they can be locked on the hall side, and can always be opened on the room or cloak room sides, whether locked or not.

One of each pair of outside or inside double doors shall have a double extension panic bolt on same, bolt to have knob, lever, push bar, push plate, push handle, or device whereby the simple act of turning a knob, or lever, or pushing against the same will release the top and bottom bolts at the same time and allow the doors to open.

Independent top and bottom bolts shall not be used.

Similar provisions continued to be included in Ohio's construction codes from 1957 through 1979 after which Ohio began using nationally developed model construction codes as the basis of the State's building codes. These model codes contained similar requirements for doors in the egress path, thus assuring that occupants would not be impeded in their exiting to safety. Currently, Ohio's building and fire codes are based on the International Building Code (IBC) and International Fire Code (IFC) developed and published by the International Code Council (ICC).

The National Fire Protection Association's (NFPA) *Life Safety Code* (NFPA 101) was first published in 1912 and was entitled *Exit Drills in Factories, Schools, Department Stores and Theaters*. The 1958 edition included Section 22 for Educational Occupancies. It addressed exiting, travel distances, fire escape stairs, stairways, panic door hardware, smoke barriers, and fire resistive enclosures of central heating equipment, as well as provisions for lighting, signage, alarms, and drills. It, too, contained language similar to Ohio's that outlined door requirements. Section 3204 required:

All doors on exits, or providing require means of egress to exits, shall be so arranged as to be readily opened from the side from which egress is to be made, at all times when the building, structure or area served is occupied. Locks, if provided, shall not require any key to operate from the inside, except as otherwise permitted by Section 23 for mental and penal institutions⁶.

These changes have led to adjustments and modifications to code requirements that regulate construction in the United States. Encouragingly, as a result of this work, NFPA reported in 2008:

[T]here has not been another school fire in the United States in which 10 or more people have died. Between 1994 and 1998, grades K through 12 averaged one civilian death per year, which has been a typical annual death toll for schools since at least 1980. Moreover, these fatalities do not appear to be innocent children, but juvenile fire-setters caught in the fires they set or adults such as janitors. It is a bittersweet legacy that, after 100 years, we have indeed made progress in improving school fire safety, and the innocent victims of Collinwood, Ohio, did not die in vain⁷.

Current Technical Code Provisions

The ICC was the outgrowth of an effort to combine the publication of multiple codes at the end of the Twentieth Century. At that time there were three model codes that were regionally developed and published, but largely contained identical provisions for regulations of construction for the health and safety of the public. The three model codes were organized and adopted in the Northeastern and Midwestern, Southern, and Western parts of the US. Efforts to consolidate the organizations and the code development process came to focus on the development of the first IBC in 2000. Ohio first adopted the IBC in 2003.

All model codes have always included the use of significant standards that represent the best means and methods of application and manufacturing of systems, materials and designs. The NFPA is internationally recognized for its efforts to standardize such parts of the construction industry as the electrical, fire protection and life safety systems and means of egress for use in buildings. Other organizations provide standards for the uniform application of regulations for evaluation of materials and systems. The IBC together with several important NFPA and other industry standards included therein achieves an appropriate level of safety and health. The Board has relied upon many of the ICC

⁶ *Building Exits Code*, NFPA 101 § 3204 (NFPA 1958).

⁷ Grant, Casey C., *The Lake View School Fire*, NFPA Journal. September/October 2008.

and NFPA codes and standards in the development of the most appropriate level of regulation of buildings for use in the State of Ohio.

In evaluating the basic factors of risk associated with the variety of building configurations the building and fire codes determine how the varied egress components assure their proper functioning in the egress system. Current building and fire code provisions prescribe three fundamental characteristics for all egress doors, including those in educational occupancies.

First, these egress doors must be *readily openable from the egress side without the use of a key or special knowledge or effort*. While security is important -- the code already attempts to balance security and safe egress -- the life safety of occupants is essential. Special knowledge or effort would dictate the need for unusual and unexpected physical ability to unlock the egress door or make it fully available for egress and would thus increase the time necessary to exit. Fine motor skills are severely compromised in a time of emergency. Using devices that require specialized skill or knowledge will interfere with occupant egress, or possibly even prevent it altogether. Therefore, in order to ensure safety for all building occupants, egress requirements must protect and accommodate the widest number of individuals, not only under normal circumstances and at optimal performance levels, but also in times of increased stress where everyone's ability to perform normal, simple door operations becomes compromised. Understanding potential conditions in emergency situations, the 1958 edition of NFPA required that, "Latches or other releasing devices to open exit doors, or doors in the path of travel to reach exits, shall be of simple types, the method of operation of which is obvious, even in darkness"⁸.

