Appeal Hearing Statement on behalf of East Sussex County Council

Bird in Eye south, Framfield Road, Uckfield

Planning Application Ref: WD/2021/2198/MAO
PINS Ref No: APP/C1435/W/22/3307820

Client: ESCC TDC

Ref: 12527/2.3

Date: April 2023

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Issue	Issue date	Compiled	Checked	Authorised
FINAL	6th April 2023	RN	LNS/KK	KK

1 Preamble

1.1 This Hearing Statement has been prepared in relation to an Appeal against the non-determination of an outline planning application (all matters reserved except for access) for up to 290 residential dwellings at the site known as Bird In Eye South with access from the B2102, on land to the south of Bird in Eye Farm, Framfield Road, Uckfield.

1.2 The Statement has been prepared by Roger New of GTA Civils and Transport. GTA have been appointed by East Sussex County Council to assist in its consideration of and response to the proposed development, and in the presentation of its case at the Appeal. In that work I have liaised with Kal Kamboh of East Sussex County Council (Strategic Sites Transport Advisor, Transport Development Control, Communities, Economy and Transport) who authored the formal highway responses to Wealden District Council.

1.3 I am a Project Manager at GTA Civils and Transport. I hold a BSc in Civil Engineering and an MSc in Transportation Engineering from Leeds University and am a member of the Institution of Civil Engineers (MICE) and a Chartered Engineer (CEng). I have over 40 years experience in both the public and private sectors in the fields of traffic and highway engineering and strategic transport planning. During that time I have had extensive experience of involvement in the preparation of local plans and wider area transport strategy, as well as being responsible for dealing in both public and private sectors with a wide range of development proposals.

2 Introduction

2.1 East Sussex County Council (ESCC) as the County Highway Authority has objected to the planning application for the following reasons:

1. *"The proposal would result in a material change in the volume of traffic using B2102 Bird in Eye Hill where speeds are derestricted, and hazards would be introduced by the slowing, stopping, and turning traffic at the proposed access, contrary to para 111 of the National Planning Policy Framework.*
2. *The proposal would lead to increased traffic hazards on the B2102 Bird in Eye Hill by reason of the inadequate visibility at the proposed access and would therefore be contrary to para 111 of the National Planning Policy Framework.*
3. *Insufficient measures have been submitted on the highway to support an urban extension, for purposes of reducing traffic speeds which are required to support sustainable transport modes.*
4. *Non-car travel choices for residents/users are limited between the site and Uckfield town centre as a result of substandard highway infrastructure which would not encourage sustainable travel modes and would therefore be contrary to para 104 and 106 of the National Planning Policy Framework."*

2.2 Reasons 1, 2 and 3 all relate to the suitability and acceptability of the proposed new junction on B2102 Framfield Road (Bird in Eye Hill) providing vehicle access to the proposed development. This Statement first addresses those Reasons under the collective heading of 'The Proposed Site Vehicle Access'. This is followed by the council's supporting position relating to Reason 4, under the heading of 'Sustainable Accessibility'.

2.3 The Statement concludes with ESCC's position relating to the impact of the proposed development on the safe and efficient operation of the town centre highway network.

2.4 ESCC's formal responses to the local planning authority of 08.12.21, 12.05.22 and 04.11.22 are included at Appendix 1. Those record the very detailed reasoning supporting the council's position as the proposals developed. This Hearing Statement summarises the council's position in relation to the most recent submissions to ESCC by the Appellant relevant to the lodging of the Appeal and subsequent on-going discussions.

3 The Proposed Vehicle Site Access

3.1 Drawing 5330-021 Rev K (hereafter referred to as Rev K) is the latest access junction design submitted prior to the applicant's decision to Appeal against non-determination of the planning application. Rev K is the result of consideration by ESCC of successive layout proposals and associated RSA1 safety audits. Full details of ESCC's engagement with the Appellant and commentary on each proposal is shown in Appendix 1. This Hearing Statement sets out the position in relation to Rev K, and any further discussions and potential scheme developments.

3.2 Rev K includes no facilities for non-motorised users (NMUs), either those already using the main road or those generated by the site proposals. It is acknowledged that the vast majority of NMU trips generated by the site will be to and from the Uckfield direction and therefore able to use the proposed new shared pedestrian / cycle site access to Framfield Road west of the hospital. However, Rev K makes no provision for any cyclists generated by the site and travelling eastwards, or for any existing cyclists using the main road in both directions at the site access, or for other vulnerable users associated with other site uses. The proposed access would be serving not only a major housing development but also the existing operations on Bird in Eye Farm and a proposed SANG. Because of those mixed demands, the access would need to support many types of users and ensure that all users are accommodated safely, not only vehicles generated by the proposed housing and existing business/farm vehicles but also pedestrians, potentially with children and/or dogs, and cyclists.

3.3 Rev K shows a ghost island priority junction with a right turn lane. The Appellant contends that capacity assessments of a simple priority junction, which would not include the right turn lane, do not indicate the need for one, but it has been incorporated into the junction at ESCC's request. ESCC does not consider a right turn lane as optional in this location. Recorded 2-way flows on the B2102 past the site are between 4500-5500 vehicles per day. The site proposals would generate about 1500 vehicles per day. There would therefore be a substantial proportion of traffic at the junction making conflicting turning movements, with the majority of site generated traffic making the right turn when accessing the site. Figure 2.3.1 of CD123 (DMRB technical standard CD123 is attached at Appendix 2) places this combination of major and minor flows firmly in the area where a ghost island arrangement is the most likely appropriate provision. It is also considered important that the form and layout of the proposed access junction, and any potential resultant queueing, would not impact on the free flow of eastbound emergency vehicles associated with the hospital / medical centre. A simple priority junction would not satisfy that requirement.

3.4 The current posted speed limit past the proposed site access is derestricted (i.e. 60 mph). Rev K does not show any change in the posted speed limit at, and in the vicinity of, the proposed site access junction. During the course of development of the current scheme proposals, detailed discussions were held with ESCC relating to a reduction on this section of B2102 from the current 60mph to 30mph as set out in Appendix 1. The current proposals are for a reduction to 40mph. Speed measurements carried out for the Appellant show actual average and 85%ile speeds in the vicinity of the site access that are consistent with speed data recorded over many years at an ESCC permanent ATC site nearby on the B2102 to the west. Average speeds are significantly higher than 30mph and therefore incompatible with a 30 mph speed limit but are compatible with a 40mph speed limit. In principle ESCC are not opposed to the proposed 40 mph limit. However, there remain outstanding issues relating to:

- character - the extent to which the adjoining environment would contribute to self-enforcement, through e.g. visible frontage development, footways, street lighting, and infrastructure that supports the movement of non-motorised users. That is potentially more achievable adjacent to the site (though dependent on site layout and urbanisation appearance from the highway). To the east of the site access, there would be little, if any, character self-enforcement of the speed limit on the approach from the east without other measures which have not been proposed; and
- compatibility - potential conflicting 'messaging' for eastbound traffic between the derestricted signing at the eastern end of the 40mph length and the recently introduced safety treatment of the bend nearby to the east incorporating the junction of B2102 with Sandy Lane.

3.5 Junction ghost island dimensions shown in Rev K have been reviewed for compliance with DMRB CD123, assuming a 40mph speed limit on the approaches to and through the junction. The review of Rev K shows the majority of design dimensions to be compliant with CD123.

3.6 However, the 8m kerb radii proposed at the site access are not compliant with CD123 paras 5.5 – 5.6.6 and risk conflict between exiting HGVs and other vehicles, aggravated by the narrow proposed through lanes on the main road. CD123 para 6.8 specifies a minimum through lane width of 3.0m, maximum 3.65m and the proposed 2.75m lanes provided in the Rev K design are therefore significantly substandard. Although ESCC reluctantly agreed that such narrow through lanes may be acceptable should a 30mph speed limit be realistic, that speed limit is no longer an acceptable option. In a 40 mph speed limit environment, such a design could increase the risk of sideswipe

collisions, particularly involving larger vehicles associated with the continuing non-residential site uses and agricultural vehicles using the main road past the site as well as the site access – noting that an HGV can be max 2.55m wide (2.6m if refrigerated) plus wing mirrors, which doesn't leave much room for driver positioning variability, particularly if they are travelling on the main road at speeds similar to the observed 35mph average, 42-43 85%ile. Swept path analyses were prepared by the Appellant for the 30 mph proposal but for a 12m design vehicle only which is not considered representative of the mix of heavy vehicle types likely to need to be accommodated.

3.7 Other concerns related to the Rev K design are:

- An isolated ghost island design in such largely rural surroundings would normally be expected to provide a traffic island with a beacon and bollards with keep left signs in the centre circle at the front end of the right turn lane to highlight to drivers approaching from the east the existence and form of the junction and to provide some shielding to drivers occupying the right turn lane. Such an island has been considered post-Rev K and a design including it within Rev K (Rev L) was subject to a safety audit in March 2023 (noting that the audit dealt only with the bollard proposal - the remainder of the junction being considered to be covered by a preceding RSA1 dated November 2022). Although the full RSA1 report has not yet been received by ESCC we understand that concerns identified in the updated RSA relate to visibility, junction conspicuity, and lane widths.

- Assuming 40mph (70kmph design speed) the access road visibility splay requirements from CD123 paras 3.4 – 3.11 would be 2.4m x 120m in both directions. The visibility shown in Rev K to the west (2.4m x 113m) has been accepted as compliant with the actual recorded 85%ile speed but the full extent of that visibility is dependent on a proposed solid centre white line on the uphill approach effectively eliminating eastbound overtaking. To the east, full visibility would require extensive vegetation management which ESCC has accepted has been demonstrated by the Appellant to be deliverable. However, even then, full visibility is achieved only with a significant 'blind spot' within the splay closer to the junction on the approach from the east. Tangential visibility (i.e. complete avoidance of that blind spot) would deliver very sub-standard visibility compared to CD123 requirements.

- There is also a concern that vehicles approaching the 40 mph limit and the access junction from the east may overtake (&/or cut the corner) without effective management – a solid

white centre line extension of the hatched area may help but is unlikely to be a reliable deterrent on its own.

- Non-highway land within the visibility splays on the southern side of the road within the Appellants control would need to be adopted or have a legal agreement put in place to ensure the visibility splays are not obstructed by future planting or erection of a fence or other structure.

4 Sustainable Accessibility

4.1 The site is not close to key facilities providing for the day to day requirements of residents in the proposed housing. Most are in the town centre which is approx. 1.5km distant from the site. At such distances walking or (in particular) cycling are likely to be the more likely chosen sustainable mode than using the bus. The secondary college is 2km distant from the site access and walking is much less likely to be the chosen sustainable mode. Access to Primary schools in Uckfield would entail distances of between 1.5km and 2km from the site access.

4.2 Sustainable connectivity between the site and those town centre and other facilities in that direction is dependent on Framfield Road. Framfield Road is narrow with inadequate footways and no specific provision for cyclists. Its deficiencies as a major sustainable transport corridor for non-motorised users has long been recognised and was a feature of the Inspector's consideration of previous proposals for the application site at a planning Appeal in 2006. For the current application, the Appellant has prepared a Walking, Cycling and Horse riding Assessment and Review (WCHAR). This has been accepted by ESCC who consider that it highlights the issues, and confirms both the unsuitability of Framfield Road in its current state and the difficulties involved in attempting to retro-fit any enhancement measures.

4.3 Nevertheless, the Appellant has put forward proposals for enhancements to the Framfield Road corridor and its connection to the site. The proposed pedestrian / cycle access at the north western corner of the application site and its connection to an extended, wider (3m) shared pedestrian / cycle path westwards to the access to the hospital are agreed in principle. The Appellant's initial proposals for the remainder of the corridor into the centre of Uckfield included drop kerbs and tactile paving at existing side roads connecting onto Framfield Road and substantial revisions to / rationalisation of the existing on-street parking regime on Framfield Road. ESCC could not support the parking proposals which did not appear to address pedestrian or cycle needs and would be dependent on public acceptability and consultation and the making of Traffic Regulation Orders.

4.4 The current Appellant's proposals for Framfield Road exclude the parking control measures, retaining the drop kerb / tactile paving approach to side road crossings and incorporating at ESCC's request a formal (zebra) crossing point across Framfield Road in the vicinity of numbers 78/80. The crossing point has been subject to a road safety audit which has only just been received by ESCC from the Appellant but which highlights issues related to the difficulties of inserting such a facility into the existing highway layout.

4.5 The Appellant proposes enhancements to bus stop provision at the existing bus stops close to the hospital access and at other locations on Framfield Road. These are agreed in principle. It is also noted that the Appellant has explored the possibility of incorporating a diversion into the site of some or all buses currently passing the proposed site access, and that those proposals have very recently been submitted to the ESCC public transport team for comment. It is too early to say what ESCC's view would be on the practicality and deliverability of those proposals, including not only possible effects on current service operations but also the ability of the access junction as currently proposed to safely accommodate the bus turning movements into and out of the site. However, it is salient to note that given the distance of the site from the main town centre destinations, and taking account of waiting time and travel cost, the use of buses is unlikely to constitute an attractive alternative to the use of the car for such journeys or a significant component of overall sustainable transport usage by site residents.

5 Impact on Town Centre Highway Network

5.1 The Appellant has carried out assessments of the impacts on the town centre highway network using two approaches to the derivation of demand flows at affected junctions. An exercise undertaken using a strategic SATURN model demonstrated that increased congestion in the town centre and on the bypass as a result of this site and in combination with others could lead to a significant risk of strategic traffic reassignment away from those routes and onto much less suitable alternative routes using minor roads to the east and west of the town.

5.2 A separate exercise undertaken by the Appellant using a more conventional approach taking account of general background growth, agreed commitments, and traffic generated by the site itself, concluded that there would be an impact on key town centre signalised junctions that would need mitigation.

5.3 Currently the town centre signals are operating as best they can with the existing operating system and linking. It is agreed with the Appellant that the impacts of the proposed development could be sufficiently mitigated through the implementation of an enhanced control system. Appropriate financial contributions towards the introduction and on-going maintenance of that system would be sought from the Appellant in the event that the proposed development was to be granted planning permission.

6 Conclusions

6.1 In relation to the proposed vehicle site access there remain several concerns about the proposed design of the junction with the B2102 as shown in Rev K modified to include a 40 mph speed limit past the site. Those concerns relate to some fundamental issues that have potentially significant safety consequences for all users of the junction, particularly vulnerable users. Resolution of those issues is not considered to be achievable simply through minor amendments of the submitted Rev K design. Considerable work remains to be done before a design for the access junction can be demonstrated to be feasible, deliverable and acceptable taking all relevant considerations into account.

6.2 With regard to sustainable accessibility, ESCC's current position remains that the site is dependent on Framfield Road for sustainable connectivity between the site and important town centre and other facilities; that Framfield Road currently provides very poorly for its necessary use as a major sustainable transport corridor serving the site; and that the Appellant's proposals are not sufficient to overcome those deficiencies. Again considerable further work remains to be done to develop a scheme that can be demonstrated to be effective, feasible, deliverable and acceptable taking all relevant considerations into account.

6.3 It is agreed by all parties that there would be an impact on the safe and efficient operation of junctions within the town centre that would need mitigating. Appropriate financial contributions towards the introduction and on-going maintenance of an enhanced signal control system would be sought from the Appellant in the event that the proposed development was to be granted planning permission.

Appendix 1

ESCC Consultation Responses

Communities Economy and Transport

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Date: 08.12.21 & 12.05.22 & 04.11.22
Our Ref: WD/2021/2198/MAO
District/Borough Ref: WD/2021/2198/MAO

Applicant: Croudace/Berry

Location: LAND AT BIRD IN EYE FARM, SOUTH OF BIRD IN EYE HILL, FRAMFIELD, TN22 5HA

Development: OUTLINE PLANNING APPLICATION FOR THE ERECTION OF UP TO 290 DWELLINGS, ASSOCIATED LANDSCAPING, INFORMAL OPEN SPACE AND STRATEGIC SANG, WITH ACCESS FROM THE B2102.

Road Name or Number	B2102 Bird In Eye Hill	**Consultation Date**	1 October 2021
National Grid Reference	548366120913	**Contact Officer Details:**	Kal Kamboh 01273 482287 kal.kamboh@eastsussex.gov.uk

Recommendation:

No objection		**Objection**	x
No objection subject to the imposition of conditions		**Objection due to insufficient information**	

Comments on Transport Assessment Addendum dated September 2022 following Highway response dated 12.05.22.

Access provision for servicing this proposal was outstanding from the previous comments and matters relating to this aspect of the proposal are still not complete for purposes of giving full consideration of this application.

Being outline, the application form states that approval is sought for access. This means access and accessibility.

Site Access – this has been revised in terms of its position and is shown on drawing 5330/021 Rev. H. In fact, 2 access proposals have been produced, 1 having a ghost right turn lane as recommended, and one as a simple priority working junction. Paragraph 2.25 in the Addendum 2 is incomplete. The applicant at the time of compiling the addendum2 had instructed a RSA audit for the access provision, but to date this has not been provided. A recent email from the transport consultant dated 14/10/22 indicated that this is still awaited. The County Council indicate in their highway guidance for major new development that a RSA should be provide with a designer's response. The proposed access would be serving a major housing development alongside the existing operations on Bird in Eye Farm and a proposed SANG. The access would need to support many types of users and ensuring that the level of road traffic alongside pedestrians with children and/or dogs, cyclists, business/farm vehicles which is from a rural road. A road safety audit is essential to ensure that what is being proposed is fundamentally deliverable and can support its demand. The highway authority wishes to raise comments on the current proposed arrangement with the right turn facility:

- 30mph speed limit extension. This is desirable in principle for an urban extension, and the scale of proposed development gives rise to an increase in activity on the highway by a variety of user types. Sussex Police are required to comment on the speed limit reduction but there is insufficient detail provided to support this. It has been raised on numerous occasions that with actual speeds at 42.4mph EB and 45.9mph WB, that traffic calming and visual influence indicating a change in the environment is required, which a gateway sign cannot provide adequately. Examples are visible frontage development, footways, street lighting, and infrastructure that supports the movement of non-motorised users which are absent.
- The straight through lanes at the new access are only 2.75m wide. Ideally all lanes should be 3m in width though it is noted that the available highway and achieving the required driver sightlines has dictated this arrangement. If a 30mph speed limit can be realistically considered, then the arrangement with narrower lanes either side of the stack lane may be acceptable.
- The Right Turn facility appears to be sufficient in terms of its capacity based on the junction modelling.
- A traffic island at the eastern end of the right turn lane would help to highlight it to drivers travelling towards Uckfield. It may be an issue that drivers could potentially cutting the corner which would conflict with vehicles waiting in the right turn lane, including cyclists as there is no provision for eastbound cyclists returning to the site having a safe means to join the shared path. The principle of a traffic island east of the junction would highlight the road alignment and offer some protection to right-turning vehicles, but may conflict with vehicles turning right from the site and a swept path plan would need to demonstrate the manoeuvres by the largest vehicle regularly requiring access.
- Dragon's teeth markings are not prescribed by the TSRGD 2016. In addition, research carried out on their effectiveness concluded that these markings are only really visible to a driver at the last minute, and it is doubtful, therefore, that they would contribute much to any slowing down effect on the approach. Due to this, the markings are considered an unnecessary maintenance burden and will not be authorised.
- The proposal for access as a simple priority junction is not supported on the basis that the 30mph limit cannot be supported for reasons highlighted above. Existing speeds are in excess of 40mph and a right turning vehicle waiting in the carriageway has a risk of being impacted by an eastbound vehicle.
- The revised position of the access further east is much closer to the adjoining boundary, where is dense vegetation. There is a highway verge allowing some to be cut back, though it is generally required that the hedge is not destroyed. Any growth left unmaintained is likely to hinder a driver's visibility at the access, from a set back point of 2.4m and shallower gradient.

This is the third iteration of the proposed site access submitted which is not supported by a RSA and has problems highlighted that would need to be addressed. Given that this application has now been appealed on non-determination grounds, the proposed access has not been demonstrated to be acceptable for the proposed development. Taking into account the quantum of housing, the generation of traffic and a promotion of a travel plan (encouraging active travel) and its location which would in effect should reflect the design of an urban extension, a 30mph speed limit would be a measure that is sought to support the safety of active users. The existing conditions are not appropriate for the proposed light touch measures such as signs, road markings (which are not acceptable) and a traffic island to effectively bring speeds to 30mph and support a large development in a predominantly rural position. Attention is drawn to the first planning appeal at Mornings Mill Farm which was dismissed on highway grounds based on insufficient details relating to access and accessibility (WD/2017/1942).

Framfield Road:

- Plan 5330/017 rev F shows a raised table zebra crossing outside no. 45. A formal crossing point is supported as was referred to in the previous highway response, but the constraints of a zebra type crossing had been pointed out. Nevertheless, a raised zebra crossing has been indicated by the applicant and road safety colleagues have highlighted that a single traffic calming feature like this is not desirable as it will be unexpected by drivers. There would need to be speed reducing features in advance of any vertical traffic calming such as this.
- The bus stop in advance of the crossing seems less than ideal. A car overtaking a bus would have limited time/space to see someone crossing, especially if they are crossing from north to south.
- It is not clear what the benefits of installing parking bays are, as there are already parking restrictions to control where parking takes place. Enforcement of the any parking restrictions is unlikely.
- Inclusion of bus cages and tactile paving/dropped crossing points is a benefit, though the overall conditions of the walking and cycling environment along Framfield Road are unchanged.

Cycle Track/area to west of the site:

- The bus stops east of no. 185 aren't positioned correctly. The markings don't line up with the flag/high level kerbing. However, it was raised in an earlier response that closer bus stops would be expected to ensure that all dwellings could be within the ideal distance of 400m. A provision

close to the access, within the site (with suitable turning) would be considered provided it did not impact on the timetabling of the services.

- Having the westbound bus stop within the shared cycle/footway would present a conflict unless enough space for people to wait for a bus outside of it is provided. Passenger transport would wish to see shelters at these stops which would potentially obstruct the shared cycle/footway. This aspect of the active travel/sustainable travel provision would need to complement one another.
- Access for pedestrians/cyclists has been raised previously and the provision for eastbound cyclists to join the path indicated has not be accommodated for.

Summary

Access provision is not acceptable for this site as indicated on drawings provided in the Addendum2 for the reasons indicated in this response.

Traffic modelling, in particular impact when considering wider sites is yet to be validated, and to this site there is some concern in terms if expected town bound impact on Framfield Rd Junction with New Town. Further exacerbation on town centre roads is also expected, with knowledge that these roads are already straining to cope with current traffic volumes.

As such highway objection is presented to this development proposal. Again, previous comments highlight that a joint working relation with site proponents for Bird In Eye North would enable a more comprehensive approach to reaching urban extension characteristics that this site cannot achieve with the access arrangement as shown and with the illustrative layout being concealed from the street scene. Framfield Road characteristics are urban and have constraints as set out in earlier responses which cannot be overcome through a parking scheme. An alternative crossing provision that is more appropriate to the function of Framfield Road needs to be considered.

Accessibility proposals (footway/cycleway) have scope to be provided but are expected to join Framfield Road where there are constraints with narrow footways and lack of crossing points.

Highway objection is sustained, for the following reasons:

1) The proposal would result in a material change in the volume of traffic using B2102 Bird in Eye Hill where speeds are derestricted, and hazards would be introduced by the slowing, stopping, and turning traffic at the proposed access, contrary to para 111 of the National Planning Policy Framework

2) The proposal would lead to increased traffic hazards on the B2102 Bird in Eye Hill by reason of the inadequate visibility at the proposed access and would therefore be contrary to para 111 of the National Planning Policy Framework

3) Insufficient measures have been submitted on the highway to support an urban extension, for purposes of reducing traffic speeds which are required to support sustainable transport modes.

4) Non-car travel choices for residents/users are limited between the site and Uckfield town centre as a result of substandard highway infrastructure which would not encourage sustainable travel modes and would therefore be contrary to para 104 and 106 of the National Planning Policy Framework.

END – KK 04/11/22

Comments on Transport Assessment Addendum dated March 2022 following Highway response dated 08.12.21.

2.1 Site Access – Right turn lane requirement
Reference is made to the appeal decision dated 2006 and AADT flows at that time on Bird-In -Eye Hill (4400 vehicles). Data provided by the County Monitoring Team indicated 2019 AADT flows are 5560 and 2020 flows are 4830. As stated previously, the 2020 flows are evidently lower as a result of Covid travel restrictions. The 2019 flows are applicable and should be used for this application. The figures presented by the applicant are less at 3900 and cannot be accepted. PICADY modelling at the proposed site access has been provided but there is no breakdown of the farm/industrial unit related trips in peak periods which would need to be added to the proposal related peak trips. The PICADY analysis should be presented on flow diagrams for each peak for scenarios baseline 2019, baseline 2019 + development and existing uses, 2027 baseline, and 2027 baseline + development and existing uses.

For access to the site, the junction arrangement is required to have a right-turn lane for several reasons:

i) Site related traffic would be weighted towards the west with more right turns into the site than left turns.
ii) Emergency vehicles (associated with the nearby hospital) would be obstructed by right turners waiting within the carriageway to make a right turn.
iii) This arrangement would afford right-turning vehicles (including cyclists) some protection and assist free flow of major road through traffic.
iv) The daily traffic cumulation from the site exceeds 1400 trips. For developments generating an AADT of over 500 vehicles, right turning traffic should not impinge on general flows which are 5560. Furthermore, the event that other potential development such as Bird In Eye North comes forward, it is likely that the flows on Bird In Eye Hill will increase further.

The modelling provided is incomplete and although it is stated by the applicant that a priority junction would not result in significant queues for right turning vehicles, it is unclear form the submission what data has been used for the PICADY analysis.

Quotes from the 2006 former planning application and dismissed appeal are outdated and not valid for the current proposal now 16 years on. Furthermore, the former application was for 197 dwellings, not 290 and highway response dated June 2007 had requested that the priority junction be upgraded to be a right turn lane. The current standards are in DMRB CD123 CD 123 Geometric design of at-grade priority and signal-controlled junctions.

<u>Access Visibility</u>
A speed survey demonstrates 85th percentile speeds of 42.4mph EB and 45.9mph WB.
The required driver sightlines based on actual speeds are 113m looking west and 127m looking east, from a setback point of 2.4m (desirable minimum distances). The distances stated in the transport assessment addendum are not accepted. Manual for Streets standards are applicable where 85th percentile speeds are up to 37mph, and higher speeds should take account of Stopping Sight Distances. In this case desirable minimum distances should be applied. The sightline looking west is indicated on drawing 5330/020D as only 91m, some 22m short of the requirement based on actual speeds.

The proposal to extend the 30-mph speed restriction was not supported previously unless speeds can be reduced to an appropriate and conducive speed. This was proposed historically by the Parish Council, and it was indicated to them that traffic calming measures would be required to effectively provide suitable traffic calming. It was due to the cost of installing engineered measures that the speed limit reduction was not proceeded with. Any proposal to extend the 30mph limit will require a highway related scheme that would effectively reduce speeds and be self-enforcing and an extent of the limit extension would need to

be agreed. A matter to flag up is the bend in the road to the east of the site which should not conflict with the terminal point of a 30mph limit as traffic may be encouraged to accelerate towards this section. Such traffic calming schemes should ideally benefit from frontage development to guide drivers that they are entering a change in environment. It is expected that a continuation of built form should be visible from drivers' position to support a change to 30 mph. The 30-mph limit extension will require engineered speed reducing solution to bring mean speeds to a maximum of 33mph. Speed limit reduction schemes should accord with the guidance found in ESCC document Local Speed Limits PS05/02 which can be forwarded to the applicant's transport consultant. As shown in appendices 4 and 5, I note that a 30mph extension is shown which terminates just east of the proposed access position. The area of highway contained within the proposed 30mph extension has no significant change in character or appearance other that additional signage and three islands over a section of 500m which may not have a speed influencing effect that would be necessary for accommodating residential development associated travel needs such as walking and cycling.

A change to the speed limit would need to be authorised by a Traffic Regulation Order and have support from Sussex Police, the enforcing body. It is advised that further discussion with the highway authority is necessary to develop a suitable traffic calming scheme. As mentioned previously, collaborative working with site proponent for Bird In Eye North would assist to influence a suitable design for a traffic calming scheme from the junction for Uckfield Hospital up to a suitable point east of the proposed site access.

Following the previous RSA1, a further audit has been commissioned and the designer's response refers to scheme amendment drawings that have not been provided as part of the Transport Addendum. The only highway related application plans are provided in appendices 4, 5 and 6 [5330/020D; 5330/008E; 5330/1001]. The RSA response refers to drawings 5330/16E; 5330/18D and 5330/17E which are part of appendix 9 which in accordance with their revisions, would supersede the plans in the original TA.

Framfield Road

The parking scheme on Framfield Road has received comments from the Traffic and Safety Team in relation to the build-outs: The series of build outs proposed on Framfield Road do not appear to form part of the audit (first) and do not appear to serve any useful purpose? At the same width as the parking bays, they offer no contribution in terms of traffic calming and as there is a bollard central to each one, they do not aid crossing movements. As such, an alternative proposal in Framfield Road may offer more value to assist pedestrians crossing. It is noted that plan 5330/017 rev E shows an uncontrolled crossing with dropped kerbs and tactile paving outside 52 and 45 Framfield Road. There has been a request to the Traffic and Safety team from a local Councillor for a formal crossing with suggestion for a zebra crossing in the vicinity of Harcourt Road/Alexandra Road. There may be constraints in terms of the physical requirements for a zebra, in terms of driveways, junctions and bus stop but a more formal crossing would be preferable to one that is informal.

Proposed build outs have been questions and the locations of them are questioned.

i) the build out opposite the former church potentially prevents a bus from stopping close to the kerbs to allow passengers to board and alight safely. Installation of bus cages here is likely to be more useful than a build out.

ii) parking bays marked either side of 69 Framfield road leave a very narrow space for access into an under croft access leading to a yard in which a vehicle is parked. Access is likely to be restricted to the yard area if vehicles are parked at capacity either side of the access and opposite within the shown marked bays. See extracts below. Furthermore, the build-outs are provided but it is not known the reason. DYLs are present to restrict parking around the junction Keld Avenue.

iii) the proposal indicates demarked bays for parking, though no restrictions for parking where the caged areas are not shown. It is presumed that the parking would still be permitted in the areas outside the marked bays unless DYLS are provided. As parking restrictions are secured through a TRO requiring public consultation, there would need to be a convincing scheme not only to the Highway Authority, but to the local residents that a parking scheme would be beneficial. I have noted the2nd parking survey provided, undertaken on 9th February 2022. I do not understand what information the first table provides. Does the survey have a plan and photographs indicating the areas that are restricted that have been used for parking?
The parking scheme and survey required further discussion to understand how the survey was carried out and what the overall benefits are of the parking scheme.

Road Safety Audit
Again, a number of safety matters were raised by the auditor.
Regarding the proposed access, as I have indicated that a right turn facility should be the design standard for the proposed scale of development, this element would need to be revisited and so further comments on the access proposal are not provided to this aspect of the audit. Access provision is reliant on achieving driver sightlines and potentially reducing the speed limit with engineered traffic calming features. Turning provision of larger vehicles should also be considered at this stage and not left to detailed design as this application seeks approval for the access and accessibility.

Splitter islands on Bird in Eye Hill: the proposed tapers are not in accordance with CD123, and revisions have been made in dwgs 5330/008E, 020C and 016E. I do not have access to these drawings as they are not provided as part of the TA addendum or application submission.

Problems highlighted on Framfield Rd, that relate to the parking reconfiguration would need to be further discussed and so further comments in this regard are not provided.

Problems A.4.2, A.4.3, and A.4.4 relate to access and accessibility and are likely to require further intervention in design terms and should not be left to detailed design stage. Problem A.4.4 may be affected by off-site highway works relating to Mallard Drive (Harlands Farm) approved development which is under construction. As part of their s278 agreement, bus stops on Framfield Road close to the medical centre are enhanced and tactile paving at the existing dropped kerbs are technically accepted. A drawing can be provided on request.

Relocation of street furniture and telegraph poles can be reviewed as part of the detailed design as these can be moved. The footway sign is adjacent to land being opened up for the footway/cycleway route into the site and there would be scope to relocate this sign and potentially alter the content to indicate direction into the site. For cyclists wishing to continue eastbound, there would need to be a measure for safely re-joining the carriageway.

