

Designing for pedestrians

Improving the quality of the pedestrian environment

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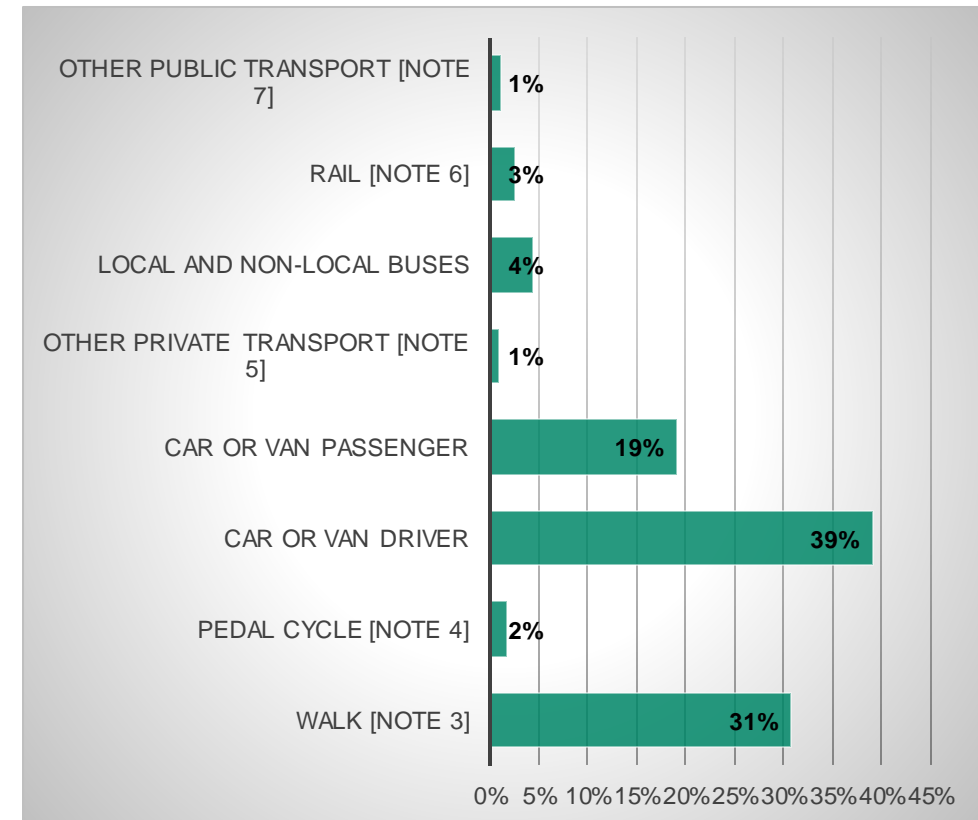
Consider this an introduction only to the topic

What's not covered

- Tactile paving
- Network planning
- Pedestrian modelling
- Shared space

Walking is fundamental to transport

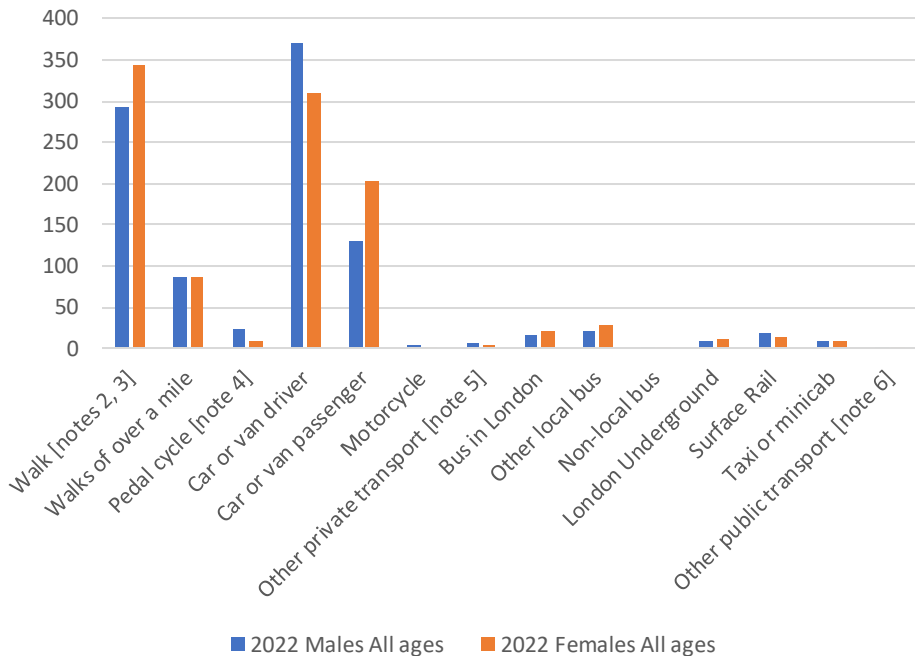
- Walking is more popular and more important than is generally understood
- More people walk on average than cycle or use a bus
- Walking is not only a mode in itself but a component of most other trips
- Failure to address weaknesses and flaws in the pedestrian aspect of a trip can compromise outcomes
- Designers should consider the whole trip experience – door to door
- *Reminder: The various duties/responsibilities under Traffic Management Act 2004 that refer to “traffic” includes pedestrians as per legal definition within Act.*



NTS0504c: Average number of trips by month and main mode (trips per person per month): England, 2002 onwards

Why do we need to reconsider how we design for walking and pedestrians?

