

# Guidelines for marking multi-lane roundabouts



ISBN 0-478-28910-3  
September 2005

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## Definitions

**'Alberta' exit lane** means a lane defined by the lane lines separating traffic in the circulating carriageway and which guide drivers in exiting from a roundabout.

**central island** means the circular or other specially shaped traffic island installed within a roundabout around which traffic circulates in a clockwise direction.

**circulating carriageway** means the carriageway around the central island on which circulating vehicles travel in a clockwise direction.

**inscribed circle** means the circle that may be inscribed within the outer kerblines of the circulating carriageway. This may not always be truly circular.

**multi-lane roundabout** means a roundabout with one or more entry and/or exit lanes and part or all of the circulating carriageway designed for or operated as two or more lanes of traffic.

**roundabout** means an intersection with one or more marked lanes or lines of traffic all of which are for the use of vehicles travelling in a clockwise direction around a central traffic island.

**spiral curve pavement marking** means the pavement marking used to introduce an additional lane within the circulating carriageway of a multi-lane roundabout.

**splitter island** means a traffic island placed within a leg of the roundabout separating entering and exiting traffic and designed to deflect entering traffic.

# 1.0 Introduction

## 1.1 Purpose

The purpose of these guidelines is to assist designers in providing the most appropriate pavement markings for existing and proposed multi-lane roundabouts in New Zealand.

## 1.2 New traffic rules

With the introduction of the *Land Transport (Road User) Rule 2004* and *Land Transport Rule: Traffic Control Devices 2004* there is a need for more consistency in the placement of pavement markings at multi-lane roundabouts. Road controlling authorities must now provide for exit lane pavement markings within multi-lane roundabouts. Exit lane pavement markings guide motorists leaving the roundabout so they should not be required to conflict with other circulating or leaving traffic. *Sub-clause 10.4(5)* of the *Land Transport Rule: Traffic Control Devices 2004* states:

*"If a section of the roadway around a roundabout, or an exit from that section of roadway, has more than one lane for motor vehicles, a road controlling authority must, by 30 June 2006, mark lanes to direct the flow of traffic."*

The rule also requires symbolic roundabout give-way signs with 'Give Way' supplementary plates to be installed on all approaches to roundabouts by 30 June 2006 and provides for a single white limit line and the marking of a 'Give Way' triangle pavement marking symbol on all approaches to all roundabouts.

## 1.3 'Alberta' method of marking multi-lane roundabouts

Many road controlling authorities around New Zealand have adopted the 'Alberta' method for line marking multi-lane roundabouts. A similar approach to providing guidance for drivers circulating multi-lane roundabouts has also been adopted in Australia. This line marking method involves the placement of exit lane pavement markings within the circulating carriageway of a roundabout to separate vehicles and guide drivers through the intersection. 'Alberta' exit lane pavement markings combined with clearly marked approach lanes, direction arrows and appropriate signage used on multi-lane roundabouts will give motorists every opportunity to negotiate these roundabouts without conflicting with other circulating traffic. It is recommended they be used on all multi-lane roundabouts.

## 1.4 Spiral curve pavement markings

Spiral curve pavement markings can be used within a multi-lane roundabout to split right turning traffic to avoid conflict with other traffic entering or exiting the roundabout.

## 2.0 Guidelines

### 2.1 Analysis

These guidelines are modelled on best practice both in New Zealand and in Australia. Multi-lane roundabouts in both urban and rural areas were examined. This included seven 4-leg, two 5-leg and two 3-leg multi-lane roundabouts, each with varying entry/exit lane configurations providing a range of 'Alberta' treatments. These treatments were (where appropriate) compared with Australian best practice using references in research carried out by Grant Thomas of the University of Canterbury whose project report, '*Rural Roundabouts and their Application in New Zealand*', was presented at the 2003 Traffic Management Workshop and Technical Conference in Christchurch.

### 2.2 Typical examples of multi-lane roundabouts

Twelve figures depicting typical layouts for approach markings and exit lanes for multi-lane roundabouts have been included in these guidelines. *Figure 4.1*, depicting a single lane roundabout, has been included to illustrate the recommended layout of pavement markings and traffic signs needed to provide guidance for motorists approaching and negotiating a roundabout. *Figures 4.2* and *4.3* have been included to illustrate the recommended approach pavement markings for multi-lane roundabout splitter islands.

### 2.3 Design guides

The guideline examples are to be read in conjunction with the *Manual of Traffic Signs and Markings* (MOTSAM) and are not intended as a replacement for Austroads and other design guides for the construction of roundabouts. The treatments depicted in *Figures 4.1* to *4.12* reflect best practice and provide a basis for designing pavement markings for specific roundabouts.

### 2.4 Vulnerable road users

Designers are encouraged to seek expert advice for the design of roundabouts for cyclists. *Austroads Guide to Traffic Engineering Practice Part 14: Bicycles* and the Transit New Zealand supplement to that document provide guidance for the design of cycle facilities in New Zealand. Due to the complexities of design no attempt has been made to include specific cycle or pedestrian facility guidance for the treatments depicted in *Figures 4.1* to *4.12* in this document.

## 3.0 Lane markings for typical multi-lane roundabouts

### 3.1 'Alberta' exit lane markings

In Victoria, Queensland and other Australian States, multi-lane roundabouts with large inscribed circles (60m in diameter or greater) have been marked with exit lane markings comprising a 9m stripe with a 3m gap. In New Zealand, until recently, practice had been to use lane line markings (a 3m stripe with a 7m gap) on exit lanes or the same length stripe (3m long) but closing the gap up to 2m within the roundabout itself. MOTSAM recommends (*Markings for multi-lane roundabouts Fig. 3.17 - Feb 2005*) exit lanes be marked using a 1m stripe with a gap of 1m (continuity line equivalent but 100mm wide); the gap can be increased up to a maximum of 2m.

In Christchurch, the stripe length and gap of the exit lane pavement markings on multi-lane roundabouts vary. However, when markings are being upgraded, there has been a move to adopt the MOTSAM recommendation and mark the exit lanes with a pavement marking comprising a 1m stripe with a 2m gap.

### 3.2 Recommended 'Alberta' exit lane and spiral curve pavement markings

For safety and efficiency, it is important that drivers do not change lanes within the circulating carriageway of a multi-lane roundabout. Drivers should be able to remain within the lane allocated to them when entering the roundabout. Exit lane and spiral curve pavement markings provide drivers with the guidance required to negotiate the roundabout, safely and efficiently.