Next, egress doors must *not require that the doors and their operating components require tight grasping, tight pinching or twisting of the wrist to operate*. People with disabilities are often unable to grasp objects with their hands or are unable to reach above or below the normal reach range specified in the building code and federal law (34" to 48" above the floor). Lever-operated mechanisms, push-type mechanisms and U-shaped door pulls accommodate the greatest range of users. This fundamental requirement minimizes the risk for the greatest number of occupants.

Lastly, the *unlatching of any door or leaf must not require more than one operation*. Requiring more than one motion – or adding multiple devices that must be engaged or disengaged to accomplish egress – compromises the safety of building occupants. There are several code-compliant options that meet this fundamental code requirement. More than one operation could be a safety hazard in an emergency situation, especially when the stress of such situations affects the abilities of individual users to quickly identify and operate such devices under emergency conditions. These essential requirements are reflected in the Ohio Building Code §§ 1008.1.9, 1008.1.9.1, and 1008.1.9.5, respectively.

⁸ *Building Exits Code*, NFPA 101 § 3205 (NFPA 1958).

Importance of Standards, Testing, Listing, and Labeling

The building code is a compilation of criteria with which materials, equipment, devices, and systems must comply to be suitable for a particular use and application in a building. Virtually every component used in building construction today has been tested, is listed, or is labeled evidencing its compliance with consensus standards. Through the Board's certification the certified building departments evaluate the materials, equipment, devices and systems submitted to them for approval as code compliant and, when compliance is determined, approves them for use in a building. The materials, equipment, devices, and systems must be constructed and installed in compliance with all conditions and limitations considered as a basis for that approval. Building department inspectors audit the construction process to assure that the building is constructed as approved. For example, manufacturer's instructions and recommendations are to be followed if the approval of the material was based, even in part, on those instructions and recommendations. The approval and inspection authority given to the building department is a significant responsibility and is a key to code compliance.

The building code is not intended to inhibit innovative ideas or technological advances. A comprehensive regulatory document, such as a building code, cannot envision and then address all future innovations in the industry. As a result, the building code must contain performance-based criteria and provide a basis for the approval of increasing number of newly developed, innovative materials, systems, and methods of construction. The building code even provides a process for the use of products, devices, and systems for which no code text or referenced standard yet exists. The fact that a material, product, or method of construction is not addressed in the code is not an indication that such material, product, or method is prohibited.

Those products, devices, and systems that *are prescribed* in the building code are those for which there are requirements developed and placed in the codes and based on industry consensus standards. The type of information required includes test data in accordance with referenced standards, evidence of compliance with the referenced standard specifications, and design calculations. These products, when they show evidence that they were tested, listed, or labeled in compliance with the criteria prescribed in the codes, are deemed to comply with the building code and are approvable. Test reports for products prescribed in the code must be submitted to a certified building department as required OBC § 114.3.1.

Overview of the April 17 & June 5 Testimony

An integral part of the Board's work on this issue involved testimony presented at the Board's April 17, 2015 and June 5, 2015 meetings⁹, including a presentation from former Chardon City Schools Superintendent Joseph Bergant. In his presentation on June 5, Mr. Bergant gave the Board a first-hand account of Chardon's experience and lessons learned from the February 27, 2012 shooting at Chardon High School. He emphasized proper planning; building relationships and trust levels in the community especially with police, fire and EMS; the "if you see it, say it" approach to reporting suspicious behavior; and keeping doors locked. In response to Board members' questions about locks, Mr. Bergant stated that before the February 27, 2012 shooting, Chardon High School's doors were lockable but only from the outside with a key. The doors were able to be unlocked from the inside just by turning the knob. He stated that he wished they would have changed the lock sets earlier to ones that would be locked all the time while still opening easily from the inside. He stated that is the cheapest and most effective option, because schools are open 24/7 and anyone can bring something into a school at any time.

On April 17, Director of the Department of Public Safety John Born led off the presentations from public safety professionals and presented background information on the State's efforts primarily in prevention and preparation. With the exception of Ohio Fraternal Order of Police (FOP), testimony from law enforcement strongly supported code changes that would allow the use of secondary locking/barricade devices. Sheriff Randy Thorp stated that law enforcement fear that primary locking devices can be easily defeated. Additionally, Deputy Gus Moore stated the Alert Lockdown Inform County Evacuate (ALICE) teaches barricading with normal items: furniture, belts, anything that keeps someone from entering a classroom. Both Chief Bruce Gower and Chief Andrew Powers discussed the cost of code-compliant options. Chief Powers from the Ohio University Police stated that his campus has very few doors that can be locked and the cost of retrofitting would be significant. Chief Powers also asked the Board to ensure they consider colleges and universities because most of the discussion had centered on K-12.

