

NGA GLASS CONFERENCE™ CARLSBAD

FEBRUARY 3-6, 2025



SCHOOL SECURITY WORKSHOP



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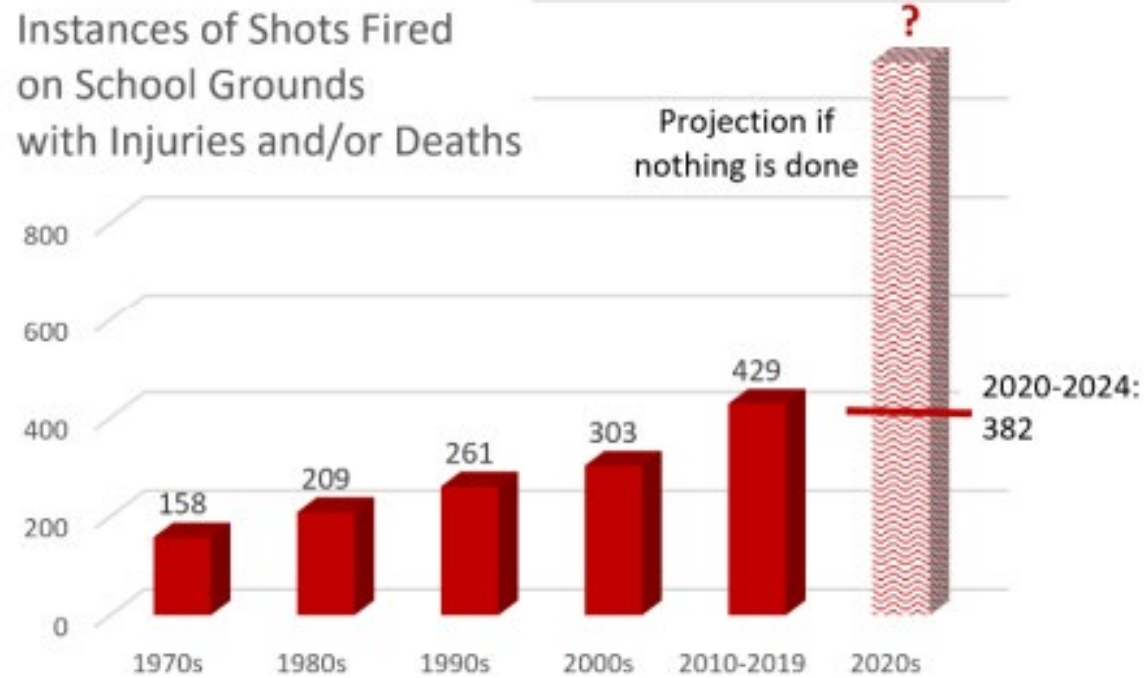
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School Security: Windows and Doors Respond First



The Beginning

Presented by Vaughn Schauss, Kuraray America, Inc.

NGA Protective Glazing Liaison

Sandy Hook – December 14, 2012

Out of this tragedy, school security was born



Students being escorted by

STATE POLICE led children from Sandy Hook Elementary School after the shooting. Students had huddled in closets and corners as the carnage unfolded.

School Security Glazing GTP (FB71-21)

2014

- 2014 GANA releases a new GIB “Security Glazing for Schools” (GANA PGC 07-0114)

2019

- Began update of GIB
- Developed 5 security categories
- Reviewed all the existing test methods to organize them into the categories.



ASTM F1233

ASTM F1233 - *Standard Test Method for Security Glazing Materials and Systems*

Blunt impacts

- Sledgehammer
- Pipe

Sharp Tools

- Chisel/hammer
- Angle iron/Sledge

Thermal Stress

- Extinguisher
- Propane burner

Chemical Deterioration

- Gasoline
- Windshield washer

Pass Criteria

Contraband - no opening that allows the passage of an 1/8" (3.175 mm) diameter rod.

Body - No opening that allows the passage of an 8" x 8" x 5" (203 mm x 203 mm x 127 mm) block



ASTM F1233

- Has **41** levels!
- Includes ballistics only testing portion
- Ballistic + Forced Entry
- Did not allow for ballistic pre-weakening and forced entry (2021 version does thanks to us!)

TABLE 2 Forced Entry Sequence of Testing

Sequence	Test Implements	Impacts	Minutes	Amount	Class Achieved
1	Ball Peen Hammer	10			1.0
2	Ball Peen Hammer	10			1.1
3	1½-in. (4-cm) Diameter Pipe/Sledge	25			1.2
4	Extinguisher, CO ₂		1		1.3
5	Sledge Hammer	25			1.4
6	Propane Torch Flame		5 ^A		1.5
7	Ripping Bar	10			2.0
8	Ram	10			2.1
9	4-in. (10-cm) Diameter Pipe/Sledge	25			2.2
10	Sledge Hammer	25			2.3
11	Propane Torch Flame		5 ^B		2.4
12	Ripping Bar	10			2.5
13	Chisel/Hammer	25			2.6
14	Gasoline	4		½ Pint (¼ L)	2.7
15	Angle Iron/Sledge	25			2.8
16	Sledge Hammer	25			3.0
17	Ram	10			3.1
18	4-in. (10-cm) Diameter Pipe/Sledge	25			3.2
19	Sledge Hammer	25			3.3
20	Propane Torch Flame		5 ^B		3.4
21	Wood Splitting Maul	25			3.5
22	Sledge Hammer	25			3.6
23	Ripping Bar	10			3.7
24	Fire Axe	25			3.8
25	Chisel/Hammer	25			3.9
26	Acetone			½ Pint (¼ L)	3.10
27	Sledge Hammer	25			4.0
28	Ram	10			4.1
29	4-in. (10-cm) Diameter Pipe/Sledge	25			4.2
30	Sledge Hammer	25			4.3
31	Propane Torch Flame		5 ^B		4.4
32	Fire Axe	25			4.5
33	Sledge Hammer	25			4.6
34	Wood Splitting Maul	25			4.7
35	Chisel/Hammer	25			4.8
36	Sledge Hammer	25			4.9
37	Acetone			½ Pint (¼ L)	4.10
38	Fire Axe	25			4.11
39	Sledge Hammer	25			4.12
40	Chisel/Hammer	25			4.13
41	Wood Splitting Maul	25			5.0

ASTM E2395

Standard Specification for Voluntary Security Performance of Window and Door Assemblies with Glazing Impact

- 5 Levels
- Glazing is subjected to ASTM E1996 hurricane missile impact
 - L1 – Missile A
 - L2 – Missile B
 - L3 – Missile C
 - L4 – Missile C
 - L5 – Missile C + ASTM F1233 Class 1



Test 5-aa1 (not consensus)

Certification Standards for Retrofitting and Reinforcing of Standard Commercial Entry Systems, Windows and Glazing



5-aa1		
Sequence	Test Implements	Impacts
1	Shot 0.762 Round	5
2	Bricks	20
3	Kicks with Steel Toe	10
4	Tools Set #1	2 min
5	Tool Set #2	3- ½ min
6	Sledge Hammer	6 min

Concerns

Relevance

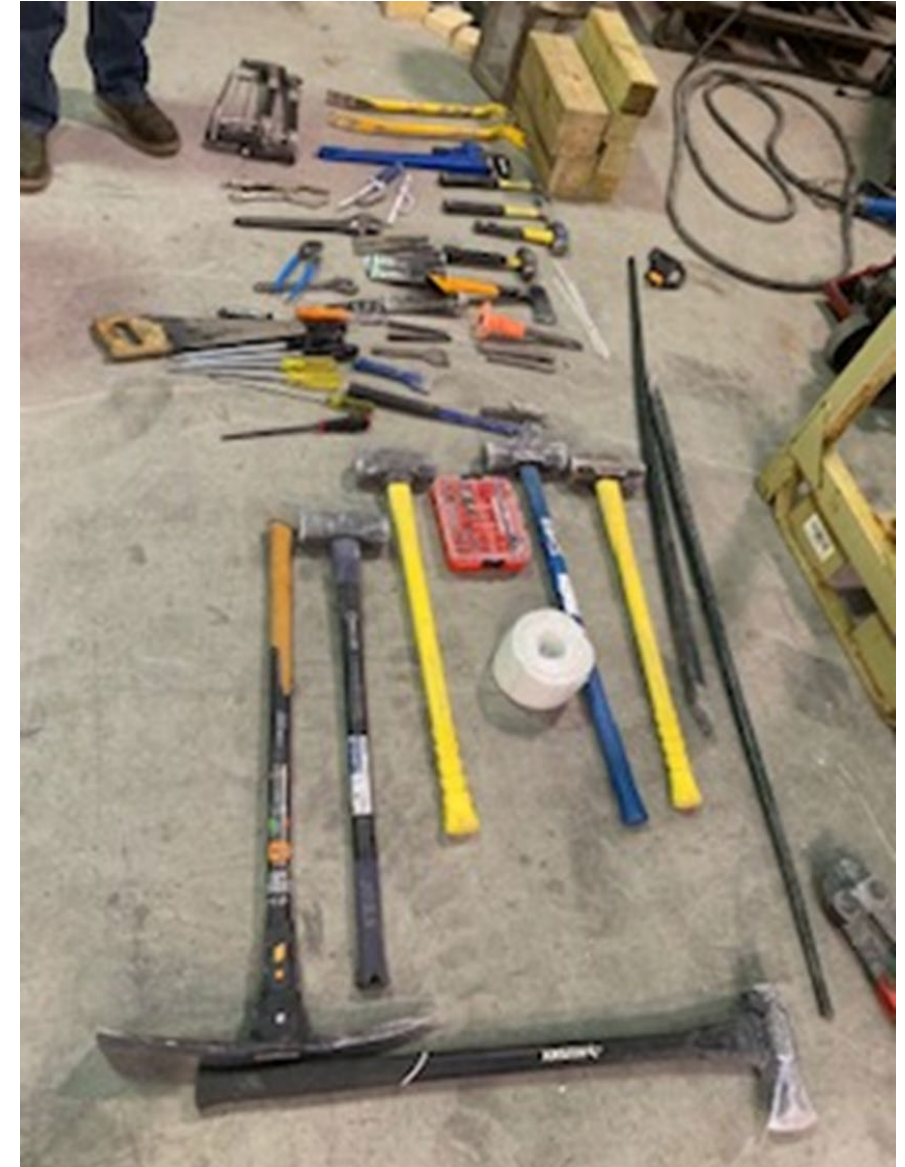
- ASTM E2395
 - Is hurricane impact relevant, what about ballistics?

