SCHOOL AREA TRAFFIC CONTROL GUIDELINES

PREPARED BY
Traffic and Safety
Transportation Systems Management and Operations (TSMO)
Division

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"Providing the highest quality transportation services for economic benefit and improved quality of life."

Engineering Manual Preamble

This manual provides guidance to administrative, engineering, and technical staff. Engineering practice requires that professionals use a combination of technical skills and judgment in decision making. Engineering judgment is necessary to allow decisions to account for unique site-specific conditions and considerations to provide high quality products, within budget, and to protect the public health, safety, and welfare. This manual provides the general operational guidelines; however, it is understood that adaptation, adjustments, and deviations are sometimes necessary. Innovation is a key foundational element to advance the state of engineering practice and develop more effective and efficient engineering solutions and materials. As such, it is essential that our engineering manuals provide a vehicle to promote, pilot, or implement technologies or practices that provide efficiencies and quality products, while maintaining the safety, health, and welfare of the public. It is expected when making significant or impactful deviations from the technical information from these guidance materials, that reasonable consultations with experts, technical committees, and/or policy setting bodies occur prior to actions within the timeframes allowed. It is also expected that these consultations will eliminate any potential conflicts of interest, perceived or otherwise. MDOT Leadership is committed to a culture of innovation to optimize engineering solutions.

The National Society of Professional Engineers Code of Ethics for Engineering is founded on six fundamental canons. Those canons are provided below.

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform Services only in areas of their competence.
3. Issue public statement only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, reasonably, ethically and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

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TRAFFIC CONTROL FOR SCHOOL AREAS

A. General

The school area is generally the school building(s) and the surrounding grounds adjacent to a roadway. Per state law this area can be extended up to 1,000 feet from the school property line to establish the school zone. However, the school area and the school zone are only a portion of the overall school route plan.

A school route plan for each school serving elementary to high school students should be prepared in order to develop uniformity in the use of school area traffic controls and to serve as the basis for a school traffic control plan for each school. The school route plan, developed in a systematic manner by the school, law enforcement, and traffic officials responsible for school pedestrian safety, should consist of a map showing streets, the school, existing traffic controls, established school walk routes, and established school crossings.

Safe Routes to School (SR2S) is an international movement and a federal program to make it safe, convenient, and fun for children to bicycle and walk to school. When

routes are safe, walking or biking to and from school is an easy way to get the regular physical activity children need for good health. Safe Routes to School initiatives also help ease traffic jams and air pollution, unite neighborhoods, and contribute to students' readiness to learn in school. SR2S programs the development of the Safe Routes action plan. This plan provides guidance on development of a School Safety Program, defining safe routes and school crossing locations. Michigan's SR2S program is managed by MDOT in cooperation with a state coalition and steering committee. Additional information regarding Michigan's SR2S program can be found at www.saferoutesmichigan.org.

The decision to use a particular device at a particular location should be made on the basis of an engineering study of the location. While these guidelines provide standards for design and application of traffic control devices, it is not meant to be a substitute for professional judgment. It is intended the provisions of these guidelines define the standards for traffic control devices, but these standards shall not be a legal requirement for their installation.

The following section sets forth basic principles and standards to be followed in design, application, installation, and maintenance of all traffic control devices and other controls required for the special pedestrian conditions of school areas. Such devices and controls include signs, traffic signals, pavement markings, adult guards, student patrols, and grade separated crossings. The type(s) of school area traffic control devices used, either warning or regulatory, should be related to the volume and speed of vehicular traffic, street width, and the number and age of the students using the crossing. School area traffic control devices should be included in a school traffic control plan.

All information in these guidelines on traffic control devices is from the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). More detail can be found in the MMUTCD, in particular, Part 7 Traffic Control for School Areas.

Guidance on what to consider at established school crossings at uncontrolled locations such as mid-block and unsignalized intersections where the mainline of the state trunklines does not stop can be found in the Guidance for Installation of Pedestrian Crosswalks on Michigan State Trunkline Highways. Of importance in this document is what data to collect and when. With this information the type of crossing can be identified and what traffic control devices to consider.

B. Signs

Design

All school warning signs, in addition to the following signs, are to have a fluorescent yellow green background:

A. School sign (S1-1)
B. School plaque (S4-3P)
C. School portion of School Speed Limit sign (S5-1)
D. XXX FEET plaque (W16-2P)
E. AHEAD plaque (W16-9P)
F. Diagonal Arrow plaque (W16-7P)
G. Reduced School Speed Limit Ahead sign (S4-5a)
H. Supplemental Turn Arrow plaque (W16-5P, 6P)
I. All Year plaque (S4-7P)

Mixing standard yellow and fluorescent yellow green backgrounds on school warning signs within a zone or area shall be avoided. When school signs are replaced, use the fluorescent yellow green background for all School Signs within the zone or area.

School area signs are shown in Figure 1. Sign sizes are given in Table 1. The design of school area signs is found in the school section of the Michigan Standard Highway Signs Book.

