

Safe School Design Task Force

OBJECTIVE, RESEARCH, & TRENDS FRAMEWORK

BUILDING DESIGN, SAFETY & SECURITY

A. Objective Statement

"Protecting the health, safety and welfare of building occupants is fundamental to what architects do." - American Institute of Architects, AIA

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Our AIA NJ Safe School Design Task Force is focusing attention on the timely and important topic of **"Building Design, Safety & Security"** as it relates to the design of safe and secure schools in New Jersey. Our Task Force objective is to share national best practices in K-12 school designs, review safeguarding possibilities, and propose new ways to help local communities improve their schools' *health, safety, and welfare* needs. The strategies used by NJ Architects to design and renovate schools shall not only protect building occupants but also create highly successful learning environments through innovative design solutions integrated with school safety systems, physical security, and wellness practices.

GOAL: Share national "best practice" guidelines, offer direction on design processes, and provide creative design ideas to enhance safety and security.

In the wake of continuous shootings in schools across the United States, often with intruders walking freely through schools to shoot at will, the issue of safety and security has increasingly become imperative to address on a national basis.

As problem solvers, architects must address school safety challenges threatening children's lives and mental well-being head-on through school design processes. This is a natural outgrowth of architectural education and training. The art and science of building design works best when it effectively and efficiently responds to program needs, supports the functionality of intended uses, addresses social, psychological, economics, and environmental factors, complies with regulations, and supports welfare requirements. Such is the case for keeping eyes wide open and protecting students with the best safeguarding strategies for K-12 schools.

It is meaningful to see architects throughout the country speaking out about the importance of the design profession. By applying planning processes and design talents, architects can address vital issues of safety and security by identifying ways to keep schools better connected to the very communities invested in making sure their children can lead long, happy, engaged, and productive lives. These voices are putting out an urgent call for school architects to respond to school safety concerns:

- Katherine Flynn, AIA, states architects should put their “*unique skills to work*” to help protect our school children. She says, “*Amid a national conversation, architects need to prioritize design as a school security solution.*”
- Judith Hoskens, AIA Leadership Group, says, “*For architects, strategic thinking on how to keep students safe is now baked into the design process*”.
- An NPR Architecture article focusing on this issue (March 17, 2023) notes that “*with gun control far from sight, schools need to redesign for student safety*”.
- Members of the AIA NJ Safe School Design Task Force agreed on a statement that says, “*Architectural Design together with Innovative Building Security Technologies can result in strategies to keep learning central to the design process and enhance School Safety and Security*”.
- HMC Architects expressed it well by stating, “*We cannot merely design schools with the goal of staying under budget or for aesthetic and educational purposes. In this era, it’s our responsibility as architects and designers to make safety a top priority with our strategic planning*”.

B. Design Innovations & Creative Solutions

DESIGN SAFETY & PHYSICAL SECURITY PLANS

For architects, student safety and the physical security of school buildings are now major priorities. Creating safe schools with features designed to deter unwanted intruders - intent on harming students and staff - from entering school buildings or limiting where they can go once inside are now fundamental and baseline needs of school layouts – a requirement as integral to school design as Fire Safety.

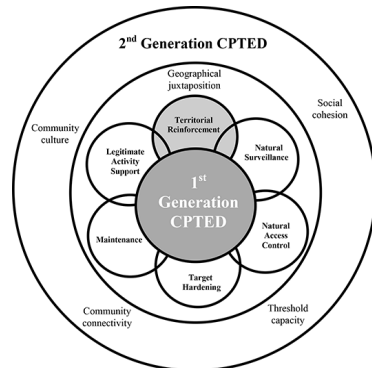
It is vital for schools to have comprehensive **Design Safety and Physical Security Plans** in place. By 2020, almost 96% of all public schools had a written plan and 98% conducted drills with their students. This means that over the past ten years, from 2010 to 2020, public schools greatly enhanced their school security systems, with a 49% increase in added security cameras and a 6% increase in access controls.

By organizing the Design Safety and Physical Security Plan in LAYERS, schools can better ensure that all areas are integrated and interconnected to prevent gaps in protection or to identify any single point of failure. Thoughtfully embracing a “Curb to Core” approach, school designs can layer security features by maximizing perimeter protection (at streets, curbs, yards) before moving to secured entryways and interiors, thereby creating layers of defense to delay or mitigate threats.

