Cycle Planning and Infrastructure Design Workshop

1 October 2016

Phil Jones

Phil Jones Associates

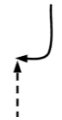
Priority junctions

Priority junctions - casualties

- Most common junction type
- 53% of cycle casualties (T-junctions, cross-roads) 2011-13
- Cyclists vulnerable to turning motor traffic

Cycle KSIs at junctions (2011-2013):

- Vehicle turns right across cyclist path (14%)
- Vehicle turns left across path of cyclist (9%)
- Vehicle fails to give way (6%)



Priority junctions - issues

Issues for cyclists:

- Moving ahead through a priority junction:
- Turning right into and out of junctions:
- Any turn moving across more than one lane or one busy lane will be uncomfortable.

Priority junctions – beneficial measures

- Reduce speed on link
- Reduce speed on turning
- Reduce number of traffic lanes
- Keep corner radii tight
- Use 90 degree approach
- Avoid left turn merges and diverges
- Closing side roads
- Making side roads one-way out
- Right turn refuges for cycles

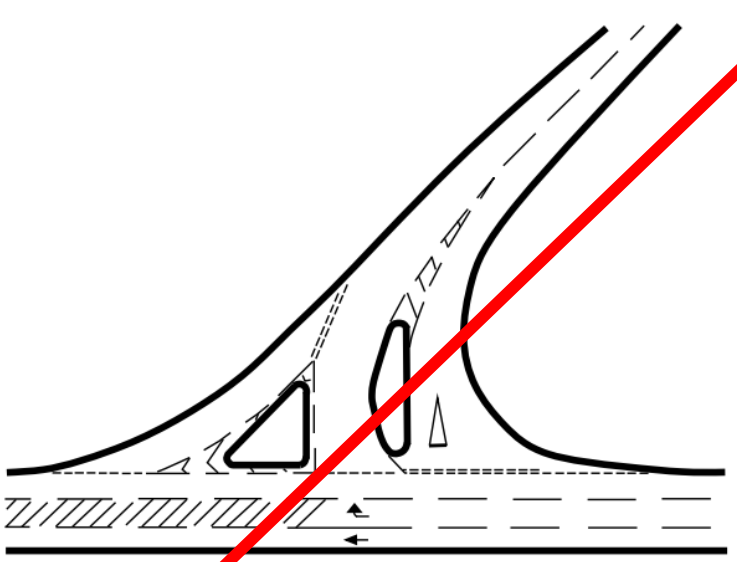
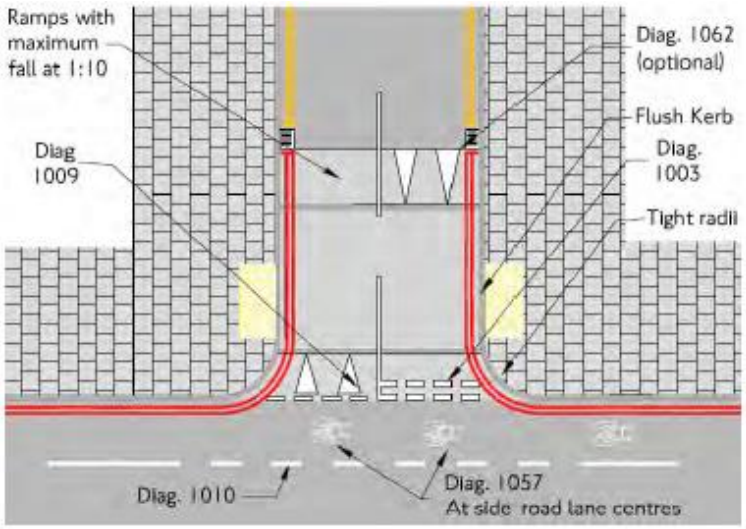


Figure 1/5 : Left Hand Splay Skew Junction
(para 1.20)

Priority junctions – Side Road Entry Treatment

- Side Road Entry Treatments have benefit for both pedestrians and cyclists
- TRL study showed significant reduction in cycle collisions with SRET
- Reduce speed of traffic entering and exiting minor road
- Beneficial when cycling is
  - on carriageway,
  - in cycle lane,
  - in cycle track



Segregated lanes and tracks at priority junctions

- Options for maintaining cycle priority through priority junctions:
  - “Bending out”, giving space for turning vehicles to yield
  - Track becomes lane at junction
  - Continue track away from carriageway without deviation

Two way tracks at side roads not preferred

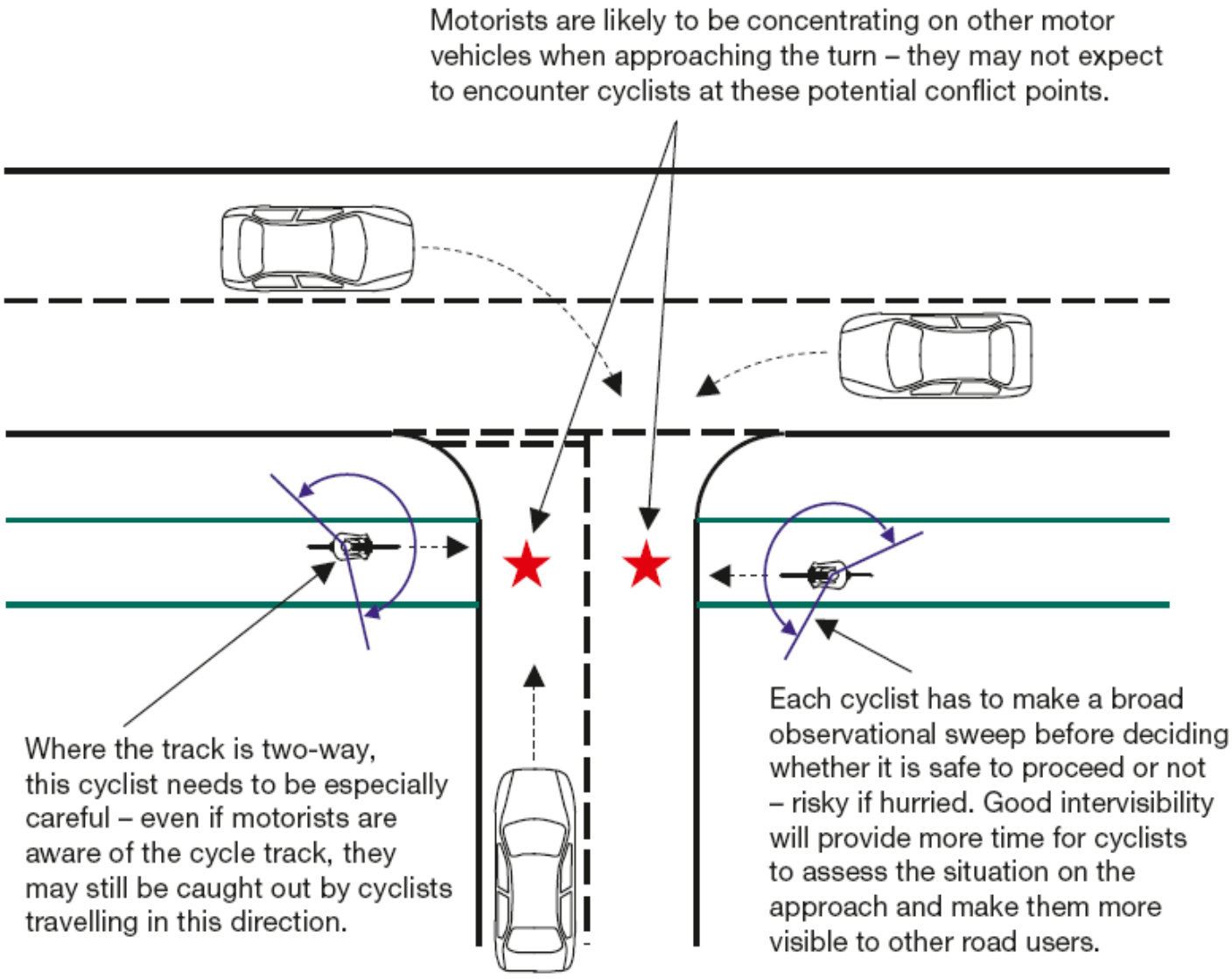


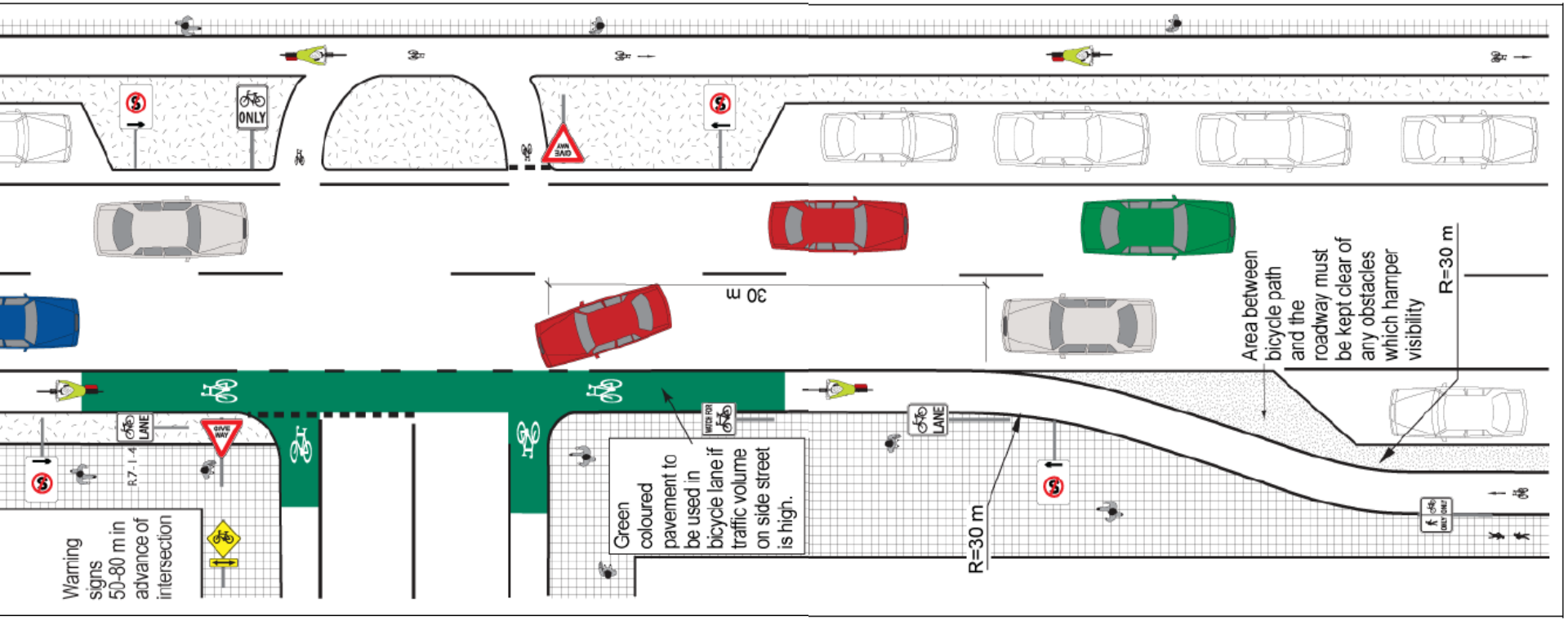
Figure 6.1 Potential conflict issues at cycle crossings near junctions

Pratt Street in August 2007 following the introduction of red surfacing, a flashing sign and two warning plates. The same treatment was adopted on Plender Street a year later.

