Rialtas na hÉireann
Government of Ireland

NTA
Údarás Náisiúnta Iompair
National Transport Authority

ACTIVE TRAVEL

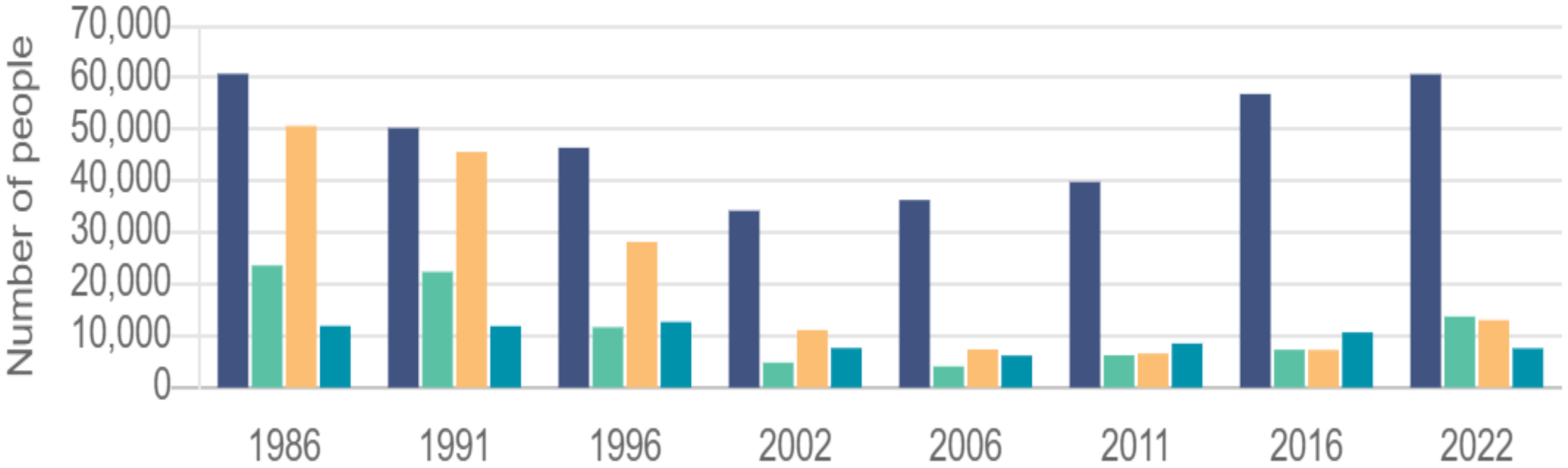
# Cycle Design Manual

## Introduction

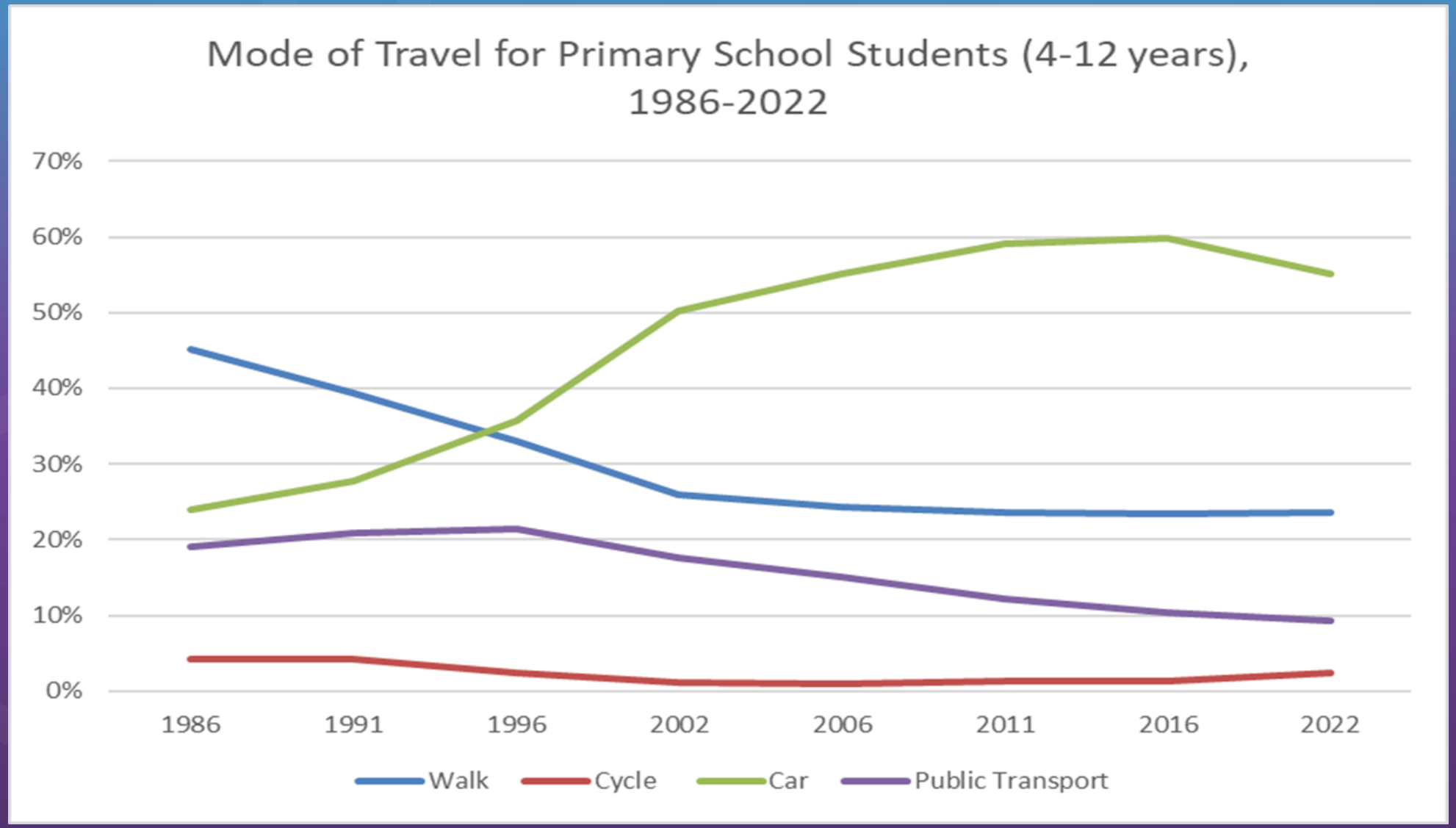
October 2023


The face of cycling in Ireland is changing!