LAYERED SECURITY

Addressing the complex issue of layered security requires multiple conversations with stakeholders to define strategies tailored to community needs. The first step is to actively listen and learn prior to proposing any measures to secure environments for students, teachers, and staff. An important aspect is to include first responders in stakeholder meetings and to conduct community workshops with local police, county sheriff, and fire officials in attendance. Their active involvement in safety discussions helps to establish essential ground rules for designing secure facilities.

Building safety and security features work best when embedded early in the design process. **Crime Prevention Through Environmental Design (CPTED)** aims to deter criminal behavior by using multi-disciplinary design strategies which apply principles of natural surveillance, natural controlled access, and territorial reinforcement. School design should maximize the ability for people to observe the space around them with a “see and be seen” focus. It should use physical features to guide pedestrians, both inside and outside, while creating perceptions of risk and consequences to potential offenders. CPTED theory and core principles include:



- **NATURAL SURVEILLANCE** – Intended users can easily observe the site with effective lighting and views.
- **NATURAL ACCESS CONTROL** – Controlling and reducing number of access points with secured vestibules.
- **TERRITORIAL REINFORCEMENT** – Creating a clear delineation of spaces with the layout helping to mark and separate “user spaces” from non-legitimate users.
- **ACTIVITY SUPPORT** – Place activity support areas where users can be made part of the natural surveillance.
- **MAINTENANCE** – Schedule maintenance routines to demonstrate territoriality control and natural surveillance.

It is important for CPTED best practices to be applied throughout the complex from **Site Perimeter** (outer campus boundaries) to **School Grounds** (outdoor activity areas), to **Building Exterior** (walls surrounding school building including entries and exits), and **Building Interior** (all inside spaces including offices, classrooms, activity areas, hallways, and support spaces). Some examples of practices include:

- **Exteriors:** Use fencing, lighting, and landscape to enhance visibility and feelings of safety. *Avoid creating dark, obscure, or hiding places for intruders. Transform underused areas into pleasant spaces including public green spaces. Keep environments clean of litter and trash. Paint murals over graffitied walls.*
- **Interiors:** Use plan layouts and the daily flow of users to naturally supervise or “self-patrol” all the school environments including its outer edges, outdoor play areas within perimeters, plus building walls, doors, windows, and interior areas.

- **Access Control Points:** Limit entries (ideally to one main) and secure access points at entrances and exits to deter any unauthorized entry into controlled environments within the school. *Optimal strategies involve natural controls using walkways, fences, lighting, signage, and landscape to guide access to and from entries and to restrict access or deter unwanted activity. Controls may include global lockdown systems, door prop alarms, and locking devices*
- **Surveillance:** Employ “see and be seen” to inhibit acts of vandalism. Design buildings and landscapes to maximize visibility during the day and at night, especially at entry points and along perimeters to facilitate effective monitoring of activities and enhance realtime safety. *Employ physical security technologies such as surveillance cameras, access control devices, door locks, alarm sensors together with supervising security personnel and speed first response policies.*
- **Zoning Security:** Safety can be layered into interior zones by allowing wings to be quickly and independently shuttered off in lockdowns coordinated with refuge areas. *Systems such as automatic door locks, threat level management, and mass notification technologies are being used today with regular maintenance ensuring that safety features and systems remain reliable. Existing schools can retrofit doors with networked locks, expanded cellular coverage, and electronics.*

INTERIOR PROTECTION THROUGH DESIGN & TECHNOLOGY

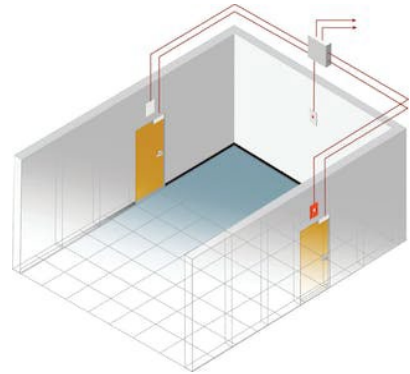
Whether designing a new ground up school, or renovating an existing structure, *Building Safety and Physical Security*, like *Fire Safety*, must be treated as a basic building requirement. ***By combining an architect's unique design skills and today's innovative security technologies, safety and security solutions can become more comprehensive and be fully integrated into a building's infrastructure.***

There is no one size that fits all approach to *Building Design Safety and Physical Security* since different school types, unique sites, and program needs all result in different solutions. Schools should think holistically about how to best secure their buildings within their budgetary parameters. Among the design issues that need to be considered are building shape and circulation configuration, application of security equipment, personnel issues, district policies, and local codes. Every aspect should be analyzed to strengthen the detection, deterrence, and response to threats.