Figure 1. School Area Signs

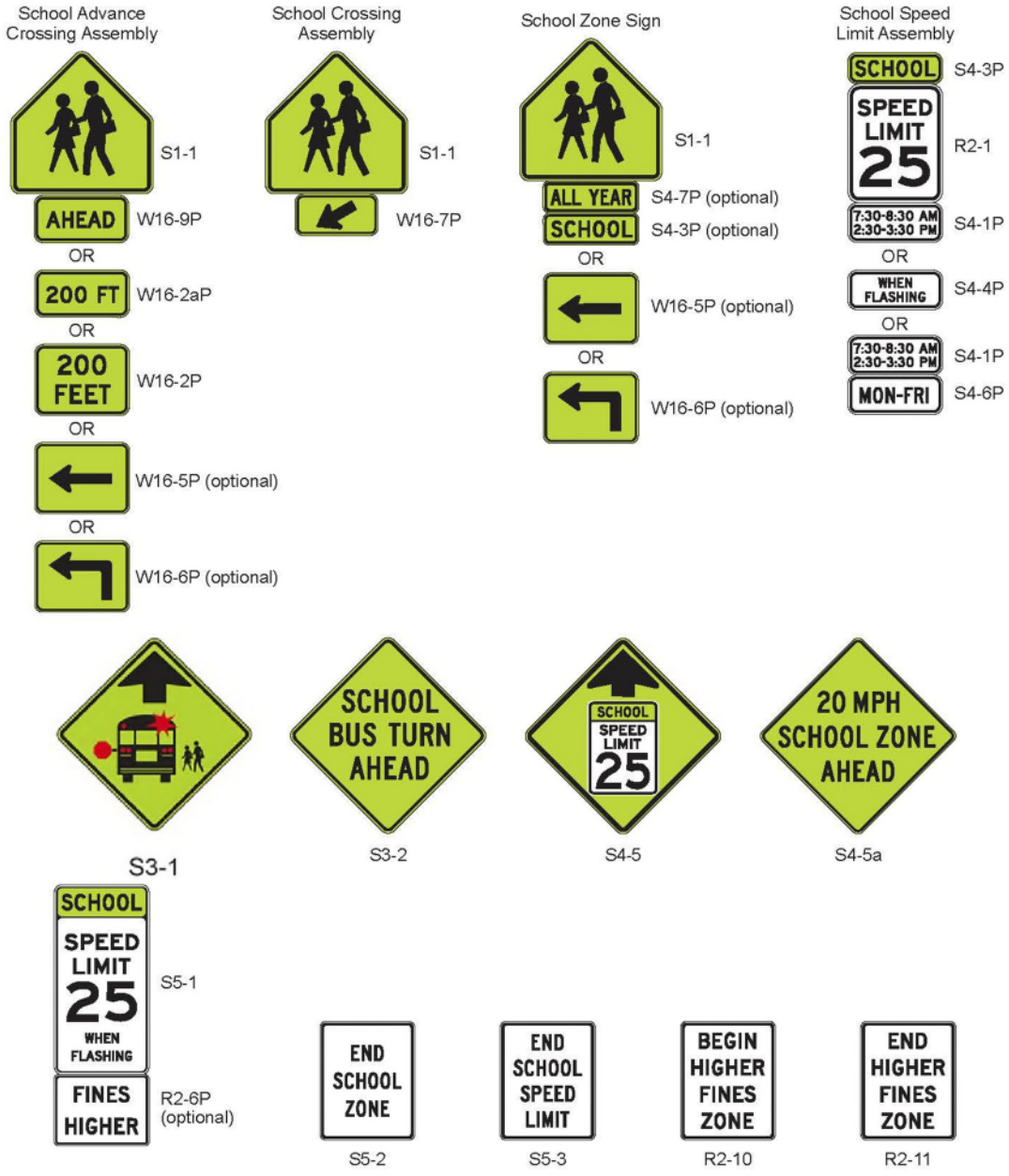


Table 1. Size of School Area Signs and Plaques on State Trunklines

Sign	MMUTCD Code	Standard	Oversized [1]
School	S1-1	36 in x 36 in	48 in x 48 in
Reduced School Speed Limit Ahead	S4-5a	36 in x 36 in	48 in x 48 in
School Speed Limit XX When Flashing	S5-1	36 in x 72 in	48 in x 96 in
End School Zone	S5-2	36 in x 48 in	----
Speed Limit (School Use)	R2-1	36 in x 48 in	48 in x 60 in
In-Street Schoolchilden Crossing	R1-6b, R1-6c	12 in x 36 in	----

Plaque [2]	MMUTCD Code	Standard	Oversized [1]
X:XX to X:XX AM X:XX to X:XX PM	S4-1P	36 in x 18 in	48 in x 24 in
School	S4-3P	36 in x 12 in	48 in x 16 in
When Flashing	S4-4P	36 in x 18 in	48 in x 24 in
Mon - Fri	S4-6P	36 in x 18 in	48 in x 24 in
All Year	S4-7P	36 in x 12 in	48 in x 16 in
XXX Ft	W16-2aP	36 in x 18 in	48 in x 24 in
Turn Arrow	W16-5P	36 in x 18 in	48 in x 24 in
Advance Turn Arrow	W16-6P	36 in x 18 in	48 in x 24 in
Diagonal Arrow	W16–7P	36 in x 18 in	48 in x 24 in
Ahead	W16–9P	36 in x 18 in	48 in x 24 in
Fines Double	R2-6aP	36 in x 24 in	48 in x 36 in

[1] Oversized – for roadways posted at 55 mph prior to a reduced school speed zone or where special emphasis is required.

[2] Width of plaque should match width of parent sign.

School Sign (S1-1)

There are multiple uses for the School sign (S1-1). It must be placed in the appropriate location depending on its use. The School sign is used in advance of locations where school buildings or grounds are adjacent to the highway to indicate a school area or zone. The sign should not be used where a physical barrier such as fencing separates school children from the roadway. It is also used in advance of established school crossings not adjacent to a school ground and at all established crossings. Further details on the use of school signs can be found below.

School Zone Sign (S1-1) and Plaques

If a school zone has been established under Section 257.627a(1)(c) or Section 257.627a(4) of the Michigan Vehicle Code, a school zone sign (see Figure 1) shall be placed at the beginning of the zone if no reduced school speed limit zone is in place. The school zone can extend up to 1,000 feet from the property line of the school in each direction if the roadway adjoins the school property. If two or more schools occupy the same property or adjacent properties, one of the following applies, as applicable:

1. If the hours of instruction at the schools are the same, then a single combined school zone shall be established.
2. If the hours of instruction at the schools are different, overlapping school zones shall be established.

When a reduced school speed limit has been established, the School Zone sign shall be placed in advance of the Reduced Speed School Zone Ahead assembly per the Guidelines for Advance Placement of Warning Signs (see Table 2).

The School Zone sign may be supplemented with an ALL YEAR plaque (S4-7P) if the school operates on a 12-month schedule. To enforce double fines in school zones for moving violations (Section 257.601b of the Michigan Vehicle Code), a FINES DOUBLE plaque (R2-6aP) shall be placed below the school zone sign. See Figures 2, 3, and 5 for examples of School Zone sign placement.

School Advance Crossing Assembly, [S1-1 with AHEAD plaque (W16-9P)]

The School Advance Crossing assembly is a combination of the School sign (S1-1) and the AHEAD plaque (W16-9P) or distance plaque (W16-2P) (See Figure 1). The assembly shall be installed in advance of the established crossing per the advance placement guidelines (see Table 2). See Figure 4 for an example of an established school crossing not next to a school ground.

If the established school crossing is within a school zone (School Zone sign in place), the School Advance Crossing Assembly shall be omitted. See Figure 5 for example of a crossing and school speed limit within a school zone.

Table 2. Guidelines for Advance Placement of Warning Signs

Posted Speed (mph)	Table 3: Minimum Advance Warning Sign Placement Distance (ft)														
	Condition	Condition B (mph)													
	A[1]	0[2]	5[3]	10[3]	15[3]	20[3]	25[3]	30[3]	35[3]	40[3]	45[3]	50[3]	55[3]	60[3]	65[3]
25	325	155	125	100[4]	100[4]	100[4]									
30	460	200	150	115	100[4]	100[4]	100[4]								
35	565	250	185	125	115	100[4]	100[4]	100[4]							
40	670	305	225	150	135	125	120	115	100[4]						
45	775	360	280	200	185	175	160	150	125	100[4]					
50	885	425	350	275	250	225	215	200	175	150	100[4]				
55	990	495	425	350	335	325	300	275	240	200	175	150			
60	1100	570	510	450	425	400	375	350	315	275	240	200	150		
65	1200	645	585	525	515	500	475	450	415	375	315	275	215	150	
70	1250	730	675	625	615	600	575	550	515	475	425	375	315	250	150

NOTES:	
1	Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. For other examples of signs for this condition, see "Condition A, Complex Maneuvers" in Table 4.
2	Typical condition in the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. For other examples of signs for this condition, see "Condition B, Stop Condition" in Table 4.
3	Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn and Curve signs with advisory speed plaques. For other examples of signs for this condition, see "Condition B, Decelerate to Indicated Advisory Speed" in Table 4.
4	The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

School Crossing Assembly (S1-1 with Diagonal Arrow)

The School Crossing assembly (see Figure 1) shall be installed at established marked crosswalk(s), or as close to it as possible, as per Section 257.613a of the Michigan Vehicle Code, and shall consist of a School Advance Warning (S1-1) sign supplemented with a diagonal downward pointing arrow (W16-7p) plaque to show the location of the crossing.

