

# 8

## chapter 8 General

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## 8.1 Introduction

Junctions are one of the most important elements of a highway network. They determine and control the network's capacity. As they are the point of conflicting movements, they are historically the most likely location of accidents.

The main purpose of a junction is to facilitate the safe transfer of road users from different directions including the safe movement of vulnerable road users.

Over half of all injury accidents occur in built up areas with more than 40% of these occurring at junctions. There is a strong correlation between the number of junctions and accesses on a road and the number of traffic accidents that occur. Therefore it is important that junction designers have a thorough understanding of the safety issues as well as capacity and environmental issues.

## 8.2 Selecting the appropriate type of junction

The principal types of junction arrangement available for the designer are:

- priority junctions (stop or yield)
- roundabouts
- traffic signal control junctions
- grade separated junctions

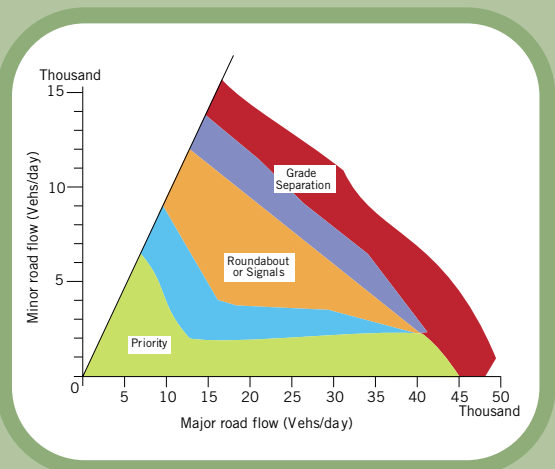
Priority junctions have the advantage that they cause little delay for major road traffic. They are the most common form of junction and work best where the traffic flow on minor roads is relatively low in relation to the major road flow. For them to operate safely there needs to be:

- adequate gaps in major road traffic for vehicles to enter and leave minor roads safely
- specific facilities for significant numbers of turning vehicles such as turning lanes and adequate width for the swept path of long vehicles
- low speeds and adequate sight distances
- specific facilities (such as crossings) for cyclists, pedestrians and mobility impaired road users.



Priority junction

Diagram 8.1 Type of junction based on traffic flow levels



Junction choice is determined through assessment of all user needs, not just those of vehicular traffic.

Traffic signals and roundabouts (including mini-roundabouts) should be considered as an alternative to priority junctions when there are substantial delays to minor road traffic or where there are accident problems relating to vehicle turning movements.

The choice between signals or roundabouts for any given location in an urban area depends on a number of factors:

- traffic signals can offer the facilities to give particular types of vehicle (such as buses) and vulnerable road users priority. They generally have a lower land take requirement than normal roundabouts and are often cheaper and easier to implement in urban areas
- roundabouts can present safety problems for pedestrians and cyclists unless the roundabout has been designed for these users (see Cycle manual)
- properly maintained, signalised junctions retain higher capacity than roundabouts, and are safer for vulnerable road users
- Co-ordinated traffic signal systems can be disrupted if roundabouts are located within the control area of the signals
- mini-roundabouts should be regarded as a remedial measure to treat specific problems on existing roads, rather than a general traffic management solution. Alternative junction types are preferred in new developments
- mini-roundabouts can help to reduce speeds and create a better balance of flow at tight urban junctions. They are often used as part of a traffic calming scheme. They should only be used at locations where approach speeds are low. Specific facilities should be provided for pedestrians and cyclists
- roundabouts tend to be better for isolated junctions where there are significant proportions of turning vehicles (particularly right turns), and traffic flows are evenly balanced with few pedestrians or cyclists
- grade separation should only be considered for the higher levels of traffic flow on Primary distributor

roads. Crossing facilities for cyclists and pedestrians must be provided for.

Diagram 8.1 gives guidance on the selection of appropriate junction types based on major and minor road traffic flows. This however should only be regarded as a starting point and the final decision should be based on an assessment of all users needs and analysis of the types and volumes of traffic to be catered for together with any site constraints and other factors such as those outlined above.

## 8.3 General design principles

First and foremost, junctions should be obvious and readable by all road users. Junctions should be kept clear of all advertising signs, in the interests of road safety.

There are a number of design principles that are common to each type of junction to ensure safe and efficient operation.

The type of junction control provided along a route should be consistent with the environment, which the road runs through. It should also be appropriate for the nature and volume of vehicles and pedestrian/cyclists that use the junction.

The geometric layout of a junction should cater adequately for all road users that are likely to use it.

Provision should be made within the layout for:

- visibility for drivers at the junction so that they can see other road users in order to carry out their movements safely
- adequate visibility for drivers approaching and leaving the junction
- adequate visibility for and of pedestrians and cyclists
- lighting of a high quality at all junctions in urban areas.
- long vehicles including the swept paths of turning vehicles, where appropriate
- turning vehicles

### Traffic signs and road markings

- Traffic signs and road markings are required to warn drivers of the presence of junctions so that they can take extra care. Advance direction signs should be provided on major routes to assist drivers in slowing down to turn and take the correct route. The Traffic Signs Manual<sup>1</sup> gives details of the requirements for signing and road markings at a range of junction types. The signs should be sited so that they are clearly visible as road users approach them and allow road users sufficient time to make their manoeuvres safely.

### Safety

- Safety measures should be an integral part of the design process to make a scheme work as safely as practically possible. Advice is given in the following chapters of this section on how this can be achieved. Safety audits should be carried out on proposals for all new junctions and for significant junction improvement works, to ensure that safety is taken into account adequately. More information on this is given in Section A, Chapter 2.

### Cyclists and pedestrians

- The needs of cyclists and pedestrians should be considered as a fundamental part of the design process rather than as an afterthought once vehicular traffic has been catered for. Good, direct and convenient facilities should be provided where they have to cross traffic streams. Delay to pedestrians and cyclists should be considered with equal significance as delay to other traffic. Specific facilities for crossing roads should be included at all junctions where there are significant numbers of pedestrians or cyclists. Specific facilities should be included for people with a mobility/sensory impairment.

### Capacity

- Adequate capacity should be provided to ensure the junctions can cope with intended traffic volumes. At congested locations extra capacity should not be provided to the detriment of road safety or facilities for vulnerable road users.

Safety measures should be an integral part of the design process to make a scheme work as safely as practically possible.

The needs of cyclists and pedestrians should be considered as a fundamental part of the design process rather than as an afterthought once vehicular traffic has been catered for.

## 8.4 References

1. Traffic Signs Manual - Department of the Environment.  
(Available from Government Publications Sale Office, Sun Alliance House, Molesworth Street, Dublin 2, or by mail order from Government Publications, Postal Trade Section, 51 St. Stephen's Green, Dublin 2, Tel 01 6476879; Fax 01 6476843)
2. TD42/95 – Geometric Design of Major Minor Priority Junctions and NRA addendum – Design Manual for Roads and Bridges. NRA addendum available from NRA, St Martin's House, Waterloo Road, Dublin 4, Ireland. Tel 01 660 2511 Fax 01 668 0009. TD42/95 available from The Stationery Office, Telephone orders +44 870 600 5522, Fax orders +44 870 600 5533