Safe Routes to School Briefing Sheets

School Site Selection and Off-site Access

INTRODUCTION

Many studies and programs, including Safe Routes to School, are currently geared toward promoting safety for pedestrians, bicyclists, and other users of nonmotorized modes of getting to and from school. These studies and programs typically cite two key benefits: (a) lowered vehicle demand and (b) exercise for children. The location of a school can influence levels of physical activity. Schools should be located to allow easy walking and bicycling for the children who will attend the school. Location varies considerably for elementary schools, middle or junior high schools, and high schools. Schools should provide pedestrian and bicycle access from all sides of their campus.

A central principle of traffic safety is to eliminate or minimize conflicts, such as those between streams of moving vehicles and between pedestrians and vehicles. When conflicts cannot be avoided, measures should be taken to minimize speeds. When designing a new school site, the various design components (buildings, driveways, walkways, bus loading areas, parking lots, etc.) should be positioned to eliminate or minimize conflicts.

SITE SELECTION

The selection of a site for a new school greatly influences the resulting design and operations of the facility. For example, if the site is located on a high-speed two-lane highway, there will be vehicles near the school traveling at high speeds and congestion will probably occur during drop-off and pick-up times due to the lack of turn lanes. Another example is a school site in a remote location with natural barriers, or built barriers such as railroad tracks. Few children will probably walk or bike to the school due to distance and limited travel paths. Siting a school within a (walkable) residential area will decrease vehicle trips and alleviate many of the conflicts discussed in this briefing sheet.

Many studies show that the distance between home and school is the strongest predictor of whether students walk or bike to school. According to National Household Travel Survey data[1] in 1969, 48 percent of K–8th grade students usually walked or bicycled to school. By 2009, only 13 percent of K–8th grade students usually walked or bicycled to school. School siting that supports walking or biking to school can influence levels of physical activity. Schools should be located in environments that contribute to the livability, sustainability, and public health of neighborhoods and communities.

The U.S. Environmental Protection Agency, in consultation with the Departments of Education and Health and Human Services, developed model guidelines for siting school facilities.[2] The *School Siting Guidelines* aim to encourage, inform, and improve consideration of environmental factors in local school siting decision-making processes. The guidelines specifically recommend:

- Locating a school such that a large portion of the student body lives within 1/2 mile (elementary) to 1 1/2 miles (high school) of the school; and
- Ensuring that safe routes to and from school are available for students.

It is desirable to locate school sites with appropriate access from the adjacent roadway, walkway, and bikeway networks. One of the widely accepted site selection criteria is to avoid locations with direct access to high-speed roadways. Others are to provide access from more than one direction to the immediate vicinity of the site, and provide access to the site from at least two adjacent streets. Access from more than one street has several potential benefits, including easier separation of parent and bus operations, better driveway spacing, and greater dispersion of traffic into and out of the site.

ROAD NETWORK

Schools need to be accessible from a street system capable of handling both school and nonschool traffic. Not only should current traffic volumes be manageable, but consideration must be given to reasonably anticipated growth in traffic. Other considerations include availability of right-of-way for sidewalks, bike lanes, and/or turn lanes (if not already present) and feasibility of establishing a reduced school speed limit zone. Accommodation of pedestrian and bicycle traffic is especially important in areas surrounding schools. The siting needs of an elementary school within the road network differ significantly from those of a high school. Elementary school siting should avoid streets that carry high volumes of traffic and higher speeds. Those streets are incompatible with the slow speeds of vehicles trying to access the school during school peak periods and with the pedestrian skills of younger children. Elementary and middle schools should be located on a collector street, and preferably at the intersection of two collector streets. Schools should not be located at the end of a cul-de-sac or have only one primary vehicle access.

SIDEWALKS

Sidewalks and designated paths leading to schools promote the use of nonmotorized modes of travel. For better pedestrian comfort, especially adjacent to high-speed traffic, it is desirable to provide a buffer space between the traveled way and the sidewalk. For rural sections without curb and gutter, sidewalks should be placed between the ditch and right-of-way line if practical. Sidewalks should be wide enough to accommodate the volume and type of pedestrian traffic expected in the area. They should be wider than minimum in the immediate vicinity of schools, where there are heavier pedestrian volumes.

Sidewalks will more likely be used if they are well-maintained and free of debris, encroaching shrubbery, and tree limbs. Bumps and uneven surfaces created by settling or underlying tree roots can cause tripping and discourage sidewalk use by students traveling by foot and in wheelchairs. Public works agencies must not pile snow on sidewalks when clearing snow from streets and should clear curb ramp accessways to sidewalks.