# People cycling to work/education 1986-2022



# Mode of travel to Primary School 1986-2022

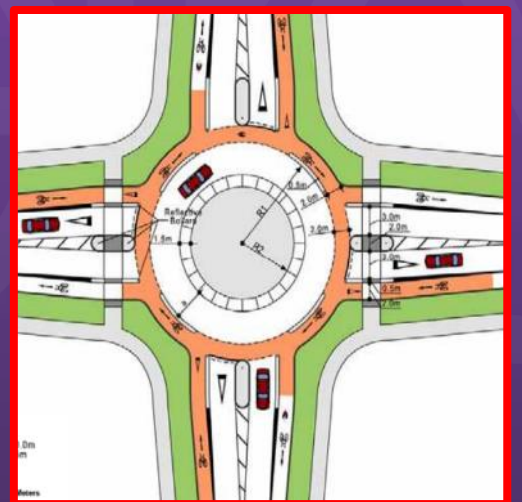


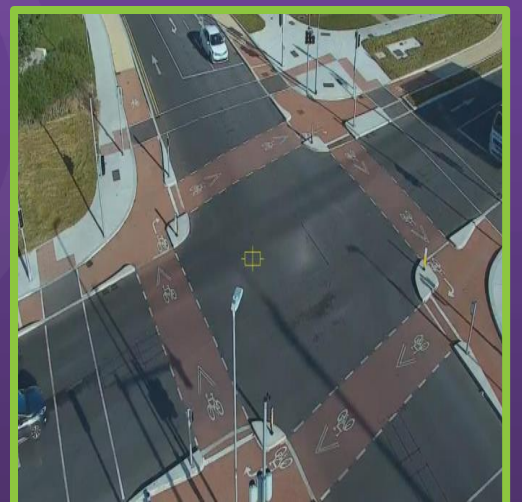
# Previous Design Manual

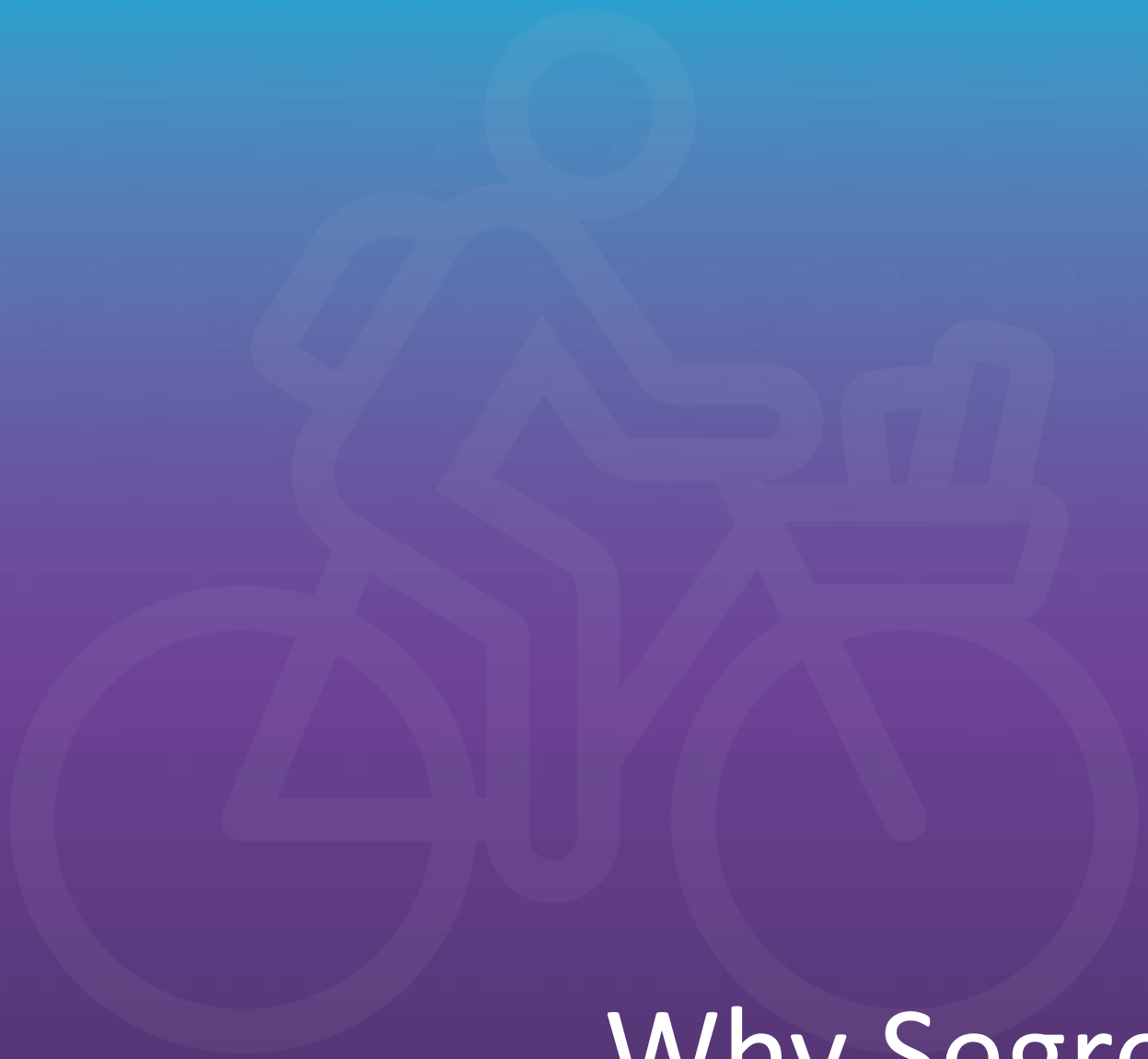
- Current design manual in place since 2011.
- High quality document which was of its time.
- The type of infrastructure that is seen as necessary to attract new cycle users in line with CAP Targets were available but not promoted in 2011 manual.

# Previous Design Manual

Change from sharing with traffic → Segregated from traffic







# Why Segregate?


Source: BicycleDutch


Source: You Tube/ Simon Burrell


0:43
RECORDED WITH
SCREENCAST MATIC

Source: An Garda Síochána

# Who we are designing for:

# Segregation

- Grand Canal Cycleway, Dublin.

# Segregation or Not?


Source: Google Maps

# Which would you rather be on?

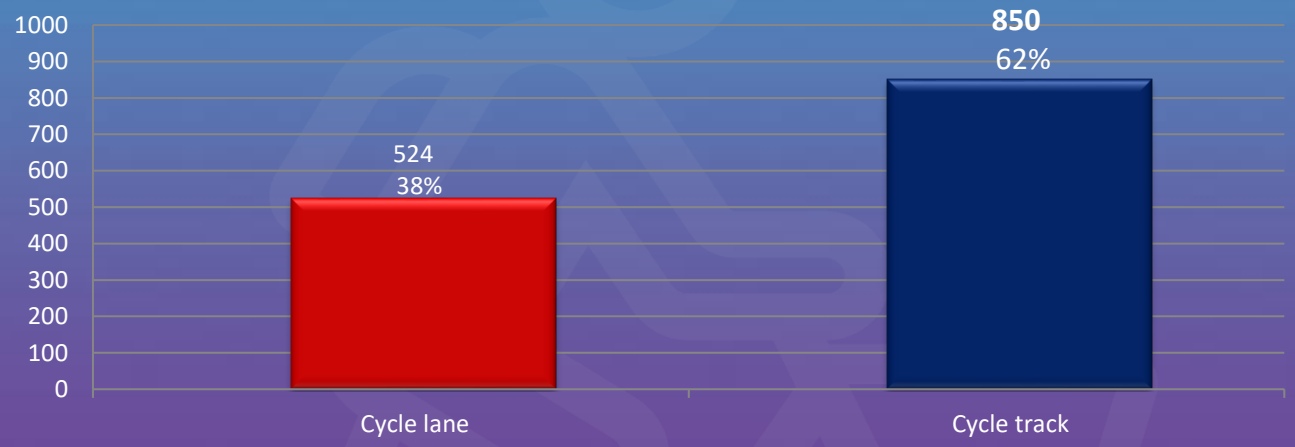
Grove Road - Lane

Premium Cycle Route - Track

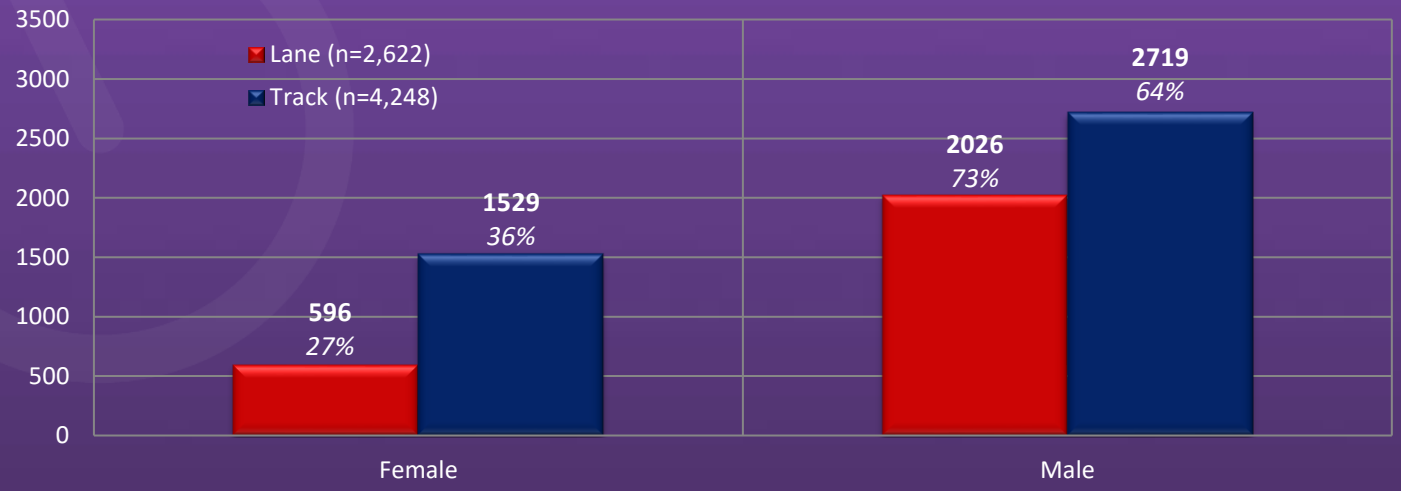
Eastbound from Rathmines Road to Baggot Street, off peak.

# Who is using the facilities?

## *Volume split of cycle routes between 8-10am*



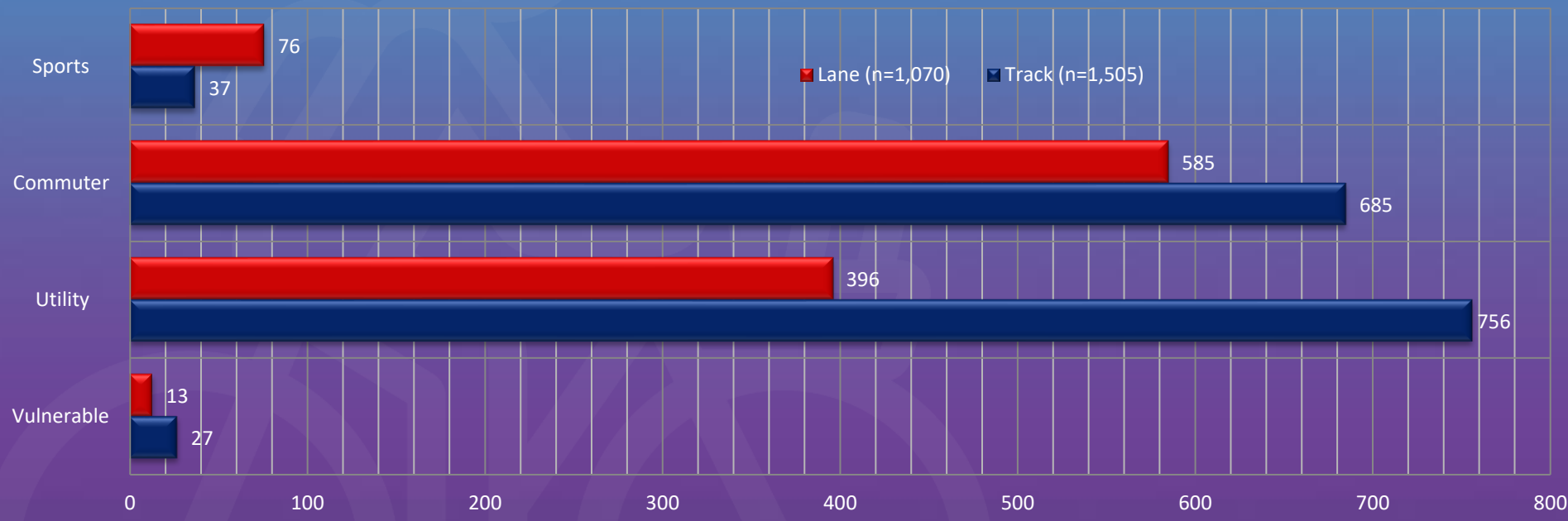

## *Gender split of each route*




Increasing the Participation in Cycling - Case Study of the Grand Canal Premium Route - Eoin O'Mahony, Joe Seymour & Matthew Richardson - Aecom/TCD