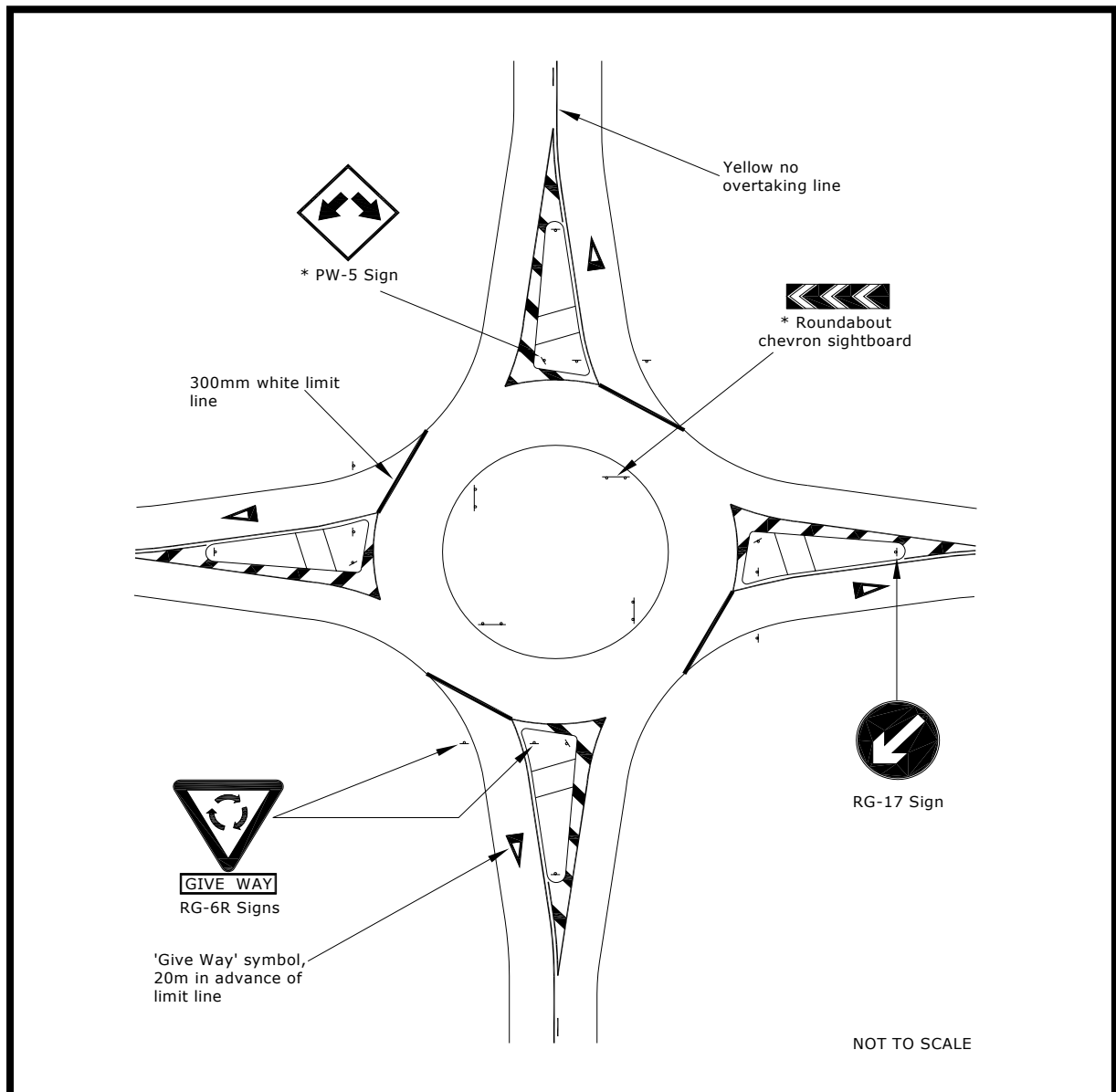
In practice, exit lane pavement markings should feature a stripe longer than that provided by MOTSAM (*Markings for centrelines at intersections Figure 3.1*). However, the gap between stripes should be relatively short to reinforce the message to drivers that they should not change lanes within the circulating carriageway. Spiral markings are most akin to continuity lines and recent experience suggests this form is effective.

To address this *Table 1* below details pavement markings for 'Alberta' exit lane and spiral curve pavement markings on multi-lane roundabouts in New Zealand. The table combines line marking practice from both Australia and New Zealand.

	Stripe (length x width)	Gap (m)
'Alberta' exit lane pavement markings	3m x 100mm	3
spiral curve pavement markings	1m x 200mm	1

**Table 1: 'Alberta' exit lane and spiral curve pavement marking format**

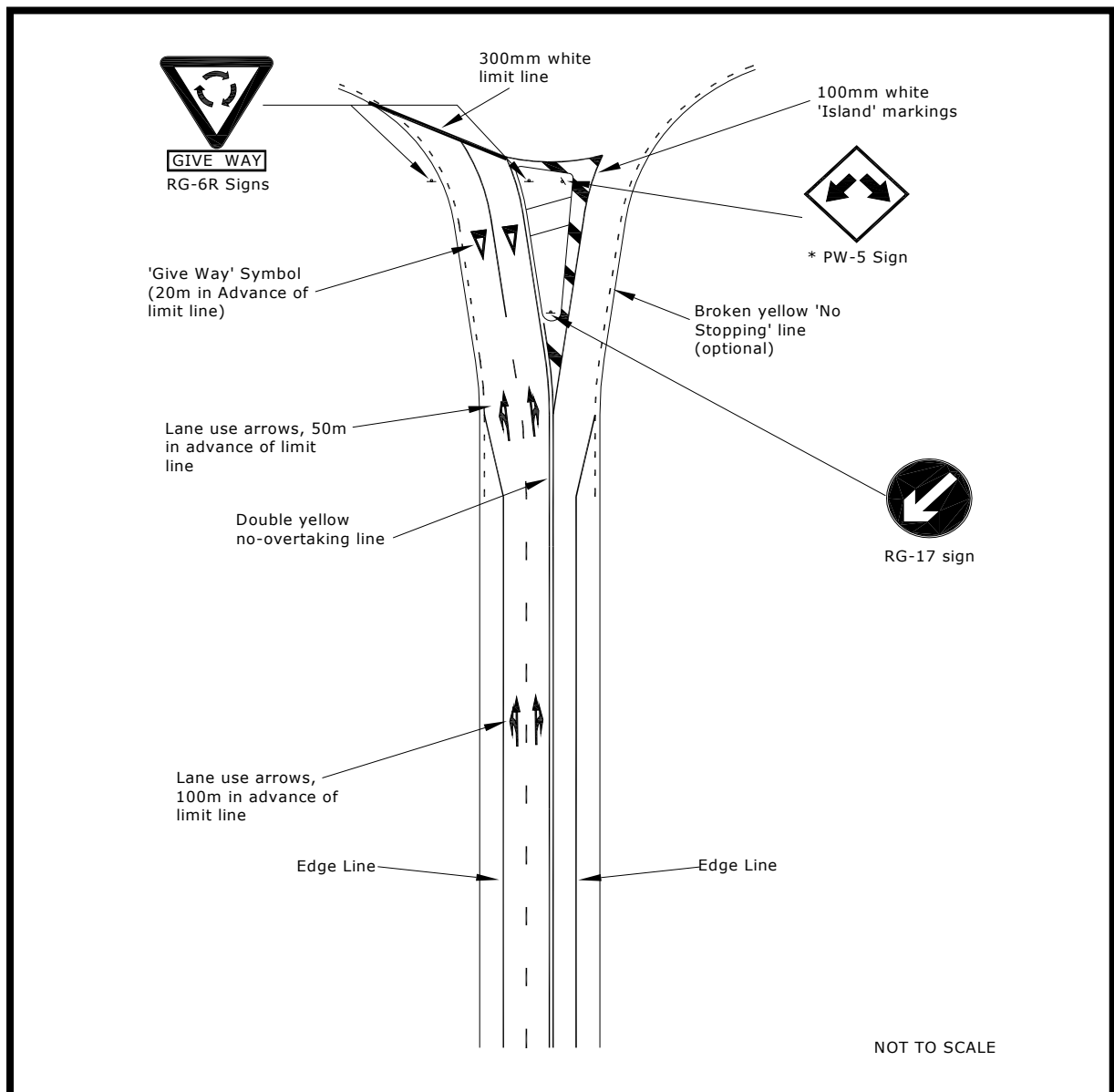
## 4 Figures



**Figure 4.1 Typical Single Lane Roundabout**

White island markings are used to provide guidance for drivers approaching splitter islands. Solid yellow no passing lines are provided on all approaches to splitter islands and are extended through to the limit line. Where a solid or flush median is used to separate traffic flows, a solid yellow no passing line should not be used. Refer also to *Figures 4.2* and *4.3* for alternative treatments at multi-lane roundabouts.

