



Providing Safe School Environments: Crime Prevention through Environmental Design

INFORMING THE DEBATE

Michigan Applied Public Policy Research Brief



Institute for Public Policy
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MICHIGAN STATE UNIVERSITY

About the Michigan Applied Public Policy Research Briefs

INFORMING THE DEBATE

The paper series, Informing the Debate, is generated from an internal grant-funded initiative sponsored by the Institute for Public Policy and Social Research (IPPSR). The initiative is the Michigan Applied Public Policy Research (MAPPR) Grant Program.

The MAPPR Program supports university faculty-led research projects that are focused on current issues being discussed in communities across the State, and often across the nation. A paper briefing of the research follows completion of the project wherein related policy implications are presented.

The MAPPR Program came about in 1992 following a two-day meeting with leaders from the business sector, nonprofit agencies, and university faculty and staff. The group recognized the pressure on urban core leaders to make critical choices having long-term impact on communities with little access to research-based information to consider or support their decisions. A commitment to generate a bank of research as a reference was set in the framework of the MAPPR Program.

Since, the MAPPR Program has bridged the statehouse and the university while cultivating multidimensional connections among community decision makers. The projects as well as the briefings serve as a central point of discussion and brainstorming. The briefings are reviewed by not only Michigan stakeholders, but also by other states' frontrunners who share the need for evidence-based research.

Additional information about IPPSR and the Michigan Applied Public Policy Research (MAPPR) Program is available at ippsr.msu.edu or by contacting AnnMarie Schneider, Grant Administrator at annmarie@msu.edu.

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MAPPR Policy Research Brief

Providing Safe School Environments: Crime Prevention through Environmental Design

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EXECUTIVE SUMMARY

School is the place where children spend much of their time every day. The school environment should be safe from any violence and danger. The question, “Do school buildings in Michigan provide safe environments for children and teachers?” has been asked by many community members. Our team of environmental design faculty and urban planning faculty members at the School of Planning, Design, & Construction at Michigan State University collected data to answer this primary question and proposed major design guidelines for school buildings.

Since C. Ray Jeffery’s Crime-Prevention through Environmental Design (CPTED) and Oscar Newman’s Defensible Space Theory were introduced at the beginning of the 1970s, three main principles to improve safety in various physical boundaries have been emphasized (Jeffery, 1972; Newman, 1973). These include offering territoriality, controlling access, and improving natural surveillance.

Based on these theoretical background and practical efforts by architect and environmental designers, some countries have set rules to require all new public school buildings to comply with the safe school design guidelines. Their safe school design guidelines emphasize three aspects: the school building should enable its occupants to spot visitors quickly, prevent unauthorized people from entering the building, and provide a safe evacuation route for children in an emergency. Their overall guidelines are strict, and the requirements for designers are strong, although private citizens are not allowed to own firearms in those countries.

In the United States, shootings and incidents of school violence have led states to require schools to have crisis plans with mandated lockdowns and fire drills, anti-bullying policies, and other measures to address potentially violent behavior and situations (O’Meara, 2014). However, little attention has been paid to the schools’ physical environments.

In Michigan, crime-free or safe school environments have been discussed among diverse community members. However, empirical evidence to show if current physical conditions of public schools are safe from crimes is rare. Community members’ opinions regarding safe school environments for children have rarely been collected. It is hard to find any practical design guidelines for creating safe school environments. Because it is almost impossible to predict the exact timing of school violence, the school environment itself should be designed and maintained more appropriately to protect the children from any violence.

Our research team proposed the main research question: Are schools in Michigan designed to prevent violent crime and protect their students? To answer this question, this research aimed (1) to assess if current school buildings and campuses comply with safe school design guidelines and (2) to conduct the State of the State Survey and focus groups with various community members to collect their input for creating safer school environments.

POLICY RECOMMENDATIONS

Utilize an assessment tool to diagnose if the school building provides safe environments for students.

Our research team developed an assessment survey that any school administrator can fill out to test the level of their school environments. The assessment tool focuses on building design characteristics, and include questions about the entrance, doors, windows, visibility of the main office, and hallways, interior layout of the school building, location and interior and exterior graphics and signage. The second component of this tool is the exterior design features including sidewalks, streetlights, and the juxtaposition between the building and landscape for securing the outdoor evacuation route. The assessment survey is available at: https://msu.co1.qualtrics.com/jfe/form/SV_0fDQ7gtE5GwPkt7

Adopt best design practices to improve the safety in indoor and outdoor environments

Gate control of the school building

Public opinions strongly supported access control of the building entry. There is no clear opinion about metal detectors. However, most respondents strongly support the installation of a buzzer system with surveillance cameras.

Wayfinding

The well-planned interior layout of the school building and clear signage were strongly indicated to improve wayfinding in school buildings.

Visibility

The school building should provide a high level of visibility. Visitors should be able to see the main office easily, and the staff in the main office should be able to check visitors once they enter the building and have good visual access to exterior groups.

Color Scheme

The interior color scheme should indicate the exits clearly. A consistent color scheme throughout the interior spaces, clearly marking the exits and the evacuation route, is recommended.