# Who is using the facilities?

*User-type profile for each route*







# Walking and Cycling Index 2021

**What percentage of residents would be helped to cycle more by better facilities?**

**65%**
More traffic-free cycle routes away from roads, eg through parks or along waterways

**70%** in 2019

**63%**
More cycle tracks along roads that are physically separated from traffic and pedestrians

**69%** in 2019

**64%**
More signposted local cycle routes along quieter streets

**68%** in 2019

**57%**
Better links with public transport (eg secure cycle parking at train /DART/LUAS stations)

**61%** in 2019

Dublin has **2,392** free cycle parking spaces across all **118** railway stations and tram stops

# Continuous Networks

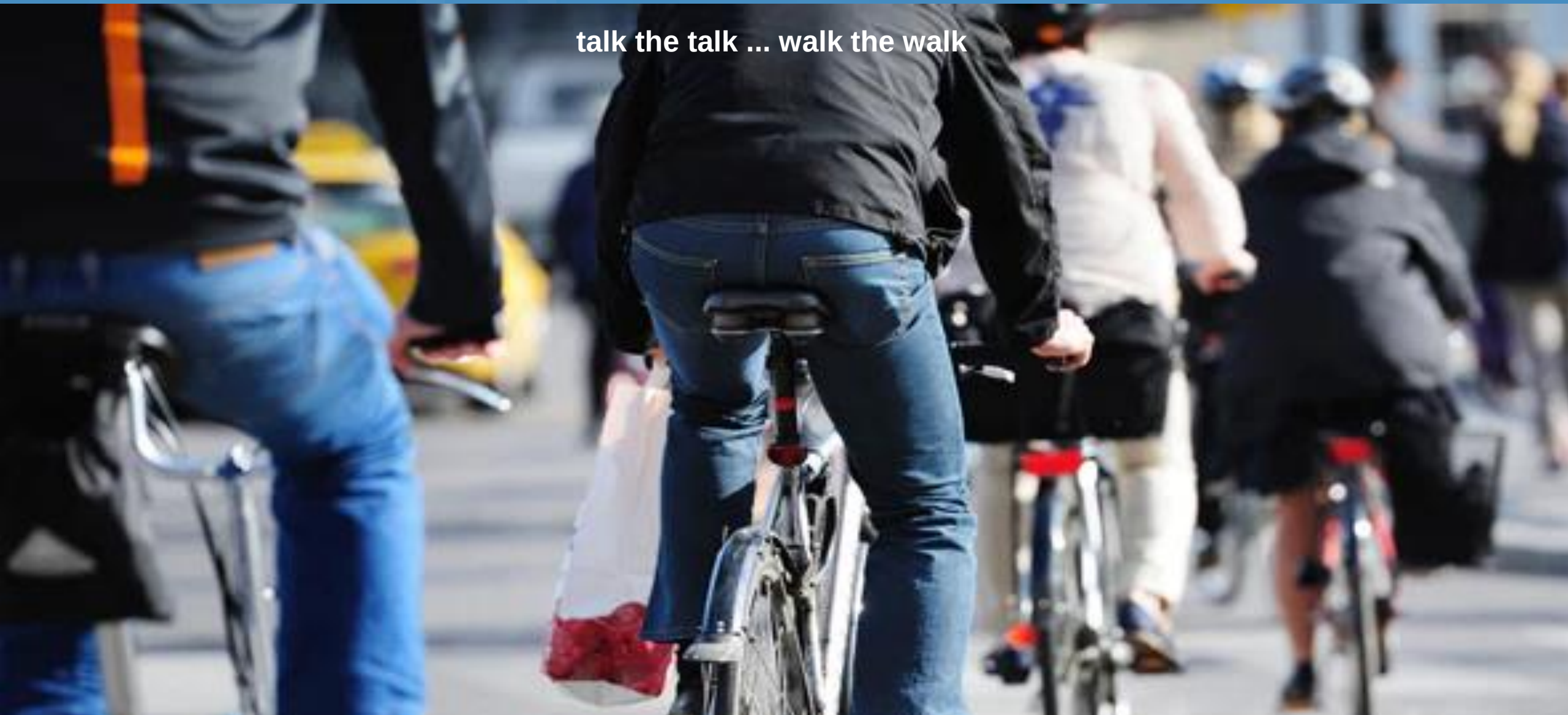
- The creation of continuous networks in our urban areas is our primary aim.
- It will not be possible to get the desirable minimum requirements everywhere, but it is important that the best possible infrastructure is provided in these weak links.
- Relaxations and Departure are being introduced to facilitate this process.

# Cycle Design Manual

# New Design Manual

- Developed over the last 2 years, taking into account developing knowledge in Ireland and Internationally.
- More focus on designing for a wider variety of users and cycles.
- More focus on segregation of cyclists from vehicles and pedestrians.

# I’m a cyclist too……..

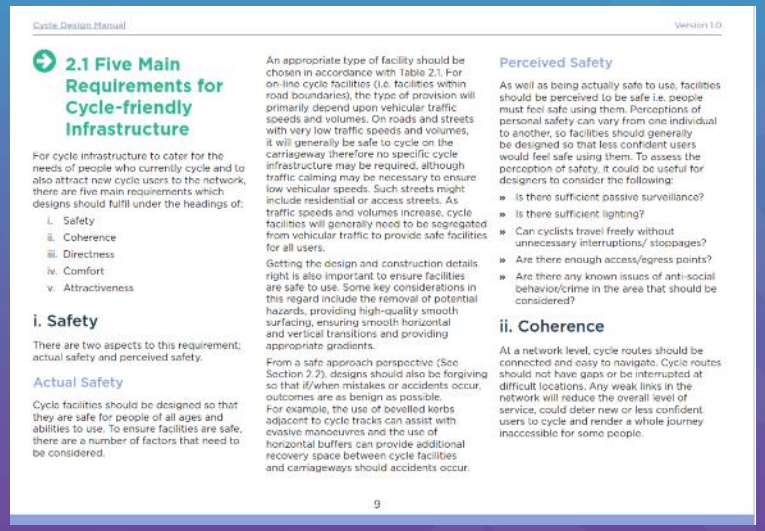


# Safe Systems Approach

- Humans are fragile and make mistakes - key is to ensure designs are forgiving to prevent fatal or serious injuries

Safer Roads and Road Sides → Safer Speeds → Safe and Healthy Modes of Travel → Reduce the number and severity of injuries

# New Design Manual



Cycle Design Manual Version 1.0

## 2.1 Five Main Requirements for Cycle-friendly Infrastructure

For cycle infrastructure to cater for the needs of people who currently cycle and to also attract new cycle users to the network, there are five main requirements which designs should fulfil under the headings of:

i. Safety
ii. Coherence
iii. Directness
iv. Comfort
v. Attractiveness

### i. Safety

There are two aspects to this requirement; actual safety and perceived safety.

#### Actual Safety

Cycle facilities should be designed so that they are safe for people of all ages and abilities to use. To ensure facilities are safe, there are a number of factors that need to be considered.

An appropriate type of facility should be chosen in accordance with Table 2.1. For on-line cycle facilities (i.e. facilities within road boundaries), the type of provision will primarily depend upon vehicular traffic speeds and volumes. On roads and streets with very low traffic speeds and volumes, it will generally be safe to cycle on the carriageway therefore no specific cycle infrastructure may be required, although traffic calming may be necessary to ensure low vehicular speeds. Such streets might include residential or access streets. As traffic speeds and volumes increase, cycle facilities will generally need to be segregated from vehicular traffic to provide safe facilities for all users.

Getting the design and construction details right is also important to ensure facilities are safe to use. Some key considerations in this regard include the removal of potential hazards, providing high-quality smooth surfacing, ensuring smooth horizontal and vertical transitions and providing appropriate gradients.

From a safe approach perspective (See Section 2.2), designs should also be forgiving so that if/when mistakes or accidents occur, outcomes are as benign as possible. For example, the use of bevelled kerbs adjacent to cycle tracks can assist with evasive manoeuvres and the use of horizontal buffers can provide additional recovery space between cycle facilities and carriageways should accidents occur.