The School Crossing assembly shall not be used at marked crosswalks other than those adjacent to schools and those on established school pedestrian routes used by students going to and from school as determined by an engineering study.

The School Crossing assembly shall not be installed on approaches controlled by a STOP or YIELD sign. The assembly should not be installed at approaches controlled by a traffic signal. See Figures 4 and 5 for examples of a crossing.

In-Street Schoolchildren Crossing Sign (R1-6b or R1-6c)

The In-Street Schoolchildren Crossing sign (see Figure 1) may be used at unsignalized school crossings in lieu of the above School Crossing assembly where a local regulation or ordinance specifically requires that a driver must yield or stop for a pedestrian in a crosswalk. When used at a school crossing, a 12 x 4-inch SCHOOL (S4-3P) plaque may be mounted above the sign. The LOCAL LAW legend on the R1-6 series signs may be omitted.

School Speed Limit Assembly Signs (S4-1P to S4-6P)

The School Speed Limit assembly or sign (see Figure 1) shall be used to indicate the speed limit where a reduced speed zone for a school zone has been established in accordance with Section 627a of the Michigan Vehicle Code. See the School Speed Limits section for Michigan Vehicle Code school speed limit statues and the appropriate speed limit to use. The School Speed Limit assembly or School Speed Limit sign shall be placed at or as near as practical to the point where the reduced speed limit zone begins. The sign shall be either a fixed-message sign assembly or a variable display type sign.

1. The fixed message sign assembly shall consist of a top plaque SCHOOL (S4-3P), a Speed Limit sign (R2-1), and a bottom plaque (S4-1P or S4-6P) indicating the specific periods of the day and/or days of the week when the special school speed limit applies. A Speed Limit Sign Beacon may also be used with a WHEN FLASHING plaque (S4-4P) to identify the periods the school speed limit is in force. For the hours of operation of the school speed limit zone see School Speed Limits.

2. Louvered signs, digital message signs, and flashing lights may be installed to supplement or replace permanent signs required under this section. Variable display signs may be used to indicate a special school speed limit. These signs may use blank-out messages or other methods to display the school speed limit only during the periods it applies. Variable display signs should be limited to locations where it is impractical to post both the statutory and school speed limits. Where practical, consideration should be given to including (on the back of variable display signs) a light or device to indicate the speed limit message is in operation.

   School Speed Limit signs with flashing beacons should be used for those locations where greater emphasis is needed.

3. The end of an authorized and posted school speed zone shall be marked with a standard speed limit sign showing the speed limit for the section of highway which follows. Below the standard speed limit sign place an END SCHOOL ZONE sign (S5-2).

4. If the school speed zone exceeds one-half mile in length, it may be desirable to install additional School Speed Limit Assembly signs to comply with spacing requirements for speed zone signs. At such locations, flashing beacons are not normally used. Care must also be taken to make sure no conflicting speed limit signs (R2-1) remain in place within the limits of the zone.

5. If the school speed zone straddles a point where the non-school speed limit changes, a School Speed Limit Assembly sign at the point of change must be provided with two numerical messages; one message is needed for display when the school speed limit is in effect, and the other message is required for all other times. If possible, this situation should be avoided.

See Figures 3 and 5 for examples of School Speed Limits.

Reduced Speed School Zone Ahead Sign (S4-5a)

The Reduced Speed School Zone Ahead (S4-5a) sign may be used to inform road users of a reduced speed zone when engineering judgment indicates advance notice would be appropriate. If used, the Reduced Speed School Zone Ahead sign shall be followed by a School Speed Limit sign or a School Speed Limit assembly. The speed limit displayed on the Reduced Speed School Zone Ahead sign shall be identical to the speed limit displayed on the subsequent School Speed Limit sign or School Speed Limit assembly.

Higher Fines Zone Signs (R2-6aP, S5-2)

The beginning and ending of an authorized school zone and posted school speed zone shall be marked with higher fines zone signs. The FINES DOUBLE plaque (R2-6aP) shall be placed below the School sign (S1-1) for all established zones. An END SCHOOL ZONE sign (S5-2) shall be placed at the zone on its own or under a standard Speed Limit sign showing the speed limit for the section of roadway that follows.

ALL YEAR Plaque (S4-7P)

If appropriate, the school superintendent may request the ALL YEAR plaque (S4-7P) be installed in a school zone to indicate the school is in session year-round. If used, the plaque shall be placed below the School Zone sign.

Parking and Stopping Signs (R7 and R8 Series)

Experience shows that most crashes involving school students are caused by students crossing streets between parked cars. Parked cars are a major obstruction to sight distance at crosswalks and intersections; therefore, it is very important “no parking” zones be considered in school areas for student safety. As a minimum, the Michigan Vehicle Code prohibits parking “within 20 feet of a crosswalk or if none, then within 15 feet of the intersection of property lines at an intersection of highways.” It is desirable to prohibit parking far enough from the crossing to provide adequate sight distance. Also, school bus loading zones and parking or stopping zones near entrances must be given careful attention. To improve both driver and pedestrian visibility, parking should be banned on all streets where such prohibition is necessary to maximize crossing safety. Loading zones should be off the street where possible.

Parking signs and other signs governing the stopping and standing of vehicles in school areas cover a very wide variety of regulations and only general specifications can be laid down here. Typical examples are as follows:

1. No Parking 8:00 AM to 5:00 PM School Days Only
2. No Stopping 8:00 AM to 5:00 PM School Days Only

3. No Standing 8:00 AM to 5:00 PM School Days Only
4. 5 Min. Loading 8:00 AM to 5:00 PM School Days Only

To affect a parking restriction, a local ordinance or Traffic Control Order (TCO) must be enacted prior to installation of the appropriate regulatory prohibition signs.