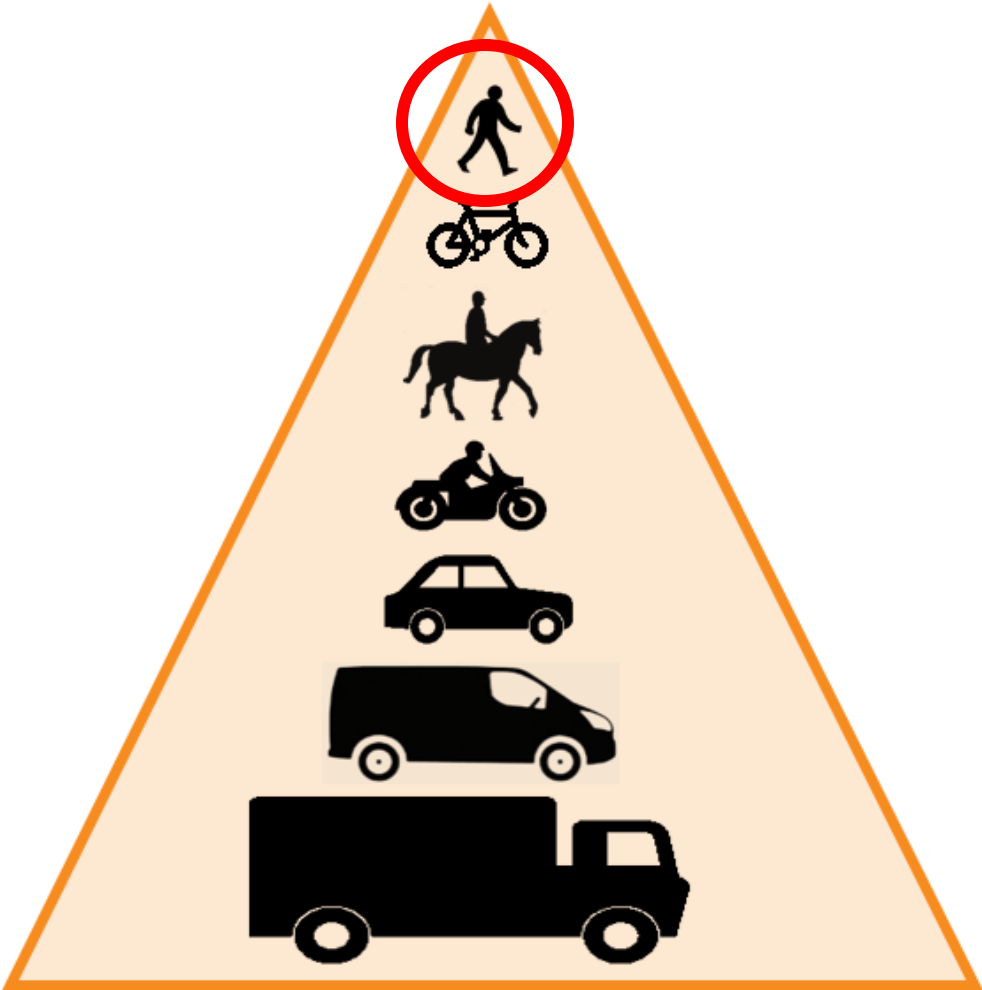
NTS0601a: Average number of trips by sex, age and main mode (trips per person per year):
England



- **Equality/Equity**; pedestrians disproportionately women or less advantaged
- **NetZero**; the most carbon neutral form of transport
- **Gear change**; policy driver
- **LTN 1/20**; potential impact on pedestrians from giving more space to cyclists
- **New Inclusive Mobility guidance**; new design requirements
- **Updated Highway Code**; changes in hierarchy/rules
- **Crashes**; stagnation in reducing casualty numbers
- **Health**; lack of physical activity and obesity
- **Liveable Neighbourhoods/Low Traffic Neighbourhoods**; streets as places and reducing car dominance

HIGHWAY CODE CHANGES 2022

RULE H1 – NEW HIERARCHY OF ROAD USERS



RESPONSIBILITY INCREASES TO TAKE
CARE AND REDUCE DANGER TO OTHERS

Rule H1 - DRIVERS of vehicles that can cause the greatest harm in the event of a collision bear the greatest responsibility to take care and reduce the danger to others. This principle applies most strongly to drivers of HGVs, LGVs, cars/taxis and motorcycles. Cyclists and horse riders have a responsibility to reduce danger to pedestrians.

Walking is more than a transport mode

EVEN A FEW ADDITIONAL STEPS A DAY FOR THE MOST SEDENTARY CAN DELIVER VAST MENTAL AND PHYSICAL HEALTH BENEFITS

Since April 2013 over 700 older adults have taken part in our walking projects.

And those small steps have had big outcomes, as these numbers reflect.

68%

Are more connected with their community.

70%

Feel less lonely or isolated.