My concerns remain intact with regard to achieving suitable access and accessibility based on the points raised and having had discussions with the transport consultant with regard to the access, and the need to have verified the impact of the development on the adjacent and wider network, the application attracts objection. Discussions with the applicant have been arranged and the above will be raised to seek solutions.

K Kamboh – 12.05.22

Original response Dec 2021

Executive Summary

This application can only be considered on the access arrangements proposed. The impact of the development cannot yet be considered as the applicant has agreed to jointly work together with other development proponents to consider wider highway impact on the network in Uckfield and surrounding areas. As this work is being carried out currently with purpose to study the existing network and identify the opportunities, constraints and potential mitigation required for future growth that has not been possible through the local plan process, the impact on the network and principle of the development is not yet accepted or understood. Until this joint working group has completed the transport modelling the formal highway response cannot be provided in full. As such a highway objection is presented based on insufficient information that the applicant is fully aware of.

Response:

This application seeks outline planning consent for up to 290 dwellings on a greenfield site (agricultural) and retains an area of existing development comprising Bird-In-Eye farm business units (12 in total). The site is shown to be served from Bird-in-Eye Hill (B2102). The site has history of a planning appeal dismissal for housing dating back to 2009 (WD/2006/3564 for 197 dwellings), when 2 other sites were subject to the appeal inquiry (Downlands and BIE North). At the time of that appeal, the development at Ridgewood Farm had not been submitted or approved.

A Transport Assessment, Road Safety Audit and Travel Plan have been submitted which will be referred to within this response. Pre-application advice for approximately 175 dwellings was provided for site but was not extensive as the scope for the proposed development kept changing and a response was provided which highlighted the constraints of the site location and connectivity by non-motorised users. The applicant refers to meetings with the County Highway Authority which relate to wider impact modelling for several major sites in the Uckfield area.

<u>Existing conditions – B2102</u>

Actual speeds for the B2102 have been measured in two separate positions either side of the proposed access for a 7-day period 9-15th July 2019 and the results of the speed survey indicate that the 85th percentile speeds are 42.4mph EB and 45.9mph WB. Peak period flows 08-0900hrs and 17-1800hrs are approximately 400 vehicles in each hour segment.

The B2102 has Average Annual Daily Traffic count of 5560 (1% HGV) vehicles as of 2019; and 4830 (1% HGV) in 2020. The count for last year demonstrates a Covid19 related reduction in overall trips on the network, hence the 2019 data should be used as baseline and the 2020 is not accepted.

Police reported crash data within the highway has been interrogated for a period of 5 years for area between Sandy Lane junction and Framfield Road junction with Newtown/High Street. A total of 8 injury crashes (categorised as 5 slight, 2 serious and 1 fatal) occurred. Although this is unfortunate, the contributing factors were driver error in all cases, and not contributory to the road design or character.

The site is located within 2km walking distance of Uckfield High Street shops and amenities and approximately 1-1.5km from the railway station and bus station.

The pedestrian infrastructure towards the town centre, when using Framfield Road, is poor as a result of narrow footways, parked vehicles straddling footways, no defined crossing points until the signalised junction with New Town/Bridge Farm Road. Here the inter-visibility for pedestrians is poor, there is little footway width and when pedestrians are waiting to cross the road, there is little space for other pedestrians to pass by. The junction here is very much vehicle dominant and the current pedestrian experience between the site and the Framfield Road signalised junction is not convivial nor would it encourage travel on foot.

Cycling is a mode of travel available to confident cyclists who are not discouraged by the existing local infrastructure/characteristics. However, encouraging new users or less confident cyclists would require the use of quiet residential streets, as an alternative to the main roads that are bus routes and carry high volumes of traffic. The availability of permeable residential streets to serve a suitable cycle route is a convoluted route through Keld Avenue which avoids a potential wait at the signals but this location has uncontrolled connection between the B2102 (New Town) and Mill Drove.

Public bus transport is available on Framfield Road, but which is very limited and cannot support commuter journeys. Although there are bus stops within 300m of the site, the most regular service (231 Uckfield to Etchingham) operates 6 buses per day between 0740 and 1740 so allows a passenger to reach destinations up to Etchingham before 0900 but the last bus to return arrives at 1726 with no option after that. Bus services are also available in the town centre/bus station, but entails a 1.3km walk which exceeds the recommended distance (400m), the walking environment is below a suitable standard and would take 20 minutes plus bus waiting time, which is not convenient and encourage car use instead.

Rail services are available within 1.1km which is an acceptable distance to walk for commuting long distances and trains generally run to schedule with waiting times minimal for regular users. Again, the walking route is using Framfield Road, where constraints have been highlighted.

Employment areas in Uckfield are the Bell Lane and Ridgewood industrial estates; High Street (tertiary sector).

The Application

For the proposed development of 290 units comprising 189 market and 101 social/affordable (unit type unspecified), the main issues to consider and requirements that would need to be met are:

- Access - Suitable vehicle, pedestrian and cycle access, to include sufficient width, gradient and visibility splays are a standard requirement.

The proposed vehicular access into the site is in a position a short distance east of the existing farm access which would be closed as part of the proposal. The retained uses at BIE Farm, and existing dwellings Lycroft, 18 and 19 Bird In Eye Hill would have vehicular access from the proposed arrangement. The proposed access is within a section of Bird In Eye Hill (B2102) that is currently subject to a derestricted speed limit (60mph).

The geometry and configuration of the access should take account of the traffic expected to use it and 290 dwellings, 12 business units and 2 existing dwellings would generate in excess of 1400 trips per day. The types of business or related vehicles are not provided. The type of junction shown is a simple priority

arrangement, and at pre-application stage, when 175 dwellings were proposed, the site proponent was requested to consider a right-turn stack lane and given the uplift to the quantum of housing proposed within this application with daily trips on the minor access road exceeding 1400 movements, a right turn lane is recommended, bearing in mind the anticipated distribution of traffic being predominantly weighted to and from Framfield Road junction. Furthermore, the assessment at the site access has been based on 2020 observed trips which are not acceptable and does not account for trips that are derived from the existing dwellings and businesses served by the site access. The TA indicates in 5330/405D the proposal will generate 80 trips turning right into the site in the PM peak hour which is likely to be greater as a result of the businesses and visitors to the proposed SANG (the existing Horsted Green Park SANG should be considered as an example in terms of trip generation).

Driver sightlines at the access should reflect either posted speed limit, or where speeds are lower, the 85th percentile recorded speeds over a period of 7 days. The emerging 85th percentile speeds of 42.4mph EB and 45.9mph WB would require sightlines to be imposed in accordance with Manual for Streets 2. The actual speeds would need to be much lower for consideration for 30 mph speed limit reduction as the speed limit should be self-enforcing. As 30mph limit is suited to urban areas, the extension of an urban zone would need to display the visual character [frontage development, street lighting, built form, footways - as examples] to provide visual guidance for road users that they are within a restricted area. Speed limit signage alone is not acceptable for self-enforcement in this case. The required driver sightlines based on actual speeds are 113m looking west and 127m looking east, from a set back point of 2.4m (desirable minimum distances). The distances stated in the transport assessment are not accepted, nor is there a plan to demonstrate what is achievable.

It is repeatedly mentioned that a 30mph limit extension is supported by the highway authority. This is not the case, and this is not explicitly stated in the pre-application response as this notion is reliant on the view of ESCC Road Safety Team and Sussex Police and as mentioned earlier is reliant on visual characteristics for an urban area to enable self-enforced lower speeds. These parties have been consulted and their views can be provided in due course.

Road safety audit

The vehicular access to the site should be supported with a RSA 1 and scheme promoter's response. It is noted that this has been provided and a total of 10 problems have been highlighted.

1) LOCAL ALIGNMENT - proposed access

Auditor Comment: Vehicles may approach Bird in Eye Hill at inappropriate speeds. The application site is currently set at a level above the adjacent Bird in Eye Hill with the existing access rising gradually away from the main carriageway. The proposals relocate the existing access to Bird in Eye Farm in order to serve a proposed development of 300 residential dwellings as well as two existing dwellings outside of the application site. The scheme drawings do not identify the gradient of the proposed carriageway at this stage, however, the land in proximity appears to be approximately 2 to 2.5 metres higher than the level of the existing carriageway. A gradient in excess of 1 in 20 on approach to a simple priority access could lead to junction overshoot type incidents. It is recommended that the access road is set at a gradient shallower than 1 in 20 on approach to
the B2102.

Designer Response: The proposed access will be designed with 1 in 20 or slacker gradient than in accordance with standards with the land either side, graded up away from the carriageway at an appropriate gradient.

LHA view – it is considered that the access details are required as part of the detail for this outline application and the appropriate gradient proposed should be presented as part of the matters for considering suitability and deliverability of the vehicular access. As such as there are no access details such as cross sections, or junction geometry, the access detail is incomplete.

2) GENERAL – Bird in Eye Hill

Auditor Comment: Drivers approaching the proposed traffic island may not become aware of the feature at a safe distance. In proximity of the proposed access, Bird in Eye Hill is derestricted, subject to the 60 mph national speed limit and accommodates a number of bends in proximity of the proposed access. The proposals that are subject to this Stage 1 Road Safety Audit includes two options; one to extend the existing 30mph zone to a point just east of the proposed access and another where the derestricted nature of the road remains unchanged but a splitter island is to be installed just to the west of the proposed access to ensure that eastbound vehicles approaching the proposed access, do not encroach the opposing lane and thus ensure the achievable visibility accords observed speeds. The scheme drawing illustrates that illuminated keep left bollards are to be provided which should highlight the features to approaching drivers, however, due to the existing alignment of Bird in Eye Hill to the west as well as vegetation abutting the carriageway, forward visibility for eastbound drivers is limited. As such, there may be insufficient warning of the traffic island which could lead to vehicles striking the feature and a loss of control type incidents. It is recommended that sufficient forward visibility is achievable to an object within the carriageway.

Designer Response: The Highway Authority are supportive of the extension to the 30mph speed limit and as set out in MfS2, the starting point for visibility on non-trunk roads is MfS. It is clear that Bird in Eye Hill is not a trunk road and sufficient forward visibility is achievable.

LHA view – the 30mph speed limit extension cannot be supported without clear acceptance from Sussex Police and the Road Safety Team at ESCC. Frontage development and an environment conducive to supporting lower speeds is a prerequisite. Although forward visibility is available there is evidence that traffic does breach the speed limit. The presence of the isolated island within a derestricted speed limit that is not supplemented by street lighting or frontage development may encourage middle of road driving during quieter times such as night when road traffic volumes are low.

3) GENERAL – Proposed access

Auditor Comment: Existing Telegraph / Electric pole will become an obstruction to vehicles. Signage and telegraph poles are situated within the existing verge along Bird in Eye Hill. The proposals relocate an existing access approximately 30 metres to the east which is to serve the existing dwellings as well as the proposed development of 300 dwellings. However, a telegraph/electric pole is situated in the proposed bell mouth access in the path of vehicles and will be an obstruction. It is recommended that the telegraph/electric pole is relocated, and the access is free of obstructions.

Designer Response: All existing street furniture, utility covers and gullies will be reviewed during the detail design of the scheme.

LHA view: The pole would need to be relocated to accommodate the access, and it is agreed that this should be reviewed at detailed design stage (S278) and the pole placed in a position that does not obstruct access safety requirements of the highway and its users.

4) GENERAL - Proposed Access and Bird in Eye Hill

Auditor Comment: Existing road gully will be within the path of vehicles. Bird in Eye Hill is cambered with surface water falling to the channels either side of the carriageway where road gullies are present. During the site visit associated with this Audit, a number of gullies in proximity to the proposed works were observed to be blocked and therefore ineffective. The proposals that introduce a traffic island to the west of the proposed access, widen the Bird in Eye Hill carriageway where a gully is present either side of the road. No details of the proposed surface water drainage have been provided at this stage; however, an insufficient network is likely to result in ponding during inclement conditions which increases the likelihood of loss of control type incidents. Furthermore, a road gully within the path of a vehicle could give rise to loss of control type incidents particularly for two wheeled vehicles and vehicles undertaking a braking manoeuvre. It is recommended that an adequate surface water drainage network is provided.

Designer Response: All existing street furniture, utility covers and gullies will be reviewed during the detail design of the scheme.
LHA view: it is agreed that features in the highway that are affected by a highway related scheme can be reviewed at detailed design stage (S278).

5) JUNCTIONS – Bird in Eye Hill

Auditor Comment: Drivers approaching and waiting to turn right into the proposed access may not become aware of each other at a safe distance. In proximity of the proposed access, Bird in Eye Hill is derestricted, subject to the 60 mph national speed limit and accommodates a bend on each approach. The proposals that are subject to this Stage 1 Road Safety Audit includes two options; one to extend the existing 30mph zone to a point just east of the proposed access and another where the derestricted nature of the road remains unchanged but a splitter island is to be installed just to the west of the proposed access to ensure that eastbound vehicles approaching the proposed access, do not encroach the opposing lane and thus ensure the achievable visibility accords with the splays illustrated. The Audit Team took measurements whilst on-site and visibility splays of 2.4x117.2 metres and 2.4x102 metres are achievable from the proposed access to an approaching vehicle, however, due to vegetation within the verge to the north of the carriageway, forward visibility to and from a vehicle attempting to turn right into the access, is restricted to below 117.2 metres for westbound drivers. As such, a westbound driver will have insufficient warning of the traffic attempting to turn right and vice versa. It is recommended that the sufficient forward visibility is achievable.
Designer Response: As stated by the Auditor's, the proposed access is clearly visible for westbound drivers and as such, one would approach cautiously in the knowledge that a vehicle may attempt to turn right. It must be noted that a right turning vehicle will be moving across the carriageway and not be a stationary object. The Highway Authority are supportive of the extension to the 30mph speed limit and in any event, MfS2 advises that the starting point for calculating visibility for non-trunk roads should be MfS. It is evident that sufficient visibility is therefore achievable to/from the proposed access.
LHA view: designer response is assuming that a 30 mph speed limit is supported, and vehicles would approach cautiously, and a right turning vehicle is not stationary (a vehicle waiting to turn has to ensure that it is safe to do so and eastbound vehicles may prevent this). Furthermore, there would be an increase in traffic volume approaching from the west as a result of the proposal. It was raised that a ghost right turn lane at the proposed access should be considered. The auditor comments remain valid.

6) JUNCTION - Proposed access

Auditor Comment: No road markings are provided to highlight the need for exiting vehicles to give-way. The existing access arrangement serving a mixed-use development on land at Bird in Eye Farm does not accommodate any road markings. The proposals subject to this Stage 1 Road Safety Audit are to provide a priority access that serves a development of 300 dwellings. The scheme drawings provided with the Audit Brief provided do not identify that any carriageway markings are to be provided at its junction with Bird in Eye Hill. Vehicles exiting may not therefore align themselves sufficiently to allow space for a vehicle to enter simultaneously which could give rise to sideswipes type incidents as well as rear end shunts along Bird in Eye Hill and junction overshoot type incidents. It is recommended that road markings are provided to guide vehicles sufficiently.
Designer Response: Give-way and road centreline markings are to be provided.
LHA view: it is considered that the access specification is required as part of the detail for this outline application and the appropriate junction configuration should be presented as part of the matters for considering suitability and deliverability of the vehicular access. As such as there are no access details such as cross sections, gradient, or junction geometry, and the access detail is incomplete.

7) JUNCTION – Proposed access

Auditor Comment: Insufficient space may be provided to allow service vehicles to enter. The existing access to Bird in Eye Farm is approximately 5 metres wide with large corner radii that allow for Heavy Goods and Agricultural Vehicles to manoeuvre safely. The proposals include the relocation of the priority access with 8 metre corner radii which provides access to a 5.5m wide carriageway. No swept path analysis has been provided with the Audit Brief and as such, the corner radii may not be sufficient to allow for the infrequent HGV movements that could be expected from a development of 300 dwellings. Should turning movements be restrictive, vehicles could be required to encroach the opposing lane or vehicles may be required to reverse out of the proposed access or in order to enter and exit the access raising the risk of rear-end, sideswipe collisions.

Designer Response: A swept path analysis has been undertaken and the proposals are adequate for the expected vehicles.

LHA view: A refuse truck has been tracked through the access as shown. The access details are insufficient as stated previously. A further note is that the access will serve existing industrial related uses and although the weekly occurrence of a refuse truck would ordinarily be accepted with some overhang onto adjacent lanes, more frequent use of such vehicles for the 12 business units (details been excluded in this application) would require an access that accommodates larger vehicles that require regular use. The access should accommodate regular use by all vehicles without the risk of conflict on the highway or at the access.

8) WALKING, CYCLING & HORSE RIDING – proposed footpath connection BIE Hill

Auditor Comment: Existing signage will become an obstruction to pedestrians. In proximity of the proposed footway cycleway access the verges of Bird in Eye Hill accommodates a number of telegraph / electric poles and road signs. The proposals introduce a connection between Bird in Eye Hill and the local pedestrian network, to the west of the proposed access via footpath through a wooded area. An existing telegraph / electric pole is situated just to the west of the proposed connection will be situated central to the footway and become an obstruction to pedestrians that could force one to enter the carriageway suddenly raising the risk of vehicle collisions with pedestrians. It is recommended that the telegraph pole is relocated.

Designer Response: All existing street furniture, utility covers and gullies will be reviewed during the detail design of the scheme.

LHA view: Agreed, though the proposal should be able to demonstrate deliverability and any relocation of telegraph poles and road signage would require alternative locations that are suitable for their revised positions and should not compromise accessibility or highway safety.

9) WALKING, CYCLING & HORSE RIDING – proposed footpath connection BIE Hill

Auditor Comment: Cyclists are likely to utilise the proposed footpath. Bird in Eye Hill benefits from a footway along the southern side that terminates just to west of the gated access to the application site. The scheme drawing provided with the Audit Brief illustrates that a footpath connection is proposed at this location which is approximately the same width as the existing footway, however, as identified within the Transport Assessment associated with the scheme, a 3.0-metre-wide shared use footway / cycleway link is to be provided. The proposed link is considerably shorter than following Bird in Eye Hill and as such, it is highly likely that cyclists will utilise the link. Should the link be insufficient to accommodate a high number of pedestrians and cyclists, there could give rise to cyclist-pedestrian collisions. It is recommended that the width of the facility is increased appropriately to accommodate cyclists.

Designer Response: The section of footway between the pedestrian/cycle access and the bus stops to the west will be widened to 3m to facilitate its use as a shared footway/cycleway.

LHA view: Agreed, though the proposal should be included as part of access detail submission included in the audit brief, and considering the provision being up to the carriageway, it is advised that a section of verge of say 0.5m is included to separate the non-motorised provision with the carriageway to prevent users from sidestepping into oncoming traffic that may be driving close to this facility (HGV and bus route).

10) WALKING, CYCLING & HORSE RIDING – proposed footpath connection BIE Hill

Auditor Comment: Existing road sign could become an obstruction to users of the footway. Bird in Eye Hill benefits from a footway along the southern side that terminates just to west of the gated access to the application site at a location where a 'pedestrians in carriageway' road sign with a 'no footway for 1 mile' plate is present. The sign face appears to provide insufficient headroom for a pedestrian to walk beneath. Should a pedestrian step slightly off the existing footway, the sign would be an obstruction resulting in a personal head injury. It is recommended that the sign face is relocated further back from the edge of footway or raised to a suitable level.
Designer Response: All existing street furniture, utility covers and gullies will be reviewed during the detail design of the scheme.
LHA view: Auditor recommendation is accepted, and detailed design of the scheme can include the minor adjustment of the sign in position or height provided it does not conflict with the proposed provision of the footway/cycleway

To summarise the Road Safety Audit, it is apparent that insufficient details were included in the audit brief and submitted as part of the application documents. A 30mph speed limit can only be accepted if the environment is conducive to supporting a self-enforcing reduction in speeds. This would be assisted by frontage development, street lighting, and a visual change in character supported by urbanising the street infrastructure. It is contested that the highway authority supports a 30mph as this would be reliant on a suitable scheme to support this notion. Consideration of the Bird In Eye North site which is being offered as a potential housing site has the potential to contribute to the urban extension of Uckfield and the sites are advised to be considered collaboratively as they can coordinate highway enhancements for mutual and wider benefit. As such the vehicular access details submitted are not accepted.

Pedestrian and Cycle Access

This is indicated on the submitted plan as a route from the northern corner on the westernmost point where the site meets the highway. The submitted plans do not show this in detail though a plan is provided within the Transport Assessment documents (5330/008C) which also includes the proposal for a 30mph limit with gateway features.

The ESCC Passenger Transport team have been consulted on this proposal and have provided the following comments and contribution request:

In terms of this application, I have the following observations/concerns.
The size of the site means that dwellings in the south east part of the development will be in excess of 500 metres walking distance to the B2102. The consultant's Transport Assessment, in Appendix 21, appears to be it acceptable to walk a further 450 metres to the existing 'Uckfield Community Hospital' bus stops on the B2102 to the west. Clearly this is totally inappropriate.

Two new bus stops (one in each direction) would need to be provided adjacent to the main site entrance, and even then, they would be in excess of the accepted 400 metre walking distance. Each would need to have a raised kerb, bus stop clearway, bus shelter with seating, new bus stop pole (sourced from Externiture), lighting and real time information provision. A safe and accessible road crossing point would be required.

In Appendix 22 it is noted that the consultant has approached the bus operator for costed proposals to improve the frequency of the weekdays daytime only 2 hourly bus service 231. A couple of return journeys are also provided on Saturdays by a community transport operator.

It is not appropriate for the developer to secure service improvements directly through a bus operator. The current contract with the bus operator of service 231 is due to end in 2022. The indicative prices provided that operator in April 2021 will now have significantly increase due to the cost of securing driving staff due

to the national shortage of bus drivers. The particular is suggesting future contract price increases of up to 20% so as to account for additional driver costs and other cost pressures.
The level of service specified is also not sufficient. Already the existing service is reaching capacity at school times, so additional provision will be needed for pupils from the development attending secondary schools in Heathfield and Uckfield. There is additionally the requirement for an early morning, evening and Sunday service. In particular, the last journey from Uckfield currently is 1735, which is too early for commuters from a wider (eg. from Brighton making connections at Uckfield Bus Station, and train commuters from London). We estimate the additional cost of these bus requirements to be:

- *£69,256 per annum for the level of Monday to Saturday provision as shown in Appendix 22 (ie a 20% increase).*
- *£10,120 per annum for the additional early morning provision (Mondays to Fridays).*
- *£43,560 per annum for the additional evening provision (daily).*
- *£18,061 for the Sunday daytime service provision.*

Therefore, a total of £140,997 per annum, which will be required for a minimum of 3 years.

The proposals on Framfield Road include a crossing point in vicinity of 2-8 Framfield Road. This is close to a signalised junction where traffic queues back to and beyond, and where footways are narrow (less than 1.5m in width). This is not included in the RSA and cannot be considered as a deliverable solution as part of accessibility strategy. Bus stop improvements are proposed but these are not to the requirements of the Passenger Transport Team nor have these been part of the RSA.

The installation of parking controls on Framfield Road has been presented by the applicant and supported by a parking survey on one day. The Lambeth methodology requires :

Residential Developments The Council requires a parking survey to cover the area where residents of a proposed development may want to park. This generally covers an area of 200m (or a 2 minute walk) around a site. For further detail see 'Extent of survey' below. The survey should be undertaken when the highest number of residents are at home; generally late at night during the week. A snapshot survey between the hours of 0030-0530 should be undertaken on two separate weekday nights (ie. Monday, Tuesday, Wednesday or Thursday).

The methodology is directed at proposed development and not necessarily for securing parking restrictions for existing development that benefits from unrestricted parking provision. If the applicant wishes to understand where residents park, it may not be solely on Framfield Road as other minor roads are also utilised. The outcome of the parking survey is therefore not considered to be an appropriate parking assumption for this road and further surveys are recommended, jointly with the BIEN site proponents in accordance with a methodology that is agreed with the Highway Authority.

A non-motorised user audit is required carried out to understand any constraints experienced by pedestrians and cyclists using the highway network to connect to local service providers and amenities, to then seek appropriate and commensurate solutions to assist accessibility for this group of highway users. Ideally, as BIEN has a direct relationship to this site and potential link to the north of the railway line, and mentioned earlier, a collaborate approach drawing together sustainable solutions from each site (they are very much reliant on each other) would benefit both sites. Joint solutions to overcome the accessibility constraints for both these sites are likely to be more meaningful and effective if both sites work together to prevent conflicting mitigation measures that come forward independent of each site.

It is recommended that these sites coming forward independently is likely to result in collaborative working to address appropriate and safe mitigation measures later down the line, and as such it would make sense not to have conflicting solutions and have solutions and measures that are conducive to both sites worked out form the outset, given that both these sites have been considered at appeal with the Inspector's comments highlighting the constraints and opportunities in this location.

Since pre-application discussions, which I highlight were not conclusive and did not indicate support for a 30mph extension explicitly (no reference was made within the pre-application response that the applicant has provided in appendix 1).

At this stage, the access and accessibility aspects of the application have not been fully addressed or justified.

Highway Impact

Modelling for this site is being prepared in conjunction with several other major sites in Uckfield as part of an agreed strategy between the County Highway Authority and Wealden District Council. The applicant has signed and committed to a Statement of Common Ground to understand the wider impact of traffic on the highway network. The trip assessment of the proposal, as mentioned earlier is based on 2020 baseline surveys which were taken during a Covid restricted period and are unrepresentative.

Proposals to install SCOOT has been explored as part of the highway assessment for land at Eastbourne Road for 90 dwellings (WD/2020/0410). At that time both MOVA and SCOOT solutions were considered by the East Sussex Highways signals team and deemed as ineffective and it is unlikely that this can be considered as a solution or be modelled to demonstrate mitigation at the critical junctions Framfield Rd or High Street/Bell Lane. Further comments on this aspect of the application cannot be provided until the outcome of the wider modelling exercise is complete.

Internal Layout

An indicative layout of the proposed development is provided. The details do not give any indication fo housing types or amount of parking. The TA suggests that the parking will be provided in accordance with the ESCC parking standards. This is essentially a reserved matter, though it should be clear at this stage that the indicative layout can meet the proposal description and highway related requirements. The SANGS car parking area shown as 30 spaces appears to be served from a minor road which is potentially to unadopted standard. If the SANG is available to the general public it would have amenity value and road that connects to it should ideally be adopted or responsible to the SANG managing authority for its maintenance if it remains privately owned.

There is a public right of way that runs along the south boundary of the SANG, and suitable connections should be provided to allow SANG users to link to it, though gated sections.

Swept path plans have been provided throughout the site, though the application seeks consent for access only. As the layout is not for determination, the swept path plans are not considered as part of this response. The swept path plan for the access is shown though the details of the access are not complete and it has been requested that other vehicle movements from the business units are considered as they would require use of this access.

It has not been specified if the proposed site road network is to be offered for adoption. This should be indicated at outline stage.

Travel Plan

This is required to be secured through a s106 agreement.
It is essential that this site and its proposed uses are supplemented with a suitable travel plan which covers a 5 year period (and phased, if phases identified). The applicant has provided with the application a framework travel plan which is welcomed. The Passenger Transport team has suggested that bus service and infrastructure improvements are required as part of this development. In addition, hard measures

which have yet to be agreed and would be identified through a NMU audit, would need to form part of the Travel Plan so that it can be promoted effectively and define non-motorised routes.

Measures that have been included in the submitted travel plan framework are:

1) Travel Plan Coordinator
2) Residents' information pack – to include local walking and cycle routes, cycle journey planning resources, promotion of cycle training, public transport information on routes and timetables, locations of nearby destinations and mapping with cycle/walking times and distances. A £150 travel voucher offered for sustainable travel.
   This pack should also include car club membership details/promotion, home deliveries for shopping, setting up a local group on a social network site by the travel plan coordinator which should also promote car sharing, walking and cycle groups.
3) Car club - only 1 vehicle has been included and is likely to be appropriate initially.
   For a development of this scale 2 EVs are recommended with fast-charge facilities within an adopted road to enable wider use. For each household, Car club membership for a minimum of 2 year period with 50 miles drivetime should also be provided for each household.
4) *For inclusion: A twice annual Dr Bike visit to the development ensure that resident's cycle equipment is maintained to a good standard during the travel plan period.*

Monitoring of the travel plan – baseline surveys should be provided by 25th occupation and future surveys are required in years 1, 3 and 5 at this site, on the basis that sustainable travel modes should be reinforced on a much more regular basis to minimise where possible, the potential impact on the highway network by single occupancy vehicles. This attracts an audit fee of £6k.

Summary:

The application is currently incomplete in terms of access, accessibility and modelling details. Assumptions for a 30mph extension and SCOOT infrastructure are not accepted. Mitigation measures to improve non-motorised environment along Framfield Road should derive from the outcome of a NMU audit, ideally in conjunction with proponents of BIEN site to achieve meaningful and effective transport schemes to create a more sustainable environment.

To note:

S106 requirements (not conclusive)

1) Travel Plan for a 5-year period and travel plan audit fee of £6k. TP to include and flexible voucher for £150 for use on sustainable travel measures; car club membership for first occupant of each dwelling for 2 years and 50 miles drive time.
2) Car club provision – 2 E-vehicles and 2 dedicated fast-charging bays within the site
3) Road layout and access provision - subject to a combined s278/s38 agreement where internal roads are offered for adoption.
4) Provision of bus infrastructure (Two new bus stops adjacent to the main site entrance with a pedestrian crossing, raised kerb, bus stop clearway, bus shelter with seating, new bus stop pole, lighting, and real time information provision - subject to a s278 agreement and service improvement contribution of £140,997 per annum, which will be required for a minimum of 3 years.
5) Accessibility related highway works – to be agreed

On behalf of the Highway Authority
For Director of Communities, Economy and Transport

Appendix 2

DMRB Technical Standard CD123

Design Manual for Roads and Bridges

Road Layout
Design

CD 123
Geometric design of at-grade priority and signal-controlled junctions

(formerly TD 41/95, TD 42/95, TD 40/94, and those parts of TD 50/04 and TD 70/08 relating to priority and signal-controlled junctions.)

Revision 2

Summary
This document provides requirements for the geometric design of at-grade priority and signal-controlled junctions.

Application by Overseeing Organisations
Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

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Release notes

Version	Date	Details of amendments
2	Aug 2020	Revision 2 (August 2020) To correct issue with incorrect reference being added to clause 2.4 NOTE 2 as part of January 2020 update. Correct reference is CD 169. Revision 1 (January 2020) Revision to update references only. Revision 0 (August 2019) CD 123 replaces TD 41/95 and TD 42/95. CD 123 and CD 122 together replace TD 40/94. CD 123 and CD 116 together replace TD 50/04. CD 123 also replaces those elements of TD 70/08 relating to priority and signal-controlled junctions. The relevant content of these documents have been re-written to comply with the new Highways England drafting rules.

Foreword

Publishing information

This document is published by Highways England.

This document supersedes TD 41/95 and TD 42/95 which are withdrawn. In combination with CD 122 [Ref 4.N], this documents supersedes TD 40/94, which is withdrawn. In combination with CD 116 [Ref 1.I], this document supersedes TD 50/04, which is withdrawn. This document also supersedes elements of TD 70/08 that relate to priority and signal-controlled junctions.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This document provides requirements and advice on the geometrical design of at-grade priority and signal-controlled junctions.

In addition to signal controlled junctions, this document provides a single point of reference for the geometric design of at-grade priority junctions that has been historically split across a number of documents. It merges and rationalises the content of TD 41/95 and TD 42/95 and incorporates the priority junction elements of compact grade separated junctions and wide single 2+1 lanes, which were previously covered by TD 40/94 and TD 70/08 respectively.

In order to remove duplication across the various types of priority junctions defined by the previous documents, priority junctions are now formed of two key elements. These two elements are the priority junction (the layout of the minor road arm) and the major road central treatment (the layout of the major road aspect of the junction e.g. a ghost island arrangement). This approach allows for flexibility of varying the form of the layout of the minor road and/or major road while removing the repetition and ambiguity resulting from the entire junction being treated as a single component in the previous documents.

In order to rationalise and remove duplication between direct access layouts, the definition of a direct access is now only used for a single field or dwelling. A priority junction is now for anything greater; however, the requirements/advice for a priority junction differ depending on whether the road provides a through route or not (i.e. an entrance to a business park or development).

Other notable changes/additions include:

1) advice on permitting particular movements at single lane dualling and dual carriageway priority junctions (predominantly relating to the right turns out of the minor road);
2) expanded advice on the use of nearside passing bays, including recommended dimensions; and
3) improvements made to the way visibility splays are defined at priority junctions to ensure that a full splay is provided rather than just a line of visibility from the minor road set back point.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 6.N] apply to this document.