Bending out, space to yield

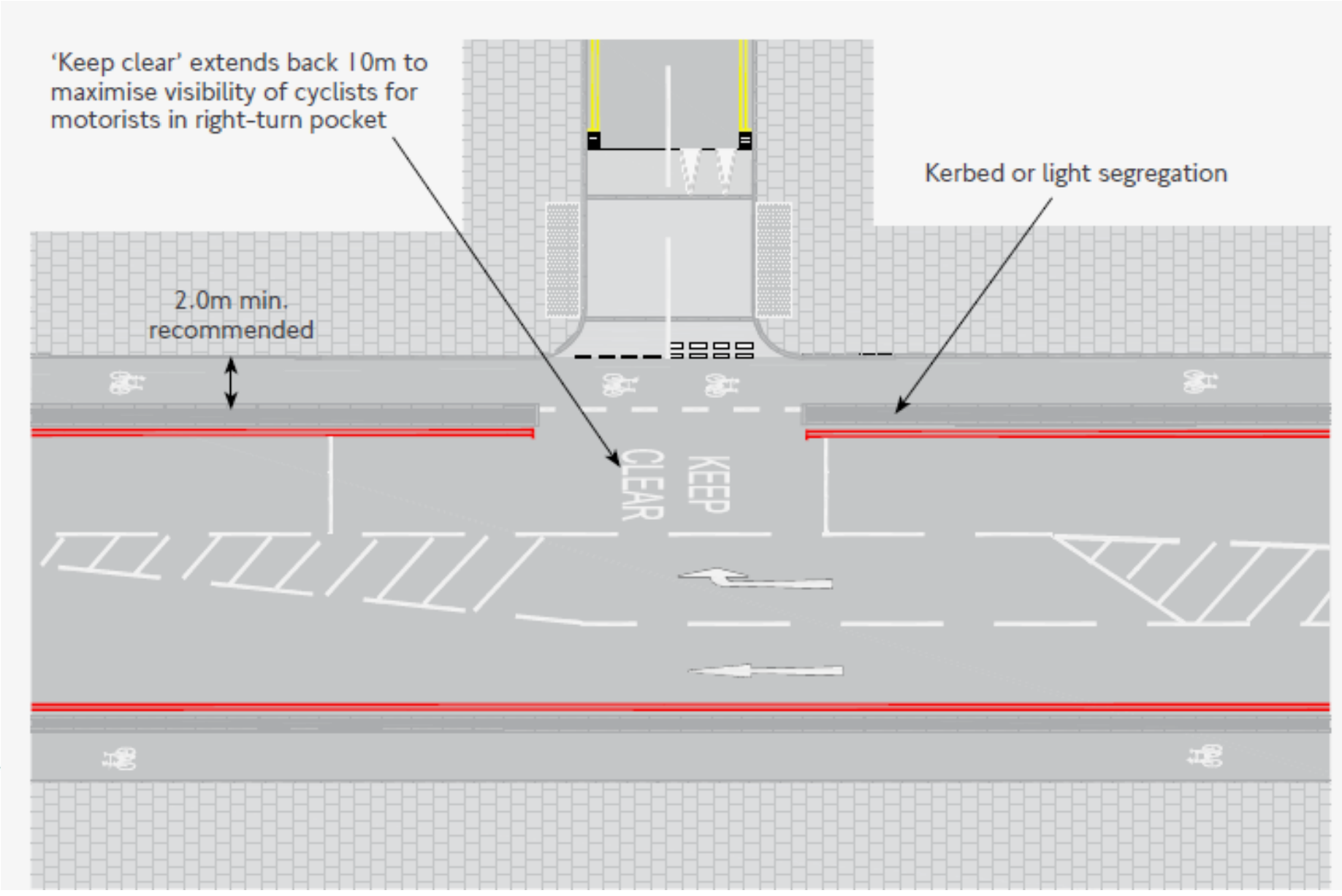
Bending out, space to yield

Track becomes lane at junction



Schweizerhaus
Schweizerhaus
Prater
P

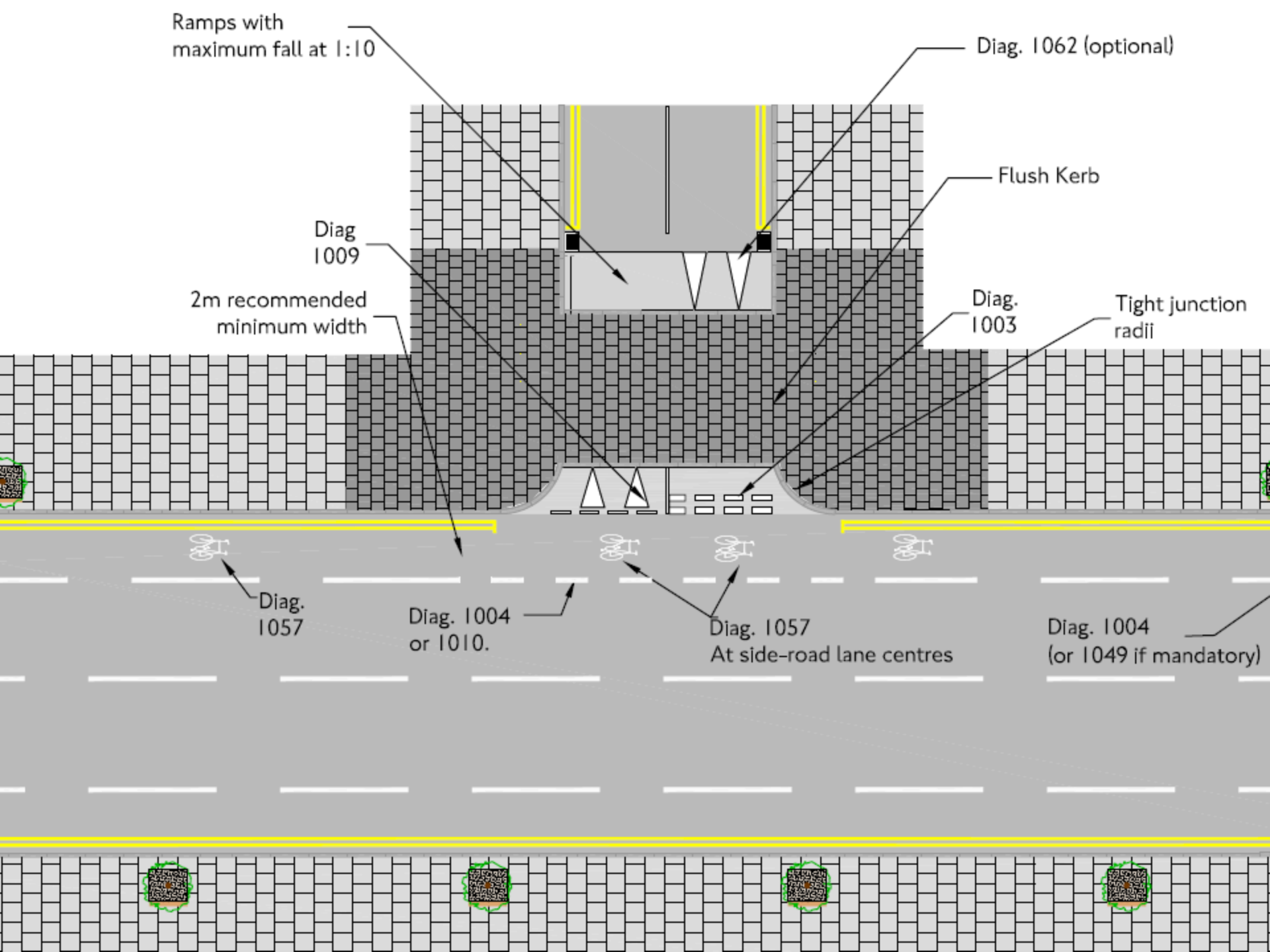
Track becomes lane at junction



Track becomes lane at junction

Continue track without deviation

Continuous footway


Ramps with
maximum fall at 1:10
Diag. 1062 (optional)
Flush Kerb
Diag
1009
2m recommended
minimum width
Diag.
1003
Tight junction
radii
Diag.
1057
Diag. 1004
or 1010.
Diag. 1057
At side-road lane centres
Diag. 1004
(or 1049 if mandatory)

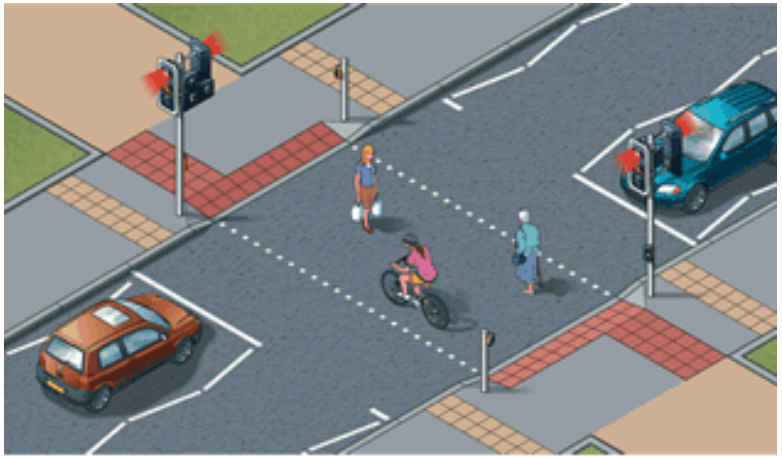
Continuous footway and cycleway

Continuous footway and cycleway

MEHR OFFIS
UND DAS GRATIS!

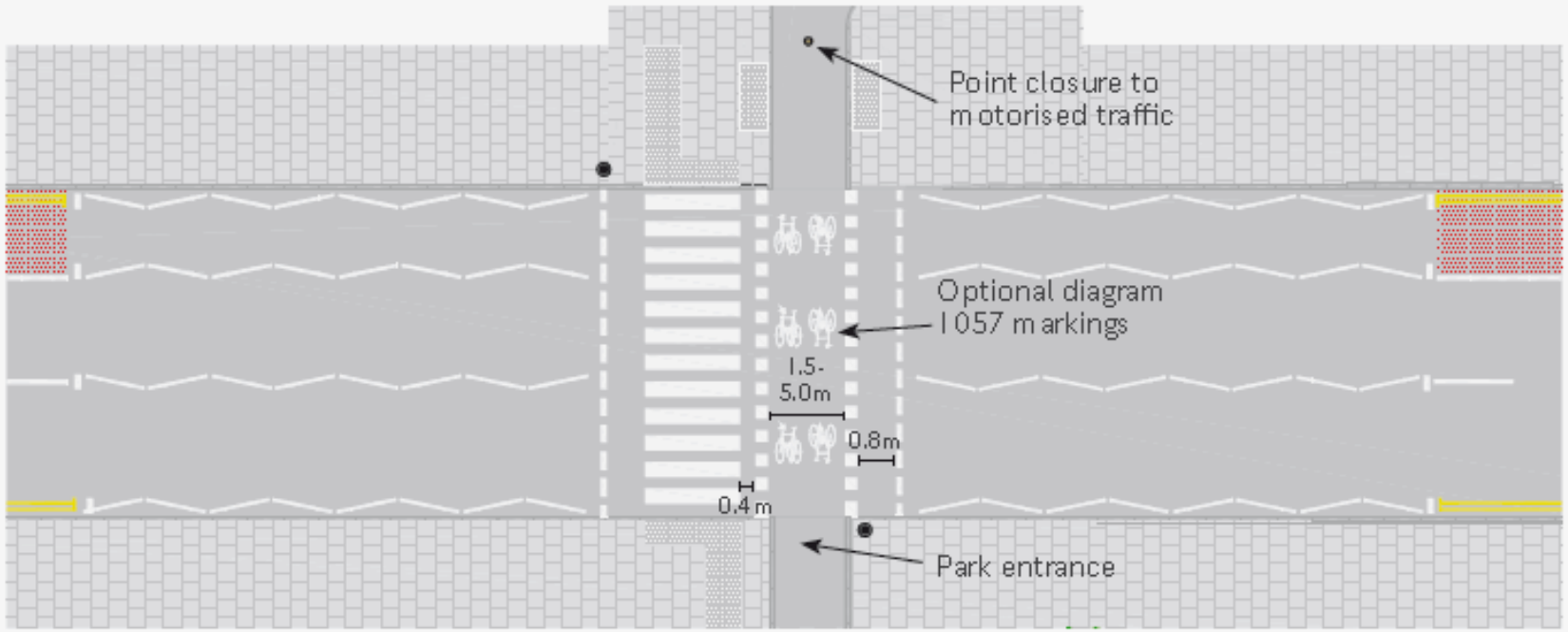
Crossings

- Important to provide continuity of off-carriageway cycle routes across busy roads
- A crossing is simply a junction where one or more arms only carries cycle traffic
- Priority Crossings
- Zebra Crossings
- New ‘Shared Use’ Crossings
- Signal Controlled Crossings
  - Standalone cycle only
  - Toucan
  - Integrated into overall junction control