#### Perceived Safety

As well as being actually safe to use, facilities should be perceived to be safe i.e. people must feel safe using them. Perceptions of personal safety can vary from one individual to another, so facilities should generally be designed so that less confident users would feel safe using them. To assess the perception of safety, it could be useful for designers to consider the following:

- Is there sufficient passive surveillance?
- Is there sufficient lighting?
- Can cyclists travel freely without unnecessary interruptions/ stoppages?
- Are there enough access/egress points?
- Are there any known issues of anti-social behavior/crime in the area that should be considered?

### ii. Coherence

At a network level, cycle routes should be connected and easy to navigate. Cycle routes should not have gaps or be interrupted at difficult locations. Any weak links in the network will reduce the overall level of service, could deter new or less confident users to cycle and render a whole journey inaccessible for some people.

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Cycle Design Manual Version 1.0

Clear signing and wayfinding can be particularly important where cycle routes use minor roads and off-line facilities that are not signed for other traffic. See example in Figure 2.1. Wayfinding can be very useful for new users and visitors to navigate their way around the cycle network. Refer to Section 5 for further guidance on signing and wayfinding.



Figure 2.1 Example of wayfinding on the Dun Laoghaire Rathdown County Council Active School Travel Scheme

Coherence is also important at an individual scheme level, particularly where a number of different link types are connected. For example where the cycle provision changes from quiet street to a cycle track (Figure 2.2) the transition must be logical and intuitive.



Figure 2.2: Example of a seemless transition from a quiet street to a cycle track, Eden Park, Dublin.

Similarly, at large or complex junctions the route for cyclists through the junction should be clearly defined and easily understood by all users. The use of red surfacing and road markings (see Figure 2.3) will be key design tools in this regard.

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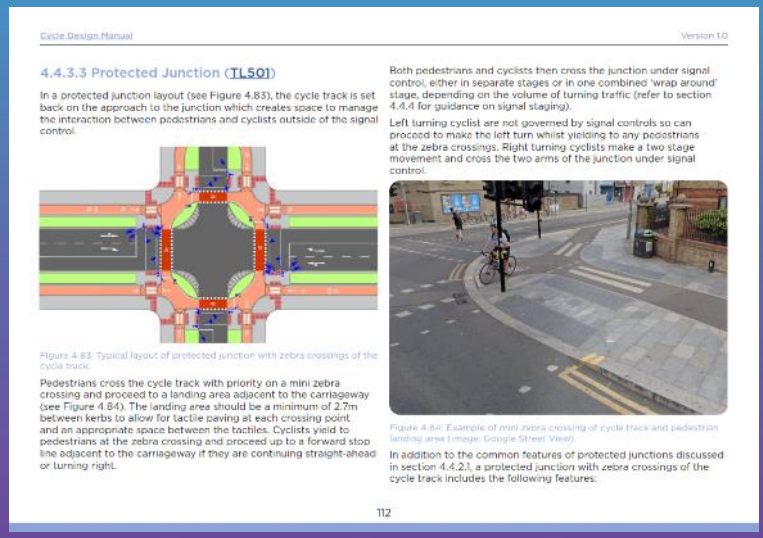

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### 4.4.3.3 Protected Junction (TL501)

In a protected junction layout (see Figure 4.83), the cycle track is set back on the approach to the junction which creates space to manage the interaction between pedestrians and cyclists outside of the signal control.



Figure 4.83: Typical layout of protected junction with zebra crossings of the cycle track.

Pedestrians cross the cycle track with priority on a mini zebra crossing and proceed to a landing area adjacent to the carriageway (see Figure 4.84). The landing area should be a minimum of 2.7m between kerbs to allow for tactile paving at each crossing point and an appropriate space between the tactiles. Cyclists yield to pedestrians at the zebra crossing and proceed up to a forward stop line adjacent to the carriageway if they are continuing straight-ahead or turning right.

Both pedestrians and cyclists then cross the junction under signal control, either in separate stages or in one combined 'wrap around' stage, depending on the volume of turning traffic (refer to section 4.4.4 for guidance on signal staging).

Left turning cyclist are not governed by signal controls so can proceed to make the left turn whilst yielding to any pedestrians at the zebra crossings. Right turning cyclists make a two stage movement and cross the two arms of the junction under signal control.



Figure 4.84: Example of mini zebra crossing of cycle track and pedestrian landing area (Image: Google Street View).

In addition to the common features of protected junctions discussed in section 4.4.2.1, a protected junction with zebra crossings of the cycle track includes the following features:

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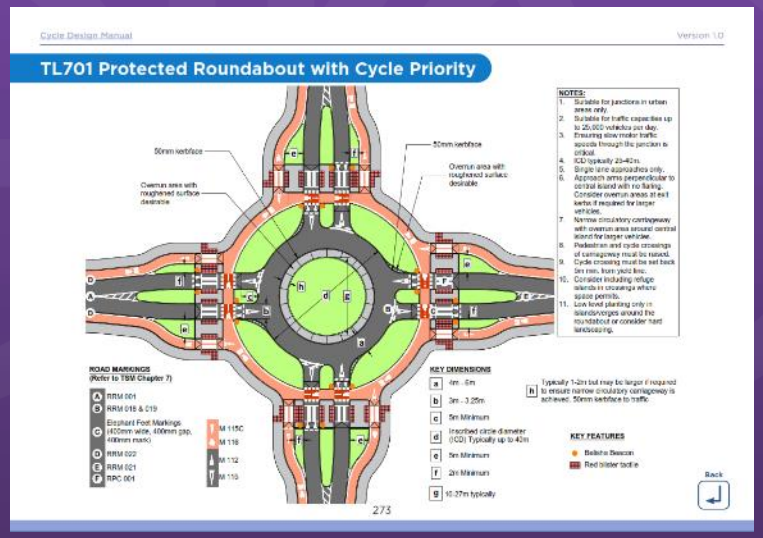

Cycle Design Manual Version 1.0

## TL701 Protected Roundabout with Cycle Priority




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Cycle Design Manual Version 1.0

## TL701 Protected Roundabout with Cycle Priority

### Cyclist perspective view approaching roudabout



**Key Features:**

1. Protected cycle track.
2. Cycle track rises to the same level as the at-grade crossing.
3. The pedestrian crossing area is flush, on a flat top hump, across the cycle track, with tactile paving as appropriate. Cyclists must yield to crossing pedestrians.
4. Pedestrian refuge area.
5. Cyclists entering the roundabout must yield to the circulating cyclists.
6. Raised pedestrian zebra crossing followed by parallel cycle zebra crossing with single narrow traffic lane entry/exit.
7. SUDS / public realm greening opportunities.

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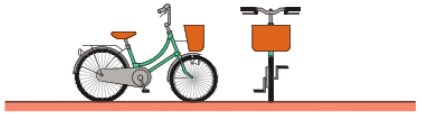
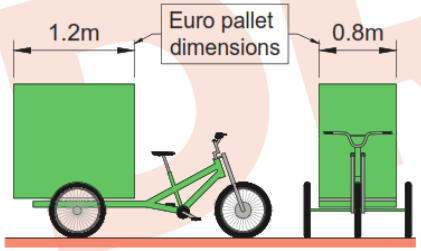
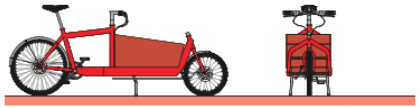
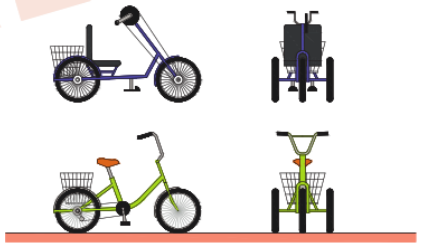
# New Design Vehicles

- Designing for a wider variety of cycles, including the wide range of accessible cycles and cargo bikes which are growing in availability and require wider infrastructure.
- Universal design vehicle: 2.8m long x 1.2m wide.
- 8 to 80 design principals at its core.

| Standard Bicyle | Wheelchair Bicycle | Child Trailer Bicycle |
|---|---|---|
|  |  |  |
| • 1.8m length<br>• 0.65m width<br>• 1.65m turning circle | • 2.65m length<br>• 0.66m width<br>• Additional turning circle requirements up to 3.2m | • Additional turning circle requirements up to 3.2m<br>• Trailer attached (up to 1.3m long) |
| **Cargo Bicycle** | **Front Loading Cargo Bicycle** | **Tricycle / Handcycle** |
|  |  |  |
| • Trailer can be attached (extra 1.6m long) | • 2.0m - 2.5m<br>• Up to 0.85m wide<br>• Additional turning circle requirements up to 2.65m | • Additional turning circle requirements up to 2.65m<br>• Lower eye height for visibility<br>• Lower clearance to kerbs and other objects |

# New Design Manual

- Clearer instruction to designers on the type and widths of cycle facilities to be used.
- Departure from standards process initiated to raise quality of facilities.