Abbreviations

Abbreviations

Abbreviation	Definition
AADT	Annual average daily traffic
ASL	Advance stop-line
HGV	Heavy Goods Vehicle
SLD	Single lane dualling
SSD	Stopping sight distance
S2	Single carriageway cross-section, 1 lane each direction (see CD 127 [Ref 1.N])
WS2	Wide single carriageway cross-section, 1 lane each direction (see CD 127 [Ref 1.N])
WS2+1	Wide single 2+1 carriageway cross-section, 2 lanes one direction, 1 lane opposing direction (see CD 127 [Ref 1.N])

Terms and definitions

Terms

Term	Definition
Auxiliary lane	An additional lane provided on the nearside of the major road carriageway at junctions to increase merge or diverge opportunity and/or provide additional space for weaving traffic.
Changeover	A carriageway layout which effects a change in the designated use of the middle lane of a WS2+1 road from one direction of traffic to the opposite direction.
Collector road	A road separate to the junction which collects other local roads and accesses into a link that connects to the minor road in advance of the junction.
Compact grade separated junction	A grade separated junction designed with a two way unsegregated connector road between the major and minor road. The connector road joins the major road via a priority junction designed to this document.
Corner taper	A short taper following the corner radius provided to accommodate the swept path of larger vehicles.
Crossroads	For the purpose of this document, crossroad junctions are where the centre line of a minor road, when extended across the major road, fits within the carriageway of an opposing priority junction.
Design vehicle	The design vehicle for at-grade priority and signal controlled junctions is a 16.5m long articulated Heavy Goods Vehicle.
Desirable minimum stopping sight distance	Desirable minimum stopping sight distance (SSD) is as defined in CD 109 [Ref 5.N].
Direct access	A connection to an all-purpose trunk road providing access to a single field or dwelling only that does not provide a through route.
Duplicate primary signal(s)	Where there is more than one primary signal, additional signals erected to the offside are duplicate primary signal(s).
Ghost island	A major road central treatment that uses road markings to create an additional lane to allow traffic waiting to turn right from the major road into the minor road to do so without impeding through traffic movement.
Hatched area	An area of road marking hatching used to discourage and/or channel vehicle movements.
Intervisibility zone	The area within a signal-controlled junction that ensures road users can see other road users (including pedestrians) between each stop line.
Major road central treatment	A collective term for the central treatments associated with ghost island, single lane dualling or dual carriageway junctions.

Terms (continued)

Term	Definition
Major road	A road on which traffic has priority of movement over adjoining roads.
Minor road	A road on which traffic concedes priority to traffic on the major road.
Overtaking sections	Sections of two lane single carriageway where the combination of horizontal and vertical alignment, visibility and or width is such that there are clear opportunities for overtaking using the opposing lane, as described in CD 109 [Ref 5.N].
Phase	The sequence of conditions applied to one or more streams of vehicular traffic or pedestrian traffic which always receive identical light signal indications.
Primary signal	A light signal erected near the stop line. NOTE: Where there is more than one signal located near a stop line, the signal on the nearside is the primary signal.
Priority junction	A junction controlled by a 'Give Way' or 'Stop' arrangement. NOTE 1: Stop arrangements are only used where there are severe visibility restrictions. NOTE 2: Direct accesses can operate in a similar manner but are not classed as priority junctions.
Reservoir length	The length required for queuing between the opposing arms of a staggered junction.
Rural roads	Rural roads are as defined in CD 109 [Ref 5.N]
Secondary signal	Traffic signals located beyond the primary signal, facing the same direction of traffic flow. NOTE: The information given by a secondary signal is the same as that given by the primary signal with which it is associated, but additional information compatible with that of the primary can also be given.
Signal-controlled junction	A junction that has full or part time signals on one or more of its arms.
Simple priority junction	A form of priority junction where there is no major road central treatment, such as a ghost island or single lane dualling, and no merging/diverging tapers or auxiliary lanes.
Single lane dualling	A single carriageway major road central treatment that uses physical traffic islands to provide space for right turning movements in and/or out of the minor road in order to not impede through traffic movement.
Stagger distance	The distance along the major road between the centre lines of the two minor roads at a staggered junction.

Terms (continued)

Term	Definition
Staggered junction	A junction arrangement where the major road is continuous through the junction and two opposing minor roads form priority junctions that are offset from one another. NOTE: Two opposing priority junctions are not staggered when the layout of any central treatments do not overlap or the junction spacing is greater than the major road SSD.
Storage length	Storage length is the length over which vehicles can queue without causing obstruction to, or being obstructed by, vehicles in the adjacent lane.
Swept path	The swept path of a vehicle is the movement and path of different parts of a vehicle when that vehicle is undertaking a turning manoeuvre. It is the envelope swept out by the sides of the vehicle body, or any other part of the structure of the vehicle.
Taper merge / diverge	An area of additional carriageway that is tapered to/from the major road, which is provided on the nearside of the major road carriageway at junctions to increase merge or diverge opportunity.
Through route	A road that provides a connection to the wider road network. NOTE: A road that does not form part of a through route requires a road user to access and leave a site through the same junction.
Traffic island	A traffic island is a raised (kerbed) or marked-off area on the road. NOTE: A traffic island can be used to accommodate pedestrian refuges and traffic signals, and as a means of separating lanes of traffic or opposing traffic flows.
Urban roads	Urban roads are as defined in CD 109 [Ref 5.N]
WS2+1 roads	A wide single carriageway road with two lanes of travel in one direction and a single lane in the opposite direction, with a 1 metre hatch separating opposing traffic flows.

1. Scope

Aspects covered

1.1 This document shall be used for the geometric design of at-grade priority junctions and signal-controlled junctions.

NOTE 1 This document is applicable to both new and improved junctions.

NOTE 2 This document does not cover the general provision of walking, cycling and horse riding facilities at at-grade priority junctions. Requirements and advice relating to this are provided in CD 143 [Ref 3.N] and CD 195 [Ref 2.N].

1.2 This document shall be used for the geometric design of the priority junction element of a compact grade separated junction.

NOTE Requirements for the link road element of a compact grade separated junction are provided in CD 122 [Ref 4.N].

Implementation

1.3 This document shall be implemented forthwith on all schemes involving the geometric design of at-grade priority and/or signal controlled junctions on the Overseeing Organisations' all-purpose trunk roads according to the implementation requirements of GG 101 [Ref 6.N].

Use of GG 101

1.4 The requirements contained in GG 101 [Ref 6.N] shall be followed in respect of activities covered by this document.

2. Junction selection

Priority junction selection

2.1 Priority junctions shall not be used on motorways or all-purpose dual three lane carriageways.

2.1.1 Priority junctions should not be located on a sharp curve on a major road.

NOTE 1 *The placement of a priority junction on the inside of a sharp curve is particularly hazardous as this can restrict visibility to a much greater degree than on the outside of a curve, and is likely to create blind spots.*

NOTE 2 *The placement of a priority junction on the outside of a sharp curve can result in drivers on the major road misinterpreting the minor road as the ahead direction. Equally drivers on the minor road could misinterpret the layout as drivers on the mainline as having to give way.*

2.1.2 Priority junctions should only be located on level ground or where any approach that is on a downhill gradient does not exceed 2% over the applicable desirable minimum stopping sight distance (SSD).

2.1.3 The number of priority junctions providing access to the all-purpose trunk roads should be minimised.

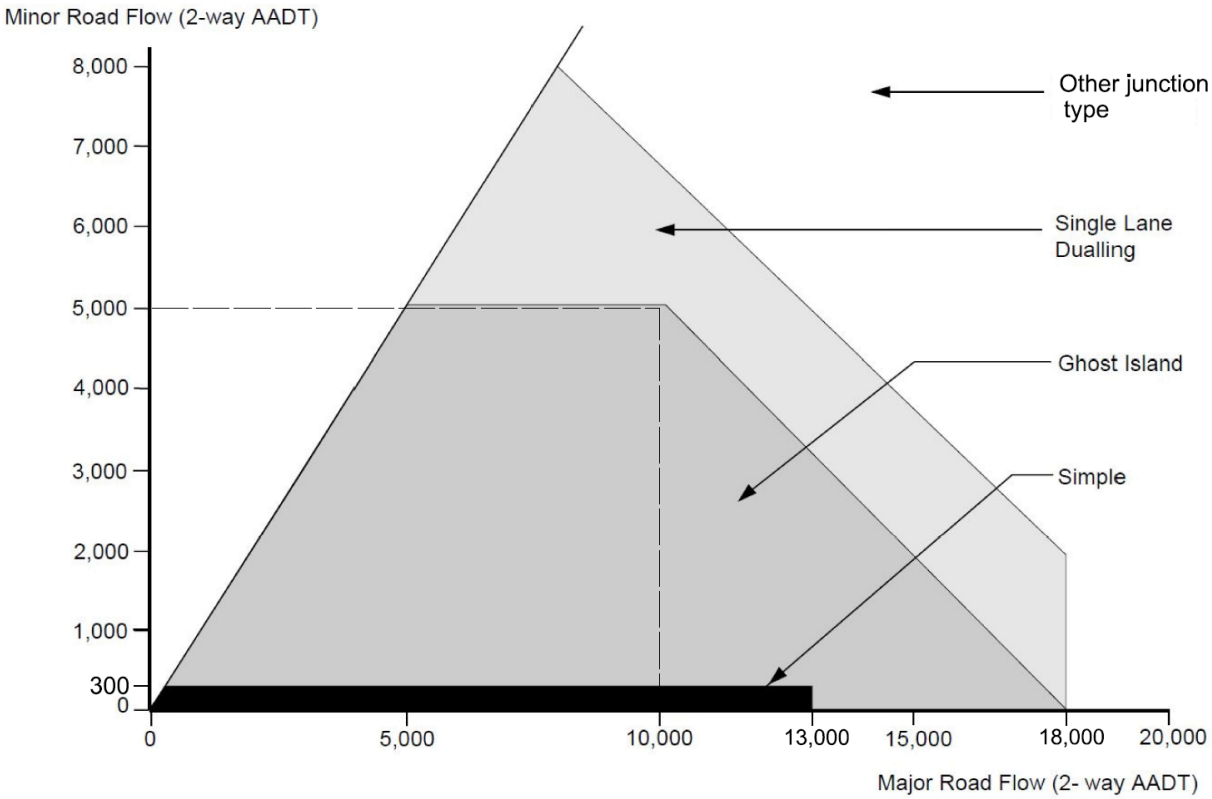
NOTE *Minimising the number of junctions on a road can be achieved by connecting side roads and accesses to a collector road running parallel to the main road.*

2.2 Priority junctions that do not form a through route shall not be provided on overtaking sections.

2.3 Simple priority junctions shall only be used on single carriageway roads without a climbing lane.

2.3.1 The selection of priority junction and major road central treatment for single carriageway roads should be determined based on the standard of major road and traffic flows on both the major and minor roads. Figure 2.3.1 illustrates approximate levels of provision for varying traffic flows.

Figure 2.3.1 Approximate priority junction provision on single carriageway roads based on flows only



NOTE *The 2-way AADT design year flows are used to determine the approximate level of junction provision prior to more detailed traffic modelling to check capacity.*

2.3.2 At junctions where there are high seasonal variations, or short intense peaks in the traffic flows, then the appropriate seasonal or peak flows should be used.

NOTE 1 *Figure 2.3.1 takes into account traffic delays, entry and turning traffic flows and collision costs.*

NOTE 2 *Seasonal or peak flows need to be extrapolated to determine revised 2-way AADT flows for use in Figure 2.3.1.*

2.4 New priority junctions shall not be sited where they encroach on the visibility requirements of adjacent priority junctions on major roads with:

1) a speed limit of greater than 40 mph; or
2) a speed limit of 40 mph or less, where the minor road forms part of a through route.

NOTE 1 *In England and Wales, on major roads with a speed limit of 40 mph or less, decisions on priority junctions where the minor road does not form part of a through route, and direct accesses are first dealt with by the local planning authority.*

NOTE 2 *The placement of priority junctions in relation to lay-bys is covered in CD 169 [Ref 3.I].*

WS2+1 roads

2.5 On WS2+1 roads, priority junctions shall only be;

1) located at changeovers;
2) located at WS2+1 to S2 interfaces; or
3) on the adjoining S2 road, at least 500 metres from the point where the road cross-section changes from a WS2+1 cross section.

NOTE 1 *Priority junctions can be used to facilitate a changeover of overtaking lanes on WS2+1 roads. This is shown diagrammatically in Figures 2.5N1a to 2.5N1d.*

Figure 2.5N1a Priority junction layouts at changeovers - conflicting layout

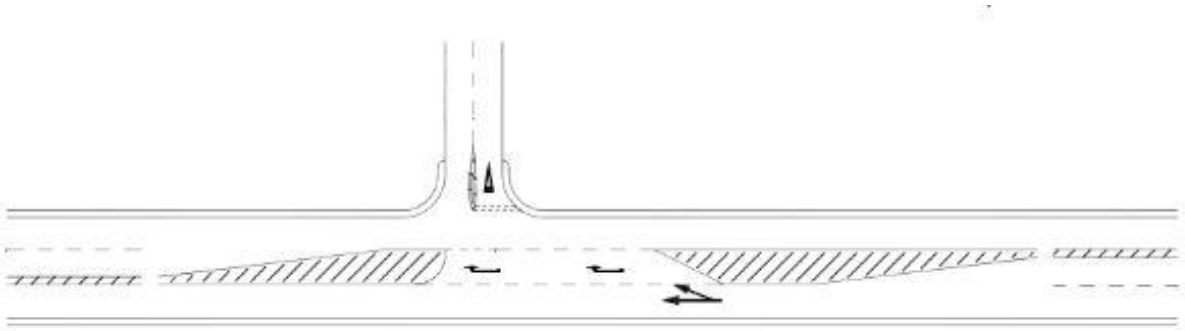


Figure 2.5N1b Priority junction layouts at changeovers - non-conflicting layout

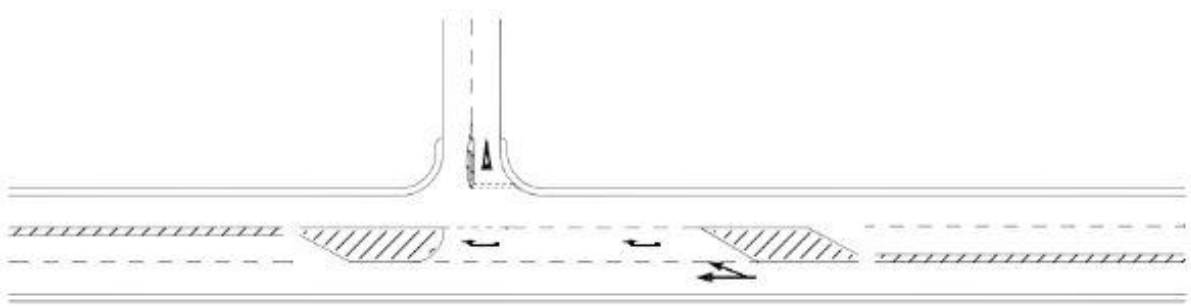


Figure 2.5N1c Staggered junction layouts at changeovers - conflicting layout

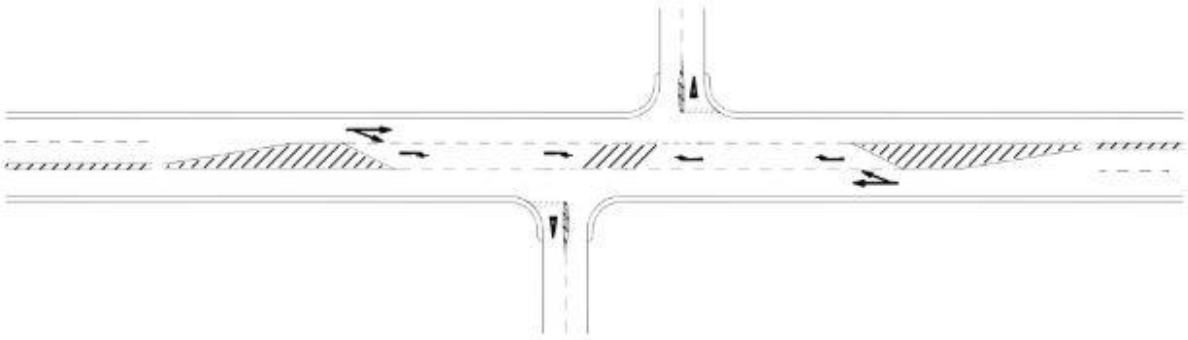
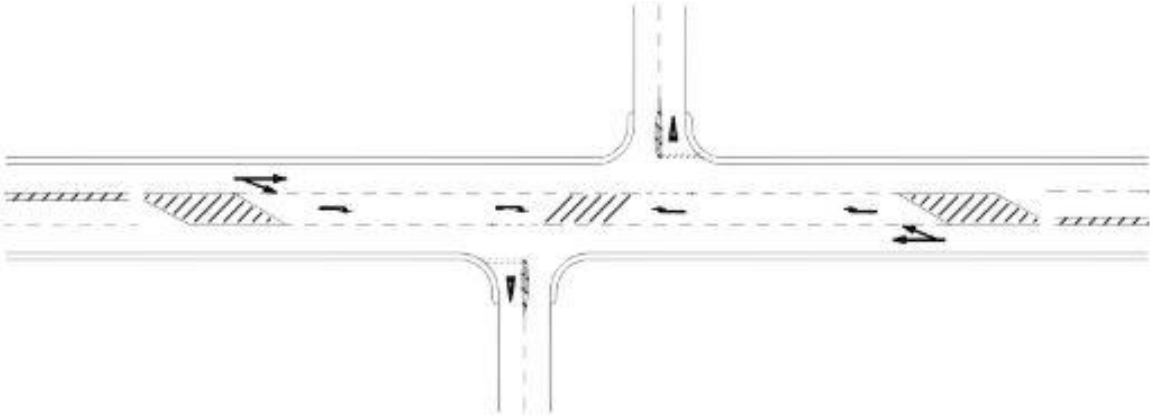


Figure 2.5N1d Staggered junction layouts at changeovers - non-conflicting layout



NOTE 2 Priority junctions can be used at the interface between WS2+1 roads and S2 single carriageway roads. This is shown diagrammatically in Figures 2.5N2a to 2.5N2e.

Figure 2.5N2a Right-turn at end of single lane section

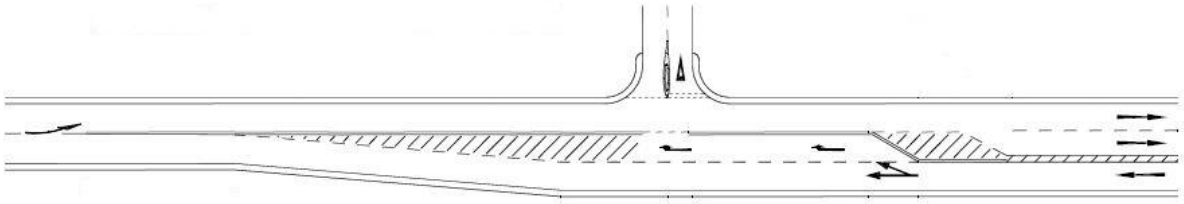


Figure 2.5N2b Right-turn at end of overtaking lane section

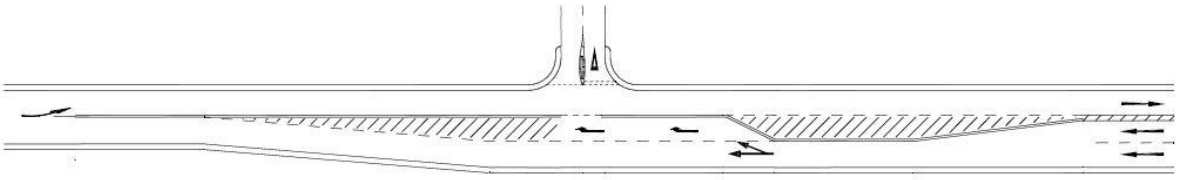


Figure 2.5N2c Right-turn at start of single lane section

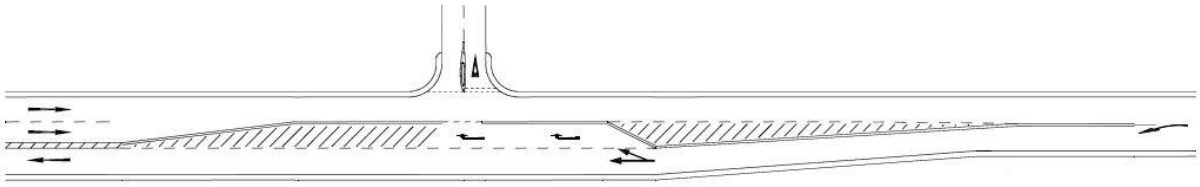


Figure 2.5N2d Right-turn at start of overtaking lane section

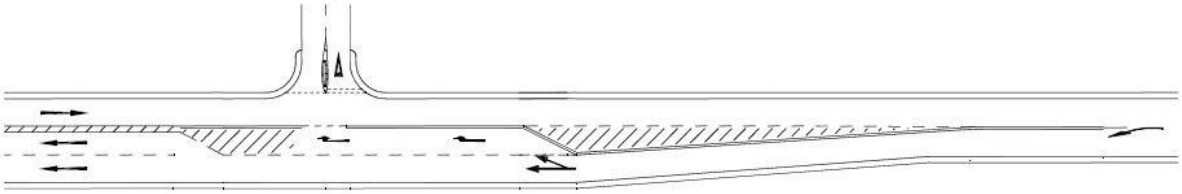
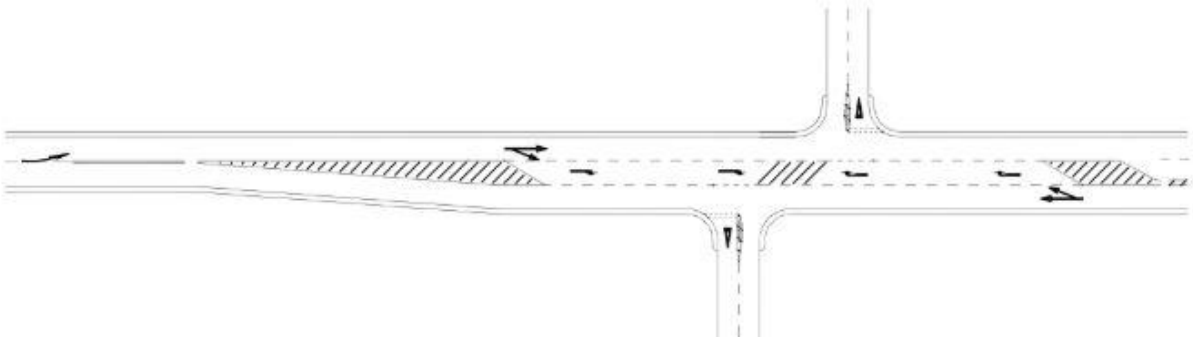


Figure 2.5N2e Staggered junction layouts at WS2+1 interface



2.6 Priority junctions on WS2+1 roads shall include either;

1) a ghost island central treatment; or
2) a physical central reserve to prevent right turn movements.

NOTE *At priority junctions the middle lane is dedicated to right-turning traffic, with a single lane provided in each direction through the junction.*

2.7 Left-in/left-out priority junctions shall only be provided on WS2+1 roads where they are included as part of a compact grade separated junction, with a physical central reserve instead of the middle lane.

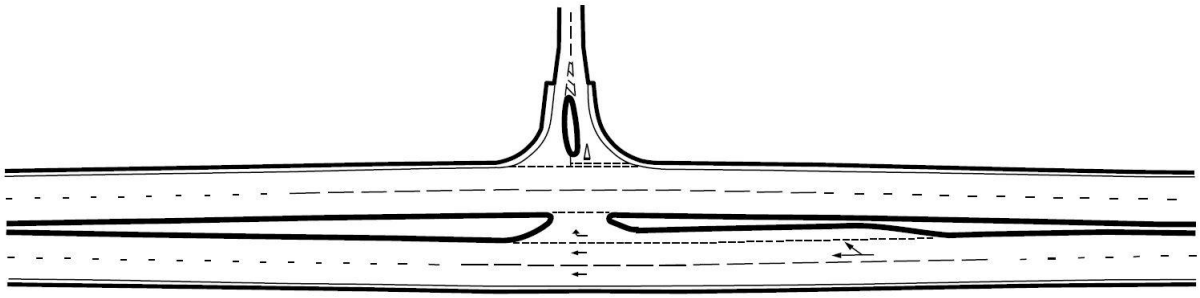
2.8 Where there is a physical central reserve on WS2+1 carriageways, u turns shall be prohibited at both ends of the central island.

2.9 An additional fourth lane for right turning vehicles shall not be provided on WS2+1 roads.

Dual carriageway roads

2.10 At priority junctions on dual carriageways, where right turns in and/or out of the minor road are to be accommodated, the central reserve shall be widened to provide waiting space for vehicles turning right (as illustrated in Figure 2.10).

Figure 2.10 Example of dual carriageway central reserve widening for a priority junction



NOTE *Provision of turning facilities allows vehicles of nearly all lengths turning right from the minor road into the major road to carry out the manoeuvre in two stages.*

2.10.1 Priority junctions should not be provided on rural dual carriageway roads where the minor road flows exceed 3,000 vehicles AADT 2-way.

2.11 Priority junctions shall be located a minimum of 1 km in both directions from the end of the central reserve where the carriageway changes from a single carriageway to dual carriageway.

NOTE *Priority junctions at changes in carriageway cross section can lead to an increase in accident potential because of the merging manoeuvres that will be occurring on the major road at this point.*

Major road central treatment selection

2.12 Priority junctions shall include a major road central treatment when the minor road flow exceeds 300 vehicles 2-way annual average daily traffic (AADT), or the major road flow exceeds 13,000 vehicles 2-way AADT.

NOTE 1 *Priority junctions can be designed as all movement junctions or restricted movement junctions (with individual movements deterred or prevented).*

NOTE 2 *Priority junctions can be used in combination with a major road central treatment and as part of a compact grade separated junction.*

NOTE 3 *Priority junctions with no major road central treatment are simple priority junctions.*

Ghost island central treatment

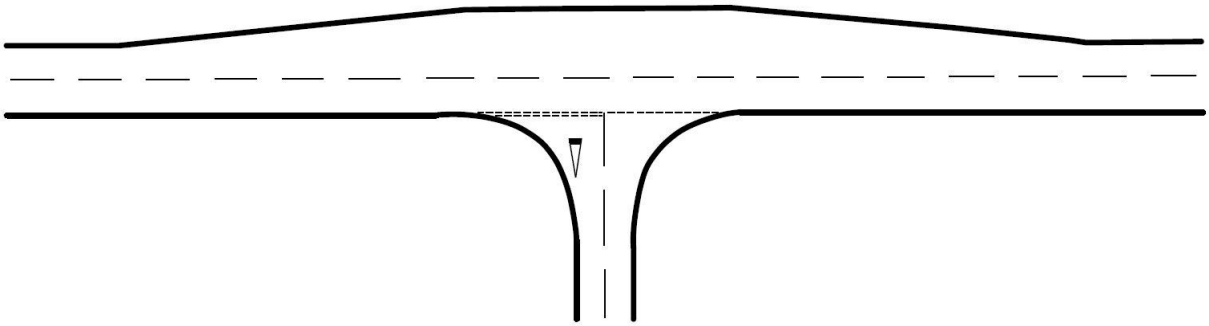
2.13 Ghost islands shall not be used where overtaking opportunities on adjacent links are restricted.

2.13.1 On new single carriageways where overtaking opportunity is limited, ghost island junctions should be sited on non-overtaking sections.

2.14 Ghost islands shall only be used where major road traffic flows allow traffic turning right out of the minor road to do so in one manoeuvre.

2.14.1 On urban roads with a speed limit of 30mph or less, where a ghost island cannot be accommodated, a passing bay as illustrated in Figure 2.14.1 may be used.

Figure 2.14.1 Illustrative example of a passing bay



NOTE *A passing bay provides space for through vehicles to pass vehicles waiting to turn right into the minor road but only at low speed.*

Single lane dualling (SLD) central treatment

2.15 SLD shall not be used within 3 km of the tip of taper to a dual carriageway.

2.16 SLD shall not be used on WS2+1 or where there is a climbing lane in one direction through the junction.

2.17 SLD layouts shall only be used on roads with hard strips.

2.18 SLD shall be formed by widening the major road to provide a central reservation that includes waiting space for vehicles turning right.

2.18.1 SLD should be used in preference to ghost islands where overtaking opportunities on adjacent links are restricted, and/or where traffic turning right out of the minor road would need to make this manoeuvre in two stages.

2.18.2 On new single carriageways where overtaking opportunity is limited, SLD junctions should be sited on non-overtaking sections.

NOTE *The improved carriageway cross section can result in a tendency for drivers to speed up through the junction where slow moving vehicles can be crossing or turning.*

Permitted movements at SLD and dual carriageway priority junctions

2.19 Where right turns in or out of a minor road at SLD junctions are restricted by traffic islands, u turns shall be prohibited at both ends of the central island.

2.19.1 Right turning movements out of the minor road at SLD and dual carriageway junctions should be restricted by traffic islands where these movements can be accommodated at a subsequent junction, such as a roundabout.

NOTE 1 *Restricting right turn movements out of the minor road at SLD and dual carriageway junctions can reduce collision risk by:*

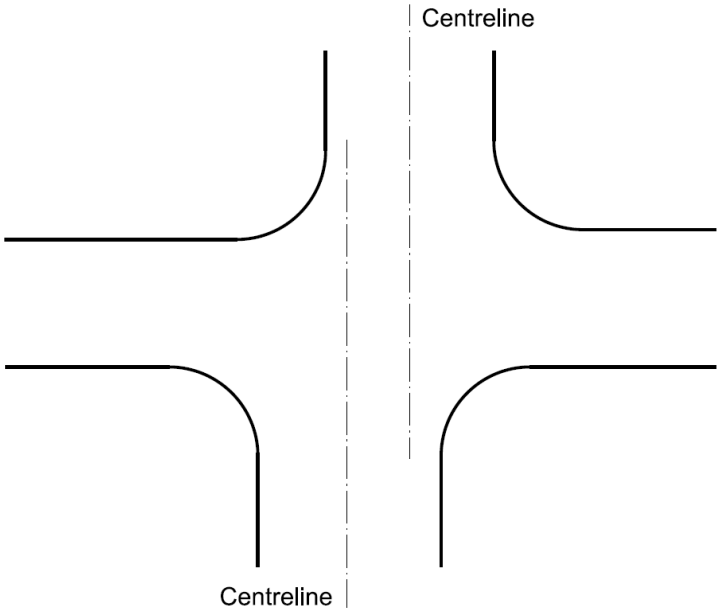
1) *removing interaction between vehicles turning right into the minor road and out of the minor road, which can cause confusion as to who has priority; and*
2) *eliminating the need for larger vehicles that cannot be fully sheltered in the central gap having to undertake the right turn out in one stage or overhanging the through lanes if they decide to undertake the movement in two stages.*

NOTE 2 *A round trip of approximately 2 km can be considered an acceptable diversion to eliminate right turn movements out of the minor road for private accesses, developments and little used minor or unclassified roads at SLD and dual carriageways junctions.*

Crossroads and staggered junctions

2.20 Where the centre line of a minor road, when extended across the major road, fits within an opposite priority junction carriageway (as illustrated on Figure 2.20) the junction shall be designed as a crossroads and not a staggered junction.

Figure 2.20 Crossroad layout



2.21 Crossroads shall only comprise two opposing simple priority junctions.

NOTE 1 *As simple priority junctions are not permitted on dual carriageway roads, crossroads can only be used on single carriageway roads.*

NOTE 2 *Staggered junctions are safer than crossroads where a significant proportion of the flow on the minor roads is a cross movement.*

2.22 The stagger distance of a junction shall be measured as the distance along the major road between the centre lines of the two minor roads.

2.22.1 Where staggered junctions are provided they should be right/left staggers (where minor road traffic crossing the major road first turns right, proceeds along the major road and then turns left).

NOTE *Right/left staggers are preferred to left/right staggers because traffic turning between the minor roads is less likely to have to wait in the centre of the major road.*

2.23 The minimum right/left stagger distance shall be:

1) 50 m for a priority junction with no central treatment;
2) 50 m for a ghost island junction;
3) 40 m for a SLD junction; and
4) 60 m for a dual carriageway junction.

