

REPORT OF COMMITTEE ON WARRANTS FOR PEDESTRIAN WALK SIGNALS

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In cities one-half to three-quarters of the traffic deaths are to pedestrians and a recognition of this fact is causing attention to be focused on the pedestrian problem. Ten to 15 per cent of the urban pedestrian problem is centered at signalized intersections. In spite of the fact that two to three times as many pedestrians are killed while crossing against the signal as obeying it, thousands of dollars are being spent on signal control.

In recognition of these facts, this committee was appointed to investigate various methods of regulating pedestrian traffic by means of signals, to evaluate their effectiveness, and to recommend the principles upon which future application of traffic signals for pedestrian control should be based.

The committee undertook by questionnaire to learn the experience in cities with pedestrian signal control where pedestrian programs have been publicized or where pedestrian signal equipment has been purchased. The returns indicated a wide variety of methods for operating pedestrian signals, a lack of uniformity in the pedestrian signal indication, and an inadequacy of data as to the effect of pedestrian signals on pedestrian observance and pedestrian accidents.

For clarifying the responsibilities of pedestrians and motorists the committee recommends legislation of which the principal features are as follows: (a) Requires pedestrian to start to cross the street only on a green or walk signal, (b) Prohibits pedestrian from crossing street at any point between intersections unless a crosswalk has been officially designated, (c) Requires vehicles waiting at a signalized intersection to remain absolutely stationary until their signal displays a green signal and the green signal only, and (d) Requires motorists to yield the right-of-way to pedestrians who have legally entered the street on a green or walk signal until those pedestrians have reached a point of safety.

Under such a law, the pedestrians would sacrifice some of their freedom of movement at signalized intersections and in compensation a clearer responsibility for the pedestrians' safety would be placed upon the motorist.

The report also contains the committee's recommendation for circumstances under which pedestrian walk signals should be used. They are, (a) To identify an absolute free period for pedestrians, (b) to advise pedestrians as to the best time to cross, (c) to give the pedestrian information on when it is safe to cross which he would not otherwise discover from the signals, (d) to give pedestrians information at intersections where split signal heads are in use.

In cities one-half to three-quarters of the traffic deaths are to pedestrians. As this fact is more generally appreciated, major attention is coming to be focused on the pedestrian problem. Ten to 15 per cent of the urban pedestrian problem is centered at signalized intersections. In spite of the fact that two to three times as many pedestrians are killed while crossing against traffic signals as while obeying them, thousands of dollars are being spent on signal control in the belief that it will afford positive pedestrian protection. In concentrated urban areas, the task of

regulating traffic, so that both motorists and pedestrians are equally considered, is becoming increasingly complex.

In recognition of these facts, this committee was appointed to investigate various methods of regulating pedestrian traffic by means of signals, to evaluate their effectiveness, and to recommend principles upon which future application of traffic signals for pedestrian control should be based.

As a first step in its work, the committee undertook by questionnaire to learn the experience in cities where pedestrian

programs have been attracting attention or special pedestrian signal equipment has been purchased. At the same time, the chairman of the committee was able, in his own city, to observe under conditions there present the effect of pedestrian signals of several types employed in several different manners. The principal facts disclosed by these investigations are:

1. Of the 18 cities queried, 12 used special signals for regulating pedestrians and 6 sought pedestrian compliance with the standard signal indications for vehicles.

2. *Type of Signal Used for "Walk" or "Go"*

Standard lens—Walk—White letters—black background	3 Cities
Black letters—white background	3 Cities
Green letters—black background	2 Cities
Standard lens—Walk—Color not specified	3 Cities
Neon—Walk—Red	1 City
Neon—Walk—Blue	1 City
Amber—Red lenses	1 City
Two Red lenses	1 City

3. *Type of Signal Used for "Don't Walk" or "Wait"*

Word "Don't" in Neon lights preceding the word "Walk"	2 Cities
Standard size lens reading—"Wait"	2 Cities
Standard size lens reading—"Stop"	1 City

4. *Location of Pedestrian Signal*

In 10 cities, the special pedestrian lens or signal is mounted immediately below the signal controlling vehicles.