Table 2.1 - Cycle facilities selection guide

| Speed Limit | Two-way traffic flow (peak hour pcus) | Remote Cycleway/ Greenway | Standard cycle track (incl. two-way tracks) | Stepped cycle track | Protected Cycle Lane | Mandatory Cycle Lane | Mixed Traffic |
|---|---|---|---|---|---|---|---|
| 20km/h | < 200 | | | | | | |
| | 200-400 | | | | | | |
| | > 400 | | | | | | |
| 30km/h | < 200 | | | | | | |
| | 200-400 | | | | | | |
| | > 400 | | | | | | |
| 40km/h | < 200 | | | | | | |
| | 200-400 | | | | | | |
| | > 400 | | | | | | |
| 50km/h | < 200 | | | | | | |
| | 200-400 | | | | | | |
| | > 400 | | | | | | |
| 60km/h | Any | | | | | | |
| ≥ 80 km/h | Any | | | | | | |

Provision should be suitable for most users
Provision may not be suitable for all and may exclude some potential users
Provision not recommended as it's unlikely to be suitable for a range of users
Provision not suitable

Table 2.2 - Width Calculator

**A. Inside Clearance**

| Type | Additional width required (m) |
|---|---|
| Flush or near-flush surface including low and splayed kerbs up to 60mm high | 0.00 |
| Kerbs 61mm to 150mm high | 0.20 |
| Vertical feature from 151mm to 600mm high | 0.25 |
| Vertical feature above 600mm high | 0.50 |

**B. Central Width**

| Direction | Flow (cycles per peak hour) | Desirable minimum width (m) | Absolute minimum width (m) |
|---|---|---|---|
| One-way cycle track | <300 | 2.00 | 1.5* |
| | >300 | 2.50 | 2.00 |
| Two-way cycle track | <300 | 3.00 | 2. 00 |
| | >300 | 4.00 | 3.00 |
| Cycle lane | All | 2.00 | 1.50 |
| Shared Active Travel Facility | <300 | 4.00 | 3.00 |
| | >300 | 5.00 | 4.00 |

*May not cater for comfortable overtaking or cycling two abreast

**C. Outside Clearance**

| Type | Additional width required (m) |
|---|---|
| Flush or near-flush surface including low and splayed kerbs up to 60mm high | 0.00 |
| Kerbs 61mm to 150mm high | 0.20 |
| Vertical feature from 151mm to 600mm high | 0.25 |
| Vertical feature above 600mm high | 0.50 |

| D. Buffer Width | One-way cycle Tracks | | Two-way cycle track | |
|---|---|---|---|---|
| Speed limit (kph) | Desirable min buffer (m) | Absolute min buffer (m) | Desirable min buffer (m) | Absolute min buffer (m) |
| ≤30 | 0.00 | 0.00 | 0.50 | 0.30 |
| 40/50 | 0.50 | 0.00 | 0.50 | 0.30 |
| 60 | 1.00 | 0.50 | 1.00 | 0.50 |
| 80 | 2.00** | 1.50** | 2.00** | 1.50** |
| 100 | 3.50*** | 1.50*** | 3.50*** | 1.50*** |

**including any hard strip *** Excluding any hard shoulder

**Notes:**

i. Desirable minimum widths should be used when calculating required widths of facilities. Where desirable values cannot be achieved, incremental reductions towards absolute minimum values may be considered.

ii. The use of widths less than the above guidance should be avoided. In exceptional circumstances where widths cannot comply with the guidance, the designer should seek a departure from standard and this should be approved by the relevant Sanctioning Authority prior to incorporation into the design.

iii. On gradients greater than 3%, cycle track width should be increased by 0.25 m to allow for greater lateral movement.

iv. Where gullies are present on a cycle track that do not allow cycles to easily overrun, the cycle track width should be increased by the widths of the gully.

# New Design Manual

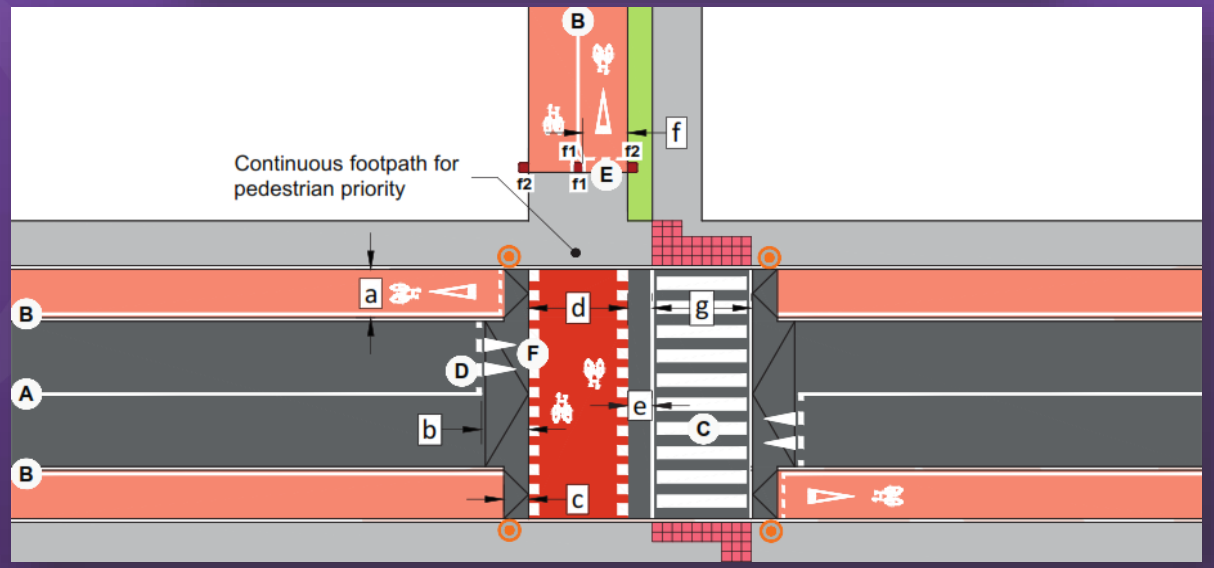
- Wider infrastructure to allow more social cycling and also overtaking of slower cyclists.
- More emphasise on reducing volume and speed of vehicles to allow cyclists to share the carriageway.

# Contra Flow Cycle Lanes

- More information on providing for contra flow cycling with use of shared street now proposed.
- Minimum carriageway widths are recommended for two-way cycling on one-way shared streets.

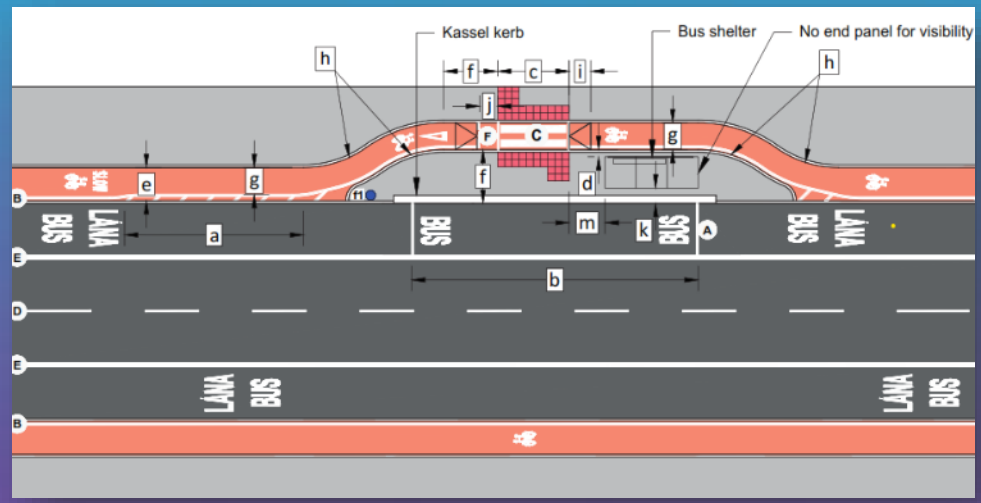
# Zebra Crossings

- Introduction of mini-zebra crossings across cycle lanes to give priority to pedestrians.
- Introducing parallel Zebra Crossings.
- Marketing programme to be developed with RSA to improve road user behaviours.



# Bus Stop Bypasses

- Island bus stops have been implemented in Ireland for many years.
- New manual looks at introducing measures to improve experience for pedestrians:
  - Narrowing of cycle lane.
  - Deflection of cyclists.
  - Zebra crossing with possible addition of audible tactile units.




# Priority Junctions

- The most common type of junction.
- More emphasise placed on continuation of cycle and pedestrian facilities across side roads.
- Will need drivers to yield right of way; while this is in line with existing Rules of Road will require a change behaviours.