Rule 25: Toucan crossings can be used by both cyclists and pedestrians

Parallel Crossing in TSRGD 2016



Indicative layout 5/03: Parallel priority crossings

Parallel Crossing – LB Hackney

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Roundabouts and Gyratories

Roundabouts

- UK roundabouts rarely comfortable for cyclists
- Typical designs bad for cycle safety and comfort
  - Multi-lane entries
  - Wide circulatory carriageway
  - Easy, fast exits
  - Free flow left turn slips

Yet:

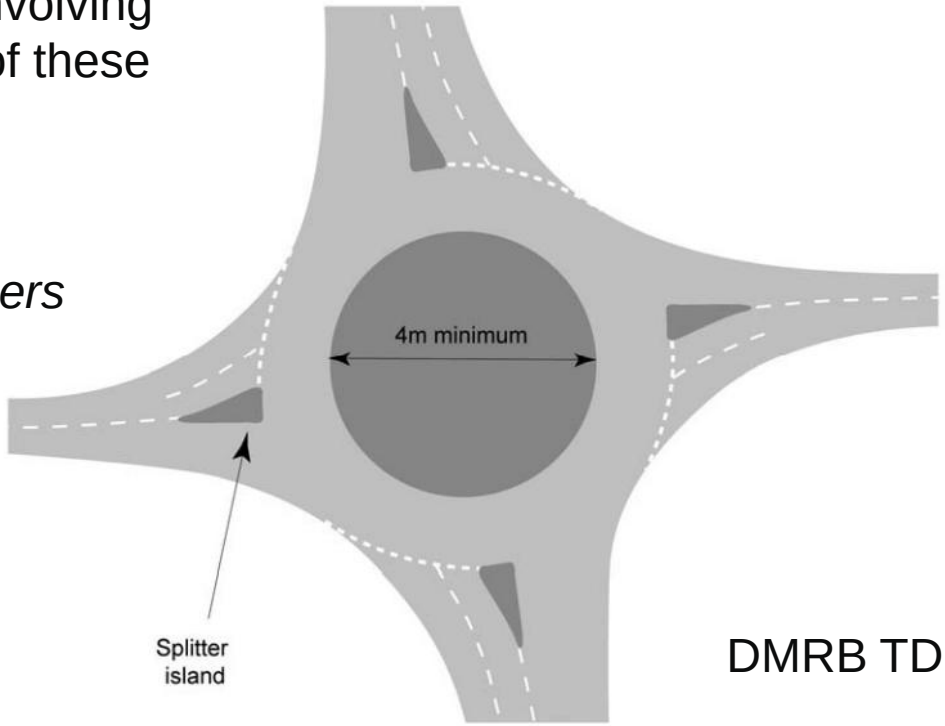
- Dutch practice prefers roundabouts
- Less stop/start, effort, delay

Roundabouts in DMRB

Cyclists require special consideration at roundabouts to ensure safe passage...

10% of all reported accidents involving cyclists occur at roundabouts; of these 11% are serious or fatal.

DMRB TA 91/05,
Provision for Non Motorised Users



DMRB TD 16/07

Figure 3/1: Normal Roundabout

Roundabouts – beneficial measures

- Reduce speeds on the approaches
- Reduce speeds through the junction
- Reduce number of traffic lanes to one
- Reduce size of junction
- Keep entry and exit radii tight
- Avoid left turn slips
- Provide off-carriageway tracks
- Raise driver awareness of cyclists

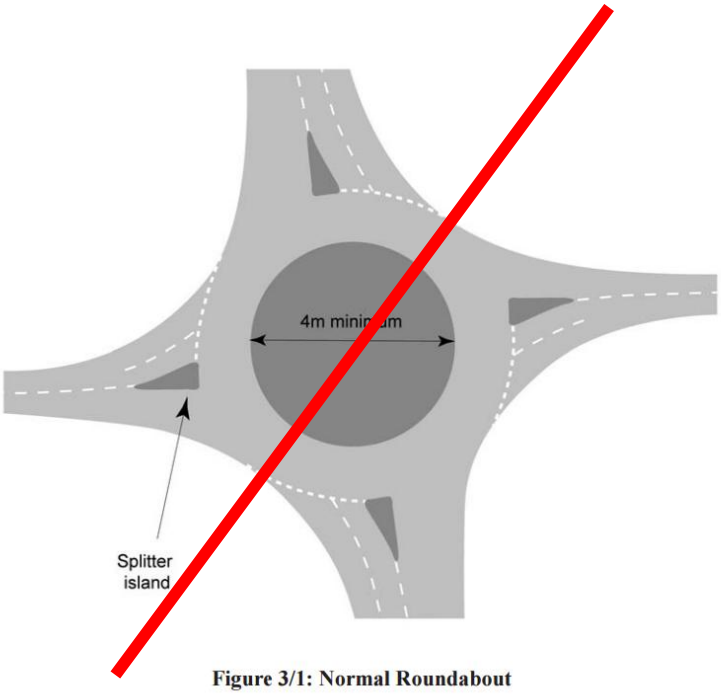
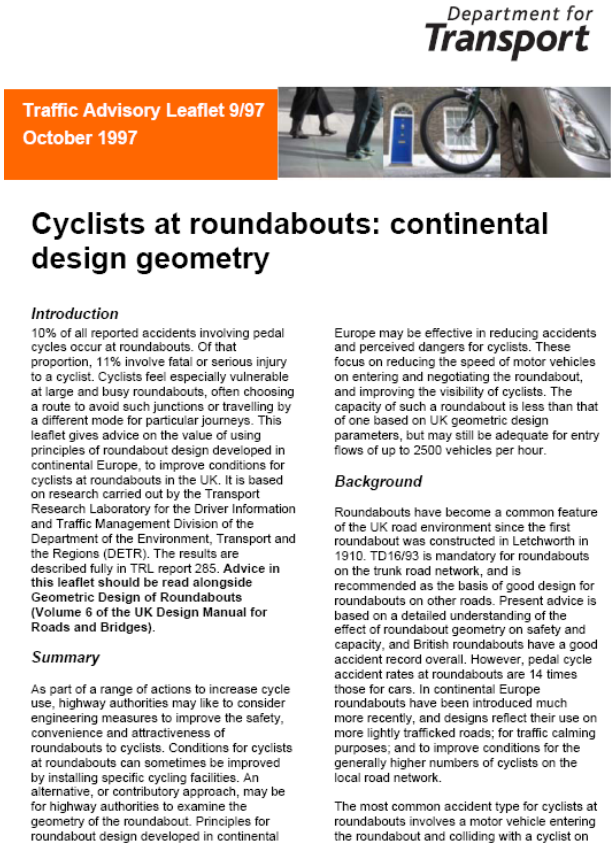


Figure 3/1: Normal Roundabout

Continental geometry

- Approaches and exits perpendicular
- Entries and exits ~4 m wide
- Entry and exit radius ~10m
- Entry path curvature <100m
- Diameter 25-35 metres
- Central island 16-25 metres
- Circulating carriageway 5-7 metres
- See Traffic Advisory Leaflet 9/97



Department for Transport

Traffic Advisory Leaflet 9/97
October 1997

Cyclists at roundabouts: continental design geometry

Introduction

10% of all reported accidents involving pedal cycles occur at roundabouts. Of that proportion, 11% involve fatal or serious injury to a cyclist. Cyclists feel especially vulnerable at large and busy roundabouts, often choosing a route to avoid such junctions or travelling by a different mode for particular journeys. This leaflet gives advice on the value of using principles of roundabout design developed in continental Europe, to improve conditions for cyclists at roundabouts in the UK. It is based on research carried out by the Transport Research Laboratory for the Driver Information and Traffic Management Division of the Department of the Environment, Transport and the Regions (DETR). The results are described fully in TRL report 285. **Advice in this leaflet should be read alongside Geometric Design of Roundabouts (Volume 6 of the UK Design Manual for Roads and Bridges).**

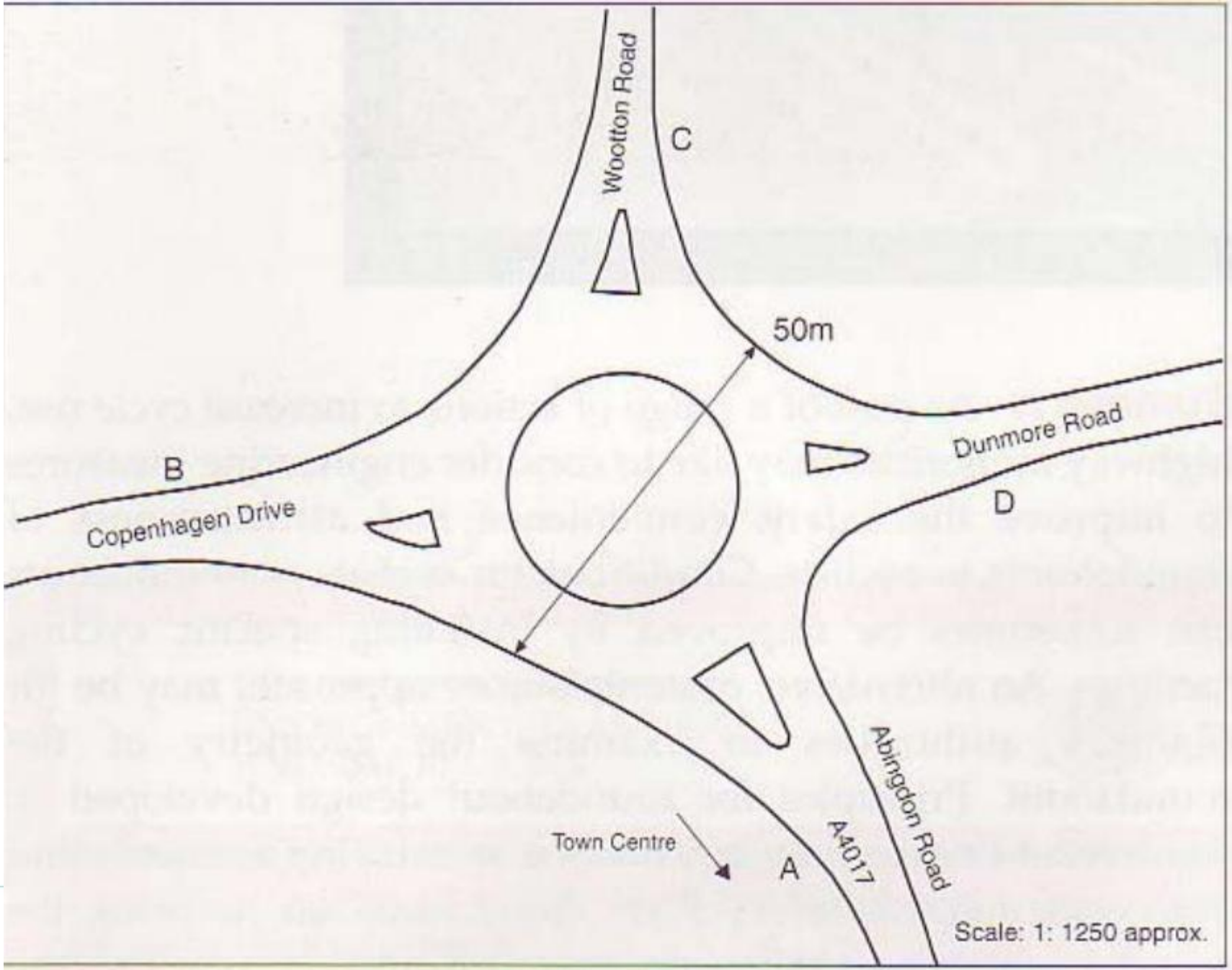
Summary

As part of a range of actions to increase cycle use, highway authorities may like to consider engineering measures to improve the safety, convenience and attractiveness of roundabouts to cyclists. Conditions for cyclists at roundabouts can sometimes be improved by installing specific cycling facilities. An alternative, or contributory approach, may be for highway authorities to examine the geometry of the roundabout. Principles for roundabout design developed in continental Europe may be effective in reducing accidents and perceived dangers for cyclists. These focus on reducing the speed of motor vehicles on entering and negotiating the roundabout, and improving the visibility of cyclists. The capacity of such a roundabout is less than that of one based on UK geometric design parameters, but may still be adequate for entry flows of up to 2500 vehicles per hour.