\* Street name or destination signs, located to avoid conflict with sight lines, can be used to guide motorists and may replace the PW-5 'Diverge' signs on splitter islands or the chevron sight boards on the central island.

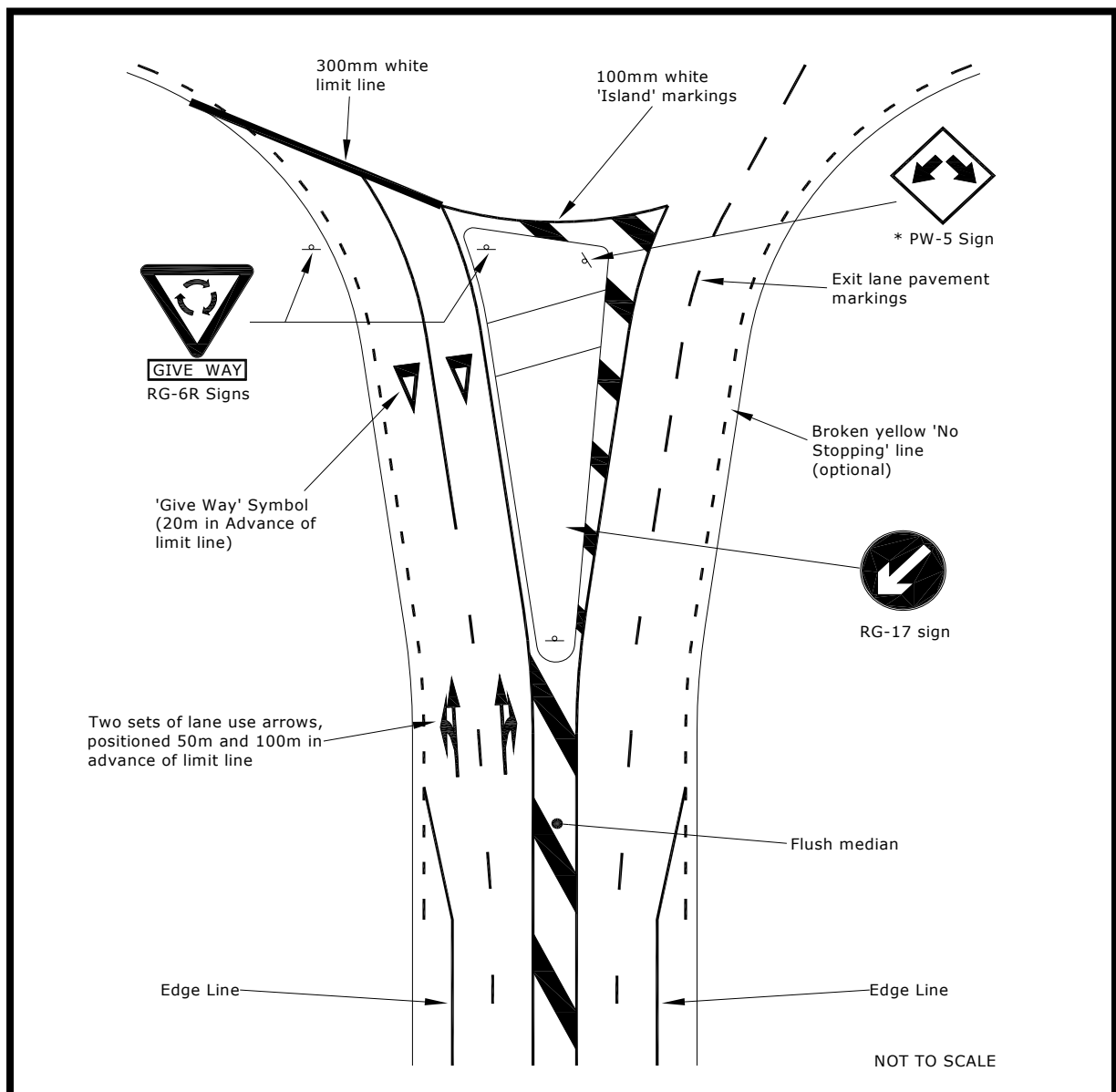


**Figure 4.2 Typical approach to roundabout splitter island**

This diagram indicates the appropriate markings and traffic signs for multi-lane approaches to roundabouts. White island markings are used to provide guidance for drivers approaching splitter islands. Solid yellow no passing lines are provided on all approaches to splitter islands and are extended through to the limit line. Where a solid or flush median is used to separate traffic flows, a solid yellow no passing line should not be used (see *Figure 4.3*).

Two sets of lane use arrows are to be provided on all approaches to the roundabout at 50m and 100m in advance of the limit line. Give way symbols should be marked within each lane 20m in advance of the limit line.

\* Street name or destination signs, sited to avoid conflict with sight lines, can be used to guide motorists and may replace the PW-5 'Diverge' signs on splitter islands or the chevron sight boards on the central island.

