SCOTTISH DEVELOPMENT DEPARTMENT

TECHNICAL MEMORANDUM SH6/73

CRITERIA FOR TRAFFIC LIGHT SIGNALS AT JUNCTIONS

TECHNICAL MEMORANDUM SH 6/73 (H1/73)

CRITERIA FOR TRAFFIC LIGHT SIGNALS AT JUNCTIONS

I. GENERAL

1. The following criteria are for interpretation of the objectives of traffic signals and are not intended to be absolute. In particular the minimum traffic figures in Section II below should only be used to justify signal control where a real problem exists and where cheaper and more effective alternative solutions are not available. Traffic flow alone cannot be used to justify control.

2. To deal with future growth, signal installations should not normally be provided with less than 20% reserve capacity or with such other reserve capacity as may be appropriate if there are known future changes in volume or distribution.

3. Occasionally signals may be justified although none of the criteria are fully met but where some of them just fail to be met. Where 2 or more are satisfied to the extent of 80% or more of the values stated below, signals can be considered although other measures may well be found to be more appropriate. Conversely the high cost of the additional safety facilities needed on high speed roads means that such signals cannot be justified where the minimum criteria of Section II or the minimum side road figures in Section III are only just met.

II. REDUCTION OF TRAFFIC CONFLICTS AND DELAYS

MINIMUM TRAFFIC FLOWS

Type of Area	Average hourly flow* in v.p.h. to exceed	
	Total Entering intersection	Contribution from side roads
a. Large Urban Area	500	150
b. Suburban and Small Urban Areas	400	125
c. Elsewhere	300	100

*All the above figures are the average of the flows during the 4 busiest hours of any weekday.

III. INTERRUPTION FOR SIDE ROAD TRAFFIC

4. If side road traffic experiences unreasonable delay or danger in trying to break into a continuous stream of traffic on a major road, signals may be considered. In such cases the total traffic should exceed 1200 vph of which not less than 75 vph

are on the minor road where there is an existing STOP sign, or 100 vph where there is no STOP sign. The relaxation to 75 vph in relation to STOP signs is not appropriate on unrestricted roads. The reason for different criteria with and without a STOP sign is that the gap in major road traffic which would be accepted by a minor road vehicle is less where there is no STOP sign.

These figures are the average of the flows during the 4 busiest hours of any weekday.

5. At lightly trafficked junctions where buses on the side road experience excessive delay in breaking into the traffic stream it may be desirable to consider the installation of traffic signals. For those situations where buses are delayed and traffic signals can reduce the delay without adversely affecting other traffic, a bus on the side road should be regarded as equivalent to 10 vehicles for the purpose of the criteria.

IV. PEDESTRIAN FACILITIES

6. Where pedestrians experience difficulty at a junction at which signals are not justified according to the figures given above then Pelican pedestrian signals, the criteria for which are given in Circular Roads R199 may be the solution. Where the pedestrian crossing is away from the junction guard rails should be considered to channel pedestrians onto the crossing. If it is not possible to site the signals away form the junction, consideration may be given to relax the minor road figures quoted in Section II by up to 50% and to provide signals at the junction with a walk-with traffic or separate pedestrian phase. (Such signals will inevitably introduce delay to vehicular traffic and should only be provided when the pedestrian problem cannot reasonably be resolved by other means eg footbridge).

7. At signals which are justified in accordance with the criteria, consideration should be given to either a walk-with-traffic or a separate pedestrian phase if the concentration of turning traffic exceeds 700 vph during the time that the signal is at green, ie if there is more than one turning vehicle every five seconds of green time or the flow of pedestrians crossing any arm of a junction is greater than 300 per hour. These figures are the average of the flows during the 4 busiest hours of any weekday. The possibility should be also be explored of separating the pedestrian-vehicle conflict from the vehicle-vehicle conflict by installing separate but linked pelican crossing(s) for pedestrians away from the junction.

8. If the introduction of a separate pedestrian phase would result in no spare capacity (and a suitable alternative is not available) consideration should be given to prohibiting certain turning movements or alternatively giving a limited extension of the appropriate intergreen period. The traffic management implications of banned turns should be fully considered taking account of any likely changes in journey times, accidents, environmental conditions and so on. Any additional intergreen period should be time switch controlled so that its use is limited to meeting the pedestrian requirement at peak time.

V. ACCIDENTS

9. To justify the installation of signals on accident grounds alone there should be a record of at least 5 personal injury accidents per year.

VI. POLICE CONTROL

10. Only where police control is regularly exercised for at least 2 hours a day can signals be considered as an alternative to save police manpower. The traffic volume criteria in Section II will generally be satisfied in such cases.