However, Retired Officer Mike Weinman stated that FOP has not made a decision on secondary locking/barricade devices. He raised concerns regarding whether a secondary locking/barricade device was accessible to students and the lack of uniformity between communities if the decision to use a specific secondary locking/barricade devices was purely a local decision.

At the April 17 meeting, Rick Amweg, Executive Director for Center of P-20 Safety & Security, cautioned the Board, before it adopted any changes to the building or fire codes to conduct a full

⁹ See Appendix F & Appendix G for detailed summaries of testimony presented.

evaluation of current code compliant methods. Additionally, Mr. Amweg stated that he also participated in the Ohio Attorney General’s School Safety Task Force and helped draft the recommendations¹⁰. He told the Board that nowhere in any of the recommendations used by the P-20 Center do they recommend using any device that is contrary to the current state building or fire codes. Mr. Amweg stated that several reports and recommendations, including the Sandy Hook Advisory Commission Report¹¹, recommend that classroom doors be lockable from the inside but none recommend devices that would result in violation of national or local building and fire codes. Mr. Amweg’s testimony also emphasized that the Sandy Hook Advisory Commission Report points out that there has never been an event where a shooter breached a locked classroom door.

Building code officials spoke at both the April 17 and June 5 meetings opposing changes to the code that would allow secondary locking/barricade devices. However, there appeared to be some division amongst fire service on the issue of secondary locking/barricading devices. Chief Deputy State Fire Marshal Jeff Leaming stated that the SFM does not recommend any change to the building or fire code to recognize secondary locking/barricade devices. Chief William Shaw stated that secondary locking/barricade devices inhibit rapid ingress/egress and is a solution for one type of incident instead of an all-hazards approach. He also shared the concerns presented by FOP that if the decision was to give local authorities the ability to decide whether secondary locking/barricade devices were used, mutual aid forces in neighboring communities responding to an emergency would not always have the needed information regarding such devices. Assistant Chief McDermitt stated that their organization has conducted extensive research and concluded that no change to the building or fire codes is necessary:

There are multitude of existing products that meet the current code requirements that are “labeled” and “listed” for this purpose and have been tested for functionality. We also advocate retro-fitting of classroom doors with large windows, to doors that have a smaller, internally wired guarded window and if possible, a hardened door for a total protection package. We also advocate a statewide educational campaign to explain current code requirements¹².

Alternatively, Assistant Chief John Desmarteau presented the Board with Northeast Ohio Fire Prevention Association’s (NEOFPA) White Paper on Temporary Lockdown Procedures¹³. In the white paper, NEOFPA states:

Non-conventional arrangements that are not in compliance with the code but do permit a door normally used for egress to be secured temporarily from within a space by trained occupants only during a true lockdown emergency or training event, are recognized by NEOFPA provided that the devices and/or processes employed meet the following criteria:

¹⁰ See Appendix H.

¹¹ See Appendix I

¹² See Appendix G.

¹³ See Appendix H.

1. The lockdown process does not require the physical alteration of the door and jamb assembly, or the installation of any hardware that would be of a permanent nature.
2. The lockdown process must comply with the requirements of chapter 10 of the fire and building codes when not in use.
3. The requirements for lockdown drills as specified within chapter 4 of the OFC shall be adhered to.
4. The fire code official (AHJ) must approve the devices and/or processes. The fire code official shall also document that occupants who will be utilizing these approved devices and/or processes have received the appropriate training in their operation.

Assistant Chief John Desmarteau stated that ideally NEOFPA would prefer only code compliant hardware installed in schools. However, he stated that many schools cannot afford them, and NEOFPA would rather know what alternative devices are being used in those schools.

Northeast Ohio Fire Prevention Association's white paper position was supported by Chief Robert Searles from the City of Mentor. Chief Searles stated that he also participated in the Attorney General's School Safety Task Force¹⁴ and he emphasized the need for a layered response system. As part of Mentor's layered response system, Chief Searles stated that they use a single-action door barricade device that does not take special knowledge or ability. Teachers have been taught how to deploy it and firefighters have been taught how to defeat it. But Chief Mike Carroll from Lyndhurst stated that South Euclid-Lyndhurst is not allowing secondary locking/barricade devices in their schools and presented testimony opposing code changes that would permit them. Fire Prevention Officer Kate Earley recommended code changes for new school construction requiring locks on doors and a small window in the door on the hinge side.

