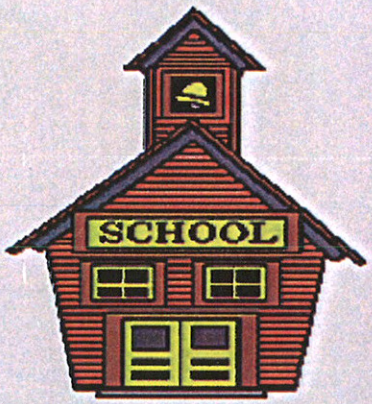
PATH MANUAL



School Pedestrian Safety Policies and Guidelines

P A T H

School Pedestrian Safety Policies and Guidelines

Sioux Falls, South Dakota

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Engineering Division

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Forward

The protection of school-age children walking along or across streets is one of the most sensitive subjects City officials have to face. National statistics have indicated that children 15 years and younger represented 23% of the total population but accounted for 30% of all nonfatal pedestrian injuries and 11% of all pedestrian fatalities. Among children between the ages of 5 and 9 who were killed in traffic crashes, 25% were pedestrians[1].

The job of providing school-child pedestrian protection belongs to everyone including the student, the parent, the traffic engineer, the police safety expert, the crossing guard, the school administration, the teacher, the PATH representative, and the passing motorist.

Many requests for traffic signals, signs, markings, and other controls are received from concerned parents, school officials, or other citizens. If all of these demands were met, there would have to be many more police officers assigned to school duty, and many more traffic devices. However, such demands are not always in line with actual needs. These additional controls are often costly and many times tend to reduce respect for those that are warranted. The most effective and safest traffic control can be obtained through the uniform application of realistic policies, practices, and standards developed through engineering studies.

Pedestrian safety depends largely upon public understanding of accepted methods for safe and efficient traffic control. This principle is never more important than in the control of pedestrians and vehicles in the vicinity of schools. Neither school children nor vehicle operators can be expected to move safely in school zones and school crossing areas unless they understand both the need for controls and the ways in which these controls function for their benefit.

This guide has been prepared to aid those responsible for traffic control in school areas. It explains and illustrates the steps necessary for the proper control of traffic in school areas. The Manual of Uniform Traffic Control Devices[2], published by the U.S. Department of Transportation, and School Trip Safety Program Guidelines[3], published by the Institute of Transportation Engineers, provide the background for the content of this booklet.

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[1] NHTSA Traffic Safety Facts , Washington, D.C.: National Highway Traffic Safety Administration. DOT HS 808 958,1999.

[2] Manual of Uniform Traffic Control Devices for Streets and Highways, U.S. Department of Transportation, Federal Highway Administration, 2000.

[3] School Trip Safety Program Guidelines, An ITE Recommended Practice, Institute of Transportation Engineers, 1984.

I. School Safety Committees

The first step desirable to provide pedestrian safety in school areas is the organization of a School Traffic Safety Committee. Individual elementary school traffic safety committees have been formed in Sioux Falls since 1977. These committees have come to be known as PATH (Pedestrians Avoiding Traffic Hazards) committees. In 1981, an area wide PATH committee was established by the City Commission. (See Appendix A for a history of Sioux Falls PATH). Membership on this committee is now by appointment of the Mayor and includes representatives from the general public, the public school administration, the School Board, the South Dakota Safety Council, the South Dakota AAA, the Police Department, and the City Engineering Division. Seventeen members sit on the area wide PATH committee.

The local school PATH committees consist of volunteer membership but typically should include the school principal and the local PTA safety chairperson. For purposes of this publication, these school committees are referred to as local PATH committees, while the area wide group is known as the City PATH committee.

City PATH is advisory in nature, having no legislative authority or budget. It is looked upon as a clearinghouse where problems unsolvable through established procedures may be brought for discussion and recommendations.

The duty of City PATH is to guide and coordinate all activities associated with the general school safety programs, including the following:

A. Develop recommended policy on school walk trip safety.

B. Provide periodic review of conditions, programs, and policies; recommend improvements to City and school officials.

C. Coordinate the receiving, reviewing, and resolution of suggestions and complaints about school trip safety.

D. Assist in developing recommended school bus/pedestrian service area boundaries based on the school trip safety situation.

E. Maintain a good public relations program regarding school pedestrian safety.

F. Recommend immediate actions for emergency problems to responsible units of government and monitor follow up.

G. Provide input to the decision process for new school location and design.

II. Areas of Responsibility

In the city, there are four main groups, which are actively involved in establishing and enforcing policies for school pedestrian safety. Cooperation among these groups is essential to maintain a high uniform quality of safety for children on their way to and from school.

The four groups are:

- Law Enforcement
- Traffic Engineers
- Schools
- Parents

A. School Responsibilities

These responsibilities are assumed by the school principal, local school PATH committee, or assigned to a competent staff member in each school:

1. Develop the "safest route to school." This is a plan developed for each individual school by the school and traffic officials responsible for school pedestrian safety. It consists of a simple map showing streets, the school, existing traffic controls, and established school routes and crossings to be used by children enroute to and from school. The routes should provide maximum protection for the children. They should take advantage of existing traffic controls, and the children should be required to walk somewhat longer distances if necessary to avoid locations that may be considered a risk.

2. Instruct children on and make parents aware of the suggested use and purpose of the "safest route to school" plan.

3. Make field checks to determine whether the suggested "safest route" is being properly used. Special attention should be given to unsafe activities of school children, need for speed limit enforcement, trimming of weeds, trees or bushes that obscure vision, and to pavement markings that need repair. The loading and unloading of students from buses and private vehicles should be reviewed and improvements recommended. Parking problems should be reported to the school authorities.

4. Annually review the "safest route to school" and revise and update as needed.

5. Establish and annually review guidelines for the safe loading and unloading of students from buses and private vehicles.

6. Provide school safety patrols and for their training and supervision.

7. Provide the time and place, and cooperate with the school safety patrol officer in instructing children in safety procedures.

8. Determine and report all problems and requests for repair, or additional traffic controls to the City's Traffic Engineer, preferably in writing.

B. Parent's Responsibilities

Parents working either individually or collectively through the local PATH can greatly increase the safety of their children by:

1. Instructing children in the "safest route to school" as determined by school safety officials and seeing that they use it. The plan should not be limited only for school use, but should be encouraged for all pedestrian travel.

2. Obeying traffic laws when driving children to and from school.

3. Reporting to the school or the City Traffic Engineer any problems, which seem to be overlooked.

C. Police Department Responsibilities

1. Work with school authorities in determining and mapping the "safest route to school."

2. Instruct school children in the safe way to cross streets and supervise school crosswalks.

3. Demonstrate and lecture children in safety procedures.

4. Supervise bicycle tests and inspect bicycles.

5. Cooperate and coordinate with the schools and local PATH organizations in school safety problems.

D. City Traffic Engineer Responsibilities

The traffic section of the Sioux Falls Engineering Division is comprised of qualified traffic engineers and engineering technicians.

1. Determine general policies for the safe movement of both pedestrians and vehicles.

2. Develop suitable warrants (minimum requirements) for traffic controls, including those, which are dependent on characteristics of

schools, to provide adequate protection for school children. (Warrants for the most commonly used controls are printed in the following sections).

3. Investigate and make recommendations on all requests received from school authorities, parents, and police, and determine priorities for the application of traffic controls.

4. Order or recommend the installation of traffic controls.

5. Determine the overall results of traffic controls by reviewing accident records, speed studies, etc.

6. Report to City officials and give recommendations for additional policies or alterations of existing policies needed to increase public safety.

