



Transport
Roads & Maritime
Services

Traffic Signal Design

Section 9 Posts

Issue No: 1.7 12 February 2018



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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1 Investigation	A Design Plan Checklist
2 Warrants	B Traffic Signal Symbols
3 Design Process	C Location and Function of Lanterns
4 Plan Requirements	D Location and Dimensions of Components
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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.
- Traffic Signal Design Guide.
- Delineation Manual.
- NSW Bicycle Guidelines.
- Standard Drawings.
- Technical Directions.
- Technical Specifications.

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1.4	Jun 2012	Various	Amended requirements for post types 6, 9, 14, 15.	R O'Keefe Mgr Traffic Policies, Guidelines & Legislation
1.5	Aug 2012	9.3	Amended minimum median widths.	R O'Keefe Mgr Traffic Policies, Guidelines & Legislation
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Issue	Date	Section	Description	Approver
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		9.1	Note about exemptions added.	
		9.1.1	Acceptable weight of posts amended. Note about determining the clear zone added.	
		9.3	Width of median for stage crossing amended.	
		9.6	Current usage, height of posts, footing depths, length of mast arms added or amended as required.	
		9.8	Weight of Type 14 & 15 posts amended.	

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9.1 Introduction

Posts are used for mounting traffic signal lanterns, terminal box assemblies, audio-tactile driver units, signs, pedestrian push-button assemblies, post-mounted controllers, camera units and flash units. There is a wide range of posts available to suit a variety of circumstances. The Type 2 post is the most commonly used and is normally 4.1 m long. Non-standard lengths should be avoided. When posts other than this are to be used, their type and length should be described in a post chart on the design plan.

Note: requests for exemptions or special approvals must be documented with evidence showing how the benefits of the exemption outweigh the risks. When considering exemptions, recommendations from Network Operations and Traffic Signals Operations or Road Design Engineering must be taken into account and addressed appropriately.

9.1.1 Rigidity and protection of posts

The rigidity of traffic signal posts needs to be considered in order to reduce the severity of crashes within the road environment at traffic signal sites. The use of less rigid posts must always be considered as they are better suited to absorbing the energy and reducing the severity of a crash and thus the likelihood of an injury; rigid posts do not.

In general terms, less rigid post types do not need protection. These include post Types 1, 2, 7, 8, 13 and mast arm Types 4, 5S, 5L & 5XL.

Rigid post types require protection (unless located outside the clear zone¹ or at the rear of the footway with a minimum offset of 3.0 m from the kerb). These include mast arm Types 10, 11, and 12. For details regarding the types of protection available refer to Austroads Guide to Road Design Part 6: Road Design, Safety and Barriers.

Type 6 posts and Type 9 mast arms are rigid but will be permitted within the clear zone and will not require protection on the footpath due to their relatively light weight (up to 760 kg fully loaded) compared to other posts.

Type 14 posts and Type 15 mast arms (multi-function poles) can be either less rigid or rigid. These posts will be permitted within the clear zone and do not require protection on the footpath if the fully loaded weight does not exceed 760 kg. If greater than 760 kg, their use is to be based on a risk assessment which must be approved by the relevant Precinct/Regional Director (delegation level 4). The risk assessment should include factors such as the location, speed, likelihood of impact, together with the manufacturer, the fully loaded weight and height.

The manufacturer will provide the unloaded weight on a plate affixed to the bottom of the post. The fully loaded weight of Type 14 posts and Type 15 mast arms must be included in the post chart remark column area of the Traffic Signal Design Plan (refer to Section 4 Plan Requirements).

9.2 Location of posts

Location details are covered in Appendix D Location & Dimensions of Components.

¹ The determination of clear zones is described in the Austroads Guide to Road Design Part 6. For practical purposes, kerb-side bicycle lanes may be considered auxiliary lanes, which can be taken into account when determining the clear zone.

9.3 Posts on medians

Median posts must be used to avoid the over use of rigid mast arms. Where it is proposed that a median post not be used (other than as indicated in this section), approval from the relevant Precinct/Regional Director (delegation level 4) is required.

A minimum median width of 2.4 m should be provided wherever possible. This will accommodate signal maintenance, pedestrians and/or cyclists (see Section 5.3 in Geometry). However, if this is not possible then the following minimum median widths must be made available to allow for traffic signal hardware and lateral clearances:

- 1.2 m allows for any single post with or without a 200 mm lantern and minimum pedestrian storage. If post is adjacent to narrow (<3.3 m) or curving lanes, 1.5 m is to be provided at the nose of the median for a minimum length of 5 m
- 1.5 m allows for dual 200 mm lanterns or a single 300 mm lantern
- 1.8 m allows for dual 300 mm lanterns and/or repeater pedestrian lanterns
- 3.0 m allows for a two stage marked foot crossing.