As architects, we create unique design solutions for school clients every day. As curriculums and teaching methods evolve, so do the spaces we design change to include STEM, flexible layouts, movable furniture, IT integration, and common spaces focused on hands-on learning experiences. *So, how can we balance the need for additional security with design principles that foster a more nurturing next-generation learning environment for students?* Here are five focus areas to balance security and operations:

FOCUS AREA: Provide a Highly-Secured Main Entry & Access Path.

While large schools may have multiple points of entry, the more entry points there are, the more expensive security becomes. With one main entry point well-regulated with access control, surveillance, and strong design features such as bullet-resistant glazing films and doors resisting breakage or compromise—schools can have more control over its visitors. In addition, it is imperative to design the main entry in a way to limit the ability or threat of a vehicle driving through the building. Bollards, landscaping, and planter walls can become good deterrents to stop vehicles before they get to the building.



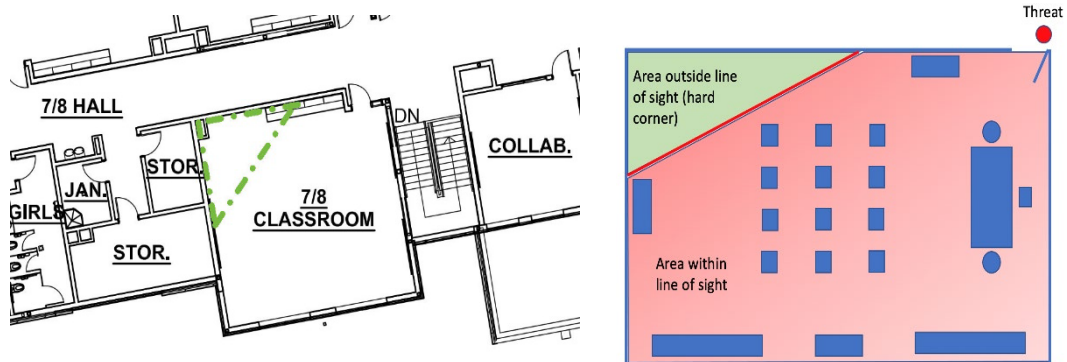
A critical design element in school safety is addressing the building entry. By funneling visitors to a single point of entry and creating a vestibule within that entry where they can be greeted and identified, the school can better control access and safety.

FOCUS AREA: Use Innovative Technologies & Mass Notification Systems.

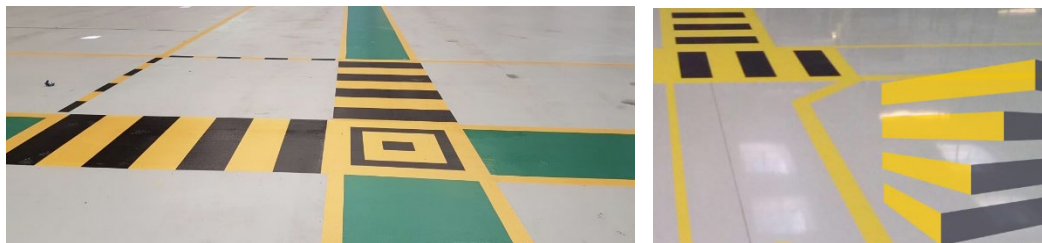
Installing systems throughout the campus to provide immediate, direct contact to local law enforcement can save valuable seconds and lives in dangerous situations. Some systems allow anyone assigned a panic button device to immediately alert local 911 dispatch and set off a campuswide alarm. Used with monitored surveillance cameras, plus motion detectors every 40 feet, system operators can locate the shooter within a minute. Systems like this also help prevent incidents like the Parkland HS shooting, where the shooter pulled the fire alarm. Some systems allow for police to introduce “hot zones,” where ceiling smoke canisters can go off isolating shooters and limiting visibility. *“Visual AI” is a NextGen technology which can proactively detect threats, analyze suspicious behaviors, identify perimeter breeches or weapons, and automatically alert authorities by using computer vision, deep learning analytics, and existing cameras.*

FOCUS AREA: Use Distinct Floor Patterns to clearly mark “Safe Zones”.