III. Pedestrian School Route Plan

The initial act of the Local School PATH Committee should be the development of a suggested school route plan for each school serving elementary and kindergarten students. The plan consists of a simple map showing streets of the area served by the school, the school, existing traffic controls, established school routes, and crossings. Figure 1 shows a typical school route plan map.

The plan permits the orderly review of school area traffic control needs, the coordination of school pedestrian safety education and engineering activities, and is useful in developing uniformity in the use of school area traffic controls.

A. Criteria

The criteria considered necessary in developing a good route plan are as follows:

1. In general, the school route plan should be designed to provide maximum protection for the children at minimum cost to the taxpayer. School routes should be planned to take advantage of the protection afforded by existing traffic controls. Where feasible, school boundaries should be revised if a change would eliminate a hazardous crossing. Occasionally, it may be necessary for children to walk longer distances to avoid hazardous crossings and to make use of existing traffic controls. The following factors should be considered in determining the feasibility of requiring children to walk longer distances:

    a. The availability of adequate, safe sidewalks, or off-road walk areas to and from the location with existing control.

    b. The number of children using the crossing.

    c. The age levels of the children using the crossing.

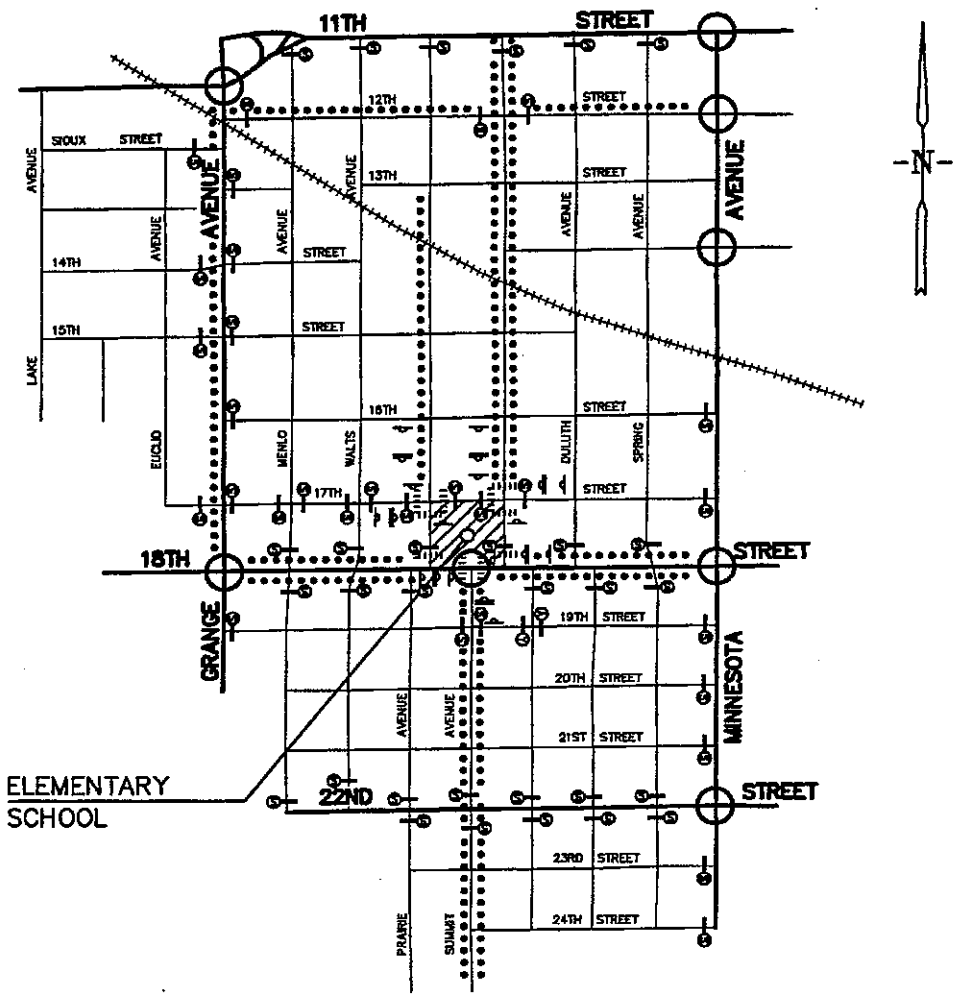
    d. The total extra walking distance.

2. The City PATH Committee should adopt policies on the application of these factors.

3. School children should be thoroughly instructed by the schools and parents on the purpose and proper use of the school route plan. Each child should be provided with a copy of the map showing the school route plan. This map should be taken home so that parents may check the route to be used by their children and instruct them on its use, even to the extent of walking over the route with the child. It is desirable to have parents sign and return to the schools a statement indicating that they have instructed the child on the use of the appropriate school route.

Figure 1

PATH MAP



LEGEND

- APPROVED "SAFE" ROUTE TO SCHOOL
- SIGNALIZED INTERSECTION
- YIELD SIGN
- STOP SIGN
- MARKED SCHOOL CROSSING
- SCHOOL SIGNS S1-1, S2-1, & S5-1

TRAFFIC ENGINEER'S OFFICE
CITY OF SIOUX FALLS

Date _____

Approved _____ Denied _____

Name _____

Title _____

Comments:

4. Frequent field checks should be made along school routes to determine whether they are being properly used. This activity could be adopted as an annual safety project for parent-teacher organizations. Adult volunteers could occasionally walk the school routes for the purpose of recording and reporting such circumstances as unsafe activities of school children, failure to use the routes, improper driving practices, the need for enforcement to deter speeding, need of maintenance work to reduce potential hazards (such as cutting weeds or trimming or eliminating trees that obscure vision, and the repainting of pavement markings). The Local School PATH Committee should take prompt action toward correcting conditions reported from such surveys.

5. Each school's route plan should be reviewed by its Local School PATH Committee each year to determine the possible need for revision. This evaluation should be conducted between school years so that any necessary revisions may be made before the school term begins. Such revisions may be necessary because of new schools, changes in school district boundaries, changes in highway or traffic patterns, opening of new residential areas, or installation of new controls.

B. Safety Activities

After the school route plan has been developed, the following safety activities should be pursued:

1. School principals, parents, teachers, the public information media, and the general public should be made familiar with the School Traffic Safety Program. The Local School PATH Committee should organize meetings and presentations to inform all concerned parents as to the purpose and value of the school route plan, the theory and methods behind the planning of the school routes, and the procedure to be used in processing complaints and requests. Such events should include an opportunity for the audience to ask questions and offer suggestions on the program.

2. School children should be thoroughly instructed in all aspects of school traffic safety. The school training and supervising program should teach all children at the earliest possible age the ability to take care of themselves and to assume responsibility for their own safety at all pedestrian crossings. This program should include the instruction of children in safe walking and bicycle riding habits. Traffic authorities should assist in this program by calling attention to specific conditions and hazards that require special emphasis in the child's education program.

3. The children must be taught that they alone are responsible for their safety and that they must be careful and alert at all times. They must be convinced that a traffic sign, a traffic signal, school bus flashers, or even a crossing guard does not relieve them of that responsibility; and that all street crossings are to be considered dangerous, and that only through safe crossing habits and practices will they remain safe.

IV. School Crossing Control Criteria

A. General

During the development of the pedestrian school route plan there may be circumstances that will require crossing a major highway or other potential traffic hazard. By applying a uniform procedure of study and analysis to each of the possibly hazardous crossings, it will be possible to make recommendations and assign priorities for the uniform application of traffic controls or other measures described later in this guide.