On June 5, Ms. Erin West a parent of a child attending a school in SWLS presented recommendations to the Board from a parent's perspective. Ms. West is a member of Southwest Licking Parents and Community Standing with Administrators and Teacher (SWAT), the parent organization that raised the money to purchase the secondary locking/barricade devices that were determined to be non-compliant. Ms. West presented code changes, "Cody's Code Changes," named for her son. Ms. West described her changes as an "all hazards" approach, not just the hazards of the past. The proposal would allow for secondary locking/barricade devices only in Level 3 Lockdown Situation under specific conditions -- including an emergency response plan developed with local police and fire, and regular training -- and only devices that would not require an alteration to the door. The proposed code changes would only apply to existing schools, and new schools must have code compliant locks. Ms. West explained that she wished her school could purchase code-compliant retrofit locks, but they cannot afford them.

¹⁴ See Appendix H.

Additional public testimony came from local architect Joann Gretter, who provided testimony opposing the use of secondary locking/barricade devices in classrooms. Also, Mark Berger, an inventor, provided general information on building safety/security methods and recommended that the Board should not base its decision on a body of product that exists, but rather what it thinks is best for the students. Al Ramirez from Underwriters Laboratories (UL) described the scope of UL's product testing and standards development process. Mr. Ramirez stated that when they test doors, they are typically tested as a system, and ensure components of the door do not impede the door's function and purpose.

Representatives from various door hardware and secondary locking/barricade device manufacturers addressed the Board at its June 5 meeting. These representatives explained their products, demonstrated how they worked, and described their benefits. One manufacturer representative of door hardware raised accessibility concerns of secondary locking/barricade devices.

Finally, many individuals who testified addressed the cost of both code-compliant options and secondary locking/barricade devices¹⁵.

¹⁵ See Appendix F & Appendix G.

Analysis

Risk Management

Building codes are sets of regulations governing the design, construction, alteration, and maintenance of buildings and structures. They specify the uniform minimum requirements to adequately safeguard the health, safety, and welfare of building occupants. There is no more important factor in reducing a community's risk in the built environment than the adoption and enforcement of up-to-date building codes. Evaluating older buildings and retrofitting existing structural and non-structural components are also critical steps. To survive and remain resilient, communities should also strengthen their core infrastructure and critical facilities so that they together will protect occupants and be able to continue to provide essential services.

The design and construction of secure and safe buildings (those with a minimal danger or risk of harm) is understandably a primary goal for owners, architects, engineers, project managers, construction managers, developers, facilities managers, code officials, fire officials, building inspectors, city/county/state officials, emergency managers, law enforcement agencies, lenders, insurers, product manufacturers, the public, and other stakeholders. Making this goal a reality is often a challenge due to funding limitations; resistance from the occupants due to impacts on operations, productivity, and accessibility; and the impacts on the building due to perimeter security, hardening, and standoff requirements. Understanding the impact that site security has on the overall security of the building is important as well. However, a balance between the security and safety goals and the other design objectives and needs of the facility and its users can be attained.

Designing buildings for security and safety requires a proactive approach that anticipates and then protects the building occupants, resources, structure, and continuity of operations from multiple hazards. The building code by its very structure is the basic programming tool used by design professionals to understand the risks inherent in a project and is a primary solution to providing a built environment that addresses the risks. Based on a code analysis, building owners and their designers can address risks depending on the security requirements, acceptable levels of risk, cost-effectiveness of the measures proposed, life cycle costs, and the impact these measures have on the design, construction, and use of a building. If a nationally developed set of construction requirements is used, then regardless where the analysis and design are done or by whom, the fundamental process of identifying what can happen at a given location, how it can affect the built environment, and what the potential losses could be remain essentially the same from state to state.

There are times when it appears that addressing all the various threats will pose conflicts in arriving at an acceptable design and construction solution. Examples include access control measures

that prevent intrusion but may also restrict emergency egress, or environmental limits for light pollution reduction juxtaposed to the need for security lighting objectives. Conversely, design and security features can complement each other, such as the design of site architectural elements or landscaping materials that double as vehicle barriers.

Most security and safety measures involve a balance of operational, technical, and physical safety features. For example, to protect a given facility from unwanted intruders, a primarily operational approach might stress the utilization of guards around the clock; a primarily technical approach might stress video surveillance; while a primarily physical approach might stress locked doorways and access control. In practice, a combination of approaches is usually employed and the building code is developed with this all-risk principle in mind.