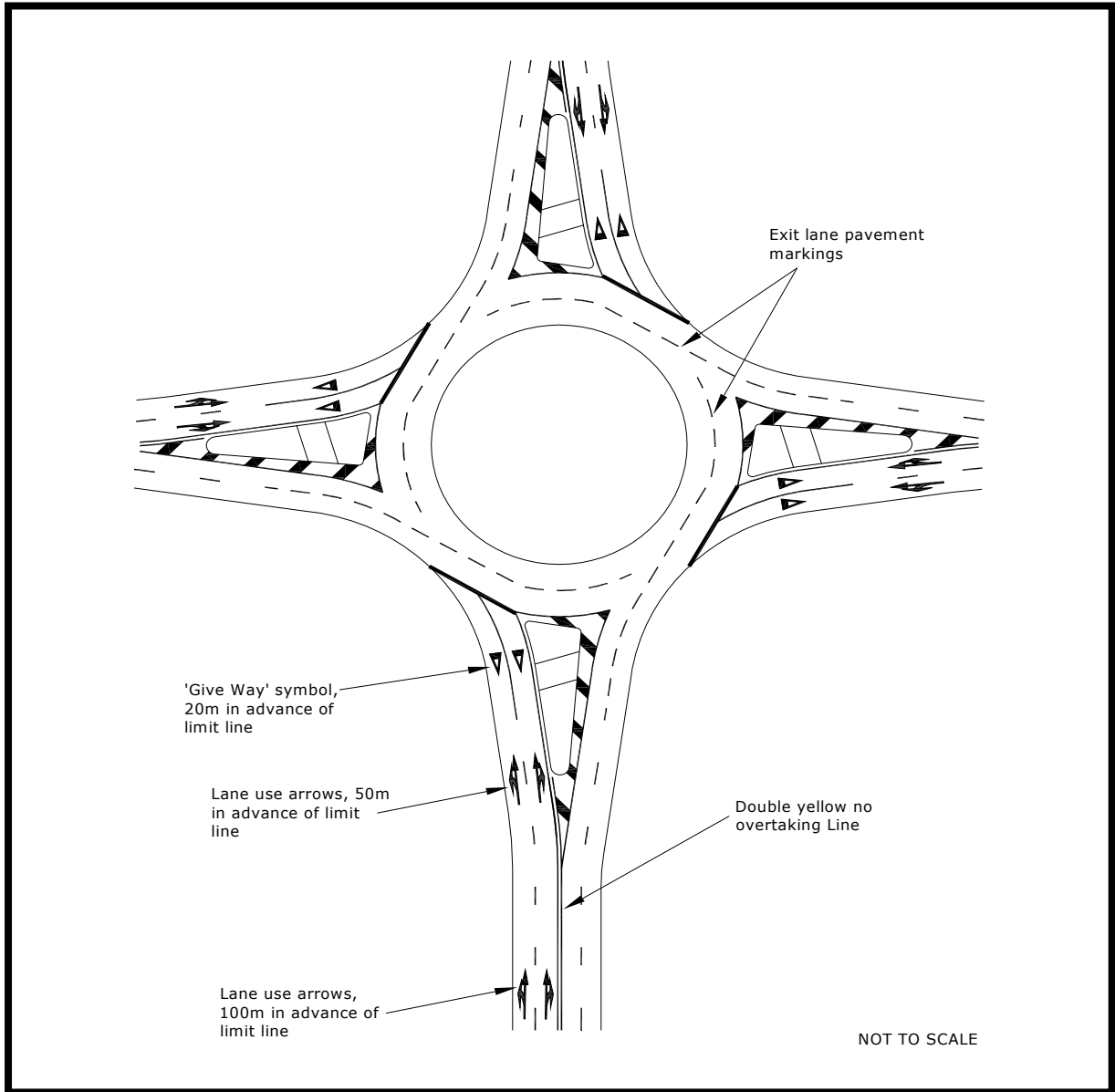


**Figure 4.3 Typical flush median approach to a roundabout splitter island**

Alternative pavement marking treatment for a splitter island approach to a roundabout recommended where there is a flush or a solid median. This diagram indicates the appropriate approach lane pavement markings and traffic signs for multi-lane roundabouts.

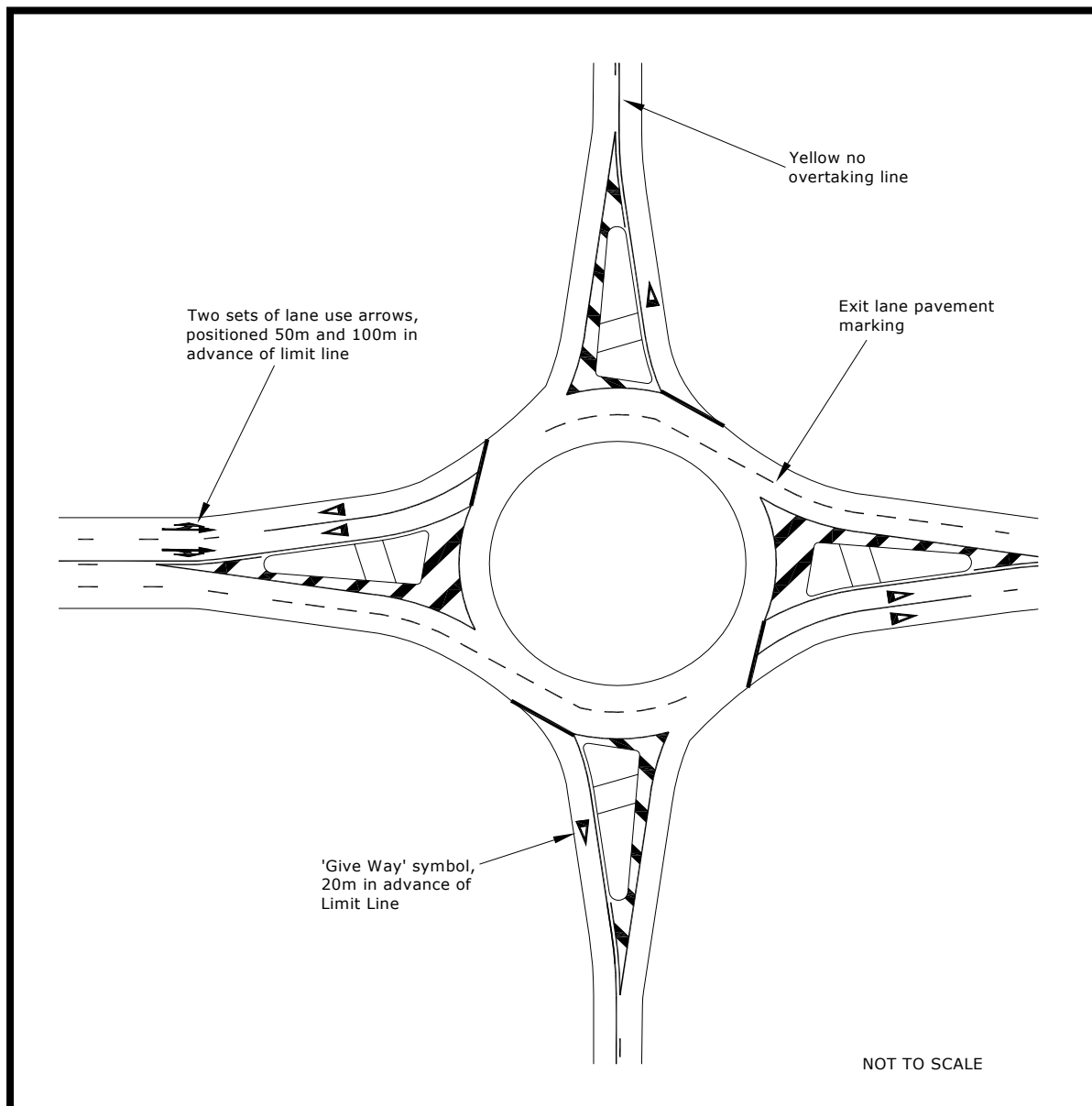
Two sets of lane use arrows are to be provided on all approaches to a roundabout at 50m and 100m in advance of the limit line. Give way symbols should be marked within each lane 20m in advance of the limit line.

\*Street name or destination signs, sited to avoid conflict with sight lines, can be used to guide motorists and may replace the PW-5 'Diverge' signs on splitter islands or the chevron sight boards on the central island.