2.24 The minimum left/right stagger distance for a priority junction with no central treatment shall be 50 metres.

2.25 The minimum left/right stagger distance for a priority junction with central treatments shall be as given in Table 2.25.

Table 2.25 Minimum stagger distances for left/right staggered junctions

Design speed (kph)	Stagger distance (metres)		
	Ghost island	Single lane dualling	Dual carriageway
50	50	--	60
60	50	--	60
70	60	--	60
85	75	75	75
100	100	100	100
120	--	--	130

NOTE *For higher design speeds, the distance is based on the sum of the two deceleration lengths lying side by side plus the turning lengths (and queuing lengths, if appropriate) at each end, otherwise it is based on the manoeuvring requirements of the design vehicle.*

2.26 Staggered junctions shall not be used on climbing lane sections.

Signal-controlled junctions

2.27 Where the 85th percentile speed on the approach roads is greater than or equal to 104 kph (65 mph), a signal-controlled junction shall not be provided.

Direct accesses

2.28 Direct accesses shall not be used on motorways, all-purpose dual three lane carriageways and on WS2+1 roads.

2.29 Direct accesses shall not be provided on overtaking sections.

2.29.1 Direct accesses should be avoided where possible.

NOTE 1 *The primary purpose of the trunk road network is to provide for the safe and expeditious movement of long distance through traffic. That means strictly limiting the number of direct accesses to trunk roads.*

NOTE 2 *Direct accesses can be joined together with a link or service road before they join the main carriageway of the trunk road.*

2.29.2 Direct accesses on single carriageway roads should not be positioned facing each other.

2.30 On dual carriageways, gaps in the central reserve to accommodate right turns in and out of a direct access shall not be provided.

2.31 Direct accesses shall not be provided at locations where the major road gradient is greater than 4%.

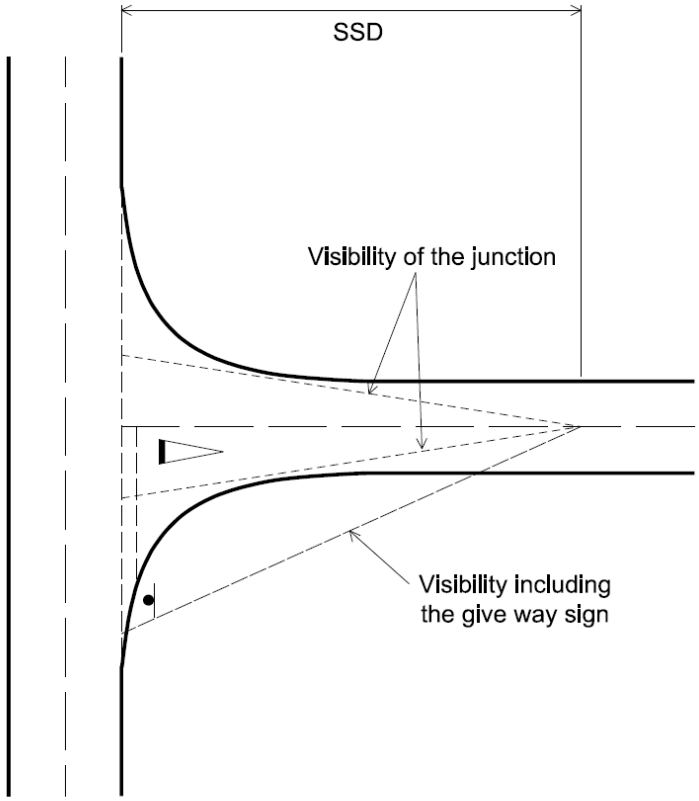
3. Visibility

Minor road approach visibility

Priority junctions

3.1 On a minor road approach to a priority junction, there shall be unobstructed visibility of the junction from a distance corresponding to the desirable minimum SSD for the design speed of the minor road, including the give way sign where present, as illustrated in Figure 3.1.

Figure 3.1 Priority junction approach SSD visibility



NOTE SSD is measured from the eye heights and to the object heights given in CD 109 [Ref 5.N].

3.2 An approaching road user shall be able to clearly see the junction form, from a minimum distance of 15 metres back along the centreline of the minor road, measured from the continuation of the line of the nearside edge of the running carriageway of the major road (as illustrated in Figure 3.2a and 3.2b).

Figure 3.2a Priority junction approach visibility

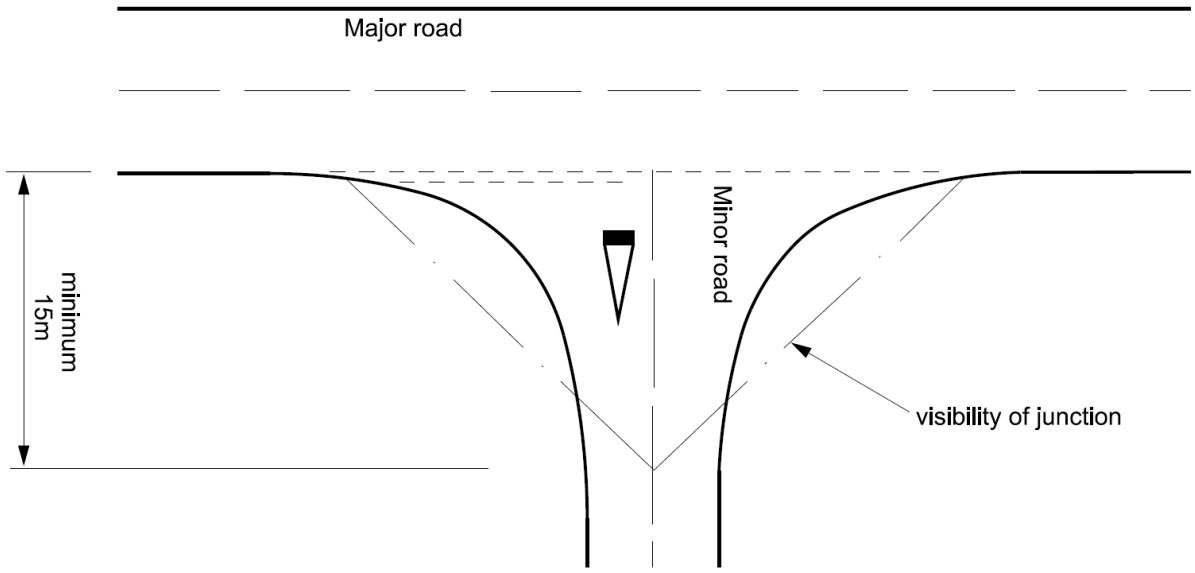
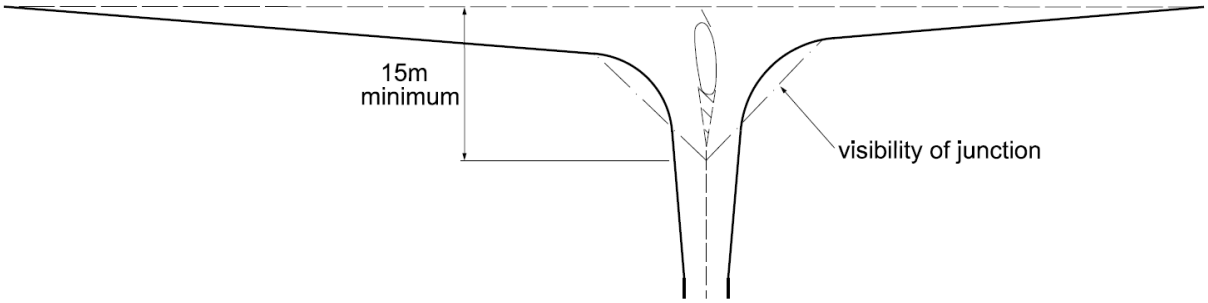


Figure 3.2b Priority junction approach visibility (incorporating tapers on the mainline and traffic island on the minor road)



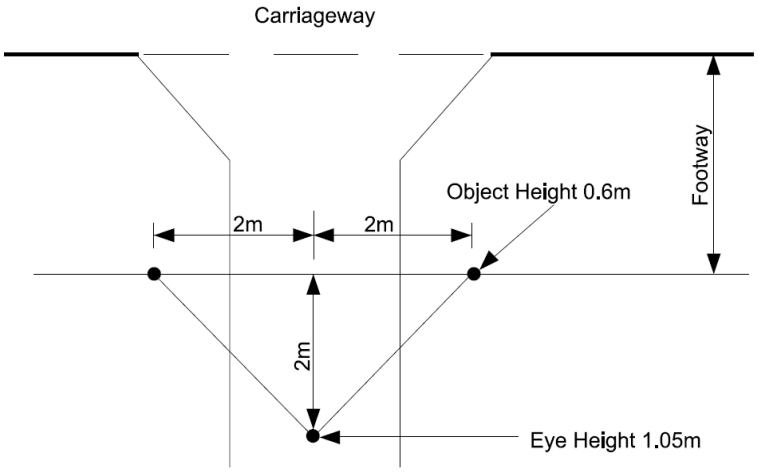
NOTE 1 *The 15 metre measurement is from the continuation of the line of the nearside edge of the running carriageway not the continuation of the back of the major road hard strip if present.*

NOTE 2 *Visibility is measured from the eye heights and to the object heights using the envelope of visibility in CD 109 [Ref 5.N].*

Direct accesses

3.3 Where a direct access crosses a footway, a visibility splay shall be provided in accordance with Figure 3.3.

Figure 3.3 Visibility at the back of footway crossing



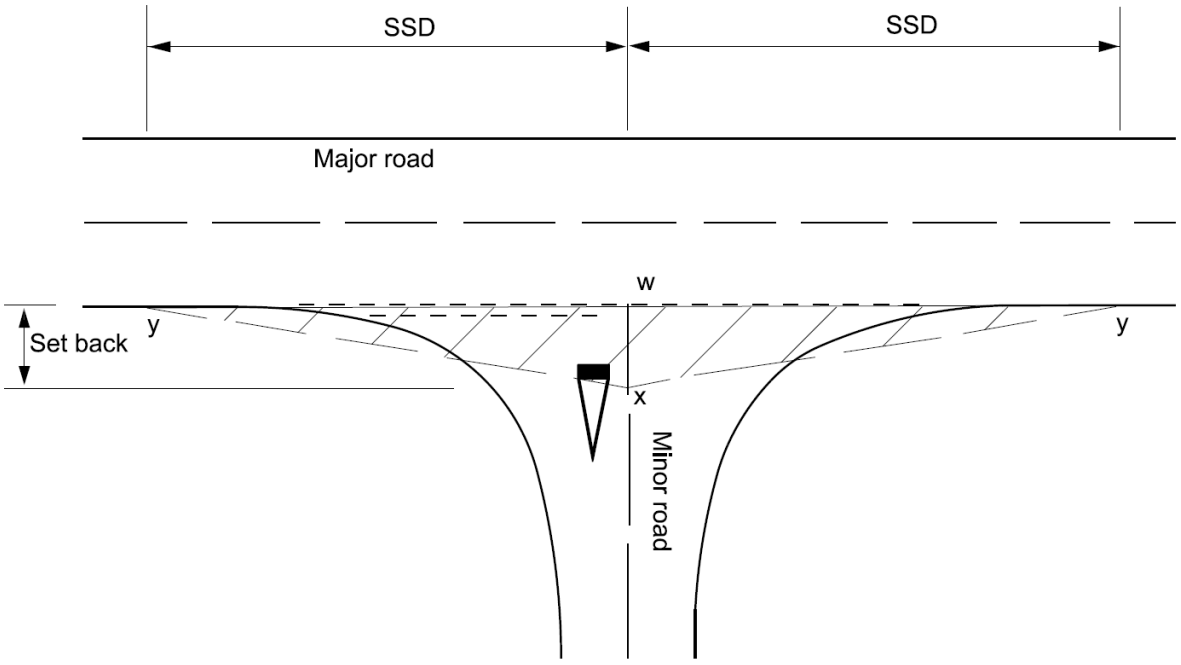
Junction visibility

Measurement of visibility at minor roads and direct accesses

3.4 Unobstructed visibility shall be provided at all priority junctions and direct accesses by a visibility splay formed between the following three points, as illustrated in Figure 3.4:

1) a point W corresponding to the intersection point between the minor road centreline and the major road edge of carriageway;
2) a point X setback along the minor road centreline measured from the continuation of the line of the nearside edge of the running carriageway of the major road; and
3) a point Y on the major road nearside edge of carriageway, corresponding to the desirable minimum SSD for the speed of the major road measured along the edge of the major road carriageway from point W.

Figure 3.4 Priority junction visibility splays



NOTE 1 Visibility is measured from the eye heights and to the object heights given in CD 109 [Ref 5.N].

NOTE 2 The visibility splays shown are for a junction where left and right splays are required.

NOTE 3 Where there are hard strips on the major road, point X is measured from the continuation of the line of the nearside edge of the running carriageway of the major road.

NOTE 4 Inappropriate positioning of lay-bys, bus stops, traffic signs and other street furniture can result in obstruction to visibility splay.

NOTE 5 Parked vehicles can obstruct visibility splays and where necessary restrictions can be introduced to mitigate this risk.

3.5 The speed of the major road for determining point Y in the visibility splay shall be based on:

1) design speed only for direct accesses and priority junctions on new major roads;
2) design speed only for priority junctions that form part of a through route on existing major roads; and
3) design speed or speed measurement for direct accesses and priority junctions that do not form part of a through route on existing major roads.

NOTE Speed measurement of an existing major road involves calculating the 85th percentile speed of traffic.

3.6 A visibility splay to the right on the minor road shall be provided:

1) at all priority junctions and direct accesses where minor road traffic can join a 2-way major road; and
2) at all priority junctions and direct accesses where minor road traffic can turn left to join a 1-way major road.

3.6.1 Visibility splays to the right on the minor road should also be provided at priority junctions and direct access where minor road traffic can turn right to join a 1-way major road and there are contraflow provisions (e.g for cyclists).

3.7 A visibility splay to the left on the minor road shall be provided:

1) at all priority junctions and direct accesses where minor road traffic join a 2-way single carriageway major road;
2) at all priority junctions and direct accesses where minor road traffic can turn right to join a 2-way dual carriageway road and the central reserve gap is not wide enough to accommodate a waiting design vehicle; and
3) at priority junctions and direct accesses where minor road traffic can turn right to join a 1-way major road.

3.7.1 Visibility splays to the left on a one way road should also be provided at priority junctions and direct access where minor road traffic can turn left to join a 1-way major road and there are contraflow provisions (e.g for cyclists).

NOTE Where the minor road is one way leading from the major road, no visibility splays for vehicles turning out of the minor road are required as these movements are not permitted.

3.7.2 On a one-way major road, visibility splays may be provided in both directions for vehicles turning out of the minor road.

NOTE Visibility splays in both directions at a one-way major road provides a level of future proofing, and accommodates potential traffic management arrangements.

3.8 The minimum distances used to locate point X and therefore generating the visibility splay shall be:

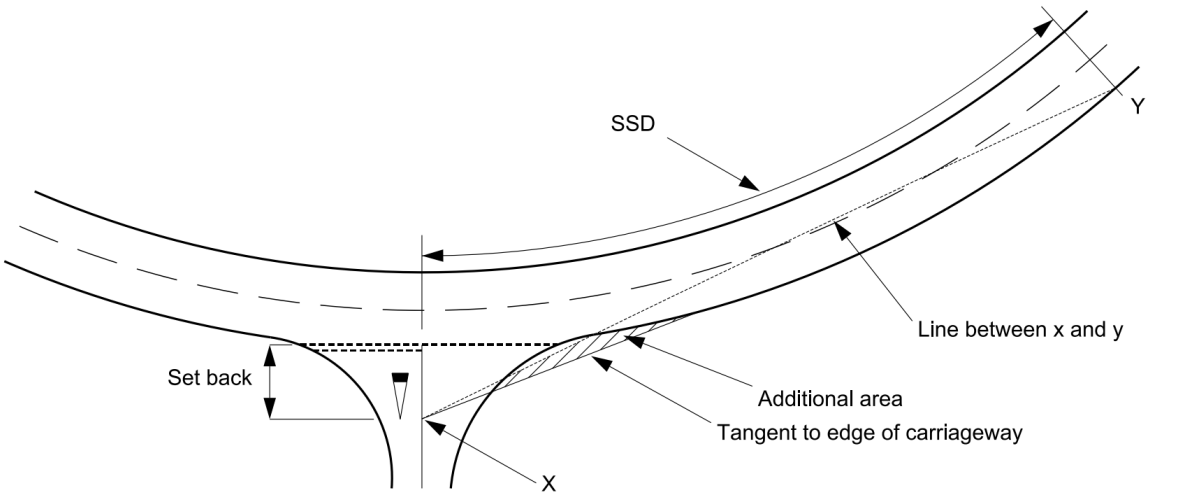
1) 2 metres for direct accesses;
2) 2.4 metres for simple priority junctions; and
3) 4.5 metres for all other priority junctions.

3.8.1 The distances used to locate point X and therefore generating the visibility splay should be:

1) 4.5 metres for direct accesses; and
2) 9 metres for all priority junctions.

3.9 Where the line between points X and Y falls partially within the major road carriageway, an additional area shall be added to the visibility splay formed by drawing a line from X to a point tangential to the nearer edge of the major road running carriageway, as illustrated in Figure 3.9.

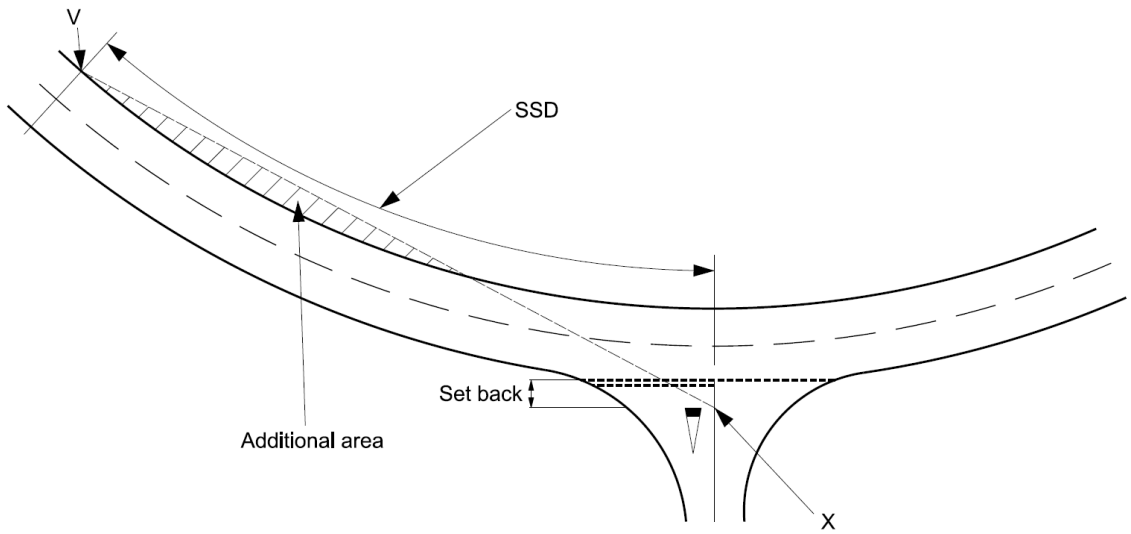
Figure 3.9 Priority junction visibility splay on a curved major road



3.10 Where a priority junction is located on the outside of a major road curve, an additional area shall be added to the visibility splay in the verge on the inside of the major road curve, formed by a line between the following two points, as illustrated in Figure 3.10:

1) a point X at a set back distance of 2.4m; and
2) a point V on the major road offside edge of running carriageway, corresponding to the desirable minimum SSD for the speed of the major road.

Figure 3.10 Priority junction offside visibility splay on a curved major road



NOTE 1 *Where there are hard strips on the major road, point V is measured to the nearside edge of the running carriageway not the back of the major road hard strip.*

NOTE 2 *Providing the additional visibility in the verge on the inside of a major road curve allows drivers to see the full extent of the carriageway and approaching vehicles for the desirable minimum SSD.*

3.11 The desirable minimum SSD at all priority junctions shall not be available from an X distance greater than 9 metres.

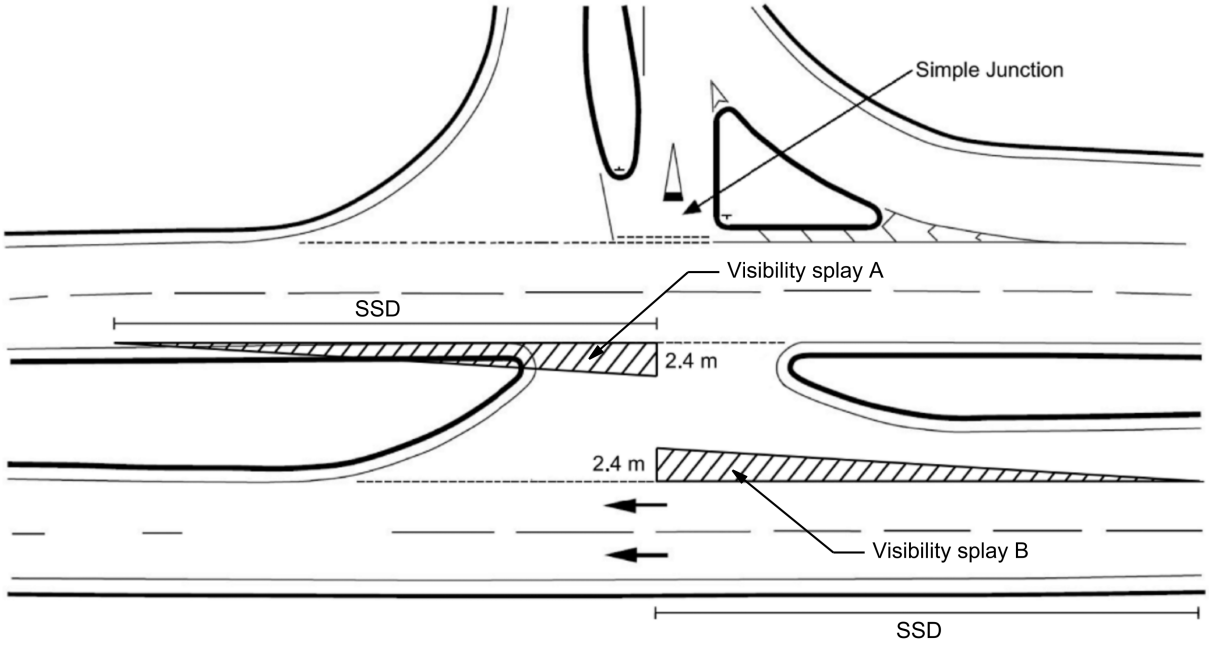
NOTE *In open areas, it can be necessary to artificially restrict the visibility splay to prevent the desirable minimum SSD being available from an X distance of greater than 9 metres.*

Measurement of visibility in the central reserve

3.12 Unobstructed visibility shall be provided in the centre of the major road, on dual carriageway and SLD junctions where right turns are permitted, by a visibility splay formed between the following three points, as illustrated in Figure 3.12:

1) the intersection point between the centre of the opening and the offside edge of major road carriageway;
2) a point 2.4 metre setback along the centre of the opening measured from the continuation of the line of the offside edge of the running carriageway of the major road; and
3) a point Y on the major road offside edge of carriageway, corresponding to the desirable minimum SSD for the design speed of the major road measured from the 2.4 metre setback point.

Figure 3.12 Central reserve visibility splays



NOTE *Visibility is measured from the eye heights and to the object heights given in CD 109 [Ref 5.N].*

3.13 Visibility splays in the central reserve of dual carriageways or SLD shall be provided in the following circumstances:

1) visibility splay A, as illustrated in Figure 3.12, where right turn into the minor road is permitted/and/or;

2) visibility splay B, as illustrated in Figure 3.12, where right turn out of the minor road is permitted.

4. Geometric design of direct accesses

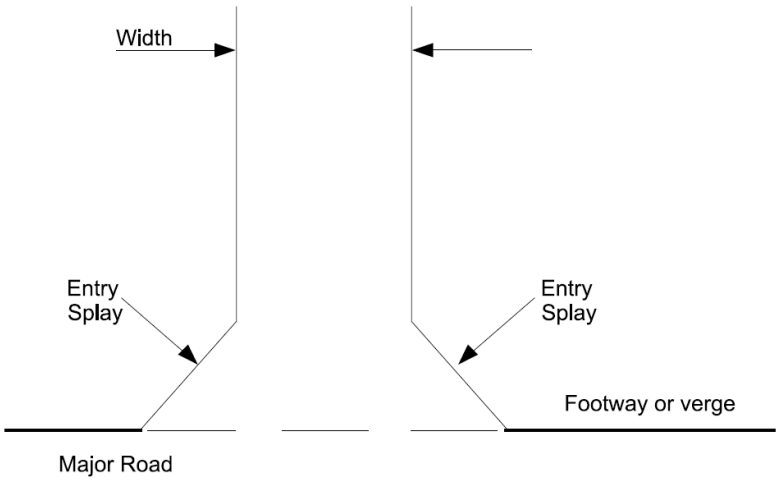
4.1 Direct accesses shall only be used where access is to a single field or dwelling with less than 50 vehicle movements per week.

4.1.1 A direct access should not be provided on trunk roads where it is feasible to provide an alternative access onto the local road network.

4.1.2 A priority junction may be provided instead of the direct access.

4.2 The layout in Figure 4.2 shall be provided as the minimum level of provision for a direct access.

Figure 4.2 Direct access layout



NOTE *Hardened strips can be provided at field accesses to assist in the removal of mud from tyres and equipment prior to entering the trunk road.*

4.2.1 The width of a direct access for a single dwelling should be a minimum of;

1) 3.1 metres where building regulations apply to the access width;
2) 2.5 metres where building regulations do not apply to the access width.

NOTE *A minimum width of 3.1 metres allows access if needed by a typical fire and rescue service vehicle as detailed in The Building Regulations 2010, Fire Safety, Volume 1 - Dwelling Houses Building Regs 2010 (fire safety) [Ref 2.I].*

4.2.2 The width of a direct access for a field access should be a minimum of 3.5 metres.

4.2.3 The entry splays at direct accesses should be a minimum of 1 metre by 1 metre for a single dwelling and 2 metre by 2 metre for a field access.

4.3 Where entrance gates are provided across a direct access they shall be set back to accommodate one vehicle in the access, clear of the main running lane and footway if one is present.

NOTE *The vehicle to be accommodated is the largest type expected to use the access on a regular basis, which in the case of farm vehicles can include a trailer.*

4.3.1 Gates for direct accesses should open away from the highway.

4.3.2 Where it is not possible to accommodate gates opening away from the highway, the setback should be increased to accommodate them being fully open without encroaching into the carriageway.

4.4 For direct accesses, the gradient on the approach to the trunk road shall not exceed 10% either uphill or downhill.

4.5 For direct accesses, the gradient on the access approach shall not exceed 4% over a distance of at least 5 metres, measured from the edge of the major road carriageway.

4.5.1 For direct accesses, the gradient not exceeding 4% on the access approach should be provided for a minimum length of 10 metres, measured from the edge of the major road carriageway.

4.5.2 For direct accesses, the gradient on the access approach should not exceed 2% immediately adjacent to the trunk road.

NOTE *Providing a relatively flat section prevents drivers having to perform a 'hill start', which reduces the risk of vehicles stalling or inadvertently rolling out into the major road.*

5. Geometric design of priority junctions

General

5.1 The road camber on the major road shall be retained through the junction with the minor road graded into the channel line of the major road.

5.2 Allowance shall be made for the swept turning paths of the worst case design vehicle which is expected to use the priority junction, unless:

1) the design vehicle is expected to form only a very small percentage of the total number of vehicles that will use the junction; and
2) any swept path conflicts as a result of the design vehicle encroaching into other lanes will not occur on bends.

NOTE *In cases where hard strips are present, the design vehicle is assumed to use the additional space during turns and at simple junctions, the design vehicle can encroach into opposing traffic lanes.*

5.3 For priority junctions, the gradient on the minor road approach shall not exceed 4% over a distance of at least 15 metres, measured from the edge of the major road carriageway.

5.3.1 For priority junctions, the gradient on the minor road approach should not exceed 2% over a distance of at least 15 metres, measured from the edge of the major road carriageway.

NOTE *Providing a relatively flat section prevents drivers having to perform a 'hill start', which reduces the risk of vehicles stalling or inadvertently rolling out into the major road.*

5.4 At new priority junctions, the minimum approach angle of the minor road approach, measured over 15 metres from the edge of the major road carriageway, shall be 70 degrees.

NOTE *Angles less than 70 degrees can result in drivers having to look excessively over their shoulders or the major road approach being in a vehicle blind spot.*

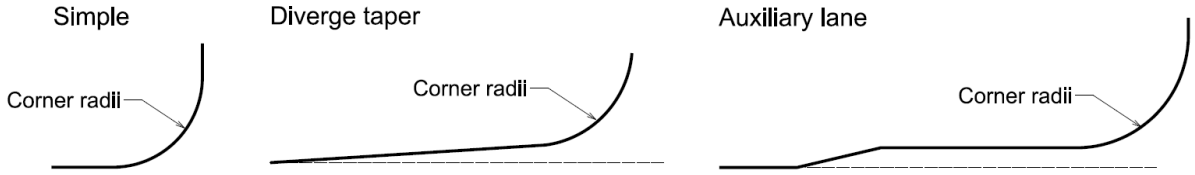
5.4.1 At new priority junctions, the minimum approach angle of the minor road approach, measured over 15 metres from the edge of the major road carriageway, should be 90 degrees.

Corner radii and corner radii tapers

5.5 At all priority junctions, corner radii shall be provided where the edge of the carriageways or kerb lines of the major and minor roads intersect at each corner where turning movements need to be accommodated.

5.6 Corner radii shall be measured for simple priority junctions, and priority junctions with merge/diverge tapers or auxiliary lanes in accordance with Figure 5.6.

Figure 5.6 Corner radii



5.6.1 At simple priority junctions where no provision is to be made for the design vehicle, the minimum corner radii should be:

1) 6 metres in urban areas; and
2) 10 metres in rural areas.

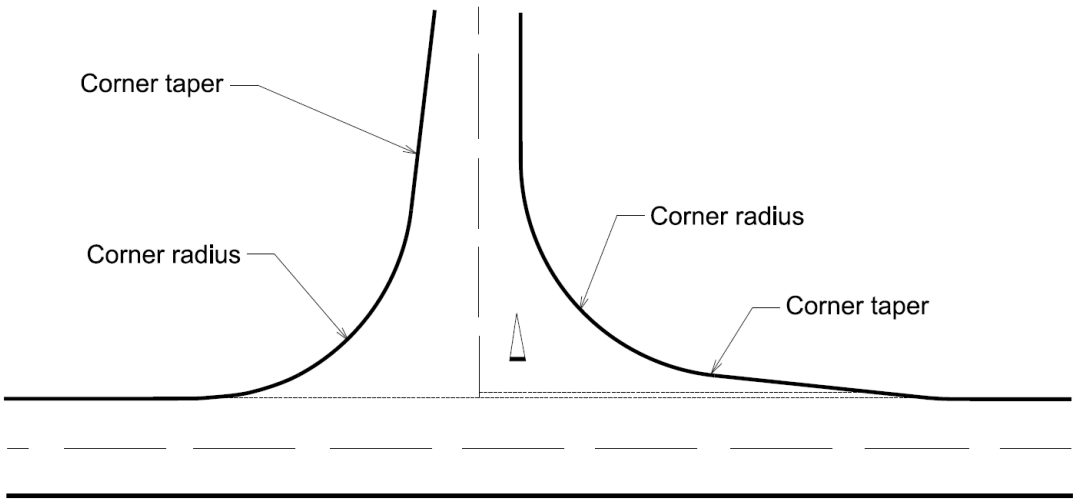
5.6.2 At simple priority junctions where provision is made for the design vehicle, the corner radii should be:

1) 10 metres in urban areas followed by a corner taper of 1:5 over a distance of 30 metres;
2) 15 metres in rural areas followed by a corner taper of 1:10 over a distance of 25 metres; and
3) 15 metres followed by a corner taper of 1:8 over a distance of 32 metres, when part of a staggered junction arrangement.