Full Setback

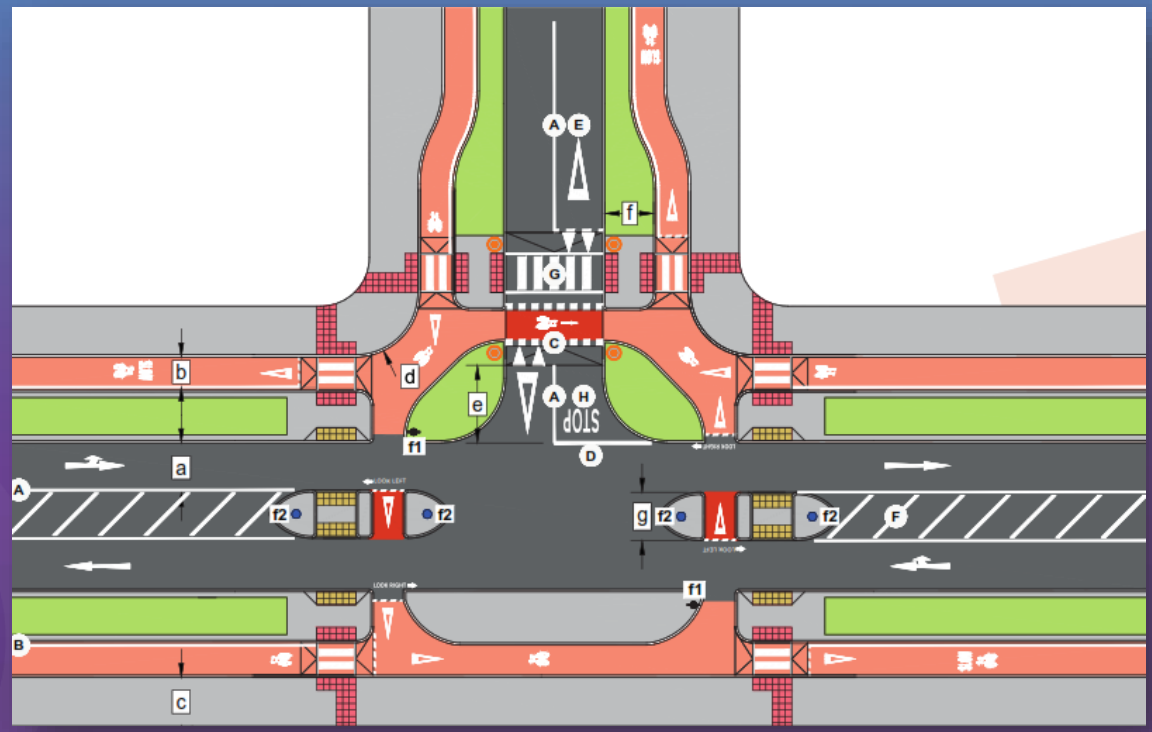

Partial Setback


No Setback


TAXI
STOP
Bothar Eighlín
ST. HELEN'S ROAD

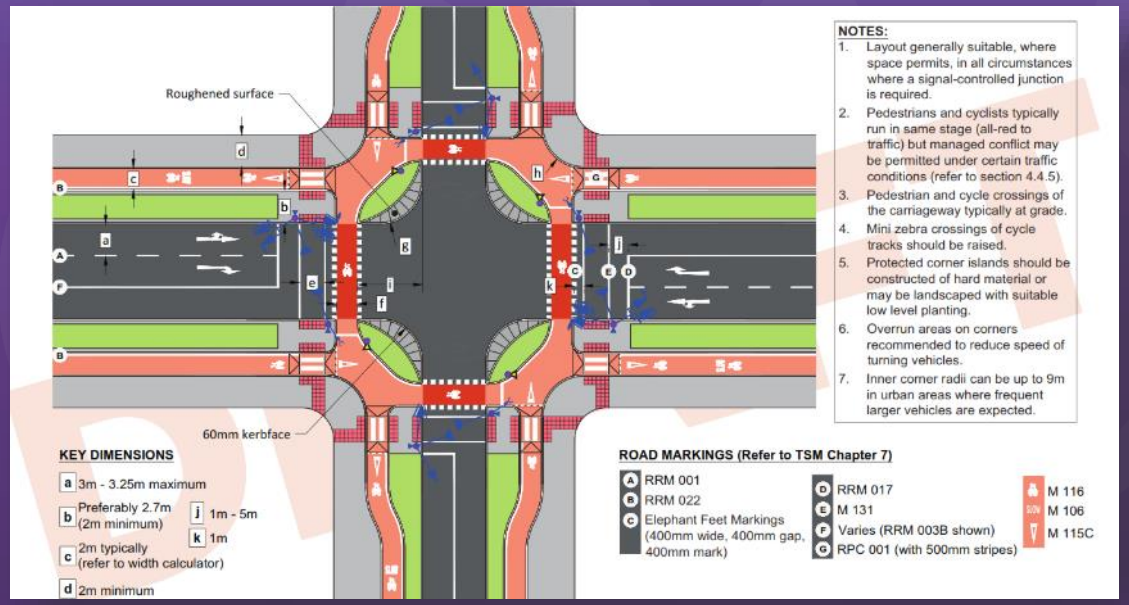
# Priority Junctions

- Introduces the concept of protected priority junctions.
- Recommending using central refuge to allow pedestrians and cyclists to cross one lane at a time which is significantly safer.

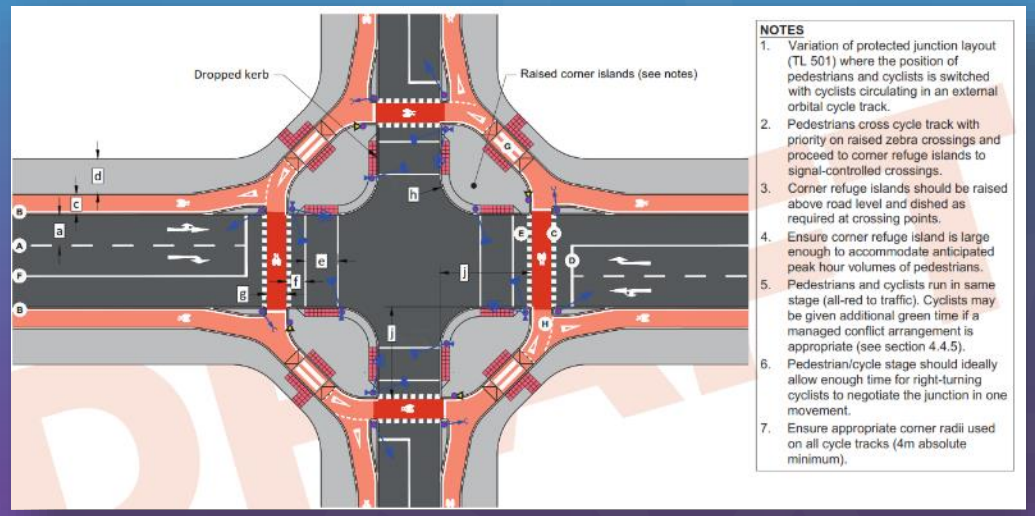


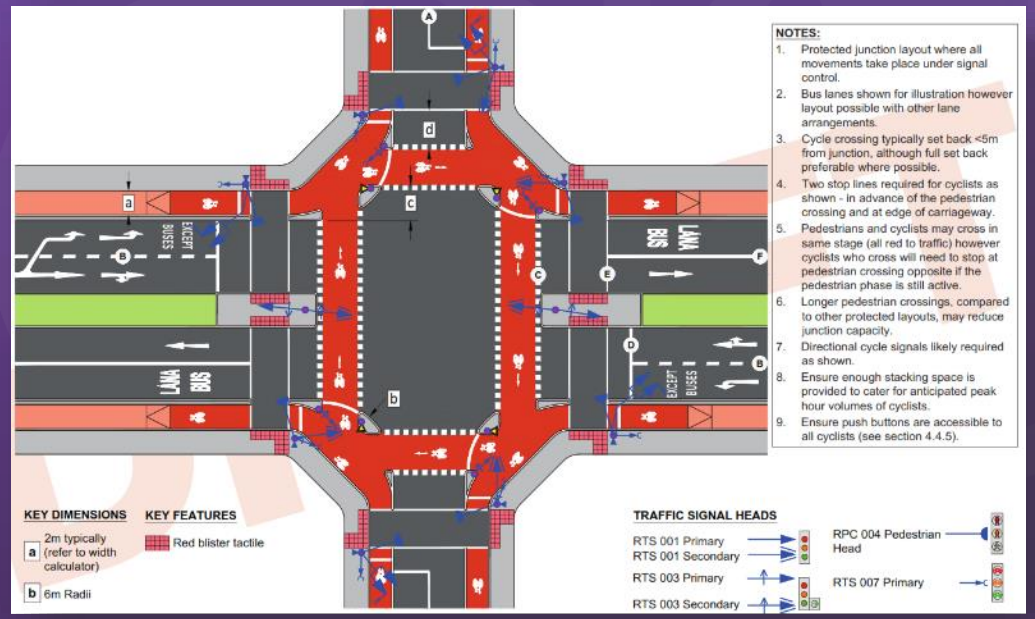
# Signal Controlled Junctions

- Introduces the concept of protected signalised junctions.