Specifically utilized in classrooms and other areas where access is via single door entries, architects can use various floor colors and patterns to clearly distinguish “safe zones.” In an emergency, students can go to that floor colored area, knowing it would be a safe spot in the room. Safe Zones are located based upon calculating complex angles of how a potential shooter could attack from the hallway or exterior. It assumes all classrooms are equipped with door locking systems. Schools can reinforce safety behavior by conducting drills to quickly access patterned floor sections, which most children can comprehend.



A hard corner is an area of a classroom not visible to someone looking in from a door or window. Step outside your classroom and make note of all the areas you can see inside the classroom. Everything outside of your line of sight would be a hard corner. Once you have identified your hard corners, you can use floor patterns or colors to “mark” the hard corner line.



Hard corner markings work best when they are fully integrated into the school design and are combined with other protective features such as the use of Safety Doors and Locks, Window Coverings, Shut Off Lights, Good Communications, Drill Rehearsals, and Sound Mitigation.

FOCUS AREA: Use Automatic Door Locking Systems Throughout.

One of the easiest ways to prevent mass shooting situations is to not provide the shooter any targets in the first place. Schools can drastically limit the odds of mass injury or death by having a system whereby the press of a button locks all doors on campus. For this system to work effectively, all doors must be equipped with electronic hardware and the doors cannot be propped open by staff during the school day. These systems are very common in incarceration settings and can be designed inconspicuously so as not to raise panic or a sense of a non-safe space. Most systems are activated by remote FOB, which communicates to a database that can access one or multiple locks across the facility.



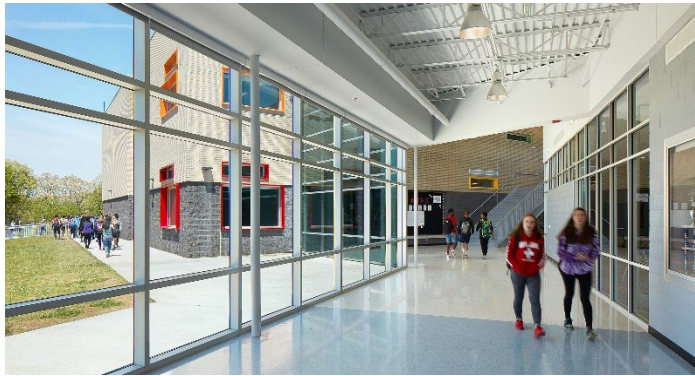
Access management involves design integration to ensure main entries are visually monitored and designated doors are accessible off-hours by card readers only. While securing classroom doors with global lockdown features are high priorities, other concerns involve securing loading docks and service yards and locating them away from entrances.

FOCUS AREA: Use Glazing, lots of Glazing, placed in the Right Locations.

As strange as it sounds, glazing—when utilized in the right context and location—is one of the best ways to ensure school safety. Increased visibility to the outside allows staff to identify a threat sooner than if it were hidden behind solid walls. By limiting the number of blind spots where things can go unnoticed, glazing helps to prevent common threats of bullying or isolationism. Human eyes can easily assess a situation and report dangerous threats to law enforcement if they see them occur and have access to mass notification (a cost-effective layer of protection). Plus, transparency is key for both learning and safety since good sight lines and glazing connect learning spaces to common areas thereby promoting a sense of community, while also enabling passive supervision by adults.



At Hendersonville's Innovative High School, students integrate into a community oriented and highly collaborative environment. The highly transparent space enables staff to easily track the entry and movement of students along with their social interactions in the large commons area. A combination of fixed and mobile furnishings adds flexibility in using the space.



At Asheville Middle School, the use of floor to ceiling glazing with a protective film lets in abundant natural light and supports circulation along a highly-visible perimeter edge creating a safe environment for students to move freely during both day and nighttime hours.



With abundant transparency to the corridor and adjacent classrooms, this learning commons offers students a balance between supervision and independence. Teachers and staff can ensure student safety during project-based and collaborative activities.



An "Open Design" layout gains usable space by eliminating extraneous corridors and possible hiding places. Interior glazing provides daylight by bouncing light through transparent layers in each learning space and by orienting them with multi-faceted visibility points. Sight lines, vital to student safety, allow adult supervision from space to space.