76%

Feel fitter or healthier.

80%

Feel less stressed or anxious.

- Walking has an important role outside of transport
- Important indicator in ideas of Place
- As a leisure activity both as a “walk/ramble” and jogging/running
- Supports social interaction at a family, group and community level
- Health benefits both physical and mental health

Source: Living Streets

Who are pedestrians?

The “traditional” viewpoint....

- Single solitary person
- Male figure
- Able bodied
- Walk speed 1.2 m/s



Who are pedestrians in reality?



Walking for everyone

Making walking and wheeling more inclusive



- Pedestrians come in all shapes, sizes and numbers
- *The terms **pedestrian** and **walking** include people using mobility aids such as wheelchairs and mobility scooters designed for use on the footway, and people with physical, sensory or cognitive impairments (LTN 1/20)*

However

- Good pedestrian design is not about disability or the mobility impaired - it's a people issue
- Consider parents with children, those carrying shopping/luggage, couples, pushchairs...

Network Design Principles

Table 2: Pedestrian Network Design Principles	
Safe	The public realm should be safe to use at all times of day and for people to feel safe to spend time in
Inclusive	All walking environments should adhere to the principles of inclusive design by ensuring that they are accessible to, and usable by, as many people as reasonably possible without the need for special adaptation or specialised design
Comfortable	Designated walking areas should allow unhindered movement for pedestrians by providing sufficient space
Direct	Facilities should be positioned to provide convenient links between major walking trip attractors
Legible	Features should be consistent and easy to understand for all pedestrians to know intuitively how to navigate within a space
Connected	Walking networks should have a high density of route options to suit pedestrians' needs
Attractive	Walking environments should be inviting for pedestrians to pass through or spend time in

Table 2.1.2 Core design principles for walking, cycling and horse-riding

Coherence	Link trip origins and destinations, including public transport access points. Routes are continuous and easy to navigate.
Directness	Serve all the main destinations and seek to offer an advantage in terms of distance and journey time.
Comfort	Infrastructure meets design standards and caters for all types of user, including children and disabled persons.
Attractiveness	Aesthetics, noise reduction and integration with surrounding areas are important.
Safety	Dedicated networks and facilities not only improve pedestrian, cyclist and equestrian safety, but also their feeling of how safe the environment is. This includes access to adjacent areas, sightlines, fencing, lighting, landscaping and surveillance. It also includes avoiding opportunities for assailants to conceal themselves.

- Various documents establish principles for pedestrian planning
- General ideas align
- Principles apply to design considerations at a practical level

Design Principles – Coherence and Legibility

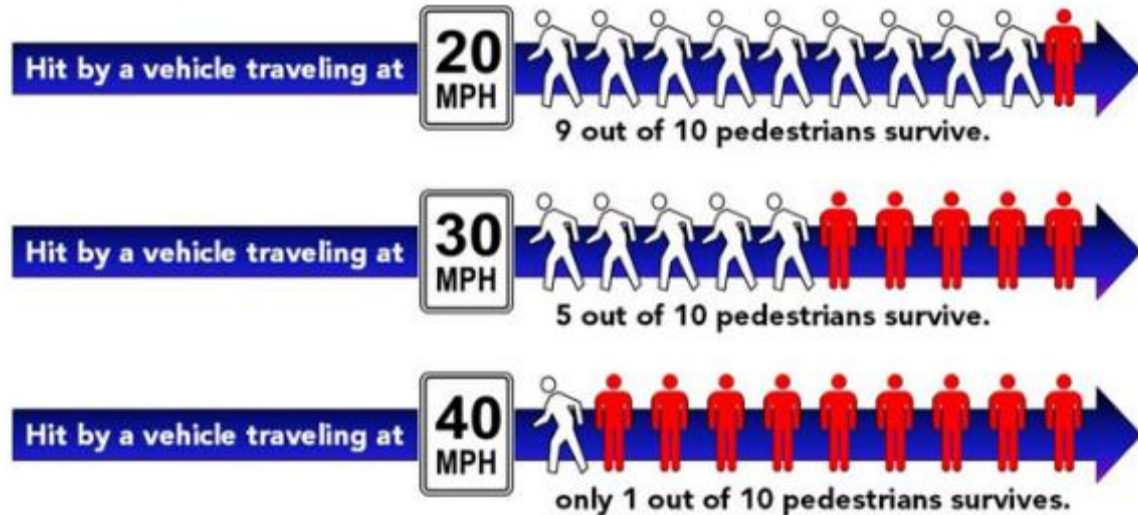
- Routes and pathways should be logical and easily understood
- They should be clearly defined and identifiable by all
- They should link to key destinations and locations
- Consistency in materials and appearance should be provided
- *Poor design just rigidly applies pavement provision without considering route choice*

Design Principles – Directness

- Pedestrian route choice is influenced by a number of factors
- Primary drivers tend to be:
 - **Distance** – how far do I need to walk?
 - **Time** – how long will it take?
- Many responses to poor design such as goat tracks are due to a lack of thought about pedestrian route choice and behaviour
- Routes should therefore be direct and minimise diversions supporting line of sight movement
- Diversions can expose pedestrians to greater risk



Design Principles – Safety (Road)