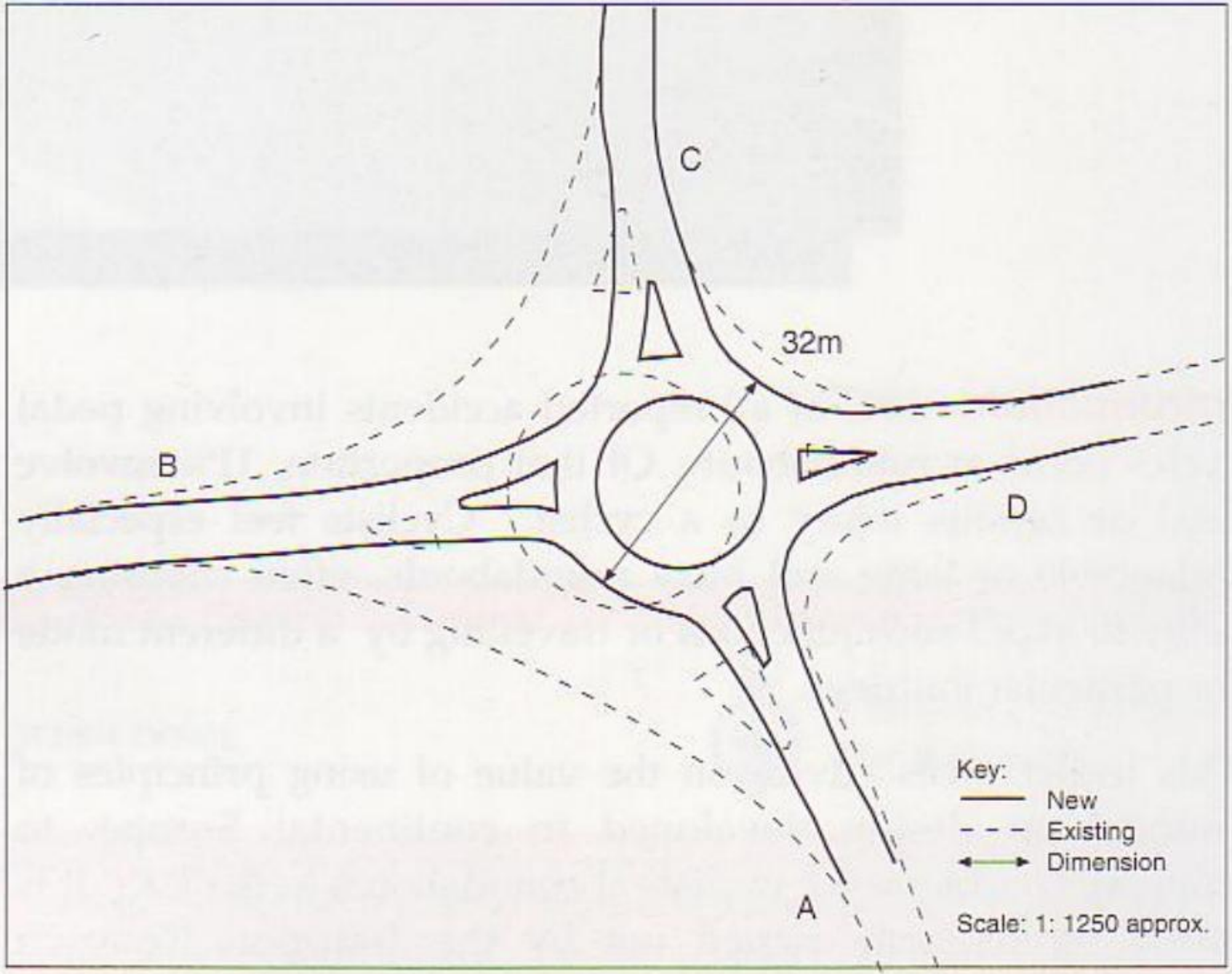
Background

Roundabouts have become a common feature of the UK road environment since the first roundabout was constructed in Letchworth in 1910. TD16/93 is mandatory for roundabouts on the trunk road network, and is recommended as the basis of good design for roundabouts on other roads. Present advice is based on a detailed understanding of the effect of roundabout geometry on safety and capacity, and British roundabouts have a good accident record overall. However, pedal cycle accident rates at roundabouts are 14 times those for cars. In continental Europe roundabouts have been introduced much more recently, and designs reflect their use on more lightly trafficked roads; for traffic calming purposes; and to improve conditions for the generally higher numbers of cyclists on the local road network.

The most common accident type for cyclists at roundabouts involves a motor vehicle entering the roundabout and colliding with a cyclist on



Existing Design



Continental Design

Compact Roundabout

- Included in DMRB TD 16/07
- Similar to Continental, but less cycle-friendly
- Smaller island diameter

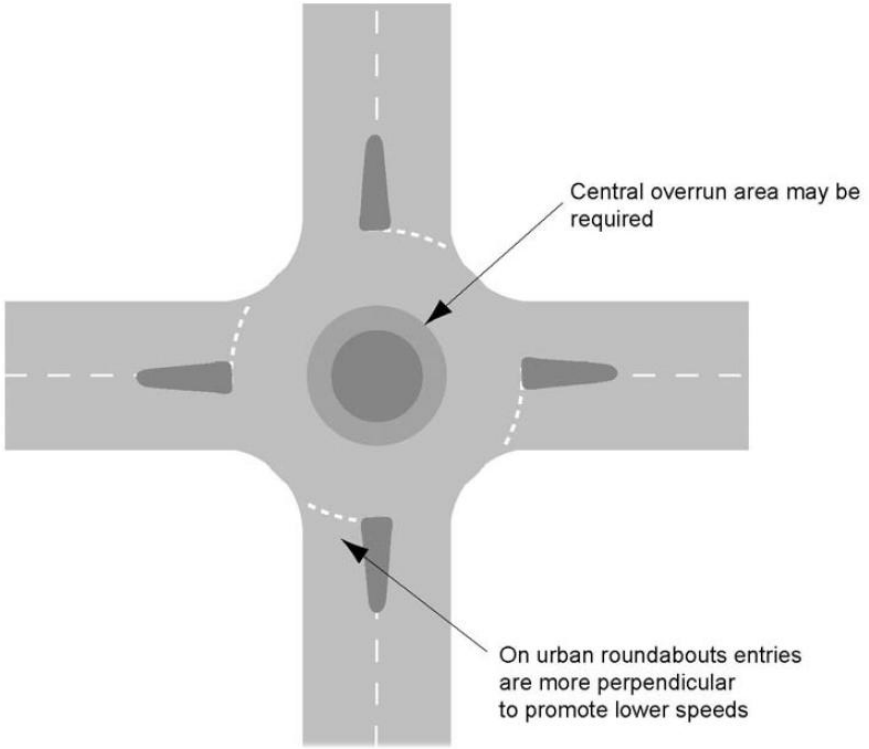


Figure 3/2: Compact Roundabout in an Urban Area

Continental geometry

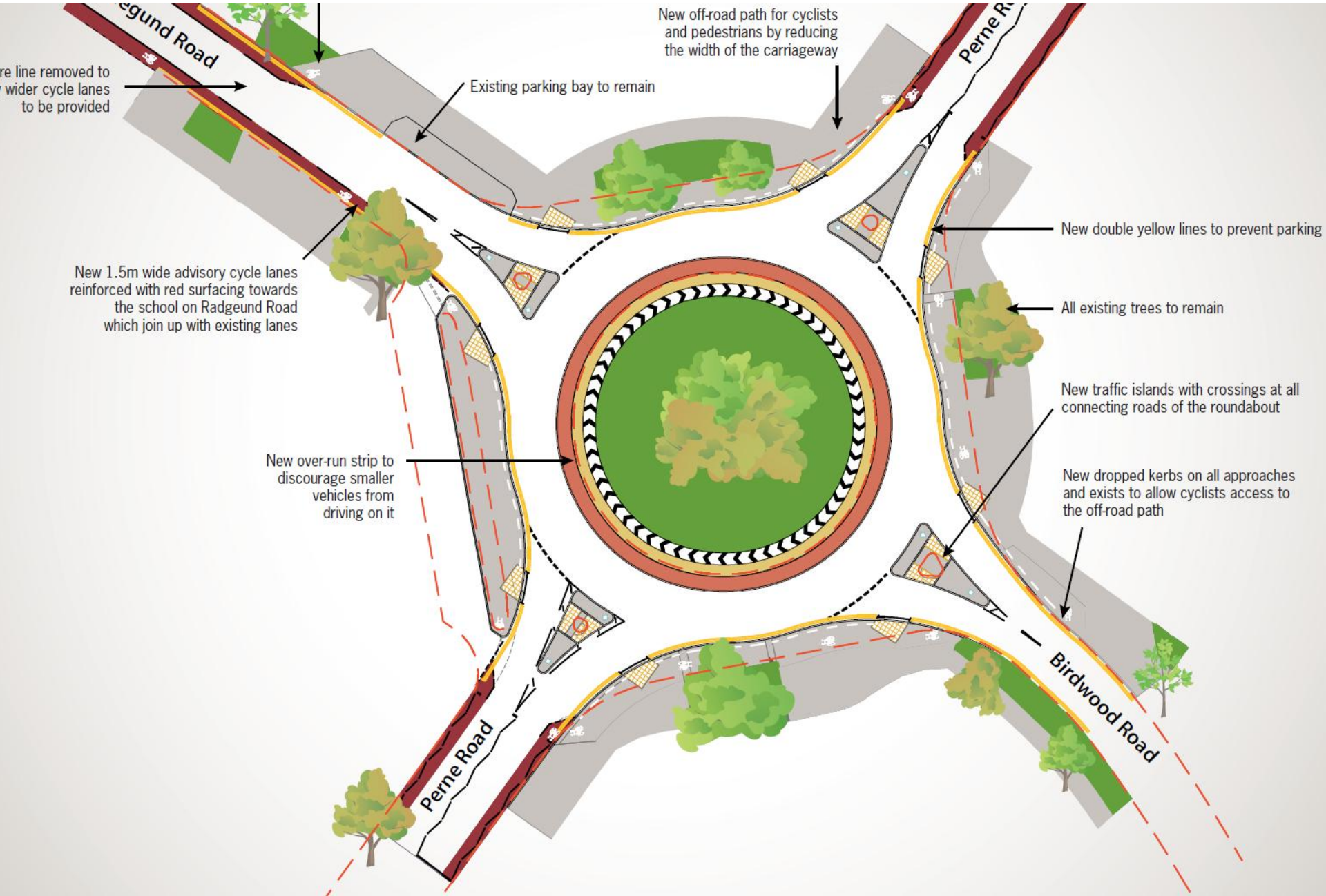
- At low flows/speeds, cyclists can remain on carriageway
- Indicative upper limit for on-carriageway cycling – 6000-8000 vpd junction throughput
- Less subjectively safe than off-carriageway tracks, however

