PennDOT LTAP
technical
INFORMATION
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Effective Stop Sign Placement

STOP signs are one of the most common traffic signs and also one of the most often misused. A STOP sign is intended to assign right-of-way at intersecting street locations; however, they are often misused to address speeding concerns. Fortunately, there are warrants that provide guidance for the proper and effective placement of STOP signs.

Stop Sign Warrants

A warrant is a guideline to determine the need for installation of a sign rather than absolute criteria. The use of a warrant, tempered with professional judgment and local knowledge, will result in effective implementation. STOP signs should only be used where warranted since they can cause substantial inconvenience to motorists.

For example, knowledge of the local road system will quickly identify problem/crash areas that you may improve by proper sign placement. Local police officers or other municipal employees can collect the data to evaluate the STOP sign warrants listed below. As outlined in the MUTCD, the following factors should be considered to properly evaluate the warrants:

- Vehicular, bicycle, and pedestrian-traffic volumes on all approaches;
- Number and angle of approaches;
- Approach speeds;
- Sight distance available on each approach; and
- Reported crash experience.

The review of intersection geometry, adjacent roadway features, and vehicle speeds through the area are also necessary to accurately determine the placement of proposed STOP signs.

STOP sign warrants are outlined in Section 2B.04 and Section 2B.06 of the MUTCD (http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm) and PennDOT's Publication 212, *Official Traffic Control Devices,* which can be found on PennDOT's Forms and Publications webpage and is also available at ftp://ftp.dot.state.pa.us/public/PubsForms/Publications/PUB%20212.pdf. The following warrants are found in these publications:

MUTCD

Section 2B.04 of the MUTCD states that STOP signs should be used if engineering judgment indicates that one or more of the following conditions exist:

A) Intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;
B) Street entering a designated through highway or street; and/or
C) Unsignalized intersection in a signalized area.

In addition, the use of YIELD or STOP signs should be considered at the intersection of two minor streets or local roads where the intersection has more than three approaches and where one or more of the following conditions exist:

A) The combined vehicular, bicycle, and pedestrian volume entering the intersection from all approaches averages more than 2,000 units per day;
B) The ability to see conflicting traffic on an approach is not sufficient to allow a road user to stop or yield in compliance with the normal right-of-way rule if such stopping or yielding is necessary; and/or
C) Crash records indicate that five or more crashes that involve the failure to yield the right-of-way at the intersection under the normal right-of-way rule have been reported within a three-year period or that three or more such crashes have been reported within a two-year period.

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Section 2B.04 goes on to state that STOP signs should not be used for speed control. They should be installed in a manner that minimizes the numbers of vehicles having to stop. At intersections where a full stop is not necessary at all times, consideration should be given to using less restrictive measures, such as YIELD signs (see Section 2B.08).

After the decision has been made to install two-way stop control, deciding on the appropriate street to stop should be based on engineering judgment. In most cases, the street carrying the lowest volume of traffic should be stopped. A STOP sign should not be installed on the major street unless justified by a traffic engineering study. See the LTAP Technical Information Sheet #140, *Multiway Stop Sign Installation,* for additional information on controlling intersections with multiway stops.

Section 2B.06 of the MUTCD states that the use of STOP signs on the minor-street approaches should be considered if engineering judgment indicates that a stop is always required because of one or more of the following conditions:

A) The vehicular traffic volumes on the through street or highway exceed 6,000 vehicles per day;
B) A restricted view requires road users to stop in order to adequately observe conflicting traffic on the through street or highway; and/or
C) Crash records indicate that three or more crashes that are susceptible to correction by the installation of a STOP sign have been reported within a 12-month period, or that five or more such crashes have been reported within a two-year period. Such crashes include right-angle collisions involving road users on the minor-street approach failing to yield the right-of-way to traffic on the through street or highway.

The following considerations might influence the decision regarding the appropriate street upon which to install a STOP sign where two streets with relatively equal volumes and/or characteristics intersect:

A) Controlling the direction that conflicts the most with established pedestrian crossing activity or school walking routes;
B) Controlling the direction that has obscured vision, dips, or bumps that already require drivers to use lower operating speeds; and
C) Controlling the direction that has the best sight distance from a controlled position to observe conflicting traffic.

Publication 212

Publication 212 adds additional STOP sign warrants including:

212.106(a): Approaches to through highways
212.106(b): On a channelized right-turn roadway at a signalized intersection where:

A) the traffic-control signals are not readily visible, and
B) the right-turn roadway does not have separate signals, and
C) a yield sign is not appropriate.