In one locality, special three-color pedestrian signals are mounted in a housing and on a post entirely separate from the signal controlling vehicular traffic.

5. *Method of Operating Pedestrian Signals*

6 cities reported the use of a "Walk" lens which starts simultaneously

with the green signal and cuts off several seconds before the conclusion of the vehicular interval.

In two cities, the "Walk" lens duplicated the green signal for vehicles and was displayed during the full green period.

In the majority of cities reporting, special problems at complicated intersections necessitated specially designed pedestrian signal systems.

6. *Results of Use of Pedestrian Walk Signals*

Of the 18 cities questioned, seven reported that pedestrian obedience to signals was improved by the use of a special "Walk" signal. Only one of the seven submitted substantiating data reporting that prior to the use of special signals, 60.6 per cent of pedestrians observed entered the intersection on the green signal. After the installation of pedestrian signals, the proportion of the pedestrians entering the intersection on the green signal increased to 71.9 per cent (61.4 per cent entering on the "Walk" signal and 10.5 per cent on the green indication following the "Walk" period). Following an intensive program of education and after the pedestrian signals had been further improved, 85.3 per cent of the pedestrians crossing the average downtown intersection entered the street on the green indication. In this same area at a few particularly complicated intersections, the compliance with the "Walk" signal reached a peak of 92.5 per cent.

Six of the cities reported that pedestrian accidents were reduced by the use of the special signal, but data were available only in one case. In that instance, whereas pedestrian injuries decreased 9.9 per cent throughout the entire city, they decreased 16.6 per cent in the area where pedestrian signals were used.

In general, the returns from the questionnaire indicated a wide variety of methods for operating pedestrian signals, a lack of uniformity in the design of the pedestrian signal indication, and an inadequacy of data on the effect of special pedestrian signals on pedestrian observance and accidents.

SHARING THE INTERSECTION

At a typical intersection where pedestrians have not been excluded by physical means, it is necessary that the motorists and pedestrians share together the use of the intersection. In order that the sharing may be fair to each class of traveler, each must be allotted certain rights and be required to meet certain responsibilities. At an intersection controlled by traffic signals, motorists and pedestrians each would benefit from a clarification of their rights and responsibilities. In the bulk of the States, pedestrians' rights and duties at signalized intersections are defined as follows:

Pedestrians Subject to Traffic Control Signals

Pedestrians shall be subject to traffic control signals at intersections as heretofore declared in this act, but at all other places, pedestrians shall be accorded the privileges and shall be subject to the restrictions stated in this article

Red Alone or "Stop"

1 Vehicular traffic facing the signal shall stop before entering the nearest crosswalk at an intersection or at such other point as may be indicated by a clearly visible line and shall remain standing until green or "Go" is shown alone

2 No pedestrian facing such signal shall enter the roadway unless he can do so safely and without interfering with any vehicular traffic

Judging from the pedestrian accident record, this view of pedestrian obedience to traffic signals is inadequate. Further, it does not establish a policy whereby both motorists and pedestrians equitably share in the use of the intersection. The

motorist cannot enter the intersection when faced with a red signal. When he is proceeding with a green signal and seeks to turn, he must yield the right-of-way to pedestrians. Then, if the pedestrian decides it is safe to cross against the red light, the motorist still must yield. In contrast with these restraints upon the motorist, it has been common practice, in view of the pedestrian's exposure to injury, to grant him nearly unrestricted freedom. Entirely aside from the question of equity, such a philosophy not only produces accidents and lessens the pedestrian's regard for traffic regulation in general, but also makes for inefficiency in the operations at a heavily traveled intersection.

The most recently amended Uniform Act Regulating Traffic on Highways approved by the National Conference on Street and Highway Safety, prescribes the following pedestrian behavior at signalized intersections.

