



Economic Impact Analysis Virginia Department of Planning and Budget

13 VAC 5-63 – Virginia Uniform Statewide Building Code

Department of Housing and Community Development

October 18, 2004

The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with Section 2.2-4007.G of the Administrative Process Act and Executive Order Number 21 (02). Section 2.2-4007.G requires that such economic impact analyses include, but need not be limited to, the projected number of businesses or other entities to whom the regulation would apply, the identity of any localities and types of businesses or other entities particularly affected, the projected number of persons and employment positions to be affected, the projected costs to affected businesses or entities to implement or comply with the regulation, and the impact on the use and value of private property. The analysis presented below represents DPB's best estimate of these economic impacts.

Summary of the Proposed Regulation

The General Assembly mandates in §36-98 of the Code of Virginia that the Virginia Board of Housing and Community Development adopt and promulgate a Uniform Statewide Building Code, which supersedes the building codes and regulations of counties, municipalities, and other political subdivisions and state agencies.

The proposed regulatory action repeals the existing Uniform Statewide Building Code (USBC) and promulgates a new regulation in its place. The new regulation updates building codes and standards developed by the International Code Council (ICC) and incorporated by reference in to the USBC from the 2000 edition to the 2003 edition. The codes being updated include the International Building Code (IBC), the International Residential Code, and the International Property Maintenance Code. The International Plumbing Code, the International Mechanical Code, the ICC Electrical Code, the International Fuel Gas Code, and the International Energy Conservation Code, which are referenced by the IBC, have also been

updated from the 2000 edition to the 2003 edition. In addition to updating references to existing ICC codes, the proposed regulation incorporates the International Existing Building Code, a new code developed by the ICC. According to the Department of Housing and Community Development (DHCD), the existing regulation is being repealed largely because of the extensive reformatting required to incorporate the new International Existing Building Code into the USBC. Finally, the proposed regulation deletes some documents incorporated by reference into the existing USBC. According to DHCD, the adoption of the 2003 ICC codes makes it unnecessary to incorporate these documents by reference.

Updating from the 2000 edition to the 2003 edition of the ICC codes (1) requires greater fire safety methods of garage construction in residential buildings when a garage is located below a habitable room, (2) allows the limited use of wood treated with fire retardant in roof construction of certain types of noncombustible buildings, (3) requires installation of entrapment avoidance devices in the drains of all commercial and residential swimming pools, (4) eliminates several provisions relating to the number of window and door openings allowed in courtyard walls of commercial buildings, (5) allows a putty pad protection system to be used for electrical outlets on fire-rated walls, (6) permits the use of platform lifts instead of ramps in certain areas to accommodate people with disabilities, and (7) prohibits the use of wired glass in Group E (educational) occupancies and requires the use of tempered glass in its place.

The proposed regulation also modifies existing language, rearranges sections, and reformats the existing USBC. According to DHCD, these are not substantive changes. Many of the changes are in order to incorporate the new International Existing Building Code. Incorporation of the International Existing Building Code is not likely to have a significant effect on design and construction practices in the state because the minimum requirements for compliance (or compliance alternatives) are unchanged between the proposed and existing USBC. The International Existing Building Code provides more prescriptive provisions for the rehabilitation of buildings than provided for under the existing USBC. All other changes are intended to clarify various aspects of the USBC. All Virginia-specific requirements relating to the construction, rehabilitation, or maintenance of buildings are unchanged between the existing and proposed USBC.

Estimated Economic Impact

The proposed regulation updates building codes and standards developed by the ICC and incorporated by reference into the USBC from the 2000 edition to the 2003 edition. The following are identified by DHCD as the substantive changes between the 2000 edition and the 2003 edition of the ICC codes¹.

(1) The proposed regulation requires greater fire safety methods of garage construction in residential buildings when a garage is located below a habitable room. Specifically, if a residential building is constructed with a habitable room above the garage, the ceiling of the garage must be covered with a N-inch Type X (fire resistant) gypsum board or equivalent that provides a one-hour fire rating. The existing requirement is for the ceiling to be covered with a ½-inch gypsum board or equivalent that provides a 20-minute fire rating. According to DHCD, a 4' × 8' board of N-inch Type X gypsum is likely to cost approximately \$10 more than a ½-inch gypsum board of similar dimensions. Thus, for a standard 12' × 22' single garage, it is likely to cost an additional \$80 to \$90 to meet the requirements of the regulation.² The additional cost will only be incurred on new residential construction in which the garage is constructed with a habitable room above it. New construction of garages with habitable rooms adjacent to them and existing residential construction are unaffected by the proposed change.