MAJOR CROSSINGS

One way to encourage pedestrian and bicycle access is to supplement marked crosswalks with crossing guards. It is also important to consider on-site crosswalks, particularly those across entrance driveways where vehicles may turn in conflict with pedestrians or bicyclists.

The provision of a student pedestrian and cyclist queuing area at major crossings could decrease conflicts between waiting students and traffic. Phoenix, Arizona, USA, developed wider student queuing areas and painted “stand-back lines” to delineate where students should stand while waiting at crosswalks for busy street crossings.[3]

The *School Area Traffic Control Briefing Sheet* also provides guidance on traffic control devices for major crossings, such as pavement markings, beacons, and signals.

ROAD ALIGNMENT

Adequate sight distance near school exits and entrances is important for safe and efficient traffic operations. If the school site is located on a tangent section of roadway that is relatively flat, then sight distance is typically not an issue. If the site is located along a road with horizontal and/or vertical curvature, then good visibility might be a challenge. An example of this concern is when the queue of vehicles in the parent drop-off zone extends beyond the driveway and vehicles on the adjacent roadway encounter stopped traffic just after rounding a tight horizontal or vertical curve.

Other guidance regarding alignment includes:

- All roads within the school site should have a maximum grade of 5 percent to avoid configurations that could impair a motorist’s vision.
- The location of driveways, buildings, landscaping, fences, block walls, and the school signs that typically mark the main entrance must permit adequate sight distances for drivers and pedestrians.
- The placement of the pedestrian crossing, along with the signs and markings selected for the crossing, should consider the existing horizontal and vertical curves on the approaches to the crossing.

TURNING LANES

The presence—or rather, the absence—of a turn lane, especially when considering the intense peaking associated with a school, can affect traffic operations around the school. The congestion, in turn, can influence the operations and safety of the pedestrian and bicyclist school trips. Some agencies have guidelines for the installation and design of turn lanes for access to adjacent sites, while others cite the AASHTO *Policy on Geometric Design of Streets and Highways*—also known as the Green Book—as a primary source for their turning lane criteria.[4] Installation of turn lanes is particularly important to consider when school sites are located on high-speed roadways, where separation of turning movements from through traffic provides operational and safety benefits.

School sites generate substantial peaks of traffic during relatively short periods. These peaks must be considered in the design and layout of turn lanes to school sites. When a turn lane is not provided, drivers will use a shoulder (if present) as a de facto right-turn lane or will cause stopped traffic on the neighboring streets. When a turn lane is insufficient to handle the queues, drivers will spill back onto the through lanes because of the high traffic demand and the inadequate length of the turn lane. In both of these scenarios, the resulting congestion will be associated with delay and weaving maneuvers as drivers attempt to bypass the queues.

The addition of a turn lane increases the distance pedestrians must walk when crossing the major roadway. Accompanying the turn lane with a raised median can provide pedestrians a refuge area within the crossing. If the location is signalized, the wider crossing could also affect the signal timing and may require a longer waiting period for pedestrians. The operational and safety trade-offs for vehicles, pedestrians, and bicyclists should be considered when deciding whether to install a turn lane.

ONE-WAY OPERATIONS

In certain situations, one-way operation of streets and school driveways can reduce or eliminate conflicts that cause congestion or safety problems. One-way operation can be considered when:

- A narrow street fails to function effectively under two-way operations either all or some of the time, such as during drop-off and pick-up times;
- Opposing left turns cause congestion;
- The preference is to eliminate cut-through traffic in a residential area; or
- There is a need to decrease turning conflicts, which could improve safety for the area.

A one-way street has advantages in reducing conflicts with turning traffic and in limiting the number of traffic directions conflicting with pedestrians. Disadvantages are that speeds may be higher than in two-way operations, and motorists must take a circuitous route to reach their destination. The direction of the one-way operation should be such that children do not need to exit their vehicle from the street side.

When a new one-way street is proposed—either as a temporary, part-time measure or as a full-time solution—a traffic analysis needs to be done to identify advantages and disadvantages to the pedestrian, bicycle, and vehicle traffic networks. The change could affect neighborhood traffic circulation and possibly even influence arterial-level traffic, depending on the location of the school. The traffic analysis should explore how best to implement the treatment, including whether the treatment should be part- or full-time and whether two-way bicycle traffic operation should be allowed with the one-way vehicle restriction.

REFERENCES

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3. Cooner, S.A., K. Fitzpatrick, M.D. Woolridge, G.L. Ford. *Traffic Operations and Safety at Schools: Recommended Guidelines.* Report No. 0-4286-2, Texas Transportation Institute, College Station, TX, 2004.
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