Green Alone or "Go"

Pedestrians facing the signal may proceed across the roadway within any marked or unmarked crosswalk

Red Alone or "Stop"

No pedestrian facing such signal shall enter the roadway unless he can do so safely and without interfering with any vehicular traffic

Pedestrian Walk and Wait Signals

Whenever special pedestrian-control signals exhibiting the words "Walk" or "Wait" are in place such signals shall indicate as follows:

- a) WALK—Pedestrians facing such signal may proceed across the roadway in the direction of the signal and shall be given the right-of-way by the drivers of all vehicles
- b) WAIT—No pedestrian shall start to cross the roadway in the direction of such signal, but any pedestrian who has partially completed his crossing on the walk signal shall proceed to a sidewalk or safety island while the wait signal is showing

If traffic signals are properly applied giving due consideration to pedestrians, it

would seem entirely reasonable to require that pedestrians enter the intersection only on the green light whether or not it is supplemented by a walk signal, and to require them to remain on the sidewalk when faced by a red signal whether or not it is supplemented by a "Wait" or "Don't Walk" signal.

It is the belief of the committee that traffic codes should contain the following provisions relating to pedestrian behavior at signalized intersections:

- A. Requiring pedestrians to start to cross the street only on a green or walk signal.
- B. Prohibiting pedestrians from entering the street on a red, wait, or don't walk signal (whichever designation shall be the approved standard)
- C. Requiring vehicles at a signalized intersection to remain stationary until their signal displays a green signal. (If possible, present codes should be strengthened to combat the practice by motorists of starting on the amber before the green signal. Such cheating may jeopardize the last few steps of a pedestrian's passage.)
- D. Requiring motorists to yield the right-of-way to pedestrians who have legally entered the street on a green or walk signal in order to permit those pedestrians to reach a point of safety.
- E. Prohibiting a vehicle approaching an intersection from overtaking and passing any vehicle that is stopped at a cross-walk to permit a pedestrian to cross
- F. Prohibiting pedestrians from crossing the street at any point between intersections controlled by traffic signals unless a crosswalk has been officially designated.

Under such a law, the pedestrian would sacrifice some of his freedom of movement but in compensation the motorist would

be shouldering greater responsibility and traffic operations would be made both safer and more efficient.

To expedite traffic operations based upon a law such as outlined above, certain physical improvements are important. The committee is recommending that motorists be required to yield the right-of-way to any pedestrians crossing their path who have legally entered the intersection on a green or walk signal. The use of islands in the center of wide streets as pedestrian refuges will minimize the amount of waiting time demanded of the motorist; it will enable vehicles waiting on a red signal to start more promptly when the signals change and will likewise facilitate turning movements. According to the committee's recommendations, when it is prescribed that turning vehicles shall yield the right-of-way to pedestrians legally crossing on a green or walk signal, a problem immediately presents itself at intersections where both heavy turning movements and large volumes of pedestrians are present. It is not enough merely to stipulate which traffic shall yield passage to the other—some provisions must be made for clearing both classes of traffic through the intersection. Rather than leaving motorists and pedestrians to compete for the right-of-way, the conflict should be cleared up in a positive manner, either by means of police supervision, by assigning separate signal periods for turning vehicles and pedestrian movements, or by prohibiting the turning movements altogether.

THE OPERATION OF PEDESTRIAN SIGNALS

As the pedestrian accidents have in recent years been accorded greater concern, methods of preventing pedestrian mishaps have received greater thought. One of the results of this development has been a great recent interest in pedestrian control by traffic signals, especially signals designed exclusively for the control and protection of the pedestrian. These

signals and the more elaborate control mechanism required for their use are costly and cut into traffic budgets

This committee's investigation prompts the conclusion that the use of the special walk signal is not in all cases producing the desired results. Obviously, the success of pedestrian control in any community is related to the adequacy of legal authority and the amount of effort devoted to education and enforcement. Over and above these considerations, however, the committee believes that there is not a significant value to using a walk indication under all circumstances. At a standard intersection where short signal cycles are in operation on streets of average width, the walk indication might be in operation for an insignificant portion of the total cycle if it were illuminated only during the period when it is safe for a pedestrian (walking at four feet a second) to enter the street and cross completely to the opposite curb. As long as the green vehicle signal has the meaning to pedestrians recommended by the committee, and drivers strictly yield the right-of-way until pedestrians reach a point of safety, the standard green lens meets the requirements for pedestrian control and protection at many intersections.