Accessibility

The accessibility for students with disabilities should be required. The location of elevators is very critical for fast evacuation of wheelchair users. The location of the elevator should be clearly presented.

Classroom

Classroom design should provide several ways of evacuation for students in emergency. Windows in the classroom should function as emergency exits for students, the faculty, and staff. Classroom teachers should be trained on how to guide students during emergencies. The window area should be cleared. No furniture or equipment should be allowed under the emergency windows.

Landscape

Well-maintained landscape improves perceived safety. The landscape around the school building should provide territoriality and safety shelters at the same time.

Common Environmental Factors

Two factors were repeatedly emphasized for improving safety in interiors and exteriors of the school buildings and campuses: Signage for improving wayfinding and lighting.

Enhance training and mental health programs for school safety

Members of the public indicated the importance of safety training for teachers and staff members. They also highlighted safety training for students, which should be led by teachers and the school staff.

Each state is required to have a list of trainings that districts have conducted to secure students during school hours. Michigan schools seemed to follow this requirement very well; however, students were not clear about the training for bomb or gun threats. Lack of training for substitute or part-time teachers was also indicated by parents and students. These issues should be revisited by school administrators and policy makers.

School districts are strongly recommended to provide mental health programs for community members and students to prevent them being intruders against school properties. In collaboration with mental health program providers, police, and school administrators, the school district could share the information about these programs with students, teachers/staff, and parents.

Encourage school districts and administrators to participate in community wide conversations regarding school safety

During the process of data collection for this research project, many parents were concerned about the safety at schools while many school administrators refused to participate in the survey nor focus groups to discuss the school safety issues. They indicated the lack of staff to take care of this issue. Any support from the community members, providing incentives, or offering additional staff specialized in the matters of school safety would help.

OVERVIEW OF THE ISSUE

Theoretical Background

Since C. Ray Jeffery's Crime-Prevention through Environmental Design (CPTED) and Oscar Newman's Defensible Space Theory were introduced at the beginning of the 1970s, many environmental designers, planners, and researchers have emphasized three main principles from these theories to improve safety in various physical boundaries (Jeffery, 1972; Newman, 1973). These principles are *achieving territoriality, controlling access, and improving natural surveillance*.

Jeffery (1972) proposed the concept of CPTED, as a criminologist, and Newman (1973) developed practice-based solutions for architectural implications, as a registered architect and researcher. Since then, these theories and associated principles have become a solid foundation for the researchers and designers in the United States and elsewhere (i.e., Canada, Singapore, South Korea, and UK) who have wanted to enhance safety from crime in different architectural settings (Kim, 2006; Nubani, 2006).

Design Guidelines in Other Countries for Creating Safe School Environments

The CPTED and the defensible space theory inspired architects, designers, planners, city officials, and researchers around the world. In addition to referring to the principles from these two theories, some developed their own CPTED guidelines for residential, commercial, or educational facilities.

Furthermore, countries like South Korea set a rule to require all new public school buildings to comply with the safe school design guidelines, based on CPTED (Seoul Solution, 2015). The Ministry of Education in South Korea also strongly recommends existing school buildings to follow these guidelines when they are renovated (Park & Kim, 2011). Their safe school design guidelines emphasize the following three aspects: 1) The school building should enable its occupants to spot visitors quickly, 2) prevent unauthorized people from entering the building, and 3) provide a safe evacuation route for children in an emergency. The overall guidelines in South Korea are strict and the requirements for designers are strong, even though private citizens are not allowed to possess firearms.

Attentions Needed to the Safe School Environmental Guidelines

In the United States, shootings and incidents of school violence have led some states to require schools to have crisis plans with mandated lockdowns and fire drills, anti-bullying policies, and other measures to address potentially violent behavior and situations (O'Meara, 2014). However, little attention has been paid to the schools' physical environments. Most rules for creating safe school environments are recommendations, not requirements. Many schools built before the CPTED were introduced in the 1970s are still operating. Some of their environments may never be constructed with CPTED or defensible space design guidelines in mind. As a result, those school environments and their students can be vulnerable to violence.

School is the place where children spend much of their time every day. There is no question that the school environment should be safe from any violence and danger. It is thus obvious that school buildings should be able to control their access to unwanted visitors. In addition, school buildings must provide a safe and clearly marked evacuation route for students and teachers. It should be required to have a clear interior path and notable signage for students to follow for an emergency evacuation.

IN MICHIGAN

Attention Needed to the Safe School Environment

In Michigan, crime-free safe school environments have been discussed among community members. However, empirical evidence to prove if current physical conditions of public schools are safe is rare. The community members' voices regarding the safe school environment for students have barely, if at all, been collected. Therefore, it is a difficult task to adopt any practical design guidelines for creating safe school environments based upon community input. Because it is nearly impossible to predict the exact timing of school violence, the school environment should be designed and maintained more appropriately to protect the children from all violence at any time.

Research Purpose

The main research question of this project: Are schools in the State of Michigan designed to secure students from violent crimes or during an emergency? To answer this question, this research aimed: (1) to develop an assessment tool to measure the safety levels of current school buildings and campuses; (2) to conduct focus groups with various community members to collect their input for creating safe school environments, and; (3) to conduct the State of the State Survey to gain input from a broader range of population in Michigan.