Vulnerable Populations

Simply stated, the model code development process used in the United States has, as one goal, the development -- in partnership with state and local governments, industry professionals, universities, laboratories, architects and engineers, manufacturers, the public, and many others -- of a family of national consensus model codes that are comprehensive, risk-based, and all-hazard in approach. This allows for a balance of code provisions that address the various risks to which occupants of buildings and structures may be exposed. These risk factors begin with classifying and evaluating common characteristics in buildings or structures that can present risks. The code's risk-based requirements are not only grounded upon what a building is made of, how big it will be, and how it will be used, but also provide guidance to designers by considering other risk factors that may be present simultaneously in a building, such as at-risk-population-based factors that bring with them other code limits and requirements.

Code requirements vary depending on whether occupants might be incapacitated or impaired in any way (sleeping, sedated, intoxicated); whether occupants are familiar with their surroundings (home or office versus hotel, theater, or stadium); occupants' capabilities of responding in an emergency (the very young, very old, or the physically impaired); the numbers of people in a space or building (office, conference room, auditorium, stadium); the likelihood of panic in an emergency (home, office, theater); the likelihood of being exposed to potential hazards (different in a factory, storage building, garage, or classroom); occupants' travel times to safety (single story residence, apartment building, high-rise office building, mall, stadium); or special loads or conditions (factory, prison, storm shelter, etc.).

Another consideration that has been greatly researched, documented, and subsequently implemented by the codes (falling under an occupant capability risk factor category) would be the code requirements to assure that the disabled have access to jobs and services. Accessibility requirements,

mandated under federal and state law, require features to be built into a building that assure that the largest numbers of people can access and use the buildings and structures we all use in our daily lives. This same access must also include egress during emergencies. The U.S. Census Bureau reports that one in five Americans has a disability¹⁶. Given this sizeable population, the codes address the needs of this population.

Granted these varied risk considerations, the codes set out to classify buildings by what they are built of (construction type classifications). This allows for a consideration of how that building would perform in a fire or disaster and require the designer to adjust the built-in safety features that would be needed. Once the construction type is determined, the limits on how large and how tall it should be (allowable building height and area limits) are established. History, fire tests, listing, and labeling of all building components help balance these risks. Given certain risks, to protect occupants, building systems must be incorporated into a building to essentially “stand watch” for occupants’ safety. This need results in the incorporation of such components as fire protection systems with sensors that “smell” and “watch” for fire or the products of combustion; egress systems and their proper configuration to allow sufficient time to exit; occupant notification systems to sound recorded or real-time messages instructing occupants in an emergency. Passive components as well as active features are used in buildings to address risk. These passive systems are such things as provisions for fire resistance/fire separation requirements for walls, floors, and ceilings, and adequate structural, plumbing, mechanical, and electrical systems.

Whether young or old, disabled or not, buildings or structures built to current code requirements address, in an all-hazard risk-based way, the needs of building occupants under a variety of situations and conditions that balance these often diverse expectations. Building methods, components, or systems that ignore this process can cause the building itself to become a hazard to its occupants.

Sandy Hook Advisory Commission Report

Several individuals who testified at the April 17, 2015 and June 5, 2015 meetings referenced the Sandy Hook Advisory Commission (Commission). The Commission was established by Connecticut Governor Dannel P. Malloy shortly after the attack on Sandy Hook Elementary School on December 14, 2012. Over a two-year period the Commission “reviewed laws, policies, and practices in place on December 14, 2012 in order to make recommendations intended to reduce the probability of another

¹⁶ United States Census Bureau. *Nearly 1 in 5 People have a disability in the U.S., Census Bureau Reports, Report Released to Coincide with 22nd Anniversary of the ADA*, July 25, 2012. <http://www.census.gov/newsroom/releases/archives/miscellaneous/cb12-134.html>

tragedy on the scale of what occurred at Sandy Hook Elementary School.”¹⁷ The Commission presented its Final Report (Final Report) to Connecticut Governor Malloy on March 6, 2015, the same day the Board established its forum on classroom barricades. The Commission’s work focused on three areas:

Safe School Design and Operation
Law Enforcement, Public Safety, and Emergency Response
Mental Health/Mental Wellness

For the purposes of this Report, the Board focused on the information and recommendations included in the Commission’s Final Report related to Safe School Design and Operation (SSDO).