B. Analysis of Need

Analyzing the Need for School Crossing Protection

1. The recommended procedure for study is based on the following assumptions:

   a. Alternating gaps and blockades are formed in the vehicular traffic stream in a pattern peculiar to each location. This requires an analysis of hazards at each location.

   b. Pedestrians will wait a reasonable amount of time for an adequate gap in traffic before crossing a street.

   c. There is no traffic control signal at the location under study. If a signal has been installed, particular attention should be given to Appendix D before proceeding with Items 2 and 3 of the field studies listed below.

2. Once it has been determined which intersections require further study, the necessary field survey data should be obtained. (See Appendix B).

3. For safety, a pedestrian must wait for a gap in traffic that is of sufficient duration to permit him/her to cross the street without interference from vehicular traffic. When the delay (between the occurrence of adequate gaps) becomes excessive, children may become impatient and endanger themselves by attempting to cross the street during an inadequate gap. Compounded by the inability of most children to properly judge gap size and vehicle speed, the need for control at, and warning of, crossings is especially critical. This delay may be considered excessive when the number of adequate gaps in the traffic stream during the period the children are using a crossing is less than the number of minutes in that same time period. With this condition (when adequate gaps occur less frequently than an average of one per minute), and where a significant number of

children cross, some form of traffic control is needed which will create gaps in the traffic stream necessary to reduce the hazard.

4. The need for some special form of protection can be determined by using procedures contained in Appendix C.

V. Traffic Control for School Areas

A. General

This section sets forth basic principles and prescribed standards to be followed in the 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, signals, markings, adult guards, student patrols, and grade-separated crossings.

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

1. Legal Authority

Article VII of Chapter 40 of the Revised Ordinances of the City of Sioux Falls states in part:

ARTICLE VII. TRAFFIC CONTROL SIGNS, SIGNALS, AND DEVICES.

Section 40-114. Authority to install traffic control devices.

The City Traffic Engineer shall place and maintain traffic control signs, signals, and devices when and as required under the traffic ordinances of this city to make effective the provisions of said ordinances, and may place and maintain such additional traffic control devices as he may deem necessary to regulate traffic under the traffic ordinances of this city or under state law or to guide or warn traffic. (Ord. No. 64-75, § 1, 9-29-75).

Sec. 40-115. Manual and specifications for traffic control devices.

(a) All traffic control signs, signals, markings, and other devices shall conform to the current edition of the Manual of Uniform Traffic Control Devices, approved by the federal highway administrator as the national standard for all highways open to public travel, in accordance with Title 23, U.S. Code, Sections 109(b), 109(d), and 402(a) and 23 CFR 1204.4, which is hereby incorporated and adopted herein the City of Sioux Falls, South Dakota.

(b) All signs, signals, markings, and other devices required hereunder for a particular purpose shall, so far as is practicable, be uniform as to type and location throughout the city. All traffic control devices so erected and not inconsistent with the provisions of state law or this article shall be official traffic control devices. (Ord. No. 64-75, § 2, 9-29-75; Ord. No. 134-82, § 1, 12-27-82).

2. Meanings of "Shall," "Should," and "May"

In sections of the Manual of Uniform Traffic Control Devices, dealing with the design and application of traffic control devices, the words, "shall," "should," and "may" are used to describe specific conditions concerning these devices. To provide clarity of the meanings of these words as used in this booklet, the following definitions are given:

a. **Shall**—A mandatory condition. Where certain requirements in the design or application of the device are described with the "shall" stipulation, it is mandatory that these requirements be met.

b. **Should**—An advisory condition. Where the word "should" is used, it is considered to be advisable usage, recommended but not mandatory.

c. **May**—A permissive condition. No requirement for design or application is intended.

3. The standards of the Manual of Uniform Traffic Control Devices outlined in this guide apply to all streets and highways in Sioux Falls regardless of type or level of governmental agency having jurisdiction.

4. All traffic control devices used in school areas shall conform to the applicable specifications of the Manual of Uniform Traffic Control Devices.

5. Maintenance of devices must be to high standards to assure that legibility is retained, that the device is visible, that it is functioning properly, and that it is removed if no longer needed.

6. Special care shall be taken to see that devices in use on a part-time basis are in operation only during the time periods they are required.

7. Regulatory traffic control devices for school areas should be removed, covered, or not operated when they are not needed for extended periods of time, such as during summer vacations.

B. Signs

1. Designs of Signs

   Uniformity in design includes shape, color, dimensions, symbols, wording, lettering, and illumination or reflectorization. The City Engineering Division, upon request, will furnish detailed drawings of the standard signs illustrated in this guide.

2. Dimensions

   The sign dimensions prescribed in this booklet shall be standard for application on public highways. An increase above these standard sizes is desirable where greater legibility or emphasis is needed.

3. Illumination and Reflectorization

   Ordinarily, the signs used for school area traffic control need not be reflectorized or illuminated, but, if there is a considerable use of school facilities by children during hours of darkness, it may be desirable to give the signs in the vicinity of the school adequate nighttime visibility.

4. Position of Signs

   a. Signs should be placed in positions where they will convey their messages effectively without restricting lateral clearance or sight distances. Placement, therefore, should be accommodated to highway design and alignment and to roadside development.

   b. Signs should have the maximum practical lateral clearance from the edge of the traveled way for safety of vehicles that may leave the roadway and strike the sign supports. Normally, signs and/or supports should be positioned so that the edge of that part of the installation nearest the roadway is no closer than two feet from the edge of the curb. However, where no curb exists, a minimum distance of six feet from the edge of the roadway should be maintained.

   c. Portable signs or other control devices, which could become projectiles if struck by a vehicle, shall not be placed within the roadway at any time.

5. Heights of Signs

   a. Signs erected at the side of the road in rural districts shall be mounted at a height of at least five feet, measured from the bottom of the sign to the level of the roadway edge.

   b. In business, commercial, and residential districts, where parking and/or pedestrian movement is likely to occur, or where there are other obstructions to view, the clearance to the bottom of the sign shall be at least seven feet.

6. Erection of Signs

   Normally, signs should be mounted approximately at right angles to the direction of, and facing, the traffic that they are intended to serve.

7. School Advance Sign

   The School Advance Sign is intended for use in advance of locations where school buildings or grounds are adjacent to the highway. It may also be used in advance of established school crossings not adjacent to a school ground.

School Advance Sign

School Crossing Sign

Where used, the sign generally shall be erected not less than 150 feet nor more than 700 feet in advance of the school grounds or school crossing. The sign shall have a standard size of 30 inches by 30 inches except when used on streets with four or more lanes of traffic then the standard size of 36 inches by 36 inches should be used.

8. School Crossing Sign

   a. The School Crossing Sign is intended for use at established crossings used by pupils going to and from school, except that the signs shall be omitted at crossings where vehicular traffic is controlled by stop signs. Only crossings adjacent to schools and those on established school pedestrian routes shall be signed. School crosswalks at signalized intersections should also be marked with signs.

      (1) When used, the sign shall be erected on the right-hand side of the roadway at the crosswalk or at the minimum distance possible in advance of the crosswalk.

      (2) The sign shall have a standard size of 30 inches by 30 inches except when used on streets with four or more lanes of traffic then the standard size of 36 inches by 36 inches should be used.

   b. A School Advance Sign shall be used in advance of the School Crossing Sign.

9. School Speed Limit Signs

   a. The School Speed Limit Sign shall be used to indicate the speed limit where a reduced speed zone for a school area has been established in accordance with law. The sign shall be either a fixed-message sign or a variable display-type sign.

      (1) The fixed-message sign shall consist of a sign 24 inches by 48 inches reading "School Speed Limit 15 When Children Present".

(2) The numerical speed limit displayed on the sign shall be the limit established by law.