The proposed change is also likely to produce some economic benefits. Use of more fire resistant material on the ceiling of garages with habitable rooms above them could reduce the risk of damage to life and property from fires originating in a garage. The ICC code writing body determined that fires could spread more easily through the ceiling of a garage than through its walls. The use of fire resistant material on the ceiling increases the time it takes for the fire to spread to the house and, thus, allows more time for people to be rescued and property to be salvaged from the residence. The proposed requirement has been in the commercial building code for many years. Given the increased prevalence of residential construction with habitable rooms above garages, the ICC determined that the additional protection against fire was also

¹ It should be kept in mind that many of the differences between the 2000 edition and the 2003 edition of the ICC codes may not have a significant effect on current design and construction practices, especially in commercial construction. According to DHCD, due to insurance and liability concerns, design and construction professionals tend to stay abreast of the latest issues and commercial buildings tend to be designed and constructed to standards above and beyond those required by the USBC.

required in the residential building code. According to DHCD, construction of habitable rooms above garages is on an increasing trend, especially in high-end developments.

The net economic impact of the proposed change will depend on whether the additional cost of protecting against the risk of damage to life and property from fire is greater than or less than the benefits of doing so. It is not possible to make a precise determination of the net economic impact at this time. Such an estimate would require data on the number of fires originating in a garage below a habitable room and the resulting damage to life and property. It would also require calculating the reduction in the risk to life and property by the use of more fire resistant material. However, the additional costs of complying with the requirements of the regulation are not very large. Moreover, the ICC code writing body determined the risk to be significant enough to recommend the use of more fire resistant material on the ceiling of garages below habitable rooms. Thus, to the extent that the proposed change reduces the risk of damage to life and property from fire without imposing any sizeable additional costs, it is likely to produce a net positive economic impact.

(2) The proposed regulation allows the limited use of wood treated with fire retardant in roof construction of certain types of noncombustible buildings. Under existing regulations, wood treated with fire retardant can only be used in roof construction of buildings less than three stories in height. The proposed regulation will allow fire retardant-treated wood to also be used in Type II construction (smaller noncombustible buildings) of all heights and Type I construction (larger noncombustible buildings) where the vertical distance from the upper floor to the roof is 20 feet or more.

The proposed change is likely to produce some economic benefits. Rather than using noncombustible framing (steel and concrete), the proposed change will allow another method of construction for Type II and certain types of Type I buildings, thus providing a greater diversity in construction methods. According to DHCD, the proposed change is in response to fire retardant-treated wood becoming available under new standards to assure its quality. Allowing this type of wood to be used in roof construction of Type II and certain Type I buildings will increase the range of design options in the construction of these types of buildings. The

² A standard 18' × 22' double garage is likely to require an additional \$120-\$130 to protect the ceiling in accordance with the requirements of the regulation.

proposed change could also provide some cost savings. Use of wood treated with fire retardant requires a different method of construction than roof construction with steel and concrete, making it difficult to precisely estimate the cost savings associated with the proposed change. According to DHCD, steel construction averages \$130 per square foot and concrete construction averages \$177 per square foot for commercial buildings. While the average cost of wood construction for commercial buildings is not readily available, it averages between \$45 and \$150 per square foot for residential buildings. Wood construction costs for commercial buildings are likely to be similar to the wood construction costs for residential buildings. Thus, the proposed change could result in some cost savings.

The proposed change could also impose additional economic costs by increasing the risk of damage to life and property from fire. Commercial buildings using fire retardant-treated wood in roof construction could pose more of a fire hazard than a commercial building using steel and concrete in its roof construction. However, according to DHCD, there have been no serious problems and no known failures of the type of wood being allowed for use in roof construction. Moreover, the ICC code writing body recognized the safety record of fire retardant-treated wood and determined that its use would provide a safe and low cost alternative to using steel and concrete in the roof construction of certain types of buildings. Thus, it is not likely that the limited use of this type of wood in roof construction permitted under the proposed regulation will significantly increase the risk of damage to life and property from fire. To the extent that the proposed change provides a greater range of construction and design options and reduces the cost of construction for certain types of building without significantly increasing the risk to life and property, it is likely to produce a net positive economic impact.