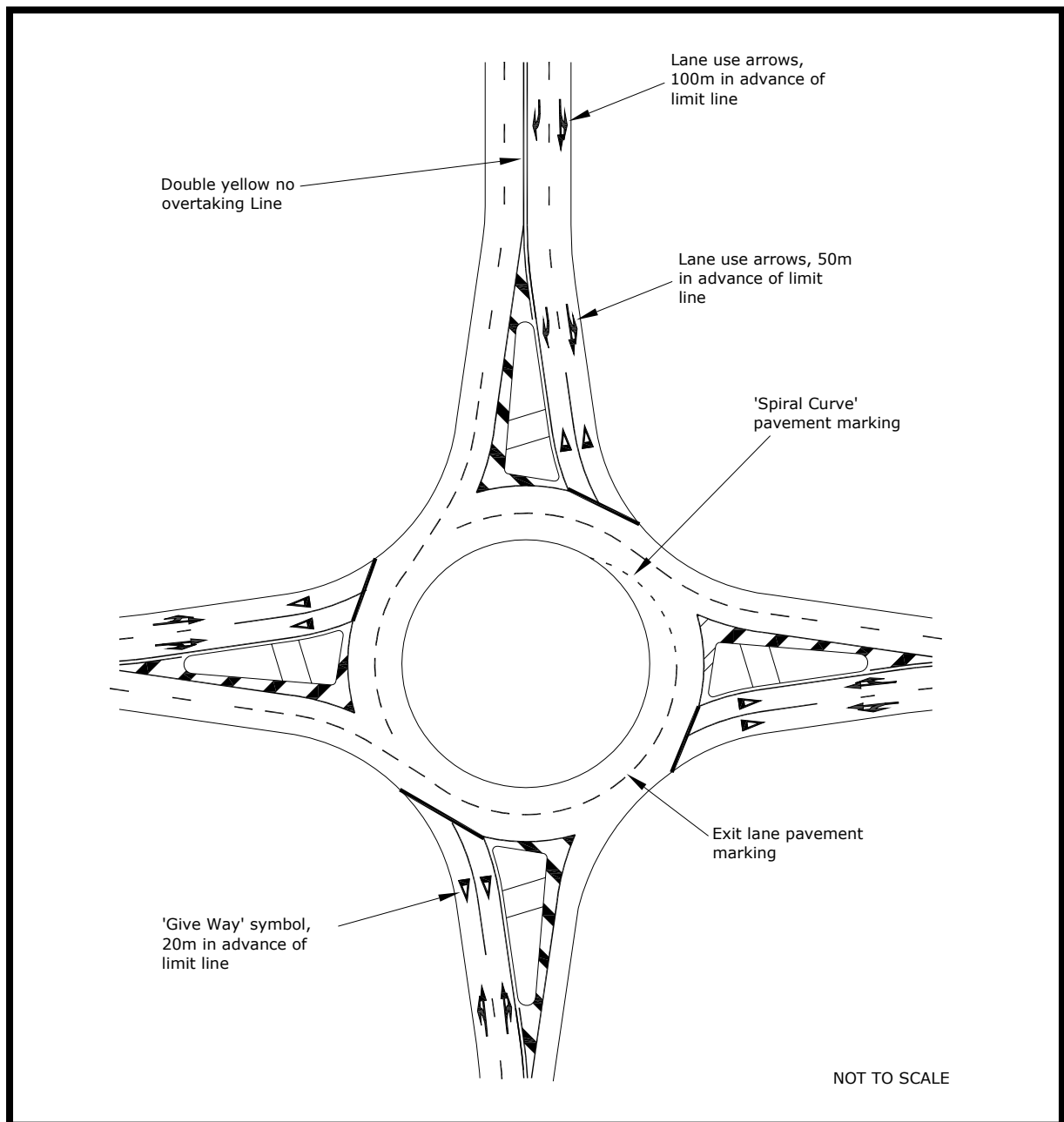
**Figure 4.4 Typical multi-lane roundabout with 2-lane approaches / exits**

Markings are the same for all approaches and exits.



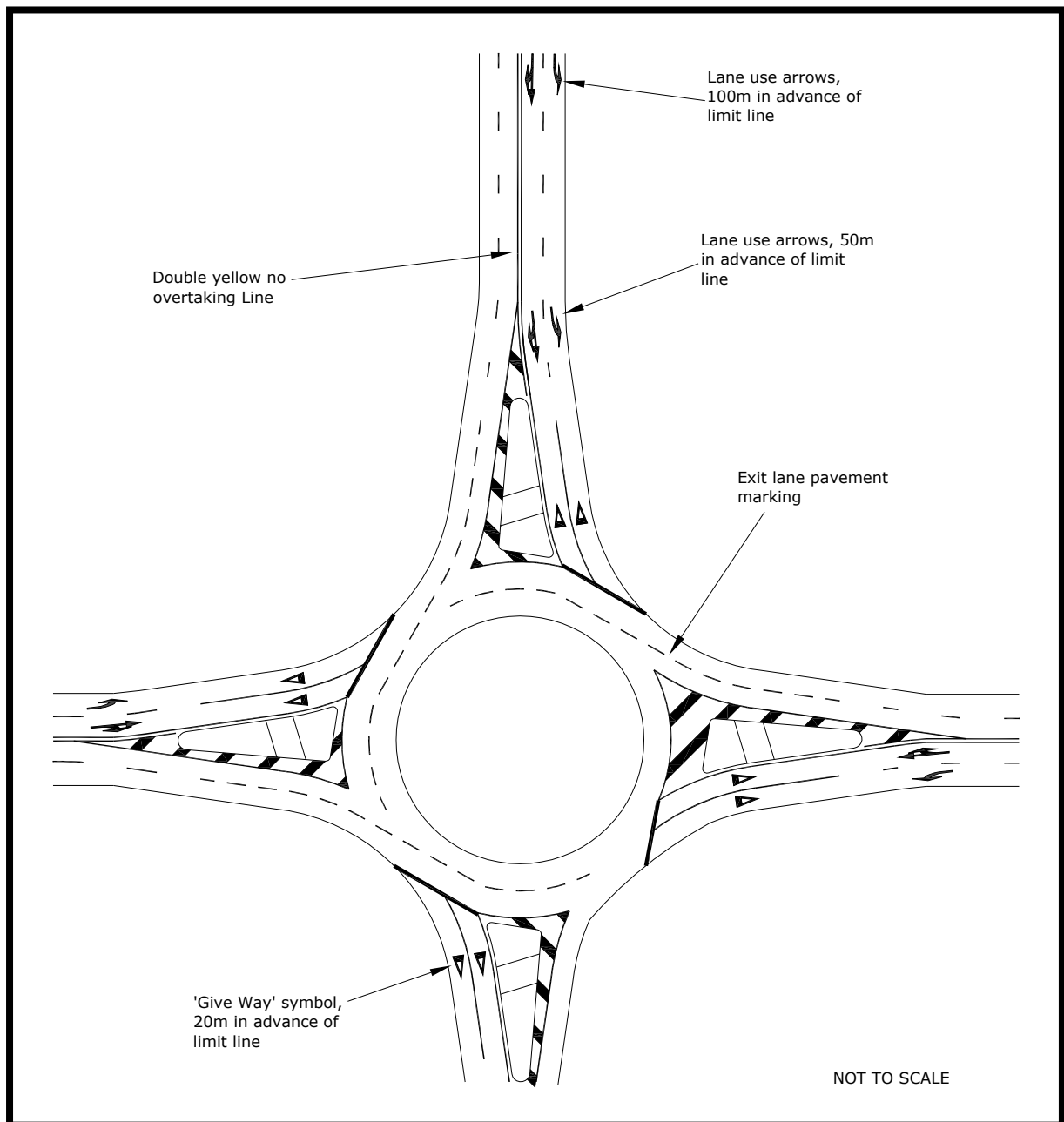
**Figure 4.5 Typical multi-lane roundabout with two 1-lane approaches /exits and two 2-lane approaches / exits**

White splitter island markings are used to narrow the circulating carriageway from the two single lane approaches. When constructing a new roundabout the splitter islands can be extended into this area where only one exit lane is required. However, allowance may need to be made for the turning circles of large overdimension or overweight load-carrying vehicles on specific routes.