Repeatability?

- ASTM F1233
 - Six males, muscular (180 to 250 lb), in good health, who carry out an enthusiastic assault.
 - No less than two members of the test team will be left-handed, and no less than two shall be right-handed.

Governing body, consensus standard?

- 5-aa1
 - who owns it, how can it be updated?



New Task Group

- Feb 2020, a Project Creation Form submitted
- **Title**: “Develop a School Security Test Method”
- **Project Description**: Develop a consensus-controlled test standard for glazing materials intended for school security

Development of ASTM F3561

Presented by Julie Schimmelpenningh, Eastman
NGA Laminating Glazing Liaison

ASTM F3561

Forced-Entry-Resistance of Fenestration Systems After Simulated Active Shooter Attack

Presented by Travis Hoover, Intertek

Senior Manager

Security Research Center

TESTING PROGRAM

- There are currently 2 test laboratories who test to ASTM F3561.
 - Molimo Architectural Testing – York, PA
 - Intertek - global
- Who do I contact at Intertek?
 - Primary contact would be myself at our York, PA lab
 - Another option is to submit your request through the Building & Construction page on the Intertek website
- What is necessary for Intertek to provide a quote?
 - Product description with full set of detailed drawings
 - Size(s) to be tested
 - Glass, frame and hardware options

TESTING PROGRAM

- How do I know what to test?
 - If a system test, then you need to consider the product offerings that make sense for this specific application.
 - Commercial window manufacturer needs to consider
 - Glass
 - Glazing type
 - Frame
 - Operable or Non-operable
 - Hardware
 - Commercial door manufacturer needs to consider
 - Door panel/core construction
 - Frame
 - Locking hardware
 - Hinge hardware
 - Glass
 - Glazing type
 - Outswing or Inswing

GENERAL SCOPE OF ASTM F3561

- Primarily intended for building products (windows, doors, modular panels, glazings and similar products) for forced-entry protection after sustaining an active shooter attack
- Systems are to be full-size systems representative of production with all required hardware
- Minimum of three separate test specimens of identical construction per product type are required to be tested per the standard. For example, two single door systems would be required to be evaluated for glazing/panel weakening and forced entry impact and one door system for lock weakening and forced entry impact.
- Three specimens of each the largest and smallest unit shall tested. All sizes between will be qualified once both sets have successfully met the criteria.
- Glass only – non-system test outlined in the Appendix is considered pre-evaluation and not intended to “certify” the product without testing as part of a full system
- Depending on product type there are prerequisite standards – ASTM F476, ASTM F588, ASTM F842

TESTING CONSIDERATIONS

- Different glass offerings can be combined within a system to qualify both compositions and reduce the amount of specimens and testing cost.
- Testing multiple bays of a storefront assembly as pictured can help reduce overall test cost due to minimal setup time in the test lab.



TESTING CONSIDERATIONS

- Large assemblies such as a glazed entrance door with sidelite and transom can be tested as complete system to qualify all products collectively.
- If system is not compromised after the impact tests on the glazing of the door, consideration can be given to perform the weakening and impact tests on the lock of the same specimen.

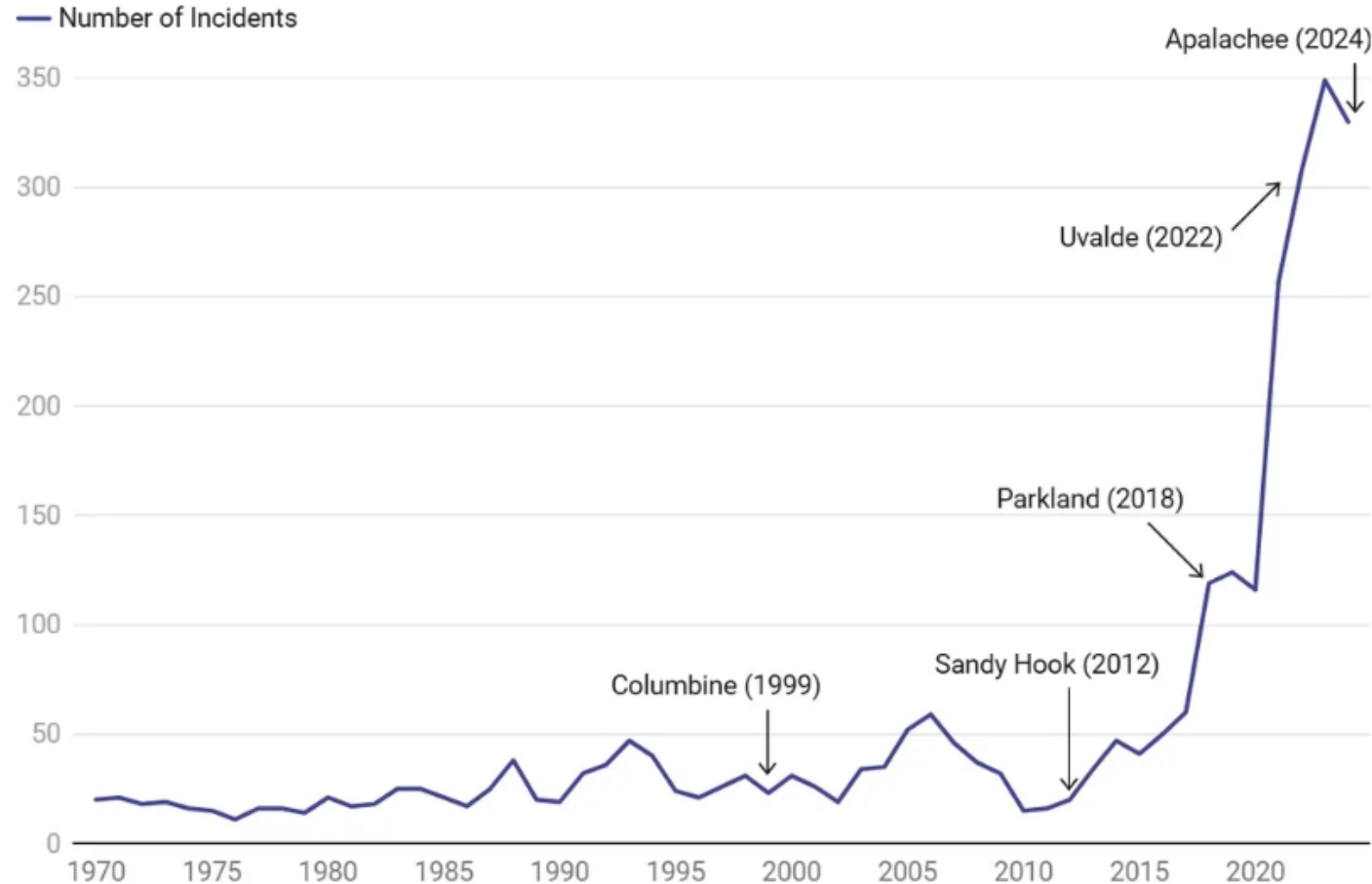


Incorporating ASTM F3561 into the Building Project

Presented by Doug Penn, Trulite

2024 saw the 2nd highest number of K-12 school shooting incidents

The 2024 count fell only 19 below the all-time high of 349 incidents recorded in 2023



- ◆ Frequency and severity of school shootings have risen in recent years, and with it, an increased need for a relevant international standard that considers the need to slow and, if possible, prevent intruders from entering facilities through locked fenestration. Security glazing products are a part of the equation for designing and creating safer schools by deterring and slowing forced entry during active assault events.....hence the birth of ASTM F3561 developed by the National Glass Association School Security Task Group.



F3561 Purpose

It is Not to Provide a Bullet Resistant Product, but to Prevent an Armed Intruder from Accessing a Building & Providing Time for 1st Responders to Arrive

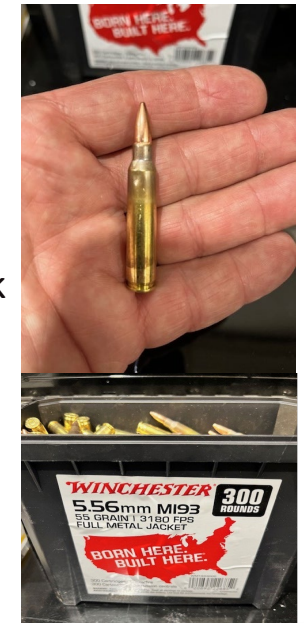


1.3 This test method is not to be used for ballistic resistant glazing rating. Test projectiles are permitted to perforate the entire specimen. The test projectile firings are intended to simulate actions taken by an assailant to aid in the ability to gain entry to a facility.