(3) The proposed regulation requires installation of entrapment avoidance devices in the drains of all new commercial and residential swimming pools. The commercial and residential building codes now require the use of anti-vortex drain covers or the use of other approved methods for preventing entrapment by swimming pool drains. There have been several instances of death and injury (especially among children) due to body part entrapment in the drain of a swimming pool, wading pool, or spa. In a 2003 draft report, the Consumer Products Safety Commission (CPSC) reports that it is aware of 73 cases of body entrapment, including 12

confirmed deaths, between January 1990 and October 2003.³ Of these, 31 incidents occurred at swimming pools (commercial and residential). The deaths occurred after the body or limb was held against the swimming pool drain by the suction of the circulation pump. In addition, the report states that two instances of evisceration and disembowelment were reported to the CPSC over the same period. Specifically, with respect to children, the CPSC knows of 18 incidents, including five deaths, involving body part entrapment of children between the ages of two and 14. DHCD is not aware of any such injuries or fatalities in Virginia. However, this could be in part due to the lack of a reporting and recording mechanism for such incidents. The use of anti-vortex drain covers or other entrapment avoidance devices is likely to reduce the occurrence of such incidents. The minimum cost of installing an anti-vortex drain cover meeting the requirements of the regulation ranges from \$10 to \$30. According to DHCD, insurance and liability concerns ensure that most swimming pools currently manufactured in the United States are already fitted with anti-entrapment devices. Thus, the proposed change is likely to affect the construction of those pools that do not always include entrapment avoidance devices, such as homemade pools and pools imported from other countries.

While there are costs and benefits associated with the proposed change, it is not possible to make a precise determination of its net economic impact. The cost of installing entrapment avoidance devices is easily determined. However, it is not possible to precisely estimate the benefits of the proposed change, i.e., the reduction in the number of deaths and injuries by installing anti-entrapment devices in swimming pools. Based on the CPSC report, it would appear that the risk of death or injury due to body part entrapment in swimming pool drains without entrapment avoidance devices is significant. On the other hand, the cost of installing such a device is not very large and most swimming pools manufactured in the United States already come with these devices installed. Thus, to the extent that the proposed change reduces the risk of death and injury due to body part entrapment in swimming pool drains without imposing any sizeable additional costs, it is likely to produce a net positive economic impact.

(4) The proposed regulation eliminates several provisions relating to the number of window and door openings allowed in courtyard walls of commercial buildings. In determining whether the walls facing a courtyard are permitted to have window and door openings, the

³ U.S. Consumer Product Safety Commission, Washington, D.C., 2003. *Draft Guidelines for Entrapment Hazards:*

existing regulation assumes a property line between the opposite walls of the courtyard. In general, only if the walls are more than ten feet apart are window and door openings permitted. Exceptions to this rule are allowed when not more than two levels of the building open into the courtyard, the aggregate area of the building (including the courtyard) is within the allowable area, and the building is not a Group I (institutional) classification. In the case of these exceptions, courtyard walls do not have to be ten feet apart in order to have window and door openings. The proposed regulation eliminates these requirements for commercial buildings containing courtyards. Courtyard walls will now have no restrictions regarding the number of window and door openings permitted. The exterior wall of the building itself will not have any limits on window and door openings unless it is within ten feet of another building on the same lot or within ten feet of the property line.

The proposed change could produce costs and benefits. Increased costs could manifest themselves in the form of an increased risk of fire spreading within a building and from one building to another due to the lifting of restrictions on the number of window and door openings allowed in courtyard walls. By restricting the number of window and door openings, the existing regulation could reduce the risk of a fire spreading from a building to its courtyard and hence, to other parts of the building and to neighboring buildings. The benefits are likely to manifest themselves in the form of greater flexibility in designing commercial buildings with courtyards. Window and door openings can now be incorporated into courtyard walls where previously they had not been allowed.