**Figure 4.6 Typical multi-lane roundabout with 2-lane approaches (one featuring an exclusive right turn lane), three 3-lane exits and a 1-lane exit**

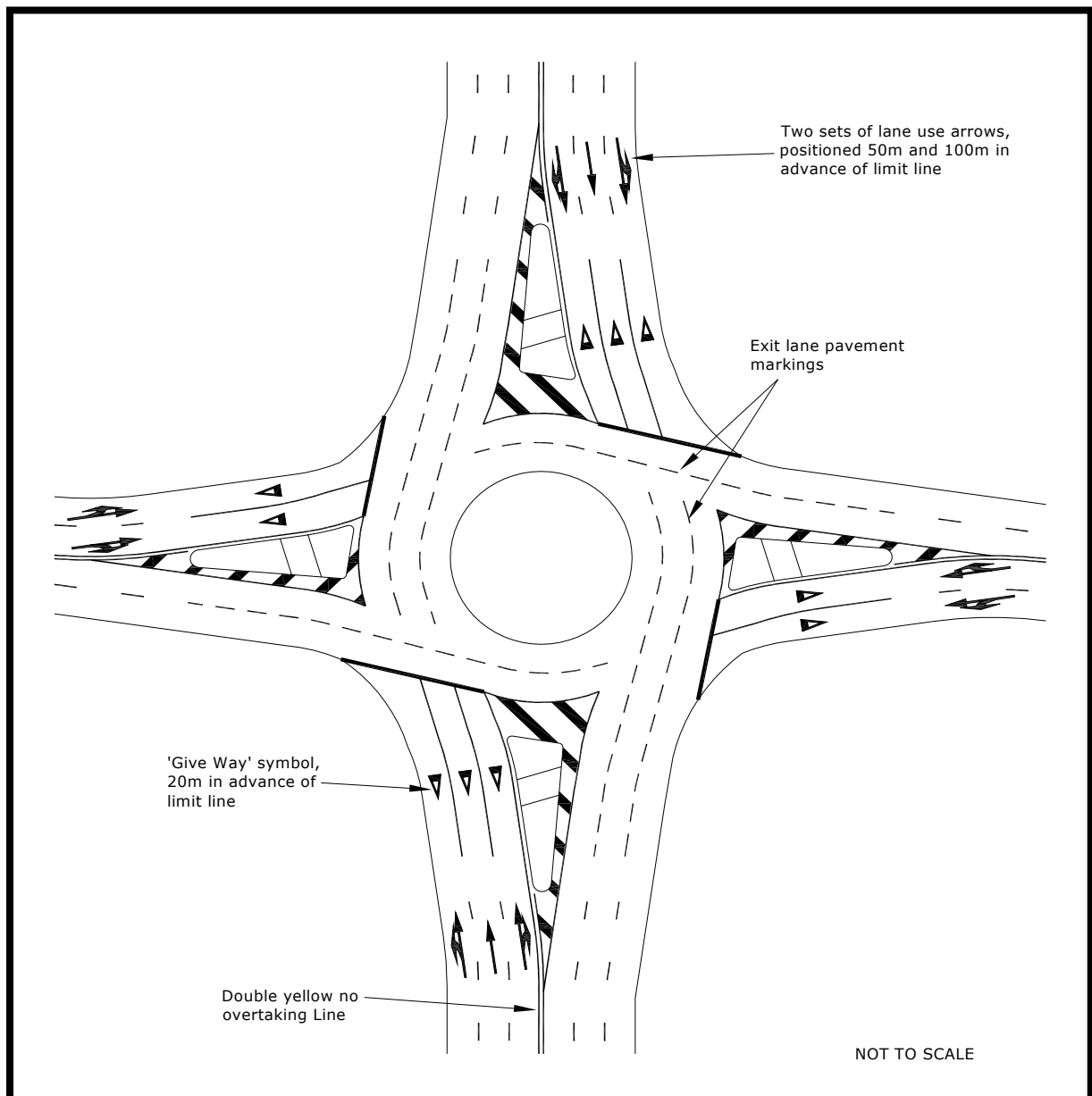
Similar multi-lane layout to the roundabout depicted in *Figure 4.4*. However, on one of the approaches, an exclusive right turn lane has been introduced with its own 'Alberta' exit lane and spiral curve pavement marking to split right turning traffic from the straight through movement which has only one exit lane. The spiral curve pavement marking is required to guide motorists entering the roundabout from the west and intending to make a right turn to proceed south to use the correct exit lane.



**Figure 4.7 Typical multi-lane roundabout with 2-lane approaches (one featuring an exclusive left turn lane), three 2-lane exits and a 1-lane exit**

Similar multi-lane layout to the roundabout depicted in *Figure 4.6* but with an exclusive left turn lane on one of the two lane approaches and a single-lane exit lane on the opposing leg of the roundabout. No spiral curve pavement markings are required.

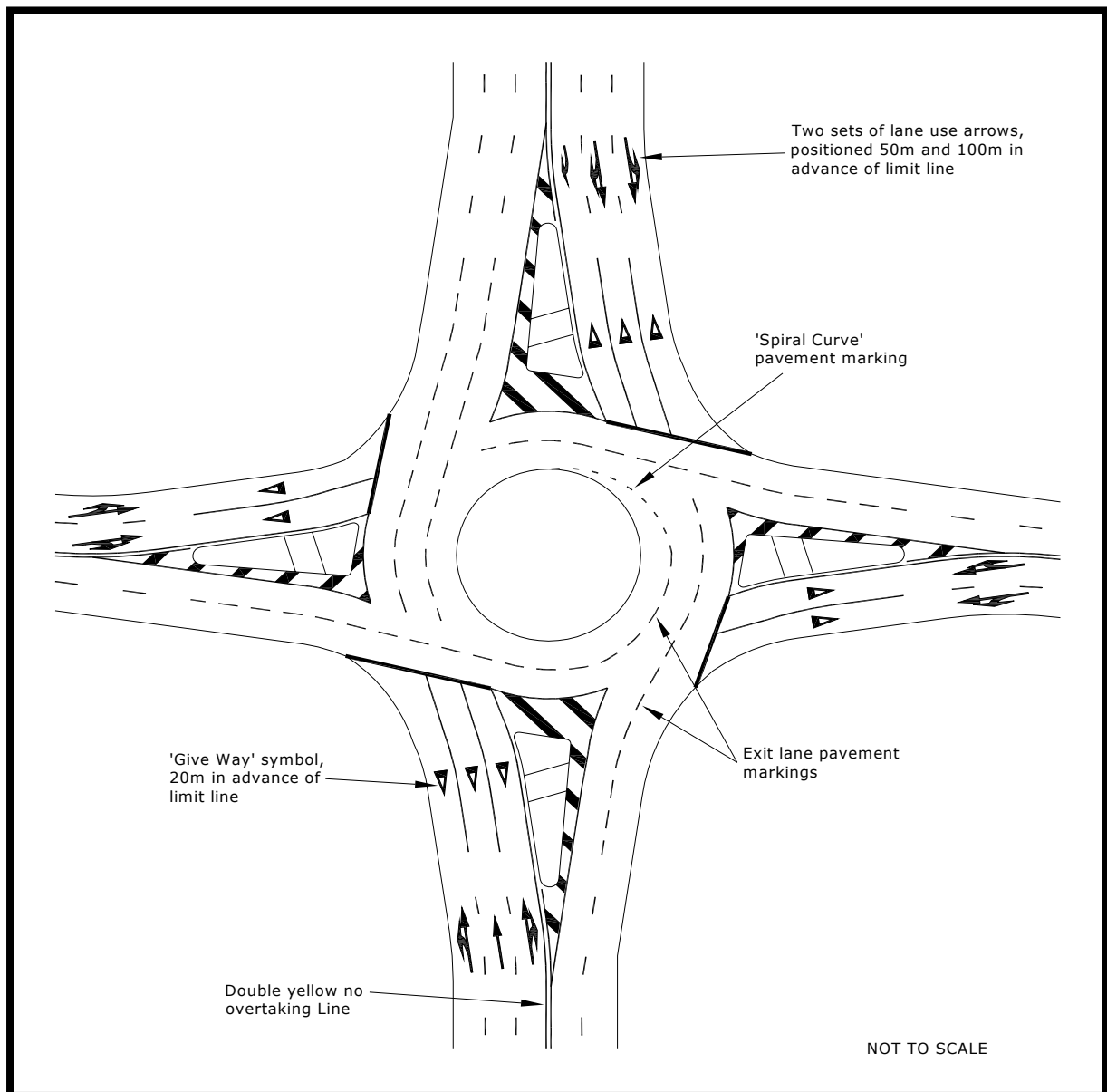
The circulating carriageway is narrowed with white island markings and a single exit lane. When constructing a new roundabout the splitter island can be extended into this area. However, allowance may need to be made for the turning circles of large overdimension or overweight load-carrying vehicles on specific routes.