In developing its SSDO recommendations, the Commission used an all-hazards risk management approach¹⁸. The Final Report explains that the Commission reviewed the Columbine and Virginia Tech reports, but determined that these reports did not provide usable recommendations for SSDO. The Commission concluded that, “while developing strategies specifically intended to address active shooter events is very important, a more holistic approach to SSDO is necessary and appropriate”¹⁹. The Commission had previously issued an interim report dated March 18, 2013, which is referenced many times throughout the Final Report. Its interim report included a recommendation for the development of SSDO standards, resulting in the formation of the School Security Infrastructure Council (SSIC) in Connecticut. The SSIC issued the Report of the School Safety Infrastructure Council²⁰. Additionally, the Commission’s interim report included twenty-two recommendations addressing safe school design and human resource emergency preparedness²¹. The Commission notes that almost all of the recommendations were subsequently adopted in the Report of the School Safety Infrastructure Council. The Final Report then proceeds to set forth twelve additional recommendations related to SSDO. Most pertinent to the Board’s charge – and most salient – is the Commission’s Recommendation No. 1:

The SSIC Report includes a standard requiring classroom and other safe-haven areas to have doors that can be locked from the inside. The Commission cannot emphasize enough the importance of this recommendation. *The testimony and other evidence presented to the Commission reveals that there has never been an event in which an active shooter breached a locked classroom door.* Accordingly, the Commission reiterates its recommendation that all classrooms in K-12 schools should be equipped with locked doors that can be locked from the inside by the classroom teacher *or substitute* [emphasis in the original].

¹⁷ *Final Report of the Sandy Hook Advisory Commission Presented to Governor Dannel P. Malloy State of Connecticut*, at xi (Conn. Mar. 6, 2015).

¹⁸ *Id* at 20.

¹⁹ *Id* at 21.

²⁰ See Appendix J. Report of the School Safety Infrastructure Council, Revised and Updated to June 27, 2014.

²¹ *Final Report of the Sandy Hook Advisory Commission Presented to Governor Dannel P. Malloy State of Connecticut*, at 32 (Conn. Mar. 6, 2015).

Later, the Commission identifies Key Safe School Infrastructure Standards. The Commission notes that while standards established by the SSIC were incorporated into the Final Reports Appendix, it felt it important to specifically provide a subset of the SSIC's report's salient recommendations²². The criteria the Commission used to identify the subset were:

- (1) Relative ease of feasibility to implement the recommendation.
- (2) Opportunity for the recommendation to provide significant safety and security value.
- (3) Ability to implement the recommendation at a reasonable cost for the extent of protective design value obtained²³.

The subset addresses: School Site Perimeter Standards; Parking Areas and Vehicular and Pedestrian Routes; Recreational Areas – Playgrounds, Athletic Areas, Multipurpose Fields, Communication Systems, School Buildings Exterior – Points of Entry/Egress and Accessibility; School Building Interior; Roofs; and Critical Assets/Utilities. While this subset includes important information to be considered for school building design and operation, for the purposes of this Report the Board focused on the information presented by, and recommendations of, the Commission for Classroom Security as part of the School Building Interior. These include²⁴:

- 6.11 All classrooms shall be equipped with a communications system to alert administrators in case of emergency. Such communication systems may consist of a push-to-talk button system, an identifiable telephone system, or other means.
- 6.12 *Door hardware, handles, locks and thresholds shall be ANSI/BHMA Grade 1*²⁵.
- 6.13 *All classroom doors shall be lockable from the inside without requiring lock activation from the hallway, and door locks shall be tamper resistant*²⁶.
- 6.15 *Classroom door locks shall be easy to lock and allow for quick release in the event of an emergency*²⁷.
- 6.16 *Classroom doors with interior locks shall have the capability of being unlocked/released from the interior with one motion*²⁸.
- 6.17 *All door locking systems must comply with life safety and State of Connecticut building and fire codes to allow emergency evacuation*²⁹.
- 6.xx Provide doors between adjacent classrooms to provide means of moving classroom occupants from one classroom to the next as a means to relocate students and teachers from an impending hallway threat. Provide such doors with suitable locking hardware to preclude unauthorized tailgating³⁰.
- 6.xx Provide closers on these doors so that they automatically return to a closed, latched, and locked position to preclude unauthorized entry³¹.

²² *Id* at 45.

²³ *Id*.

²⁴ *Final Report of the Sandy Hook Advisory Commission Presented to Governor Dannel P. Malloy State of Connecticut*, at 56 – 57 (Conn. Mar. 6, 2015).

²⁵ This standard is already incorporated in the OBC.