NEIGHBORHOOD DOOR LOCKDOWN ZONES: DESIGN CONCEPT

An innovative design idea worthy of consideration involves creating small, safe, and secure "Neighborhood Door Lockdown Zones." Lockdown neighborhoods can be integrated directly into the design of new buildings or carefully retrofitted into existing schools via modifications. Special effort must be made to seamlessly integrate protective devices such as video cameras monitoring security doors or rolldown safety gates placed at strategic in corridors, stairways, and entry vestibules without "over-hardening" the visual impact of school aesthetics or affect the school climate and culture. Once surveillance cameras spot an unwanted intruder, potentially an active shooter, or sees a breach of perimeter security and unauthorized entry, then the Neighborhood Door Lockdown can operate as noted:

- *After identifying a "neighborhood" intruder, trained security personnel in the security center shall activate a Global Door Lockdown of the neighborhood.*
- *Classroom doors in neighborhood hallway plus SECURITY doors at pivotal wing location (at ends of "neighborhood" hallways) can be put into Lockdown Mode.*
- *Hallway SECURITY doors, like FIRE doors, typically shall be kept in a "hold open" position until activated, when they are automatically closed and locked.*
- *Hallways or stairway vestibules can be equipped with sliding or rolling SAFETY gates integrated with release mechanisms with "hold open" positions, automatic closure activation, and remote locking controlled by security staff.*
- *All security systems shall be coordinated to comply with fire and egress codes.*

This design concept results in "securing neighborhood" quickly and remotely by sealing off a wing or a zoned area from the rest of the school community. Students, staff, and educators can follow protocols to protect themselves in safe zones while intruder(s) are trapped within lockdown hallways or stair vestibules until first responders arrive. *A key benefit of this approach is that intruders entering facilities with "neighborhood lockdown" devices will not be able to freely move around the school to continue shooting people.* It is noted that when lockdown SAFETY doors or SECURITY gates are in operation, then alternative pathways must be designed to enable emergency access into adjacent areas or alternate exits.

Neighborhood Door Lockdown Design Strategy:

General Notes: Strategy recommends all **School Corridors** are equipped with AI-supported video cameras, monitored by security staff, and providing coverage throughout school's interior and exterior. Strategy integrates **individual classroom lockdown hardware with neighborhood control system** which is overseen by security staff and operated remotely during emergencies and drills.



School Entries including the Main School Entry, Activity Wing Entry, Student Bus Entries, and Service Entry.



Secured Vestibules (monitored mantraps) at Entries equipped with cameras & buzzer-release door locks.



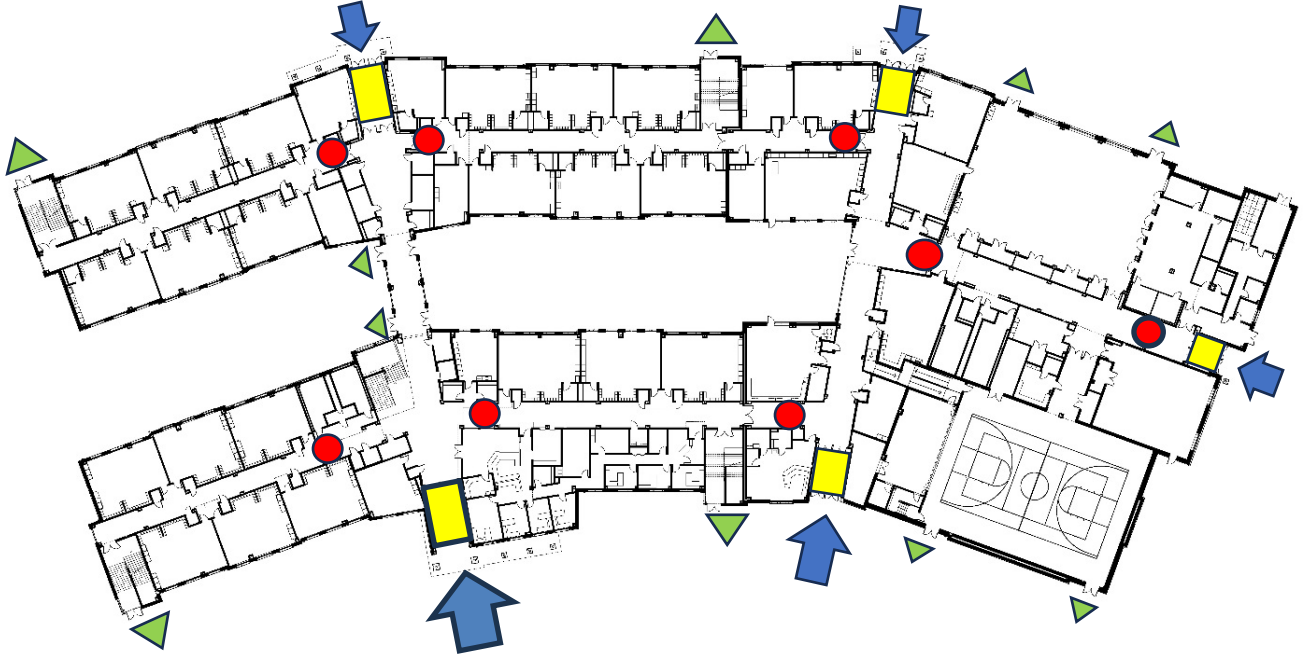
Egress Door Locations providing designated egress capacity in accordance with all code regulations.