Figure 2. Example of Signing for a Higher Fines School Zone without a School Crossing

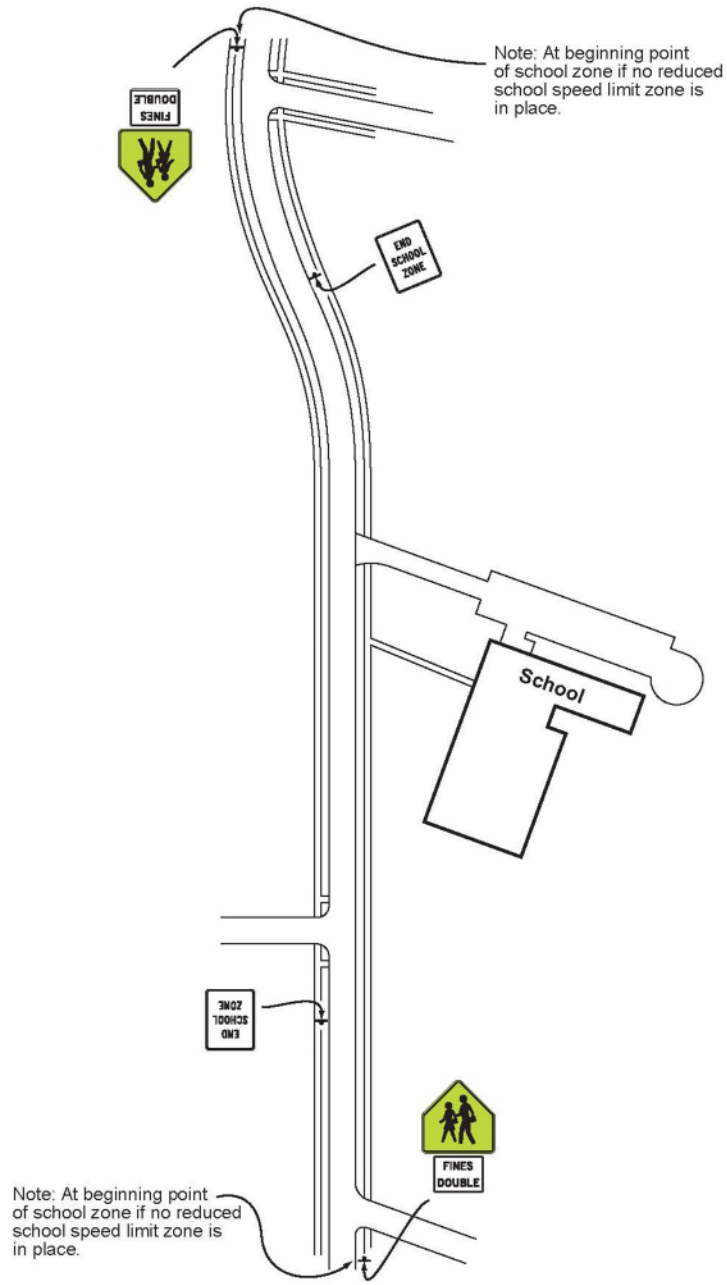
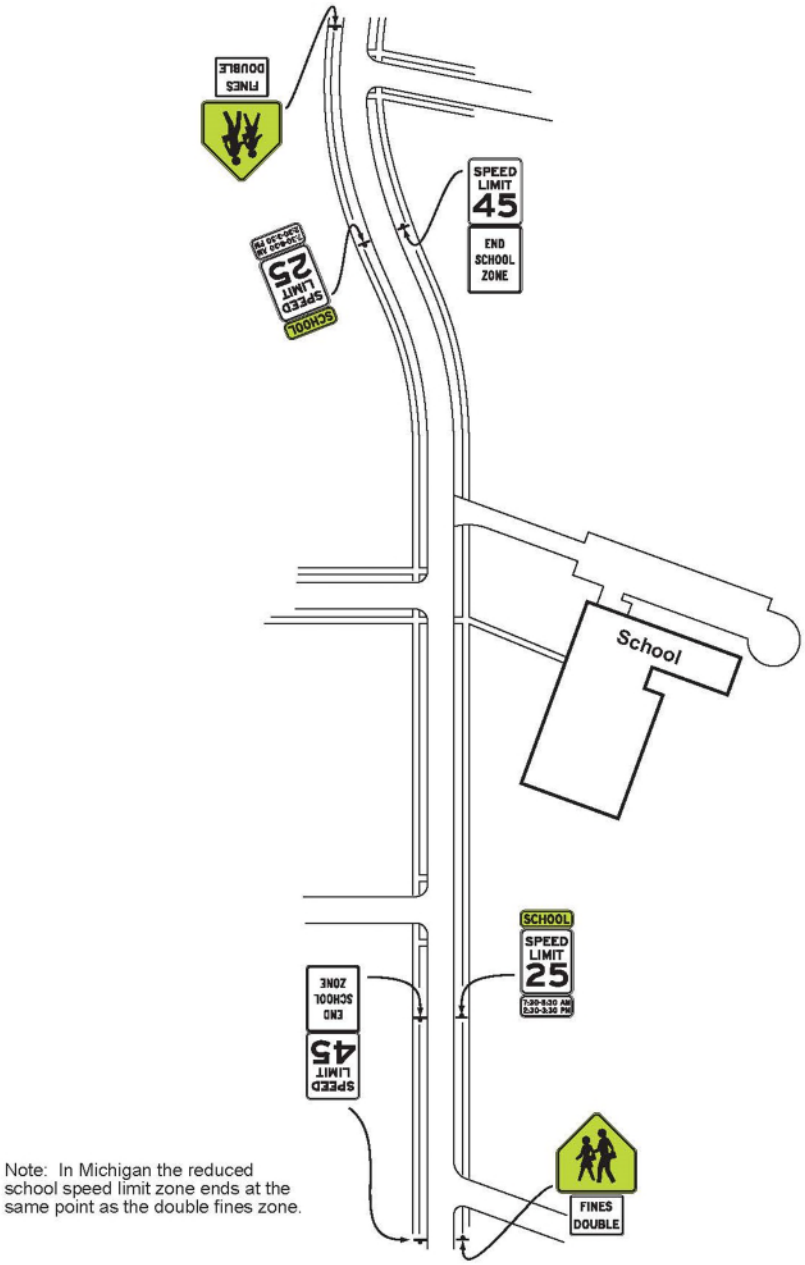


Figure 3. Example of Signing for a Higher Fines School Zone with a School Speed Limit



Note: In Michigan the reduced school speed limit zone ends at the same point as the double fines zone.