- Safety of route is important
- Users should not feel threatened by other modes or vehicles
(including cyclists/e-scooters)
- Conflicts should be minimised
- Where roads need to be crossed routes providing safe and easily used options should be provided
- Speed is the greatest threat to pedestrian safety and survivability

- We know the risks and have many tools and systems in place for this

Design Principles – Safety



Poor forward visibility and blindspot



Research from Victoria Walks in Australia

Personal safety and security

- Perceptions of personal safety and security – fear of crime i.e. fear of assault or harassment are important in pedestrian design
- Pedestrians need to feel safe particularly women, elderly and children
- Good design considers CPTED (Crime Prevention through environmental design)
 - Surveillance both passive (e.g. over looking) and active (i.e. CCTV) are important
 - Limiting blindspots and dark/hidden areas
 - Good lighting and forward visibility
 - Providing escape routes not caging people in
 - Routes and locations that have increased activity and other users improves the safety for all
- Consider how places change over the day and some routes may be less safe at night e.g. parks, cut throughs, or areas with drunk

Design Principles – Quality

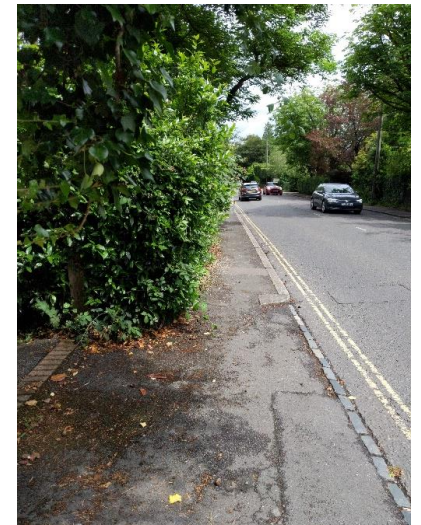
- Ideas of attractiveness, comfort and route quality support pedestrian activity
- Surfaces should be smooth and free of holes and uneven surfaces.
- Gradients should be considered (less than 1:20)
- Routes and provision should consider the quality of materials and ongoing maintenance and cleanliness
- Maintenance is a key issue for pedestrians as Councils tend to neglect this
- Designs should try to reduce the maintenance burden

Challenges Facing Pedestrians

Pedestrians' common concerns can be judged from research, undertaken for Living Streets in 2012, which asked Welsh adults which, if any, of the following problems they had encountered on their local streets.

Table 4.1 – Challenges facing pedestrians – YouGov poll for Living Streets

Problem	Percentage (%)
Litter or dog fouling	76
Broken or cracked pavements	66
People parking on the pavement	62
Potholes in pavements	58
Pavements which have been badly patched up after street works	54
People cycling on the pavement	53
Fly tipping, graffiti or abandoned cars	41
Street clutter and obstructions on the pavement	39
Badly managed street works	32
Street lighting not working/not enough street lighting or street lighting being turned off or removed	23



Routes Assessments

- Different tools exist that assess pedestrian routes and identification of issues and scoring of a route
- **Healthy Streets**; an approach that uses a series of indicators to understand how a street operates and suggest/indicate areas of improvements
- **Neighbourhood scale mapping and analysis**
- Series of tools and techniques to understand different components of the network
- **Pedestrian Environment Review System (PERS)** an auditing system for pedestrian environments
- Visit sites at different times of day as pedestrians peaks not the same as vehicle peaks
- Get different perspectives e.g. from women, those with children, pushchairs, etc

Example of Healthy Streets Check for Designers applied to the Archway proposal



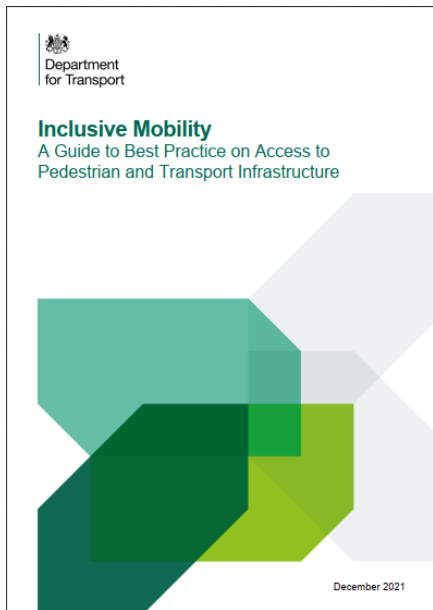
Output of the HSCD for the Archway proposal with before and after scores for each Health Streets Indicator.