If the median width is 3.0 m or greater, the median post must be provided with a pedestrian push-button (see Section 8.15 in Lanterns and Section 11.4.2 in Detectors).

It is not necessary to locate posts on medians if an intersection has only one or two lanes on an approach (including any shoulder and assuming lanes are standard desirable width), unless this will result in the use of an unprotected rigid post or mast arm within the clear zone or not at the back of the footway.

9.4 Mast arms

If a rigid mast arm is used, unprotected, within the clear zone (other than at the back of the footway with a minimum offset of 3.0 m from the kerb) or on a corner island, approval from the relevant Precinct/Regional Director (delegation level 4) is required.

If the option of providing a median post has been eliminated, then alternative installation methods such as mast arms, overhead gantries or use of existing overhead structures may be considered.

Mast arms may be considered in the following situations if there is satisfactory clearance above the roadway (see AS5100.1:2017 for minimum vertical clearances) and from overhead powerlines as shown on drawing No VM211-20:

- On any approach where stopping sight distance cannot be achieved using other standard posts or poles (eg where the primary lanterns are hidden by trees, poles, awnings, vertical or horizontal curves)
- On any approach with three or four lanes and traffic movements can be controlled by overhead lanterns on a Type 5S, 5L, or 5XL mast arm. A Type 9 mast arm may be used in this situation if a Type 5XL does not provide sufficient outreach
- On any approach with five or more lanes and traffic movements can be controlled by overhead lanterns on a Type 9, 10, 11, or 12 mast arm
- On any approach where it is necessary to avoid three 3-aspect lanterns in the same assembly, eg where no median post is provided, dual three-aspect lanterns are mounted overhead on the arm for the right and through lanterns and dual three-aspect lanterns are mounted on the mast for the left and through lanterns as shown in Figure 9.1.

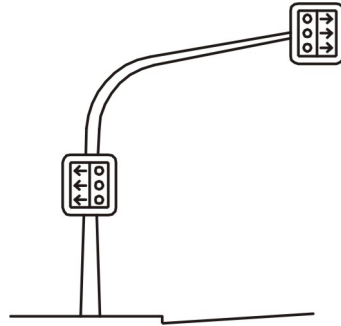


Figure 9.1 Use of mast arm to avoid three 3-aspect lanterns

Whenever an overhead primary is provided at an intersection with a controlled right hand turn, 6 aspect lanterns (ie dual three-aspect lanterns) must be provided on the overhead primary and not only in the secondary position(s).

If a mast arm cannot be installed at or near the stop line, it may be located on the departure side of the intersection. In this situation a primary post would still be required.

The orientation of the arm must be at 90 degrees to the kerb and shown accurately on the design layout. If the orientation is not obvious, it must be dimensioned.

Overhead lanterns should be placed above the second lane from the kerb. Usually this lantern will be either a single three-aspect lantern or, in the case of the inclusion of right turn movements, it may be a dual three-aspect lantern. If it is considered that increased conspicuity is required, it is acceptable to use a longer outreach and place a single three aspect lantern above the second lane from the kerb, for the through movements, and a single three aspect lantern above the right turn lane(s) for the right turn movements.

The lateral positioning of an overhead lantern is preferably above the centre of a lane, but no less than 1.0 m from the lane line. This is needed to meet Work Health & Safety requirements in consideration of maintenance of the lanterns from an elevated platform vehicle.

9.5 Numbering of posts

The numbering of posts is done in a clockwise direction from the controller. In the case of a ground-mounted controller, the numbering commences at the first post encountered in a clockwise direction from an imaginary line drawn from the controller to the centre of the intersection.

In the case of a post-mounted controller, only a Type 2 post is used and the post on which the controller is mounted is labelled as post number 1. Note that public utility poles are not suitable for installing post-mounted controllers (see Section 9.11).

Where it is determined that advance warning flashing lights are necessary at a particular intersection, the advance warning flashing lights and associated signs are mounted on two Type 2 posts, 600 mm apart (or a specially designed post) and designated a number in sequence with the rest of the installation. If an oversized sign is required a specially designed post or pair of posts would be required. See Section 15.9 in Special Situations for details of operation.

Where a Type 2 camera unit post is provided at an intersection, the post is to be designated a number in sequence with the rest of the posts.