Figure 4. Example of Signing for a School Crossing Not Next to a School

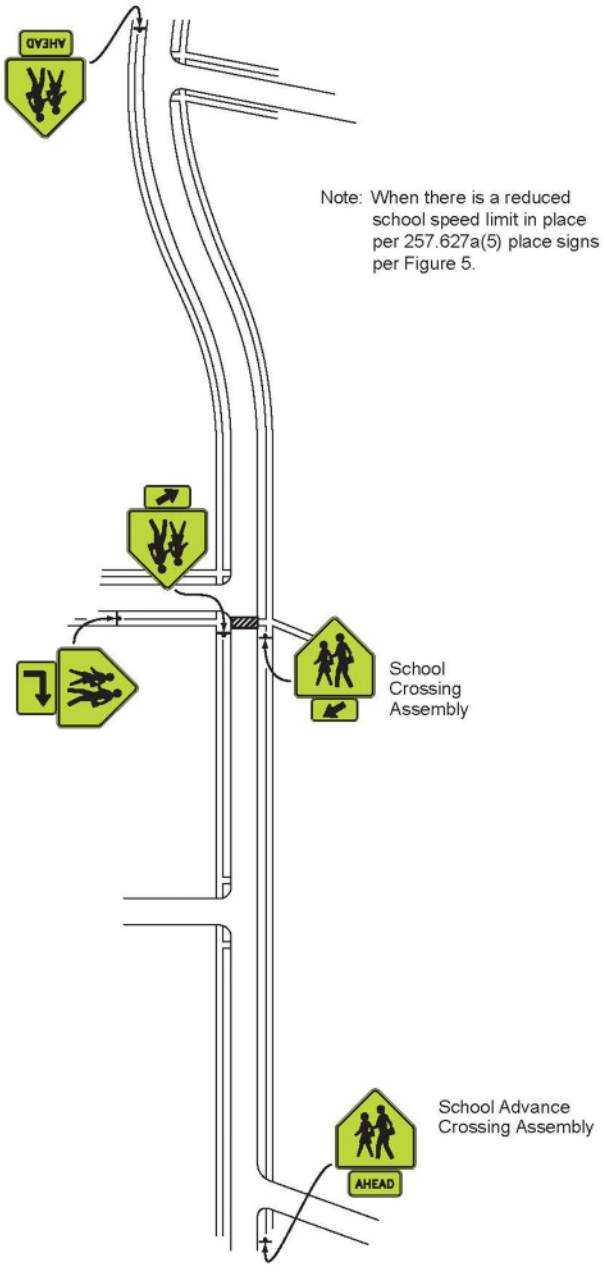
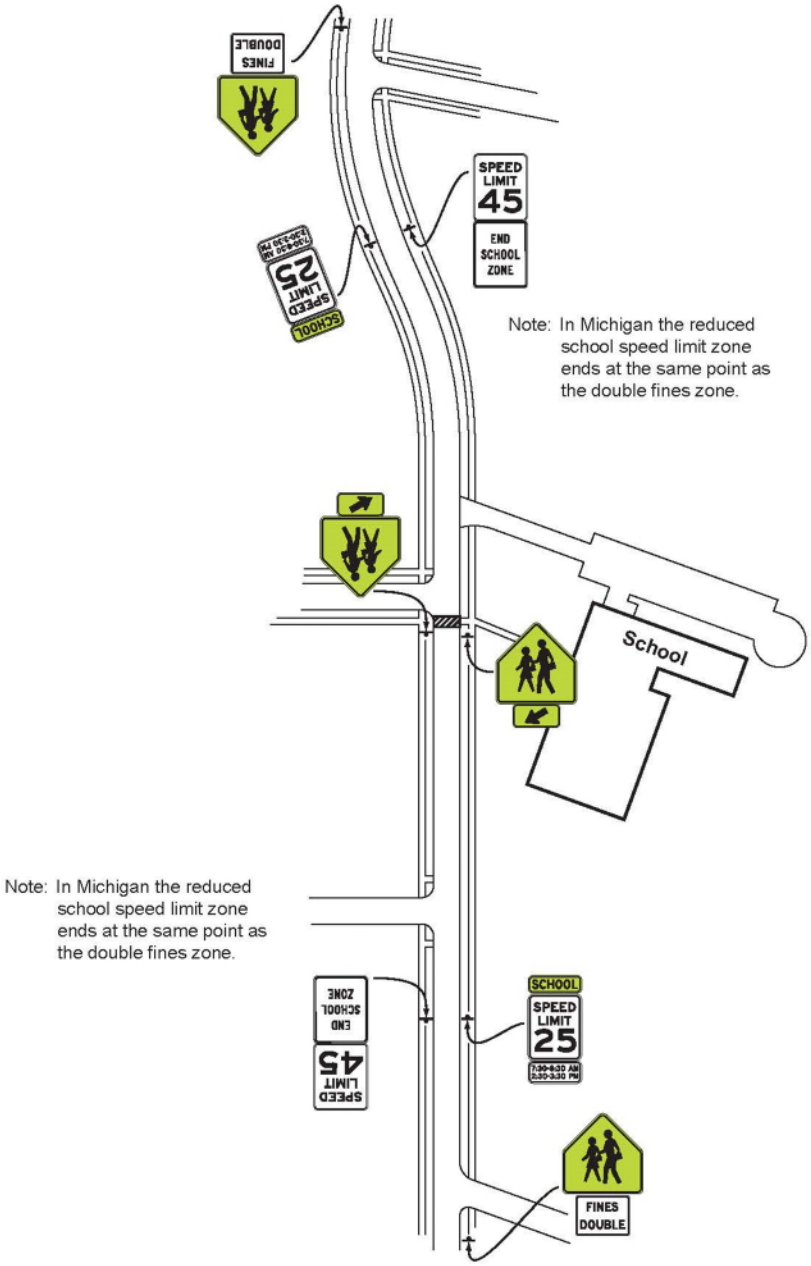


Figure 5. Example of Signing for a School Zone with a School Speed Limit and a School Crossing



C. Pavement Markings

Functions and Limitations of Pavement Markings

Pavement markings have definite and important functions to perform in a proper scheme of school area traffic control. In some cases, they are used to supplement the regulations or warnings of other devices, such as traffic signs. In other instances, they obtain results, solely on their own merits, that cannot be obtained by the use of any other device. In such cases, they serve as a very effective means of conveying certain regulations and warnings that could not, otherwise, be made clearly understandable.

Pavement markings have definite limitations. They may be obliterated by snow, may not be clearly visible when wet, and may not be very durable when subjected to heavy traffic. In spite of these limitations, they have the advantage, under favorable conditions, of conveying warnings or information to the driver without diverting his attention from the roadway.

Standardization of Application

Each standard marking shall be used only to convey the meaning prescribed for it in these guidelines.

Crosswalk Markings

All crosswalks along a designated school crossing route shall utilize special emphasis crosswalk markings. The area of the crosswalk is marked with white longitudinal lines at a 90 degree angle to the line of the crosswalk.

1. Under special circumstances (where no advance stop line is provided, or where vehicular speeds exceed 35 MPH or where crosswalks are unexpected), it may be desirable to increase the width of the crosswalk.