The net economic impact of the proposed change will depend on whether the costs of removing restrictions on window and door openings in courtyard walls are greater than or less than the benefits of doing so. According to DHCD, there are very few existing commercial buildings that (i) contain a courtyard less than ten feet wide or (ii) cannot avail themselves of the exceptions provided for under the existing regulation. This could be either because it is unusual to construct courtyards that are less than ten feet wide and do not fall under any of the exceptions or because existing restrictions on window and door openings discourage the construction of such courtyards. In the former case, the proposed change is not likely to produce significant costs or benefits. In the latter case, lifting the restrictions could result in more buildings being

constructed with courtyards that have window and door openings that previously would not have been allowed, potentially increasing the risk of a fire spreading within a building and from one building to another. Under these circumstances, the net economic impact of the proposed change will depend on whether the increased risk of fire is greater than or less than the benefits of allowing window and door openings in courtyard walls. There is not enough information available at this time to make a precise determination of the net economic impact of the proposed change. Such a calculation would require being able to estimate the impact of the proposed change on the construction of commercial buildings containing courtyards and on the increased risk of a fire spreading. It would also require being able to estimate the benefits of providing additional flexibility in the construction of commercial building with courtyards. However, neither the costs nor the benefits associated with the proposed change are likely to be very large. According to DHCD, removing existing restrictions on window and door openings in courtyard walls is not likely to have a significant effect on the spread of fire within a building or to neighboring buildings⁴. Moreover, the agency does not believe that the proposed change will lead to significant changes to current design and construction practices for commercial buildings.

(5) The proposed regulation allows a putty pad protection system to be used for electrical outlets on fire-rated walls. Under the existing regulation, electrical boxes in fire-rated walls are required to be separated by at least 24 inches horizontally. The proposed regulation will allow electrical boxes to be side-by-side or on both sides of a fire-rated wall without a horizontal separation distance as long as a putty-pad type fire resistant pad is wrapped around the boxes. Thus, the proposed change provides more flexibility in the placement of electrical outlets on fire-rated walls.

The proposed change is likely to have costs and benefits associated with it. The costs could manifest themselves in the form of an increased risk of fire from electrical outlets and boxes. However, according to DHCD, the proposed change is not likely to have a significant effect on the risk of fire. Putty pad-type fire resistant pads have been tested and shown to protect outlets from the spread of fire. The benefits of the proposed change could manifest themselves in the form of increased flexibility in the placement of electrical boxes on fire-rated walls.

⁴ According to DHCD, as a courtyard is defined as an open, uncovered space and the heat of a fire moves perpendicular to the opening in a building, lifting restrictions on the number of door openings in courtyard walls is

However, these benefits are likely to be limited. According to DHCD, putty pads are permitted under the 2000 IBC as long as they meet the specified American Society for Testing and Materials standard and can be used as an alternative to existing requirements. The proposed change will now allow putty pads to be used with less documentation than required under the existing regulation. A 7.25" × 7.25" × 0.19" putty pad meeting the requirements of the regulation costs approximately \$6.

The net economic impact of the proposed change will depend on the magnitude of the costs and benefits accruing from it. Neither the costs nor the benefits associated with the proposed change appear to be very large. Thus, while it is not possible to precisely estimate the net economic impact of the proposed change, the net economic impact is not likely to be very large.

(6) The proposed regulation permits the use of platform lifts instead of ramps in certain areas to accommodate people with disabilities. The existing regulation allows platform (or wheelchair) lifts to be used instead of ramps or elevators only under certain limited circumstances. The proposed change expands the instances when platform lifts may be used instead of a ramp or elevator to include providing access to raised areas in courtrooms. In addition, the proposed regulation allows the use of platform lifts for exterior accessible routes where site constraints make the use of ramps infeasible. Platform lifts can currently be used on exterior accessible routes where ramp use is infeasible, but only after its use has been approved as a modification under the existing USBC. Under the proposed regulation, platform lifts can be used as an alternative to ramps without having to obtain approval.