Tested as A Complete Assembly



Mechanism and ballistic round to simulate AR-15 attack



Glass: 10X

Lock: 5X



F3561



ASTM F3561 Impact Level	Potential Energy	Accumulated Impact Energy
Level 1.1	50	50
Level 1.2	50	100
Level 2.1	100	200
Level 2.2	100	300
Level 3.1	150	450
Level 3.2	150	600
Level 4.1	200	800
Level 4.2	200	1,000
Level 5.1	250	1,250
Level 5.2	250	1,500
Level 6.1	300	1,800
Level 6.2	300	2,100
Level 7.1	350	2,450
Level 7.2	350	2,800
Level 8.1	400	3,200
Level 8.2	400	3,600

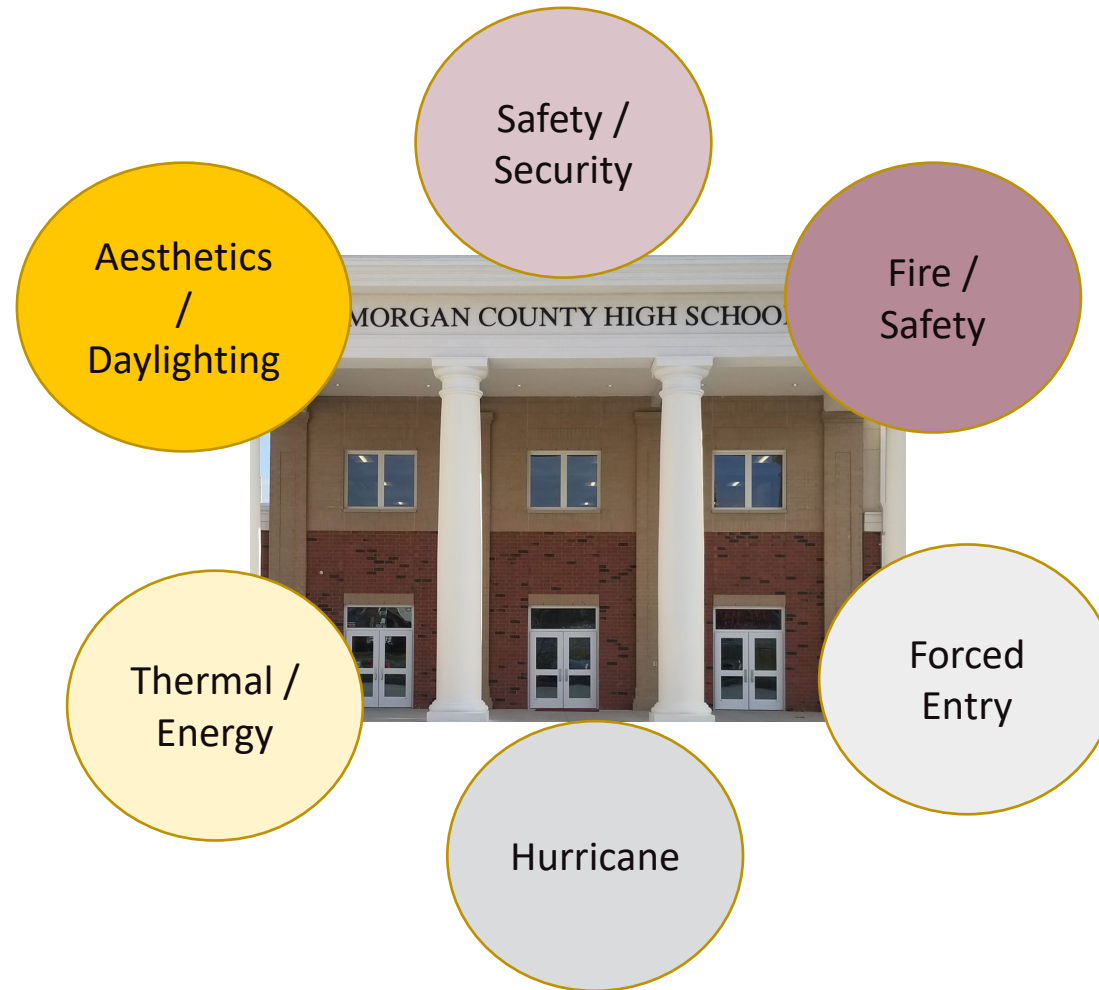
The Glass and The Lock are
Subjected to these Impacts



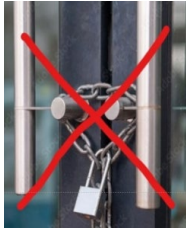
What is Required to Pass Level 8

- Glass:
 - Even after impacting the glass 16-Times a hole may not have developed that is large enough for someone to reach through and unlock the door
- Locking Mechanism:
 - The Doors must remain securely locked even after having been struck 16-Times

F3561 Applications



Safety- Fire / Security Entrances



Safety:

- Laminated Glass
- Optional Chain Resistant Pulls
- Available Access Control

Fire:

- Rim Exit Device for Egress
- Von Duprin FER 33 & 99

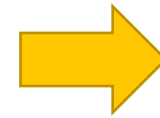
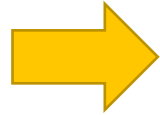
Durability:

- Medium & Wide Stile Aluminum Doors
- Rim Exit Device
- Glass Surface interior & exterior

Convenience:

- Popular Exit Device with Schools
- Removable Mullion

Safety / Security Storefront

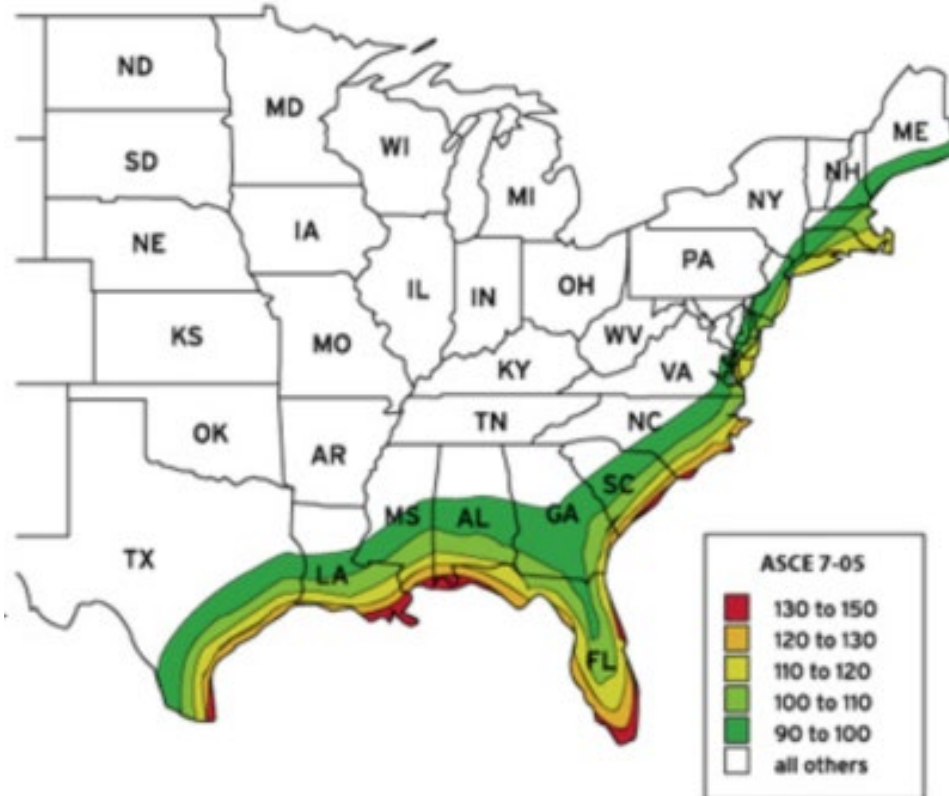


- Safety:
 - Laminated Glass
- Performance:
 - Proven Air, & Water Resistance
 - Proven Thermal Performance
- Durability:
 - Anodized, or Painted Finishes
 - Proven Structural Performance



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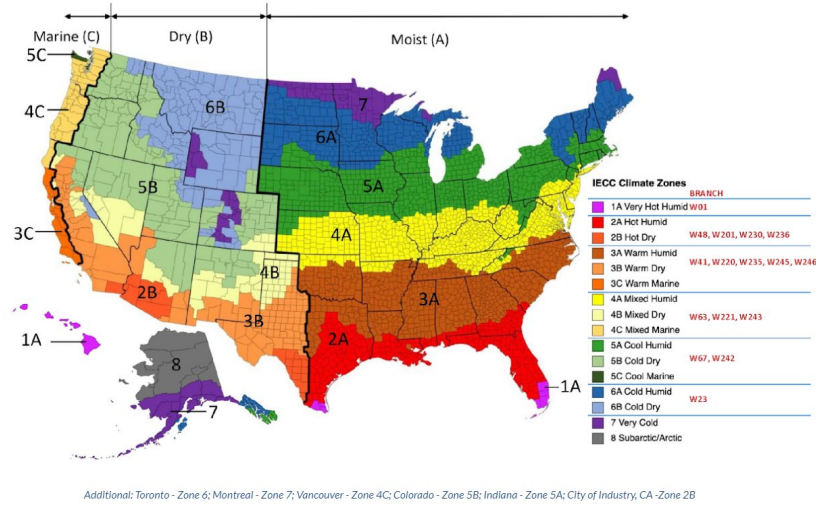
Hurricane