MAPPR RESEARCH PROJECT

This research employed both qualitative and quantitative approaches. School visits and focus group interviews were conducted using the qualitative approach and the State of the State Survey (SOSS) was conducted to collect quantitative data for statistical analyses.

Research Methods

Literature review of the safety school design guidelines

Existing safe school guidelines such as the crime-prevention through environmental design (CPTED) for schools' guidelines from across the U.S. and other countries were collected and integrated for creating a school building and campus assessment tool for schools in Michigan. Its usability was tested by school administrators.

School visits and a diagnosis of interiors and exteriors of school buildings and campuses

Process: Our research team created a list of public schools in Michigan and contacted them via email. We introduced the research purpose and the process and asked for their participation. More than 300 administrators such as superintendents, principals, or assistant principals in Michigan were contacted.

Issues: Only a few responded to our email request. It is possible that the school administrators might not have much interest in this topic or they were busy with their tasks due to the lack of staff support. More attention to this topic is needed.

State of the State Survey (SOSS) for investigating the opinions of a broad range of populations

In collaboration with the Office for Survey Research (OSR) at Michigan State University, the State of the State Survey (SOSS) was conducted. SOSS is a public opinion phone survey that targets 500 to 1,000 randomly selected Michigan residents (OSR, 2019).

Our research team targeted 1,000 Michigan residents. SOSS was expected to collect Michigan residents’ opinions and suggestions for improving school buildings, and campus designs to secure building occupants from violent crime. The questions for the SOSS are presented in Table 1.

Table 1. School Safety Questions for the State of the State Survey

Category	Questions	Note
Demographic and socioeconomic questions Respondents’ children attending public schools	Age, Gender, Residency, Area of Residency, Family composition How many children in your household attend public schools in your area? What grade is each child in?	Common questions for all SOSS research Put the number
General perceptions about the school safety in their areas	Do you think that the public schools in your city or township are generally very safe, somewhat safe, somewhat unsafe, very unsafe, or neither safe nor unsafe?	From very unsafe to very safe
Violent crime experiences that target public schools in their areas	Have you experienced or heard about: - Bomb threats/ Shootings or gun-related threats/ Intentional destruction of school buildings or property / Robberies or thefts / Kidnappings or attempted kidnappings / Bullying against individual students	Yes or No
Building entry safety control	Which of the following do the public schools use in your area use? - Door locks and buzzers at entrances / Surveillance cameras at entrances or in hallways / Regular police patrols of the buildings	Yes or No
Importance of the school safety related issues	Safety training for teachers, students, and staff / Mental health education and program for students who are suffering from depression or anger issues / Controlled access to schools / Security equipment other than access control, such as Surveillance cameras or metal detectors / Renovated and updated school buildings and facilities to improve school Safety / Signage to show evacuation routes to students / Appropriate street lights in parking lots and on school property / Marking the evacuation routes in school buildings using different colors or lights / Providing hiding spots for kids in the classroom to protect them from school invaders / Easy access from public roads and streets to school entrances / Fences around school property	Very important, somewhat important, somewhat unimportant, very unimportant, Or neither important nor unimportant.

Note: All tables, images and figures within this document are accredited to the lead author, Suk-Kyung Kim, PhD.

Focus Group Interviews with Parents and Students

The purpose of the focus groups was to explore environmental design solutions for improving safety at schools with students and parents with school-age children. Their responses are usually based on experiences and perceptions. Because they are the context experts, the data from the focus group could improve the quality of the information about relevant issues.

The participants of the focus groups were recruited through school emails and personal contacts of the research team. A total of 25 high school students, two former students, and

11 parents of elementary, middle, or high school students participated in these focus group meetings. The first focus group consisted of five parents and two former students. The second and third focus groups consisted of high school students only. The fourth focus group consisted of parents only. The research team tried several different types of focus groups with different members including parents, students, and former students to test the types of issues that were identified, but the composition of the groups did not seem to affect the outcomes. All groups, regardless of composition, identified very similar issues and potential solutions related to school safety. A series of the focus group meetings were held between May and June of 2019.

A questionnaire to be employed during the focus group meetings was developed and approved by the MSU Institutional Review Board. For students younger than 18 years old, we offered a consent form to be signed by their guardians and themselves. The focus group meetings were held in collaboration with the National Charrette Institute. Every meeting followed the order of the questionnaire contents and was divided into two parts.

Part 1: Participants answered the questions regarding general perceptions of school safety, experiences with hearing about any unsafe situations during their school years, opinions about school entry access and control, school safety training, evacuation, building interiors, and mental health programs.

Part 2: The research team provided school maps with tracing papers and asked participants to draw or write their opinions about design aspects that impact school safety such as the school parking lot, traffic flow, landscaping (whether it provides dark spots or safe shelters), sidewalks, lighting, and outdoor sports facilities.

Findings and Discussions

[School Safety Assessment Tool](#)

Based on a thorough review of literature and a pilot test, the tool for assessing the safety of the school buildings and campuses was created. This is a self-assessment survey that any school administrator can fill out to test the level of their school environments.