With a legal background such as recommended, the committee believes that there are only four situations in which the use of special pedestrian signals are warranted.

- 1 To identify an exclusive pedestrian interval.

When pedestrians are accorded the uninterrupted use of a crossing or entire intersection during a certain signal period, a special indication obviously is needed in addition to the green, amber and red signal for vehicles.

2. To inform pedestrians as to the best time to cross.
 - a) At the average crossing the pe-

destrian is expected to move when vehicles approaching the intersection are stopped from entering that crosswalk. If the signal faces controlling vehicles are so placed as not to be visible to waiting pedestrians, an informative pedestrian signal is required. At every intersection where pedestrians are a factor and where there is not otherwise a signal indication directly facing each pedestrian path, the pedestrian signal is essential

- b) On streets of average or greater width where traffic is moving at high speed and where the volumes of pedestrians crossing through that traffic are reasonably heavy, there is very real danger to any pedestrian caught without warning in the middle of the wide street when the traffic signal changes. To meet this situation, a signal, in addition to the signal controlling vehicular traffic, is warranted to warn the pedestrian when he can no longer enter the street and complete the crossing to the opposite curb or center island before the signal changes. For this purpose, a signal is justified when there are four or more moving lanes for the pedestrian to cross, when the speeds of traffic are above those found normally in a congested business district, and when the volume of pedestrian cross traffic averages 300 persons an hour for six hours a day.¹

¹ This volume of pedestrian traffic is suggested by Section 304, Manual on Uniform Traffic Control Devices, which prescribes that such a volume of pedestrian cross traffic is required to justify the installation of fixed time signals designed for pedestrian protection. The committee feels, however, that research and investigation would be desirable to determine the validity of this warrant

3 To inform the pedestrian when he is expected to cross at intersections where he could not otherwise discover this information from the standard traffic signals.

a) At offset intersections, intersections where signals are operated on more than two phases or where signals provide unusual turn periods, pedestrians frequently cannot tell from looking at the signal which controls vehicles when they are expected to cross over a particular crosswalk. In such cases, it is imperative that the information be afforded the pedestrian by means of a walk indication.

b) At standard intersections where the volume of both turning vehicles and pedestrians is great, it may be desirable to control the turning vehicles and the pedestrians so they are not in conflict. In arriving at such segregation, it is necessary to tell the pedestrian, by means of a walk indication, when he is expected to enter the street.

4. To give pedestrians information at intersections where split signal heads are in use.

At intersections where the signals are split so as to give opposing traffic on the same street different green periods, it is necessary for the pedestrian to cross each half of the street at a different period. A special pedestrian indication is essential in order that the man on foot can know when he should cross each half of the street

STANDARDS FOR PEDESTRIAN WALK SIGNAL

The committee has suggested that there are four conditions under which special walk signals can be used to advantage.

These four circumstances fall into two general classifications—either those which positively identify a clear, unobstructed walk period, or those which inform the pedestrian when he may cross most expeditiously. In the first of the four situations listed, the pedestrian signal identifies an exclusive pedestrian period. In the remaining three cases, the signal is advisory or informative in character. In the first case, the pedestrian has every right to expect a clear and uninterrupted passage. In the latter three cases, his behavior must be quite different and he must constantly be on the alert for turning vehicles. A group of crosswalks in major business districts studied from this point of view indicated that there are 35 per cent (with a range from 10 per cent to 186 per cent) as many vehicles crossing the pedestrian's path when he complies with the green signal as when he violates the signal and crosses on the red. When he does cross on the red, he is concerned with cars passing straight through the intersection; when crossing on the green, he is jeopardized by only a third as many vehicles but they are turning from ahead and behind. Since this condition exists at the majority of intersections where pedestrian volumes are significant, it would appear important that a walk signal operated simultaneously with the green should not be given too high a value as pedestrian protection.