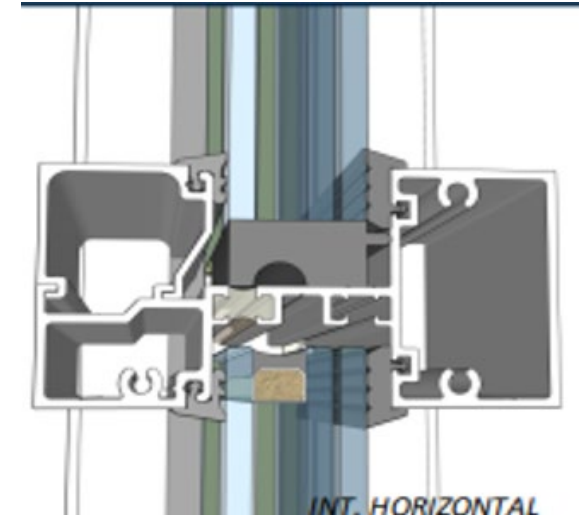
- ❑ Projects also occur In Hurricane Impact Zones:
 - Must Comply with ASTM E-1886 & E-1996
 - Require Florida Product Approval including HVHZ
- ❑ Tested as a complete system:
 - Entrances
 - Storefront
 - Glazing
 - Hardware Options
 - Impact & Cycle Testing



Thermal / Energy



2018 IECC	U-Factor	SHGC	2021 IECC	U-Factor	SHGC	2024 IECC	U-Factor	SHGC
1A	0.50	0.25	1A	0.50	0.23	1A	0.50	0.23
2A	0.50	0.25	2A	0.45	0.25	2A	0.45	0.25
2A	0.50	0.25	2A	0.45	0.25	2A	0.45	0.25
2B	0.50	0.25	2B	0.45	0.25	2B	0.45	0.25
2A	0.50	0.25	2A	0.45	0.25	2A	0.45	0.25
3A	0.46	0.25	3A	0.42	0.25	3A	0.38	0.25
3A	0.46	0.25	3A	0.42	0.25	3A	0.38	0.25
3A	0.46	0.25	3A	0.42	0.25	3A	0.38	0.25
3A	0.46	0.25	3A	0.42	0.25	3A	0.38	0.25
4A	0.38	0.36	4A	0.36	0.36	4A	0.34	0.36
4A	0.38	0.36	4A	0.36	0.36	4A	0.34	0.36
4A	0.38	0.36	4A	0.36	0.36	4A	0.34	0.36
4A	0.38	0.36	4A	0.36	0.36	4A	0.34	0.36
5A	0.38	0.38	5A	0.36	0.38	5A	0.34	0.38
5B	0.38	0.38	5B	0.36	0.38	5B	0.34	0.38
6A	0.36	0.40	6A	0.34	0.38	6A	0.34	0.38



- Projects occur in areas requiring enhanced thermal performance:
 - Energy codes continue to require better performing systems
- Framing systems:
 - Thermal break option
- Glass:
 - 1-5/16 Insulating units
 - Coated glass options

Aesthetics / Daylighting



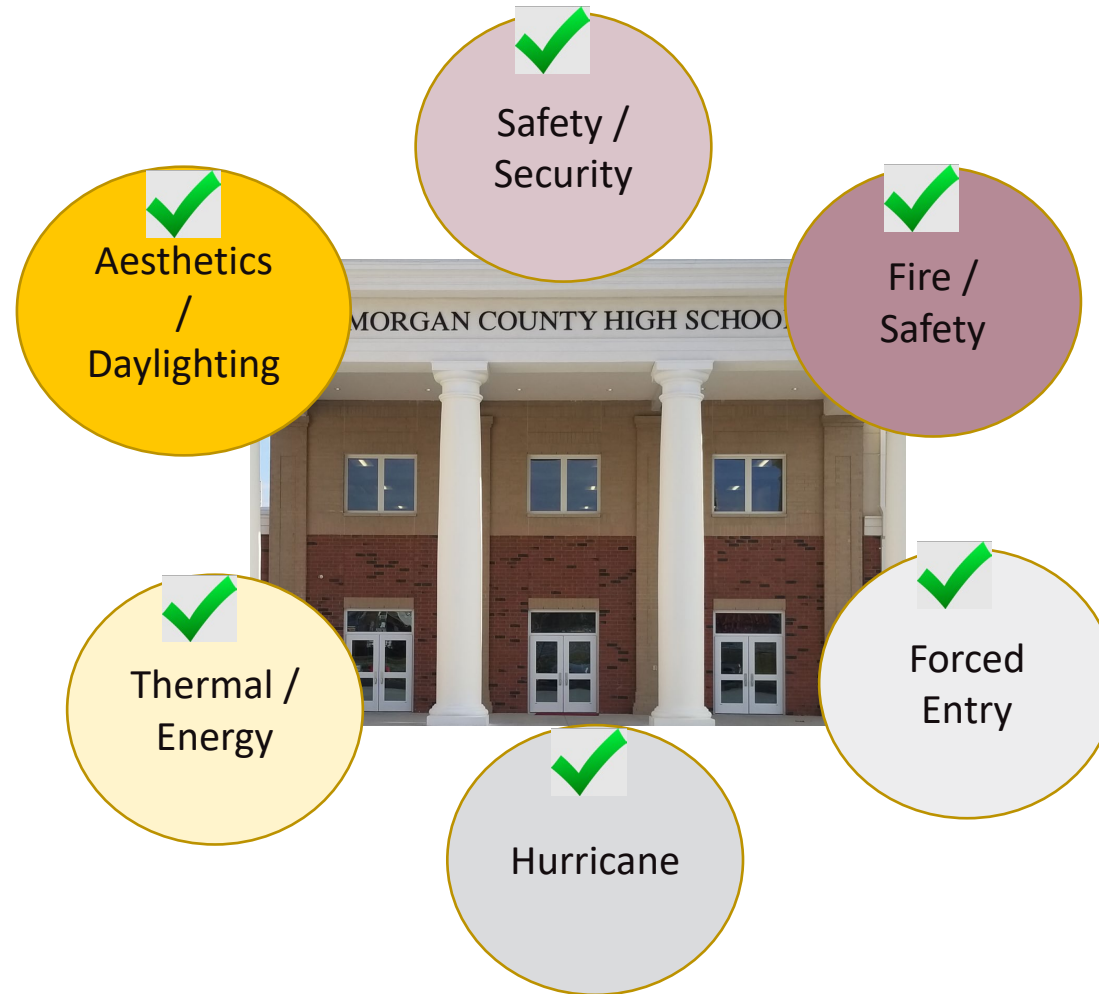
- ❑ Aesthetics:
 - Clean lines for storefront and entrances
 - Option for entrances up to 84" X 96"
 - Does not look like a prison
 - Mid-Rail option
 - Multiple finishes
- ❑ Daylighting:
 - Full door lite option
 - Large fixed lites for storefront



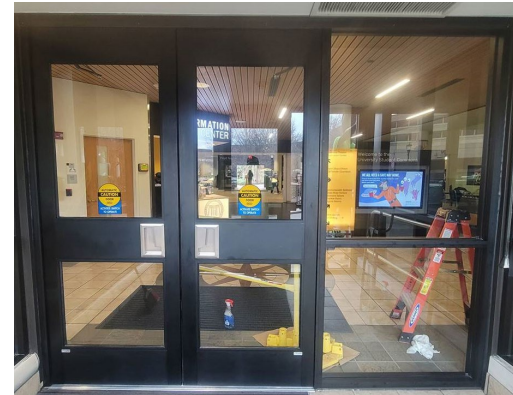
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F3561 Applications



Projects: New Construction



- ❑ Aluminum Systems:
 - Standard Proven systems easily specified
 - Readily available in standard finishes
 - Simple to install: Dry Glazed
- ❑ Hardware:
 - Specifically developed Exit Devices & Removable Mullion for ASTM F3561
 - Readily Available from inventory
- ❑ Glass:
 - 1-5/16" Insulating Units
 - Readily available Interlayer
 - Two Interlayer Options for either Level 4, Or Level 8

Door Locking Mechanisms

Presented by Devin Bowman, Technical Glass Products

Challenges in Areas Where Fire- and Life-Safety Requirements Overlap with Security Goals

**SAFER SCHOOL DESIGN:
SOLVING CURRENT
CHALLENGES WITH
BEST PRACTICES AND
INNOVATIVE MATERIALS**

Setting the Scene



There are about
3,230 fires

in educational buildings each year.

- The International Association of Fire Chiefs



Since 2000, schools and institutes of
higher education have been the

2nd most frequent
targets in active shooter incidents.

- FBI, Via Partner Alliance For Safer Schools

Setting the Scene

- When fire and life safety requirements intersect with enhanced security goals, it is important that one form of protection does not compromise the other
- Using incompatible components can result in unintended risks to occupant safety
- For example, security-rated components can burn quickly and intensely, inhibiting the ability for fire-rated components to protect occupants



SECURITY | FIRE | FIRE + SECURITY

Solution: Using Compatible Components or Testing as a Full System

Why is it important?