The assessment tool focuses on building design characteristics, and includes questions about the entrance, doors and windows, visibility of the main office, and hallways, interior layout of the school building (e.g., clear route to exits and lockable hiding spaces), location and design of you-are-here maps, and interior and exterior graphics and signage. The second component of this assessment tool is the exterior design features including sidewalks, streetlights, and the juxtaposition between the building and landscape for securing the outdoor evacuation route.

Public Opinions from the State of the State Survey

The SOSS was conducted from June through November 2019. A total of 1,000 individuals participated in this survey. As Table 2 shows, over 62% of the respondents agreed that the public schools in their areas are safe, while 14.5% were concerned about school safety. About 23.1% said the safety of the public schools in their area is acceptable.

Table 2. Safety in the Public Schools in Their Areas in Michigan

Safety in public schools in their areas	Frequency	Valid Percent
Very unsafe	39	3.9
Somewhat unsafe	106	10.6
Neutral/Acceptable	231	23.1
Somewhat safe	363	36.4
Very safe	259	26
Total	998	100

Members from the public indicated that they had heard about any crimes against schools in their areas. They have heard or experienced bomb threats (30.7%) and/or intentional destruction of school building or property (30.7%). Some of them also indicated shootings or gun-related threats in their areas (23.2%). Bullying against individual students received the highest percentage. This result strongly supports our research team’s suggestions for providing better evacuation routes, clear indoor and outdoor signage for better wayfinding, and removing dark spots within school buildings.

Table 3. Crimes Against Schools

Type of Threatening During the School Hours	Frequency	Percent
Bomb Threats	307	30.7
Shootings or Gun-related Threats	232	23.2
Intentional Destruction of School Buildings or Property	307	30.7
Robberies or Thefts	249	24.9
Kidnappings or Attempted Kidnappings	120	12
Bullying against Individual Students	565	56.5

In terms of security tools in school buildings, 39.8% indicated door locks and buzzers at the building entrances, and 39.0% indicated surveillance cameras.

Table 4. Security Tools in Use at Schools in Their Areas

Security Tools	Frequency	Percent
Door locks and buzzers at entrances	398	39.8
Surveillance cameras at entrances or in hallways	390	39
Regular police patrols of the buildings	256	25.6

As the most important solutions for improving school safety, members from public indicated (1) controlled access to schools, preventing outsiders from entering, (2) mental health education and programs for students who are suffering from depression or anger issues, (3) appropriate streetlights in parking lots and on school property, and (4) safety training for teachers, students, and staff. For these four high priority issues, public opinions were not different whether the subject (or individual) had a child or not.

Public opinions were different for (1) adding security equipment other than access control, such as surveillance cameras or metal detectors, (2) renovating or updating school buildings and facilities to improve school safety, and (3) providing hiding spots for kids in the classroom to protect them from school invaders, depending on whether the subject (or individual) had a child or not.

Table 5. Improving the Security at School

		N	Mean	Between Groups	
				F-value	P-value
Improving school safety -- Controlled access to schools, preventing outsiders from entering	No child	723	1.4	1.386	0.239
	1 or more	264	1.46		
	Total	987	1.42		
Improving school safety -- Mental health education and program for students who are suffering from depression or anger issues	No child	725	1.47	2.311	0.129
	1 or more	264	1.38		
	Total	989	1.45		
Improving school safety -- Appropriate street lights in parking lots and on school property	No child	725	1.45	0.43	0.512
	1 or more	265	1.48		
	Total	990	1.46		
Improving school safety -- Safety training for teachers, students, and staff	No child	726	1.61	1.962	0.162
	1 or more	265	1.53		
	Total	991	1.59		
Improving school safety -- Signage to show evacuation routes to students	No child	725	1.59	0.019	0.889
	1 or more	265	1.6		
	Total	990	1.59		
Improving school safety -- Security equipment other than access control, such as surveillance cameras or metal detectors	No child	725	1.68	6.788	0.009
	1 or more	265	1.52		
	Total	990	1.63		
Improving school safety -- Renovated and updated school buildings and facilities to improve school safety	No child	725	1.75	6.454	0.011
	1 or more	265	1.58		
	Total	990	1.7		
Improving school safety -- Providing hiding spots for kids in the classroom to protect them from school invaders	No child	724	1.89	4.662	0.031
	1 or more	265	1.72		
	Total	989	1.84		
Improving school safety -- Marking the evacuation routes in school buildings using different colors or lights	No child	722	1.95	3.604	0.058
	1 or more	265	1.82		
	Total	987	1.92		
Improving school safety -- Easy access from public roads and streets to school entrances	No child	725	2.05	7.938	0.005
	1 or more	265	1.86		
	Total	990	1.99		
Improving school safety -- Fences around school property	No child	724	2.34	0.443	0.506
	1 or more	265	2.29		
	Total	989	2.33		

Note: 1. Very important, 2. Important, 3. Neutral, 4. Unimportant, 5. Not at all important

Design Considerations for Improving the Safety at Schools

Interior Environmental Elements of the School Building

- **Gate control of the school building:** Focus group participants and the SOSS respondents strongly supported access control of the building entry. There is no clear opinion about metal detectors. However, most respondents strongly support the installation of a buzzer system with surveillance cameras. Some schools have more than one buzzer available, but most school parents prefer one buzzer system of the main entrance of the school building.