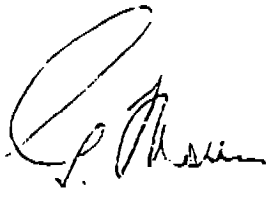
VII. PART-TIME SIGNALS

11. If for at least 2 hours of the day traffic movements at a junction cause either delay or danger, for example if vehicles have to make turning movements through fast and continuous main road traffic, it is recommended that consideration be given to the installation of part-time signals provided that the traffic volumes of paragraph 4 are met during the period concerned and subject to any relaxation justified in accordance with paragraph 3.

12. Part-time signals should not normally be provided solely because of delay to vehicles or personnel using private premises. Exceptional cases involving safety should be referred to the Chief Road Engineer.

VIII. AREA CONTROL AND LINKING SYSTEMS

13. Consideration should be given to linking or operating signals under a single controller where junctions are close together. It may be beneficial to link junctions up to 300 metres apart or greater if platoons are still evident and there would be no adverse effect. The criteria for linked systems is given in Circular R 231.



July 1973

Scottish Development Department
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Telephone 031-556 8433, ext 371 or 423

The County Clerk
The Town Clerk

Your reference

Our reference RE/GT/6/2/Pt F

Date 18 July 1973

CIRCULAR NO R287.

Sir

CRITERIA FOR TRAFFIC SIGNALS AT JUNCTIONS

I. GENERAL

1. Existing published criteria for considering traffic signal control lay down minimum values for daily traffic, or accidents. This at times has tended to preclude consideration of signal control when difficulties arise only in the peak hours, or where the need is primarily for pedestrians. Also the existing criteria do not allow for differences between junctions which are in cities and those in less congested areas. The attached criteria in Technical Memorandum SH6/73 (H1/73) remedy these deficiencies by -

i. basing the traffic flow on the 4 busiest hours in any 24 hours, rather than 12-16 hours;

ii. providing fuller and more realistic guidance to help pedestrians;

iii. giving separate traffic flow criteria for city, suburban and rural sites.

2. As with previously published criteria, it is emphasised that the fact that the criteria are met in any particular instance does not mean that signal control is necessarily appropriate. Other forms of treatment may be cheaper and more effective. In considering the desirability of installing traffic signals where volumes are close to the minimum justification figures it is desirable to bear in mind that under average conditions the delay with signals is likely to exceed the delay without signals if the total traffic is less than 1200 vph at a good visibility site or 800 vph at a poor visibility site.

II. OBJECTIVES

3. Vehicle actuated traffic signals when properly located and operated may be installed to achieve one or more of the following basic objectives -

i. reduce traffic conflicts and delays;

ii. interrupt a continuous stream of main road traffic in order to allow side road traffic to flow;

iii. meet pedestrian needs;

iv. reduce accidents;

v. avoid the necessity for police control;

vi. aid progression in linked or area control schemes.

4. Whilst it is generally possible to identify one of these as the primary object for installing signals - usually (i) - from the point of view of establishing criteria they seldom occur alone. For example, police control is not operated unless there are traffic conflicts and delays and/or a pedestrian problem. Accidents likewise do not result unless there is a conflict.

5. The attached criteria are for interpretation of the above objectives and are not intended to be absolute; Local Authorities are expected to take them into account before submitting any proposal to the Chief Road Engineer. Early consultation with the Chief Road Engineer on detailed design is desirable and can minimise delay in installation. If there are cases where signals are considered justified but the sites do not meet the criteria the reasons for special consideration must be given. Traffic signals for linked and area schemes are not required to meet the criteria of this circular nor are traffic signals outside Fire or Ambulance Stations. These are dealt with separately.

6. Councils will be aware of the need for signal installations to be set up correctly and subsequently be effectively maintained. All signal timing should be calculated for isolated intersections using either the method contained in Road Research Technical Paper No 56 "Traffic Signals" HMSO 1966 or SIGSET: (a computer method developed at University College London, details of which are available from the Traffic Operations Research Group, University of Newcastle upon Tyne). Timings for linked and area systems should be calculated using either the TRANSYT or Combination Method. Similarly, the reasons for installing traffic signals may be nullified if maintenance is poor; erratic operation can cause frustration and result in accidents and may excessively increase delay. Setting should be reviewed periodically or when changes are known to have occurred in traffic distribution.

7. Copies of this circular and of the Technical Memorandum are attached for the information of the Surveyor or Engineer to your Council.

I am Sir
Your obedient Servant

Chief Road Engineer

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