Design

Range of guidance and advice documents

- Spread over various documents by different agencies



- Manual for Streets (1 and 2)
- CD 143 Designing for walking, cycling and horse-riding (Highways England)
- Pedestrian Comfort Guidance for London (TfL 2010)
- Design Guidance Active Travel (Wales) Act 2013
- Streetscape guidance (TfL 2019)
- Designing for walking (CIHT 2015)
- Planning for Walking Toolkit (TfL 2020)
- Inclusive Mobility : A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure (DfT 2021)
- Traffic Signs Manual (TSM) Chapter 6

Rethinking the design mindset and equality of treatment

Consider how we design road carriageways – typical approach

- Design vehicles – lorries of size x (% of vehicles)
- Swept paths
- Sight lines
- Vertical clearance from objects
- Demand, flows and congestions – number of lanes
- Junctions/conflict points

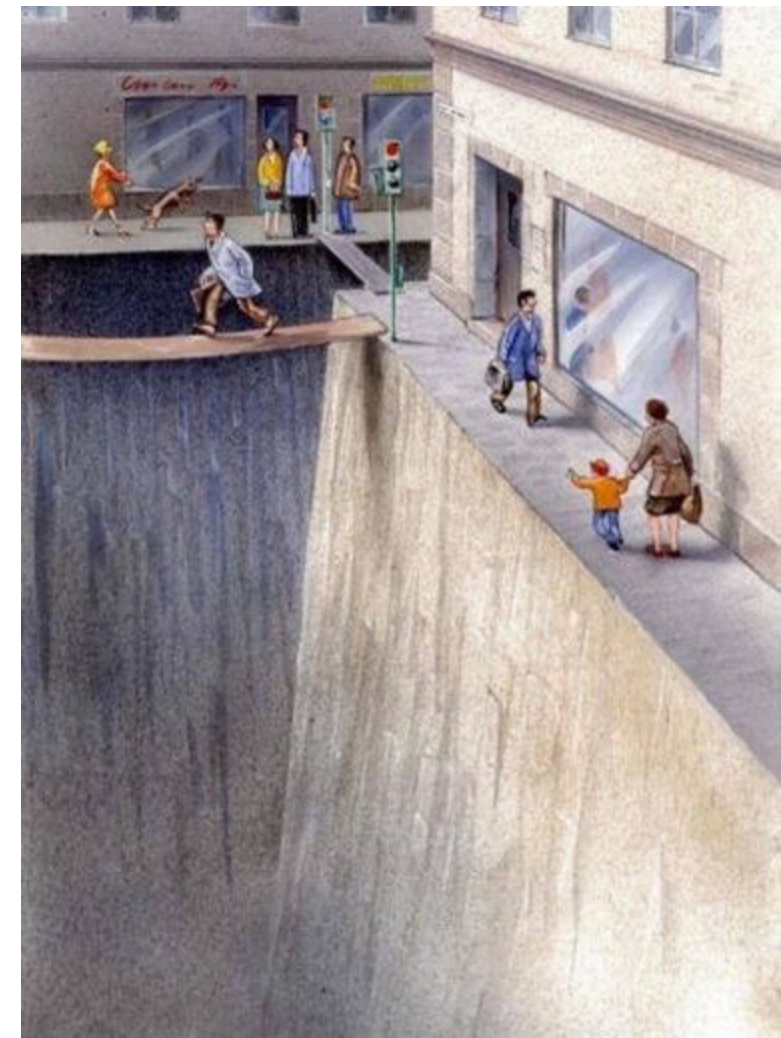
How does this translate to pedestrians?

The simple Do Minimum approach

- Provide a standard width on at least one side of the road
- Provide a few crossing places

- **Absolute minimum width: 1.8m**
- **Desirable minimum width: 2.0m**
- **Preferred width 2.6m (especially adjacent to high-speed roads)**

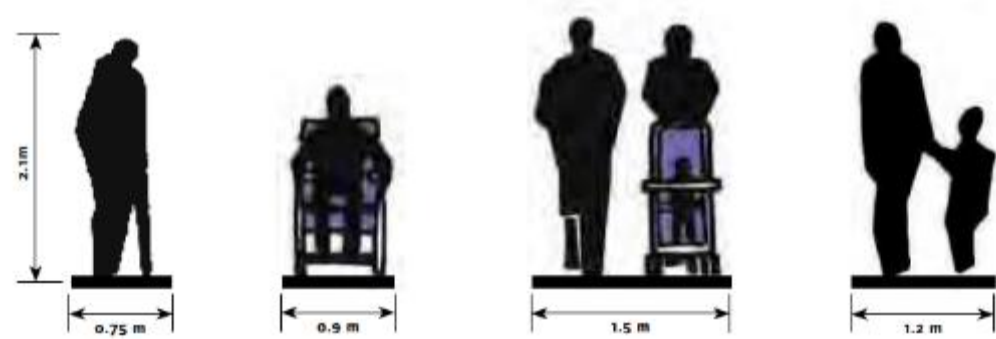
Desirable minimum width	2.6 metres
Absolute minimum width	2.0 metres



Not a good outcome!