212.106(d) (1): One-lane bridges and underpasses
212.106(d) (2): Crossings
212.106(d) (3): Private roads and driveways
212.106(d) (4): Truck pulloffs and hazardous grades
212.106(d) (5): Temporary traffic control

Ordinances

A STOP sign needs an ordinance to make it "legal" and enforceable. Once you complete your engineering and traffic study examining the above mentioned warrants and documenting all findings and results, work with your solicitor to craft or amend the appropriate ordinance.

Improper Use of Stop Signs

Unfortunately, STOP signs are commonly placed in an effort to control speed on local streets, even though the MUTCD states that STOP signs should not be used for speed control. Many people believe that forcing motorists to stop at each intersection will decrease overall speed on the road. However, studies show that STOP signs only reduce speed immediately adjacent to the sign. Many drivers accelerate between intersections to make up for time lost at the STOP sign. Engineering studies indicate that the inappropriate installation of extra STOP signs may cause additional problems, such as more rear-end collisions, a redistribution of traffic onto side streets, wasted fuel, and drivers ignoring the inappropriate STOP signs. If speed control is a concern, municipalities can use PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook,* to help with addressing this problem.

Stop Sign Placement

In addition to warrants, the MUTCD also provides STOP sign placement standards and guidance in Section 2B.10. This section states that STOP signs must be located on the right side of the approach to which it applies, as close as practical to the intersection it regulates, while optimizing its visibility to the road user it is intended to regulate. Signs in other locations should be considered only as supplementary to signs in the standard locations except as otherwise indicated in Section 2A.16 of the MUTCD.

When a STOP sign is installed at the required location and the sign visibility is restricted, a STOP AHEAD sign (see Section 2C.36) must be installed in advance of the STOP sign. In non-urban areas, STOP signs should be placed 6 to 12 feet from the

edge of the travel way of the intersecting roadway. In urban areas with sidewalks/curbs, STOP signs should be placed a minimum of 4 feet in front of crosswalks and not less than 2 feet from the face of curb. These are shown in Figure 2A-2 and 2A-3 of the MUTCD.

Section 2A.19 supports this and indicates that in areas where lateral offsets are limited, a minimum lateral offset of 2 feet may be used. A minimum offset of 1 foot from the face of the curb may be used in urban areas where sidewalk width is limited or where existing poles are close to the curb.

Here are a few other practical tips to consider when placing a STOP sign:

- The standard size for a STOP sign is 30" by 30" on a single-lane road and 36" by 36" on a multi-lane road.
- No sign should be mounted back-to-back with a STOP sign in a manner that obscures the shape of a STOP sign.
- Section 2A.16 contains additional information about separate and combined mounting of other signs with STOP signs.
- STOP lines, when used to supplement a STOP sign, should be located at the point where the road user should stop (see Section 3B.16).
- Never install two STOP signs on the same post. If greater emphasis is required, install a larger STOP sign or install a second STOP sign on the left side of the road.
- If only one STOP sign is installed on an approach, the STOP sign should not be placed on the far side of the intersection.
- Where two roads intersect at an acute angle, the STOP sign should be positioned at an angle, or shielded, so that the legend is out of view of traffic to which it does not apply.
- At wide-throat intersections or where two or more approach lanes of traffic exist on the signed approach, observance of the stop control may be improved by the installation of an additional STOP sign on the left side of the road and/or the use of a STOP line.

Lastly, unless protected by guiderail or installed beyond the clear zone, all sign posts must be of PennDOT-approved breakaway design. This applies to all new installation and replacement of existing STOP signs.

Suggestions for Improving Sign Visibility

A common issue with STOP signs is the visibility of the sign as the motorist approaches the intersection. Here are some suggestions to help improve the visibility of the STOP sign as motorists approach the intersection:

- Increasing the sign size
- Adding reflective post striping
- Adding a supplemental sign on the left side of the road
- Adding STOP AHEAD sign (if warranted per sign visibility criteria)
- Trimming/removing obstructions/vegetation
- Adding a red flashing light to the sign
- Adjusting the sign position/placement
- Adding pavement markings, such as STOP bars and STOP AHEAD text

Final Note

By following the appropriate steps prior to installing STOP signs, a municipality may use STOP signs to reduce crashes and properly regulate traffic through an area. Improper signing and ignoring the warrants create dangerous conditions for both drivers and the responsible municipality. In addition, unwarranted or substandard traffic-control devices that contribute to a crash can sometimes be grounds to award judgment against an agency involved in a legal dispute.

If you have any questions, you can call LTAP at 1-800-FOR-LTAP for assistance.