Additional checkpoints for safety include the following.

- **Wayfinding:** Wayfinding in interior spaces includes the You-Are-Here map and signs to lead visitors toward the main office, classrooms, and other interior spaces.
 - Guidance to the main office: Upon entering the building, visitors are asked to check in at the main office. Some schools have a clear sign to show this information, while others have a small sign or put the sign in a hard-to-see spot.
 - Signs on the wall show clear pathways to exit doors, classrooms, and other destinations.
 - The You-Are-Here map is placed in front of the main entrance to provide a clear evacuation route to school building users that include building occupants and visitors.

Figure 1. Controlled Access (Left) and Wayfinding to Show the Evacuation Route (Right)



Check-In Information for Visitors

You-Are-Here-Map to Show Evacuation Route

- The well-planned interior layout of the school building is closely related to the wayfinding issue which is the navigation of interior spaces of the building. However, many old Michigan schools have existing structures and several added structures since they had to accommodate for the increasing number of students moving to the area. The additional part and the original structure usually do not offer consistent signs, good lighting, or consistent interior features to help students navigate inside the building.

- **Visibility:** The school building provides a high level of visibility. Visitors should be able to see the main office easily, and the staff in the main office should be able to check visitors once they enter the building and have good visual access to exterior groups. There should be no visual obstacles along the hallway and in the reception area of the main entrance of the school building, which can provide good visibility to both visitors and the main office staff.

Figure 2. Considerations for Improving the Surveillance from the Main Office



The window from the main office for improving surveillance.

Reception desk to control the visitors when the main office not facing the building entrance

- **Color Scheme:** The interior color scheme indicates the exits clearly. A consistent color scheme throughout the interior spaces to clearly mark the exits and the evacuation route is recommended. Particularly, in interior spaces that do not provide open visual access, like locker rooms, a clear color scheme is required. Figure 3 shows an example of the color scheme in the locker room indicating the exits. This can easily lead students to the exits in emergency.

Figure 3. Color Scheme Leading To the Exits in A Locker Room Where Visual Access Is Limited



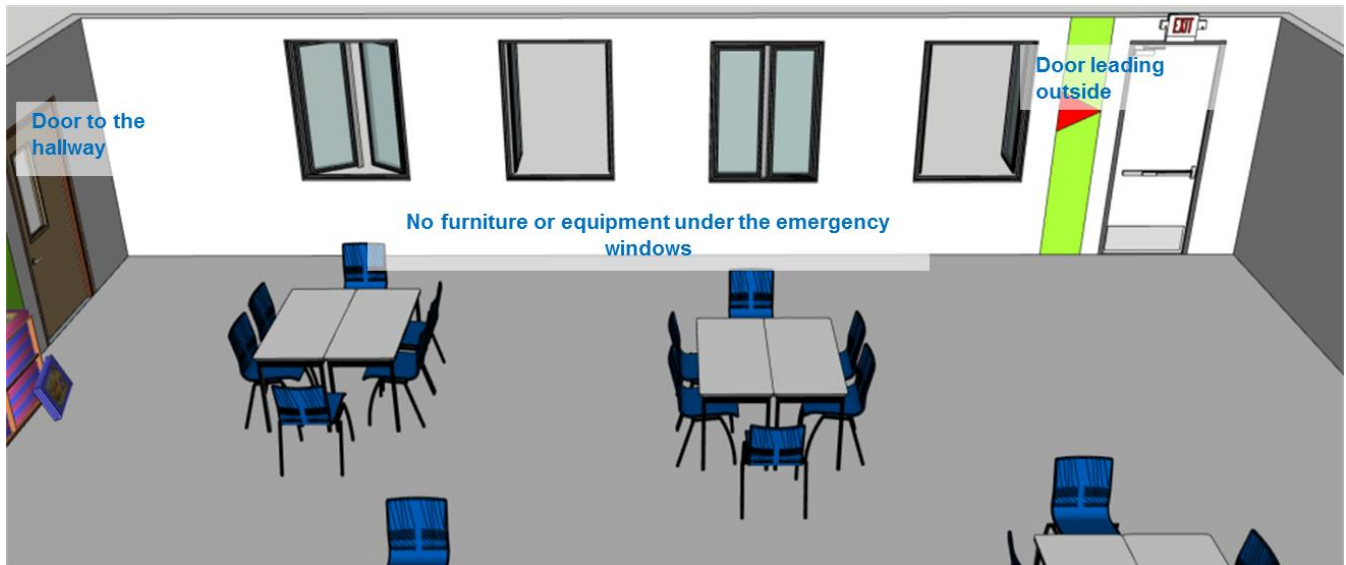
- *Accessibility:* The accessibility for students with disabilities is required. The location of elevators is very critical for fast evacuation of wheelchair users. The location of the elevator should be clearly presented. It is not recommended to have several stairs in front of the elevator. The sign to indicate the location of the elevator should be clearly seen.
- *Classroom:* Classroom design provides several ways of evacuation for students in emergency.