Lund, Sweden

Lund, Sweden

ANMERA

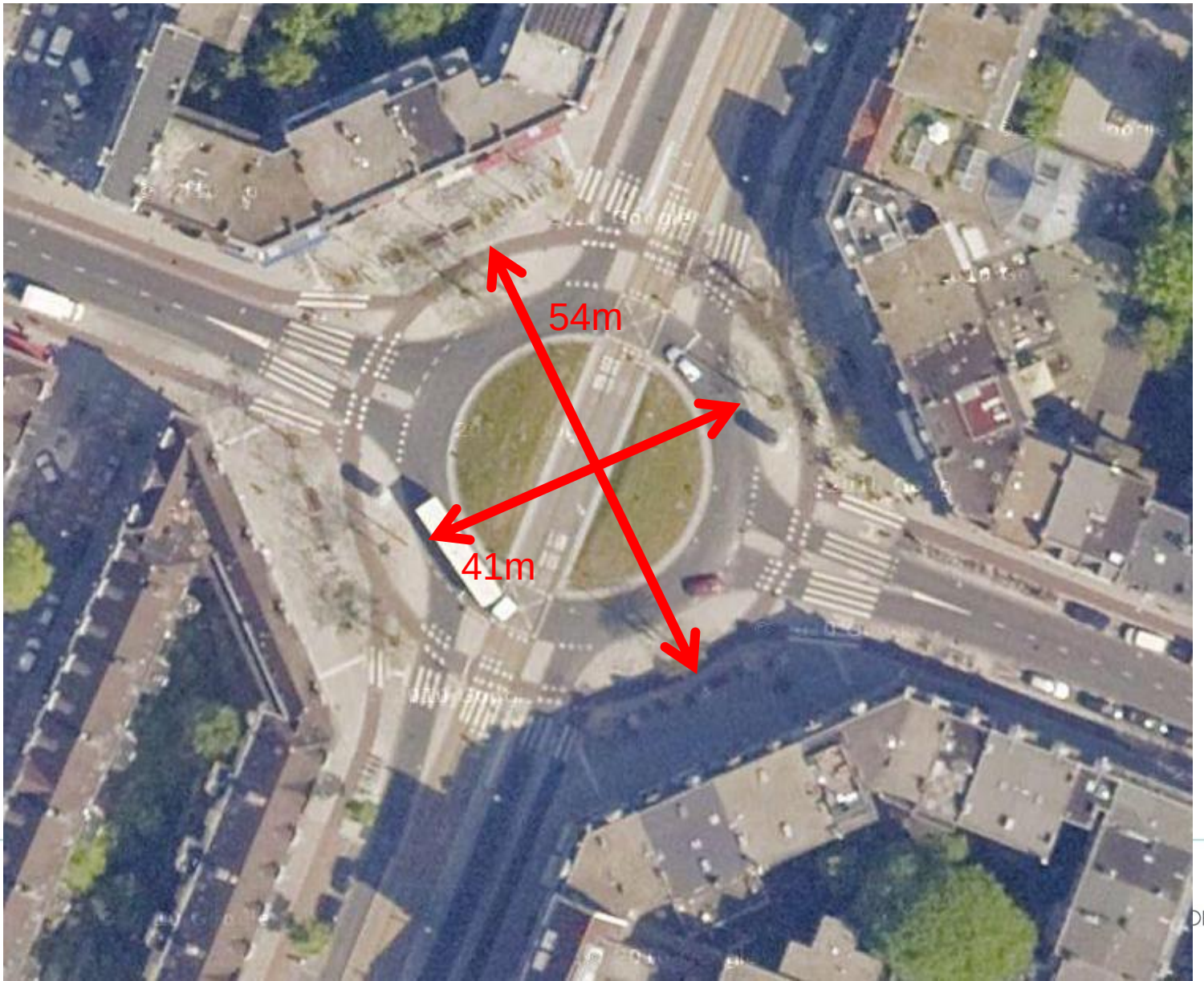
Radegund Road, Cambridge



External Cycle Tracks

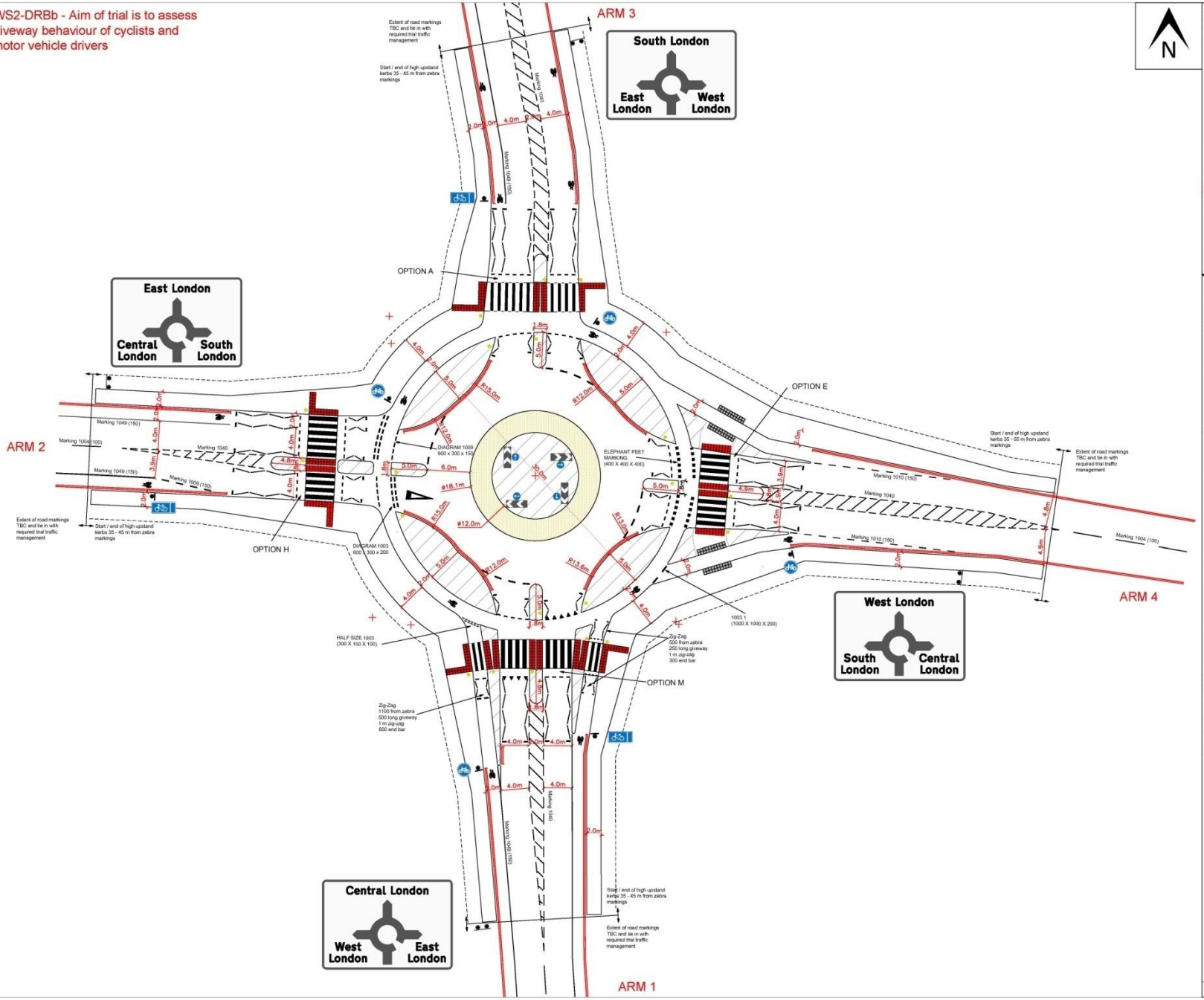
- Greater subjective safety if cycling provided for off-carriageway
- Continental/compact geometry makes it easier to provide tracks
- Key question: Provide priority at crossings?
- Use one-way tracks if priority
- Two way tracks with grade-separated, no-priority or signal-controlled crossings

Dutch Roundabout with priority



Utrecht

WS2-DRBb - Aim of trial is to assess giveway behaviour of cyclists and motor vehicle drivers



NOTES

All dimensions in notes in millimeters unless specified

Road Markings

- Sharks teeth - 500 wide x 500 high with 500 gap
- Elephant feet guidance markings - 400 wide x 400 high with 400 gap.
- Cycle logo (1057) - 1780 high x 1100 wide
- Hatching (1041) - 4m line and 3m gap (100) with internal lines with 2m gap and 150 wide
- Red route markings (1018.1) - 100 line x 100 gap x 100 line
- Start of cycle lane/ orbit guidance (1009) - 1m line x 1m gap and 150 wide
- Merge markings (1010) - 1m line x 1m gap and 150 wide
- Warning line (1004) - 4m line and 2m gap and 100 wide.
- Roundabout giveway (1003.1) - 1m line x 1m gap and 200 wide.
- Cycle lane boundary line (1049) - 150 wide
- Give way triangle (1023) - 3750 x 1250
- Give way marking (1003) - 600 x 300 x 200 wide
- Orbit lane give way (1003) - 300 x 150 x 100

Signs and infrastructure

- Belisha Beacon
- Chevron Sign - 400 high x 1400 wide with one way sign (606) (600).
- Cycle lane sign (959.1) - 825 x 375
- Cycle track sign (955) - 450
- Advanced map-type directional sign placed 45 metres from the junction
- Surface mounted charcoal tactile paving consisting of 400 x 400 flags
- Surface mounted red tactile paving consisting of 400 x 400 flags
- Extent of Sightscreens (arctic lorry trailers)
- Truck Apron - tarmac construction, 10mm high rising to 100mm high covered in buff colored paint.
- Traffic islands with brown Type-1 infill.

Zebra crossings

All zebra crossings 4 metres wide (including over cycle lane).
Width of bars on carriageway 500 except for end bars which are altered to match kerbs.
Width of bars on cycle lane 400, zig-zag vary as per drawing.

TRL and TfL working in Partnership

Client	TfL
Project Title	Cycle Facility Trials (11112436)
Drawing Title	Dutch Style Roundabout - UK MARKINGS Detailed Design
Drawn By JPB / Checked By PV / Approved By PV	
Date 29.04.13	Scale 1:250 (A1)
Purpose	Detailed Design
Drawing Number	WS2-DRBc-003 (DD)
Rev	D