NOTE 1 *Merge and diverge tapers allow mainline traffic to accelerate or decelerate, whereas corner tapers allow for the swept path of large vehicles while turning round the corner radii.*

NOTE 2 *For the left turn into the minor road, the corner taper is provided along the minor road and for left turns out of the minor road the taper is provided along the major road, as illustrated in Figure 5.6.2N2.*

Figure 5.6.2N2 Corner radius tapers at priority junctions without diverge tapers or auxiliary lanes



5.6.3 At ghost island junctions where no diverge or merge tapers are provided the corner radii should be 15 metres followed by a corner taper of 1:6 over a distance of 30 metres.

5.6.4 At ghost island junctions where a diverge taper is provided the corner radii should be:

1) 15 metres followed by a corner taper of 1:6 over a distance of 30 metres at the merge;
2) a minimum of 40 metres at the end of the diverge taper where the major road design speed is greater than 85 kph;
3) a minimum of 20 metres at the end of the diverge taper where the major road design speed is 85 kph or less.

5.6.5 At SLD, dual carriageway priority junctions, and where there is a mainline physical central island on a single carriageway road, the diverge corner radii should be:

1) 20 metres where no diverge taper/auxiliary lane is provided; or
2) a minimum of 40 metres at the end of the diverge taper where the major road design speed is greater than 85 kph; or
3) a minimum of 20 metres at the end of the diverge taper where the major road design speed is 85 kph or less.

NOTE *Mainline physical central islands on the single carriageway road are used as part of a compact grade separated junction layout.*

5.6.6 At SLD, dual carriageway priority junctions, and where there is a mainline physical central island on a single carriageway road, the merge corner radii should be:

1) 20 metres where no merge taper/auxiliary lane is provided; or

2) 25 metres where the major road design speed is 85 kph and a merge taper is provided; or
3) 30 metres where the major road design speed is greater than 85 kph and a merge taper is provided.

NOTE *Mainline physical central islands on the single carriageway road are used as part of a compact grade separated junction layout.*

Carriageway widths

5.7 Where a physical traffic island is provided on the minor road, the minor road approach lanes shall be 4.0 metres wide at the tip of the associated hatched marking.

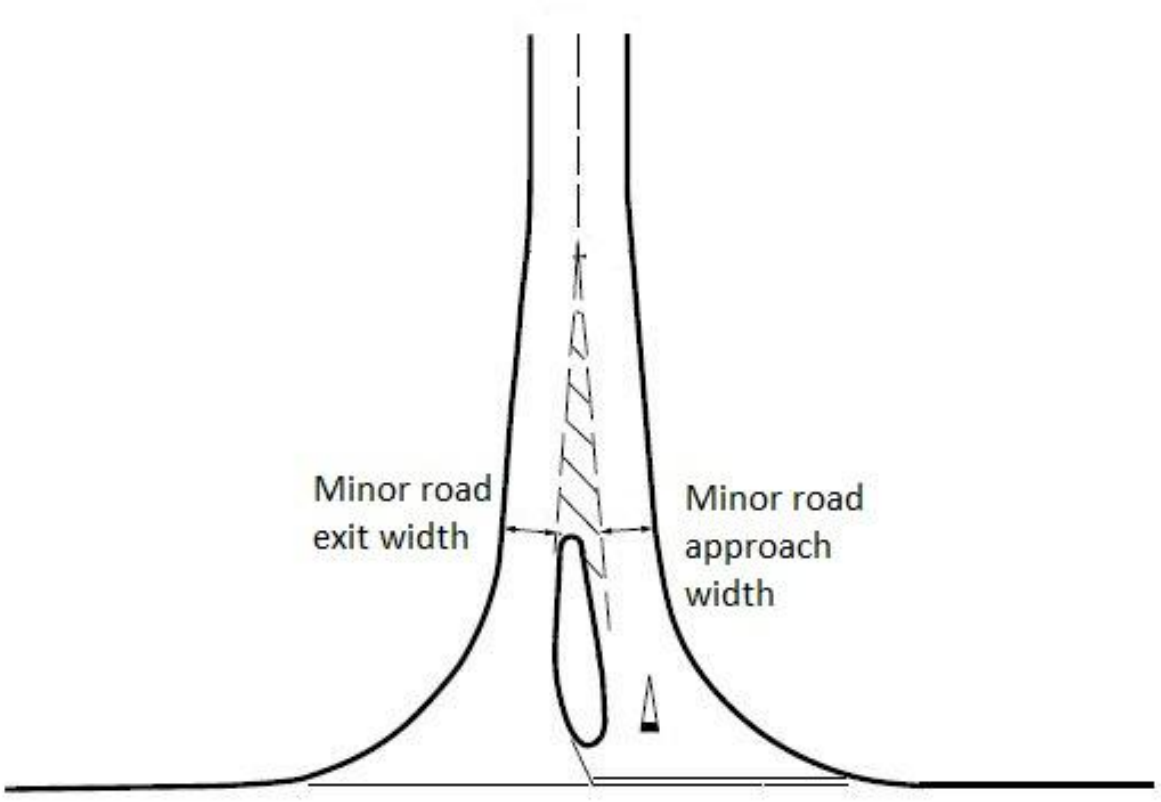
NOTE *Lane widths do not include hard strips if they are present.*

5.7.1 Where no physical traffic island is provided on the minor road, the existing minor road lane width should at least continue up until the start of the corner radius, or give way line if no corner radius is to be provided.

5.8 Where a physical traffic island is provided on a minor road, the width of the minor road approach lane adjacent to the island at its furthest point from the major road (as illustrated in Figure 5.8) shall be:

1) 4.0 metres at simple priority and ghost junctions where there is a single lane at the give way line;
2) 4.5 metres at SLD and dual carriageway junctions where there is a single lane at the give way line; and
3) 5.5 metres where the approach widens to two lanes at the give way line.

Figure 5.8 Minor road approach and exit lane widths



5.9 Where a physical traffic island is provided on a minor road, the width of the minor road exit lane adjacent to the island at its furthest point from the major road (as illustrated in Figure 5.8) shall be:

1) 4.0 metres at simple priority junctions;
2) 4.5 metres for ghost island junctions; and
3) 5.0 metres for SLD and dual carriageway junctions.

5.10 For curves which have a radius of 90 metres or less, minimum lane widths shall be in accordance with Table 5.10.

Table 5.10 Lane widening on curves of 90 metre radius or less

Inside curve radius (metres)	Single lane carriageway or inside lane of two lane carriageway (metres)	Outside lane of two lane carriageway (metres)
10	8.4	6.5
15	7.1	6.0
20	6.2	5.6
25	5.7	5.2
30	5.3	5.0
40	4.7	4.6
50	4.4	4.3
75	4.0	4.0
90	3.8	3.8

NOTE 1 Where carriageways are taken around short radius corners added width provides the necessary space to cater for the swept path of larger vehicles.

NOTE 2 Lane widths for radii greater than 90 metres are given in CD 109 [Ref 5.N].

5.11 For actual curve radii that fall between two curve radius values given in Table 5.10, the minimum lane width shall be interpolated.

5.12 On single lane sections greater than 50 metres in length, there shall be sufficient carriageway space to allow a broken down vehicle to be passed by other vehicles.

5.12.1 For curves which have a radius of 90 metres or less, hard strips that provide an additional 2.5 metres minimum of carriageway space should be added to the single lane carriageway widths given in column 2 of Table 5.10 to allow a broken down vehicle to be passed by other vehicles.

NOTE The addition of 2.5 metres carriageway width does not apply to two lane carriageways in column 2 of Table 5.10.

Minor road traffic islands

5.13 Physical traffic islands shall have an area of at least 4.5 square metres.

5.13.1 Traffic islands smaller than 4.5 square metres should be defined by road markings.

NOTE Traffic islands can be used to :

a) give guidance to long vehicles carrying out turning movements;
b) channelise intersecting or merging traffic streams to reduce collision risk from overrun;
c) warn drivers on the minor road that a junction is ahead (this can be particularly useful at crossroads to highlight the need to give way and the location of the give way line);
d) provide shelter for vehicles waiting to carry out manoeuvres such as waiting to turn right;
e) assist pedestrians and/or cyclists.

5.13.2 Physical traffic islands should include features to make them conspicuous, e.g traffic bollards and signage.

5.13.3 Traffic islands on minor roads should be physical islands.

5.14 Physical traffic islands shall be used on the minor road where one or more turning movements are prohibited to prevent or deter such movements.

5.15 Junctions that form part of a compact grade separated junction shall include physical islands to prevent right turn manoeuvres in to and out of the major road.

5.16 Traffic islands on the minor road shall be setback a minimum of 1 metre from the edge of running carriageway or in-line with the back of major road hard strip if the hard strip is equal to or greater than 1 metre wide.

Diverge tapers and auxiliary lanes

General

5.17 Nearside diverging tapers and auxiliary lanes shall not be provided:

1) at simple junctions;
2) where the design speed of the major road is less than 85 kph; and
3) at all other priority junctions that are on the inside of curves.

NOTE *Where the minor road is on the inside of a curve, the diverging lane can adversely affect visibility for drivers emerging from the minor road.*

5.18 At non-simple junctions which are not on the inside of a curve, a nearside diverging taper or auxiliary lane shall be provided in accordance with Table 5.18a and 5.18b.

Table 5.18a Criteria for provision of nearside diverging tapers or auxiliary lanes on A class major roads with a speed limit of 85kph or greater

Minor road		**A class with a speed limit =>85 kph**	
		Flow =< 7000 AADT	**Flow > 7000 AADT**
A and B class road		Yes	Yes
Non A or B class road	left turning traffic ≥ 600 AADT; or left turning traffic ≥ 450, > 20% HGV; or left turning traffic ≥ 450, > 4% gradient.	Yes	Yes
	left turning traffic ≥ 300 and < 600 AADT; or left turning traffic ≥ 225 and < 450, > 20% HGV; or left turning traffic ≥ 225 and < 450, > 4% gradient.	Optional	Yes

Table 5.18b Criteria for provision of nearside diverging tapers or auxiliary lanes all other major roads

Minor road	Major roads other than A class with a speed limit => 85 kph	
	Flow =< 7000 AADT	Flow > 7000 AADT
left turning traffic ≥ 600 AADT; or left turning traffic ≥ 450, > 20% HGV; or left turning traffic ≥ 450, > 4% gradient.	Yes	Yes
left turning traffic ≥ 300 and < 600 AADT; or left turning traffic ≥ 225 and < 450, > 20% HGV; or left turning traffic ≥ 225 and < 450, > 4% gradient.	Optional	Yes

NOTE *Diverging tapers and auxiliary lanes can also be provided on major roads where the speed limit is 85 kph or above, and the minor road flows are below the thresholds described in Tables 5.18a and 5.18b.*

5.18.1 Where the major road flow exceeds 7000 AADT, auxiliary lanes should be provided instead of tapers for diverging traffic.

NOTE *Vehicles decelerating on main carriageways can have an effect on the capacity of the through carriageway by impeding following drivers. The provision of an auxiliary lane allows turning traffic to perform the majority of its deceleration off the mainline.*

Diverge taper and auxiliary lane widths and lengths

5.19 Nearside diverging tapers shall be formed by an increase in width to 3.5 metres at the start of the corner radii into the minor road.

5.20 Where right turns into the minor road are permitted, a give way line shall be provided at the end of the diverging taper or auxiliary lane.

5.20.1 Where a give way line is provided, a traffic island should be provided to segregate the give way from the major road.

5.21 The length of a nearside diverging taper or auxiliary lane shall be measured as the distance from the beginning of the taper up to the "Give Way" line, as shown in Figure 5.21a and 5.21b.

Figure 5.21a Major/minor priority junctions with nearside diverging taper

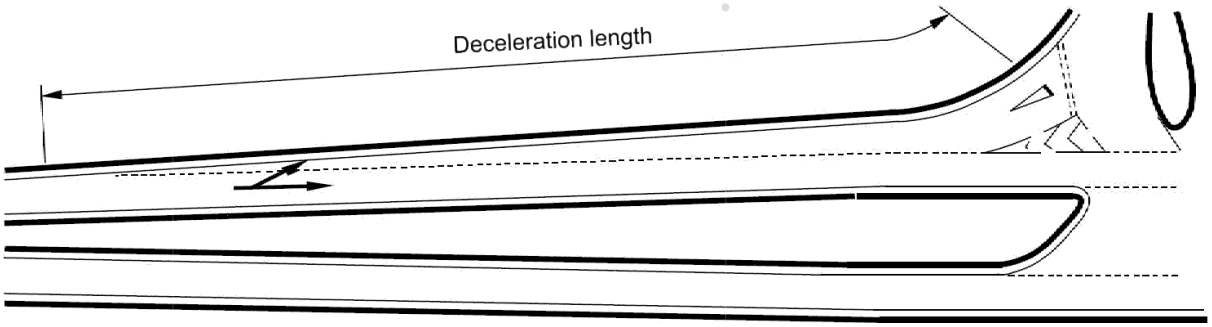
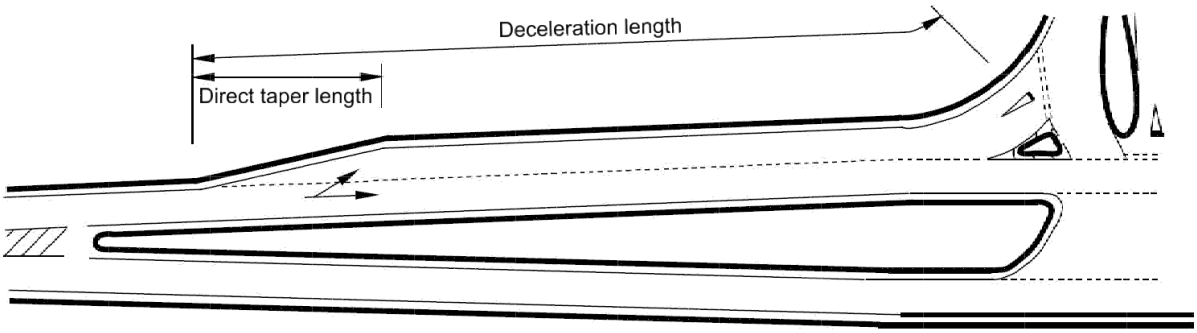


Figure 5.21b Major/minor priority junction with nearside auxiliary lane



5.22 The minimum length of a nearside diverging taper or auxiliary lane shall be in accordance with Table 5.22.

Table 5.22 Diverge taper, auxiliary lane and right turn lane lengths for deceleration

Design speed (kph)	Diverge taper or auxiliary lane deceleration lengths (metres)					Direct taper (metres)
	On up gradient		On down gradient			
				over 4%		
	0 - 4 %	over 4%	0 - 4 %	Dual carriageways	Single carriageway (including ghost islands and SLD locations)	
50	25	25	25	25	25	5
60	25	25	25	40	25	5
70	40	25	40	55	40	15
85	55	40	55	80	55	15
100	80	55	80	110	80	25
120	110	80	110	150	110	30

NOTE The gradient is the average for a 500 metre length before the minor road.

5.22.1 For design speeds of 100 kph or less, auxiliary lane lengths should be a minimum of 80 metres, and sufficient to allow for the speed change from the major road to the turn into the minor road.

NOTE The auxiliary lane length can also be influenced by any need for reservoir space for turning traffic.

Merging tapers

General

5.23 Merging tapers shall only be used where the major road is a dual carriageway.

5.24 Where the major road is a dual carriageway with a design speed of 85 kph or above, merging tapers shall be provided where:

1) the volume of left turning traffic in the design year exceeds 600 vehicles AADT;
2) the volume of left turning traffic in the design year exceeds 450 vehicles AADT and the percentage of HGVs exceeds 20%; or

3) the volume of left turning traffic in the design year exceeds 450 vehicles AADT and the merging taper is for an up-gradient of greater than 4%.

5.24.1 Merge tapers may be provided at dual carriageway priority junctions with lesser flows and/or lesser HGV percentages.

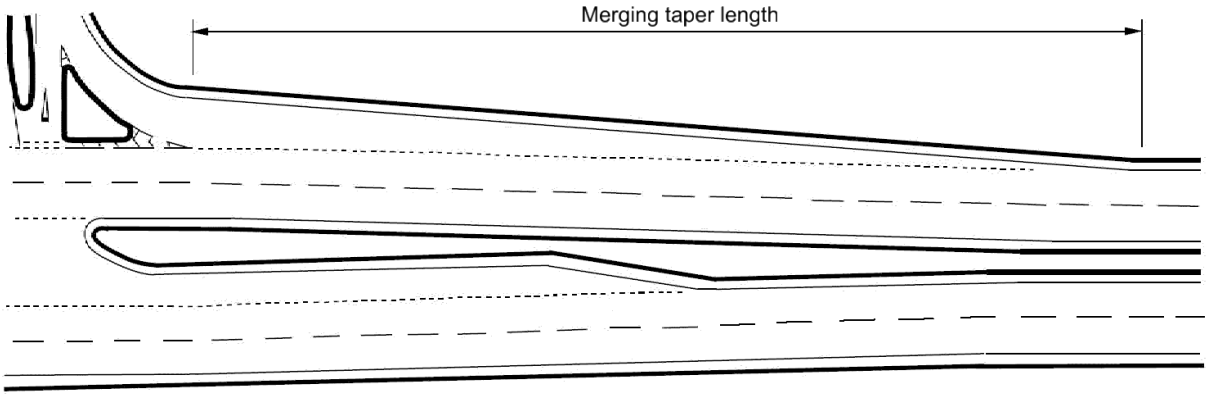
NOTE *Merge tapers can be particularly useful where there is expected to be a high seasonal use by large or slow moving vehicles.*

Merging tapers widths and length

5.25 Merging tapers shall be formed by a decrease in width from 3.5 metres at the end of the corner radii out of the minor road.

5.25.1 A traffic island should be provided to segregate the turning traffic from the major road prior to the commencement of the merging taper.

Figure 5.25.1 Major/minor priority junction with nearside merging taper



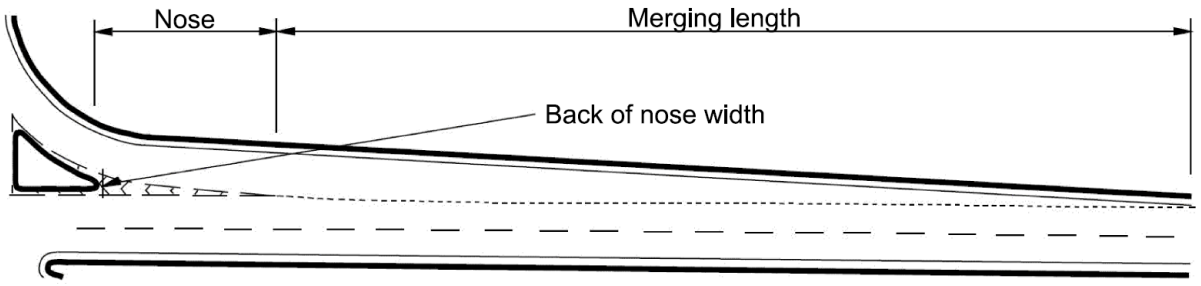
5.26 The minimum lengths of the merging tapers shall be as given in Table 5.26.

Table 5.26 Merging taper lengths (on dual carriageways)

Design speed (kph)	Merging length (metres)	
	Priority junctions where the minor road is not a through route.	All other priority junctions
85	70	90
100	90	110
120	110	130

5.26.1 On dual carriageways with a design speed of 120 kph, the merging taper should be preceded by a 40 metres nose, which has a minimum back of nose width of 2 metres (as indicated on Figure 5.26.1).

Figure 5.26.1 Major/minor priority junction with nearside merging taper (alternative for dual carriageway with a design speed of 120 kph)



6. Geometric design of major road central treatments

General

Major road central treatment formation excluding on WS2+1 roads

6.1 Carriageway widening for a central reserve treatment shall be formed using physical islands or islands defined by road markings.

6.1.1 Central treatments for SLD and ghost islands, on single carriageways, should be developed to their maximum width using the tapers shown in Table 6.1.1.

Table 6.1.1 Tapers for central islands on single carriageways

Design speed (kph)	Taper for ghost island and SLD
50	1:20
60	1:20
70	1:20
85	1:25
100	1:30
120	-

6.1.2 The tapers given in Table 6.1.1 on single carriageway roads, should be developed:

1) symmetrically on straight sections of road;
2) asymmetrically towards the outside of the curve on curved sections of road; and
3) asymmetrically away from the climbing lane on climbing lane sections.

6.1.3 For SLD, the central island should be introduced by means of hatched road markings until there is sufficient width to safely accommodate the keep left arrow traffic sign (at an appropriate size for the speed of the road) on the nose of the physical island.

6.1.4 Central treatments for dual carriageways should be developed to their maximum width using the tapers shown in Table 6.1.4.

Table 6.1.4 Tapers for central islands on dual carriageways

Design speed (kph)	Taper for dual carriageways
50	1:40
60	1:40
70	1:40
85	1:45
100	1:50
120	1:55

6.1.5 The maximum island width should continue through the junction to the tangent point of the minor road radius and the edge of the major road carriageway.

Major road central treatment formation on WS2+1 roads

6.2 On WS2+1 roads where compact grade separation is not provided, central treatments shall be formed as shown in Figures 6.2 a, b and c.

Figure 6.2a Formation of conflicting central treatment layout on WS2+1 road

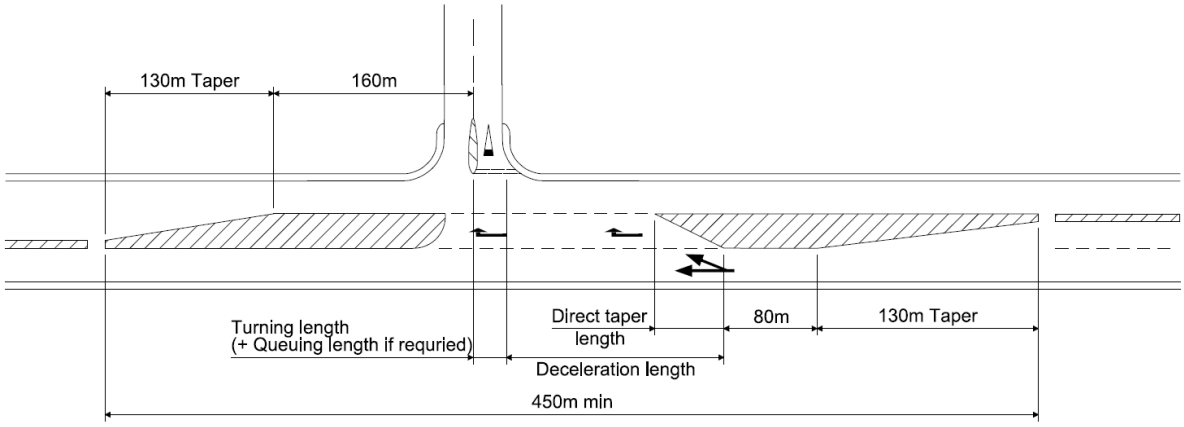


Figure 6.2b Formation of non-conflicting central treatment layout on WS2+1 road

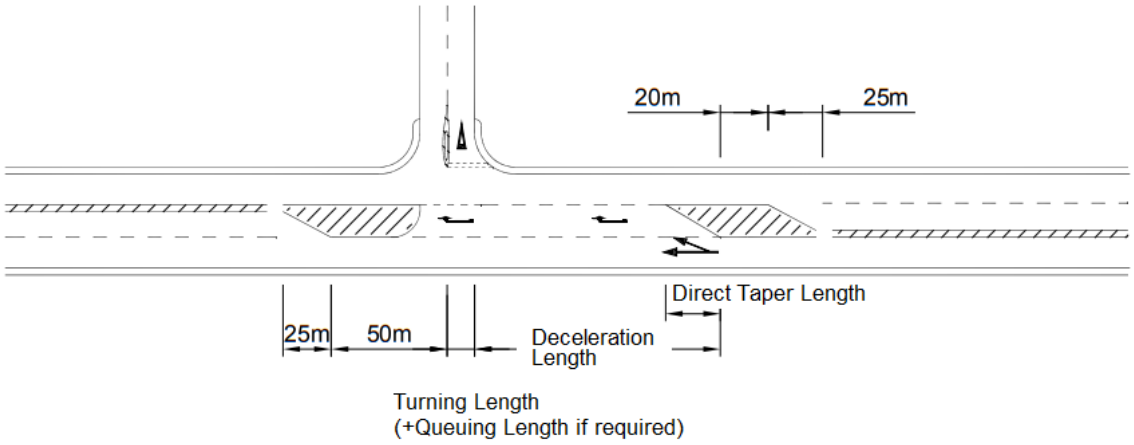


Figure 6.2c Formation of WS2+1 interface central treatment layout on WS2+1 road

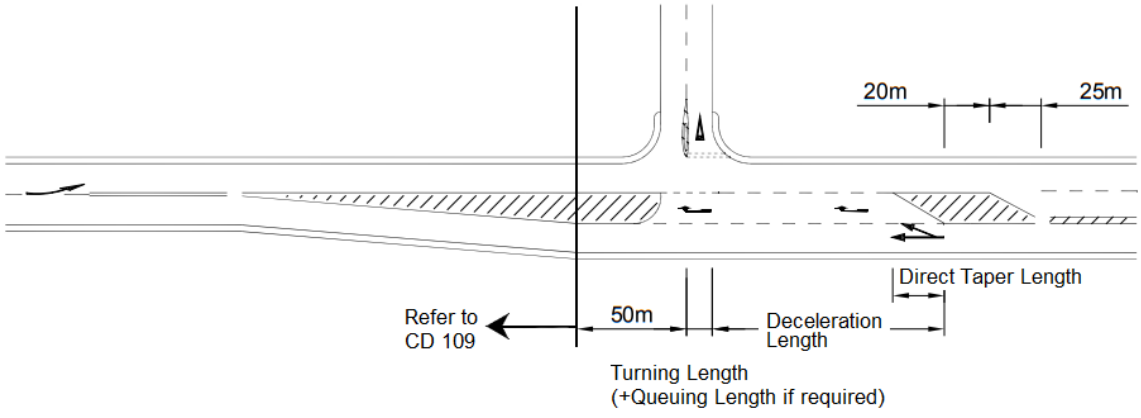


Figure 6.2d Formation of right-turn at end of overtaking lane section on WS2+1 road

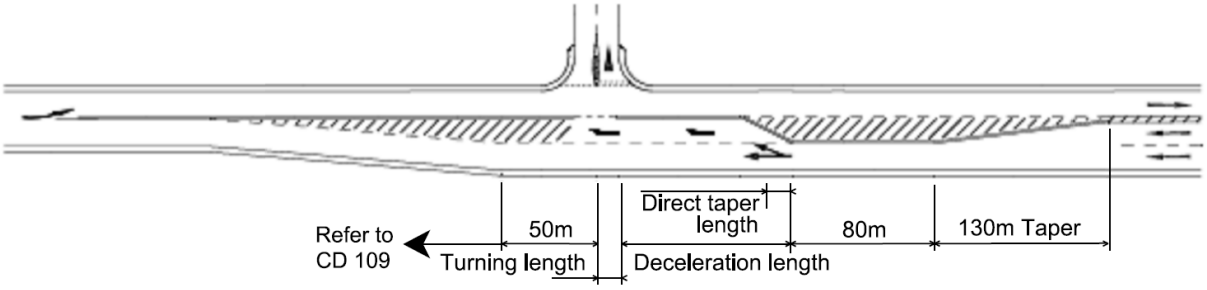


Figure 6.2e Formation of right-turn at start of overtaking lane section on WS2+1 road

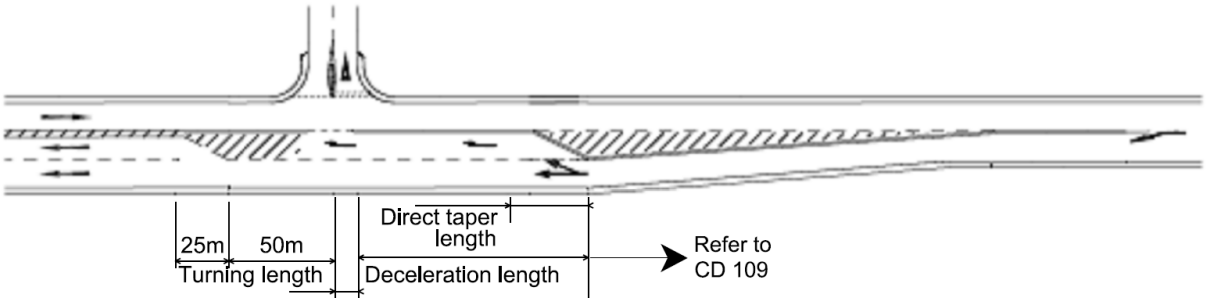
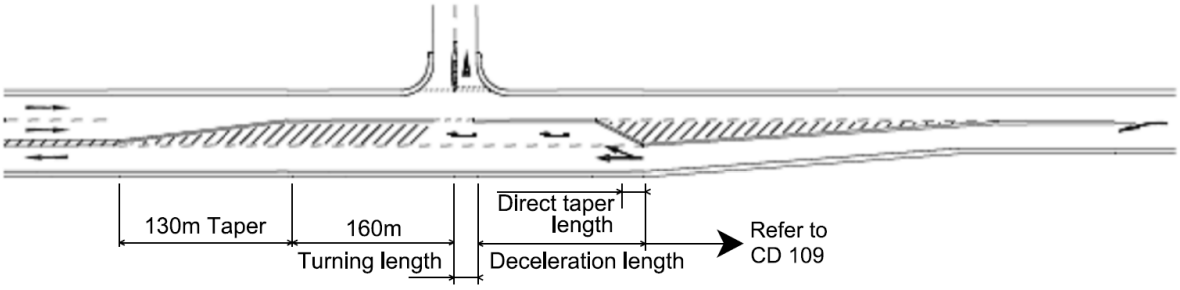


Figure 6.2f Formation of right-turn at start of single lane section on WS2+1 road



NOTE *Where a junction is located at the interface between a WS2+1 and a single carriageway, requirements for the carriageway cross-section transition are provided in CD 127 [Ref 1.N].*

Major road central treatment right turning lane length

6.3 For all central treatments, the right turning lane shall be comprised of a turning length, deceleration length and direct taper length as shown in Figures 6.3a to 6.3e.