(3) Variable display signs may be used to indicate the special school speed limit. These signs are identical to the fixed message sign with the exception of the added flashing amber beacons used during times of the day when children typically use the crosswalk. (See Appendix E)

(4) Because of special features, it may not always be practical to make variable display signs conform in all respects to the accepted standards. However, during the periods the school speed limit is in force, their basic shape, message, legend layout, and colors should conform to the standard for the fixed message sign, except that if the sign is internally illuminated, it may have a white legend on a black background.

(5) Variable display signs with flashing beacons should be used for the more critical situations where greater emphasis of the special school speed limit is needed.

(6) 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 or visible.

(7) At the end of an authorized and posted school speed zone, the speed limit for the following section of highway should be posted with a standard Speed Limit sign or with an End School Zone sign.

(8) In general, School Speed Limit signs should be installed approximately 200 feet before an officially established school crosswalk or 300 feet prior to a school's property line.

10. Parking and Stopping Signs (R7 Series)

a. Experience shows that most accidents involving school children are caused by children crossing streets from between parked cars. Parked cars are a major obstruction to sight distance at crosswalks and intersections; therefore, it is very important that "no parking" zones be considered in school areas for child safety. As a minimum, the Sioux Falls Traffic Code prohibits parking "within 20 feet of a crosswalk at an intersection" and "within 30 feet of a stop sign, yield sign or traffic signal." 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.

b. 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. A typical example is as follows:

- No Parking 7 a.m. to 4 p.m. school days.

c. The legend on parking signs shall state whatever regulations apply, but the sign shall conform to the standards of shape, color, position, and use. Generally, parking signs should display as much of the following information as is appropriate from top to bottom of the sign in the order listed.

(1) Restriction or prohibition.

(2) Time of day it is applicable, if not at all hours.

(3) Days of week it is applicable, if not every day.

d. Where parking is prohibited at all times, or at specified times, parking signs shall have red letters and border on a white

background (parking prohibition signs); and where only limited time parking is permitted or where parking is permitted only in a particular manner, the sign shall have green letters and borders (parking restriction signs). Where parking is prohibited during certain hours and permitted under a time limit at other hours of the day, two parking signs should ordinarily be used with the prohibition above the restriction. As an alternative, both messages in different colors may be used on a single panel with the sign lengthened vertically if necessary.

e. For emphasis, the word "no" or the numeral showing the time limit in hours or minutes may be in a reversed color arrangement in the upper left corner of the sign; i.e., in white on a rectangular area of red or green.

f. Normally, parking signs are placed perpendicular to the roadway. However, there may be times when it is advantageous to post them at an angle with the roadway. In these cases, there should be a single-headed arrow pointing in the direction the regulation is in effect if the sign is at the end of the zone or a double-headed arrow pointing both ways, if the sign is at an intermediate point in the zone. When signs with arrows are used to indicate the extent of the zone, the sign should be set at an angle of not less than 30 nor more than 45 degrees with the line of traffic flow to be visible to approaching traffic. As an alternative to the arrow, if the signs are posted facing traffic at an angle of 90 degrees to the curb line, there may be included on the sign, or on a separate plate below the sign, such legend as here to corner, here to alley, this side of sign, or between signs.

C. Pavement Markings

1. Functions and Limitations of Markings

a. Markings have a definite and important function 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.

b. 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.

2. Standardization

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

3. Crosswalk Lines

a. Painted school crosswalks should be installed only if all of the following criteria are met:

(1) The crossing is on an approved "safest route to school."

(2) There are 11 or more school children crossing the location during a peak pedestrian hour and traffic exceeds 51 vehicles during the same hour.

(3) There has been an official written request from the local school PATH committee to the City PATH Committee or the office of the City Traffic Engineer.

b. Crosswalk markings shall be white in color either painted as a series of 24 inch bars running parallel to the street, or two 6 inch wide lines painted as a pair running perpendicular to the street.

4. Stop Lines

Stop lines are solid white lines, normally 24 inches wide extending across all approach lanes, and used to indicate the point at which vehicles are required to stop in compliance with a stop sign, traffic signal, officer's direction, or other legal requirement. When used, the stop line should ordinarily be placed at least four feet in advance of and parallel to the nearest crosswalk line.

5. Curb Markings for Parking Restrictions

Since curb markings of yellow and white are used for delineation and visibility, parking regulations must be established through the installation of standard signs. However, when local authorities prescribe special colors for curb markings as supplemental to standard signs, they may be used.

6. Word and Symbol Markings

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

b. Word and symbol markings shall not be used for mandatory messages except in support of standard signs.

c. The letters and symbols should be greatly 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 used, eight feet or more in height, and if the message consists of more than one word, it should read "up"; i.e., 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.

D. School Area Traffic Signals

1. Definition

School signals are standard traffic control signals erected at established school crossings on the basis of a need to create adequate gaps in the vehicular traffic stream for pedestrian crossings.

2. Advantages and Disadvantages

a. When properly designed, located, and operated under conditions that fully warrant their use, school signals usually have the following advantages.

(1) Considering initial and operating costs, school signals, over a period of several years, represent an economy, as compared with the cost of providing police supervision or adult crossing guards.

(2) Under conditions of favorable spacing, they can be coordinated with adjacent signals to provide for continuous or nearly continuous movement of vehicular traffic.

b. Properly designed and warranted signals also have some disadvantages, and the following should be considered when choosing a specific means of crossing control:

(1) In many cases, accident rates will increase following signalization.

(2) In most circumstances, the school signal control requires supplemental control by an adult guard or school safety patrol because signals tend to create a false sense of security, especially in school-age children.

(3) School signal control has a much higher initial cost than police supervision or crossing guards. It should not be considered for locations where several years of use cannot be assured.

(4) If school signal control is to be installed, provision must be made for both periodic and emergency maintenance by capable, trained persons.

3. Standardization

Because of the great mobility of today's traffic and the ever increasing range of traffic circulation, it is of primary importance that there be national standardization of those features of traffic signals that affect public participation in traffic movement. This applies without exception to signals at school crossings where instant recognition and understanding of controls is vital to both students and motorists. Deviations and innovations, however well accepted by local people, are bound to lead to confusion and disobedience on the part of strangers.

Design, application, location, and operation lend themselves to a certain degree of standardization, and standards for such features are prescribed herein. A driver or pedestrian must first readily see signals and then react to their indications. Location and sequence of operation are basic requirements. Signals must be placed where a driver or pedestrian cannot miss seeing them. Standard signal messages can be recognized and heeded at a glance.

4. Warrants

a. A school 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 that the average number of adequate gaps in the traffic stream during the period the children are using the

crossing is less than the number of minutes in that same time period. A minimum of 20 children should be utilizing the crossing before applying this warrant. A safe gap is defined as follows: G(sec) = W/3.5 + 3 + (N/5 – 1) * 2

where W = Width of street
N = No. of children per group

b. When traffic control signals are installed solely under this warrant:

(1) Pedestrian signal indications (walk — don't walk) shall be provided for each crosswalk established as a school crossing.

(2) At an intersection, the signal normally should be traffic actuated. An actuated signal is a signal whose sequence and timing is determined by electronic detection of traffic or pedestrian demand on one or more approaches to the intersection. Intersection installations that can be fitted into coordinated systems may use pretimed control. At nonintersection crossings, the signal should be pedestrian actuated, parking and other obstructions to view should be prohibited for at least 100 feet in advance of and 20 feet beyond the crosswalk, and the installation should include suitable standard signs and pavement markings. Special police supervision and/or enforcement should be provided for a new nonintersection location.

c. A School Advance sign and a School Crossing sign may be used at locations where signals are installed under this warrant.