Neighborhood Lockdown Locations equipped with hold-open doors or rolldown gates which can be securely shut and locked in response to emergency situations involving intruders or active shooters. All locations and devices shall be coordinated in tandem with fire separation code requirements and doors.

EXAMPLE: Elementary School Security Lockdown Zones – First Floor Layout

Locations noted for School Entries, Secured Vestibules, Egress Points, & Neighborhood Lockdown Doors



Neighborhood Lockdown Zones shall be coordinated with FIRE and EGRESS codes so that students and staff have options to lockdown within designated safe haven areas or to quickly exit the school. Design of new buildings can layer in security systems within neighborhood classroom clusters while older buildings may be retrofitted by adding safety gates or security doors at targeted pinch points.

In the wake of school tragedies, architects will play a significant role in designing and renovating safe schools. As security technology evolves, so will design. When planning schools with clients, it is critical for designers to be adaptive and open to law officials' input. An integrated process envisions new strategies and safety features being incorporated into new school designs as well as retrofitted in existing schools, thereby delivering the next-generation of enhanced learning environments where students and teachers can succeed AND feel safe and secure in the process.

AIANJ Safe Schools: Building Design, Safety & Security Posted February 2024
Whitepaper Author - Edward N Rothe, FAIA, Emeritus. *Ed Rothe is Past President of AIA NJ, Co-chair of the AIA NJ Safe School Design Task Force, and was Co-founder of Rothe-Johnson. Architects -Planners.*

Acknowledgement is hereby given to the significant contributions made by Jeanne Perantoni, AIA, SSP Architects & Safe Schools Design Task Force Co-Chair, Ron Weston, AIA, AIANJ President, Alan Grossman, SSP, Marcus Rosenau, AIA, SSP, Stacey Kliesch, AIA, AIANJ Consultant, and Christina Goldstein, NJPSI, along with thanks for their leadership, input, advice, and support in developing AIANJ Safe Schools Design Whitepapers and disseminating information to the public.

C. Resource Reference Information

Where We Stand: School Design and Student Safety

Statement by American Institutes of Architects (AIA)

<https://www.aia.org/pages/206356-where-we-stand-school-design-and-student-sa>

A statement by the professional association of architects that focuses on how AIA will:

- Lead efforts at the local, state, and federal levels of government to update school design guidelines to enhance student safety.
- Support collaborative and continuing education to achieve safe school design.
- Strive to make safe school design eligible for federal grants.

School Safety Clearinghouse

Interagency effort among Departments of Education, Health & Human Services, Homeland Security and Justice.

<https://www.schoolsafety.gov/>

The American Institute of Architects (AIA) was integral to enacting a law that established the School Safety Clearinghouse, which is a multi-federal agency effort to provide schools and districts with actionable recommendations and the sharing of best practices to create safe, supportive learning environments for students and educators.

K-12 Educational Design for Safety and Security

American Institute of Architecture (AIA) & Committee on Architecture for Education

(CAE) <https://content.aia.org/sites/default/files/2016-04/CAE-designing-schools-for-safety-and-security.pdf> Identifies elements related to site design affecting security of facilities.

School Safety and Security Guidelines for K-12 Schools

Partner Alliance for Safer Schools (PASS) <https://passk12.org/guidelines-resources/>

A tool for objective analysis by school officials, community stakeholders, and solutions providers for assessing and prioritizing the listing of school safety and security needs.

K-12 School Security Guide – 3rd Edition/2022

Cybersecurity & Infrastructure Security Agency (CISA)

<https://www.cisa.gov/sites/default/files/2022-11/k12-school-security-guide-3rd-edition-022022-508.pdf> Guide outlines action-oriented security practices and options for consideration

across the K-12 school community. It provides comprehensive and cost-effective solutions that complement and integrate with a school's protection and mitigation capabilities.