The proposed change increases the options available for providing access to people with disabilities. By providing an additional space saving alternative to ramps and elevators in courtrooms and by allowing platform lifts to be used when ramp use for exterior accessible routes is infeasible, the proposed regulation is likely to produce economic benefits. At the same time, it is not likely to impose any significant costs. Platform lifts meeting the requirements of the regulation are a safe alternative to ramps and elevators. The increased use of platform lifts could result in more instances when people with disabilities will be required to use a different

not likely to have a significant effect on the spread of a fire to neighboring buildings. Moreover, a fire is more likely to spread within a building through interior walls rather than across a courtyard.

access route than people without disabilities. However, the increase in such instances is likely to be limited as ramps are generally cheaper to install than platform lifts⁵. Thus, platform lifts are likely to be installed only when the installation of ramps is problematic. The proposed change was recommended by the Architectural and Transportation Compliance Board and based on the new Americans with Disabilities Act accessibility guidelines. Thus, the proposed change is likely to have a net positive economic impact, improving access for people with disabilities without imposing any significant economic costs.

(7) The proposed regulation prohibits the use of wired glass in Group E (educational) occupancies and requires the use of tempered glass in its place. Under the existing regulation, wired glass products are permitted for use as safety glazing in fire-rated doors in all types of occupancies. Under the proposed regulation, tempered glass will have to be used in place of wired glass in fire-rated doors of all new educational buildings, gymnasiums, and play areas. At the time that wired glass was first permitted for use in fire-rated doors, it was the only glazing product to offer a significant degree of fire protection. Most other types of glass could not endure the thermal shock test⁶ or the high temperatures in the fire test furnace. However, wired glass has low impact resistance and tends to shatter more easily than other types of glass. In addition, the wire mesh within the glass can cause additional injuries when the glass does break. Due to its fire resistant qualities, wired glass has been exempt from CPSC's mandatory high impact test standards for over two decades. However, today there are many alternatives to wired glass that provide an equivalent level of fire protection and better impact resistance.

Thus, the proposed change is likely to have costs and benefits associated with it. The costs could manifest themselves either in the form of reduced fire protection or in the form of higher costs to maintain the existing level of fire protection. A 100 square inch sheet of wired glass to be used in a fire-rated door typically has a 90-minute fire rating. Tempered glass meeting the same fire rating could cost as much as 20 times more. According to DHCD, there are many new products available that would meet the proposed requirement, ranging in price from being comparable to wired glass to being 20 times more expensive. However, the proposed change only applies to new school construction. The fraction of glazing requiring safety or impact resistant glazing in new school construction is minimal. According to DHCD, a 100,000

⁵ According to DHCD, platform lifts can cost anywhere between \$4,000 and \$15,000.

square feet school construction project would require approximately ten square feet of safety or impact resistant glazing. Thus, even if tempered glass were to cost 20 times as much wired glass, the increase in cost would still account for a very small fraction of total construction costs.⁷

The proposed change is also likely to produce some economic benefits. As tempered glass has better impact resistance than wired glass, the proposed change is likely to reduce the risk to public health and safety from breaking glass. There is some uncertainty regarding the number of injuries caused by wired glass. CPSC reports only nine wired glass-related injuries between 1982 and 2002 that required emergency room treatment. However, other sources indicate that the figure is much higher. According to the Center for Injury Control at the Rollins School of Public Health, Emory University, 90% of the 2,500 glass door injuries seen each year in the CPSC system involve wired glass. Switching from wired glass to tempered glass is likely to reduce the occurrence of such injuries. DHCD is not aware of any serious injuries in Virginia from the breaking of wired glass.

The net economic impact of the proposed change will depend on whether the additional cost of replacing wired glass with tempered glass in fire-rated doors at educational facilities is greater than or less than its benefits. In order to make a precise determination of the net economic impact we would have to weigh the increased fire risk (or the increased cost of providing the same fire protection) against the reduced risk of injuries from breaking glass. There is not enough data on either the costs or the benefits to make such a determination at this time.

In addition to the costs and benefits associated with each change, the proposed regulation is likely to produce some additional overall benefits. According to DHCD, the 2003 ICC codes are easier to understand and implement than previous editions. Moreover, the proposed USBC includes a number of changes intended to clarify and improve the understanding of the regulation. Thus, by improving understanding and implementation of the requirements of the USBC, the proposed regulation is likely to produce some overall benefits.

⁶ The thermal shock test determines how hot glass will react when hit by water from a fire hose or sprinkler.