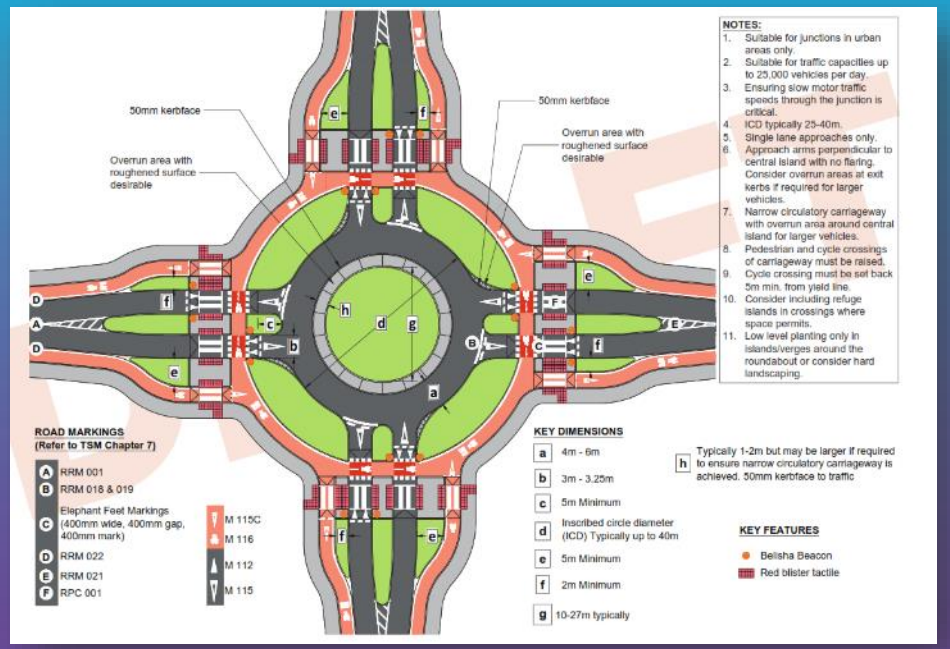

# Signal Controlled Junction



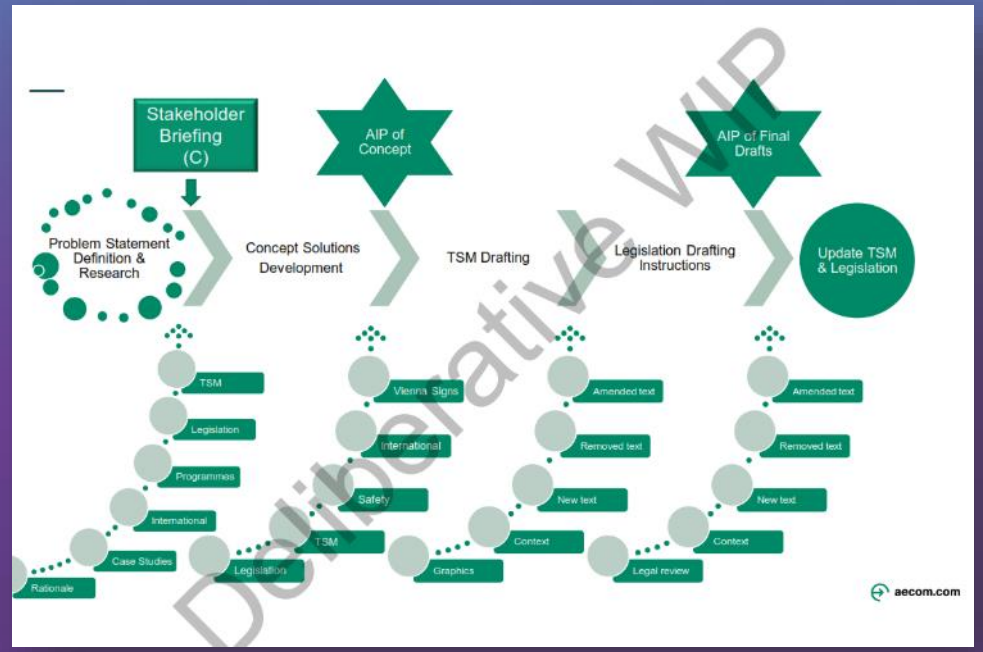

# Roundabouts

- Introduces the concept of protected roundabouts with cycle priority.
- Common in the Netherlands and being introduced in the UK and other countries.

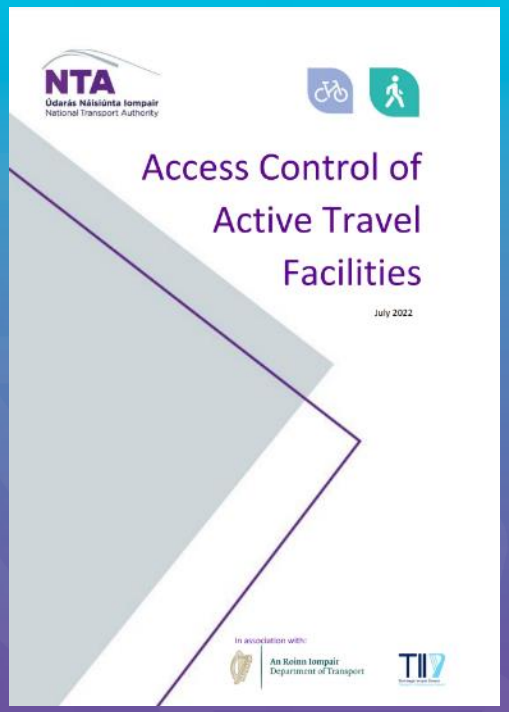


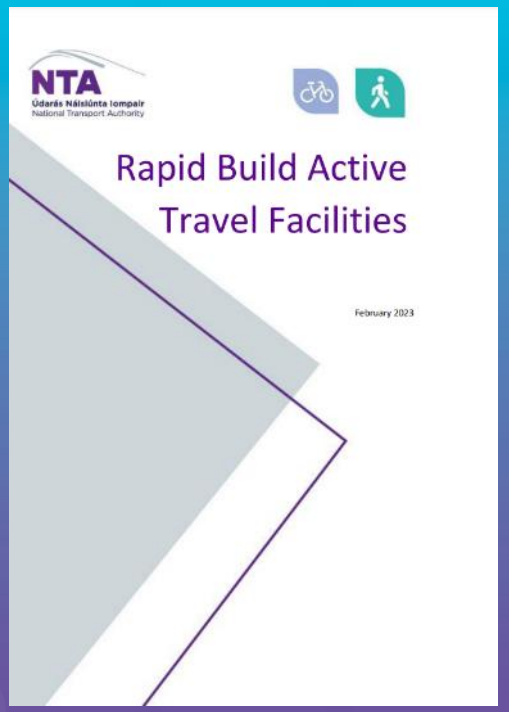

# Legislative Change

- A significant number of the new elements of the Cycle Design Manual are not catered for in current legislation, mainly signs and road markings that need to be introduced.
- A process of reviewing the background legislation and development of amendments is underway so that all new aspects of the CDM will have legislative backing.
- This is expected to be complete within 12 to 18 months.