For elementary schools, the classroom needs to offer three ways of evacuation: the main classroom door for being evacuated through the hallway, the emergency windows in the classroom, and another classroom door leading outside which will evacuate students in case the main door of the hallway is not a safe route in an emergency.

- *Doors:* Classroom doors are lockable inside. The doors to the library and other multipurpose spaces should also be lockable inside. The doors should follow ADA building accessibility guidelines and be wide enough for wheelchair users.
- *Windows:* Windows in the classroom function as emergency exits for students, faculty and staff. Classroom teachers should be trained on how to guide students

during emergency situations. The height of the windowsills should be lower for students to be able to easily escape. The window area should be cleared. No furniture or equipment should be allowed under the emergency windows.

Figure 4. Doors and windows in the classroom to secure students' safety



- *Walk-in storage:* Some classrooms can provide a secured space, which can be used as a hiding space for students or teachers when the school has an intruder.
- *Emergency bell:* An emergency bell that connects to the police department needs to be installed in the classroom. Although most teachers have cell phones and a telephone in the classroom, a one-button emergency bell would be faster to connect to the police. It should have a microphone to communicate with the call taker to deliver the correct information from the classroom.

Exterior Environmental Elements

- *Landscape:* Well-maintained landscape improves perceived safety. CPTED recommends a garden around the building to improve safety for the building occupants. For instance, the garden in Figure 5 provides safe landing to students who would exit from emergency windows. The right image shows shrubs to prevent outsiders from accessing the classroom.

Figure 5. Landscape Improving Students' Safety



The landscape around the school building needs to provide territoriality and safety shelters at the same time. It can provide natural screening and shelters for students' hiding to improve territoriality. However, a heavily wooded place near the school campus does not offer perceived safety to students.

- *Sidewalks:* For students' safe walking and running, the sidewalk is a minimum five feet wide with smooth surface materials.. The sidewalk needs to be continuous and smoothly connected to the street or parking lot. The sidewalks should also be brightly lit for safety at night. Between the sidewalk and parking spaces, a buffer zone should be provided, considering the pedestrian safety (see Figure 6).

Figure 6. Sidewalks around the School Building



No buffer zone between a sidewalk and parking spaces (Current)



A buffer zone added (Suggested)

- *Parking lot:* The parking lot is well-lit at night. It should provide a clear traffic flow for those who visit or stay in the campus. Near the parking lot, an emergency call with a light near the sidewalk around the parking lot should be installed. Clear signs to show the traffic circle for drop-off and pick-up are essential in the entry point of a parking lot.

Transportation

A transportation plan is an important element for helping students safely evacuate during an emergency. In the focus group meetings, parents and students spent a greater amount of time discussing transportation issues including problems and suggestions for securing students.

Suggestions for transportation planning around school buildings can be categorized into three domains: 1) transportation plan for emergency, 2) entry points to the parking lot, and 3) speed limits around the school campus.

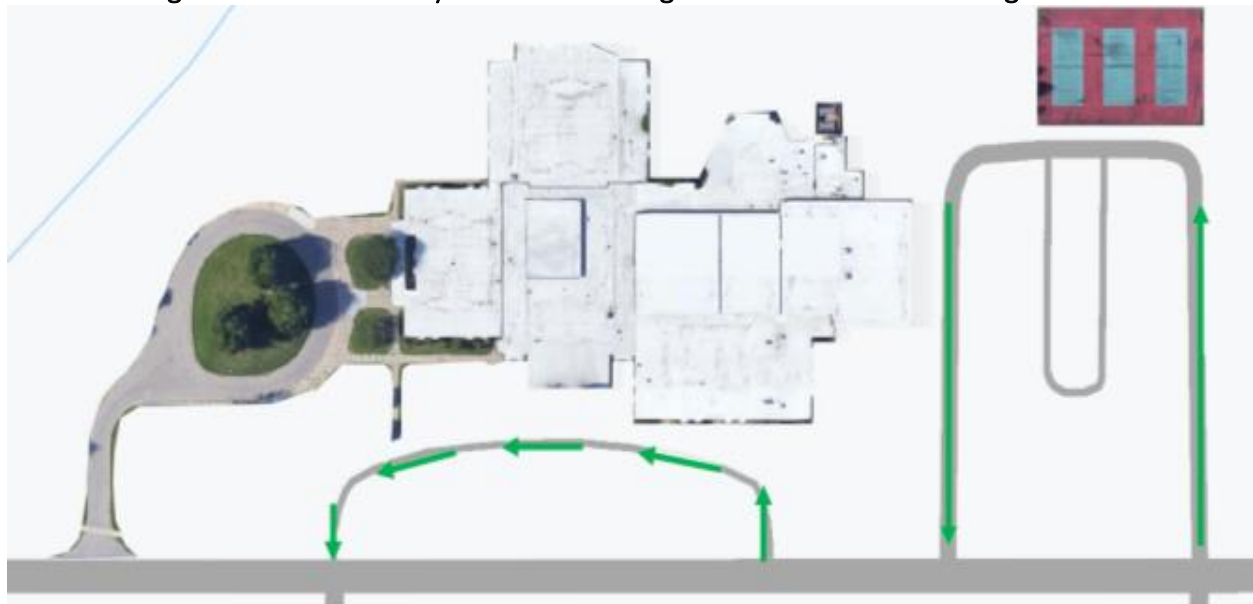
Transportation plan for emergency

Transportation planners recommend two plans for securing school students, one for regular school days and the other for emergencies.