Returns from the questionnaire sent out by the committee indicated a wide variety of pedestrian signal indications to be in use in the different cities. Further, in some cities, several distinct types of walk signals are employed. It would be highly desirable that an agreement be reached as to what should constitute a standard walk indication or indications. Agreement may be deemed necessary on the following points.

1. Wisdom of having two distinct walk indications—one for an exclusive pedestrian period and the other

- when there will be interference from turning vehicles.
2. Form, shape, color, and size of message which will be clearly readable and understandable to pedestrians from a distance and yet at the same time not be confusing to, or misunderstood by, motorists.
 3. The need, in addition to walk indication, of a signal that warns the pedestrian "Stop" or "Don't Walk."

Two national organizations—the Institute of Traffic Engineers and the National Electrical Manufacturers Association—have committees working now to decide upon standards for walk signals. It is recommended that the Highway Research Board communicate with those two groups in order that the recommendations produced by those two highly capable bodies may receive the support of the Highway Research Board.

DISCUSSION ON PEDESTRIAN WALK SIGNALS

MR. C. W. STARK, *U. S. Chamber of Commerce*: Did the committee consider the case of an intersection with a one way street or a "T" intersection? Should there be a walk signal?

MR. SORENSON: Where there is an offset street or other conditions where the vehicle signal cannot be seen by the pedestrian the committee does recommend a walk signal

MR. STARK. I think there should be more emphasis on the importance of having the signal where it can be seen at all times

MR. W. S. CANNING, *Keystone Automobile Club*: I am deeply interested in the development of recommendations for pedestrian signals and am glad the committee has defined to a degree the places where those signals may be used. About a year ago, perhaps two years, I asked if any action was being taken by the committee to recommend a differentiation in size, shape, form or color between the signal intended for pedestrian control and that intended for vehicular control. I think there should be some differential.

At the time I thought my voice was one "crying in the wilderness". At the present time I am not so sure of it. One city at least, Washington, D. C., has

erected pedestrian signals entirely distinctive, separate and apart from the vehicular signal. Some of the figures that have been submitted in the report of the committee indicate a very definite and favorable result in accident reduction by reason of the signal installation and the pedestrian enforcement.

MR. BURTON W. MARSH, *American Automobile Association*: Four warrants, or situations warranting the use of special pedestrian signals, are presented. After reading them, one question remains in my mind. Has due account been taken of the accident experience involving pedestrians? At some signalized intersections there may develop an excessive pedestrian accident record. At such an intersection, whatever its nature, it would seem that consideration should be given to the likelihood that special pedestrian signals would considerably reduce that toll. If analyses indicated such to be the probability, there would seem to be warrant for use of special pedestrian signals. Is such a warrant properly provided for?

MR. SORENSON: The committee has recognized the pedestrian warrants of the National Conference on Street and Highway Safety for standard signal installation. Where you have a progres-

sive signal system with a short cycle the addition of a pedestrian signal would do one of two things, either increase your cycle for a pedestrian crossing period or simply be informative as to when the pedestrian should use the signal.

In the latter case the pedestrian signal would be of the same duration as the present green light because there would be no reasonable period of the short cycle on which you could give a pedestrian cycle sufficient exclusive time. There

would seem to be no particular point in this latter application if the vehicle signals were plainly visible to the pedestrian.

MR. MARSH: Is that covered in your report?

MR. SORENSON: The report makes mention of the type of condition for which pedestrian signals are recommended without specifically discussing all of the types.