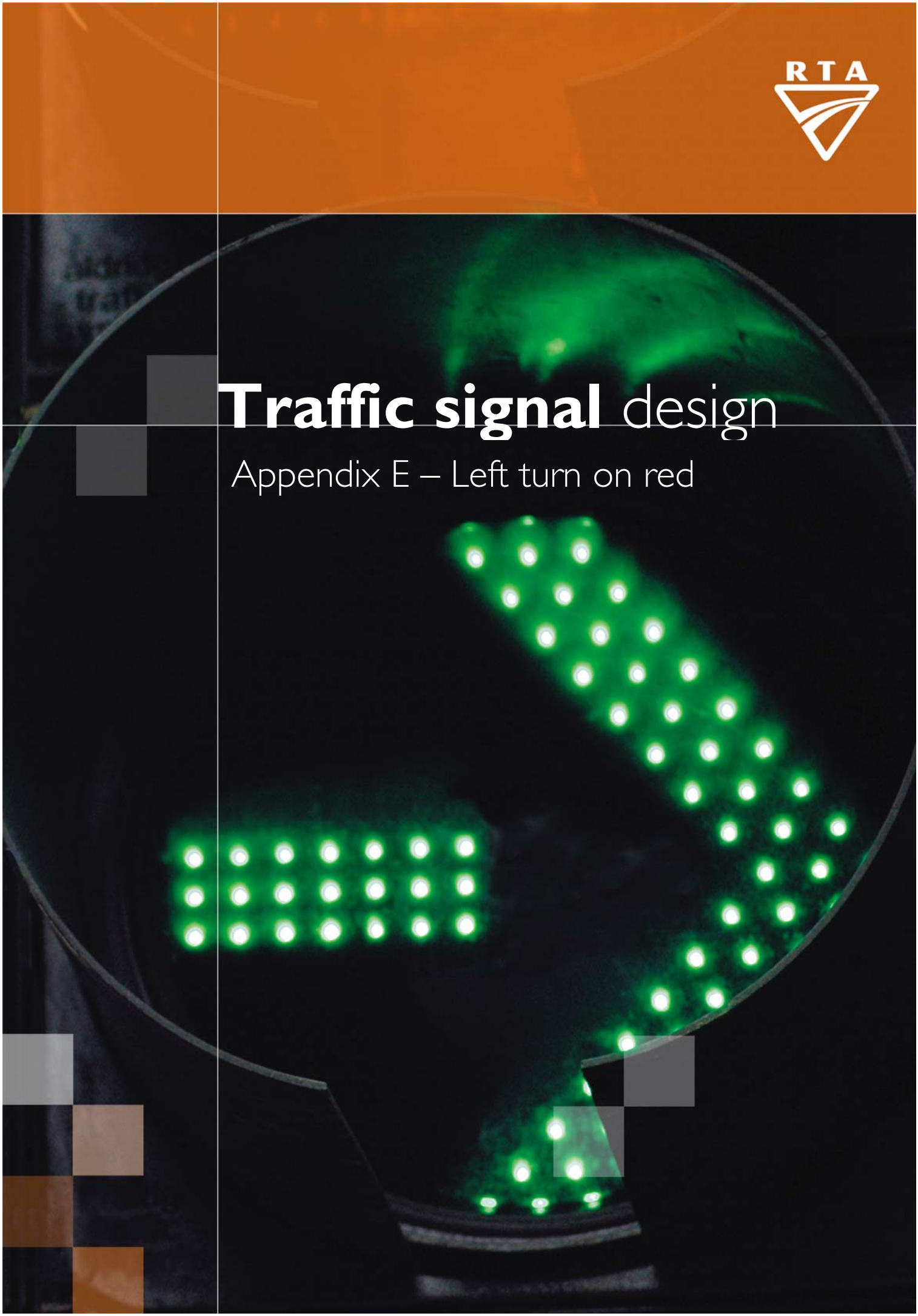
Traffic signal design

Appendix E – Left turn on red



The traffic signal design guidelines have been developed to assist in designing traffic control signals.