2. Crosswalk markings shall extend across the full width of pavement to discourage diagonal walking between crosswalks.

3. The longitudinal lines shall be a minimum of 6 feet long, 12 inches wide, and spaced 24 inches apart. When longitudinal lines are used to mark a crosswalk, transverse crosswalk lines are to be omitted.

Details of special emphasis crosswalk markings can be found in PAVE-945.

Stop and Yield Line Markings

Stop lines are solid white lines 24 inches wide, extending across all approach lanes (under both urban and rural conditions) to indicate the point at which vehicles are required to stop in compliance with a Stop sign, In-Street Schoolchildren Crossing sign, traffic signal, or other legal requirement. Stop lines shall not be used at Yield

conditions. Yield lines are white, individual triangles with a width of 24 inches and a height of 36 inches, extending across all approach lanes with a spacing of 3 to 12 inches between to allow 4 triangles per lane. Yield lines indicate the point at which vehicles are required to yield in compliance to YIELD or In-Street Schoolchildren Crossing signs.

When used, the stop and yield lines should be placed at least four feet in advance of and parallel to the nearest crosswalk line. In the absence of a marked crosswalk, the stop line shall be placed at the desired stopping point but should be placed no more than 30 feet nor less than four feet from the nearest edge of the intersecting traveled way. Stop lines at signalized locations should be placed at least 40 feet in advance of the nearest signal indication. Field reviews of stop and yield lines shall be done to ensure appropriate placement for stopping motorists.

Details of stop and yield lines can be found in PAVE-960.

Curb Markings for Parking Restrictions

Signs shall be used with curb markings in those areas where curb markings are frequently obliterated by snow and ice accumulation, unless the no parking zone is controlled by statute or local ordinance. Since curb markings of yellow and white are frequently used for curb delineation and visibility, parking regulations must be established through installation of standard signs.

Pavement Word and Symbol Markings

Word and symbol markings on pavement may be use for the purpose of guiding, warning, or regulating traffic. They should be limited to a total of three lines of words and/or symbols. Word and symbol markings shall be white in color and not be used for mandatory messages except in support of standard signs.

The letters and symbols are elongated in the direction of traffic movement because of the low angle at which they are viewed by approaching drivers. Large letters, symbols and numerals should be eight feet or more in height and not be more than one lane in width. If the message consists of more than one word, it should be from bottom to top. (The first word of the message should be nearest to the driver.) Where approach speeds are low, somewhat smaller characters may be used. The space between lines should be at least four times the height of the characters for low speed roads but not more than ten times the height of the characters under any conditions.

The SCHOOL word marking is to be placed within each approach lane at the location of the School sign (S1-1). Details of the SCHOOL word marking can be found in PAVE-960. For other word and symbol markings, see Part 3 Makings of the MMUTCD.

D. Electronical Traffic Control Devices in School Areas

Flashing Beacons

Flashing beacons can be used in school areas with sign messages including school speed limit and school crossings. The use of a flashing beacon on a school speed limit sign, which includes the WHEN FLASHING (S4-4) sign, indicates the times the school speed limit is in effect. For crossings with no school speed limit the flashing beacons should only be used when an adult crossing guard is present. See Chapter 1.7.1, School Sign Mounted Flashing Beacons, Electronic Traffic Control Device Guidelines for more information.

Rectangular Rapid Flashing Beacon (RRFB)

The RRFB is a pedestrian-actuated conspicuity enhancements for pedestrian and school crossing warning signs consisting of two rapidly flashed rectangular-shaped yellow indications mounted below the sign. The RRFB is intended to provide emphasis to the crossing signs where drivers may not be expecting pedestrians, or where special emphasis is required. It is to be used at mid-block locations or at crossings at intersection approaches not controlled by a STOP, YIELD, traffic signal or pedestrian hybrid signal. See Chapter 1.4.1, Rectangular Rapid Flashing Beacon (RRFB), Electronic Traffic Control Device Guidelines for more information.

Pedestrian Hybrid Beacon (PHB)

A Pedestrian Hybrid Beacon (PHB), often referred to as a HAWK signal, is intended as an alternative when the warrants for a full pedestrian traffic signal are not met but additional traffic control beyond signing and pavement markings are desirable. The PHB signal provides a protected walk movement but during the Flashing Don't Walk, the vehicle traffic is shown a flashing red to minimize delay. PHBs should only be considered if the crosswalk is at least 100 feet away from an intersecting street or driveway. See Chapter 1.4.2, Pedestrian Hybrid Beacon, Electronic Traffic Control Device Guidelines for more information and minimum thresholds.

Traffic Signals

Traffic signals are often requested for added protection at school crossings. Although a new signal will seldom decrease the crash potential at any location, one may be justified if it meets the warrants set out in Part 4 of the MMUTCD and it solves a problem. The meeting of a warrant is NOT justification in and of itself to install a traffic signal.

When properly designed, located, and operated under conditions that fully warrant their use, school traffic signals may have several advantages. Considering initial and operating costs, school traffic signals, over a period of time, represent an economic savings compared with the cost of providing pedestrian bridges. However, adult supervision is recommended. Under conditions of favorable spacing, school traffic signals can be coordinated with adjacent traffic signals to provide continuous or nearly

continuous traffic movement.

A traffic signal necessitated by high traffic volumes will usually have little effect on the overall crash rate at an intersection; although right-angle crashes may decrease, rear-end, left-turn, and head-on collisions will generally increase. Since right-angle crash rates will usually not be very high until large volumes of traffic use the side road, a traffic signal at a school crossing will not be justified by a volume study until the pedestrian and vehicular volumes meet the minimum warrants specified in the MMUTCD.

A traffic signal installed on the basis of only a gap study will usually increase the crash potential at a new location; however, this type of study is more indicative of a school crossing problem than a volume study. A volume study shows only the volumes of traffic using a highway, but a gap study reflects such characteristics of a roadway as its width and platooning of traffic using it. A gap study will justify a traffic signal at a school crossing if it shows insufficient gaps in the traffic stream to permit a safe crossing.

School Area Traffic Signal Warrant

The MMUTCD details nine warrants that may be used to justify traffic signal installations (satisfying a warrant is not in itself justification for a traffic signal). Warrant 5 specifically deals with school crossings.

Warrant 5, School Crossing. A school traffic signal may be warranted at an established school crossing when a traffic engineering study of pedestrian group size and available gaps in the vehicular traffic stream indicates the number of adequate gaps in the traffic stream during the period the students are using the crossing is less than the number of minutes in that same time period. A minimum of 20 students should be utilizing the crossing during the highest crossing hour before applying this warrant. In addition, use of less restrictive measures, such as advance warning signs and flashers and/or adult crossing guards, shall be considered prior to installation of a traffic signal under this warrant. A safe gap is defined as follows:

$$T = 3 + \frac{\text{width of street}}{4} + F$$

$$\text{Where } F = \frac{\text{number of students per group} - 1}{5} \times (2)$$

The school crossing signal warrant shall not be applied at locations where the distance to the nearest traffic signal along the major street is less than 300 feet unless the proposed signal will not restrict the progressive movement of traffic.