5. Intersection and Nonintersection Installations

School signals may be installed at established school crossings at intersection and nonintersection locations where there are inadequate gaps in vehicular traffic to accommodate safe pedestrian crossings.

a. Intersection locations have the hazards of turning vehicles and generally require the provision of signal equipment for the control of vehicular traffic on two streets. However, they are less likely to present an element of surprise for drivers, and may perform the secondary function of improving vehicular access to an arterial street.

b. Nonintersection locations are free from the hazards of turning vehicles, require vehicle control 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 signal head placement and the signs and markings used at nonintersection locations to be sure drivers are aware of this special application. Parking should not be allowed from 100 feet in advance of the crosswalk to 20 feet beyond.

6. Area of Control

a. A traffic control signal shall control traffic only at the intersection or midblock location where it is placed.

b. On a divided highway with a wide median (30 feet or greater), the crossing of each roadway must be signalized as a separate intersection.

7. Design Requirements for School Signal Indications

The detailed standards and requirements governing the design of signal indications for all signals, including school signals, are given in the Manual of Uniform Traffic Control Devices.

E. Crossing Supervision

There are two recommended types of crossing supervision.

- Adult control of pedestrians and vehicles with adult guards or police officers. Recommended practices for the organization, operation, and administration of an adult crossing guard program are given in Civilian Guards for School Crossings[1] and Adult School Crossing Guards.[2]

- Student control of pedestrians only with student patrols. Recommended practices for the organization, administration and operation of a student patrol program are given in Policies and Practices for School Safety Patrols.[3]

1. Adult Guards

[1] Civilian Guards for School Crossings, Traffic Institute of Northwestern University, 1804 Hinman Avenue, Evanston, Illinois 60204.
[2] Adult School Crossing Guards, American Automobile Association, Washington, DC 20036.
[3] Policies and Practices for School Safety Patrols, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611.

a. Adult guards may be used to provide gaps in traffic at school crossings, where an engineering study has shown that adequate gaps must be created. They should exercise mature judgment in selecting safe gaps in the traffic stream.

b. An adult crossing guard should be considered as an appropriate supplemental technique at school crossings where one or more of the following conditions exist:

   i. Where it is deemed necessary to assist children across a street because of heavy vehicular turning movements or high vehicular speed.

   ii. At signalized intersections.

c. Choice of Adult Guards

   i. Adult guards should be special police officers appointed by the local police agency.

   ii. The local police agency should be responsible for the selection, training, and supervision of adult guards.

   iii. High standards for selection of adult guards are essential. Adult guards must understand children and, in addition, should possess the following qualifications:

      (1) Average intelligence
      (2) Good physical condition, including sight and hearing
      (3) Mental alertness
      (4) Neat appearance
      (5) Good character
      (6) Dependable
      (7)Sense of responsibility for safety of children

d. Uniform of Adult Guards

   Adult guards should be uniformed so that motorists and pedestrians can recognize them and respond to their signals. It is recommended that their uniforms be distinctively different from those worn by regular police officers.

e. Operating Procedures for Adult Guards

   Adult guards should not direct traffic in the usual police regulatory sense. In the control of traffic, they should pick opportune times with adequate safe gaps. At these times, their presence in the roadway serves as an easily recognized indication that pedestrians are about

to use the crosswalk, and that all traffic must stop. Adult guards may use a hand-held, double-faced stop paddle. When all traffic has stopped, the adult guard allows the children to cross the roadway. Drivers may proceed when the adult guard signals them to do so.

f. Police Officers

Police officers should be used for school crossing supervision only in emergency situations on a temporary basis or at very hazardous school crossings where the use of adult guards is not feasible.

2. Student Patrols

a. 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.

b. Student patrols may be used to direct and control children at signalized intersections where turning movements are not a problem and to assist adult guards in the control of children at crossing locations used by large numbers of children.

c. Student patrols shall not be responsible for directing vehicular traffic, and they shall not function as police officers.

d. Choice of Student Patrols

i. The use of student patrols should be authorized by the local school board. School authorities should be responsible for organizing, instructing, and supervising patrols with the assistance of the local police.

ii. Student patrols should be carefully selected. They should be children from the fifth grade or higher. Leadership and reliability should be determining qualities for patrol membership.

iii. Parental approval should be obtained in writing before a child is used as a member of a student patrol.

e. Operating Procedures for Student Patrols

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

Patrol members should reach their posts at least 15 minutes before the opening and dismissal of classes and remain on duty until all students who are not stragglers have passed their post.

It is recommended that two patrols members be stationed at crossings that are out of site from the school.

Where school safety patrols are stationed, they should operate as follows:

i. At crossings controlled by a police officer or crossing guard, the safety patrol will direct the crossing of the students in conformity with the signal of the police officer or crossing guard.

ii. At crossings controlled by traffic signals, patrol members shall hold the students off the roadway until the traffic stops and the signals allow them to cross. The patrol members shall allow only the immediate group to cross, and all latecomers must wait for the next "walk" signal.

iii. At crossings with no signals, the patrol members shall:

(1) Be posted to be clearly visible to approaching traffic; however, they shall stay out of the moving stream of traffic and where there are parked cars obstructing their view, they shall be posted no farther than the outer edge of the parked cars.

(2) Patrol members shall not permit students to enter the roadway until it is safe for them to cross.

(3) When it is safe for students to cross, the patrol members shall direct them to cross the roadway in a group.

f. At crossings with pedestrian-actuated traffic signals, the patrol members shall have the responsibility for operating the push button during their periods of duty.

F. Speed Limits

1. Speed zoning will not automatically reduce accident frequency or severity. Improper zoning may actually create a situation favorable to accidents by increasing the speed differential between vehicles and by causing pedestrians to rely on a posted limit, which does not accurately reflect vehicular speeds.

2. Lowering a speed limit does not necessarily lower actual vehicle speeds. Speed zoning then is not a simple answer to hazard reduction. The speed limit selected must be based on a common sense evaluation of the hazard potential and must be reasonable to gain voluntary driver acceptance.

3. Proper speed zoning can:

   a. Reduce vehicular speed differential.

   b. Provide basis for enforcement.

   c. Increase driver respect for speed zoning.

   d. Decrease accident potential.

4. Speed zoning will not:

   a. Automatically reduce vehicular speed.

   b. Automatically reduce accidents.

5. Improper speed zoning may:

   a. Increase accident potential.

   b. Increase vehicular speed differential.

   c. Decrease driver respect for speed limits.

   d. Mislead pedestrians as to true vehicular speed.

   e. Leave actual speed virtually unchanged.

   f. Make the majority of drivers "speeders."

   g. Create enforcement problems.

6. The City's Traffic Engineer has a set of guidelines which describe the procedures necessary in establishing speed limits and should be followed at all times when speed zones are changed.

G. Grade Separation

1. 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.

2. Grade-separated crossings may be either overpasses or underpasses. The design should follow the guidelines given in the published policies of the American Association of State Highway and Transportation Officials.[4] Experience has shown that overpasses are more satisfactory than underpasses since overpasses are easier to maintain and supervise.

3. 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 the use of an at-grade crossing, barriers or supervision will be needed to assure a satisfactory level of use. The construction of a pedestrian grade separation should be considered when:

   a. 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 foreseeable possibility that the replanning of school routes or school districts will eliminate the need for such a structure.

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

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

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

   e. Such a structure will serve other pedestrians besides school children.

4. 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 children, as well as by other pedestrians:

   a. 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.

   b. Install fence barriers to channelize the movements of children, thus preventing them from avoiding the structure through the use of other, more hazardous routes.

[4] A Policy on Geometric Design of Highways and Streets, 1984; American Association of State Highways and Transportation Officials, 444 North Capitol St. N., Suite 225, Washington, DC 20004.

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

d. Provide for adequate policing and illumination of the structure to avoid moral problems, particularly in underpasses.

e. Instruct the 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.