The guidelines are to comprise 16 sections and 5 appendices. These are initially being released individually and in no specific order. The sections which are to be released are as follows:

Part	Title
Section 1	Investigation
Section 2	Warrants
Section 3	Design Process
Section 4	Plan Requirements
Section 5	Geometry
Section 6	Pavement Marking
Section 7	Phasing and Signal Group Display Sequence
Section 8	Lanterns
Section 9	Posts
Section 10	Signs
Section 11	Detectors
Section 12	Controller
Section 13	Provision for Future Facilities
Section 14	Signalised Mid-block Marked Footcrossings
Section 15	Special Situations
Section 16	References
Appendix A	Design Plan Checklist
Appendix B	Traffic Signal Symbols
Appendix C	Location and Function of Lanterns
Appendix D	Location and Dimensions of Components
Appendix E	Left Turn on Red

To determine which sections are currently available go to:

www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/trafficsignaldesign_dl1.html

The information contained in the various parts is intended to be used as a guide to good practice. Discretion and judgement should be exercised in the light of the many factors that may influence the design of traffic signals at any particular site. The guidelines make reference, where relevant, to current Australian Standards and are intended to supplement and otherwise assist in their interpretation and application.

Traffic Signal Design

APPENDIX E

LEFT TURN ON RED

Roads and Traffic Authority
www.nsw.rta.gov.au

VERSION: 1.1
ISSUED: August 2008

APPROVED BY:

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To access electronic copies of these and other guidelines go to:

www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/technicalmanuals_dl1.html

For the latest amendments (if any) to these guidelines go to:

www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/trafficsignaldesign_dl1.html

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Contents

Amendment record

Please note that the following updates have been made to this document.

Version Number	Page	Description	Issued
1.1	E-1	Reference in Section 1.1 to Australian Road Rules replaced by NSW Road Rules	August 2008
	E-5	Diagram amended to reflect new marked foot crossing markings	

1.1 DEFINITION OF LEFT TURN ON RED (LTOR)

Vehicles in any approach which has an LTOR sign displayed may turn left after stopping, provided it is safe to do so. Rule 59, in the NSW *Road Rules* (2008), provides the authority for its use.

1.2 ASSESSMENT OF LTOR SITES

Before LTOR is permitted, each proposed site is to be examined using the tests, checks and flow chart given in this guide. If the site is suitable it may be added to programmes for improvements to the operation of traffic signals.

It should be noted that LTOR not only involves installing signs. Modification to the controller personality software is also required. Specifically this modification involves changing locked call detectors in affected lanes to presence timed calls. In modern controllers the timer associated with these detector(s) defaults to zero, i.e. a non-locking call. Specifying a presence timed detector provides additional flexibility over a non-locking call.

1.3 USES OF LTOR

LTOR is a means of reducing delays at traffic signals.

LTOR must be considered as part of a system and not as an isolated expedient.

Appropriate locations are:

- minor T-junction legs to main arterial routes, where the use of presence timed detectors can circumvent calling the minor road phase;
- areas where vehicular traffic is light for significant periods during the day;
- areas where conflicting pedestrian activity is light for significant periods during the day.

Inappropriate locations are:

- sites where the right hand approach consists of an 'S' lane movement;
- sites with very high pedestrian activity during most of the day as occurs in the core area of CBD's and busy suburban shopping centres;
- sites where LTOR would conflict with an otherwise exclusive pedestrian phase.

LTOR must NOT be used with time restrictions.

Some advantages of LTOR are:

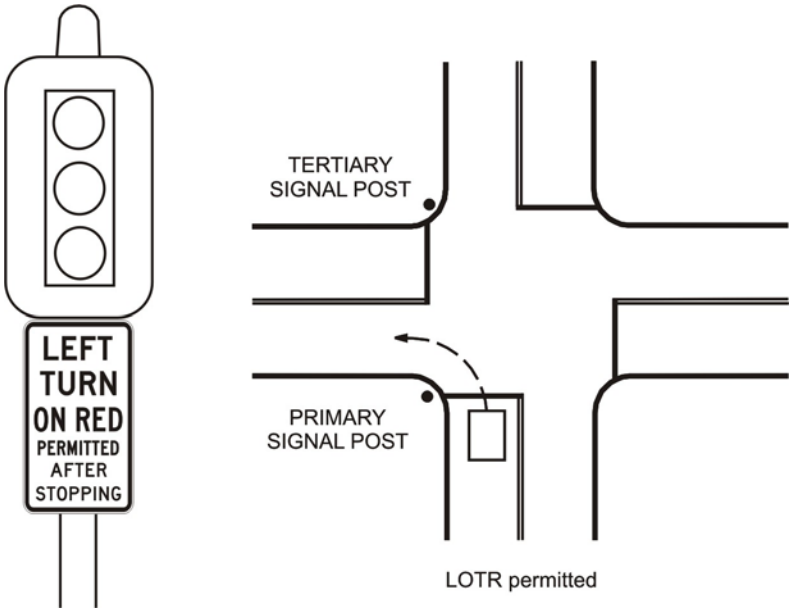
- reduction in delays to left turning vehicles and thus less fuel consumption;
- less delay and fewer stops to all vehicles during off-peak periods;
- the potential for left turning vehicles to join the head or tail of a main street platoon.

Some disadvantages of LTOR are:

- potential to develop a disrespect for red signals at other approaches;
- increased conflicts between left turn vehicles and "through" vehicles with possible minor reduction in safety for these movements;
- left turn vehicles may obstruct marked foot crossings.

1.4 SIGNS

Sign R2-205 must be placed on the primary signal post as shown below. A supplementary sign should also be placed on a tertiary signal post because drivers may not be able to see the sign on the primary post when they are near the stop line. (See Section 10.5)



1.5 RECORDS

Records should be kept for each signalised intersection of the approaches treated, date of installation and, where necessary, the date of removal.

1.6 APPLICATION OF TESTS AND CHECKS

When it is desired to apply LTOR to an approach to a traffic signal, the four critical tests given in this guide must be applied to that approach.

A "YES" response to any one of the Tests disqualifies a site from further consideration. If a site is not disqualified by the Tests then the nine Checks must be applied. A "YES" response to five or more of the Checks also disqualifies a site. If a site is not disqualified by this process, LTOR should be adopted unless there are any other critical safety problems that may adversely affect the safe operation of LTOR.

A LTOR flow chart is provided after Check 9, to help in the evaluation of these tests and checks.

1.7 TESTS

TEST 1 - IS THERE MORE THAN ONE LANE MARKED TO TURN LEFT?

If the nearside lane is an exclusive left turn lane and vehicles in the next lane are also permitted to turn left, then LTOR is not to be permitted.

TEST 2 – IS THERE A LEFT TURN RED ARROW?

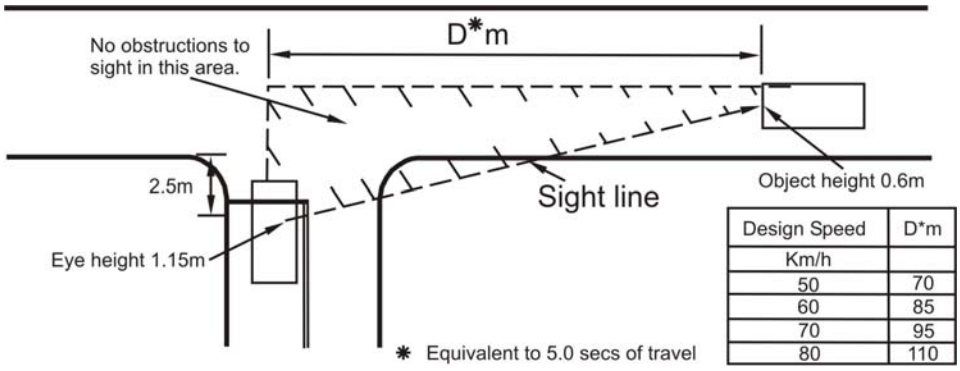
Do not use LTOR in conjunction with left turn red arrows.