Intersection and Non-intersection Traffic Signal Installations

School area traffic signals, if warranted, may be considered at established school crossings at intersection and non-intersection locations where there are inadequate gaps in vehicular traffic to accommodate safe pedestrian crossings. If it does not force students to walk too far out of the way, it is generally desirable to have signalized school crossings located at intersections.

1. Intersection locations generally require signal equipment for the control of vehicle traffic on two streets. However, they are less likely to present an element of surprise for drivers and may provide a secondary function of improved vehicle access to an arterial street.

2. Non-intersection locations are free from the conflicts of turning vehicles, require signal equipment for one street only, and may offer added convenience to students. However, they can present an element of surprise for drivers who do not expect crossings and signal control between intersections. Therefore, special attention should be given to the traffic signal head placement and the signs and pavement markings used at non-intersection locations to ensure drivers are aware of this special application. Parking should not be allowed from 100 feet in advance of the crosswalk to 20 feet beyond.

Pedestrian Signals

For information on pedestrian signal types and operation including countdown and accessible, see Chapter 3, Pedestrian Signal Guidelines, Electronic Traffic Control Device Guidelines. Countdown pedestrian signals inform pedestrians of the number of seconds remaining to safely complete their crossing. The display of the number of remaining seconds is concurrent with the flashing UPRAISED HAND indication and counts down to zero at the end of the flashing UPRAISED HAND. After the countdown displays zero the number part of the indication goes dark and a steady UPRAISED HAND is displayed.

Accessible pedestrian signals and detectors provide information in non-visual formats (such as audible tones, speech messages, and/or vibrating surfaces). These devices provide additional information to visually impaired individuals. MDOT will install them in specific situations per guidance in the MMUTCD. For more information see Chapter 3.4 Electronic Traffic Control Device Guidelines.

E. School Crossing Supervision

The presence of capable school crossing supervision, although not mandatory, is strongly urged for each non-signalized school crossing requiring special protection. The traffic control devices discussed in these Guidelines are relatively inflexible; an adult crossing guard, however, can react to varied and new conditions, overcoming these limitations. It cannot be over stressed that a capable adult crossing guard provides the greatest level of assistance to children at a school crossing.

This is particularly true when an adult crossing guard is assisted by a school safety patrol. The aid of the American Automobile Association (AAA) of Michigan, State Police, and the Department of Education may be solicited by school authorities for establishing and training adult crossing guards and school safety patrols.

Types of Crossing Supervision

There are two types of crossing supervision:

1. Adult control of pedestrians and vehicles by adult guards or police officers; and

2. Student control of pedestrians with student patrols.

Information for the organization, operation, and administration of an adult crossing guard program is given in the "Michigan Adult School Crossing Guard Manual" (available from AAA Michigan, Community Safety Services, 1 Auto Club Drive, Dearborn, MI 48126, 1-800-646-4AAA and the Michigan Department of Education).

Information for the organization, administration and operations of a student patrol program are given in "AAA School Safety Patrol Operations Manual" (available from AAA Michigan, 1 Auto Club Drive, Dearborn, MI 48126, 1-800-646-4AAA).

Adult Crossing Guards

Adult guards are used to provide gaps in traffic at school crossings where an engineering study has shown adequate gaps need to be created and where authorized by law.

Adult crossing guards are the responsibility of the local law enforcement agency having immediate jurisdiction of the crossing. They shall receive a minimum of four hours of instruction before performing the duties of an adult crossing guard. Two hours of additional instruction shall be given annually to an adult crossing guard before the beginning of each school year. The courses of instruction shall be approved by the Department of Education and the Department of State Police and conducted by the local law enforcement agency having jurisdiction, or its designee.

Uniform of Adult Crossing Guards

Adult crossing guards should be uniformed so road users and pedestrians can recognize them and respond to their signals. The uniforms should be distinctively different from those worn by regular law enforcement officers. Adult crossing guards shall wear high-visibility retroreflective safety apparel labeled as ANSI 107-2004 standard performance for Class 2.

Law enforcement officers shall also wear high-visibility retroreflective safety apparel (ANSI 107-2004, class 2) over their uniforms when directing nighttime operations.

Operating Procedures for Adult Crossing Guards

Adult guards should not direct traffic in the usual police regulatory sense. In controlling traffic, they should pick opportunities to create a safe gap. At these times, their presence in the roadway serves as an easily recognized indication pedestrians are about to use the crosswalk and all vehicular traffic must stop. When all traffic has stopped, the adult guard allows the children to cross.

When it is necessary to stop traffic, the crossing guard shall use a hand held STOP paddle at an assigned crossing only during assigned duty times. The STOP paddle (R1-1b) shall be an octagonal shape. The background of the STOP face shall be red with at least 6 inches C series capital white letters and border. The paddle shall be at least 18 inches in size and have the word message STOP on both sides. The paddle shall be retroreflectorized or illuminated when used during hours of darkness.

The STOP paddle may be modified to improve conspicuity by incorporating red or white flashing lights on both sides of the paddle. The red or white flashing lights may be arranged in any of the following patterns:

1. Two red or white lights centered vertically above and below the STOP legend;

2. Two red or white lights centered horizontally on each side of the STOP legend;

3. One red or white light centered below the STOP legend; or

4. A series of eight or more small red or white lights no larger than 0.25 inches in diameter alone the outer edge of the paddle, arranged in an octagonal pattern at the eight corners of the STOP paddle. More than eight lights may be used only if arrangement of the lights is such that it clearly conveys the octagonal shape of the STOP paddle.

5. A series of white lights forming the shapes of the letters in the legend.

If flashing lights are used on the STOP paddle, the flash rate shall be at least 50, but not more than 60, flash periods per minute.

Student Patrols

The local school board should authorize student patrols. School authorities should be responsible for organizing, instructing, and supervising patrols with assistance from local law enforcement.

Students (student patrols) may be used to direct and control children at crossings near schools where there is no need to create adequate gaps in traffic. Student patrols may be used to direct and control children at signalized intersections where turning movements are not a problem, and may be used to assist adult guards in the control of children at crossing locations used by large numbers of children. **Per state statute, student patrols shall not be responsible for directing vehicular traffic. They shall not function as police officers or adult guards.**

Operating Procedures for Student Patrols

Student patrols control children, not vehicles. They should stop children behind the curb or edge of the roadway to allow them to cross only when there is an adequate gap in traffic.

Because they are not authorized to direct vehicular traffic, student patrols shall not use a STOP paddle.

F. Grade-Separated Crossings

Function

Grade-separated crossings may be used to physically separate the crossing of a heavy volume of school pedestrian traffic and a heavy flow of vehicular traffic. The Michigan Department of Transportation will participate in the cost of a grade separation when a new or relocated roadway creates a new school crossing along the designated school route, provided the following criteria can be met. For all other situations, construction and maintenance of a grade separation will be the responsibility of the local governmental agency or school.