5. Since pedestrian grade separation structures form a permanent solution to the school crossing problem, it is suggested that 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 hazard that the structure was intended to eliminate.

VI. Snow Removal

The City of Sioux Falls and its immediate vicinity receives an average of 39 inches of snow annually, ranging from a low of 6 inches to a high of 90 inches. This generally falls in many different ways from a storm with little or no wind to a full-blown blizzard. Depending on the type of storm or the amount of snowfall, school classes may be let out early or called off altogether for a given day.

During and after any snowfall, certain precautions and actions need to be taken to help assure safety for school children to and from school.

A. City Streets

As part of its responsibility of maintaining the city streets, the Street Department has had a policy of snow removal, which is as follows:

1. Sanding and deicing as necessary when ice or light snow occurs. Hills, stop signs and signalized intersections, and heavily traveled streets are generally covered first and other locations as calls from the Police Department or other citizens may request.

2. When more than two inches falls, the Emergency Snow Routes are kept open as possible.

3. Plowing of residential streets is generally done after snowfall has ceased and Emergency Snow Routes have been treated. A Snow Removal Alert will have been declared before plowing begins. Unusually hazardous locations or completely blocked streets causing an emergency situation may be treated sooner when warranted.

4. Special parking restrictions go into effect on the Emergency Snow Routes as soon as two inches of snow has fallen and all other areas when a Snow Removal Alert has been declared.

B. Sidewalks

All snow removal from city sidewalks is the responsibility of the abutting property owner or resident. City ordinance requires that these sidewalks be cleared of snow and ice within 48 hours after any snowfall or snow accumulation.

1. Sioux Falls Code, Section 38-76 states, "It shall be the duty of the owner, tenant, or person in possession of any property abutting on any sidewalk to keep such sidewalk free from snow and to cause any

accumulated snow to be removed from any such abutting sidewalk within forty-eight (48) hours after the termination of any snowfall, or snow accumulation."

2. Sioux Falls Code, Section 1–4(a) states, "Whenever in this Code or in any ordinance of the city an act is prohibited or is made or declared to be unlawful or an offense or a misdemeanor, or whenever in such Code or ordinance the doing of any act is required or the failure to do any act is declared to be unlawful, and no specific penalty is provided therefore, any person who shall be convicted of any such violation shall be fined not more than two hundred dollars ($200.00), or imprisoned in the city jail or county jail not longer than thirty (30) days, or shall receive both such fine and imprisonment. Each day any violation of this Code or other ordinance continues shall constitute a separate offense."

3. Any sidewalk not cleared in conformance with the above Code may be reported to the Community Development Division of the City of Sioux Falls giving a specific address or legal description. General area descriptions will not be accepted.

4. Residents or property owners on street corners should take it upon themselves to clear any snow and ice out to the curb and beyond. This would allow school children to get to the crosswalk without having to go through snow or over snowbanks, which can be dangerous. (City crews do not clean these areas until all streets are completely plowed and snow removed.)

Appendix A

School Traffic Safety Advisory Committee

I. History

The School Traffic Safety Advisory Committee in Sioux Falls, better known as the PATH (Pedestrians Avoiding Traffic Hazards) Committee was officially established by resolution of the Sioux Falls City Commission on May 11, 1981.[1] Prior to this official action, an ad hoc committee was formed in the Hawthorne-Cathedral Elementary School area to "conduct a Safe Route to School Study and develop a method and/or system to be used at the other local elementary schools in Sioux Falls."[2]

The Hawthorne-Cathedral ad hoc committee held its first meeting on February 3, 1977. After many meetings, the committee issued a report, which is still being used as the basis for PATH programs throughout the city. Sometime during the 1980-81 school term, a citizens group began meeting regularly to discuss common safety problems and the formal establishment of a citywide PATH Committee.

[1] Resolution 154-81, a resolution establishing a Sioux Falls School Traffic Safety Advisory Committee, May 11, 1981, Sioux Falls City Commission.
[2] PATH Program, Hawthorne-Cathedral Report, January, 1978, Hawthorne Cathedral Traffic Safety Committee.

II. Constitution

Resolution 154–81[3] provided for 15 members, including eight citizens representing the four quadrants of the city as defined by the boundaries of 18th Street and Minnesota Avenue, the city PTA president, and one representative from each of the following: the School District Central Office Administration, an elementary school principal, Sioux Falls School Board, the SD Safety Council, the Police Department, and the City Engineering Division's Traffic Engineer. In 1983, the City Commission approved a resolution adding a representative of the South Dakota AAA to the list of members. Shortly thereafter Sioux Falls Catholic Schools were also being represented through their own member slot.

The City PATH Committee approved a constitution[4] on an unknown date a short time after Resolution 154-81 was passed which sets forth the following purposes of PATH.

A. To periodically review all activities connected with the school traffic safety program.

B. To prepare recommendations for the Sioux Falls City Council and/or the Sioux Falls School Board on changes or additions to the school traffic safety program.

C. Give other advice to the Sioux Falls City Council and the Sioux Falls School Board and Governing Boards of Nonpublic Schools, in matters relating to school traffic safety.

D. To promote good public relations.

[3] Resolution 106-83, a resolution amending the number of members on the Sioux Falls School Traffic Safety Advisory Committee, May 2, 1983, Sioux Falls City Commission.
[4] By-Laws, 10-18-84, Sioux Falls School Traffic Safety Advisory Committee.

Appendix B

Field Survey Data

1. The number of rows of pedestrians walking five abreast at the crossing under study (N), or 1/5 the total number of pedestrians.

2. The width (in feet) of the pavement to be crossed by the group of pedestrians (W).

3. The actual pedestrian delay time (as a percentage of the total survey time) created by the traffic flow at the location under study (D).

4. Speed limits (85th percentile, if possible, or speed limit).

Procedure for Making Field Studies

1. Determination of "N"—the number of rows.

   It is assumed that pedestrians will walk in groups equivalent to five abreast approximately two seconds apart, when a group crosses a roadway. Therefore, if the group size is determined and divided by five, the required number of rows, "N," will be obtained. The 85th percentile group size is used so as to include most situations.

   There is a natural tendency for pedestrians to group together before crossing a roadway as they wait for a break or gap in the traffic stream. Thus, an observer can count the number of pedestrians that gather in each of these groups at the crossing under study and record the size on a form such as suggested in Exhibit No. B-1. A simple computation will yield the 85th percentile group and the value of "N" for the group size can be found in the second column. Note that "N" is taken as a whole number since even one pedestrian in excess of an even five will make an additional row, which will require extra clearance time.

   These pedestrian counts should be made on a normal school day during the heaviest hours of crossing activity in the morning or afternoon, preferably both.

2. Determination of "W"—the pavement width.

   This is the curb-to-curb width as measured at the crossing under study. If the roadway is divided and the center island is wide enough for the maximum-sized group of pedestrians to stand on it in safety, the curb-to-curb width of only one roadway is used for "W." This information should be obtained at the same time that the pedestrian group size study is made by recording the information suggested at the top of Exhibit No. B-1.

3. Determination of "D"—the actual pedestrian delay time.

This information is developed in a second field survey based on the information obtained in the Pedestrian Group Size Study.

Before the field survey is made to determine pedestrian delay time at the location under study, it is necessary to find the minimum length (in seconds) of a gap in traffic which will permit an 85th percentile group of pedestrians to cross a roadway of specified width. This minimum gap in traffic, known as the Adequate Gap Time (G), includes both the perception reaction time and the time needed to walk across the roadway without coming into conflict with passing vehicles.