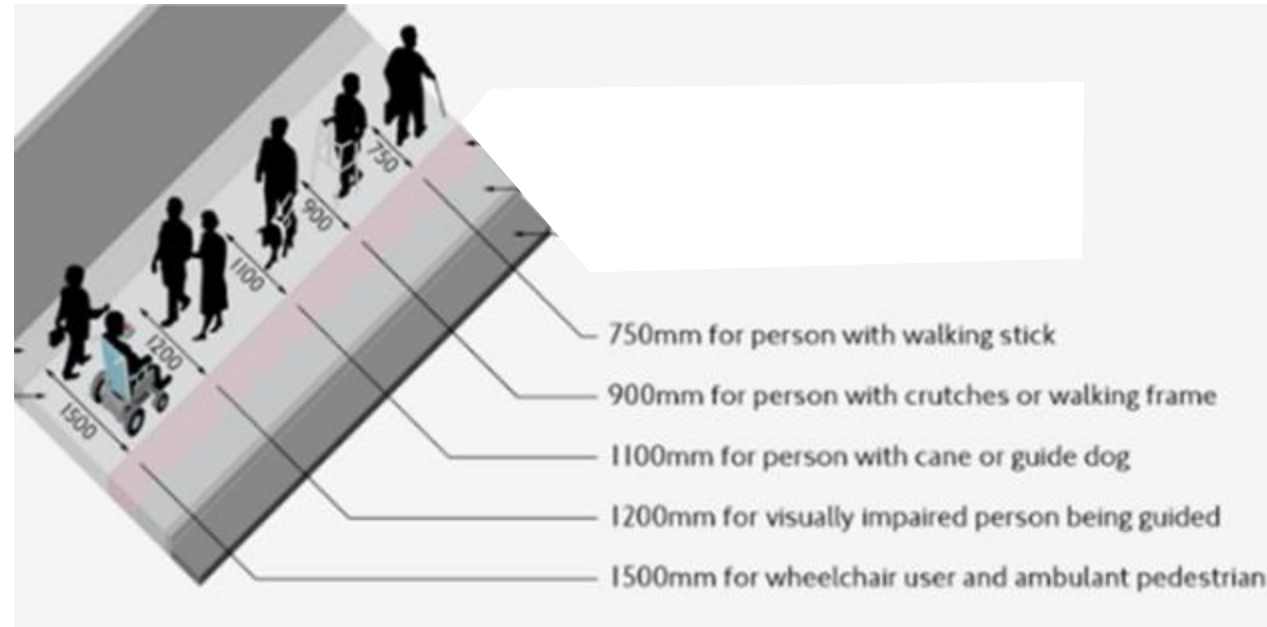
Pedestrian design “vehicle” or envelope

- Design should be user focused
- A single pedestrian dimensions 600-700mm
- Pedestrian with a stick 750mm
- Pedestrian with a cane/assistance dog 1100mm



Source: Manual for Streets

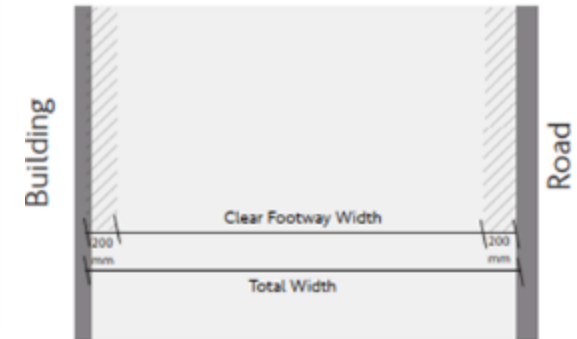
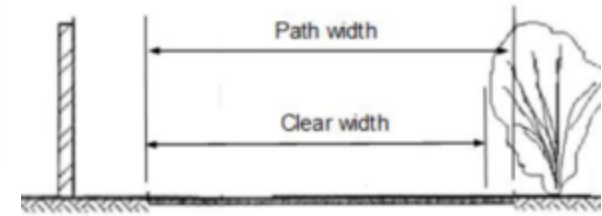
- Consider more than the single pedestrian
- Can people walk together?
- Can people pass each other?
- DDA requirements of two wheelchairs passing (1.8m)



- Consider role and function of a street

Widths and clearances

- Pedestrians “shy” from vertical objects, road edges and other pedestrians
- Difference in actual/physical width and effective/clear width
- **Actual/physical width** – the space edge to edge on a pavement
- **Effective/clear width** – the actual space pedestrians can use due to clearances and other issues
- TfL recommend 200mm clearance from buildings, kerb edge, street furniture, etc
- DMRB 250mm+ (CD 143)
- Speed on road may increase separation requirements



Vertical feature on one side and < 1.2 metres height	Vertical feature on one side and ≥ 1.2 metres height	Vertical features on both sides (distance per side)
+ 0.25 metres	+ 0.5 metres	0.25 metres for < 1.2 metres height 0.5 metres for ≥ 1.2 metres height

Footway / pavement width

Inclusive mobility guidance (2021)

- Make footways as wide as possible
- a width of 2000mm is the minimum that should be provided
- Only if due to physical constraints min 1500mm

- Considered shying from street furniture or walls
- What is role/function of street?
- Do you want free two way movements?
- Will there be couples/groups/families, etc



Maximising space - decluttering

- Street furniture major obstruction to clear widths for pedestrians
- Consider rationalisation and integration of signs and other street furniture
- Align in a street furniture area / zone
- Can easily boost effective space for pedestrians without widening
- Review need for guardrail