²⁶ This option is currently available for all new construction but is not mandatory.

²⁷ This is consistent with the current provisions of the OBC.

²⁸ This is consistent with the current provisions of the OBC.

²⁹ Like Ohio, Connecticut's building and fire codes are also based on the International Building Code and International Fire published by the International Code Council.

³⁰ This option is currently available for all new construction but is not mandatory.

³¹ This option is currently available for all new construction but is not mandatory.

- 6.20 If classroom doors are equipped with a sidelight, the glazing should be penetration/forced entry resistant to the project forced entry standard³².
- 6.21 If interior windows are installed to provide lines of sight into/out of classrooms or other populated areas, certain factors should be taken into consideration related to the size, placement and material used for those windows, including
 - 6.21.1 Minimizing the size of windows or the installation of multiple interspersed smaller windows with barriers in a larger window area to deter intruder accessibility.
 - 6.21.2 Placing windows at a sufficient distance from the interior locking mechanism to prevent or make difficult the opening of a door or lock from outside.
 - 6.21.3 Concealing or obstructing window views to prevent an assailant's ability to ascertain the status or presence of persons inside of a classroom during lockdown.
 - 6.21.4 Hardening window frames and glazing to the project forced entry standards to lessen window vulnerability [emphasis added]³³.

³² This option is currently available for all new construction but is not mandatory.

³³ This option is currently available for all new construction but is not mandatory.

Conclusion

To date, there have been no secondary locking/barricade devices that have been viewed or presented that comply with the current requirements of the Ohio building and fire codes or have had any consensus standard developed to assure their consistent manufacture, establish their usable life, or provide consistent rating for strength or durability. These single-hazard devices require specialized knowledge or skill in the steps needed to use them. They all require fine motor skills to install and to remove, thus requiring many additional operations to block a door and then many steps to return the device-blocked egress door to service for egress.

Many of these unlisted, unlabeled, and untested devices are intended to be attached to the code compliant door hardware and depend upon the integrity of the existing door hardware itself in order to function as advertised. Likewise, most are required to operate under the skill of a particular individual and do not have failsafe mechanisms in place in the event of the incapacitation or unavailability of the 'knowledgeable' or 'skilled' person. Most require tight grasping, pinching, or twisting of the wrist to operate and most are required to be placed outside the reach ranges (32" to 48" above the floor) prescribed in the building and fire codes to meet federal accessibility mandates of the Americans with Disabilities Act. This fact alone essentially prevents their use by some occupants (young, old, short) and many with disabilities and places them outside federal and state acceptable limits that make operable parts of these critical egress door building components accessible.

The Board heard testimony on the cost of code-compliant locks vs secondary locking/barricade devices. The law enforcement, fire service and parent organization representatives that support code changes to allow the use of secondary locking/barricade devices also agreed that code-compliant options are preferable but the cost of retrofitting doors is prohibitive. Based on the testimony presented the average cost of a compliant lock set was said to be approximately \$300. The cost of installation would be approximately between \$25 and \$50. Therefore, the cost to retrofit classroom doors with a code-compliant lock set could be between \$325 to \$350 per door. Whereas, the cost of many of the secondary locking/barricade devices presented to the Board was under \$100. The Board recognizes the cost difference between code-compliant options and secondary locking/barricade devices. But in this case, the cost of code-compliant lock sets is far eclipsed by their short and long term benefits.

Testimony was also presented that when such a secondary locking/barricade device is used in an emergency, the space becomes an "area of detention or restraint"³⁴. It is true that protect-in-place strategies are already incorporated into the building and fire codes for occupancies where egress is unwanted, dangerous, or impossible. These occupancies include hospitals where patients are too sick or

³⁴ See Appendix E.

incapacitated to move, jails in which the dangers of evacuation must be controlled, or in occupancies in which individuals are physically ambulatory but are mentally impaired to the point that there must be direct supervision to egress safely, such as an Alzheimer unit in a care facility. However, wherever a protect-in-place strategy is anticipated to be used, the building has many additional built-in “risk-management” features to address these increases in risk for occupants in such occupancies. Locking occupants inside a Group E Occupancy classroom with the use of secondary locking or door blocking devices would not provide the built-in safety features that would be required for a code compliant protect-in-place occupancy. Spaces originally designed as classrooms that become areas of “detention or restraint” (Institutional Occupancies) without including the built-in features that address the increased risk of locking occupants in a space results in a much lowered level of safety for any students so restricted.

