

CHAPTER 4B. TRAFFIC CONTROL SIGNALS GENERAL

Section 4B.01 General

Support:

- 01 Words such as pedestrians and bicyclists are used redundantly in selected Sections of Part 4 to encourage sensitivity to these elements of “traffic.”
- 02 Standards for traffic control signals are important because traffic control signals need to attract the attention of a variety of road users, including those who are older, those with impaired vision, as well as those who are fatigued or distracted, or who are not expecting to encounter a signal at a particular location.

Section 4B.02 Basis of Installation or Removal of Traffic Control Signals

Guidance:

- 01 *The selection and use of traffic control signals should be based on an engineering study of roadway, traffic, and other conditions.*

Support:

- 02 A careful analysis of traffic operations, pedestrian and bicyclist needs, and other factors at a large number of signalized and unsignalized locations, coupled with engineering judgment, has provided a series of signal warrants, described in Chapter 4C, that define the minimum conditions under which installing traffic control signals might be justified.

Guidance:

- 03 *Engineering judgment should be applied in the review of operating traffic control signals to determine whether the type of installation and the timing program meet the current requirements of all forms of traffic.*
- 04 *If changes in traffic patterns eliminate the need for a traffic control signal, consideration should be given to removing it and replacing it with appropriate alternative traffic control devices, if any are needed.*
- 05 *If the engineering study indicates that the traffic control signal is no longer justified, and a decision is made to remove the signal, removal should be accomplished using the following steps:*
- A. *Determine the appropriate traffic control to be used after removal of the signal.*
 - B. *Remove any sight-distance restrictions as necessary.*
 - C. *Inform the public of the removal study.*
 - D. *Flash or cover the signal heads for a minimum of 90 days, and install the appropriate stop control or other traffic control devices.*
 - E. *Remove the signal if the engineering data collected during the removal study period confirms that the signal is no longer needed.*

Option:

- 06 Because Items C, D, and E in Paragraph 5 are not relevant when a temporary traffic control signal (see Section 4D.32) is removed, a temporary traffic control signal may be removed immediately after Items A and B are completed.
- 07 Instead of total removal of a traffic control signal, the poles, controller cabinet, and cables may remain in place after removal of the signal heads for continued analysis.

Section 4B.03 Advantages and Disadvantages of Traffic Control Signals

Support:

- 01 When properly used, traffic control signals are valuable devices for the control of vehicular and pedestrian traffic. They assign the right-of-way to the various traffic movements and thereby profoundly influence traffic flow.
- 02 Traffic control signals that are properly designed, located, operated, and maintained will have one or more of the following advantages:
- A. They provide for the orderly movement of traffic.
 - B. They increase the traffic-handling capacity of the intersection if:
 1. Proper physical layouts and control measures are used, and
 2. The signal operational parameters are reviewed and updated (if needed) on a regular basis (as engineering judgment determines that significant traffic flow and/or land use changes have occurred) to maximize the ability of the traffic control signal to satisfy current traffic demands.
 - C. They reduce the frequency and severity of certain types of crashes, especially right-angle collisions.
 - D. They are coordinated to provide for continuous or nearly continuous movement of traffic at a definite speed along a given route under favorable conditions.
 - E. They are used to interrupt heavy traffic at intervals to permit other traffic, vehicular or pedestrian, to cross.

- 03 Traffic control signals are often considered a panacea for all traffic problems at intersections. This belief has led to traffic control signals being installed at many locations where they are not needed, adversely affecting the safety and efficiency of vehicular, bicycle, and pedestrian traffic.
- 04 Traffic control signals, even when justified by traffic and roadway conditions, can be ill-designed, ineffectively placed, improperly operated, or poorly maintained. Improper or unjustified traffic control signals can result in one or more of the following disadvantages:
- A. Excessive delay,
 - B. Excessive disobedience of the signal indications,
 - C. Increased use of less adequate routes as road users attempt to avoid the traffic control signals, and
 - D. Significant increases in the frequency of collisions (especially rear-end collisions).

Section 4B.04 Alternatives to Traffic Control Signals

Guidance:

- 01 *Since vehicular delay and the frequency of some types of crashes are sometimes greater under traffic signal control than under STOP sign control, consideration should be given to providing alternatives to traffic control signals even if one or more of the signal warrants has been satisfied.*

Option:

- 02 These alternatives may include, but are not limited to, the following:
- A. Installing signs along the major street to warn road users approaching the intersection;
 - B. Relocating the stop line(s) and making other changes to improve the sight distance at the intersection;
 - C. Installing measures designed to reduce speeds on the approaches;
 - D. Installing a flashing beacon at the intersection to supplement STOP sign control;
 - E. Installing flashing beacons on warning signs in advance of a STOP sign controlled intersection on major-and/or minor-street approaches;
 - F. Adding one or more lanes on a minor-street approach to reduce the number of vehicles per lane on the approach;
 - G. Revising the geometrics at the intersection to channelize vehicular movements and reduce the time required for a vehicle to complete a movement, which could also assist pedestrians;
 - H. Revising the geometrics at the intersection to add pedestrian median refuge islands and/or curb extensions;
 - I. Installing roadway lighting if a disproportionate number of crashes occur at night;
 - J. Restricting one or more turning movements, perhaps on a time-of-day basis, if alternate routes are available;
 - K. If the warrant is satisfied, installing multi-way STOP sign control;
 - L. Installing a pedestrian hybrid beacon (see Chapter 4F) or In-Roadway Warning Lights (see Chapter 4N) if pedestrian safety is the major concern;
 - M. Installing a roundabout; and
 - N. Employing other alternatives, depending on conditions at the intersection.

Section 4B.05 Adequate Roadway Capacity

Support:

- 01 The delays inherent in the alternating assignment of right-of-way at intersections controlled by traffic control signals can frequently be reduced by widening the major roadway, the minor roadway, or both roadways. Widening the minor roadway often benefits the operations on the major roadway, because it reduces the green time that must be assigned to minor-roadway traffic. In urban areas, the effect of widening can be achieved by eliminating parking on intersection approaches. It is desirable to have at least two lanes for moving traffic on each approach to a signalized location. Additional width on the departure side of the intersection, as well as on the approach side, will sometimes be needed to clear traffic through the intersection effectively.

Guidance:

- 02 *Adequate roadway capacity should be provided at a signalized location. Before an intersection is widened, the additional green time pedestrians need to cross the widened roadways should be considered to determine if it will exceed the green time saved through improved vehicular flow.*
- 03 *Other methods of increasing the roadway capacity at signalized locations that do not involve roadway widening, such as revisions to the pavement markings and the careful evaluation of proper lane-use assignments (including varying the lane use by time of day), should be considered where appropriate. Such consideration should include evaluation of any impacts that changes to pavement markings and lane assignments will have on bicycle travel.*