TEST 3 - DO CHILDREN, THE ELDERLY OR PEOPLE WITH DISABILITIES CROSS THE APPROACH?

LTOR is not to be permitted from any approach where more than 30 children, the elderly or people with disabilities, cross that approach in anyone hour period, on an average day.

TEST 4 - IS THERE INSUFFICIENT VIEW OF TRAFFIC ON THE RIGHT?

A driver, whose eye height is measured 1.15 m above the road and 2.5 m back from the kerb projection, must be able to see a point 0.6 m above the road on a vehicle approaching from the right in the kerbside lane at a distance equivalent to 5.0 seconds of travel for the design speed of the through road.
LTOR should not be permitted if this criterion cannot be met due to vertical or horizontal sight restriction within the hatched area shown below.



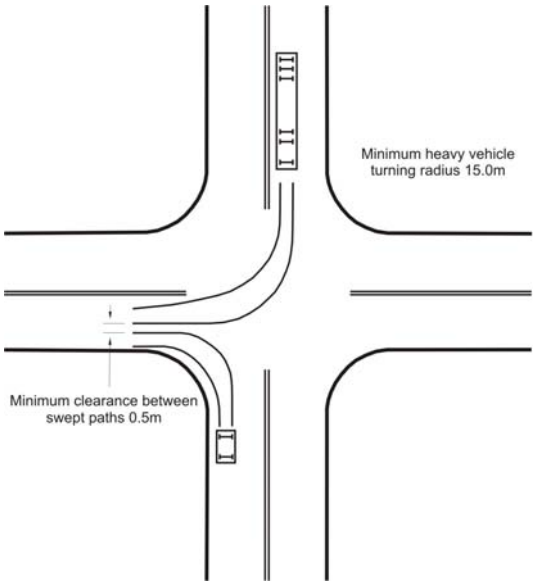
Design Speed	D*m
Km/h	
50	70
60	85
70	95
80	110

Source: Road Design Guide, Section 4, RTA, NSW

1.8 CHECKS

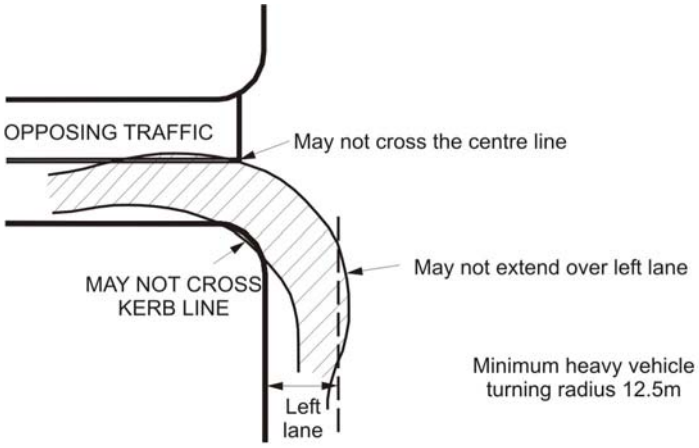
CHECK 1 - IS THERE A CONFLICT WITH A RIGHT TURN PHASE ON THE OPPOSITE APPROACH?

LTOR may be undesirable if there is a right turn phase (one or more lanes) on the opposite approach. However, where there is adequate separation between these opposing movements (e.g. a large radius kerb return and three departure lanes) then LTOR may be suitable.



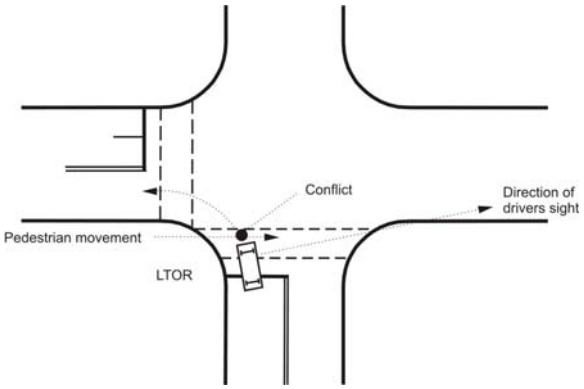
CHECK 2 - IS THERE INSUFFICIENT CLEARANCE FOR TURNING TRUCKS/BUSES OR OTHER PROBLEMS ASSOCIATED WITH LEFT TURNING TRUCKS/BUSES?