- *The plan for regular school days:* Having one or two simple traffic flows that have the least conflict with pedestrian/bicycle traffic is recommended. The points to enter the traffic flow and exit from it are recommended to be separate, although it is acceptable to put the entry and exit points close to one another.

Figure 7 shows the entrances for entering and existing are different, which could reduce traffic congestion during drop-off and pick-up times.

Figure 7. Different Entry Point for Entering the Traffic Flow and Exiting From It



- *The plan for emergency situations:* Avoiding traffic congestion is the most critical issue during an emergency. The main entrance should be designated for emergency vehicles. Parents should not be allowed to access the school campus unless instructed to do. Students should follow the protocol during an emergency, which should have clear instruction on when and under what circumstance they can access and use their own vehicles.

Signs to show the entrance and exit to the school campus during the emergency should be clearly presented. School administrators should send parents the information about

regular and emergency transportation plans for securing students during an emergency at the beginning of the school year.

Entrances to the parking lot

It terms of traffic congestion, it is usually recommended to offer multiple entrances/exists to a parking lot. However, due to limited resources for managing the traffic during regular school days, multiple entrances/exits may not be possible.

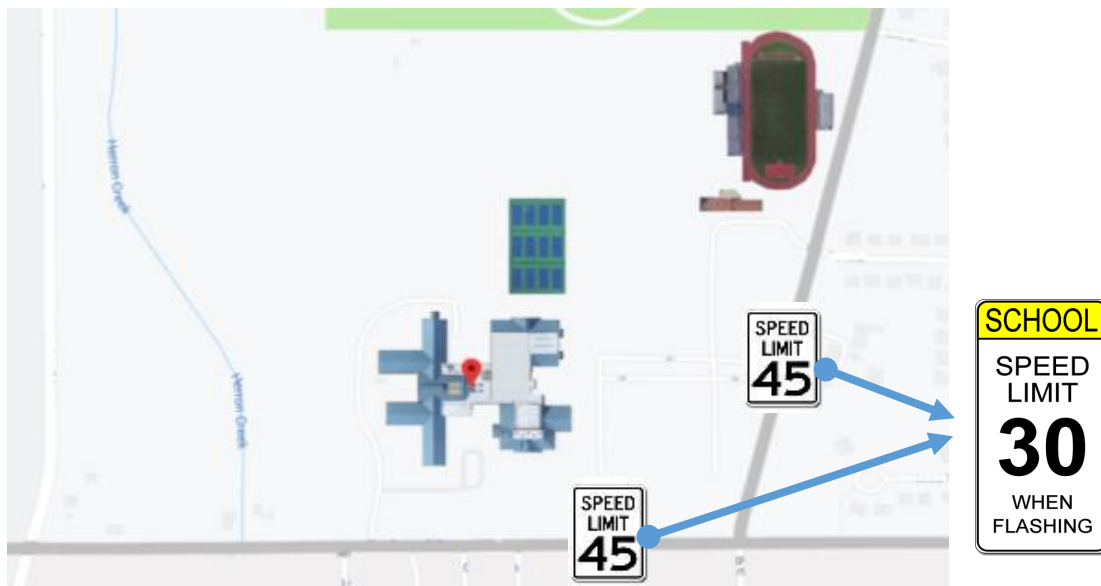
- *Back-up entrance and exit during an emergency:* It is important to secure one or two back-up entrances/exits to the parking lot for the emergency situation. This back-up entry point may need to be blocked during the regular school days. Having back-up entrances/exits can offer easier and faster access during an emergency.

Speed limits around the school campus

Typically, the speed limit around school zones in most US states is less than 25 mph. It has raised serious safety concerns that many public schools in Michigan have higher than 35 mph speed limits around their school zones. One high school in our study case has a 45 mph speed limit for two main roads surrounding the campus. This unsafe, high speed limit should be fixed. The school administrators need to submit a petition to lower speed limits to the jurisdiction that is in charge of this issue.

The speed limit around the campus in this case could be reduced by 15 mph. If the adjacent roads have limits of 45 mph, the school zone could have a 30 mph limit. The internal campus roads can also be reduced to a lower limit.