Type of Grade-Separated Crossings

Grade-separated crossings may either be overpasses or underpasses. The design should follow guidelines given in the published policies of the American Association of State Highway and Transportation Officials.[1] Experience has shown overpasses are more satisfactory than underpasses since overpasses are easier to maintain and supervise.

[1] A Policy on Geometric Design of Highways and Streets; American Association of State Highway and Transportation Officials

Criteria for Use of Grade-Separated Crossings

Grade-separated crossings should be considered only when the physical characteristics of the location make such a structure feasible. If use of the grade-separation will be less convenient than use of an at-grade crossing, barriers or supervision will be needed to assure that students use it. Construction of a pedestrian grade separation should be considered when:

1. The general conditions that require the school crossing are sufficiently permanent to justify such a structure (for example: a school route crossing a freeway) and there is no possibility re-planning school routes or districts will eliminate the need for such a structure.

2. A comparison between the cost of the structure and the cost of other controls indicates the structure is justified from the standpoint of long-range economy.

3. The physical characteristics of the location make such a structure feasible from an engineering standpoint.

4. The initial cost of such improvement does not reduce available funds to the point where other essential school crossing protection is neglected.

5. Such a structure will serve other pedestrians besides school students.

When this particular type of measure is selected, the following steps should be taken by school and traffic authorities to assure proper use of the structures by school students, as well as other pedestrians:

1. If bicycles cannot be taken to the other side, provide parking areas near the structure; however, new structures generally require barrier-free design; i.e., no stairs.

2. Install fence barriers to channelize the movements of students, thus preventing them from avoiding the structure through use of other, undesirable routes.

3. Provide for maintenance of adequate sanitary conditions, particularly in underpasses.

4. Provide for adequate illumination of structure, particularly in underpasses.

5. Instruct users in orderly conduct, particularly to prevent objects being thrown from overpasses with damage to vehicles or injury to persons passing beneath. In some instances, this may require enclosing the structure.

6. When designing pedestrian overpasses, avoid using open grating for the walkway. Experience has shown students/pedestrians do not like to use facilities with open grating.

Since pedestrian grade-separation structures form a permanent solution to the school crossing problem, it is suggested their use be considered when justified by the foregoing criteria. However, the practical problems denoted must also be considered and provided for as part of the overall program. Failure to do so may create conditions which are, in themselves, more serious from a community point of view than the school crossing concern the structure was intended to eliminate.

G. School Speed Limits

School speed limits are established per section 257.627a of the Michigan Vehicle Code. This section offers the means to provide a lower speed limit during periods of school activity. The school speed limit applies only to times when school children are present for a "Regularly Scheduled School Session." The higher (non-school) speed limit will be in effect at all other times.

Roadway Adjoin School Property

In Section 257.627a(2), the setting of school speed limits on roadways that adjoin school property is described as follows:

A school speed zone which is a maximum of 20 mph below the posted absolute speed limit, but not less than 25 mph, is available under certain conditions.

These conditions are:

1. The "School" is an educational institution operated by a local school district or by a private, denominational, or parochial organization. School does not include either of the following:
    a. An educational institution that the Department of Education determines has its entire student population in residence at the institution.
    b. An educational institution to which all students are transported in motor vehicles.

2. The street in question must adjoin school property.

3. The street in question is not a limited access highway and the portion being studied does not have an available overhead crosswalk which is being used as the primary access for the school's students.

4. The zone must be requested by the superintendent and permanent signs designating the school zone and speed limit in the school zone must be posted.

When all of the above criteria are met, a prima facie school speed zone shall be established if requested by the school superintendent. The zone shall be no more than 20 mph under the absolute speed limit in the area, but never less than 25 mph. The hours of such a zone shall be in force not more than 30 minutes before the first regularly scheduled school session, rounded to the nearest multiple of 5 minutes, until school commences, and from dismissal until not more than 30 minutes after the last regularly scheduled school session, rounded to the nearest multiple of 5 minutes. A school superintendent may begin the 30-minute period before the first regularly scheduled school session at a time that is less than 30 minutes before the first regularly scheduled school session and that extends beyond the time school commences, may begin the 30-minute period after dismissal at a time other than dismissal, and if a school has an off-campus lunch period, may designate the period provided for off-campus lunch as a

period during which the school zone speed limit applies.

Roadway Not Adjoining School Property

In Section 257.627a(4) if a school is located in an area that requires students to cross a state trunkline highway that has a speed limit of 35 miles per hour or more to attend that school, the school superintendent may submit a request for a school crossing as permitted under Section 257.613a. If, based on the traffic engineering studies, the road authority determines the need for a lower speed limit, the road authority may designate the crossing as a school zone. Before submitting a request, the school superintendent shall have completed a school route plan as prescribed in the MMUTCD, Part 7 Traffic Control for School Areas.

When all of the above criteria are met, a prima facie school speed zone shall be established if requested by the school superintendent. The zone shall be no more than 20 mph under the absolute speed limit in the area, but never less than 25 mph. The hours of such a zone shall be in force not more than 30 minutes before the first regularly scheduled school session, rounded to the nearest multiple of 5 minutes, until school commences, and from dismissal until not more than 30 minutes after the last regularly scheduled school session, rounded to the nearest multiple of 5 minutes. A school superintendent may begin the 30-minute period before the first regularly scheduled school session at a time that is less than 30 minutes before the first regularly scheduled school session and that extends beyond the time school commences, may begin the 30-minute period after dismissal at a time other than dismissal, and if a school has an off-campus lunch period, may designate the period provided for off-campus lunch as a period during which the school zone speed limit applies.

Setting of School Speed Limit

A Traffic Control Order (TCO) will not be required for either prima facie speed limit situation and the school zone will not be incorporated into any existing traffic control order covering the area. The maximum distance beyond the school frontage when adjoining the roadway in either direction for a school speed limit zone is 1,000 feet (257.627a(1)). The minimum is not defined in the Michigan Vehicle Code. If two or more schools occupy the same property or adjacent properties, one of the following applies, as applicable:

1. If the hours of instruction at the schools are the same, then a single combined school zone shall be established.
2. If the hours of instruction at the schools are different, overlapping school zones shall be established.

The Michigan Department of Transportation (MDOT) and Michigan State Police (MSP) representatives and the school superintendent will determine the appropriate length on the state trunkline highway by a majority consensus.

A school located within 1,000 feet of a highway which does not meet the criteria for

either of the above speed zones does not qualify for a school speed limit. The school, however, may be a factor in the recommendation in a speed study on the state trunkline highway in question and the superintendent should be included in the survey conducted by MDOT and MSP.

School Speed Limit Signing

For the appropriate signing for school speed limits see School Speed Limit Assembly Signs.