If more than 5 percent of left turning vehicles are trucks/buses and a standard turning path cannot be accommodated, as shown in the diagram, then LTOR is undesirable.



CHECK 3 - IS THERE A DANGER TO PEDESTRIANS CROSSING IN FRONT OF LTOR VEHICLES?

If LTOR vehicles would regularly block a signalised marked foot crossing and force pedestrians into unsafe crossings then LTOR is undesirable. The driver of the LTOR vehicle must first check pedestrian intention before moving forward into a position to check gap opportunities in the priority road. In some circumstances LTOR vehicles might also be in conflict with pedestrians crossing the priority road.



CHECK 4 - IS THERE UNUSUAL INTERSECTION GEOMETRY?

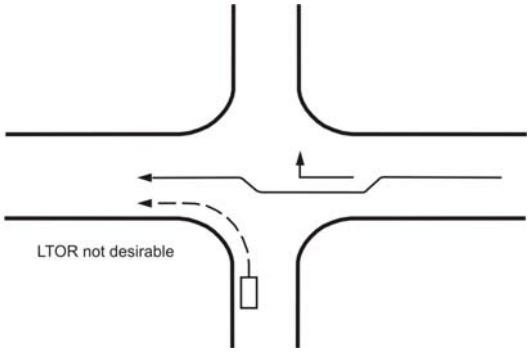
If the shape of the intersection is unusual it may lead to confusion as to which left turn is permitted on red, OR which movements are in conflict with the left turn.

CHECK 5 - IS THERE A HIGH ACCIDENT RECORD AT THE INTERSECTION WHICH MAY BE COMPOUNDED BY LTOR?

As a guide if there are more than three accidents, in a three year period involving left turning vehicles, this may indicate that LTOR is undesirable. Similarly, if there are four or more accidents involving lane change type conflicts (affecting left turn vehicles) on the right hand approach, this may also indicate that LTOR is undesirable. Refer also to Check 6.

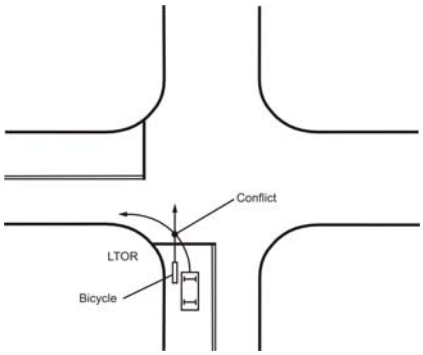
CHECK 6 - IS THERE FREQUENT LANE CHANGING BY TRAFFIC APPROACHING ON THE RIGHT?

Where traffic from the right hand approach frequently changes lanes to avoid right turning vehicles, there may be conflict with LTOR.



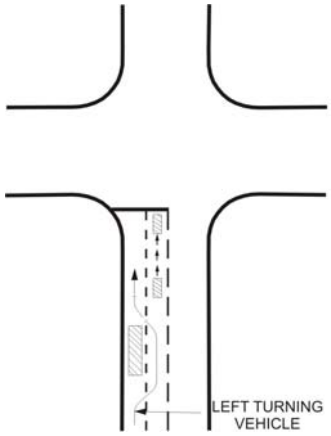
CHECK 7 - IS THERE A CONFLICT WITH BICYCLES?

If LTOR vehicles would regularly cut in front of bicycles waiting for a green signal then LTOR is undesirable.