The Adequate Gap Time may be selected from the table in Exhibit No. B-2, or it may be computed using the following equation. In either case, the values for "W" and "N" are those determined in the Pedestrian Group Size Study.

$$\text{Adequate Gap Time—G (in seconds)} = \frac{W}{3.5} + 3 + (N-1)2$$

Where W divided by 3.5 = Walking Time – the number of seconds required to walk across the roadway. This value is equal to the width of roadway (W) in feet, divided by the walking speed in feet per second (assumed to be 3.5 ft./sec.).

3 = Perception and Reaction Time—The number of seconds required for a child to look both ways, make a decision, and commence to walk across the street. This interval is assumed to be three seconds. (N – 1)2 = Pedestrian Clearance Time—additional seconds of time required to clear large groups of children from the roadway. Children are assumed to cross the roadway in rows of five with two-second time intervals between each row. The clearance time interval is equal to (N –1)2 where N is the number of rows, 1 represents the first row, and 2 is the time interval between rows.

4. Pedestrian Delay Time Field Study. After the Adequate Gap Time has been selected, the field study to determine the actual delay time to pedestrians caused by passing traffic can be undertaken. This study actually measures the time intervals between passing vehicles. Those intervals or traffic gaps that are equal to or greater than the Adequate Gap Time are the periods during which children must cross the roadway. The intervals between these gaps are the delay periods, the sum of which is the Actual Pedestrian Delay.

   Either of the following methods may be used to determine the gaps in the traffic stream. If the entire roadway must be crossed once the pedestrian leaves the curb, traffic flow in all lanes regardless of direction must be considered together.

   a. The Graphic Recorder Method—A graphic recorder similar to the Esterline-Angus recorder is used. The pen on the recorder may be actuated by a radar speed meter aimed at passing traffic or a

manually-operated pushbutton arrangement. Passing vehicles are recorded on the moving tape of the recorder as a series of sharp peaks. Traffic gaps are measured in seconds of time from one peak to the next peak. The total time of all gaps (t) which is equal to or greater than the Adequate Gap Time (G), and the total time of survey are used in the analysis of the crossing.

Upon completion of the survey, the form suggested in Exhibit No. B-3 can be used to tally the results.

b. The Metronome Method—This method makes use of a mechanical or electrical metronome, which marks time by a ticking sound. Electrical metronomes, which usually can be constructed in the traffic signal workshop, require an inverter to adapt the power from the car battery. Traffic gaps are measured with the metronome by ear and sight. The instrument is set for one-second click intervals. The field observer counts the number of clicks between passing vehicles. In this way, the length of all gaps which are equal to or greater than the Adequate Gap Time (G) is measured and recorded; lesser gaps are discarded. The form suggested in Exhibit No. B-3 can be used as a field sheet for this purpose. The overall survey time is also recorded. The metronome method of survey is recommended because of its simplicity and its low cost in equipment and manpower.

   The survey should be conducted immediately before or after the period in which children are using the crosswalk, so that they will not affect the vehicular traffic pattern. At least two surveys should be made, in the morning and in the afternoon, of the heaviest traffic weekday. Additional surveys may be necessary to verify results.

5. Computation of Actual Pedestrian Delay. When the field survey is completed, the total time of all gaps in which pedestrians could cross is found by adding the length, in seconds, of each gap, which was equal to or greater than the Adequate Gap Time (G). This figure is known as "t" and is subtracted from the total survey time is seconds (T). The following equation is then used to determine the percentage of actual pedestrian delay:

$$\text{Actual Pedestrian Delay} - D\ (\text{in } \%) = \frac{(T-t)}{T}100$$

Pedestrian Group Size Study

Study Date: _____ Location: _____

Start of Survey: _____ Crosswalk Across: _____

End of Survey: _____ Curb-to-Curb Distance: _____ feet

Divided Roadway: _____ Width of Island: _____ feet

Group Size	Number of Rows (N)	Number of Groups		Cumulative	Computations
		Tally	Total		
46 - 50	10				
41 - 45	9				
36 - 40	8				
31 - 33	7				
26 - 30	6				
21 - 25	5				
16 - 20	4				
11 - 15	3				
6 - 10	2				
5 or less	1				
Total Number of Groups				x 0.15 =	N =

Exhibit No. B-1

Table of Adequate Gap Times

Roadway Width - "W"			Number of Rows - "N"									
			1	2	3	4	5	6	7	8	9	10
16	-	19	8	10	12	14	16	18	20	22	24	26
20	-	22	9	11	13	15	17	19	21	23	25	27
23	-	26	10	12	14	16	18	20	22	24	26	28
27	-	29	11	13	15	17	19	21	23	25	27	29
30	-	33	12	14	16	18	20	22	24	26	28	30
34	-	36	13	15	17	19	21	23	25	27	29	31
37	-	40	14	16	18	20	22	24	26	28	30	32
41	-	43	15	17	19	21	23	25	27	29	31	33
44	-	47	16	18	20	22	24	26	28	30	32	34
48	-	50	17	19	21	23	25	27	29	31	33	35
51	-	54	18	20	22	24	26	28	30	32	34	36
55	-	57	19	21	23	25	27	29	31	33	35	37
58	-	61	20	22	24	26	28	30	32	34	36	38
65	-	68	22	24	26	28	30	32	34	36	38	40
75	-	80	25	27	29	31	33	35	37	39	41	43

Exhibit No. B-2

Pedestrian Delay Time Study

Study Date: _____ Location: _____

Crosswalk Across: _____

Start of Survey: _____ Number of Rows - "N" _____

End of Survey: _____ Roadway Width - "W" _____ feet

Total Survey Time: _____ Adequate Gap Time - "G" _____ seconds

Gap Size (seconds)	Number of Gaps		Multiply by Gap Size	Computations
	Tally	Total		
8				
9				
10				
11				G = (W / 3.5) + 3 + 2(N - 1)
12				
13				G =
14				
15				G = _____ seconds
16				
17				
18				
19				
20				
21				T = Total survey time X 60
22				
23				T = _____ minutes X 60
24				
25				T = _____ seconds
26				
27				
28				
29				
30				
31				
32				
33				
34				D = (T - t) / T
35				
36				
37				D =
38				
39				
40				D = _____ %
41				
42				
43				
44				
Over				

"t" = _____ seconds

"t" = Total time of all gaps equal to or greater than "G"

Exhibit No. B-3

Appendix C

Determination of the Need for Traffic Control at School Crossings

The need for some special form of protection can be determined by using Exhibit C-1. By plotting the percent pedestrian delay (D) on the horizontal axis and the width of street (W) on the vertical axis, a point will be found in relation to the appropriate pedestrian group line (N).

a. If the point is to the left of the line for the pedestrian group size being considered, no special form of traffic control is needed. However, certain signs, markings, parking restrictions, and special speed zones may be appropriate, as described later. (Point "A" on Exhibit C-1 is an illustration of this situation.)

b. On the other hand, if the point is to the right of the line for the pedestrian group size (as indicated by point "B" on Exhibit C-1) some special form of control, such as described later, will be needed.

Note that this analysis does not identify the measure, which will alleviate the hazard. It does, however, separate those locations for which special controls should be provided from those locations, which need little or no treatment, based on a factual study of actual conditions. Furthermore, an indication of priority can be obtained by noting how far to the right a point is in relation to its group size (N number). For example, let points "P" and "Q" represent two locations where the following field conditions exist:

P	Q
N = 6	N = 1
W = 40'	W = 55'
D = 70%	D = 70%

The borderline between control needed and not needed occurs at D = 59% (N = 6) for location "P," a difference of 11 from the situation as measured in the field. For location, "Q" the corresponding difference is 1. Therefore, this would indicate that conditions at "P" are more serious and should be corrected first.