**Figure 4.8 Typical multi-lane roundabout with two 3-lane approaches / exits and two 2-lane approaches / exits**

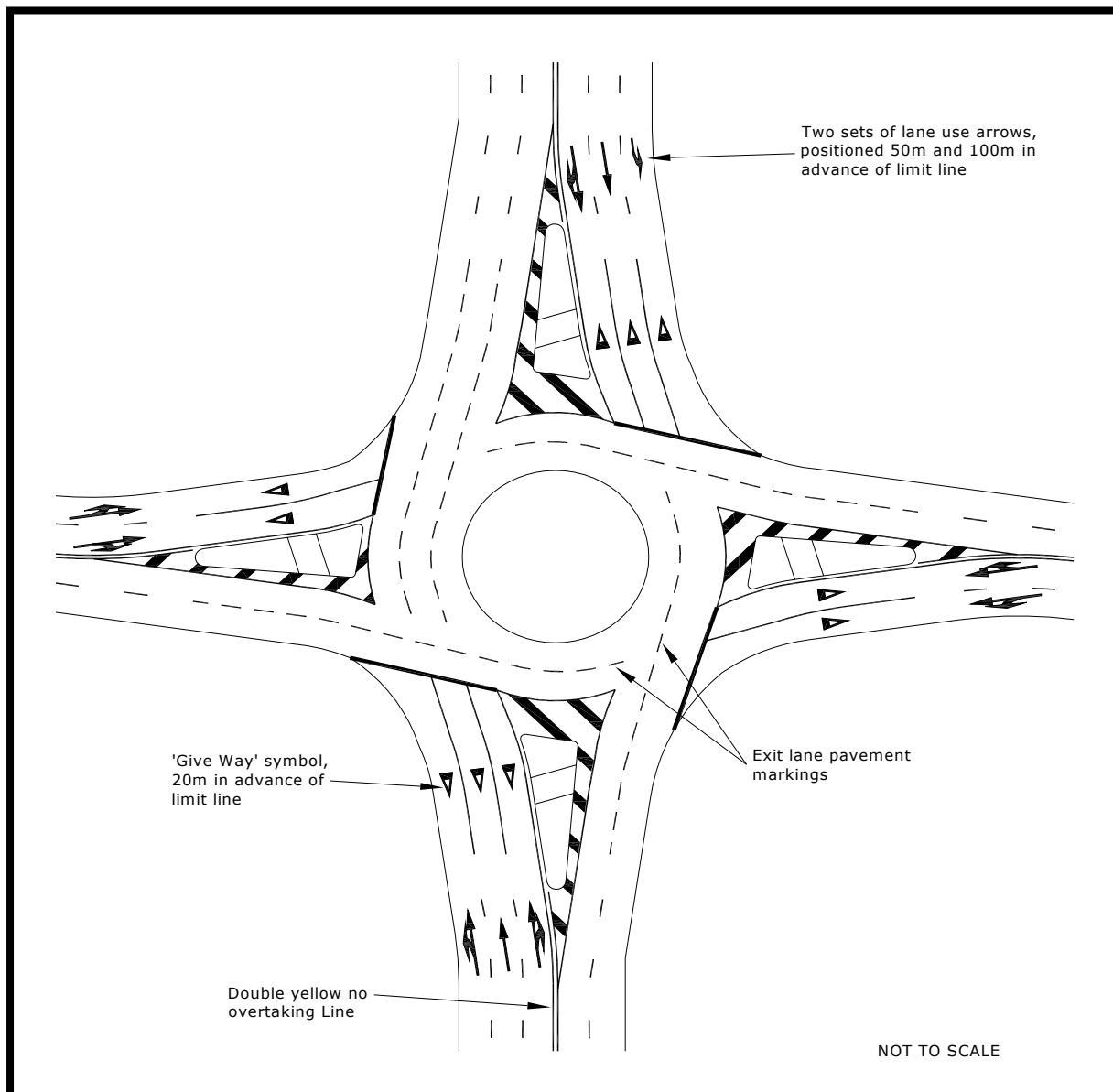
Similar major arterial/minor arterial junction to that depicted in *Figure 4.4* but with two 3-lane approaches.

The circulating carriageway has been narrowed using white island markings and two, rather than three exit lanes on the cross road. When constructing a new roundabout, the splitter island can be extended into this area. However, allowance may need to be made for the turning circles of large overdimension or overweight load-carrying vehicles on specific routes.



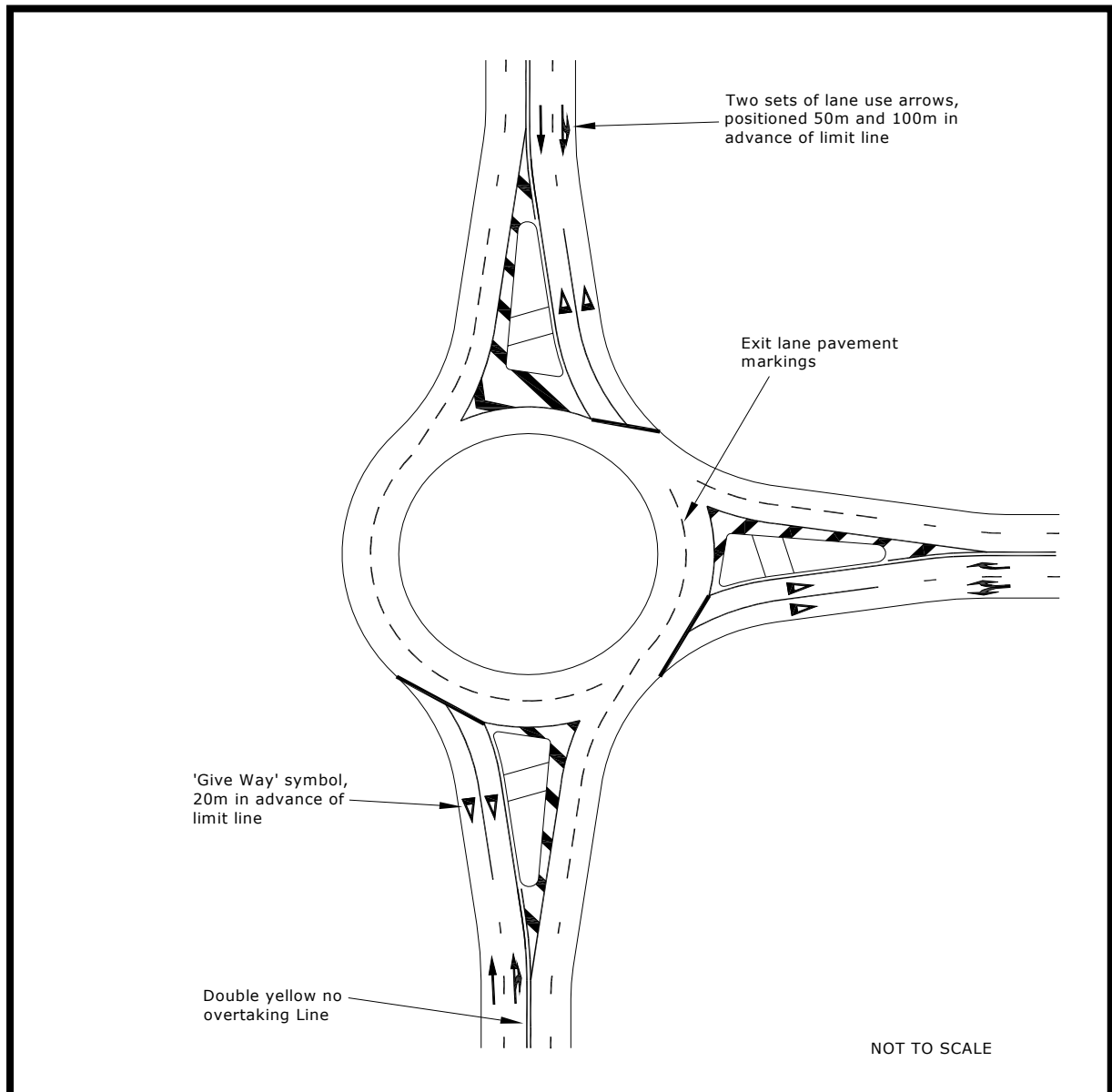
**Figure 4.9 Typical multi-lane roundabout with two 3-lane approaches (one featuring an exclusive right turn lane), two 2-lane approaches, one 3-lane exit and three 2-lane exits**