Campus Security Technology Trends to Watch in 2023

Campus Safety Magazine <https://www.campussafetymagazine.com/download/campus-security-technology-trends-to-watch-in-2023/>

Reports on the hot technologies that should be on everyone's radar this year.

Architects Prioritize Design as a School Security Solution

Katherine Flynn, AIA, published June 20, 2018; updated March 23, 2020

<https://www.aia.org/articles/201346-architects-prioritize-design-as-a>

Focus on how architects utilize strategic thinking about how to keep students safe. This is baked into the design process of every school and learning institution – with the added mandate of preventing a school from looking, feeling, or functioning like a prison.

With Gun Control Far from Sight, Schools Redesign for Student Safety

Mallika Seshadri, NPR Architecture, March 17, 2023

<https://www.npr.org/2023/03/17/1163551356/with-gun-control-far-from-sight-schools-redesign-for-student-safety>

Article exploring how architects serve as a conduit for both physical security and for supporting students' mental health to prevent violence in the first place.

Discussing School Safety and Security

Ann Marie Martin, I + S Newsletter, October 3, 2023

[https://www.iands.design/projects/education/article/33012426/marked-safe?utm_source=INTS+Insider&utm_medium=email&utm_campaign=CPS231004018&oeid=0292G0096634F6O&rdx_ident\[pull\]=omeda0292G0096634F6O&oly_enc_id=0292G0096634F6O](https://www.iands.design/projects/education/article/33012426/marked-safe?utm_source=INTS+Insider&utm_medium=email&utm_campaign=CPS231004018&oeid=0292G0096634F6O&rdx_ident[pull]=omeda0292G0096634F6O&oly_enc_id=0292G0096634F6O)

Architects offer their best advice on achieving safe schools through design approaches as well as how to properly arm schools with the best physical safeguard features which support the latest in security procedures and technologies.

Designing Safer Schools & Safer Campuses in the Age of Active Shooters

HMC Architects Blogposts, March 29, 2018, and November 14, 2023

<https://hmcarchitects.com/news/how-can-we-design-safer-schools-in-the-age-of-active-shooters/>; and <https://hmcarchitects.com/news/designing-for-student-safety/>

HMC Architects states it is our job to solve problems with design. After having ongoing strategy discussions with law enforcement, district facilities staff, and educational experts to determine effective design tactics protecting students and staff, HMC has summarized five areas of focus: Secured Main Entry, Mass Notification System, Floor Patterns indicating Safe Zones, Automatic Door Lock System, and Glazing in the Right Places. They also expanded their design approach to apply CPTED principles of natural surveillance, controlled access, and territorial reinforcement.

The Dark Side of Crime Prevention Through Environmental Design (CPTED)

Paul Cozens, Department of Humanities. Curtin University and Terence Love, Design-Out Crime Research Center; Published: March 29, 2017; [CPTED Handbook v4 20170627](#)

<https://doi.org/10.1093/acrefore/9780190264079.013.2>

The paper focuses on the “dark side” of CPTED, which relates to negative outcomes that may result if CPTED is not implemented thoughtfully and equitably as a process. It highlights CPTED as a process that can be enhanced by using “program logic models” to understand the CPTED potential outcomes that may result if any excessive use of target hardening or if any “exclusionary design tactics” are employed without diligent reflection on their impact on students and staff.

Safer K-12 Design: School Should Feel – and Look – Like School

Becky Brady, AIA, ALEP, CDT, LEED AP, Clark-Nexsen Blog, September 2023

<https://www.clarknexsen.com/blog-safer-k-12-design/>

K-12 schools exist to engage students in active learning, providing them with the skills and knowledge for successful futures. These environments should also be safe and welcoming and provide ways to address the pressing concerns of bullying, fights, school shooting risks, natural disasters, and the mental health of students and teachers. Designers must find innovative ways to make the learning space open, inclusive, AND secure by using “invisible hardening” tactics.

AIA-NJ Safe School Design Task Force Whitepapers (2023 and ongoing posts)

<https://aia-nj.org/safe-school-design/>. Link connects to more information on this topic and on related topics of K-12 health, safety, and welfare with a focus on how school design can enhance student and educator health, safety, and wellness for safer schools.