9.6 Types of posts

9.6.1 Type 1 post

A Type 1 post is less rigid and is either 3.7 m or 4.6 m in length. The Type 1 post is superseded and has been replaced by the Type 2 post.

9.6.2 Type 2 post

A Type 2 post is less rigid and is normally 4.1 m long. Footing depth is 750 mm. Where used exclusively for pedestrian lanterns, the length is 3.2 m. A higher post of 4.6 m may be used where a mast arm is not feasible. However, this may cause maintenance problems, because the lamps are out of reach with a normal maintenance ladder. Other lengths may be used where it is necessary to avoid overhead obstacles such as awnings, but these are special items. Other uses for Type 2 posts are discussed in Sections 9.6.3 to 9.6.5.

9.6.3 Type 2 short push-button post

The Type 2 Short push-button post is no longer used and has been superseded by the Type 13 post.

9.6.4 Type 2 camera unit post

The camera unit used for the detection of red signal violations is mounted on top of a Type 2 post which is less rigid and is 3.2 m long, although other lengths may be used. This is located between 15 m and 30 m before the stop line, depending on the approach width. The actual location is determined on site by Compliance Operations to ensure that the camera's angle of view covers the primary lantern, the stop line and the lower rear portion of a vehicle which drives through a red signal.

There should be no visual obstructions from awnings, signs, trees, etc, for a height of 2.8 m (or 4.5 m if a surveillance camera is required) between the post and the stop line. The post should have a minimum vertical clearance of 0.9 m to allow the camera unit cabinet to be placed on top of the post and for the camera unit to be opened once it is in place. There should also be a minimum lateral clearance of:

- 1.5 m to other poles or structures (to allow removal of the camera from the rear of the unit)
- 1.0 m to driveways
- 1.0 m to service covers within the footway.

Surveillance cameras may be attached to these posts if required (post height of 4.5 m required).

9.6.5 Type 2 flash unit post

The flash unit used in conjunction with the camera unit described above is mounted on top of a modified Type 2 post (Oscar pole) which is less rigid and is 4.5 m long (see drawings ME16112, CEB-CPE-105GA, 1038-1). This is normally located about halfway between the camera unit post and the stop line, ie 8 m to 12 m depending on the approach width. The actual location is determined on site by Compliance Operations.

The post should have a minimum vertical clearance of 0.7 m to allow the flash unit cabinet to be placed on top of the post and for the flash unit to be opened once it is in place. Lateral clearances are the same as for camera unit posts. The distance from the kerb may vary from the standard 1.0 m so that it does not obstruct the camera's view of the primary lantern.

9.6.6 Type 3 and Type 4 mast arms

Type 3 mast arms are no longer a standard item and should not be used on new designs.

The Type 4 mast arm, which is less rigid and has a footing depth of 950 mm, may be used where it is not possible to install the deeper footing required by other standard mast arms. The Type 4 may also be used for the mounting of a CCTV camera.

Lanterns on Type 4 mast arms are restricted to a maximum of 200 mm in the Region A wind area of NSW (ie 300 mm lanterns are not permitted to be used). The mast arm may still be used with a CCTV camera on the outreach and 200 mm lanterns on the column only in Region B area of NSW.

9.6.7 Type 5S (short) mast arm

A Type 5S (short) mast arm is round in section, is less rigid and has a nominal outreach position of 2.5 m and a footing depth of 1400 mm. It should only be used if type 5L (long) is impractical (eg where power lines prevent their use) or is not warranted (eg where restriction of sight distance by an awning or pole in a single-lane or two-lane approach is the only reason for installing a mast arm).

9.6.8 Type 5L (long) mast arm

A Type 5L (long) mast arm is round in section, is less rigid and has a nominal outreach position of 5.0 m. The type 5L (long) mast arm should normally be used to satisfy the above criteria detailed in Section 9.4. Where trees are growing in an approach in which a mast arm is required, a type 5L should always be used.

9.6.9 Type 5XL (extra long) mast arm

A Type 5XL (extra long) mast arm is round in section, is less rigid and has a nominal outreach position of 5.5 m. It is used in similar circumstances to Type 5L, however the extra 0.5 m on the outreach arm is to allow compliance with the Work Health & Safety requirement of positioning the overhead lantern a minimum of 1.0 m from the lane line. Type 5XL must only be used in Region A, as it does not have adequate strength for use in other regions.

(Region A is general NSW, with maximum wind gust speed of 41 m/s in somewhat protected terrain. It is the region outside Region B. See Section 9.6.13).