- Ensures one form of protection does not negate another
- Reduces chances of unintended consequences in field application
- Keeps occupants safe from a wide range of threats to life safety

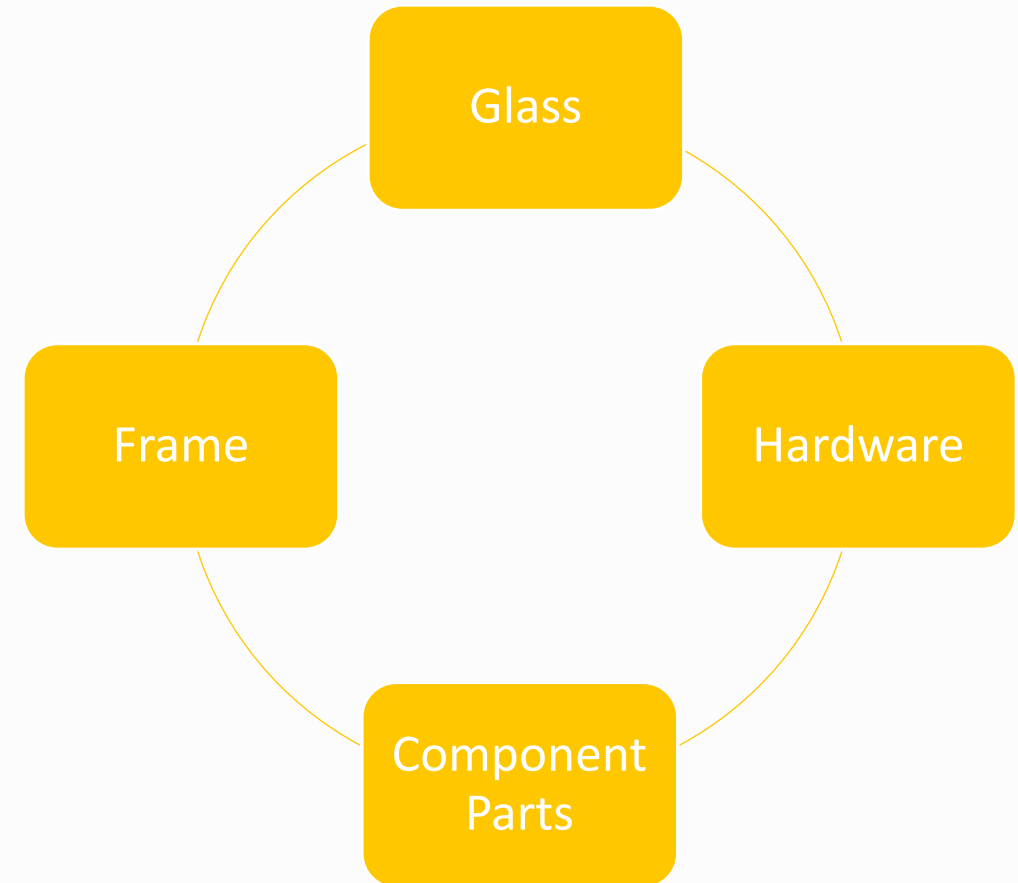


Challenge: How Do You Defend Against Multiple Threats?

- Security products are often plastic based which burn quickly and intensely—exceeding fire test parameters
- In fire-rated assemblies this may significantly reduce or entirely negate the ability for it to maintain safe egress during a fire event
- This underscores the dilemma of which to prioritize - sheltering in place or evacuating
- In retrofits, adding security components to fire assemblies may also require approvals from manufacturers or testing labs

Challenge: How Do You Ensure Security and Fire-Rated Components Work Together?

- Glass and frame assemblies are composed of many components
- Each of these components must pass testing standards
- A system approach ensures the solution lives up to its intended requirement
- With each component within a single system jointly tested to both fire and safety standards, specifiers, building owners and occupants can have confidence knowing the product will operate according to all test protocols



A system is only as good as its weakest link

Case Study: Elementary School in Oregon

Challenge

- Allow building access for students and staff while also being able to control who else is allowed in the building
- Interior entrance must meet fire-rated code requirements and provide protection against intruder events
- Rated systems visually complement non-rated systems



School Security in State and Federal Legislation

Presented by Urmilla Sowell, National Glass Association

Where does it apply?

Any Public or Private School
K-12

Adjacent campuses – grounds
w/in ¼ mile not separated by
a physical barrier or multi-
lane highway

Any on-line school that has a
permanent physical location
and gathers for instruction
more than 2x/mo

Ground Level - first floor of a
structure above finished grade
or the level of a building to
which there is an entrance
from the outside of the
adjacent ground or street

Instructional area - any
location inside the campus
buildings wherein instruction
may occur

Managed point of entry - an
entrance into a school or
classroom that is controlled
by school staff or a video
visitor management system
that may allow remote access

Exterior ground level
windows within 75 feet of an
exterior entrance shall have
ballistic glass or security film.

Windows surrounding the
interior of the classroom
entrance or instructional
areas shall have ballistic glass
or security film.

School Security: Windows and Doors Respond First

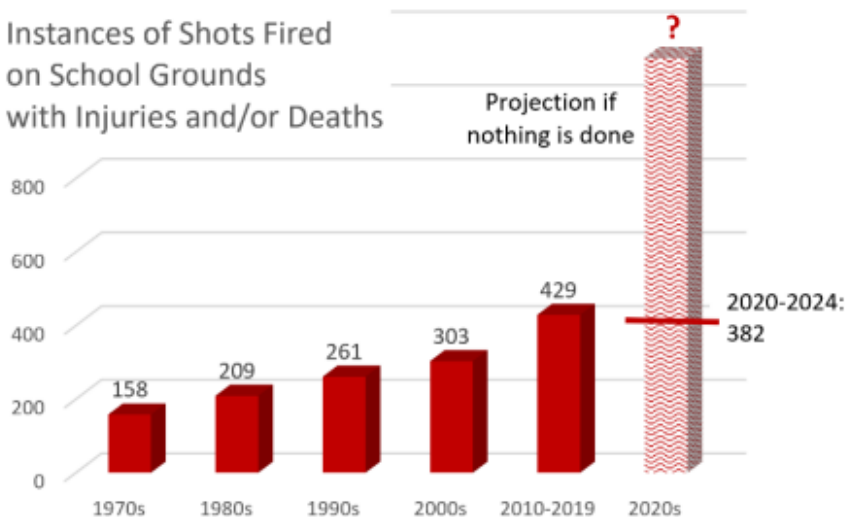
The request:

Support **H.R. 887: Securing Our Students Act** and **H.R. 2491/S. 1107: Securing Aid for Every School Act, (SAFE School Act)** allocating funds for school safety and security. The glass industry is prepared to make schools safer with security windows and doors.

The issue:

Active shooter events are becoming more frequent.

Instances of Shots Fired on School Grounds with Injuries and/or Deaths



Time is critical.

The average length of active shooter events is 8 minutes; the

The strategy:

Make schools safer with security, ballistic, and attack resistant windows and doors.

In active shooter events, windows and doors can be the first line of defense. Security glazing resistant to forced entry can be used to slow down an attacker, allowing more time for schools to enact emergency plans and for first responders to arrive.

High risk areas of school buildings include entrance areas, exterior window and door access points, and classroom window and door access points.

Third-party tested products are available.

ASTM F3561 *Standard Test Method for Forced-Entry-Resistance of Systems after Simulated Active Shooter Attack* serves as the industry-accepted standard for minimum criteria for security windows and doors for schools.

Time is critical.

The average length of active shooter events is 8 minutes; the shortest is 90 seconds. Response times for first responders average 3 minutes, so some active shooter events are over even before first responders arrive.

No building codes or mandates for school security exist.

In comparison, every building is subject to fire codes and regulations because of (relatively smaller numbers of) historic deaths in building fires. Since the adoption and enforcement of the fire codes, the number of deaths from fires has dramatically decreased.



National Glass Association (NGA) combined with the Glass Association of North America (GANA) in 2018 to create the largest trade association serving our industry. We develop standards, create technical resources, promote and advocate for glass in the built environment, and advance the industry as a viable, thriving and exciting career path. Learn more at [glass.org/advocacy](https://www.glass.org/advocacy). For further information on windows and doors for school security, please email NGA Technical Staff at technicalsvcs@glass.org.

criteria for security windows and doors for schools.

Window and door solutions:

- Serve as first lines of defense while allowing school personnel and first responders to see impending danger.
- Provide privacy and allow diffuse light in while selectively blocking attacker's line-of-sight when translucent or reflective glass is utilized.
- Can be designed for forced entry resistance and bullet-resistance.
- Are available at various protection levels as retrofit options.
- Create a secure environment for teachers and students without imposing visible barriers.
- Provide passive protection, even during power outages.

Glass can be part of the school's security plan as the "first element of surprise."

References:

- ASTM F3561 *Standard Test Method for Forced-Entry-Resistance of Systems after Simulated Active Shooter Attack*. [astm.org](https://www.astm.org)
- <https://everytownresearch.org/maps/gunfire-on-school-grounds/>
- First responders' average response time: <https://leb.fbi.gov/image-repository/police-response-time-to-active-shooter-attacks.jpg/view>
- FEMA Primer to Design Safe School Projects in Case of Terrorist Attacks and School Shootings (December 2012): https://www.dhs.gov/xlibrary/assets/st/bips07_428_schools.pdf