Figure 6.3a Major / minor priority junction with a ghost Island on single carriageway

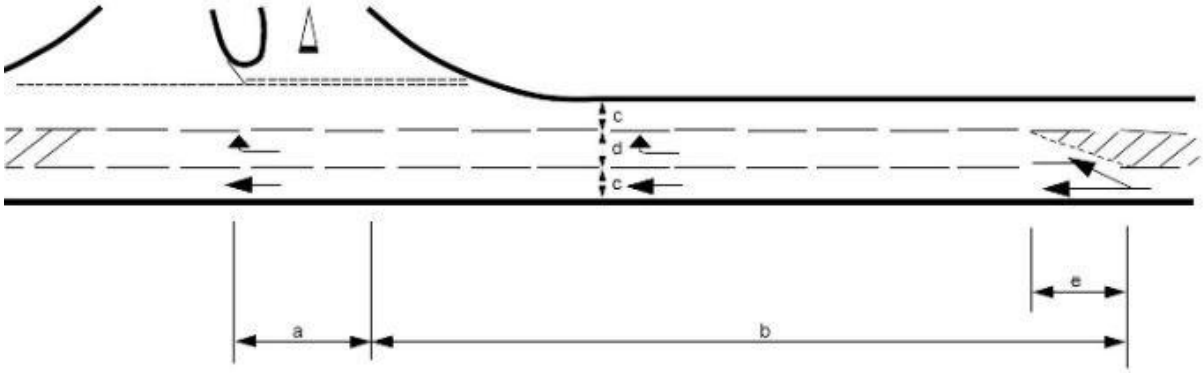


Figure 6.3b Major / minor priority junction with a up-gradient ghost island on climbing lane

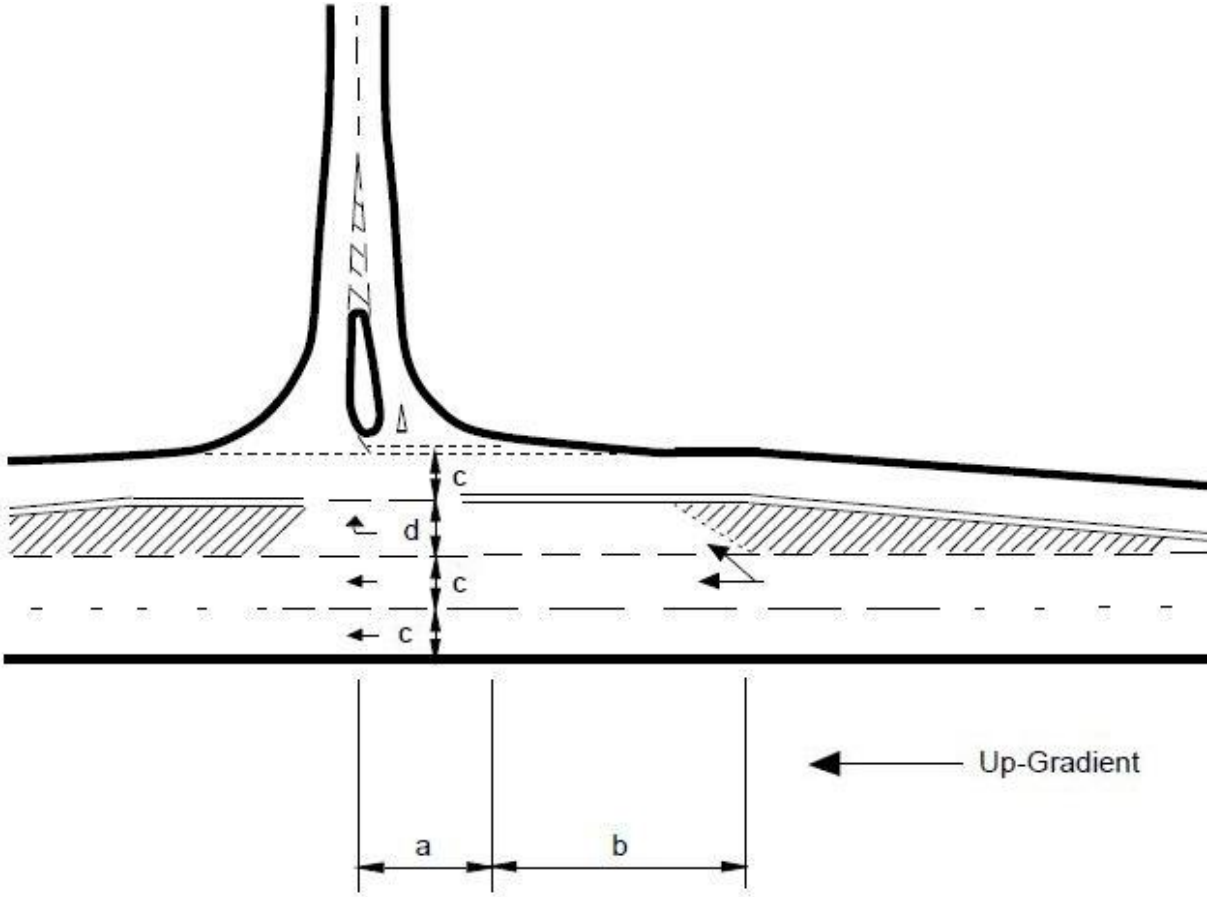


Figure 6.3c Major / minor priority junction with a down-gradient ghost island on climbing lane

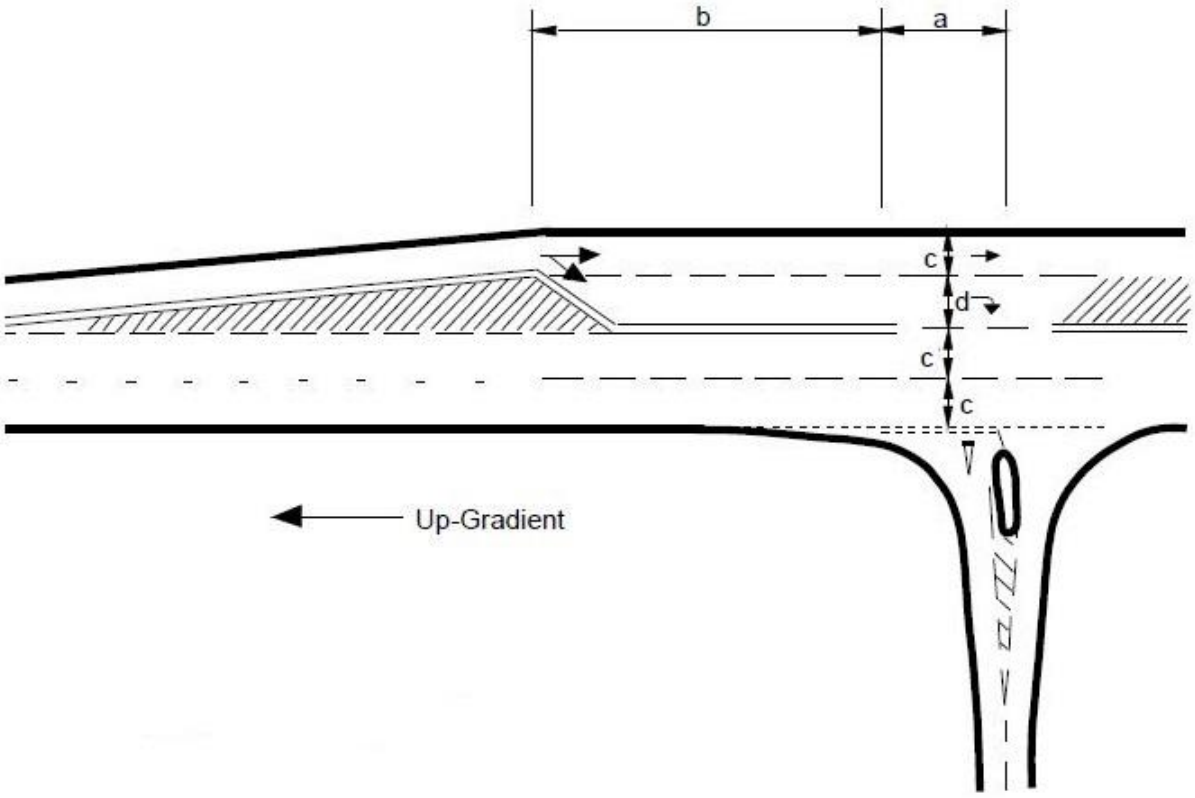


Figure 6.3d Major / minor priority junctions with SLD

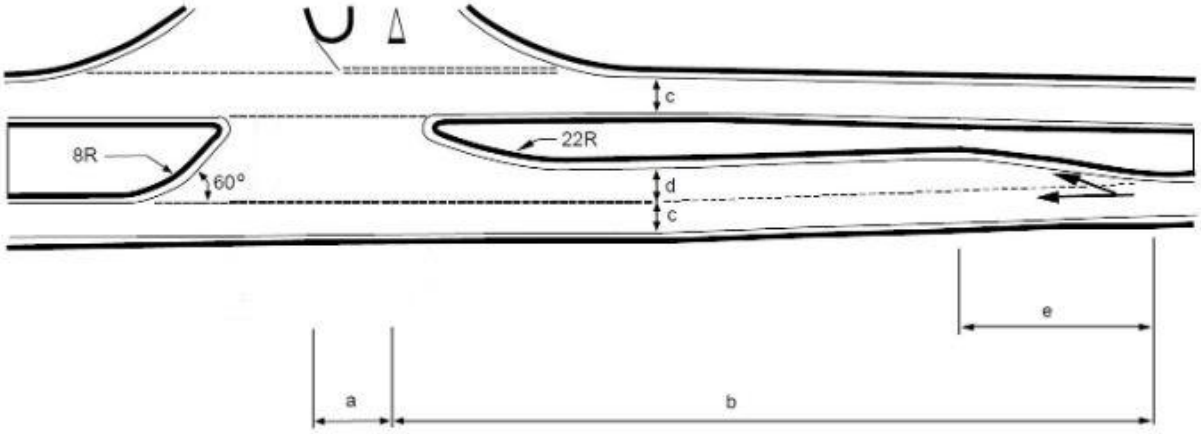
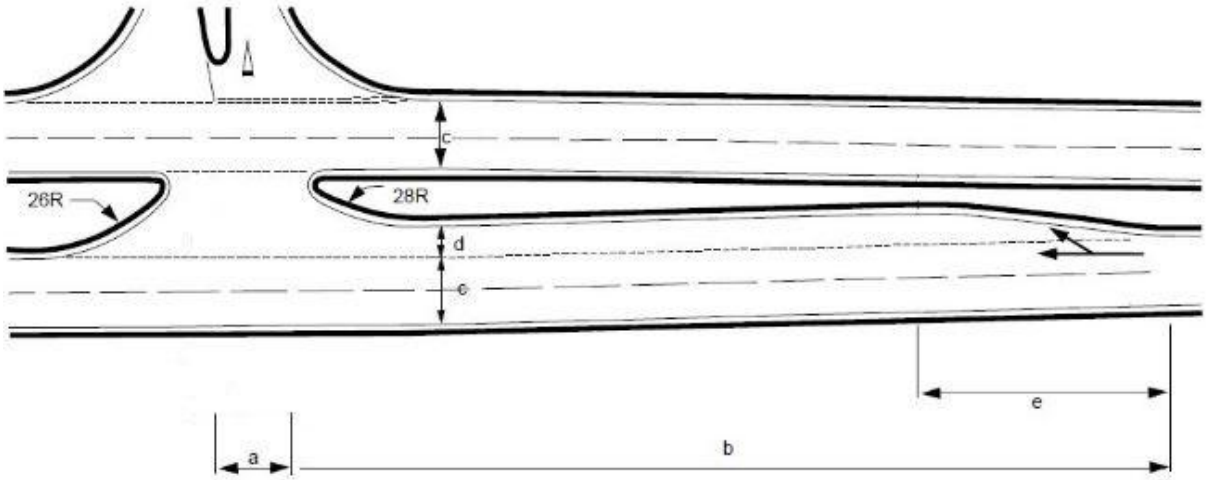


Figure 6.3e Dual carriageway major / minor priority junction



NOTE *In Figures 6.3a to 6.3e the labelled dimensions are as indicated below:*

1) a is the turning length (plus the queuing length, if required);

2) b is the deceleration length;

3) c is the through lane width;

4) d is the turning lane width; and,

5) e is the direct taper length.

6.4 The turning length shall be a minimum of 10 metres.

NOTE *The turning length is provided to allow long vehicles to position themselves correctly for the right turn.*

6.5 Where capacity calculations indicate that for significant periods of time there can be vehicles queuing to turn right from the major road, the turning length shall be increased to accommodate the forecast maximum queue length.

6.5.1 Where the turning length has been increased to the forecast queue length at a ghost island, physical islands should be provided within the hatched areas to provide greater protection to turning traffic.

6.6 For right turning lanes, the direct taper length and the minimum deceleration length shall be provided in accordance with Table 5.22.

Ghost islands

Through lane widths

6.7 At ghost island junctions on WS2+1 roads, the through lane widths in each direction shall be 3.5 metres, exclusive of hard strips.

6.8 At ghost island junctions on roads other than WS2+1 roads, the through lane widths in each direction shall be a minimum of 3.0 metres and a maximum of 3.65 metres wide, exclusive of hard strips.

6.8.1 At ghost island junctions on climbing lanes, the through lane widths in each direction should be 3.5 metres, exclusive of hard strips.

Island and right turning lane widths on WS2+1 roads

6.9 The width of the right turning lanes on WS2+1 roads shall be 4.5 metres.

NOTE *A width of 4.5 metres is utilised to allow the 3.5 metre central lane width and 1 metre hatching to be continued through the junction.*

Island and right turning lane widths excluding on WS2+1 roads

6.10 The width of the right turning lanes for new junctions, excluding WS2+1, shall be a minimum of 3.0 metres.

6.10.1 The width of the right turning lane at new and existing junctions should be 3.5 metres.

6.10.2 On rural roads, with design speeds above 85 kph or where hard strips are present, the width of the right turning lane at new and existing junctions should not exceed 3.65 metres.

NOTE Lane widths greater than 3.65m are inadvisable because wide ghost islands in these situations create a sense of space that can encourage hazardous overtaking at junctions.

6.11 The width of the right turning lanes for improvements to existing junctions, where space could be limited, shall be a minimum of 2.5 metres.

NOTE A narrow right turn lane down to 2.5m wide is only for improvements to existing junctions where space is limited and it is not possible to widen the carriageway cross section e.g. in urban areas where the carriageway is bounded by buildings.

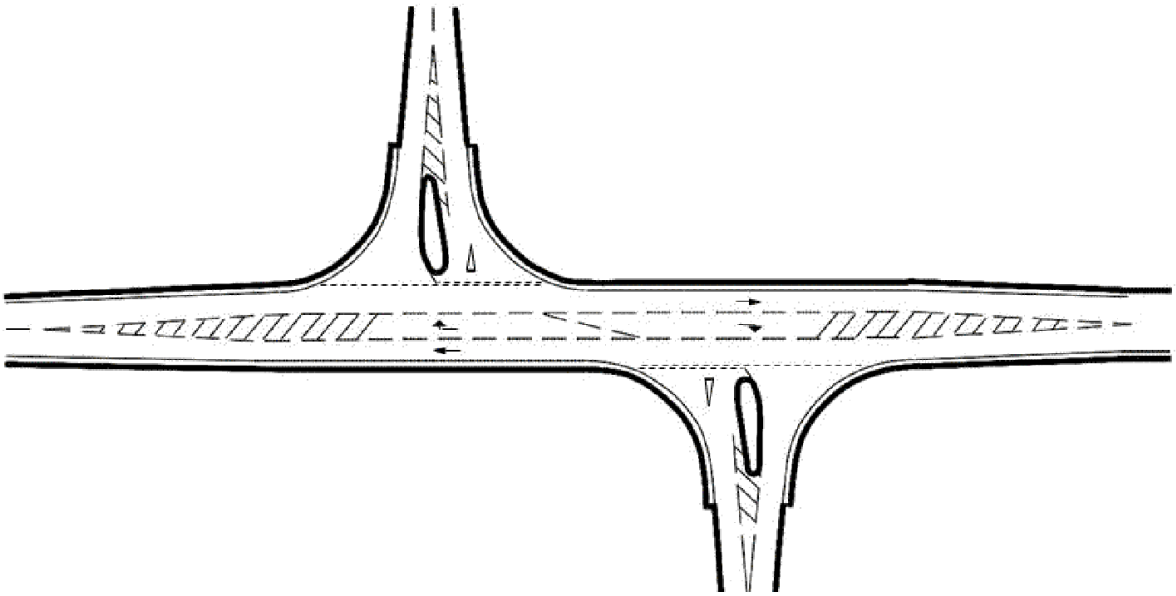
6.12 On urban roads the width of the right turning lane shall not exceed 5.0 metres.

NOTE Widths between 3.65m and 5.0m can be used where it is considered necessary to provide a degree of shelter in the centre of the road for large goods vehicles turning out of the minor road to execute the turn in two separate manoeuvres.

6.13 At left/right staggered junctions, where the deceleration lengths have the potential to overlap, the width of the ghost island shall not be increased to make them lie side by side.

6.14 At left/right staggered junctions, where the deceleration lengths have the potential to overlap, the starting points of the right turn lanes shall be joined by a straight road marking, as shown in Figure 6.14.

Figure 6.14 Ghost island configuration at left/right staggered junction



NOTE At higher design speeds, the full width of the turning lane on the ghost island is not developed until the end of the diverging section (as shown in Figure 6.14).

SLD and dual carriageway

Through lane widths

6.15 At SLD junctions, the through lane in each direction shall be 4.0 metres wide exclusive of hard strips.

NOTE *A 4.0 metre width of the through lane with hard strips allows traffic to pass a stopped vehicle within the paved width.*

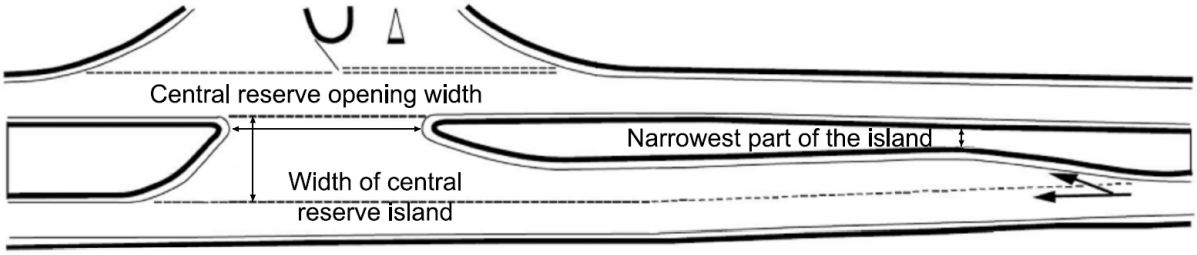
6.16 At dual carriageway junctions the through lane widths shall be the same as those either side of the junction.

NOTE *For central reserve openings on dual carriageway, the requirements for the through lane cross-sections are provided in CD 127 [Ref 1.N].*

Island and right turning lane widths

6.17 The width of the central island at the opening adjacent to the minor road, shall be a minimum of 10 metres, including central reserve hard strips.

Figure 6.17 Major/minor priority junctions with SLD



6.17.1 Where use by long vehicles is expected, the width of the central island at the opening adjacent to the minor road, should be 14.0 metres or 16.5 metres including central reserve hard strips to accommodate the design vehicle and drawbar trailer vehicle respectively.

6.18 The minimum width of any part of an SLD or central reserve island shall be 3.5 metres.

NOTE *The narrowest part of the physical island is usually located at the end of the direct taper, (shown in Figure 6.17).*

6.19 The opening in the central reserve at the opening adjacent to the minor road, shall be 15.0 metres wide, as shown in Figure 6.17.

6.19.1 Sections in the central reserve opening at SLD and dual carriageway junctions should fall towards rather than away from the minor road.

NOTE 1 *Carriageway falling towards rather than away from a minor road is particularly important where there is super-elevation across the main carriageway.*

NOTE 2 *Where the carriageway does not fall towards the minor road at a central reserve opening, drivers can potentially:*

1) fail to see the full width of the furthest carriageway from their position on the minor road;

2) not immediately appreciate the road they are joining is a dual carriageway (particularly with SLD); or

3) attempt to perform the right turn out of the minor road in one stage (by thinking that the width available in the central reserve appears insufficient to accommodate waiting vehicles).

6.19.2 The deceleration lengths at left/right staggered junctions on an SLD or dual carriageway may lie side by side.

6.20 Where deceleration lengths at left/right staggered junctions on an SLD or dual carriageway lie side by side, a physical island shall be provided to separate them, as illustrated in Figure 6.20.

Figure 6.20a SLD configuration at left/right staggered junction

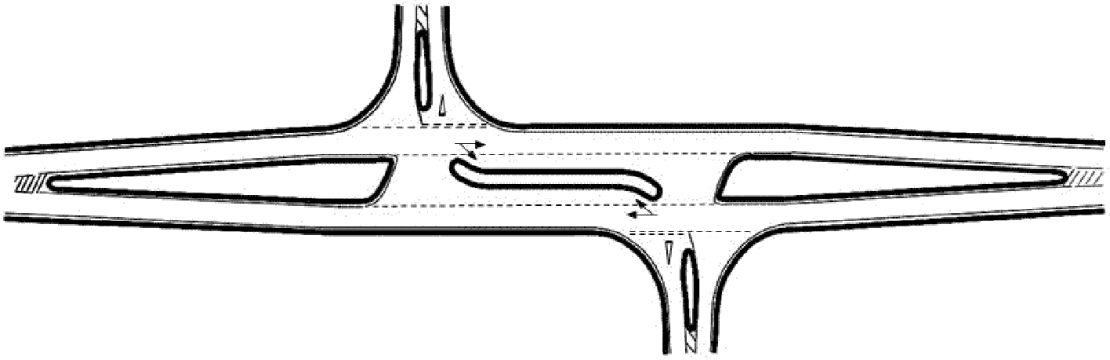
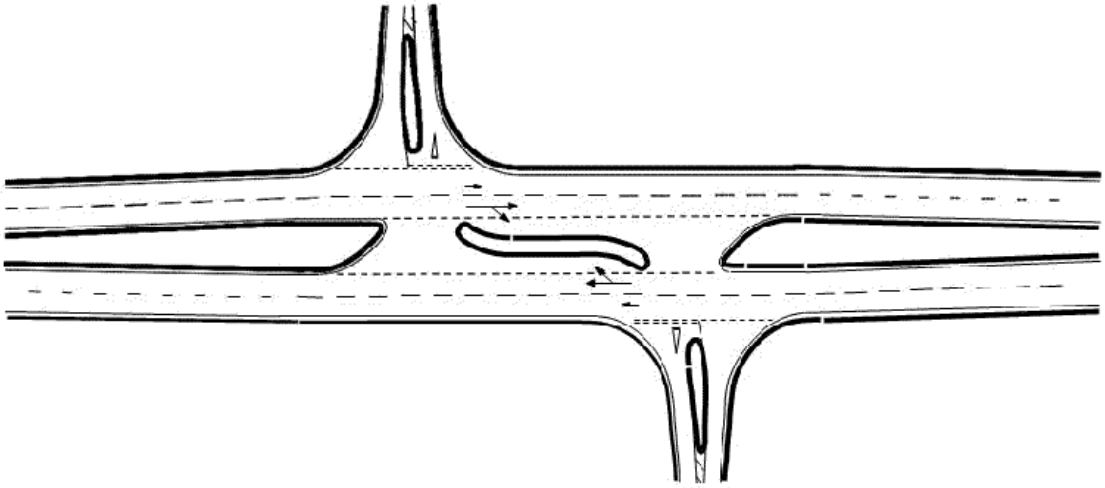


Figure 6.20b Dual carriageway configuration at left/right staggered junction

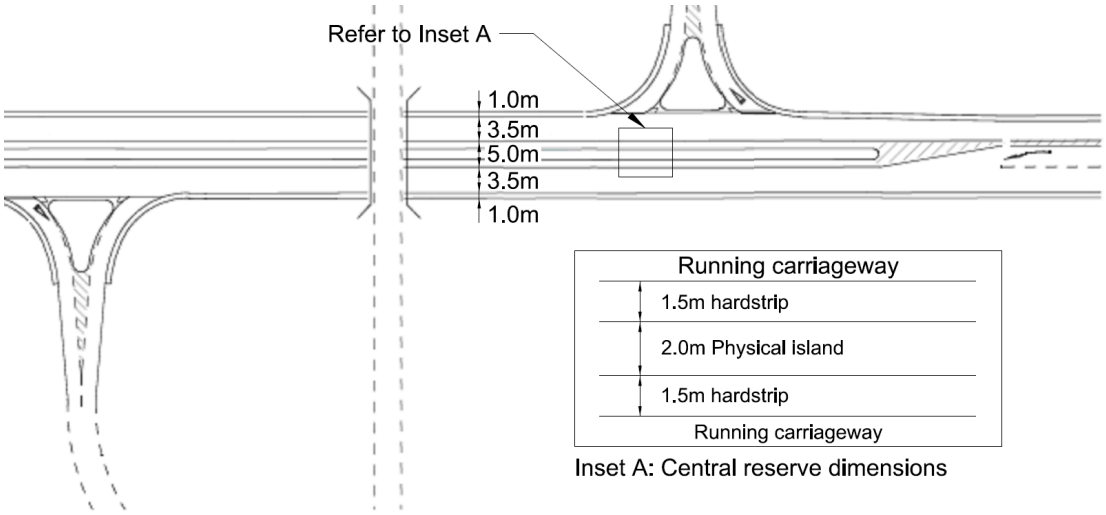


Physical central reserve layout on WS2+1

Through lane widths

6.21 The through lane in each direction shall be 3.5 metres wide with a 1 metre wide nearside hard strip, as illustrated in Figure 6.21.

Figure 6.21 Through lane and island widths on dualled sections of WS2+1 roads

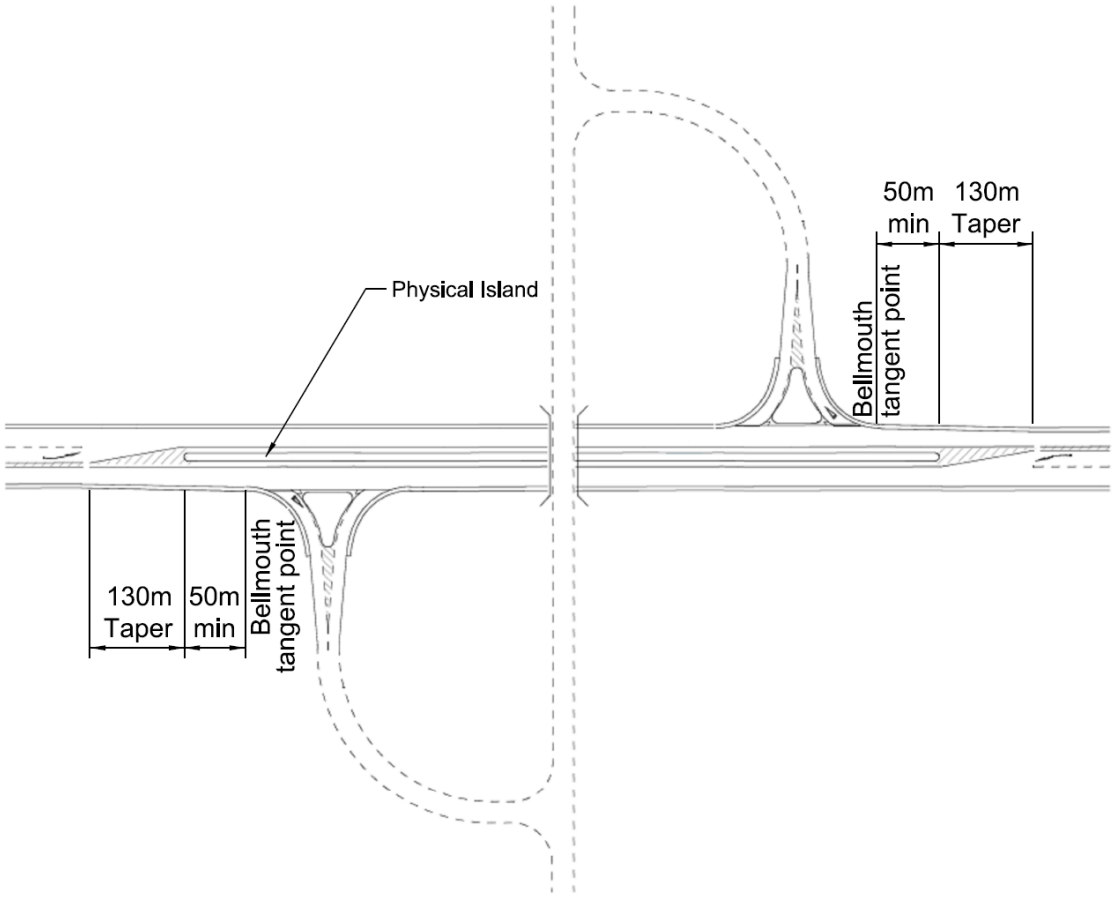


NOTE *The central reserve is formed by terminating the overtaking lane section prior to the junction, so that one 3.5 metre lane runs in each direction through the junction.*

Central island layout

6.22 The central island shall be introduced by means of hatched road markings over a taper of 130 metres as illustrated in Figure 6.22.

Figure 6.22 Introduction of dualling at grade separated junctions on WS2+1 roads



6.23 The central island shall be 5 metres wide, made up of a 2 metre physical island and 1.5 metre hard strips either side.

6.24 The central reserve shall extend a minimum of 50 metres at each end, measured from the end of the nearside radius of the minor road entry lanes, to prevent right turns.

6.24.1 The central reserve may be extended further than 50 metres at either end to further reduce the risk of right turns and/or u-turns.

Passing bays

6.25 Dimensions for passing bays shall be based on swept path analysis and the number and size of vehicles expected to be waiting to turn right at a given time.

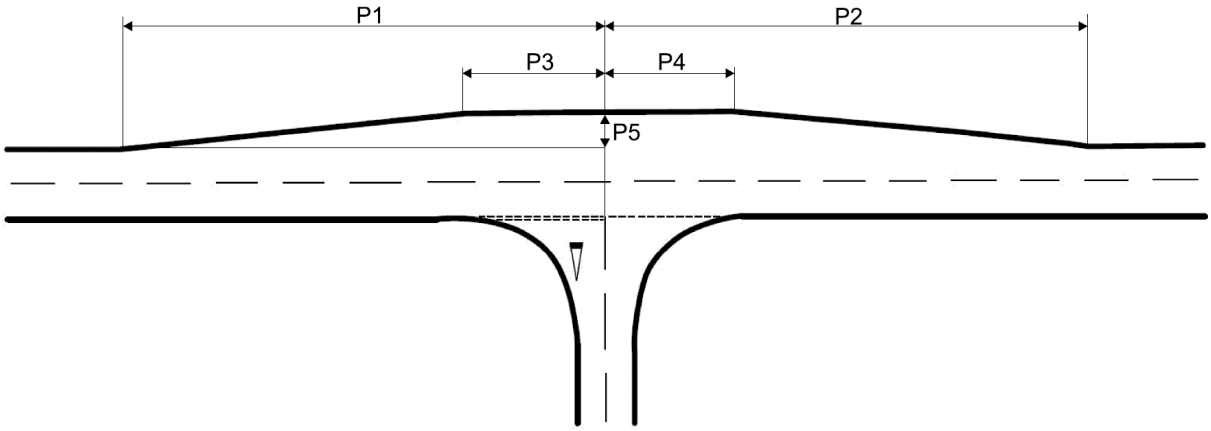
NOTE 1 Passing bays allow through vehicles to pass vehicles waiting to turn right in the centre of the major road, albeit at a reduced speed.

NOTE 2 Figure 6.25N2 and Table 6.25N2 provide typical dimensions for passing bays to accommodate different combinations of waiting vehicles where the major and minor road are both nominally 7.3m wide.

Table 6.25N2 Geometric parameters for a passing bay

Expected vehicles	Dimensions (metres)				
	P1	**P2**	**P3**	**P4**	**P5**
Car and car	18.8	13.0	10.9	5.0	0.8
Car and HGV	28.7	18.5	15.2	5.0	1.35
HGV and HGV	30.5	33.2	15.2	5.0	2.8

Figure 6.25N2 Passing bay dimensions



7. Geometric design of signal-controlled junctions

Visibility at signal-controlled junctions

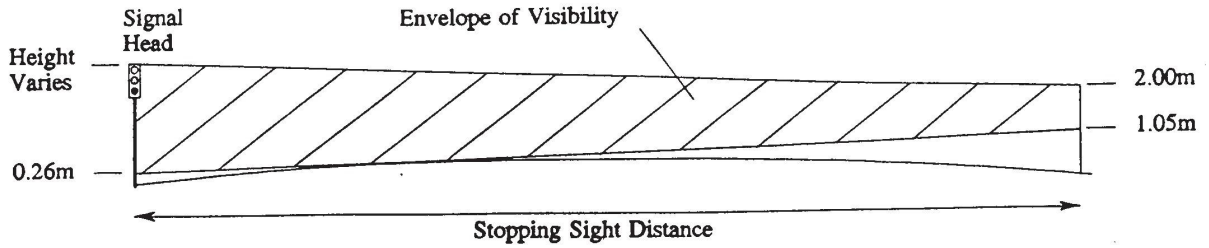
Visibility of signals

7.1 Each traffic lane shall have clear visibility of at least one primary signal associated with its particular movement, from a distance equivalent to the desirable minimum SSD of the approach road.

7.1.1 Duplicate primary signals should be provided on approaches with a speed of 85 kph or above.

7.2 Visibility to the primary signal shall be in accordance with the CD 109 [Ref 5.N] visibility envelope, but with the high object height amended to incorporate the signal head where this exceeds 2 metres, as indicated in Figure 7.2.

Figure 7.2 Visibility requirements on approach to junction



7.2.1 Where multiple lanes are provided on the approach, a signal-controlled junction may have offside primary, double-headed or overhead additional signals to ensure visibility of the signals from all lanes.

7.2.2 A minimum of 2 signals should be visible from each approach arm and each stop-line.

NOTE *The 2 signals usually comprise a primary and a secondary signal.*

7.2.3 Additional signal heads may be provided, where a driver's vision of the signal head could be obscured, for example, by a lorry in the lane adjacent to the signal.

7.2.4 Where separate signalling of turning movements is employed, a minimum of 2 signals should be visible from each approach lane associated with each of the turning movements and each associated stop-line.