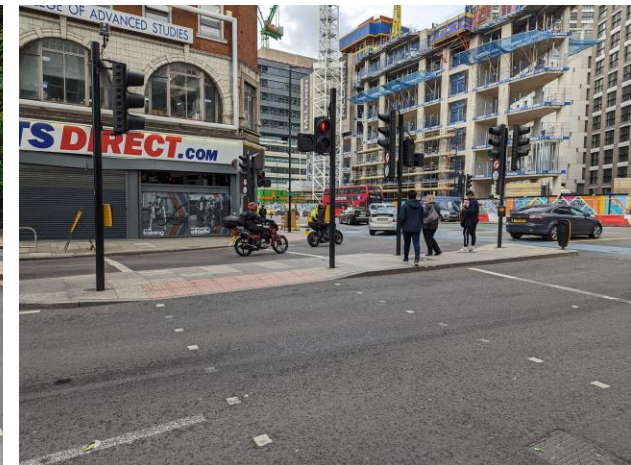
Before

1. Pedestrian guardrail provides visual and physical barrier
2. Asphalt road surface in poor condition
3. Pedestrian realm poorly defined
4. Street furniture and equipment causes clutter and uses inconsistent colours



After

1. Pedestrian realm consistently defined with Yorkstone paving
2. Clear views to Brockwell Park enhanced
3. Granite kerbs provide a high quality finish
4. New tree planting



Maximising space – kerbside activity



- Where pedestrian volumes are high we tend to have competing needs for vehicles and other activities
- Flexible spaces that maximise use for multiple activities
- Loading bays when pedestrian flows are low e.g. early AM / night
- Consider use of different materials/colours
- Hostile vehicle / encroachment considerations

LTN 1/20 or Cycles and pedestrians

- 2) **Cycles must be treated as vehicles and not as pedestrians. On urban streets, cyclists must be physically separated from pedestrians and should not share space with pedestrians. Where cycle routes cross pavements, a physically segregated track should always be provided. At crossings and junctions, cyclists should not share the space used by pedestrians but should be provided with a separate parallel route.**

Shared use routes in streets with high pedestrian or cyclist flows should not be used. Instead, in these sorts of spaces distinct tracks for cyclists should be made, using sloping, pedestrian-friendly kerbs and/or different surfacing. Shared use routes away from streets may be appropriate in locations such as canal towpaths, paths through housing estates, parks and other green spaces, including in cities. Where cycle routes use such paths in built-up areas, you should try to separate them from pedestrians, perhaps with levels or a kerb.

- Shared paths are an area of concern for pedestrians particularly elderly
- Perception issue
- Also an issue for cyclists with errant children and dog leads...
- LTN 1/20 (and other cycle guidance) does not “ban” use of shared paths but reinforces need to think very carefully about their use
- Need to ensure where shared adequate space is provided for co-existence
- **Don't just look to squeeze the pedestrians into a 1.2m footway**

Giving more space to pedestrians

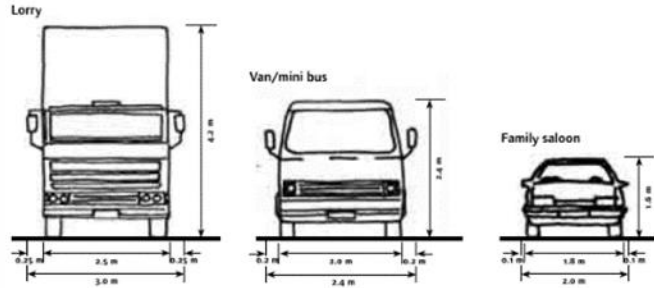


Figure 6.18 Private and commercial motor-vehicles – typical dimensions.



Figure 7.1 Illustrates what various carriageway widths can accommodate. They are not necessarily recommendations.

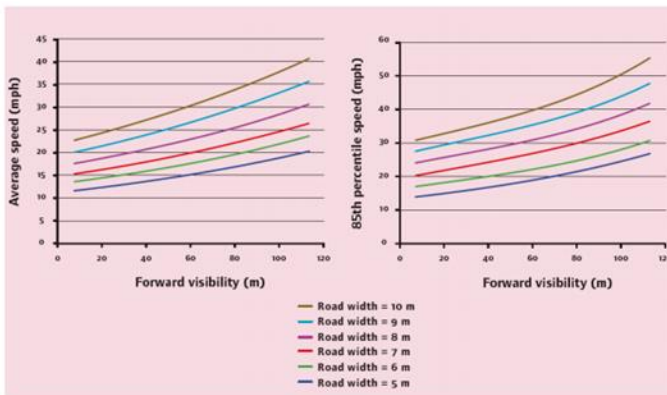


Figure 6.3 - The relationship between carriageway widths, forward visibility and speed, from Manual for Streets



- Often scope to get more space from carriageways
- How wide carriageway lanes really need to be – especially in low speed / urban areas
- Manual for Streets provides useful base
- DMRB has standards relating to higher speed roads generally 3.65m lane widths
- Common 7.3m wide roads historically in various environments
- Slower speeds can accommodate narrower widths
- Narrower lanes encourage slower speeds
- COVID 19 emergency measures showed we can do more!