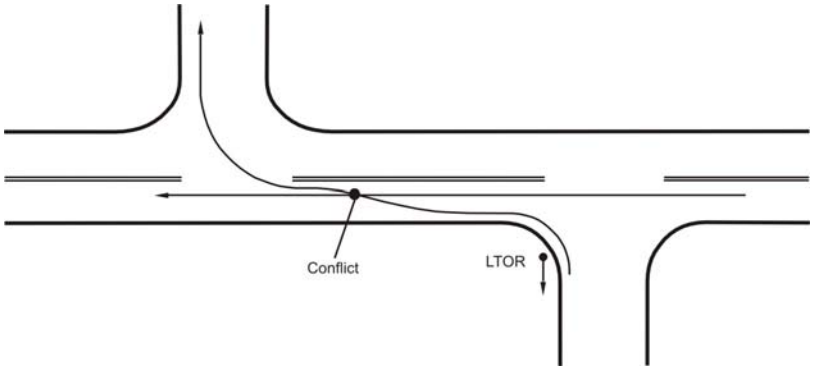
CHECK 8 - IS THERE A BUS STOP CLOSE TO THE INTERSECTION RESTRICTING THE LEFT TURN?

If the regular presence of a bus in the kerbside lane will cause increased lane changing and conflicts then LTOR may be undesirable.

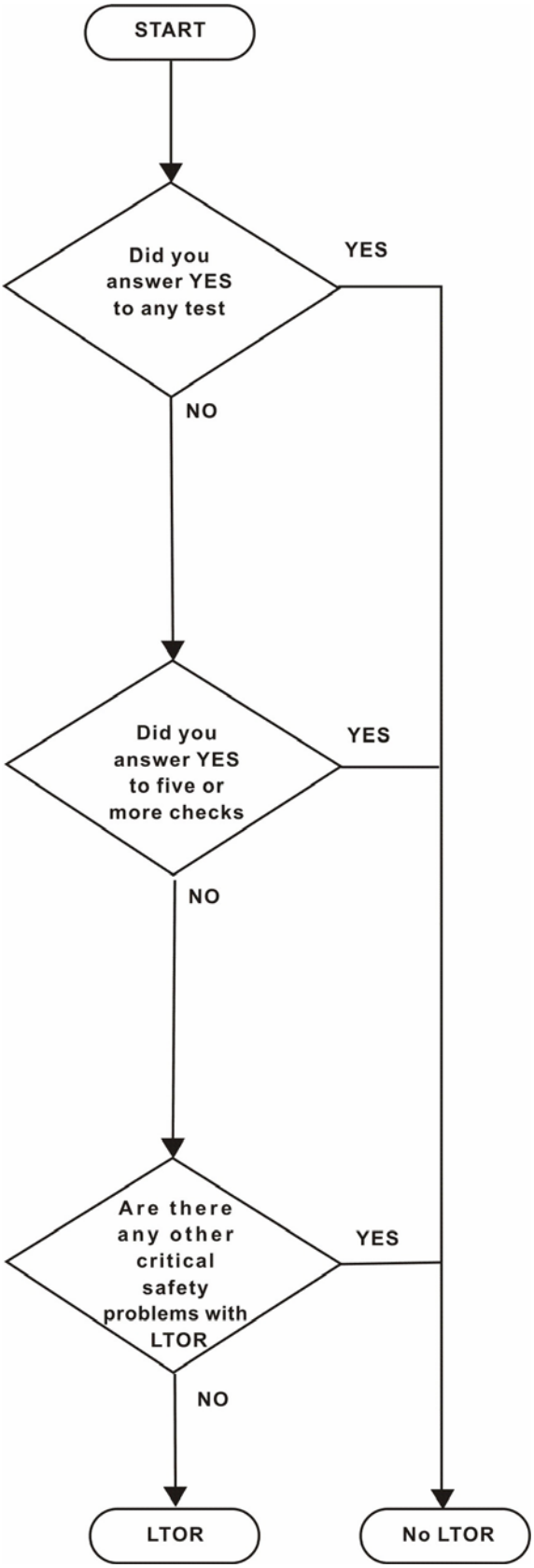


CHECK 9 - DO LEFT TURNING VEHICLES HAVE DESTINATIONS REQUIRING WEAVING WITH CROSS ROAD TRAFFIC?

If LTOR is likely to encourage undesirable weaving movements such as at closely spaced T junctions, then LTOR is undesirable.



1.9 LTOR FLOW CHART



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