9.6.10 Type 6 post

A Type 6 post is square in section, is rigid and is used where directional signs and traffic signal lanterns are required on the same post. See drawing No VM212-2 for the maximum sign loading of the Type 6 post. Footing depth is 1400 mm. The signs should be oriented at an angle of 5 degrees from the normal to the axis of the headlight beams of approaching vehicles (ie the direction of traffic, not the direction of the kerb). Type 6 posts are square and the signs are usually installed parallel to one of the faces of the post, therefore, the post itself must be oriented at the same angle. It is essential that the symbol for the post is oriented correctly on the design layout so that it reflects its actual orientation on site. If the orientation is not obvious from the plan, it must be shown by providing a dimension such as an angle from the kerb (See Section 10.13 Signs).

In a situation where a sign has to be installed at an angle, rather than parallel to one of the faces of the post, an adjustable flange adaptor will need to be called for via a note on the design plan and the sign orientation, in relation to the post, shown accordingly.

Pedestrian push buttons on Type 6 posts are mounted flush with one of the flat surfaces. This may mean that the orientation of the push button is not ideal, but the orientation of the signs usually takes precedence.

Where a standard Type 6 post is not adequate then a special post and footing will need to be designed. A note on the plan is required to specify that the post is a special post and no reference is to be made to it as a Type 6 post.

9.6.11 Type 7 post

A Type 7 post is less rigid and is normally 4 m long. Where used exclusively for pedestrian lanterns, the length is 3.1 m. Footing depth is 600 mm.

The Type 7 post is similar to the type 2 post except that it has a much smaller baseplate of 200 mm square allowing it to be exposed without being a trip hazard. The post should be considered for use on medians and triangular islands, allowing for easier maintenance and replacement compared to the buried Type 2 post.

Refer to drawings VC002-59, VM202-15, VM202-21, VM202-26,

9.6.12 Type 8 post

A Type 8 post is less rigid, is square in section and is normally 4 m long. Footing depth is 600 mm.

The Type 8 post is similar to the Type 7 post, with the smaller size 200 mm square baseplate allowing it to be exposed without being a trip hazard. The Type 8 post has a terminal box mounted on the side of the post, similar to the Type 6 post, and mast arms allowing for easy ladder access and use under awnings. The post should be considered for use on medians and triangular islands allowing for easier maintenance and replacement compared to the Type 2 post.

Refer to drawings VC002-59, VM015-42, VM202-21, VM202-25, VM202-26,

9.6.13 Type 9 mast arm

A Type 9 mast arm is square in section, is rigid and has a nominal outreach position in the range 2.5 m to 7.0 m (in 0.5 m increments). Footing depth is 1400 mm. It may be used in Region A (see Section 9.6.9) and Region B although loading restrictions do apply when used in Region B.

Regulatory signs can be fixed to Type 9 mast arms throughout NSW. Guide signs can be fixed to Type 9 mast arms in Region A, but not in Region B.

Refer to drawing VM215-1.

(Region B is the recognised wind area in the 100 km wide northern coastal belt from the 30th latitude north of Coffs Harbour, which can experience the tail end of cyclones).

9.6.14 Type 10 mast arm

A Type 10 mast arm is square in section, is rigid and has a maximum outreach of 16 m in Region A and a maximum outreach of 11 m in Region B. If a longer outreach is essential in Region B, a specially designed footing will be required to suit the situation. Footing depth is 2050 mm.

9.6.15 Type 11 mast arm

A Type 11 mast arm is rigid and is similar to Type 10 and exactly the same in regard to the column and footing details. The difference is in the length of the outreach and the lantern attachment flange and cable entry along the arm. When a Type 11 mast arm is used, the required position of the extra lanterns along the outreach arm must be shown by sketch or note on the design drawings. Type 11 mast arm has a maximum outreach of 16 m in Region A and a maximum outreach of 9 m in Region B. If a longer outreach is essential in Region B, a specially designed footing will be required to suit the situation.

9.6.16 Type 12 mast arm

A Type 12 mast arm, is rigid, and is similar to Type 10 and 11 mast arms, except that there are two attachment and cable entry points along the arm. When a Type 12 mast arm is used the required position of the extra lanterns along the outreach arm must be shown by sketch or note on the design drawings.

9.6.17 Type 13 post

The Type 13 post supersedes the Type 2 short push button post. The Type 13 post is a short push-button post, it is less rigid and is similar to a 1.5 m long version of a Type 2 post, except that it has a much smaller base plate of 200 mm square allowing it to be exposed without being a trip hazard. It is sealed at the top and is used solely to mount a pedestrian push-button assembly if no other post can be located in a position suitable to mount it. The most common location would be on a median or island. An adapter plate is available to allow a Type 13 post to be installed on an existing Type 2 footing, however, consideration should be given to expose the base plate when used on medians and islands to permit easier maintenance and replacement compared to a buried Type 2 post. Footing depth is normally 630 mm but may be installed at 500 mm. Refer to drawings VC002-66, VC002-78.