The Role of Surface- Applied Film in School Security

Presented by Lisa Winckler, International Window Film Association



THE ROLE OF SURFACE APPLIED FILM IN SCHOOL SECURITY

Lisa Winckler

Technical Consultant

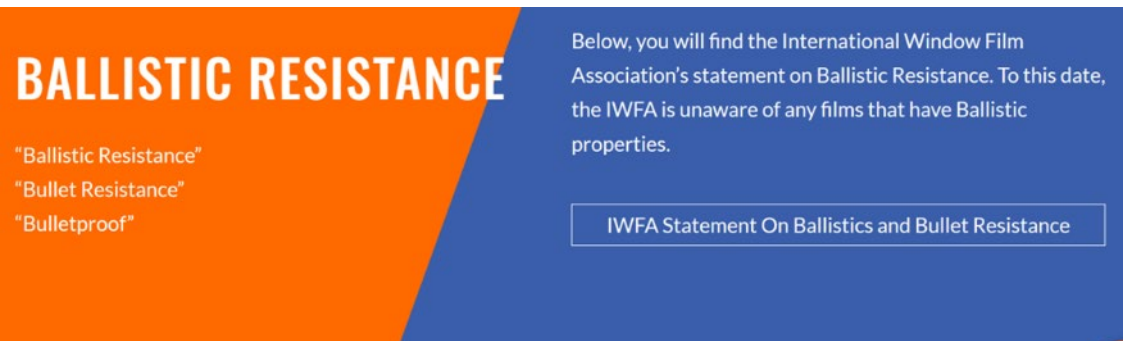
International Window Film Association

IWFA POSITION ON BALLISTIC CLAIMS

- Recently, the National Glass Association working with ASTM helped develop a new test standard, known as ASTM F3561-22, for evaluation of forced-entry-resistance of fenestration systems after a simulated ballistic attack. This standard tests full OEM assemblies for windows and doors. The ASTM F3561-22 test method was not designed to evaluate retrofit building window film that would be applied to existing door/entry or window glass. The differences in glass type, thickness, framing, locking mechanisms, and structural components makes this standard not applicable for retrofit solutions. Using this standard in a bid specification or submittal is not appropriate and likely misleading.
- iwfa.com

The International Window Film Association (IWFA) has the utmost concern about any written specification or recommendation that would call for the use of any type of window film, such as a safety or security film, as a primary component of a “bullet-resistant glazing”. Safety/security films are being used *in conjunction with* various designed and tested bullet resistance glazings, but primarily as a “spall shield” to reduce the “spalling” off of small fragments of the glazings on the interior side in the event of being penetrated by ballistics.

Our industry believes there are adequate and acceptable standards and methods for testing of products as protection against ballistics. Since window films are an addition to a glazing and not intended for use as the glazing itself, we firmly believe that an individual glazing should be tested both with and without film installed on it for any comparison of improvement in total performance. In some cases, we have seen demonstrations or claims that the use of film imparted some bullet resistant value when, in fact, the glazing itself without film had almost those same bullet resistant qualities. Extreme caution should be taken, however, to make sure that any claims about performance due to the addition of a film layer clearly state the specifics of the glazing itself as supplied by the glazing manufacturer, the specifics of the film itself as supplied by the film manufacturer, and all relevant specifics of the ballistics used and the conditions of the test. Any attempt to imply performance due to the application of the film under any other conditions (different manufacturer, different glazing, different ballistics, different conditions), we believe, would be irresponsible as the margin for error could be one of life safety.



BALLISTIC RESISTANCE

- “Ballistic Resistance”
- “Bullet Resistance”
- “Bulletproof”

Below, you will find the International Window Film Association’s statement on Ballistic Resistance. To this date, the IWFA is unaware of any films that have Ballistic properties.

[IWFA Statement On Ballistics and Bullet Resistance](#)

TOPICS

Various state laws and current situation

Retrofit issues and applications

Using Safety and Security
Window Film for delayed entry

A decorative footer image at the bottom of the slide, featuring a dark, abstract landscape with yellow and purple hues.

LANGUAGE FROM VARIOUS STATE LAWS - TEXAS

- TX – Texas law was enacted on 05/26/2023. It was an expansive set of actions both for existing schools and new schools.
- Must be implemented during the 2022-2023 school year and thereafter. Provisional certification clause expired on 08/31/2024. Annual audits.
- We estimate that over 95% of schools have been updated.
- Our dealer's experiences.
- All exterior doors shall: be constructed, both the door and door frame and their components, of material and in a manner that make them resistant to entry by intruders. Unless inside and exterior secured area, doors constructed of glass or containing glass shall be constructed or modified such that the glass cannot be easily broken and allow an intruder to open or otherwise enter through the door (for example, using forced entry-resistant film);
- Includes windows adjacent to an exterior door and ground-level windows near exterior doors.

LANGUAGE FROM UTAH, MISSOURI, AND TENNESSEE

- Utah – previously covered
- Missouri – Definition of security window film: “Bullet-resistant window film”: glass, plastic film, or other synthetic substance applied to existing glass that can withstand the minimum standard for forced entry resistance as determined by the United States Department of State Certification Standard SD-STD.01.01, Revision G, or its successor standard.
- TN – all school buildings constructed or remodeled after July 1, 2023.
- 49-6-818 (a2) Have installed a clear, bullet-resistant or entry resistant film on the glass panel of each exterior entry or basement level window and door to prevent individuals from entering the school building ...by breaking the glass in such openings. Paraphrased.

RETROFIT ISSUES AND APPLICATIONS

Language matters

- Window Film
- Safety/Security Window Film
- Window film or security composites – new technology
- Safety/Security window film attachment systems

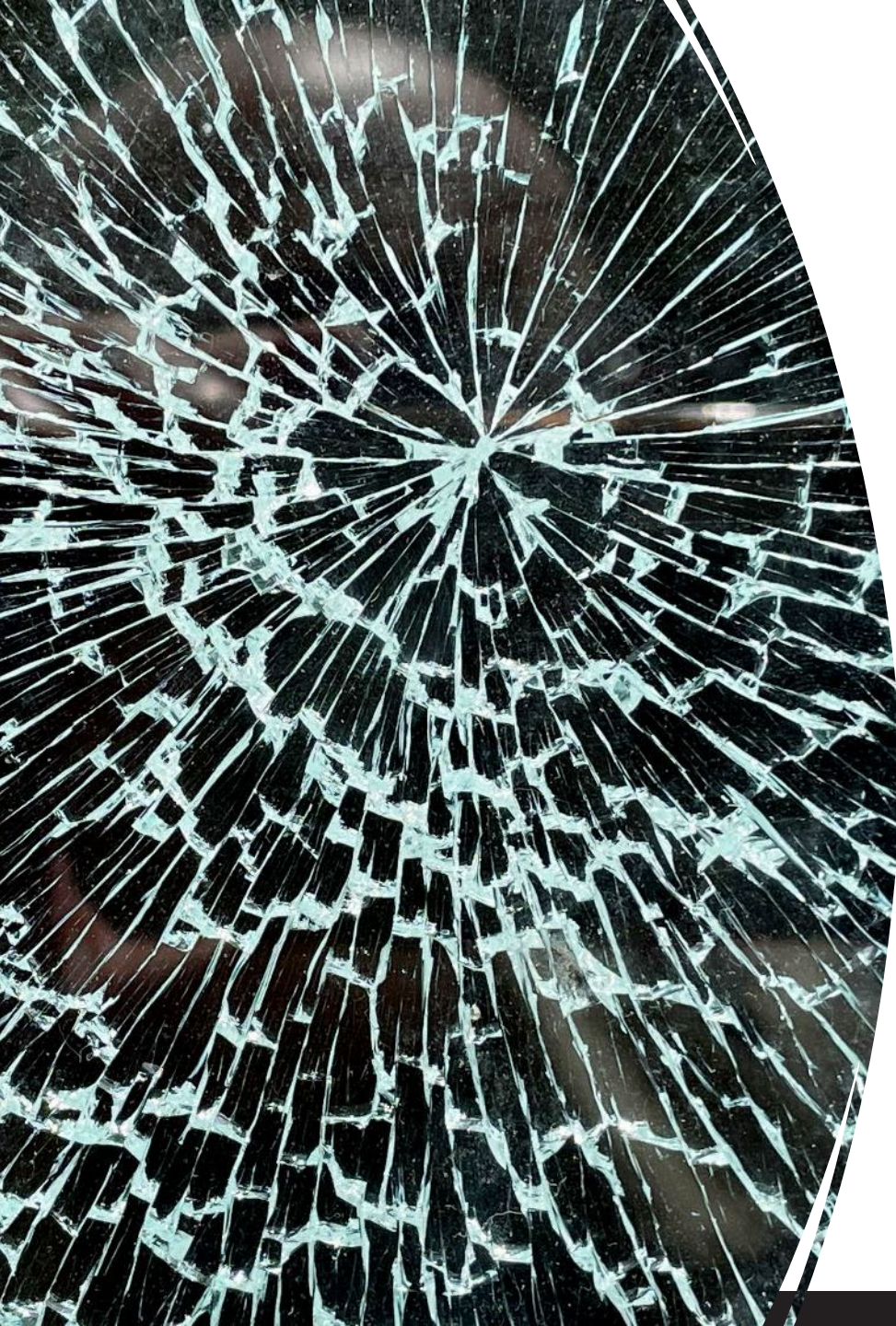
Variables

- Glass thickness, glass type, frame type, glass bite, gasket type, window type, window size, age, building location.

Testing and demonstrations

- No current standard for retrofit solutions
- “Test reports” using parameters outside the standard parameters with “pass” results or reports that use the language “tested to”.
- Demonstrations with mis-leading conditions or window/glass combinations not often found in actual use.