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17/ 1 2012
8:47:00 L20H

Stourbridge

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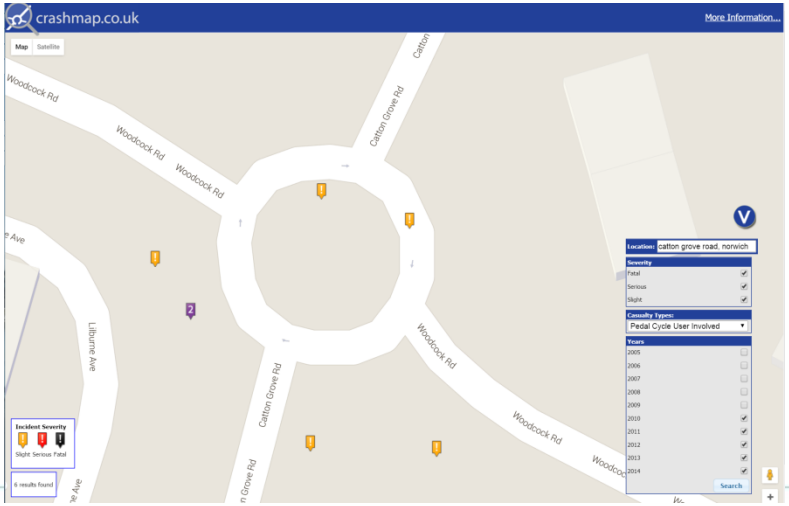
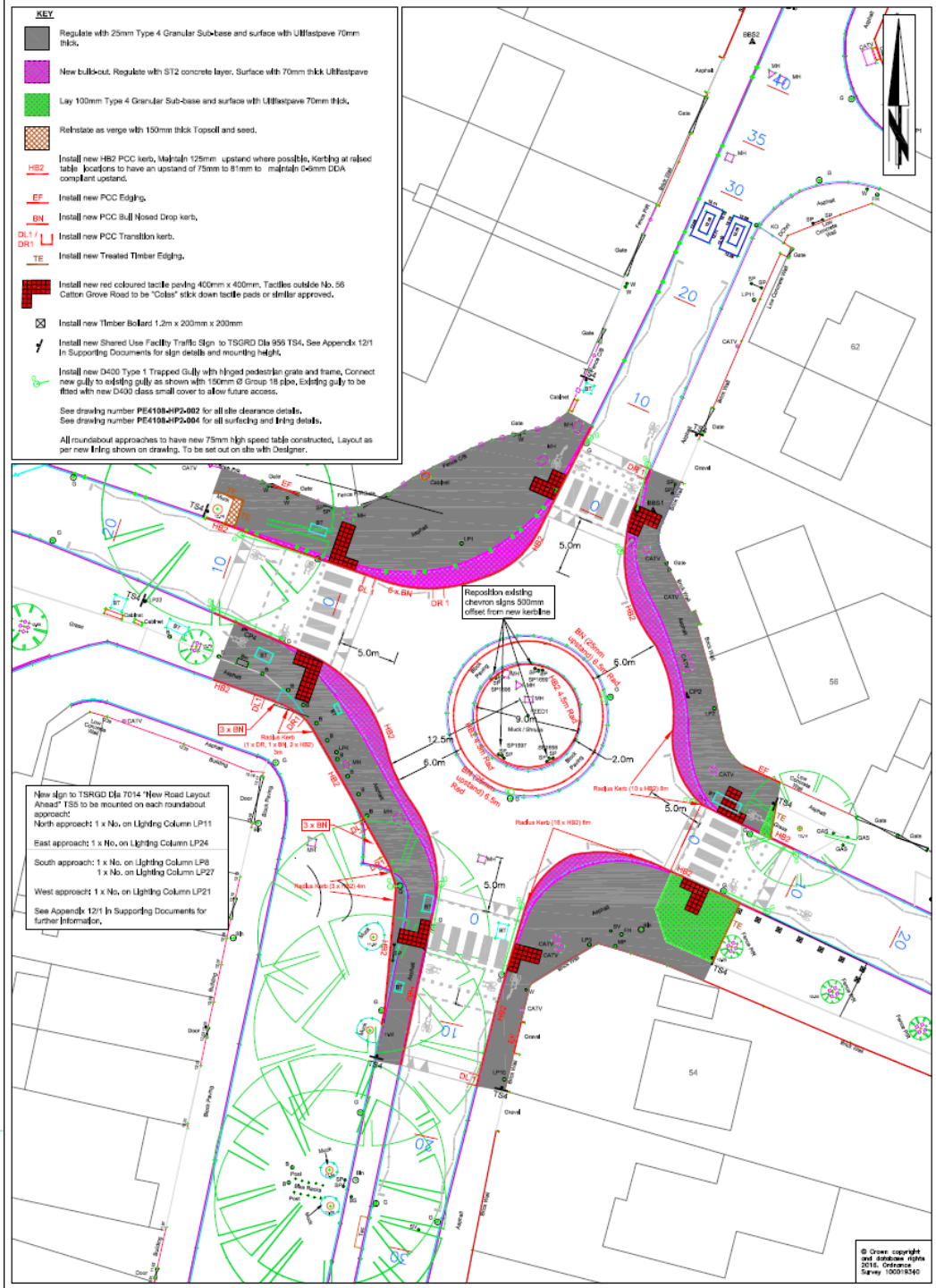
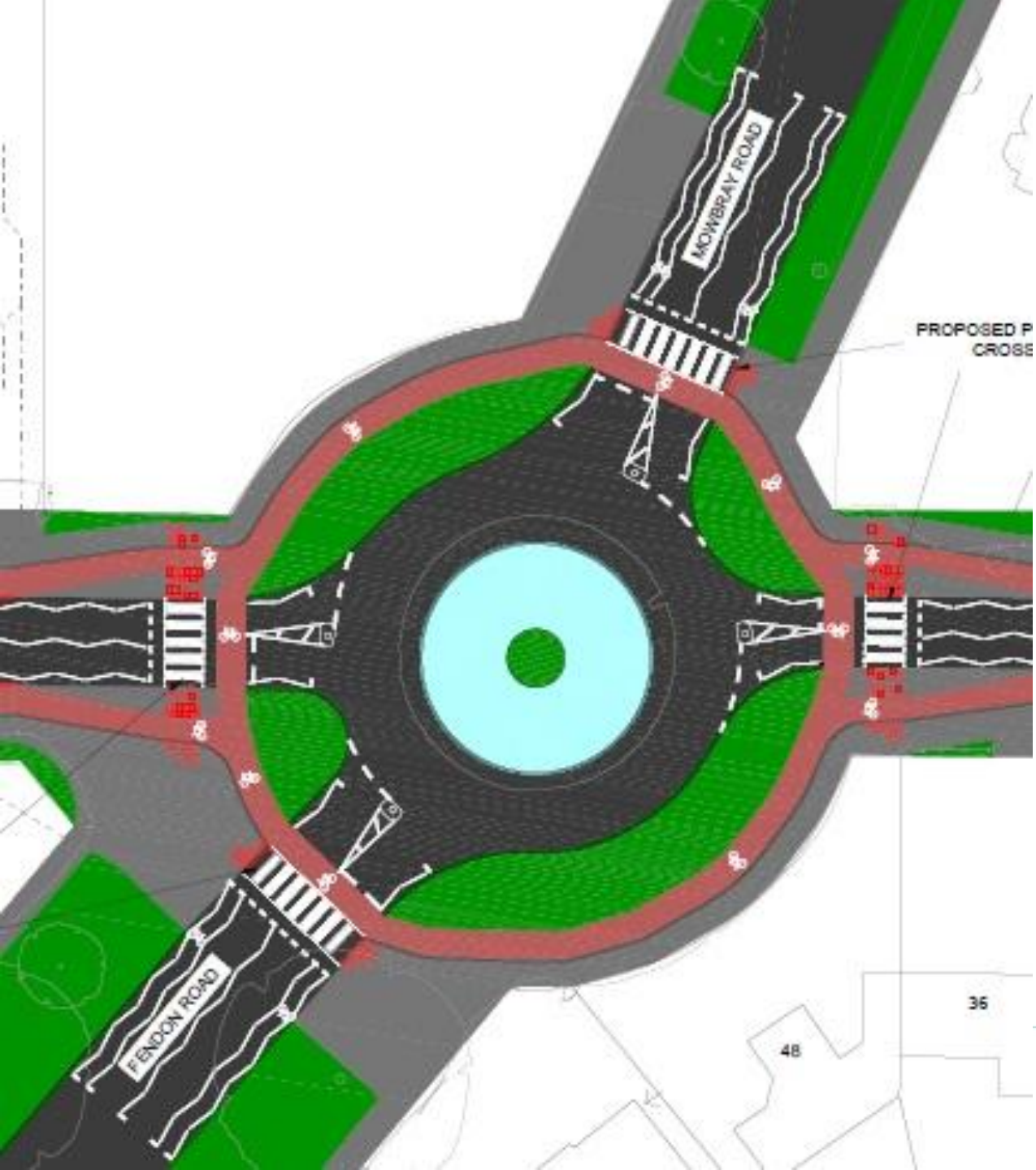
Catton Grove Road/ Woodcock Road







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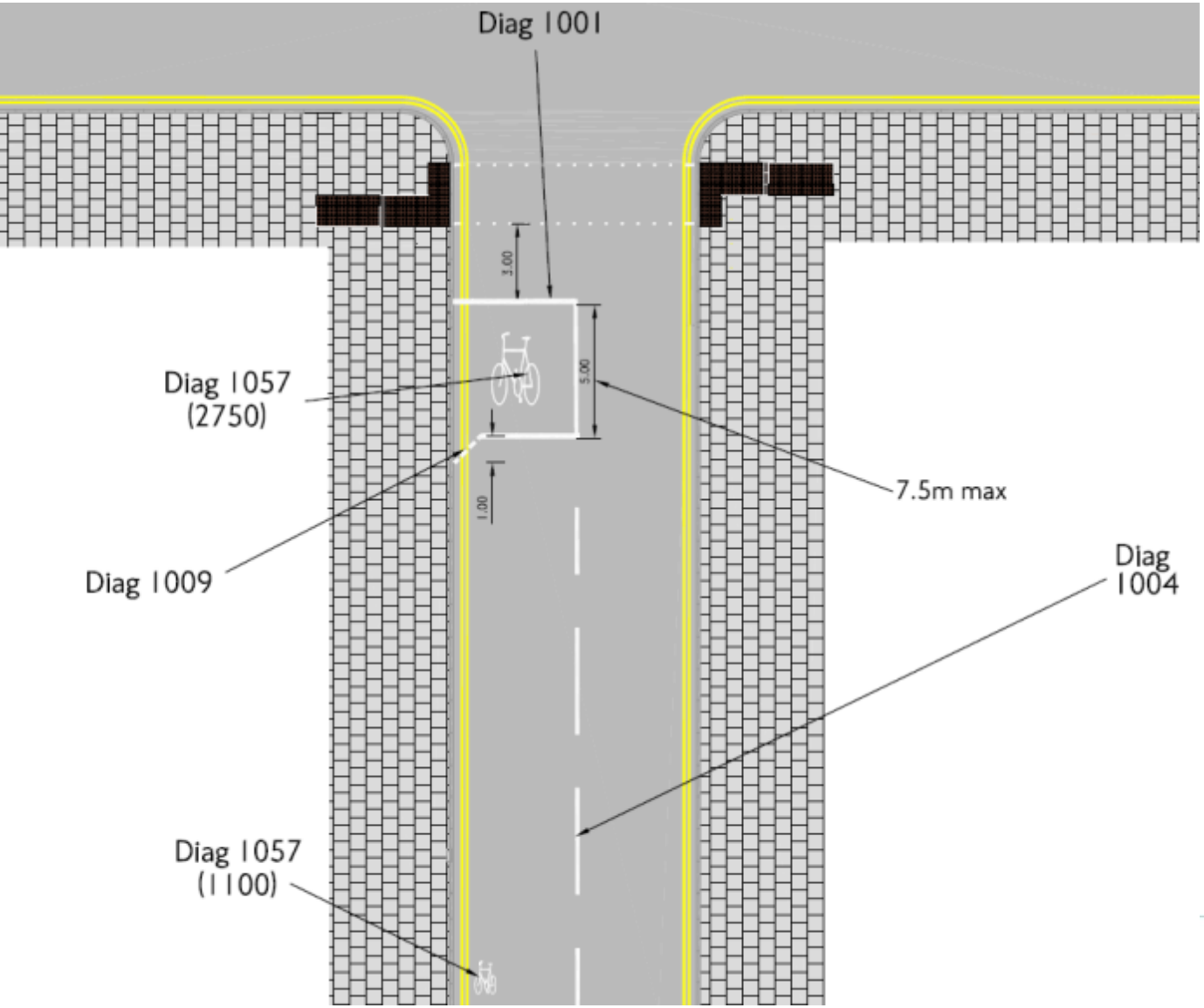
Traffic Signals

Advanced stop lines

- Advantages
  - Places cycle traffic ahead and in line of sight of motorised traffic if arriving during red phase
  - Can make right turning easier
  - Reduces chance of being squeezed by left turning motorised traffic
  - Prioritises cycle traffic
  - Increase junction efficiency
- Disadvantages
  - Of little value during green stage
  - Can encourage cyclists to be in conflict with turning traffic
  - Potential effect on intergreens
- Max. 7.5 metres deep without special authorisation in London
- Can be fed by a cycle lane or gate (TSRGD 2011)
- TSRGD 2016 to allow cyclists to cross first stop line legally (so feeder/gate can be omitted)