The Type 13 post cannot be used to mount lanterns or audio-tactile driver units (see Section 11.4.2 in Detectors).

9.6.18 Type 14 multi-function pole

A Type 14 multi-function pole is round in section, can be either less rigid or rigid and can carry a combination of traffic signals, street lights, traffic control devices, street signs, variable message signs, cameras or any other similar traffic related device. It must not carry banners or flags. It is used, in agreement with Council, where it is considered an advantage to reduce street furniture and congestion on the footpath and road related area. Where traffic signal equipment is to be installed, this should be in accordance with the current agreement document between RMS and Council.

9.6.19 Type 15 multi-function mast arm

A Type 15 multi-function mast arm can be either less rigid or rigid and is identical to the Type 14 post with the addition of the mast arm extension up to 5.5 m long. Where urban design considerations suggest the use of 200 mm lanterns on overhead mountings, this may be allowed, subject to the concurrence of the Principal Manager Network Operations.

9.7 Overhead clearances

An adequate clearance must be provided from the top of the post, mast arm or mast arm lantern assembly to any overhead power lines as shown on drawing No VM211-20. This is particularly important with the installation of mast arms, due to their greater height, and the likelihood of fouling overhead wiring. This possibility should be considered in the investigation stage.

Similarly, when installing traffic signals in the vicinity of airports, care should be taken to ensure that stipulated clearances to flight envelopes are maintained.

9.8 Lateral clearances

Type 10, 11 & 12 posts/mast arms by their function are rigid, therefore careful consideration should be given to their location with respect to road safety. It should always be the intention to place this type of traffic signal hardware outside the clear zone (corner islands should be especially avoided)

or at the rear of the footway with a minimum offset of 3.0 m from the kerb. If this is not possible, they must be protected by a barrier. Exemptions must be approved by the relevant Precinct/Regional Director (delegation level 4).

Type 14 posts and Type 15 mast arms (multi-function poles) will be permitted within the clear zone and not require protection on the footpath if the fully loaded weight does not exceed 760 kg. If above 760 kg their use is to be based on a risk assessment which must be approved by the relevant Precinct/Regional Director (delegation level 4).

When installation within the clear zone has been approved (see Section 9.4) and vehicle direction is largely lateral, a minimum clearance of 1.0 m must be provided to the kerb edge. In the case of islands, where vehicle direction is more transverse, a minimum clearance of 2.0 m must be provided to the kerb edge in all directions.

These clearance distances are measured to the centre of the post, mast arm or pole.

In consideration of the need for pedestrians and other path users to be able to pass traffic signal hardware safely and without obstruction, a minimum clearance of 0.2 m should be allowed to all traffic signal hardware, in addition to the path width provided.

See Appendix D Location & Dimensions of Components for details on clearances.

9.9 Finials

The finial is the cap placed on top of a Type 1, 2 or 7 post to protect the electrical connections in the top assembly. A clearance of 0.6 m must be provided above the finial to allow removal for maintenance and repairs.

If the 0.6 m clearance cannot be provided due to an overhead awning, a split finial may be used instead. A split finial requires a clearance of 0.375 m, but it can only be located under an awning where it is protected from the weather.

9.10 Special footings

Posts should be avoided on existing structures such as bridges. Although it may be possible to install posts in such positions, it may require specially designed footings to ensure structural integrity and adequate earthing. Approval will need to be obtained from the authority concerned. These special provisions will involve additional costs and may delay installation considerably. A special Type 2 post with a special base plate is available for installation in locations with insufficient depth for a normal footing. See drawing No. VC002-45.

Posts on new structures can be accommodated in the design of the structure. Details of any special footings must be provided on the design layout or on a separate sheet.

9.11 Public utility poles

Wooden public utility poles may be used to mount lanterns where for some reason a standard traffic signal post is unable to be installed.

Poles with transformers, switching arms or high voltage earth cables shall not be used. Steel and concrete poles shall also not be used.

The condition and the possibility of removal or repositioning of the pole should also be taken into account. Whenever the use of a pole is proposed, it is necessary to obtain permission from the public utility authority concerned. Not all authorities will allow the use of their poles.

Public utility poles and multifunction poles are not suitable for installing post-mounted controllers.

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