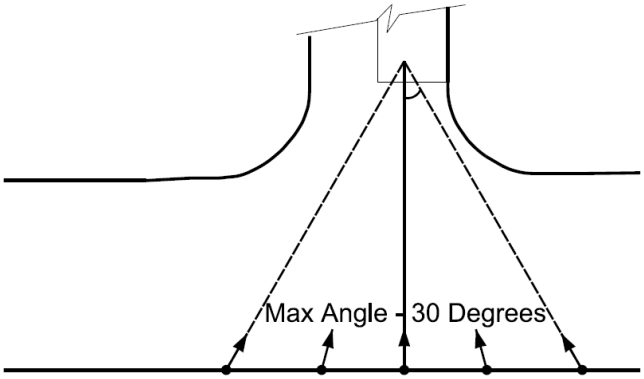
NOTE *Where separate signalling of turning movements is employed, a signal post can then display information applicable to more than one turning movement.*

7.2.5 Primary signal heads should be located a minimum of 1 metre beyond the stop-line.

7.2.6 Primary signal heads should be located in advance of crossing studs or marks if pedestrian facilities are provided.

7.2.7 At junctions with angled approaches, the secondary signal should be displaced a maximum angle of 30^{o} from the driver's line of forward sight, as indicated in Figure 7.2.7.

Figure 7.2.7 Locating secondary signals

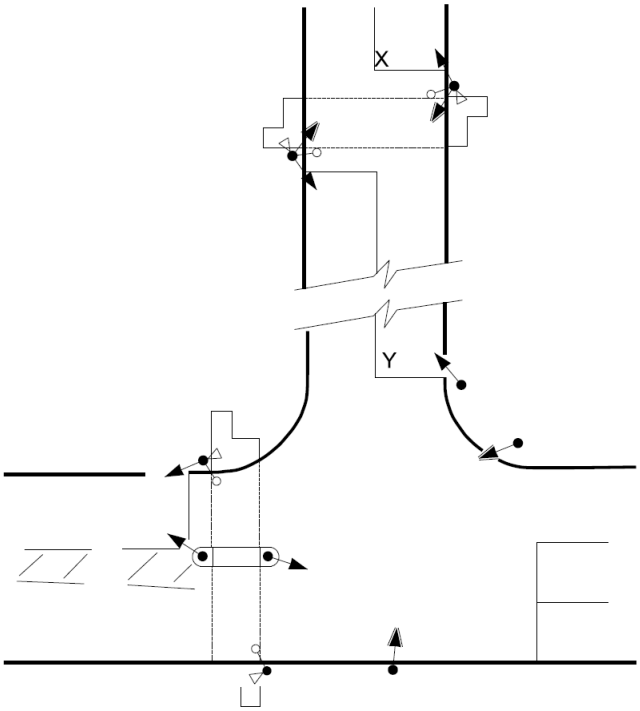


7.2.8 The distance between the stop-line and an associated secondary signal should not exceed 50 metres.

7.2.9 Where multi phased signal layouts are provided, an additional secondary signal may be utilised.

NOTE *Multi phased signal layouts can result in "see through" where road users (at point X) could be confused by the signal at the next stop-line (point Y), as indicated in Figure 7.2.9N where a displaced pedestrian crossing is illustrated. In these situations, an additional secondary signal can aid driver understanding.*

Figure 7.2.9N Example of a small signal-controlled T-junction multi-phased signal layout



7.2.10 The desirable minimum SSD should be provided to the back of the queue.

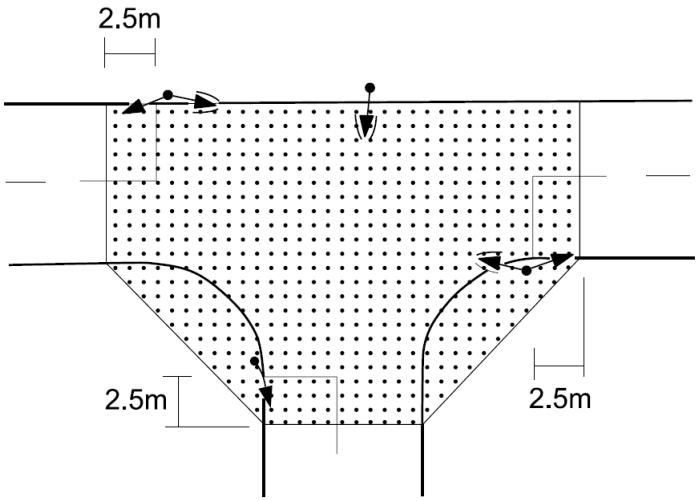
NOTE *The back of the queue could be in excess of the immediate approach to the junction as defined in CD 109 [Ref 5.N].*

Junction intervisibility zone

7.3 An intervisibility zone shall be provided that incorporates an area that extends across the full

carriageway width of each arm from a distance of 2.5 metres back from each stop line, as indicated in Figure 7.3.

Figure 7.3 Junction Intervisibility Zone (without crossings)



7.4 Where an advance stop-line (ASL) is provided, the intervisibility zone shall be measured from a point 2.5m behind the cyclists' stop-line.

7.4.1 Where a staggered pedestrian crossing is provided, the section of the crossing immediately adjacent to the junction should be included in the junction intervisibility zone.

NOTE *The junction intervisibility zone does not need to be extended to incorporate a crossing facility that is remote from the junction and operates independently of the junction.*

7.5 No substantial fixed obstructions shall be located within the intervisibility zone of new junctions.

NOTE *Details of what constitutes a substantial fixed obstruction are provided in CD 109 [Ref 5.N].*

7.5.1 No substantial fixed obstructions should be located within the intervisibility zone of existing junctions.

Entry lanes, exit lanes and storage capacity

Lane widths

7.6 Straight ahead lane widths shall be a minimum of:

1) 3.0 metres at new junctions;
2) 2.5 metres at existing junctions where the 85th percentile approach speed exceeds 56 kph (35 mph) and/or it is necessary to make provision for HGVs; and
3) 2.25 metres at existing junctions where the 85th percentile approach speed does not exceed 56 kph (35 mph) and it is not necessary to make provision for HGVs.

NOTE *Existing junctions can be an existing signal controlled junction or an existing priority junction being upgraded.*

7.6.1 At existing junctions, straight ahead lanes with widths of 2.5 metres or less should only be used where the provision of them will allow for additional lane(s) to be provided on that particular arm.

7.6.2 At existing junctions, straight ahead lanes should be a minimum of 3.0 metres wide.

7.6.3 Straight ahead lanes should be a maximum of 3.65 metres wide.

7.6.4 A minimum width of 4.0 metres should be provided between physical islands where cyclist demand indicates a need.

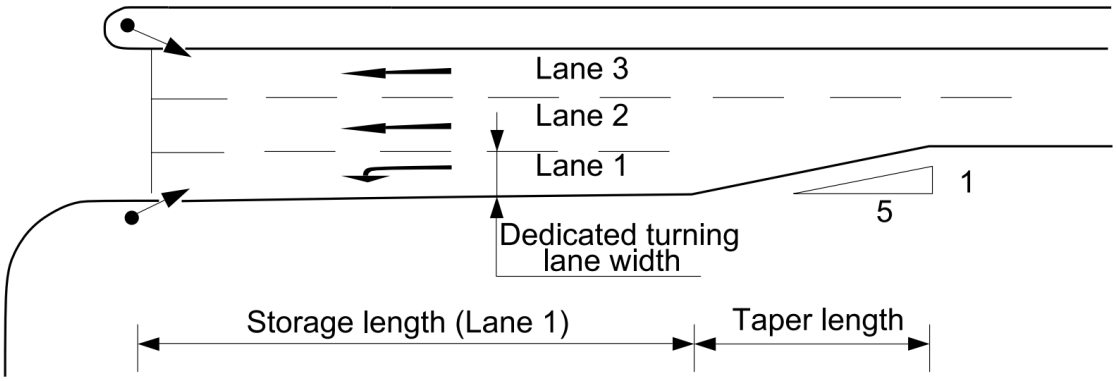
7.7 Dedicated lanes for left or right turning traffic shall be a minimum of 3 metres wide.

NOTE 1 Junction capacity can be increased by widening the road in the vicinity of the junction to provide dedicated left or right turn lanes.

NOTE 2 Vehicles in dedicated turning lanes can often move independently to those in other lanes and therefore lane widths greater than 3 metres are often necessary to allow for this.

7.8 Dedicated lanes for left turning traffic shall be developed with tapers of 1 in 5, as illustrated in Figure 7.8.

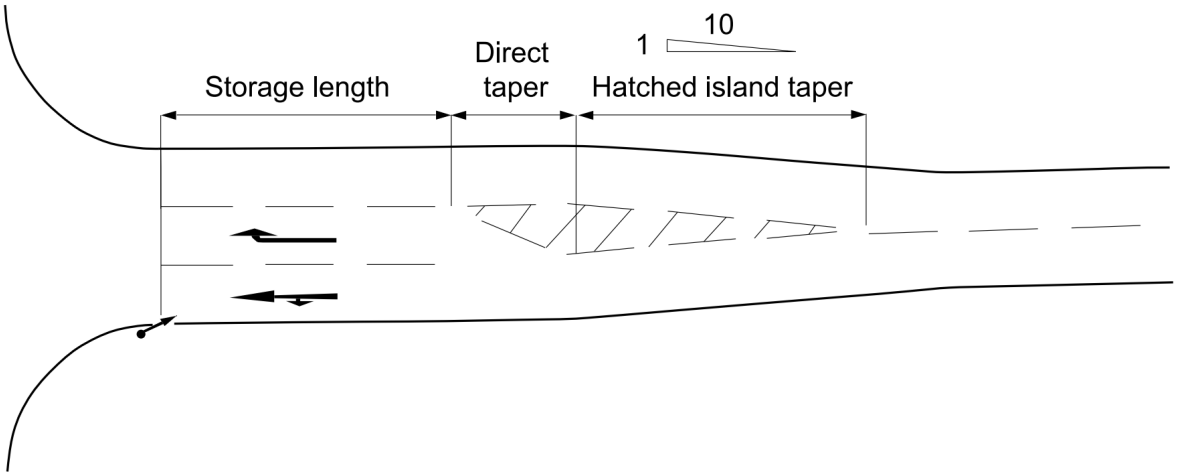
Figure 7.8 Dedicated turning lane arrangement for a left-turn approach lane



7.8.1 On single carriageway roads, right turn entry lanes may be accommodated by the provision of a hatched island, as illustrated in Figure 7.8.2.

7.8.2 On single carriageway roads, hatched islands for right turn lanes should be developed symmetrically from the centre line of the road with a minimum taper of 1 in 10 and a direct taper of 7.5 metres, as illustrated in Figure 7.8.2.

Figure 7.8.2 Right turn lane hatched island layout



Storage length

7.9 The storage length shall be measured from the stop line to the furthest point upstream where the total number of entry lanes are at full width, as illustrated in Figure 7.8.2.

7.9.1 The storage length of the left and right turn entry lanes should be designed:

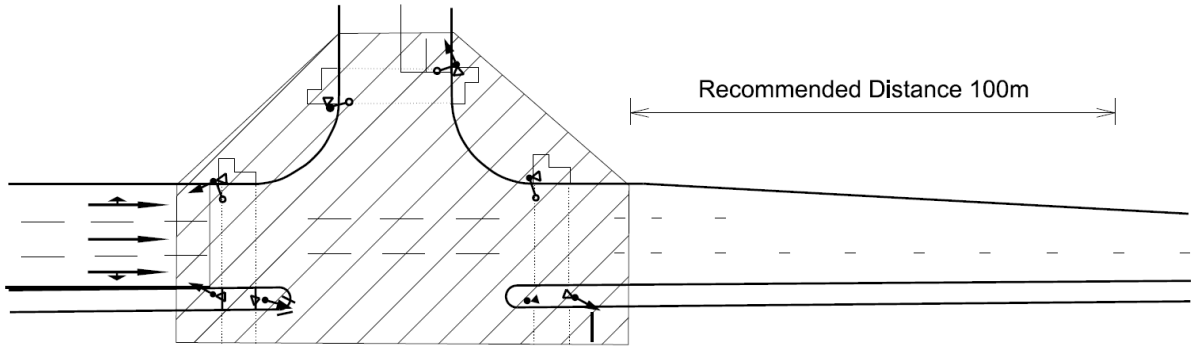
1) to meet the capacity requirements of the junction;
2) to accommodate the longest queue of stopped traffic (to avoid turning traffic blocking the adjacent lane); and
3) to avoid traffic being prevented from entering the left or right turn lane where there is a high proportion of straight ahead traffic queuing in the adjacent lane.

Exit lane continuity

7.10 Where it is necessary to reduce the numbers of lanes on an exit, this shall be carried out on either the nearside or the offside depending on the prevailing traffic flows on the exit arm.

7.10.1 Where it is necessary to reduce the number of lanes on the exit arm, a single lane should be reduced over a distance of 100 metres starting at or beyond the limit of the junction intervisibility zone, as illustrated in Figure 7.10.1.

Figure 7.10.1 Lane continuity through junction intervisibility zone



NOTE The use of lane markings within the junction intervisibility zone, can be beneficial to direct traffic streams and reduce conflict where entry and exit lane widths vary or the alignment through the junction is not a direct path.

Other geometrical elements of signal-controlled junctions

Swept path and corner radii

7.11 The design of a signal-controlled junction shall allow for the swept turning paths of the design vehicle where provision is to be made for large goods vehicles.

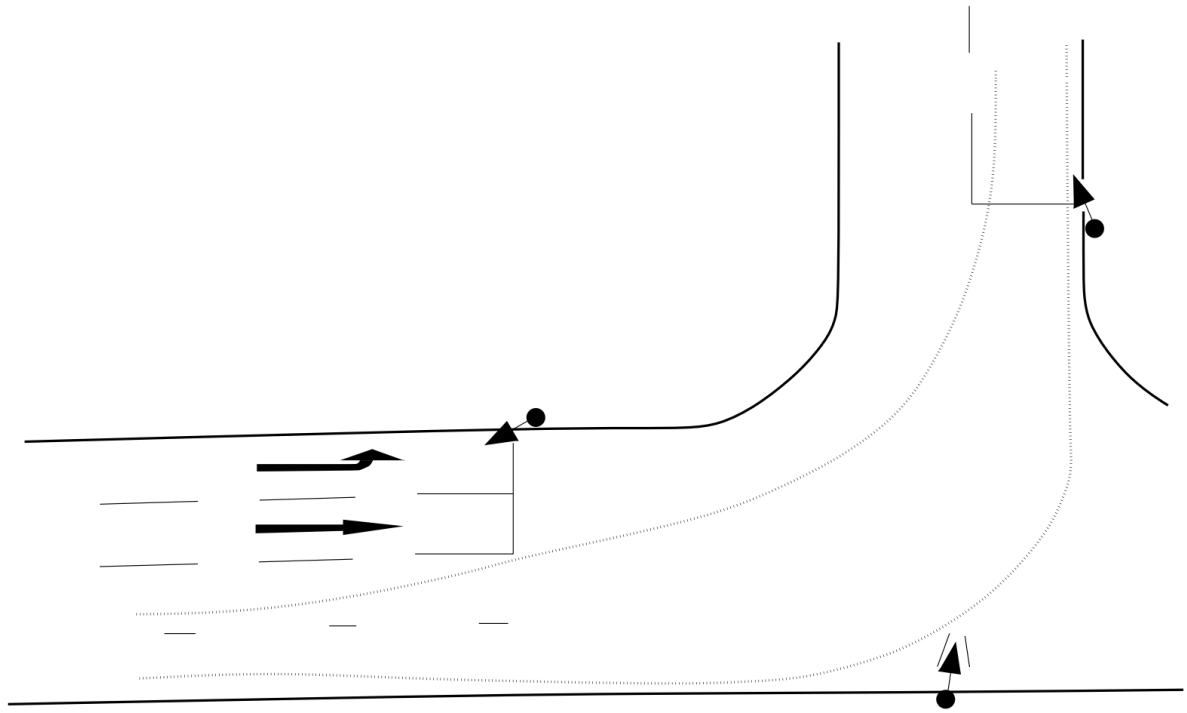
7.11.1 The design should incorporate turning radii to cater for the swept paths of the worst case vehicle that can be reasonably expected to use the junction on a frequent basis.

NOTE The worst case vehicle is the vehicle that has the most onerous swept path.

7.11.2 Where no provision is to be made for large goods vehicles, the minimum corner radii should be the same as for a priority junctions as given in Section 5.

NOTE 1 Where the layout of a signal controlled junction has not generally be designed to cater for large goods vehicles, these vehicles can have difficulty in completing a manoeuvre without encroaching into opposing lanes. In such situations, stop-lines (and crossings if present) can be set back to beyond where such a conflict would occur. This is illustrated in Figure 7.11.2N1.

Figure 7.11.2N1 Setting back stop-lines



NOTE 2 *When offsetting stop lines as illustrated in Figure 7.11.2N, care will need to be taken to ensure that the junction intervisibility zone is maintained.*

7.12 Where provision is to be made for large goods vehicles, the values for corner radii and associated tapers shall be the same as for a priority junction.

7.12.1 Stop-lines on adjacent entry lanes should not be staggered.

NOTE *At staggered stop-lines, large goods vehicles in the nearside entry lane can prevent vehicles in the offside entry lane seeing the nearside primary signal or pedestrians.*

Traffic islands (including at left-turn slips)

7.13 The nosing of central reserves and pedestrian refuges shall be set back a minimum distance of 1.5m from the edge of carriageway of the intersecting road.

7.13.1 Pedestrian crossings and any associated refuges should be located beyond the limits of the junction radii to minimise crossing distance.

7.14 A minimum clearance of 450mm shall be provided between the edge of carriageway and any street furniture.

NOTE *It can be necessary to provide additional clearance between the edge of carriageway and any street furniture where the carriageway crossfall is greater than 2.5%*

7.15 Traffic islands shall be provided to separate uncontrolled traffic from controlled traffic where left turn slip lanes are provided.

7.15.1 Traffic islands may be provided to separate two independently controlled lanes of traffic on the same entry.

7.15.2 Left turn slip lanes may be signal-controlled or uncontrolled.

7.15.3 A left turn slip lane should be provided where:

1) the left turn traffic movement is high;

2) left turn manoeuvres for large goods vehicles need to be facilitated;
3) delay for left turn vehicles would otherwise be significant;
4) left turn traffic capacity requirements would extend the green time required for the straight ahead traffic movement phase.

7.15.4 A single pedestrian crossing route through a signal-controlled junction should not include a mix of controlled and uncontrolled crossing points.

NOTE 1 Pedestrian crossings at uncontrolled left turn slip lanes can be particularly hazardous due to the potential for higher traffic speeds at these locations. When deciding to site crossings at uncontrolled left turn slips, it is important to consider the:

1) visibility levels between pedestrians and approaching traffic; and
2) availability of suitable gaps in traffic flow for pedestrians to cross.

NOTE 2 Further design requirements for pedestrian crossings on segregated left turn lanes are provided in CD 116 [Ref 1.I].

NOTE 3 Traffic islands can assist in providing safe crossings for pedestrians whilst improving traffic capacity by the incorporation of pedestrian call stages.

NOTE 4 Design requirements for pedestrian refuges are provided in CD 143 [Ref 3.N] and CD 143 [Ref 3.N].

Right turning traffic movements

7.16 On roads with a design speed of 85 kph or higher, right turning lane(s) shall be separately signalled and segregated from the adjacent ahead-only lane(s) by a traffic island.

NOTE Where opposing right turn lanes can be aligned directly opposite each other, layouts that encourage traffic to pass in front rather than behind each other can be used to improve traffic flow. They can also allow a small number of right turning vehicles to wait within the junction intervisibility zone. This is illustrated in Figures 7.16Na and 7.16Nb.

Figure 7.16Na Aligned non-hooking arrangement

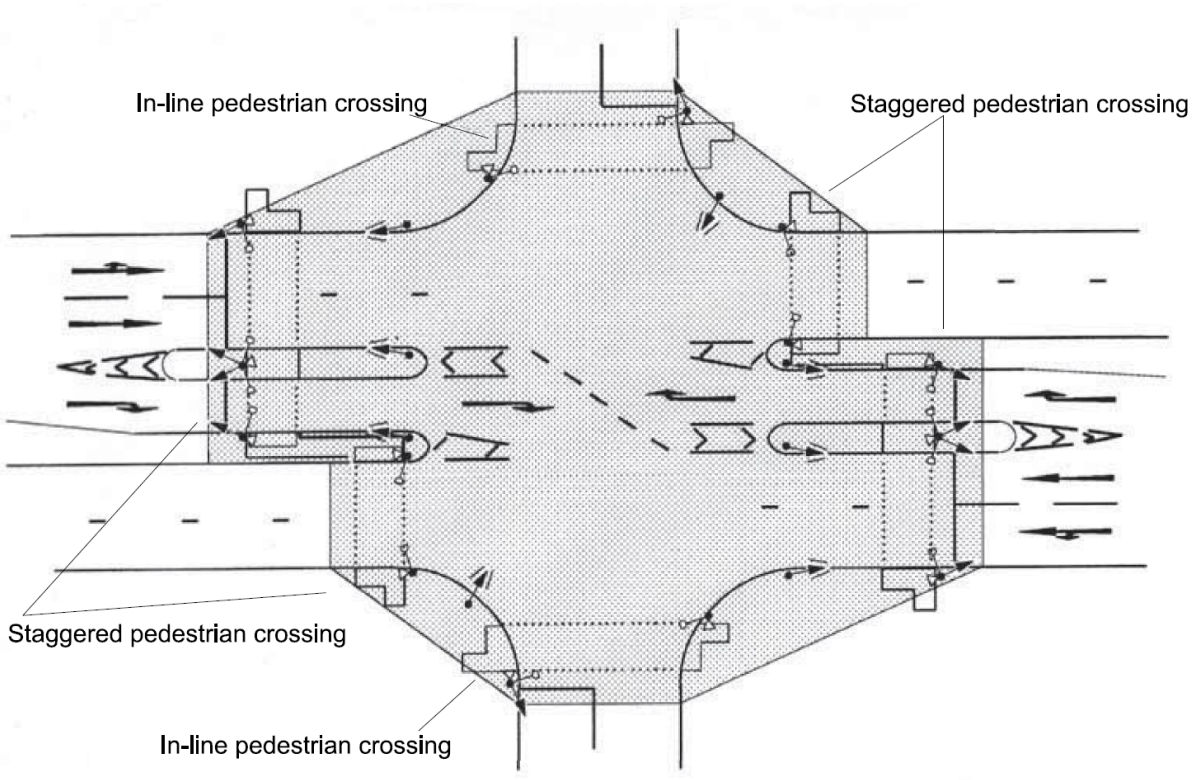
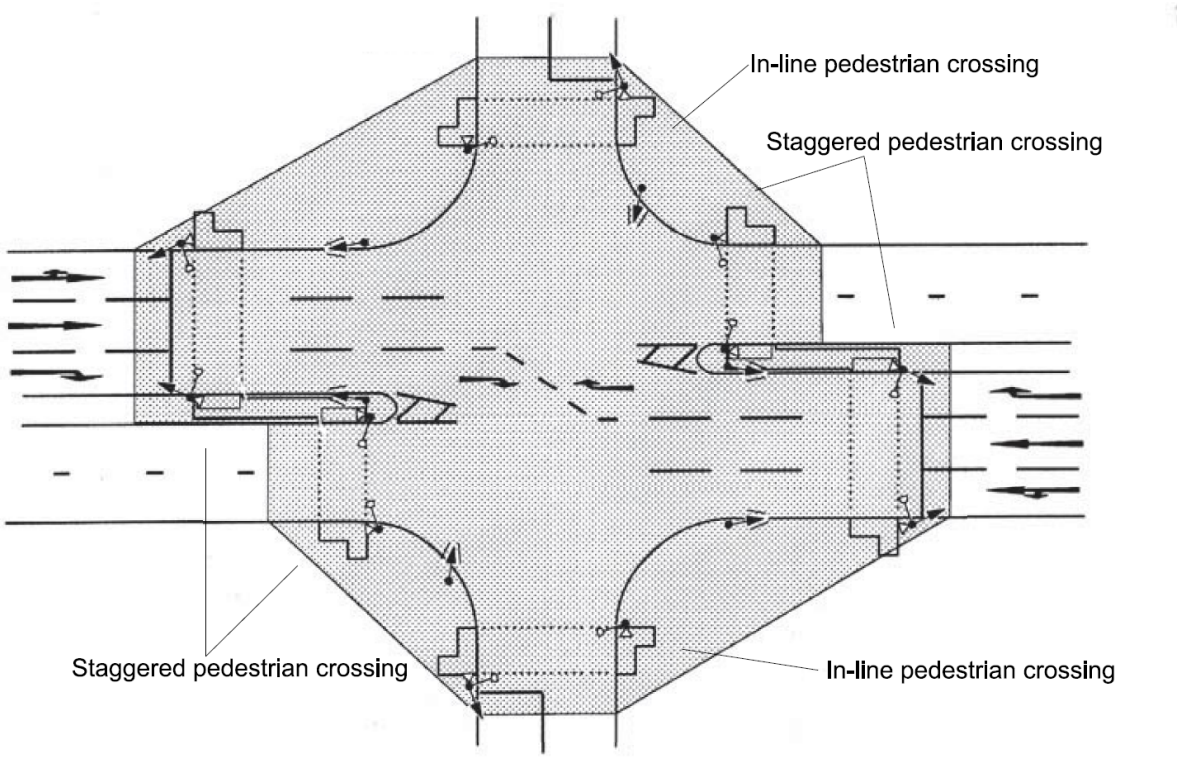


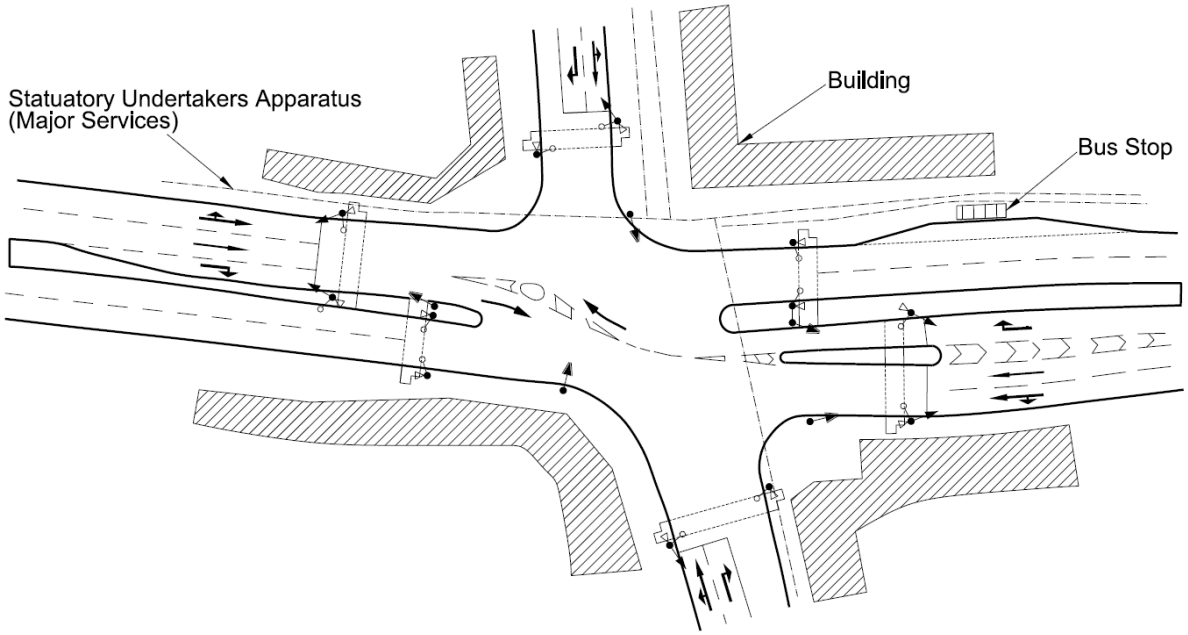
Figure 7.16Nb Offset non-hooking arrangement



7.16.1 The central reserves on the major road may be offset to encourage right turning traffic to pass in front rather than behind each other. This is illustrated in Figure 7.16Nb.

NOTE *The inclusion of a separation island as part of a right turning arrangement that encourages traffic to pass in front rather than behind each other can be useful to deflect traffic where the two arms are offset from each other. This is illustrated in Figure 7.16.1N.*

Figure 7.16.1N Example of existing signal-controlled junction subject to design constraints



7.16.2 Where the 85th percentile approach speed is greater than 72 kph (45 mph), right-turns should be separately signalled.

NOTE *Where the 85th percentile approach speed is greater than 72 kph (45 mph), there is an increased risk of accidents between right-turning vehicles seeking gaps and on-coming vehicles travelling at speed.*

Location of controller cabinets

7.17 The controller cabinet shall not be situated such that it causes either physical or visual obstruction to road users and pedestrians.

7.17.1 The controller cabinet should be positioned to allow visibility from the controller cabinet to the signal head and stop-line for each junction arm.

NOTE *Access and parking arrangements for the servicing of the signal equipment form part of the junction layout design.*

8. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. CD 127, 'Cross-sections and headrooms'
Ref 2.N	Highways England. CD 195, 'Designing for cycle traffic'
Ref 3.N	Highways England. CD 143, 'Designing for walking, cycling and horse riding (vulnerable users)'
Ref 4.N	Highways England. CD 122, 'Geometric design of grade separated junctions'
Ref 5.N	Highways England. CD 109, 'Highway link design'
Ref 6.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

9. Informative references

The following documents are informative references for this document and provide supporting information.

Ref 1.I	Highways England. CD 116, 'Geometric design of roundabouts'
Ref 2.I	HM Government. Building Regs 2010 (fire safety), 'The Building Regulations 2010, Fire safety, Volume 1 dwellinghouses'
Ref 3.I	Highways England. CD 169, 'The design of lay-bys, maintenance hardstandings, rest areas, service areas and observation platforms'

Appendix A. Examples of signal-controlled junction layouts and impact on signal operation

A1 Opposing right turns at signal-controlled junctions

Collisions at signal-controlled junctions can occur as a result of conflicts arising from right turning traffic movements. To mitigate this risk,opposing right turns should run separate phases or with a late start wherever the signal timings, junction capacity and geometric layout can facilitate this.

A2 Signal-controlled T-junctions

A2.1 Small urban signal controlled T-junction

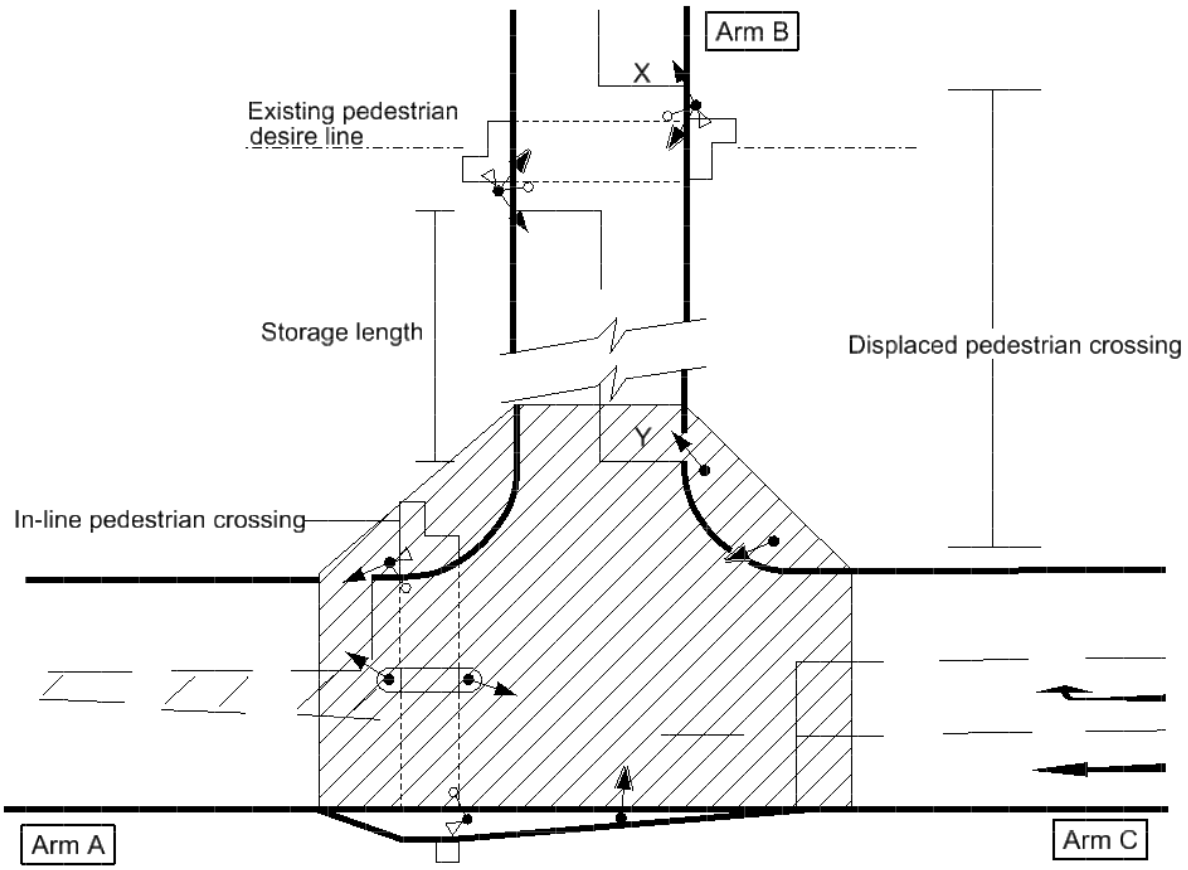
Figure A.1 illustrates a simple, small urban signal-controlled T-junction, typical of a situation where available road space is restricted and the usage by large goods vehicles is expected to be low.