⁷ At a cost of \$10 per square foot for wired glass, even a 20-fold increase in the price of safety or impact resistant glazing would increase costs from a little under 0.001% of total construction costs to less than 0.02% of total construction costs.

DHCD states in its agency document that it anticipates receiving requests during the public comment period for substantive changes to this regulation. Depending on the nature of the comments received, the agency may choose to re-propose the regulation with additional changes. DHCD has a number of technical advisory committees looking at various issues and developing proposals for change. Some of the committees have been established to look into implementing changes to the Code of Virginia. For example, the 2004 General Assembly amended the Code of Virginia to require that the Board of Housing and Community Development promulgate regulations establishing (i) standards of design and construction for commercial, industrial, and multi-family buildings such that they contain the appropriate equipment and can be used by emergency public safety personnel to send and receive emergency communications and (ii) standards for smoke detectors and other fire detection and suppression systems such that the safety of facilities marketed to senior citizens is improved. DHCD also has a number of committees reviewing issues relating to the rehabilitation code, the propane gas industry, the design and construction of elevators, the expanded use of platform lifts, and the training and certification of building and fire officials. The agency has already received a number of proposals for change from these committees. In addition, it has also received a number of proposals from various individuals and interest groups. In all, the agency states that it has received between 60 and 100 proposals for change. Following an evaluation of the various proposals for change, DHCD will decide whether to re-propose the regulation or not. However, the agency notes that there have been no substantive proposals or comments against updating from the 2000 ICC codes to the 2003 ICC codes. It is possible that some of the changes to the regulation at the re-proposed stage will affect the costs and benefits discussed in this analysis.

Businesses and Entities Affected

The proposed regulation affects property developers, contractors, construction companies, and homebuilders. Some of the proposed changes are likely to increase the cost of construction. These include requiring greater fire safety methods of garage construction in residential construction when a garage is located below a habitable room, requiring the installation of entrapment avoidance devices in the drains of all commercial and residential swimming pools, and substituting tempered glass for wired glass in fire-rated doors of Group E (educational) occupancies. Other changes increase the number of construction and design options available and are likely to provide economic benefits. Such changes include allowing

the use of wood treated with fire retardant in roof construction of certain types of noncombustible buildings, eliminating several provisions relating to the number of window and door openings allowed in courtyard walls of commercial buildings, allowing the use of a putty pad protection system for electrical outlets on fire-rated walls, and permitting the use of platform lifts instead of ramps under certain circumstances to accommodate people with disabilities.

Thus, while some of the changes are likely to impose additional costs, others are likely to provide economic benefits for businesses and entities involved in the design and construction of buildings. It is not possible at this time to determine the net impact of all the changes on these entities. Moreover, regardless of whether the changes result in an overall cost or an overall benefit to for building design and construction businesses, it is possible that neither all the costs nor all the benefits will accrue solely to them. Some or all of the additional costs or benefits may be passed on to the eventual owners of the building. The extent to which the costs or benefits are shared between these entities and the eventual owners will depend on the nature of the property market and the elasticity of demand for commercial and residential property in Virginia.

Localities Particularly Affected

The proposed regulation applies to all localities in the Commonwealth.

Projected Impact on Employment

The proposed regulation is not likely to have a significant impact on employment. Some of the proposed changes are likely to add to construction costs while others are likely to reduce costs by providing additional flexibility in construction and design. However, the net impact of all the changes on employment in the construction industry is not likely to be significant.

Effects on the Use and Value of Private Property

The proposed regulation is not likely to have significant effect on the use and value of private property. Some of the proposed changes are likely to increase the costs of construction for commercial and residential buildings. However, other changes are likely to reduce construction costs by increasing flexibility in construction and design of commercial and residential buildings. It is not possible at this time to determine the overall economic impact of all the changes.

However, regardless of whether the changes result in an overall net economic cost or an overall net economic benefit, not all of it will accrue to entities involved in the design and construction of commercial and residential buildings. Some or all of the additional costs or benefits may be passed on to the eventual owners of the building. The extent to which the costs or benefits are shared between construction and design companies and the eventual owners will depend on the nature of the property market and the elasticity of demand for commercial and residential property in Virginia.