THE ROLE OF SURFACE APPLIED FILMS

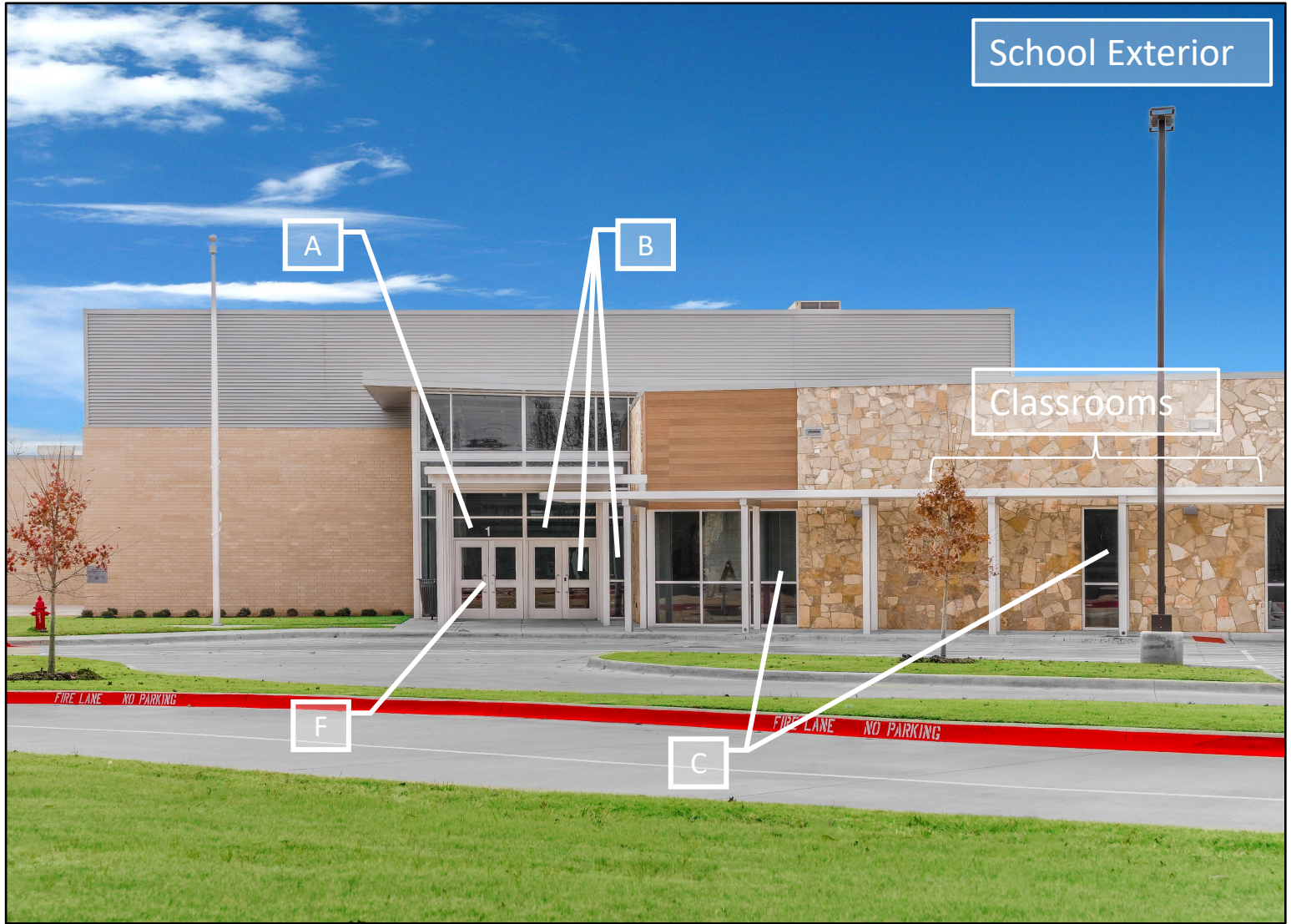
Use the resources available on iwfa.com

“Specifying Safety & Security Window Film for Delayed
Entry”

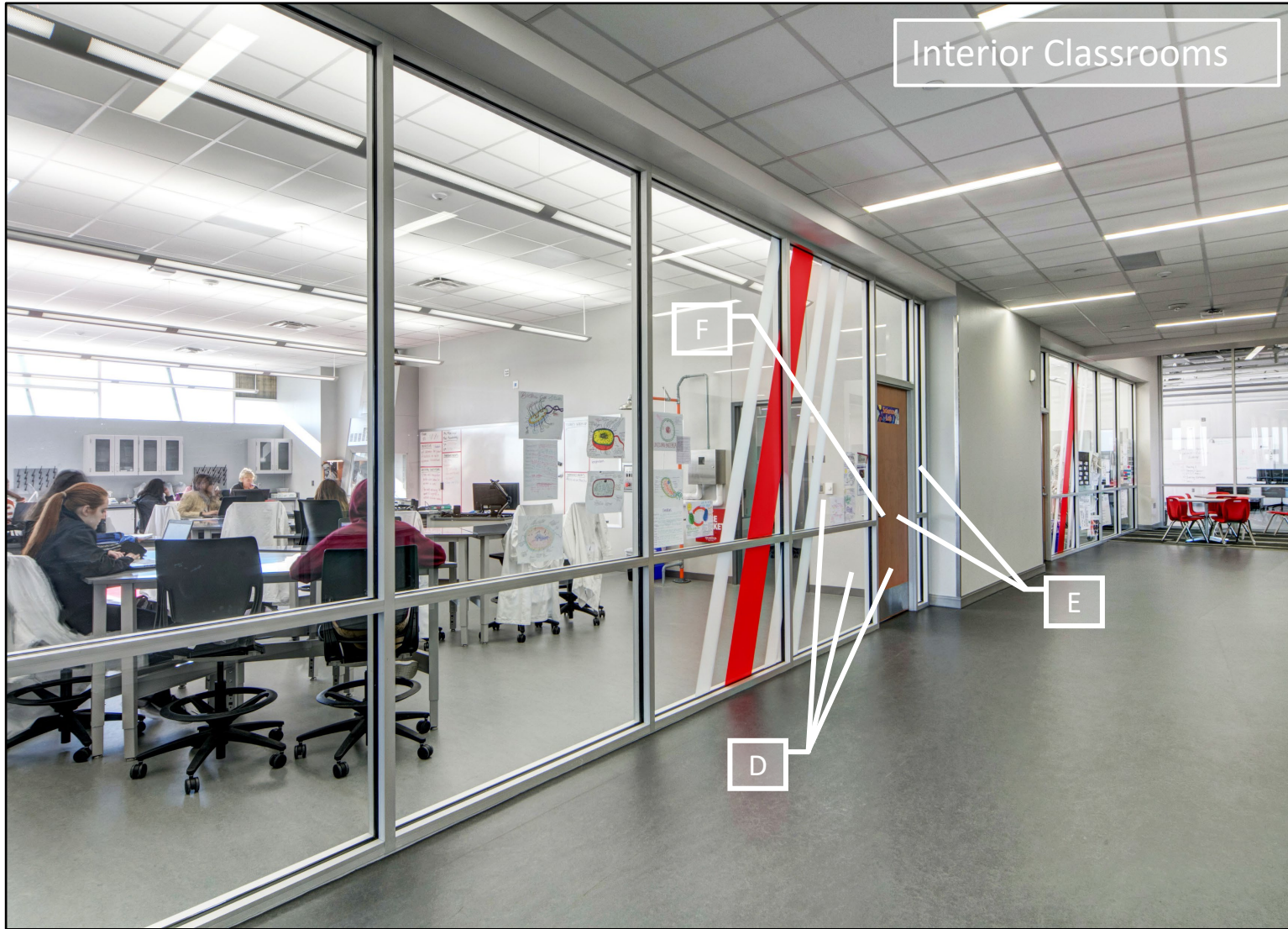
[IWFA-Safety-One-Page-1.pdf](#)

School Security Building Code Proposal

Presented by Thom Zaremba, Roetzel & Andress, NGA Building Code Consultant



- A. Main entrances.** View to pedestrian and vehicle areas.
- B. Main entrances.** Rated in accordance with ASTM F3561-23.
- C. Exterior walls.** Rated in accordance with ASTM F3561-23.
- D. Interior walls.** View into corridor/areas approaching classroom.
- E. Interior walls.** Rated in accordance with ASTM F3561-23.
- F. Doors.** Locking to comply with Section 1010.2.7.
- G. Emergency plans.** Comply with Sections 401.2 and 404 of the *International Fire Code*.



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- F. Doors.** Locking to comply with Section 1010.2.7.
- G. Emergency plans.** Comply with Sections 401.2 and 404 of the *International Fire Code*.

- A.** (492.2) Main entrances shall be constructed and designed to provide those inside the building with a view to areas where pedestrians and vehicles approach the entrance.
- B.** (429.2.1) Windows, doors, and sidelights in main entrances...shall be rated assemblies in accordance with ASTM F3561-23. Other glazed areas in the main entrance with an exposed area equal to or greater than 5 ft² (0.46 m²) and a bottom edge less than 72 in (1828.8 mm) above the finished ground level shall be rated assemblies in accordance with ASTM F3561-23.
- C.** (429.2.2.) If warranted by a design professional's assessment of forced entry risk, ground floor windows, doors, and sidelights in exterior walls shall be rated assemblies in accordance with ASTM F3561-23.
- D.** (429.3) Interior classroom windows and doors shall be designed and constructed to provide a view from the classroom into corridor or other areas used to approach the classroom.
- E.** (429.3.1) If warranted by a registered design professional's assessment of forced entry risk, interior classroom windows, doors and sidelights shall be rated assemblies in accordance with ASTM F3561-23.
- F.** (429.4) Locking arrangements in doors shall comply with applicable provisions of Section 1010.2.7.