Figure 8. Lower Speed Limit Recommended Around the School Campus



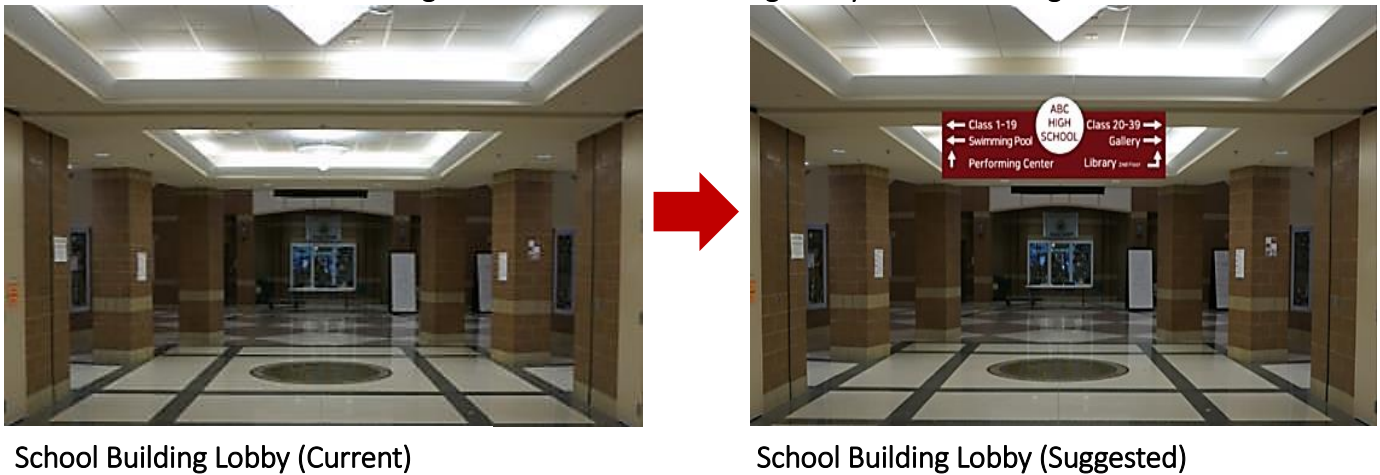
Common Environmental Factors

Two factors are repeatedly emphasized for improving safety in interiors and exteriors of the school buildings and campuses: Signage for improving wayfinding and lightings.

- *Signage:* To improve visibility and offer perceived safety for school building users, well-designed interior signs are important. Interior signs should have a consistent color scheme and fonts, clear directions, and be posted in appropriate spots. Exterior signs are also important to reduce accidents and confusion.

Figure 9 shows a suggestion for the main hallway of the school. If school signs are not clearly designed, it could lead to confusion or chaos during an emergency. School administrators should visit the issue related to signage and update it properly.

Figure 9. Main School Building Lobby with a Clear Sign



Appropriate signs with a systematic wayfinding in the outdoor school environment are also critical. Directional signs to indicate the traffic flow could reduce parents' confusion and improve efficiency of traffic circulation during drop-off and pick-up times. Figure 10 presents a sign to be added to provide clear driving directions for parents and visitors.

Figure 10. Parking Lot Entry Point with a Clear Sign



- **Lighting:** Outdoor areas should be well lit to provide safe school environments. Oscar Newman (1996) who established the defensible space theory also emphasized outdoor lighting for providing safety from crime. The lights on the exterior walls of the school building, over the sidewalks, and parking lots will provide visibility. Lighting on the main entry can improve visibility and safety. Non-glare lighting is recommended. Though it may sound contradictory, it is important to point out that several studies recommend careful placing of outdoor lights since some lighting could help burglars, not deter them (Atkins, Husain & Storey 1992).

Figure 11. Lighting on the Exterior Wall and Over the Building Entrance



Training and Mental Health Program

The participants in our research indicated **the importance of safety training** for teachers and staff members. They also highlighted safety training for students, which should be led by teachers and the school staff.

Each state is required to have a list of trainings that districts have conducted to secure students during school hours. Michigan schools seemed to follow this requirement very well; however, it was noted that students were not clear about the training for bomb or gun threats. This issue should be revisited by school administrators.

Lack of training for substitute or part-time teachers was also highlighted by the students who participate in the focus groups. During fire drills or any unexpected emergency, they observed many substitute teachers not providing proper guidance for students. The safety training for the temporary employees or part-time employees should be addressed.

School districts are strongly recommended to provide easy access to **mental health programs** for community members or students. . In collaboration with mental health program providers, police and school administrators along with school district personnel could share information about programs with students, teachers/staff, and parents.

Information about training topics and contents should be shared with parents so that they can emphasize the importance of the training and security issues with their children.

RECOMMENDATIONS FOR IMMEDIATE ACTION

The recommendations from this study need consideration when reviewing school safety protocols, developing new schools, or renovating old schools.

- Specific design considerations for interiors and exteriors of the school building are recommended. To implement these suggestions, the research team suggests continuing support from the State, school districts, administrators in individual schools, and parents to implement these suggestions.
- Limited access to school entrances, such as buzzers and camera interaction, need to be implemented in all school buildings.
- Any flyers and weekly news from the schools should update parents and students regarding any security related issues. Community wide conversations with students, parents, and school administrators are also recommended.
- Training faculty including substitute or part-time teachers should be highly emphasized. Regular training with students should be exercised. Enhancing mental health programs for community members and students is emphasized.
- Lastly, school buildings and campus designs should accommodate physical limitations of the students with disabilities. Our design suggestions for indoor and outdoor spaces in school buildings would improve both perceived and actual safety for those students.

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