Likewise, ingress or access by emergency responders for treatment or search-and-rescue appear to be crucially impeded especially in the deployment of secondary door locking or barricade devices that are inherently designed to be un-openable from the exterior of the barricaded room. Many devices have no provisions for them to be deactivated from the outside by first responders or have some non-standard proprietary tools that first responders must carry and use in order for the devices to be overcome. Additionally, most of the devices are neither visible nor identifiable from the exterior of the barricaded or blocked door. This condition would be especially difficult for mutual aid first responders who may not be familiar with the use of a particular device or a device different from that used in their home community.

It is also important to realize that most secondary locking/barricade devices require that the existing door or door frame be altered or have devices, brackets, stops, or guides installed on them. The action of drilling or mounting unlisted and unlabeled hardware on a rated door assembly can alter or affect the fire rating of the assembly.

Consistent with testimony presented, RC § 3313.536 requires that all public and private schools prepare and submit a school safety plan and building floor plan to the Ohio Attorney General’s Office. The schools are required to keep the plans updated at least every three years. The plans are available to emergency responders. The Attorney General’s School Safety Task Force recognizes that in order to minimize risks to school safety, relationships among law enforcement, fire, emergency services, school officials, staff, teachers, parents, mental health, social service, clergy, hospitals, and other health professionals need to be continually developed and, among these professionals, ongoing regular communications, planning, training, reviewing, and revising school safety plans is of utmost importance.

The current Ohio Fire Code §§ 402 and 404, based upon the 2009 International Fire Code, already defines the term “Lockdown;” outlines the contents of a lockdown plan (which includes an

approved means of two-way communication between a central location and each secured area), requires lockdown training for employees; and requires dedicated lockdown drills, separated from fire, tornado, and other drills.

The 2012 national model codes first incorporated code language which required an emergency voice/alarm communication system in all new schools or schools where the fire alarm system is being replaced. This requirement was added to enhance communication between school administrators, teachers and students during a lockdown incident. In keeping with the national recommendations for school safety, the Board approved this language and is currently in the process of adopting this code language into the OBC § 907.2.3.

The Sandy Hook Advisory Commission Final Report recommended, and strongly emphasized, that classroom and other safe-haven areas have doors that can be locked from the inside, and then highlighted standards for classroom security. Door hardware, handles, locks and thresholds shall be listed (ANSI/BHMA Grade 1); lockable from inside; easy to lock and quickly releaseable in the event of an emergency; capable of being unlocked from the inside with one motion; and compliant with life safety, building and fire codes. Consistent with these recommendations, there is a code change proposal³⁵ currently moving through the ICC code development process which would require all classroom doors in educational occupancies to be lockable from within the classroom without opening the classroom door and to be unlockable and openable from both the ingress and egress sides. This would allow immediate egress from inside the classroom and, with appropriate credential (key, keycard, or a combination), access from the outside to the classroom for first-responders. The Board considers this approach to be a viable all-hazard code-complying solution to the security question.

Based on the foregoing, the Board does not recommend any change to the current building and fire codes at this time.

³⁵ See Appendix K.

Acknowledgements

The Board would like to thank all those who participated in this study by providing testimony, research, and information to the Board. Also, the Sandy Hook Advisory Commission Final Report was an invaluable resource in the development of this Report and contains important information to be considered for school building design and operation. It is recommended reading for anyone involved in school building design. The Board extends its heartfelt appreciation to Joseph Bergant for taking time to discuss the 2012 events in Chardon High School with the Board at its June 5, 2015 meeting and his continued work to improve school safety. Finally, to the citizens of the State of Ohio in their various capacities as parents, public officials, safety personnel and building and fire officials who came forward and for the technical information provided by industry representatives and designers and manufacturers who testified, the Board expresses its gratitude and appreciation for the sincere effort to assist it in making this decision.

Appendix

- A. OBC Figure 114.2 Organization of Board Recognized Bodies and Certification Programs
- B. February 20, 2013 Division of State Fire Marshal and Board of Building Standards Advisory Statement – Egress in Educational Occupancies
- C. OBBA Case # 15-0013 File
- D. Classroom Barricade Correspondence
- E. Classroom Barricade Forum Schedule
- F. April 17, 2015 Classroom Barricade Forum Testimony
- G. June 5, 2015 Classroom Barricade Forum Testimony
- H. June 2013 Ohio Attorney General School Safety Task Force Recommendations and Resources
- I. Sandy Hook Advisory Commission Final Report March 6, 2015
- J. June 27, 2014 State of Connecticut Report of the School Safety Infrastructure Council
- K. Code and Standards Information