DETERMINATION OF NEED FOR TRAFFIC CONTROL AT SCHOOL CROSSINGS

LOCATION:_____ DATE:_____

TIME OF STUDY:_____

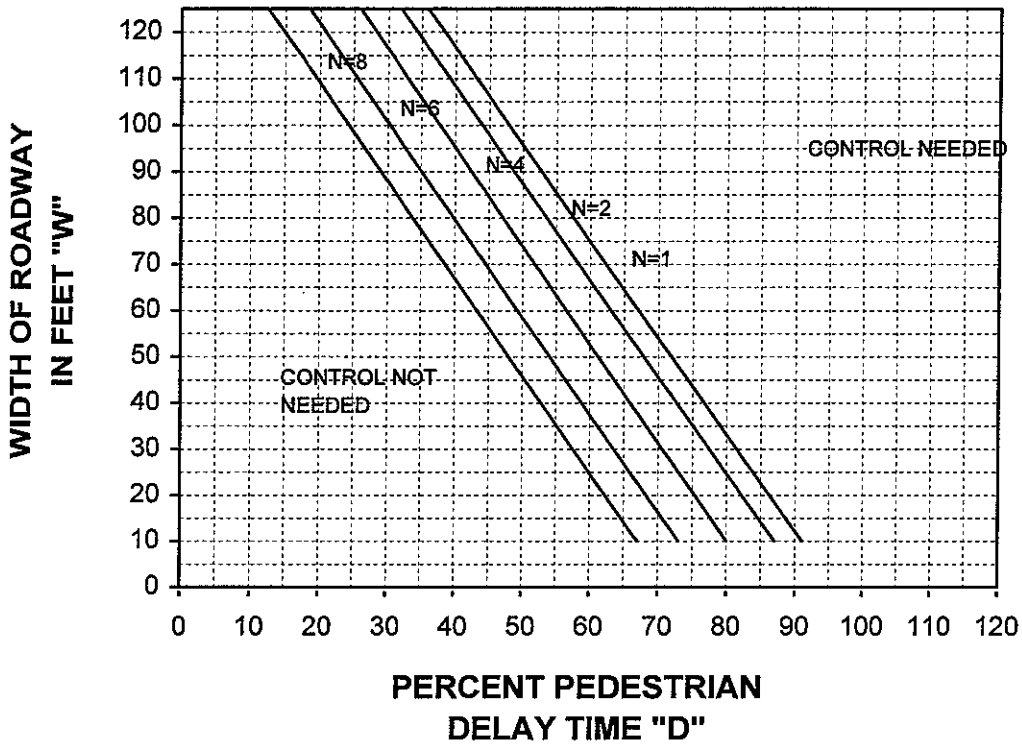


Exhibit No. C-1

Appendix D

Analysis of School Crossing at Signalized Intersections

In the body of this booklet, the analysis has assumed that traffic control signals have not been installed at the location under study. However, certain school crossings may be located at complicated and congested signalized intersections where heavy turning movements create confusion and hazard, particularly for small children. Specials controls of the type discussed earlier may be necessary to assist children at these locations.

Hazard is created as right- and left-turning vehicles (moving on the same green signal interval as the children) traverse the pedestrian crosswalk being used by the children. This hazard is determined by measuring those gaps which are equal to or greater than the Adequate Gap Time (G) in the traffic turning across the crosswalk. In this instance, the width of roadway (W) is equal to one half of the roadway, since the children are "protected" on the other half by vehicles waiting for the green light on the cross street. Except for one further consideration, the need for additional traffic control is calculated in the same manner and with the same equations used previously.

The additional item of information which must be considered is the cycle length of the traffic control signals. The cycle length is the factor "C" in the following equation for the family of lines, which appear on the graph in Exhibit C-1.

$$D_a = \frac{(C - G)100}{C}$$

Where D_a = Allowable Pedestrian Delay Time (in percent)

C = Cycle Length

G = Adequate Gap Time

Since $G = \frac{W}{3.5} + 3 + (N - 1)2$,

the equation can be written as:

$$D_a = 1 - \frac{\frac{W}{3.5} + 3 + (N-1)2}{C} 100$$

"D_a," which by definition is the maximum delay time that is acceptable to a pedestrian, is equivalent to the green and yellow vehicle signal interval of a hypothetical traffic signal. The Adequate Time Gap (G) is used as the green and yellow signal interval of the pedestrian phase. The Allowable Delay Time is found by subtracting the Adequate Gap Time from the signal cycle (C).

In developing the graph in Exhibit C-1, "C" was assumed to be 60 seconds. At a signalized intersection, if "C" does not equal 60, it will be necessary to calculate "D_a" using the above equation.

To determine whether or not a special form of protection or control is needed, the calculated "D_a" is compared with "D," the actual percentage of pedestrian delay, as found by field studies. If "D" is less than "D_a," no special steps need be taken. Conversely, if "D" is greater than "D_a," one or more of the control or warning measures set forth may be appropriate.

Note that in cases where "D" is greater than "D_a" the difference can be used to set priorities for undertaking installation of controls among several locations.

Appendix E

Engineering Division Policy for

School Speed Limit Sign Beacon

A Speed Limit Sign Beacon is two circular yellow lens sections, each having a visible diameter of not less than six inches, or alternately, one or more circular yellow lenses, each having a visible diameter of not less than eight inches.

The yellow lens color shall be in accordance with the requirements of the Standard for Adjustable Face Vehicle Traffic Control Signal Heads, Revised 1977.

Where two lens sections are used, they shall be vertically aligned, except that they may be horizontally aligned if the speed sign is longer horizontally than vertically, and they shall be alternately flashed.

Speed Limit Sign Beacons shall be flashed at a rate of not less than 50 nor more than 60 times per minute. The illuminated period of each flash shall be not less than one-half and not more than two-thirds of the total cycle.

All flashing contacts should be equipped with a filter for suppression of radio interference.

When illuminated, the Speed Limit Sign Beacon shall be clearly visible to all drivers it faces for a distance of at least a quarter of a mile, under normal atmospheric conditions, unless otherwise physically obstructed.

A Speed Limit Sign Beacon is intended for use with a fixed or variable speed limit sign, to indicate that the speed limit shown is in effect. The lenses of a Speed Limit Beacon when used with a School Speed Limit Sign may be positioned within the face of the sign.

Effective January 15, 1981, a Speed Limit Sign Beacon may be installed along the streets and highways of Sioux Falls in addition to the School Speed Limit Sign providing four (4) or more of the following warrants are met:

1. The speed limit on the street or highway in question when school is not in session is 30 miles per hour or more.
2. During the period of time that the school speed limit is 15 miles per hour is in effect, 15 percent or more of the vehicles are exceeding 25 miles per hour and adequate trial of enforcement has failed to reduce this number to less than 15 percent. (Adequate trial of enforcement shall mean that police surveillance and enforcement of not less than two vehicles per school week for a period of three weeks, then reverting to a normal enforcement effort.)

3. The number of students crossing the street at an intersection exceeds 30 in any half-hour time period during school hours.

4. The volume of traffic is 250 vehicles per hour or greater during normal school hours on the street under consideration.

5. The traffic utilizing the street or highway is comprised of 10 percent or more trucks and commercial vehicles. (Trucks and commercial vehicles shall mean any vehicle with six or more wheels on the ground or which exceeds 10,000 G.V.W.)

6. If the preceding criteria should not exist to the extent otherwise required, the City Traffic Engineer at his/her discretion may determine that other conditions exist which may satisfy one warrant.

School Speed Limit Sign Beacons shall not be installed where a traffic signal exists within a school speed zone of 250 feet or less in length.

1-26-81
Rick Knobe, Mayor — date

1-25-81
A. D. Genzlinger, Traffic Engineer — date