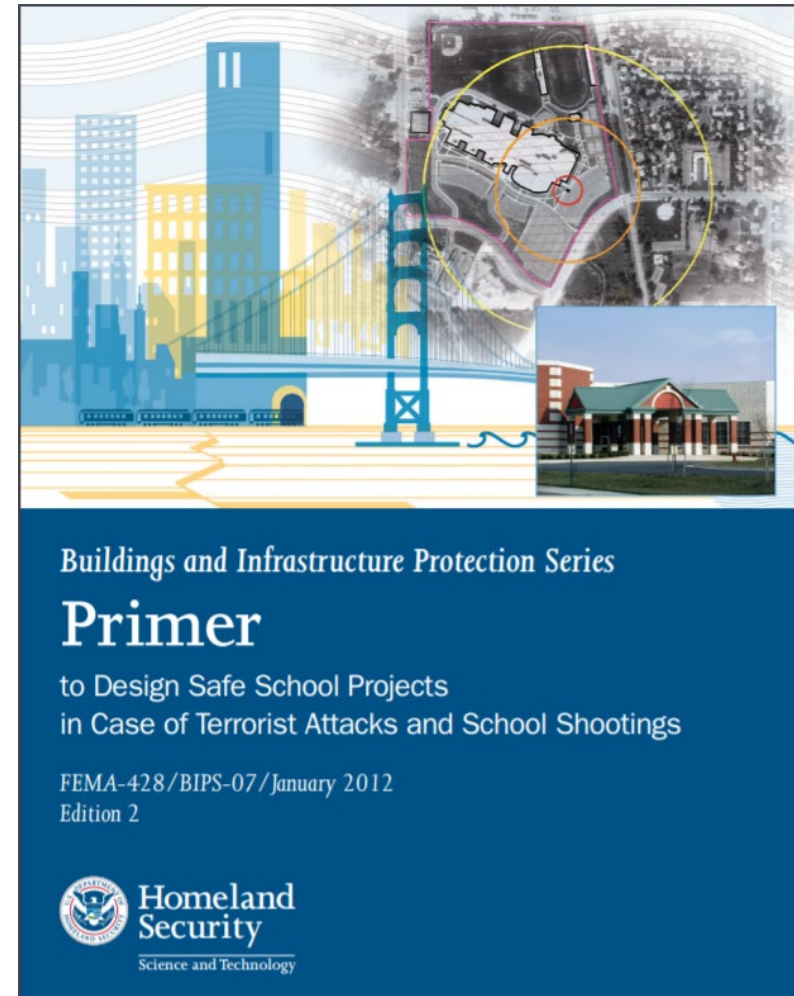
Egress doors in educational occupancies. The doors shall be capable of being locked from inside the room with a key or any other approved means; the doors shall be openable from within the room in accordance with Section 1010.2; modifications shall not be made to listed panic hardware, fire door hardware or door closers; modifications to fire door assemblies shall be in accordance with NFPA 80

Exterior entry doors. Exterior doors which provide entry into the building shall be provided with locking arrangements designed to keep intruders from entering the building, and shall comply with all of the following: the doors shall be lockable from the egress side of the door; a minimum of one door on each building face shall be capable of being unlocked from outside the building with a key or other approved means; each egress door shall be openable from within the building in accordance with Section 1010.2.

- G.** (429.5) Fire safety, evacuation and lockdown plans shall comply with applicable provisions of Sections 401.2 and 404 of the *International Fire Code*.

Identifying Potential Targets

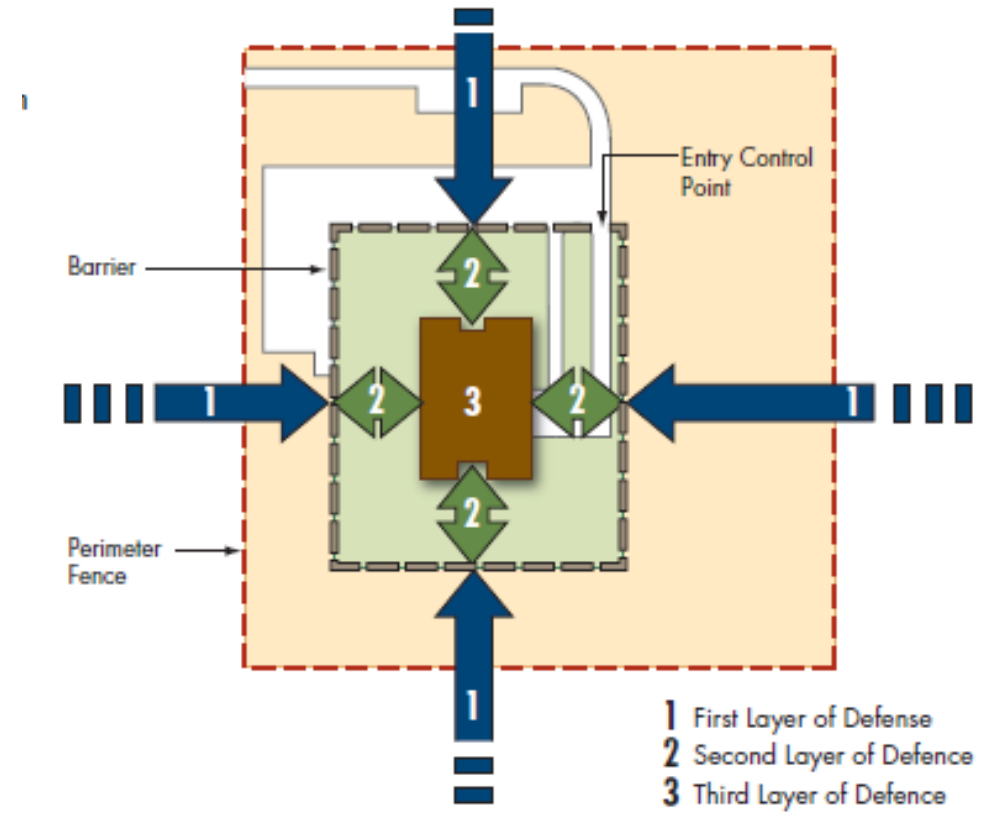
- Potential school attackers typically choose their targets to **maximize the impact** of their attack and **minimize the effort**.
- Schools are usually perceived as **easy targets** where a successful attack might produce the greatest effect.
- This effect may involve anything from massive casualties or physical destruction intended to **induce psychological shock** to symbolic acts that demonstrate a community's vulnerability and **instill fear**.



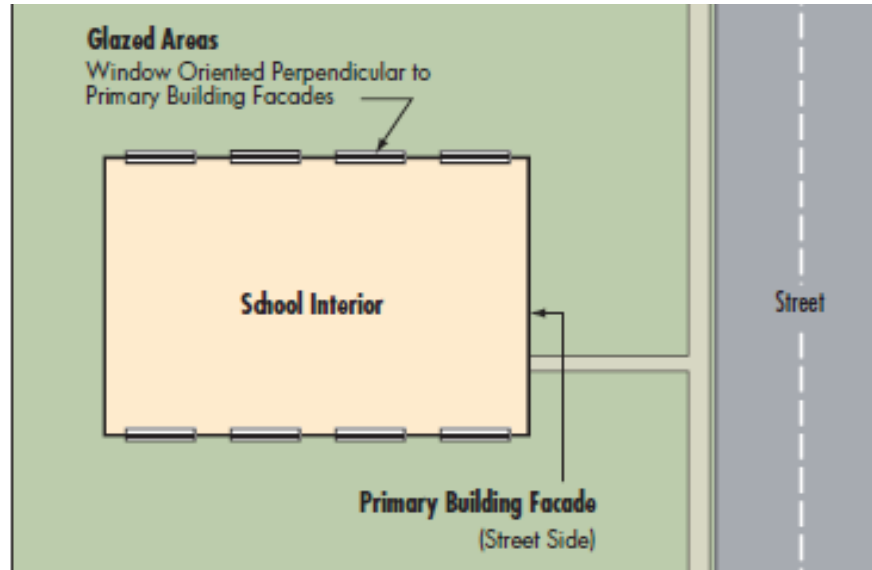
Designing a Safer School: FEMA Guidelines

- **First or Outer Layer** consists of natural or manmade barriers usually at property line or sidewalk/curb line.
 - Fence or engineered standoff
- **Second or Middle Layer** usually extends from the perimeter of the site to the exterior face of a school building.
- **Third or Inner Layer** starts at the **building envelope** and extends into the interior of the school building.

Layers of Defense for Campus Sites



Designing a Safer School: FEMA Guidelines



- Well-lit classrooms are safer, and natural light does not depend on a power source.
- Consider using burglary- and ballistic-resistant glazing in high-risk school areas.
- Consider using laminated glass in place of conventional glass.

Designing a Safer School: FEMA Guidelines

- Place windows away from doors so that, if the windows are broken, the door cannot be unlocked.
- Place horizontal windows 6 feet above the finished floor to limit entry.
- Consider using steel window frames securely fastened or cement grouted to the surrounding structure.



Protecting Against Multiple Threats with glazing



Additional Features

- Acoustical Performance
- Aesthetics
- Energy
- Solar Performance
- UV Protection

NGA's activities

- Glass Technical Papers & Manuals
 - [FB71-24 School Security Glazing](#)
 - [FB43-14 Security Glazing](#)
 - [Laminated Glazing Reference Manual](#)
 - [Protective Glazing Manual](#)
- Thirsty Thursday Webinars (on-demand)
 - [School Safety with Security Glazing](#), presented by Urmilla Sowell, NGA
 - [The Glazing Industry's Impact on the Active Shooter Standard](#), presented by Tino Amodei, ArmouredOne and Julia Schimmelpenningh, Eastman Chemical Co.
- One-Pagers
 - [School Security: Windows Respond First](#) One-Pager
- Glass Magazine Articles
 - [An Industry of "First Responders"](#) by Katy Devlin
- ASTM
 - NGA's School Security Task Group involvement in [ASTM F3561: Standard Test Method for Forced-Entry-Resistance of Fenestration Systems After Simulated Active Shooter Attack](#)