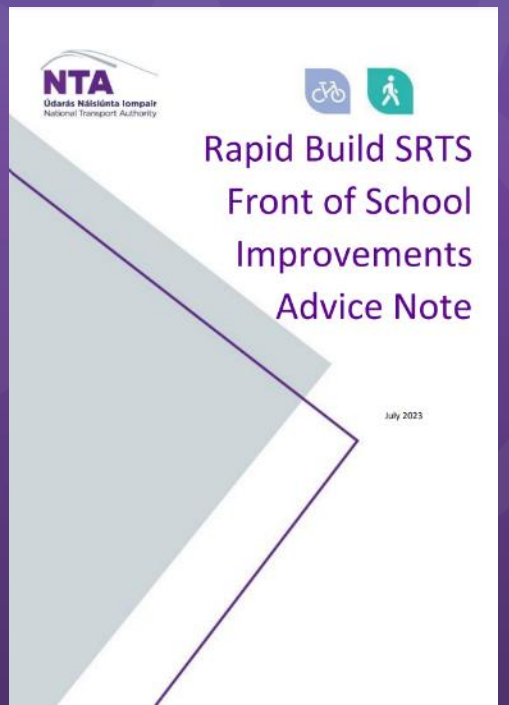


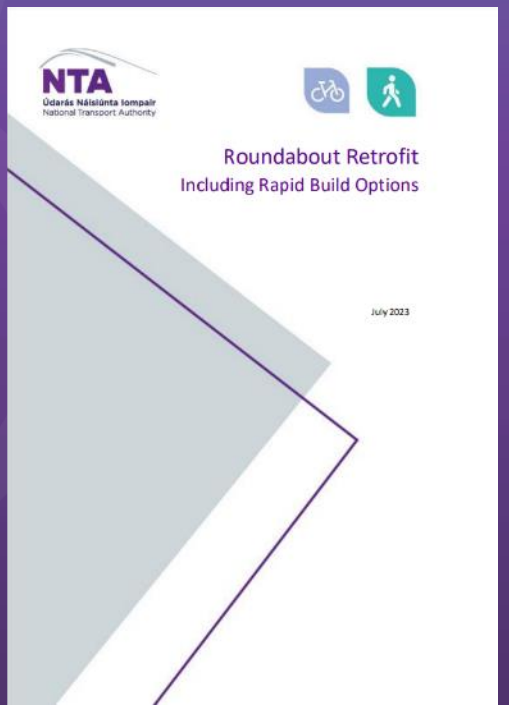
# Other Documents

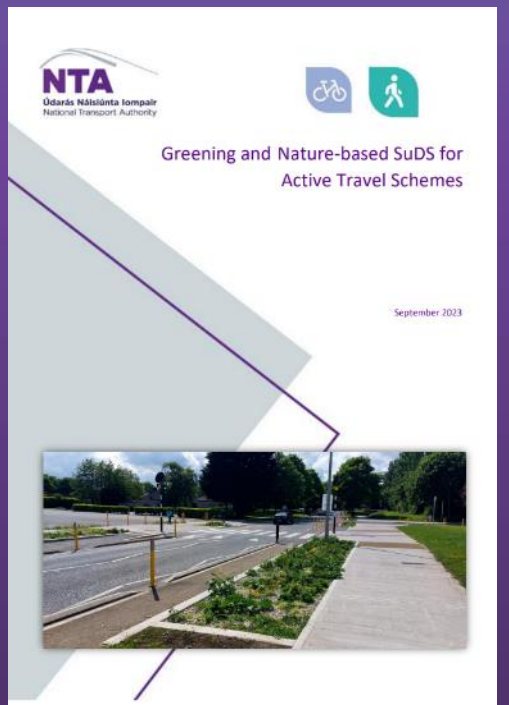






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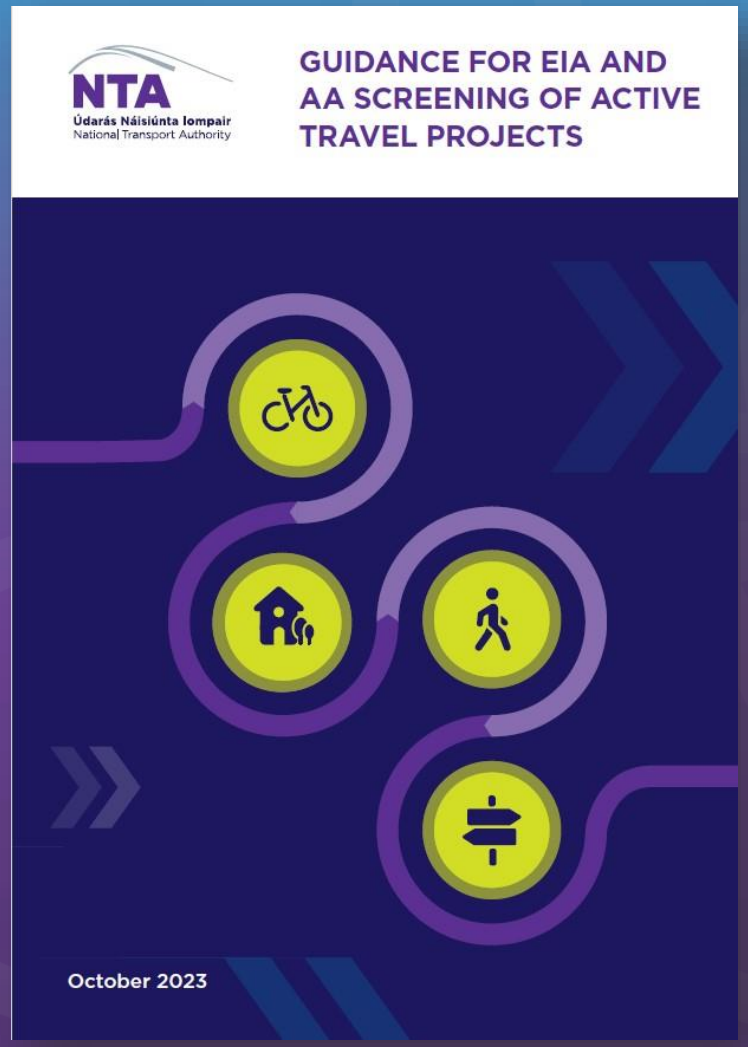
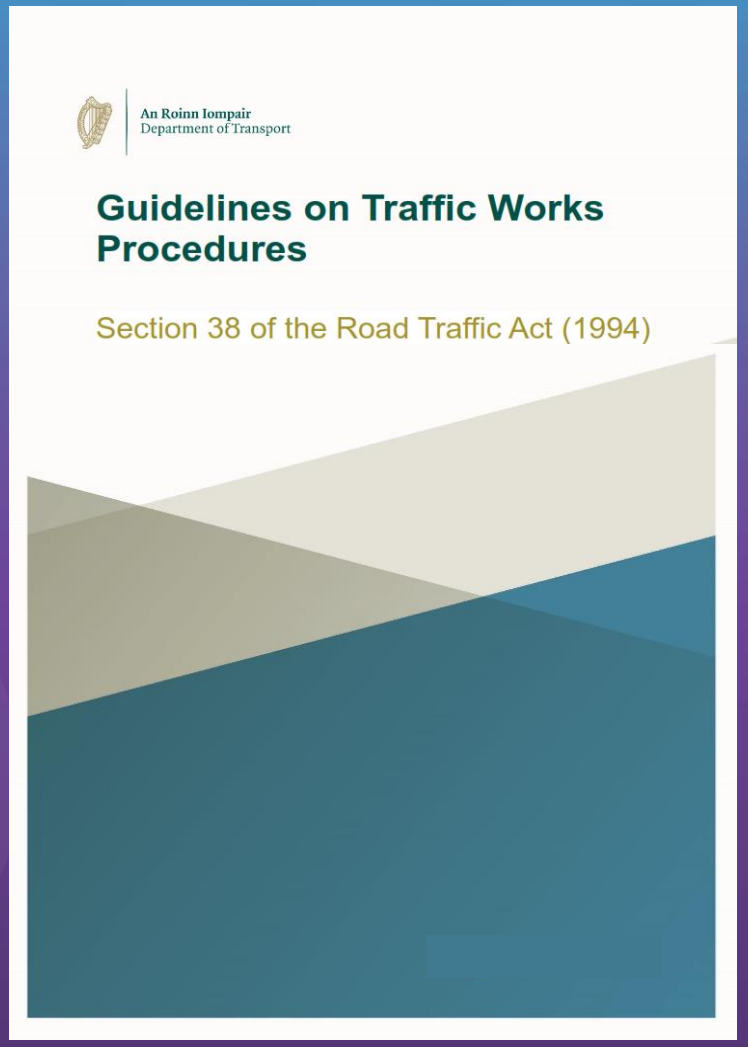


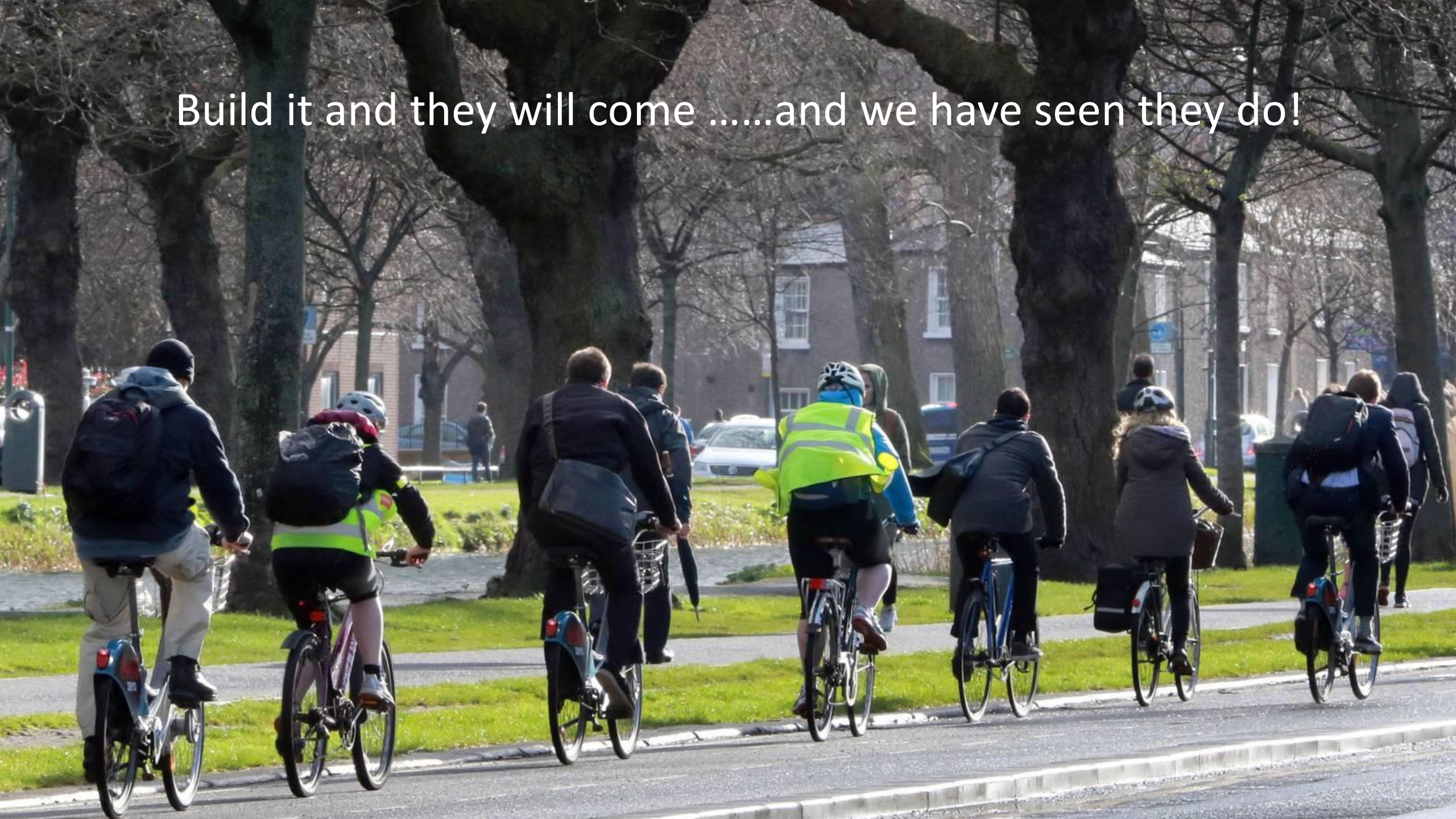



# Pedestrians



Designing for cyclists also results in better facilities for Pedestrians:

- Lower vehicle speeds.
- More crossing points.
- Buffer to footpaths with more separation to:
  - Traffic
  - Emissions
  - Noise
- Reduces footway parking.


Build it and they will come ……and we have seen they do!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