Advanced stop line with gate entry



Zone
END
NEW
Coca-Cola life
SWEETNESS FROM NATURAL SOURCES
LOWER CALORIE*
CADDY
wedeliv

Separate stages

SPINNERS
SPINNERS
Fine
coffee & grill
DESH
ENTRANCE

20
ZONE
PEDESTRIAN
ZONE
Except for
access
At any
time
Unsuitable
for HGVs
PRIME
OF THE EDITH CAVELL
TOMBLAND
CAVELL'S
DINING & LOUNGE
CAVELL'S

Low level signals

- Will be authorised in TSRGD 2016
- Will give much more flexibility in cycle signalling
- On street at Bow Roundabout and other locations

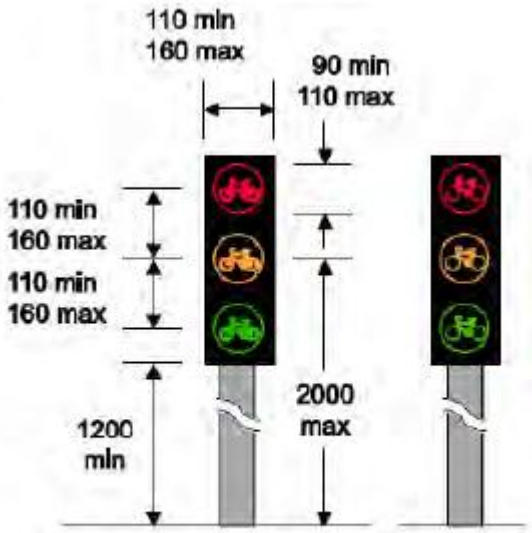
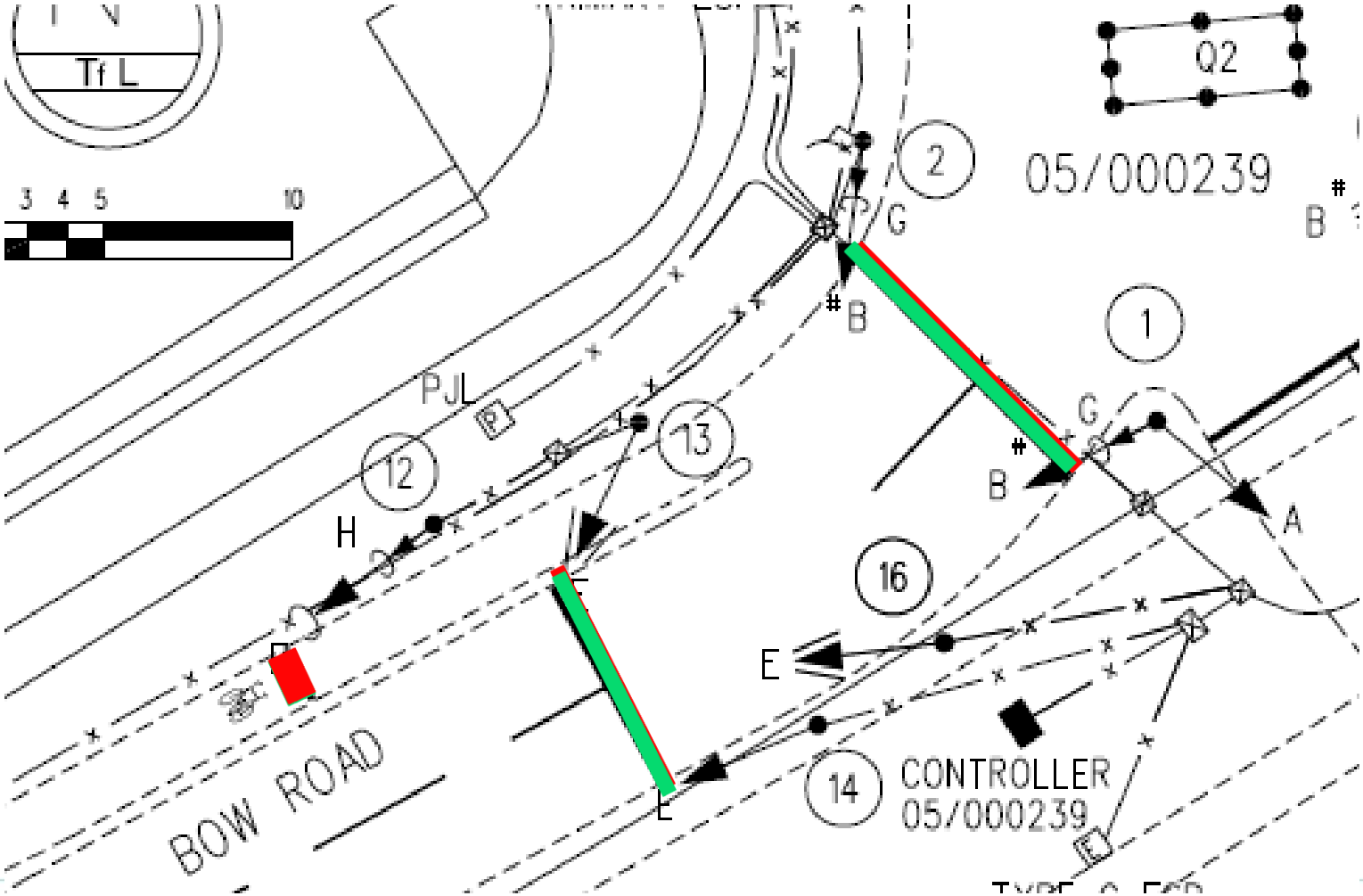


Diagram from TSRGD consultation draft (2015), Table 69, Item 4

The Boat
Bar & Restaurant

Bow Cycle Gate



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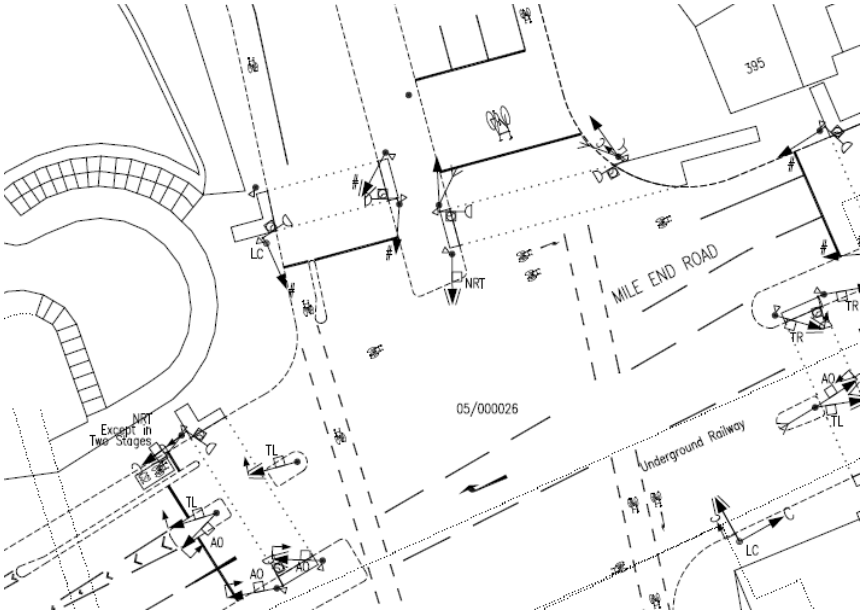
100
96
92
90
88
73

Two stage turns

- Default solution in Copenhagen
- Relies partly on give way on turning rules
- Legally possible in UK