For the purpose of this example, it is assumed that the low pedestrian movements combined with the necessity to provide a right turn from Arm C to Arm B have led to a decision not to provide a pedestrian crossing on Arm C.

The following specific design features are incorporated into the example:

1) circular corner radii without tapers (no provision for swept paths of large goods vehicles);
2) a 'displaced' pedestrian crossing on Arm B linked to the junction signals; and
3) an in-line pedestrian crossing on Arm A.

Figure A.1 Example of a small signal-controlled T-junction



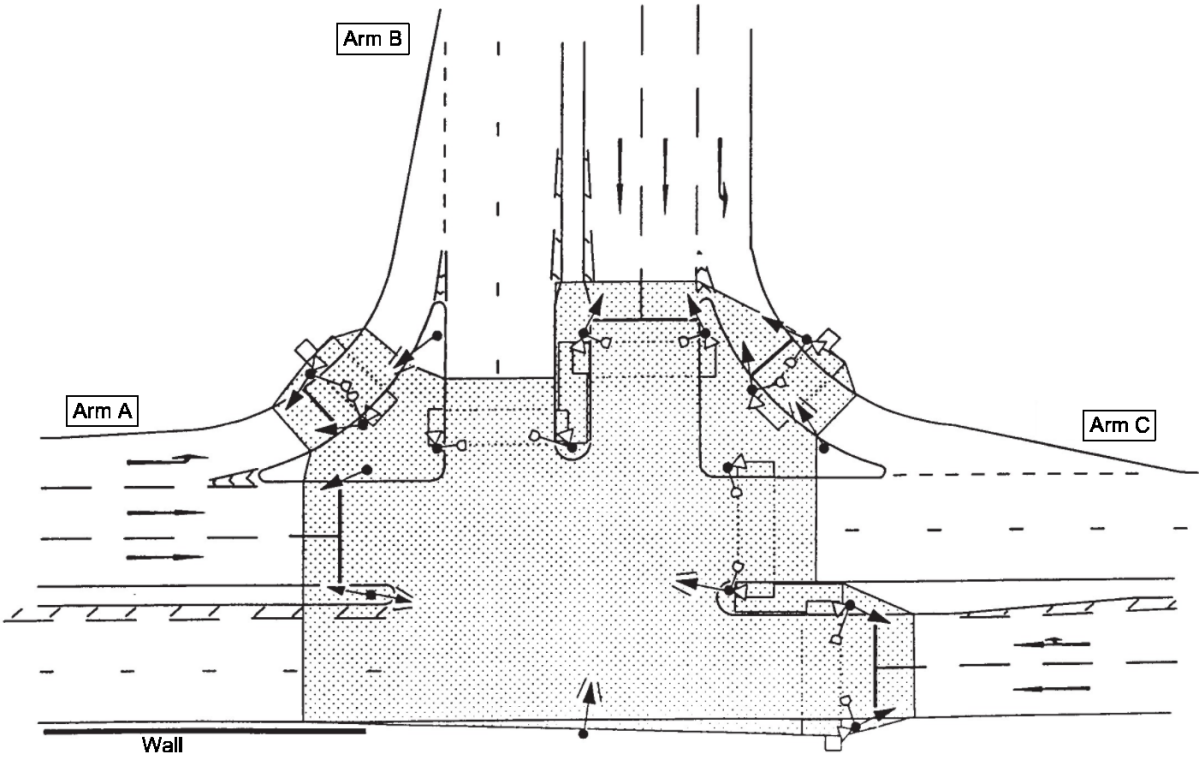
A2.2 Large urban or larger rural signal-controlled T-junction

Figure A.2 indicates an example of a large urban or larger rural signal-controlled T-junction between two dual carriageways, typical of a situation where available road space is not severely restricted, and a significant proportion of large goods vehicles is anticipated on all arms. It is assumed that a pedestrian crossing cannot be provided on Arm A due to localised physical constraints.

The following specific design features are incorporated into the example:

1) signal-controlled left turn slip lanes and separation islands (Arm A to B and B to C);
2) larger corner radii with tapers (provision for swept paths of large goods vehicles);
3) all staggered pedestrian crossings are indicated in the preferred orientation; and
4) road markings provided to channelise traffic.

Figure A.2 Example of a large signal-controlled T-junction



A3 Signal-controlled crossroads

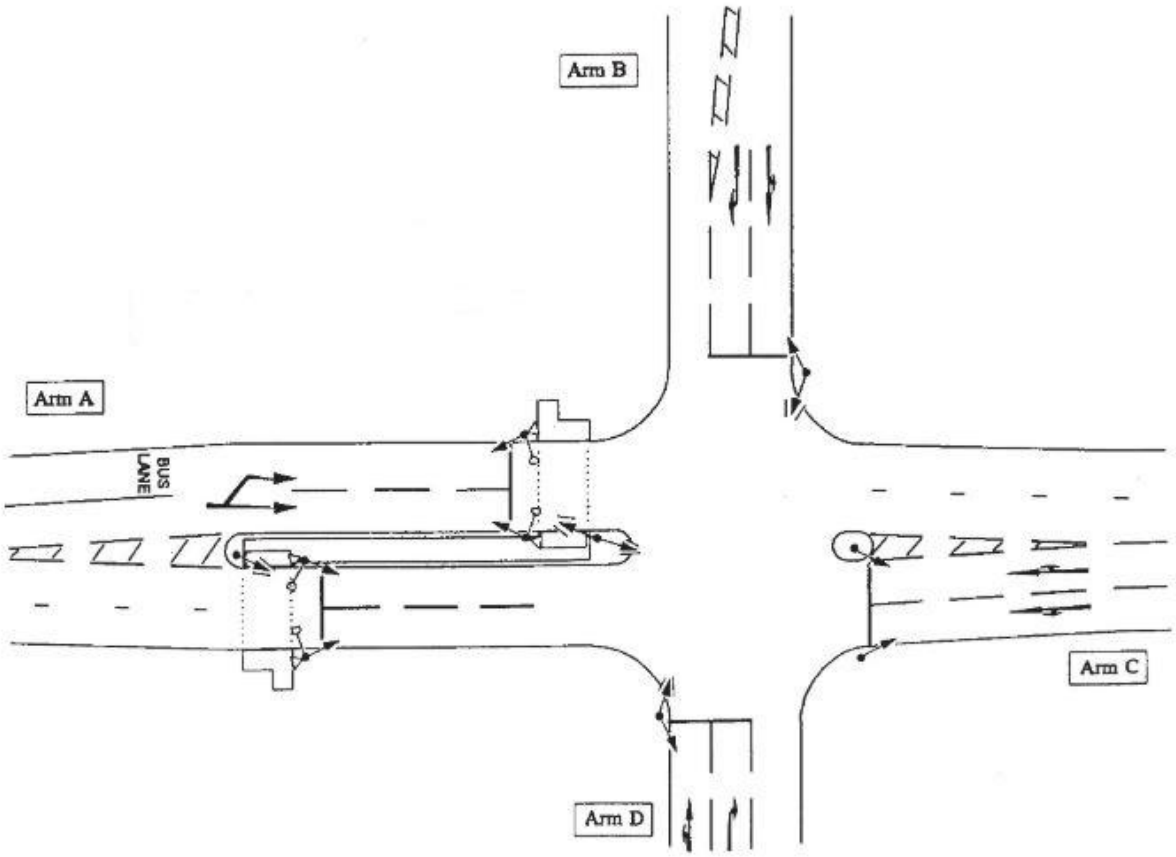
A3.1 Urban signal-controlled crossroads

Figure A.3 illustrates an example of an urban signal-controlled crossroads, typical of a situation where available road space is restricted but there is sufficient width to provide a localised central reserve on the major road. The presence of large goods vehicles in significant proportions is not expected and the major road is an important bus route. The following design features are incorporated into the example:

1) localised widening on the major road to facilitate a staggered pedestrian crossing facility;
2) circular corner radii without tapers (no provision for large goods vehicles); and
3) bus lane discontinued on approach to junction (Arm A).

In Figure A.3, the bus lane has been terminated in advance of the junction intervisibility zone and the associated pedestrian crossing. In this example, the staggered pedestrian crossing, which is part of the junction signal operation, is not in the preferred orientation.

Figure A.3 Example of a signal-controlled crossroads with a staggered pedestrian crossing



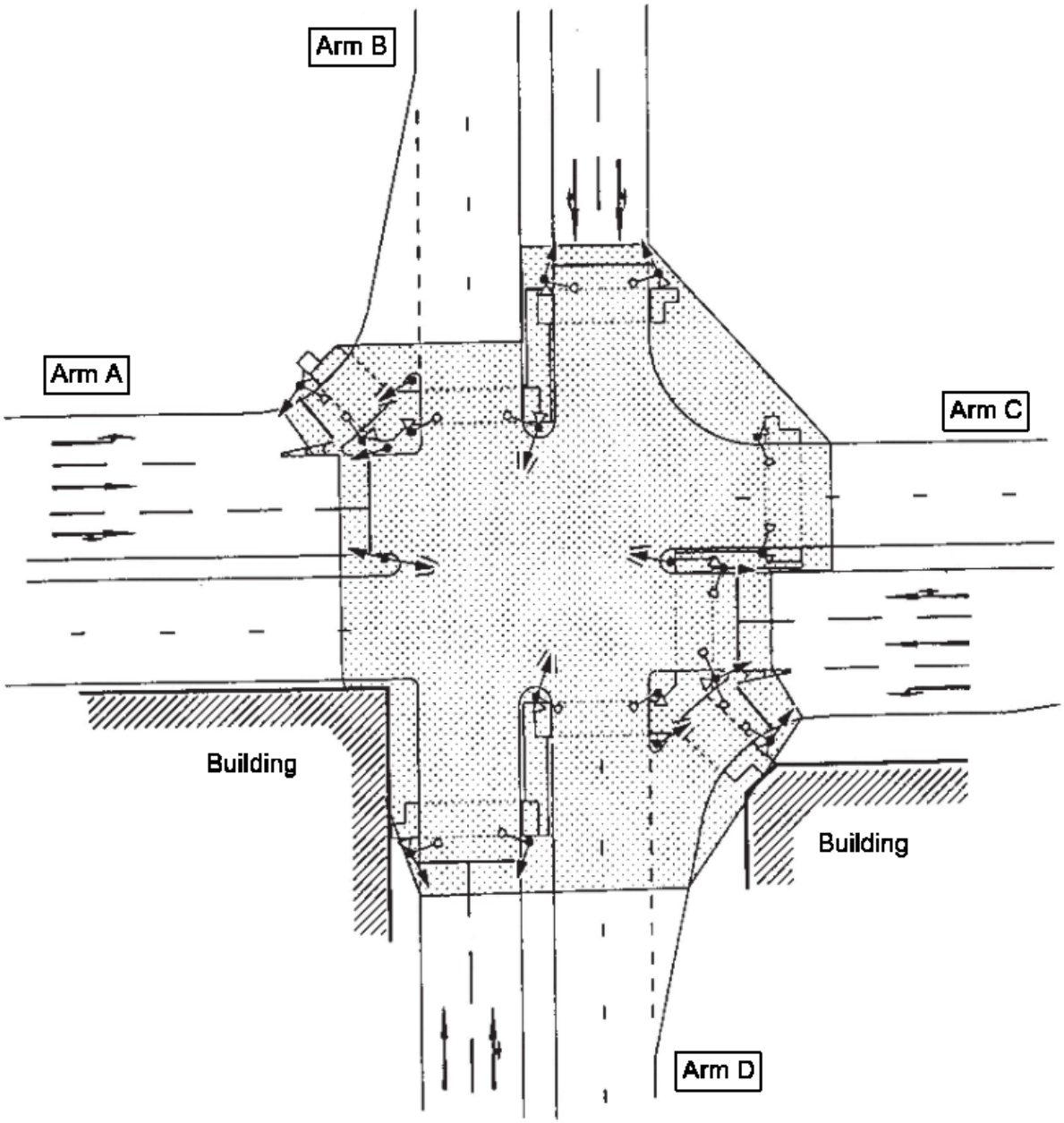
A3.2 Complex urban / rural signal-controlled crossroads

Figure A.4 illustrates an example of a larger, more complex urban or rural signal-controlled crossroad junction between two major dual carriageways. This example is intended to illustrate a situation where, although available road space is not generally restricted, there are some physical constraints which impose limitations on the turning provisions, junction intervisibility and the orientation of the staggered pedestrian crossings. The following design features are incorporated into the example:

1) uncontrolled left turn slip lane (A to B);
2) circular radius without tapers (Arm B to C);
3) controlled left turn slip lane (C to D);
4) left turn ban (Arm D to A);
5) due to the constraints imposed by the separation island, the staggered pedestrian crossing on Arm C is not the preferred orientation; and
6) the staggered pedestrian crossing on Arm D is in the preferred orientation.

In Figure A.4, the left turn from Arm D to Arm A is prohibited.

Figure A.4 Example of a large signal-controlled crossroad



A4 Signal-controlled staggered junctions

A4.1 Operation of signal-controlled staggered junctions

A large stagger may result in the need to treat the layout as two separately signal-controlled junctions, whereas a small stagger, possibly with a banned turn, may allow the junction to be treated as a simple signal-controlled crossroad. The stagger distances will usually determine the phasing, stages and timing of the traffic signals.

Where the stagger distance is greater than 250 metres the junctions should normally be considered as two separate independent signal-controlled T-junctions.

Where the stagger distance is between 75 metres and 250 metres the junctions should normally be treated as two separate, signal-controlled T-junctions with local linking of the signals to favour the major flows of traffic through the junction.

Where the stagger distance is below 75 metres the junction should normally be considered as a single signal-controlled staggered junction, provided there is sufficient reservoir length.

As the stagger distance reduces below 75 metres, it becomes more difficult to provide for the inner stop lines, pedestrian crossing facilities and associated signals. The shortest effective reservoir length is 15 metres. With a reservoir length below 15 metres, the junction should be treated as a signal-controlled crossroad with special account being taken of longer clearance distances.

Staggered signal-controlled junctions with short stagger distances could suffer from junction blocking due to a limited reservoir length between the two staggered arms.

A4.2 Left/right staggers

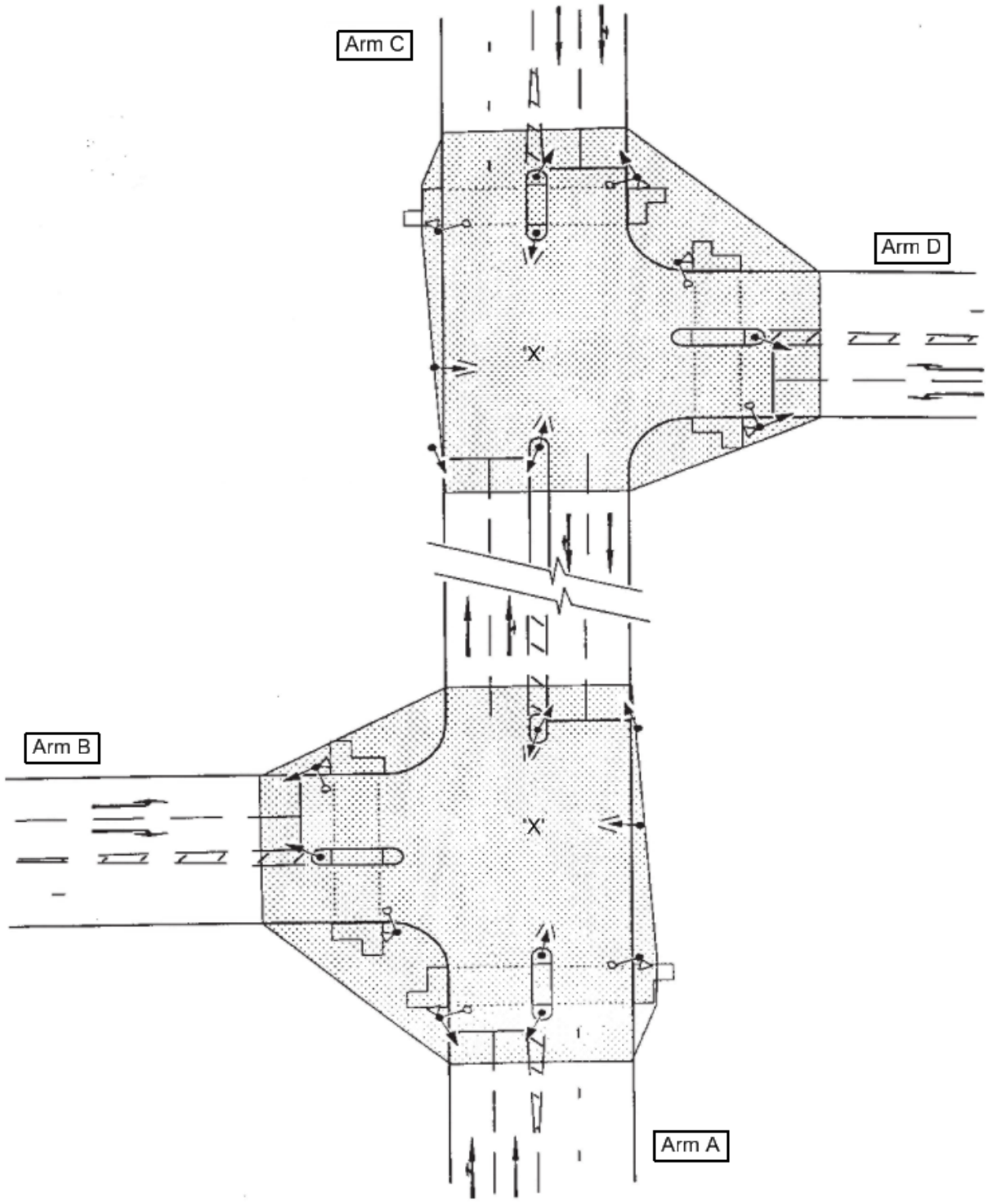
Figure A.5 illustrates an example of an urban left/right staggered signal-controlled junction, typical of a situation where the stagger distance is less than 75 metres, the reservoir length is greater than 15 metres and the presence of large goods vehicles in significant proportions is not expected. The following design features are incorporated in the example illustrated:

a) two lane approach and departure on all arms;
b) circular corner radii without tapers (no provision for large goods vehicles); and
c) inner stop lines.

A left/right stagger will usually have more onerous signal control due to the greater level of right turn traffic than a right/left stagger.

If a left/right staggered junction with less than a 75 metre stagger is signal-controlled using a 2-stage control (i.e. both the staggered arms run together), there will be a conflict as the traffic emerging from one of the arms turns right across the path of vehicles turning right into the same arm (refer to the points marked "X" marked Figure A.6). This could be hazardous if there is no intervisibility approaching the conflict point. Unless these movements are very low in volume and the length of stagger is small, it is recommended that 3-stage signalling be used with separate stages for each of the staggered approaches.

Figure A.5 Example of a left/right staggered junction



A4.3 Right/left staggers

Figure A.6 illustrates an example of an urban right/left staggered junction, typical of a situation where the stagger distance is less than 75 metres, the reservoir length is greater than 15 metres and the presence of large goods vehicles in significant proportions is not expected. The following design features are incorporated into the example illustrated:

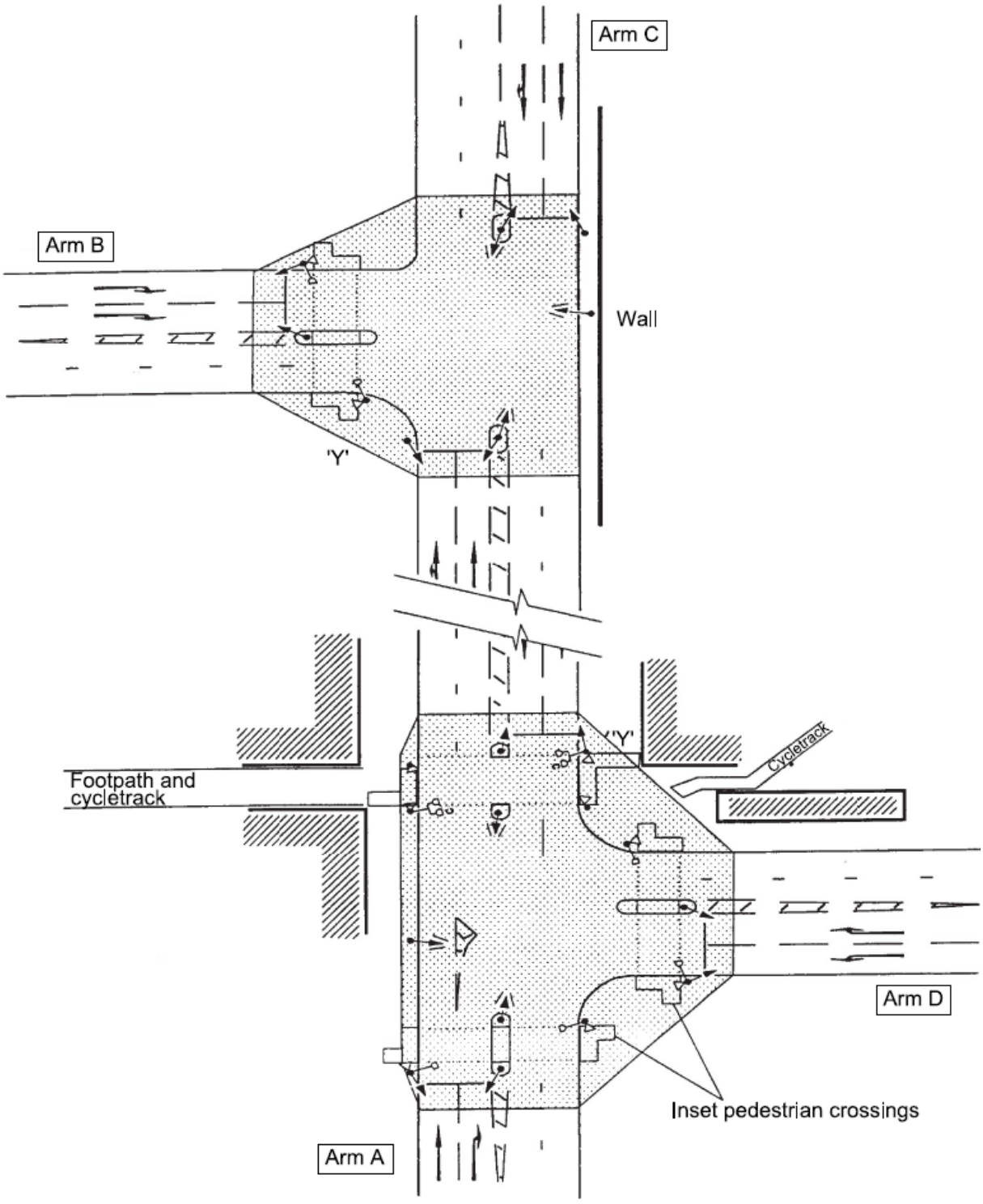
1) two lane approach and departure on all arms;
2) circular corner radii without tapers (no provision for large goods vehicles); and
3) inner stop-lines.

With a stagger distance of 75 metres or greater, the inner stop-lines (marked "Y" on Figure A.6) should be included to eliminate the very long clearance distances and extended inter-green periods which would otherwise be necessary.

Where a significant volume of pedestrian movement is anticipated, it could be beneficial to provide pedestrian facilities at each stop-line as illustrated on Arms A, C and D of the lower half of Figure A.6. Where no pedestrian desire lines exist, and the stagger distance is not great, a reduced number of pedestrian crossing facilities could be justified, as indicated on Arms B and C of the upper half of Figure A.6.

In Figure A.6, the left turn from Arm B to Arm C is prohibited.

Figure A.6 Example of a right/left staggered junction



A5 Signal-controlled skew junctions

Figure A.7 illustrates an example of an existing urban signal-controlled skew junction between two single carriageways intersecting at 70 degrees, typical of a situation where available road space is restricted and the presence of large goods vehicles in significant proportions is not expected. The following specific design features are incorporated into the example:

a) single lane approach and departure on all arms;
b) circular corner radii without tapers (no provision for large goods vehicles);
c) a simple left turn slip lane and priority junction (Arm D to A); and
d) left turn movements from Arm B to C are prohibited due to the tight corner radius.

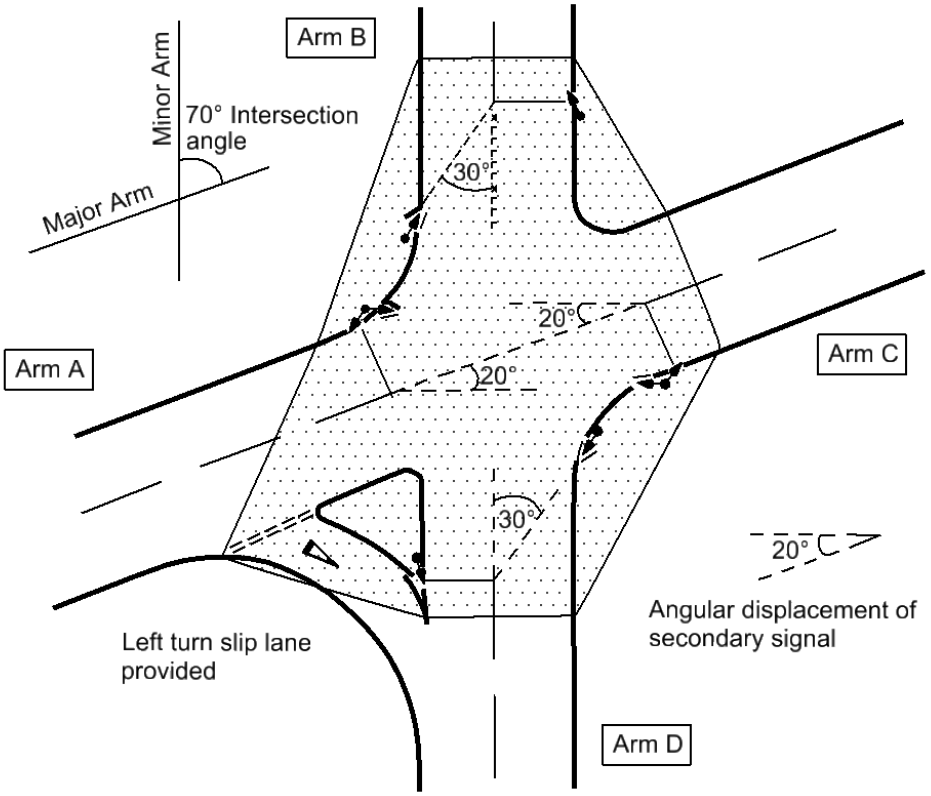
Where the roads intersect at angles other than 90 degrees, the following problems can be encountered:

1) priority might not be obvious to drivers;
2) intervisibility could be adversely effected;
3) the possibility of high speed turning movements on the obtuse angles of the junction;
4) difficultly for drivers to turn around the acute angles of the junction (particularly those of larger vehicles); and
5) difficulty in locating secondary signals..

Turning radii can be improved by the introduction of left turn slip lanes. It may also be beneficial to set stop-lines back by a reasonable distance to accommodate the junction corner radii, any left turn slip lanes and to assist in locating secondary signals.

In Figure A.7, the left left turn from Arm B to Arm C is prohibited.

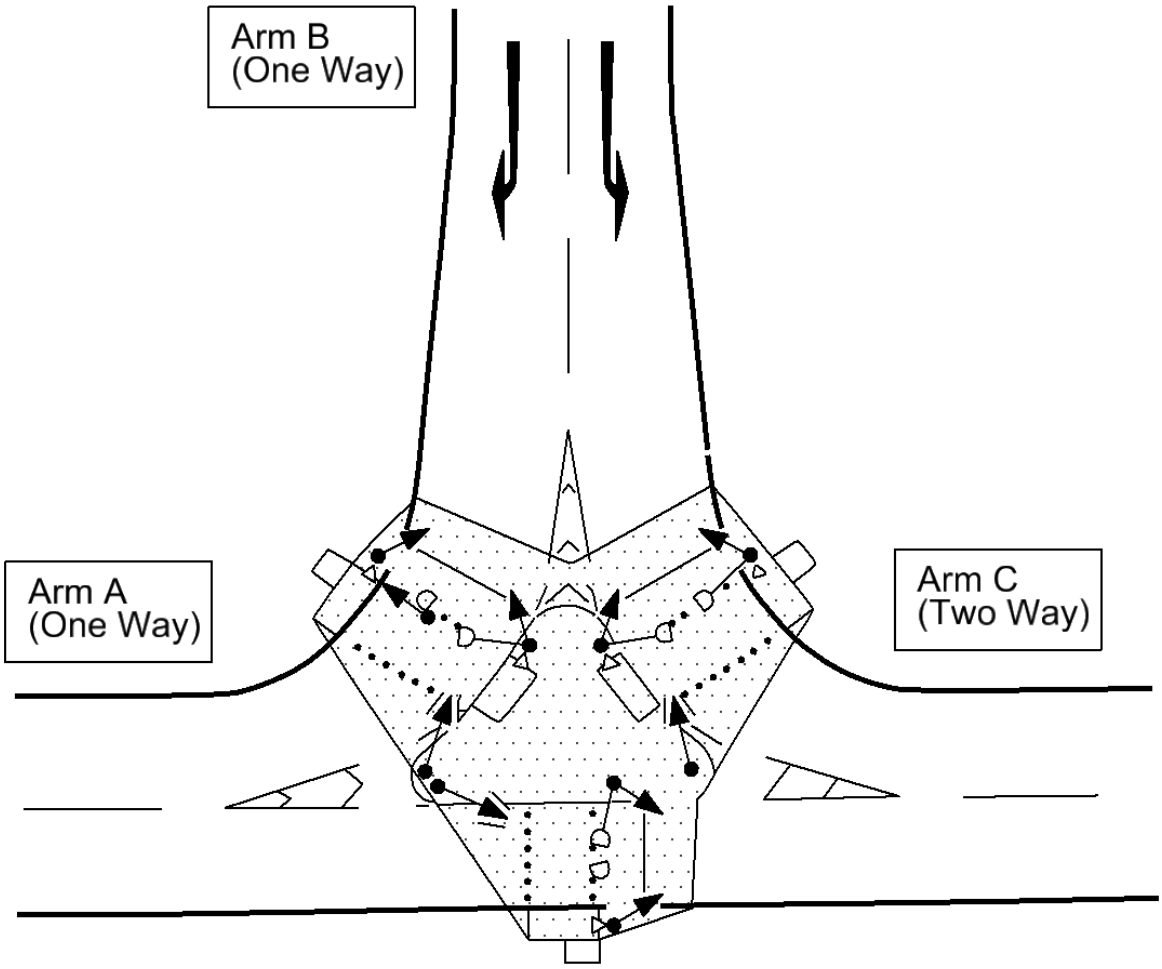
Figure A.7 Example of a signal-controlled skew junction



A6 Signal-controlled junctions on one-way roads

Figure A.8 illustrates an example of a signal-controlled junction between two one-way roads (Arms A and B) and a two-way road (Arm C) incorporating a traffic island and pedestrian crossing facilities.

Figure A.8 Example of signal-controlled junction on one-way roads



A7 Signal-controlled junctions with more than four arms

When signal-controlled junctions have more than 4 arms, efficient signalling is difficult to design. The banning of one or more right turns or directing traffic away from the junction will assist in alleviating these difficulties.

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