Preface

The traffic signal design guidelines have been developed to assist in designing traffic control signals. The information contained in the various parts is intended to be used as a guide to good practice. Discretion and judgement should be exercised, taking into account all the factors that may influence the design of traffic signals at any particular site.

The guidelines make reference, where relevant, to current Australian Standards or the Austroads Guides, and are intended to supplement and otherwise assist in their interpretation and application. If any conflict arises, the Australian Standards, the Austroads Guides and the RMS Supplements are to prevail.

The complete set of traffic signal design guidelines is as follows.

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Primary references and complementary material

Roads and Maritime has adopted the Australian Standards and the Austroads Guides as its primary technical references. Roads and Maritime has developed the following complementary material which must be used in conjunction with the Standards and Guides.

- Australian Standards Traffic Supplements.
- Supplements to the Austroads Guides.
- Delineation Manual.
- NSW Bicycle Guidelines.
- Standard Drawings.
- Technical Directions.
- Technical Specifications.

These documents are published on the Roads and Maritime website at www.rms.nsw.gov.au.

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About this release

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<th>Title:</th>
<th>Traffic Signal Design Guide: Appendix E Left Turn on Red</th>
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<tbody>
<tr>
<td>Document Number:</td>
<td>RMS/Pub. 08.092</td>
</tr>
<tr>
<td></td>
<td>ISBN 978-1-921242-95-3 (Electronic only)</td>
</tr>
<tr>
<td>Version:</td>
<td>1.2</td>
</tr>
<tr>
<td>Prepared by:</td>
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<td>14-07-2016</td>
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<th>Section</th>
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<th>Approver</th>
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<td>February 2008</td>
<td>Initial release.</td>
<td></td>
<td>C Moran A/GM Traffic Management</td>
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<tr>
<td>1.1</td>
<td>August 2009</td>
<td>1.1</td>
<td>Reference in Section 1.1 to Australian Road Rules replaced by NSW Road Rules</td>
<td>R O’Keefe Mgr Traffic Policies, Guidelines</td>
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<td>1.8</td>
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<tr>
<td>1.2</td>
<td>July 2016</td>
<td>1.1</td>
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<td>C Moran GM Road Network Operations</td>
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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 (2014), 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 programs 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 CBDs and busy suburban shopping centres.
- Sites where LTOR would conflict with an otherwise exclusive pedestrian phase.
- Where, relative to the left turning vehicle, the transverse or parallel marked foot crossings have had pedestrian protection implemented.

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 R2-20 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)

![Sign Diagram]

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 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 Checks must be applied. A "YES" response to six 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 the Checks, 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?
LTOR must not be permitted if it does not meet the safe intersection sight distance. See the Austroads Guide to Road Design Part 4A for details.

TEST 5 - IS THE INTERSECTION IN A HIGH PEDESTRIAN ACTIVITY AREA?
LTOR is not suitable for designated high pedestrian areas or other locations where there are high numbers of pedestrians.

TEST 6 - HAS ANY FORM OF PEDESTRIAN PROTECTION BEEN IMPLEMENTED ON THE TRANSVERSE OR PARALLEL MARKED FOOT CROSSINGS, RELATIVE TO THE LEFT TURNING VEHICLE?
LTOR is not compatible with any of the pedestrian protection measures outlined in Section 7.10, Phasing and Signal Group Display Sequence.

TEST 7 - DOES A SHARED PATH OR CYCLEWAY CROSS THAT APPROACH?
LTOR is not to be permitted where it would cross a shared path, separated path, bicycle lane, or single or bi-directional bicycle path.

TEST 8 - IS THERE A U-TURN PERMITTED AT THE INTERSECTION?
LTOR is not permitted at intersections were U-turns are permitted.

TEST 9 - DOES THE RIGHT HAND APPROACH PERMIT EXCLUSIVE BUS OR TRAM MOVEMENTS?
LTOR is not permitted where it may conflict with an exclusive bus or tram movement.

TEST 10 - DOES THE RIGHT HAND APPROACH CONSIST OF AN ‘S’ LANE MOVEMENT?
LTOR is not permitted where the right hand approach consists of an ‘S’ lane.

TEST 11 - DOES THE INTERSECTION PERMIT A SCRAMBLE OR EXCLUSIVE PEDESTRIAN PHASE?
LTOR is not permitted where there is a scramble crossing or exclusive pedestrian phase.

TEST 12 - IS THE INTERSECTION WITHIN 60 METRES OF A LEVEL RAILWAY CROSSING?
LTOR should not be permitted within 60 metres of a level railway crossing.

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 (eg 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 receiving road. In some circumstances LTOR vehicles might also be in conflict with pedestrians crossing the receiving 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.
CHECK 10 - IS THE SPEED LIMIT ON THE RECEIVING ROAD 80 KM/H?

LTOR is not suitable in locations where the speed limit on the receiving road is 80 km/h or more and/or the difference between the side street and main road is 30 km/h or more. However, if there are clear sight lines and suitable road geometry, implementation in an 80 km/h zone may be permissible.
1.9 LTOR Flow Chart

START

YES to any test

Yes

NO

YES to six or more checks

Yes

NO

Any other critical safety risks with LTOR

Yes

NO

LTOR

No LTOR