Similar multi-lane layout to the roundabout depicted in *Figure 4.8* but with an exclusive right turn lane on one approach. Spiral curve pavement markings are used to split right turning traffic from the straight through movement for the 'Alberta' exit lane and 2-lane (rather than a 3-lane) exit on the opposing leg. The circulating carriageway has been narrowed using white island markings with two, rather than three exit lanes on three legs of the roundabout. When constructing a new roundabout, the splitter island can be extended into this area. However, allowance may need to be made for the turning circles of large overdimension or overweight load-carrying vehicles on specific routes.



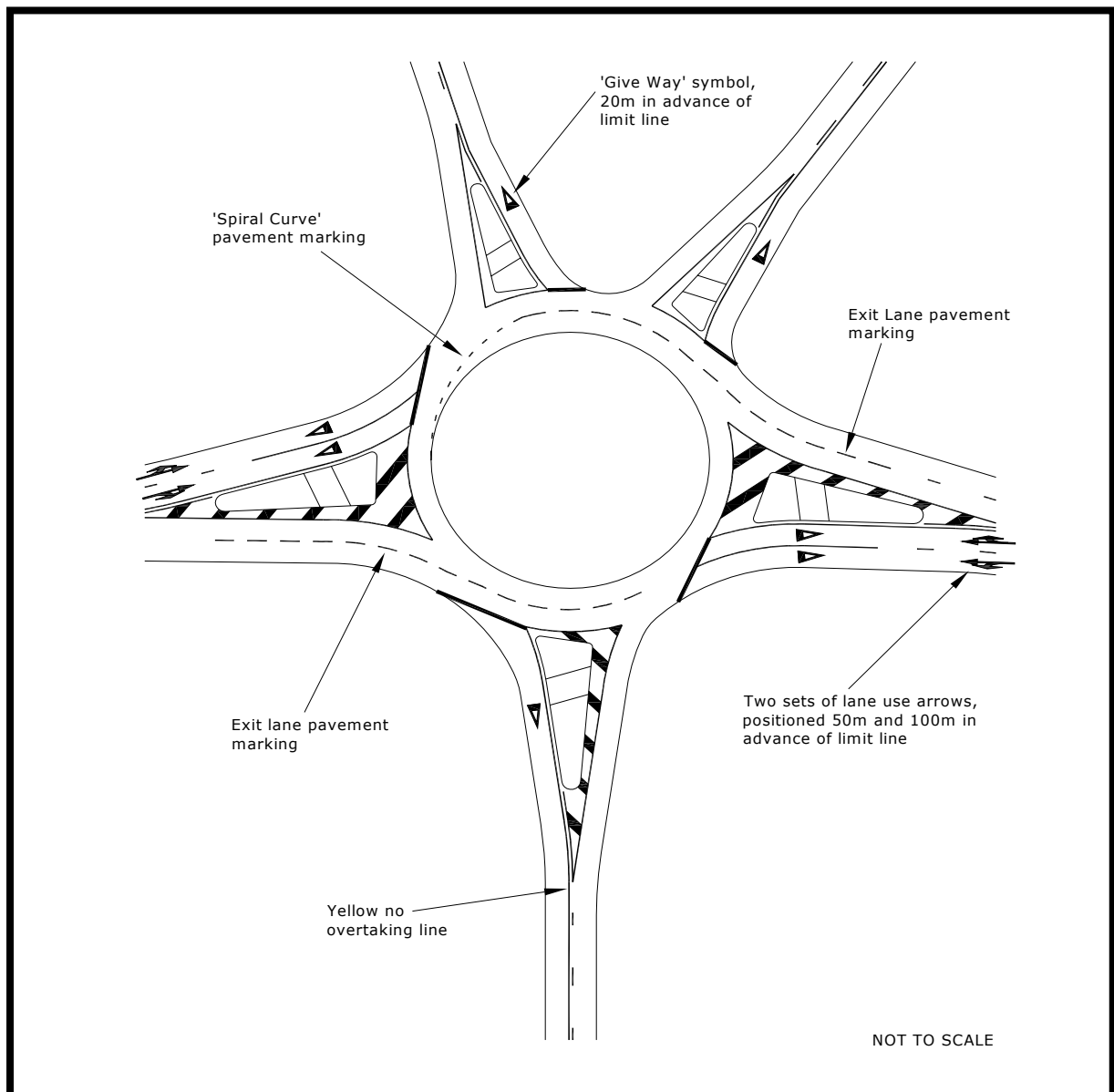
**Figure 4.10 Typical multi-lane roundabout with two 3-lane approaches (one featuring an exclusive left turn lane), two 2-lane approaches, one 3-lane exit and three 2-lane exits**

Similar multi-lane layout to the roundabout depicted in *Figure 4.9* but with an exclusive left turn lane on one of the approaches. No spiral curve pavement markings are required. However, a similar 2-lane (rather than a 3-lane) exit on the opposing leg is also required in this configuration. The circulating carriageway has been narrowed by using white island markings and with two, rather than three exit lanes on three legs of the roundabout. When constructing a new roundabout, the splitter island can be extended into this area. However, allowance may need to be made for the turning circles of large overdimension or overweight load-carrying vehicles on specific routes.



**Figure 4.11 Typical multi-lane roundabout at a T-junction with 2-lane approaches / exits**

The exit lane for this T-junction roundabout extends around the 'western' side of the roundabout. The circulating carriageway has been narrowed by using white island markings on the 'northern' leg of the roundabout. When constructing a new roundabout, the splitter island can be extended into this area. However, allowance may need to be made for the turning circles of large overdimension or overweight load-carrying vehicles on specific routes.



**Figure 4.12 Typical multi-lane roundabout with two 2-lane and three 1-lane approaches / exits**

Roundabouts with five legs can be complicated for motorists to negotiate. This example depicts a roundabout with two 2-lane approaches with 2-lane exits on the opposing legs. Single lane entries and exits from each of the other three legs will cause less confusion for motorists and are recommended. Spiral curve pavement markings have been introduced in this configuration to split right turning traffic from other movements within the roundabout and provide guidance for drivers wishing to leave the circulating carriageway at the fourth exit. This treatment overcomes a particular problem with 5-leg roundabouts with up to three single lane exits. The circulating carriageway has been narrowed using white island markings to provide for a mix of single lane and two lane exits. When constructing a new roundabout, the splitter island can be extended into this area. However, allowance may need to be made for the turning circles of large overdimension or overweight load-carrying vehicles on specific routes.