GRAY
Fri internet

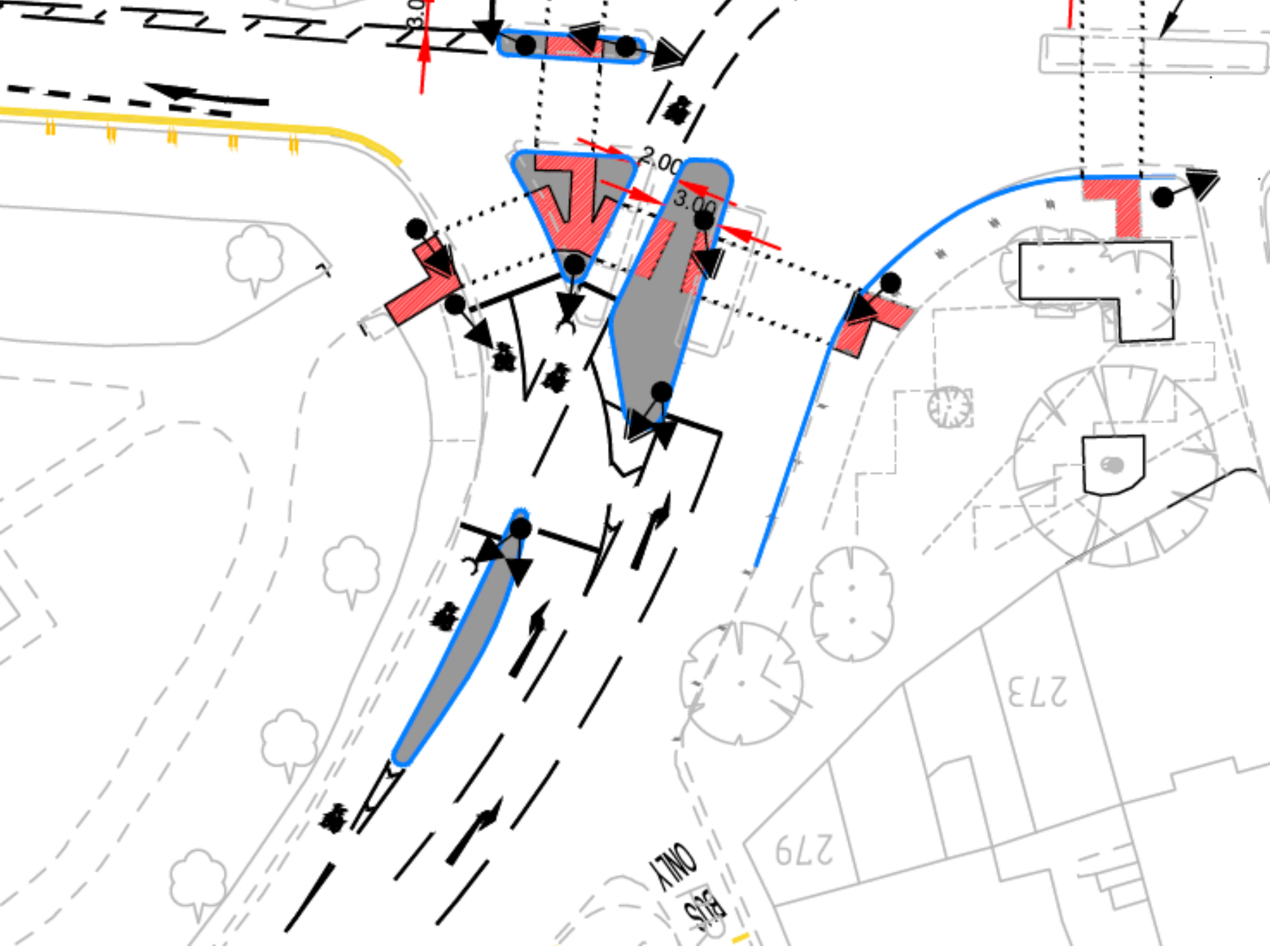
Two Stage Turns - On Street Trials



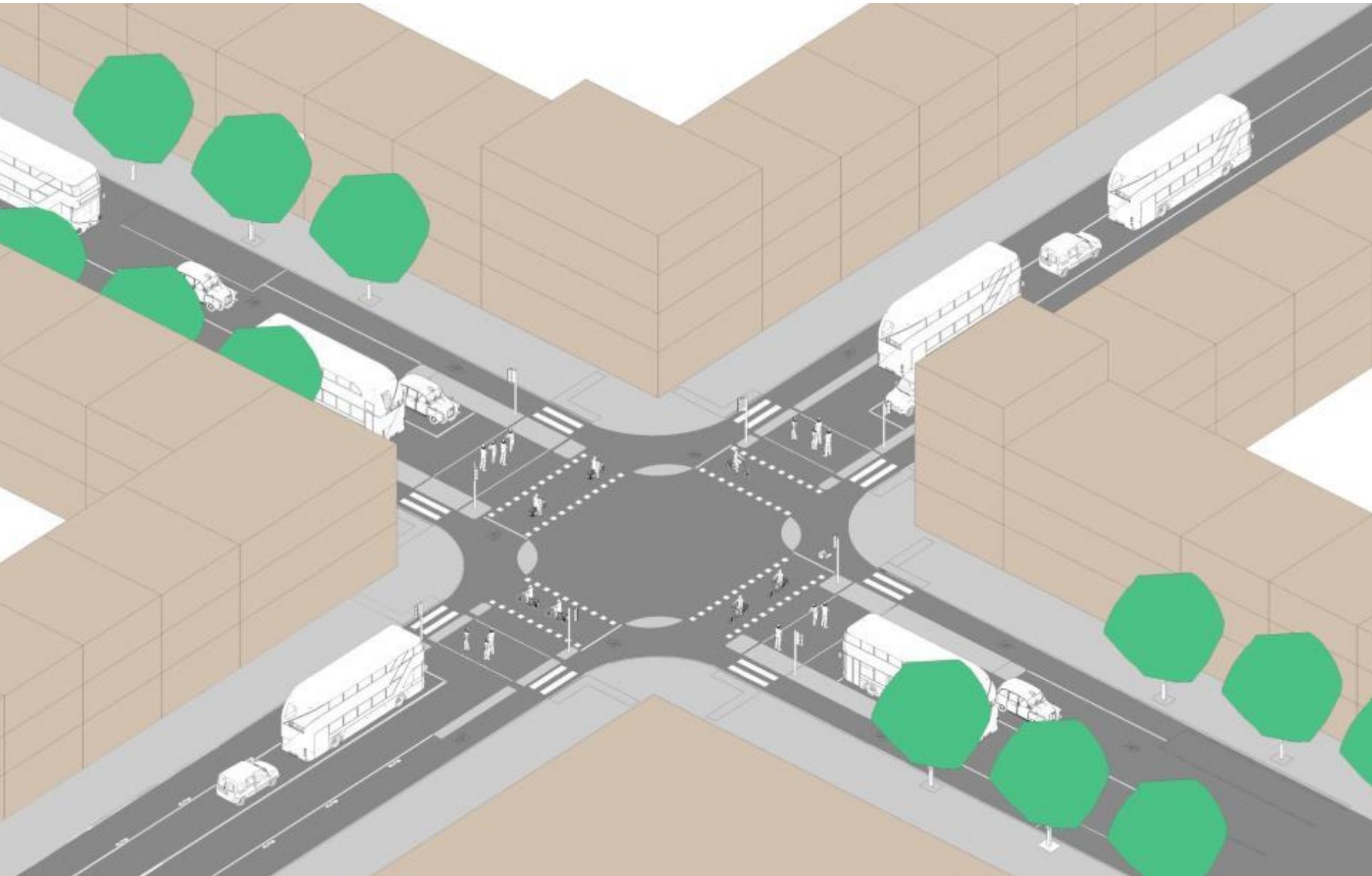
The WHITE HART
Brew Pub
The WHITE HART

Hold the Left Turn

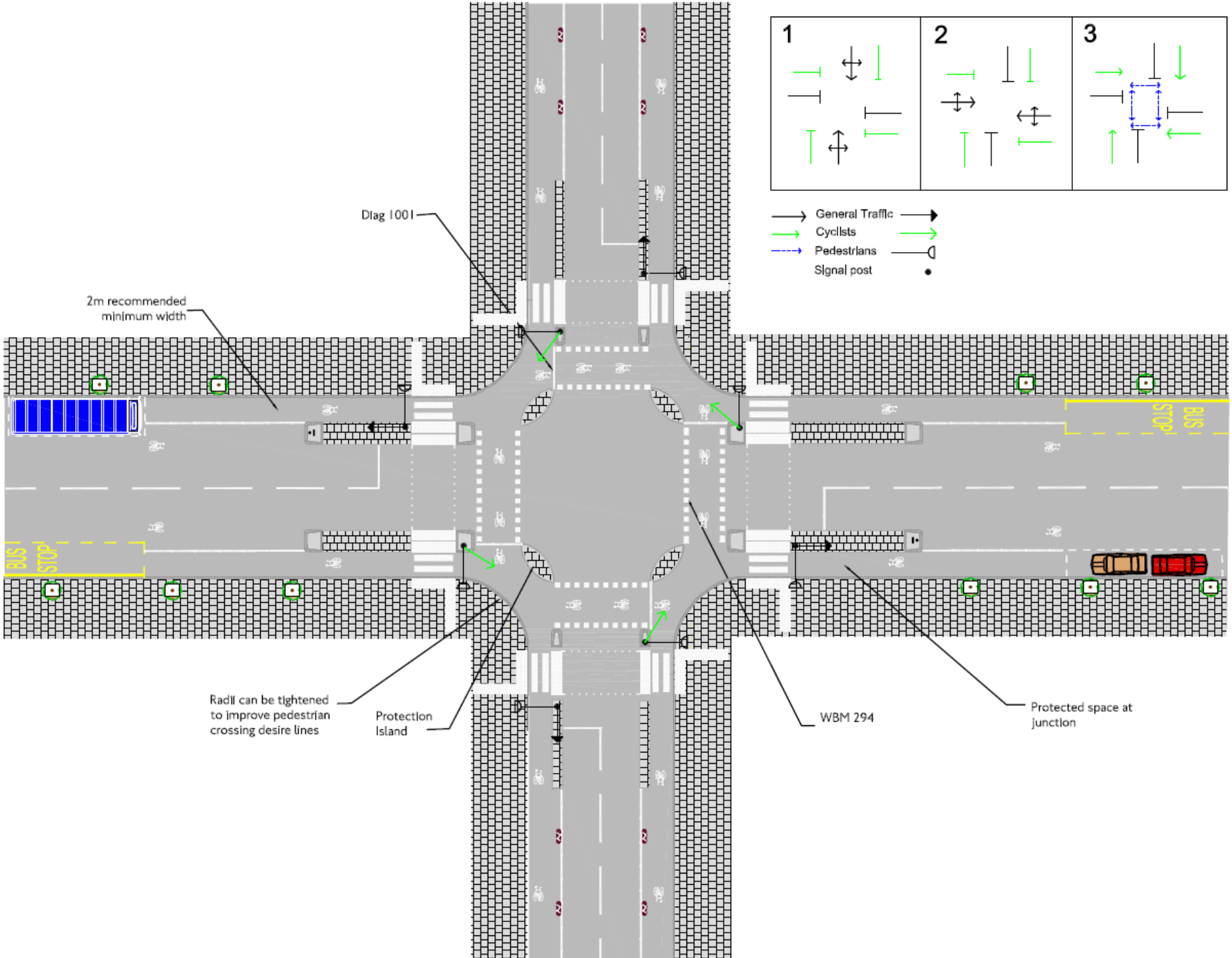
Hold the Left Turn

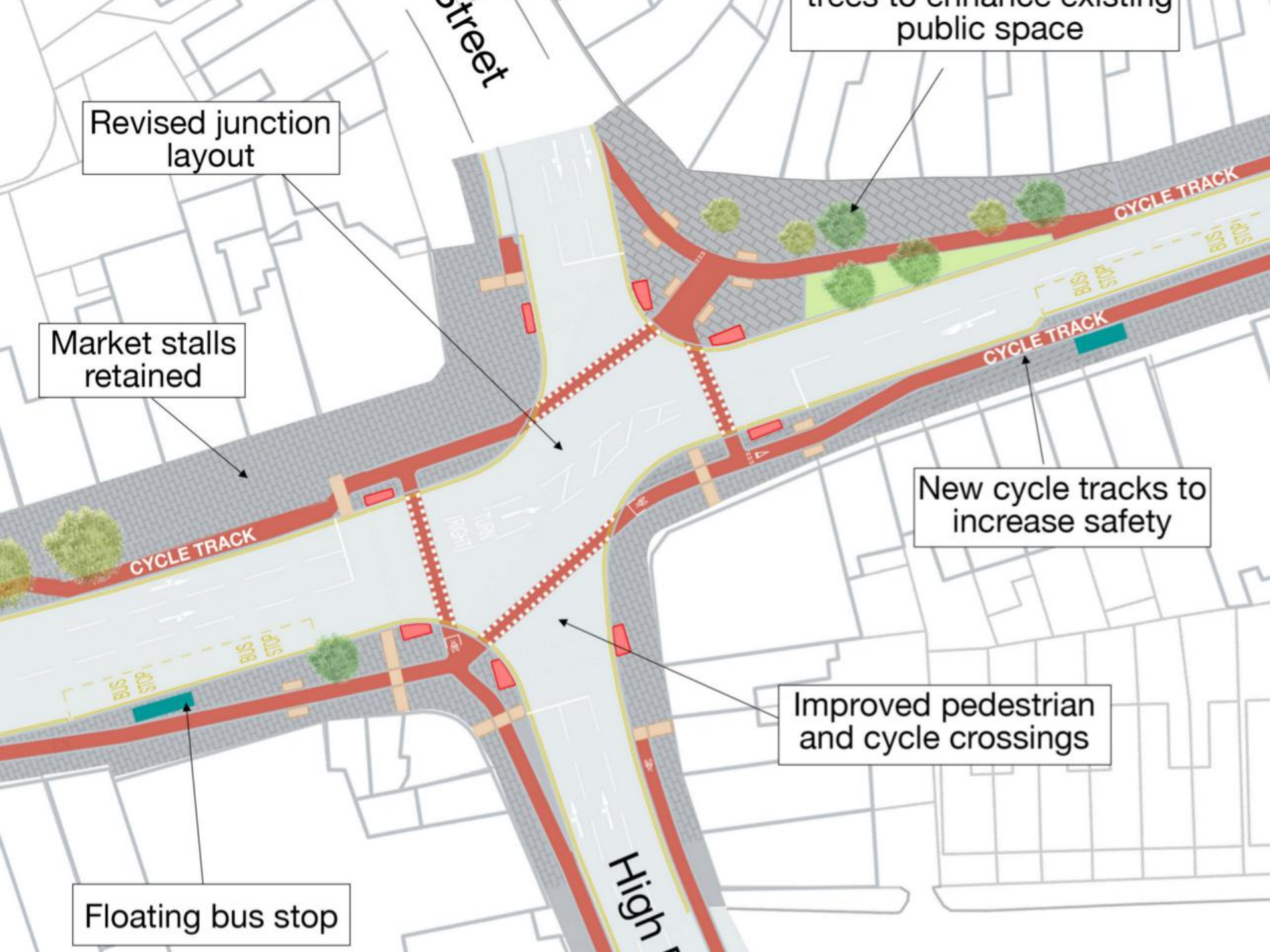

2.00
3.00
273
279
BUS
ONLY

Dutch-type layouts



Centrumring S 100
Amsterdam Centraal
Centrum-Zuidzijde Byzantium
Centraal Station Ring A10
Centrumring S 100
250


1
2
3
General Traffic
Cyclists
Pedestrians
Signal post
Diag 1001
2m recommended minimum width
BUS STOP
BUS STOP
Radii can be tightened to improve pedestrian crossing desire lines
Protection Island
WBM 294
Protected space at junction


trees to enhance existing public space
Revised junction layout
Market stalls retained
CYCLE TRACK
CYCLE TRACK
CYCLE TRACK
New cycle tracks to increase safety
Improved pedestrian and cycle crossings
Floating bus stop
BUS STOP
BUS STOP
BUS STOP
BUS STOP