Spatial analysis

- Tools exist to assess suitability of space for pedestrians
- Generally use a Level of Service approach
- Fruin LoS common reference based on person per metre or person per metre per second
- TfL Pedestrian Comfort Level approach provide good analytical method to assess spatial performance
- Other options include:
 - Simple spatial spreadsheet analysis
 - Microsimulation pedestrian modelling

Note: Capability to do all levels of analysis exists in AECOM (Urban Space team)



Figure 8 Pedestrian Comfort Levels on Footways

Crossing / junctions

- Crossing/junctions point of conflict with other modes
- Need to support safety
- Range of tools and assessment approaches
- Most are biased towards a particular mode e.g. vehicles or cycles
- Need for greater consideration of the pedestrian side of junction performance
 - How long do you wait to cross?
 - How many movements are there?
 - How long does the crossing take?
 - Is their space to wait?
- Don't currently have an agreed approach to assessing performance for pedestrians to allow comparison between modes

Table 3: Suitability of pedestrian crossings

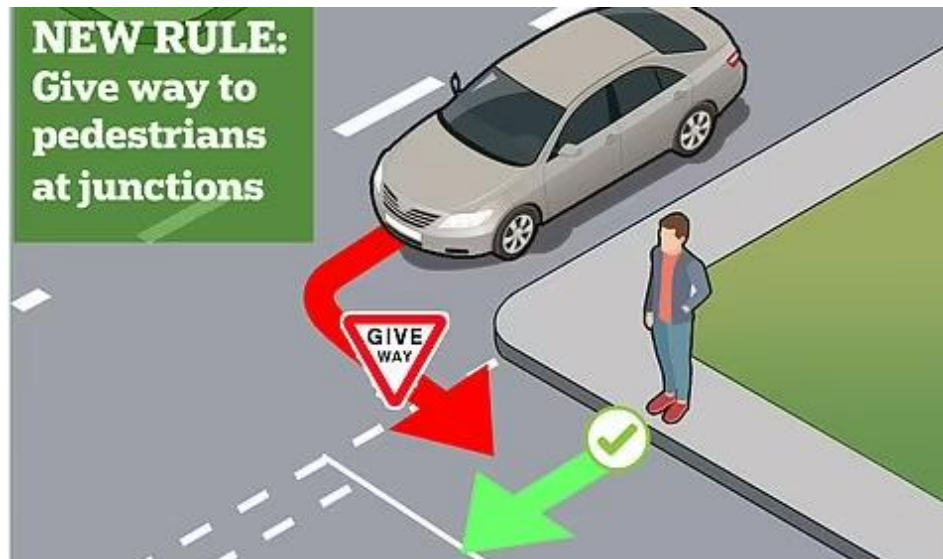
Crossing type	Traffic flow	Traffic speed					Advantages	Disadvantages
		20	30	35	40	50+		
UNCONTROLLED								
Dropped/kerb Crossings	High	Green	Green	Green	Yellow	Red	Simple to use. Low cost. Can be located flexibly. Can be located on desire lines.	Intimidating at higher flows and speeds. Subjective safety an important consideration.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
Flat-topped road hump	High	Green	Green	Green	Yellow	Red	Level crossing surface. Give advance at lower speeds.	Unsuitable for heavy, fast traffic flows. Can affect local carriageway drainage.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
Refuge/central reservation	High	Green	Green	Green	Yellow	Red	Allows crossing in two stages. Can reduce traffic intimidation for some users.	Can create pinch point for cyclists. Can be prone to traffic impact.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
Median strip	High	Green	Green	Green	Yellow	Red	Crossing point along length of verge. Caters for multiple desire lines.	Not always accessible to all users. Can impact on cycle safety over longer distances.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
Build-out	High	Green	Green	Green	Yellow	Red	Improves visibility between pedestrians and traffic. Reduction in crossing width.	Can push cyclists into traffic. Traffic collision risk if not adequately conspicuous.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
Slab-road entry treatment	High	Green	Green	Green	Yellow	Red	Level crossing surface. Give advance at lower speeds.	Can create less of central risk for motorcycles.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
Blended/junction or continuous footway	High	Green	Green	Green	Yellow	Red	Level walking surface where drivers cross the footway, which continues across the junction.	Some pedestrians may not feel comfortable with this non-traditional layout.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
CONTROLLED								
Zebra crossing	High	Green	Green	Green	Yellow	Red	Pedestrians have priority over traffic. Almost immediate access to crossing priority.	Less suitable on faster roads. Can impact on traffic flow where pedestrian stream.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
Signal controlled (stand-alone)	High	Green	Green	Green	Yellow	Red	Rarely used by older and disabled people. Signals give clear priority to pedestrians.	Can be inflexible leading to delays for both pedestrians and traffic, although puffin delays can reduce issues.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
Signal controlled (junction)	High	Green	Green	Green	Yellow	Red	Can be used on higher speed roads. All green, pedestrian phase allows diagonal crossing.	When staggered for traffic flow, pedestrians experience longer walking routes and times.
	Medium	Green	Green	Green	Yellow	Red		
	Low	Green	Green	Green	Yellow	Red		
GRADE SEPARATED								
Bridges	High	Green	Green	Green	Green	Green	No crossing delays, good subjective safety. No delays to traffic. Can be used with high traffic speeds/flows.	Poor layouts with tight turns, steep ramps, steps, and long detours will exclude some people.
	Medium	Green	Green	Green	Green	Green		
	Low	Green	Green	Green	Green	Green		
Subways/tunnels/overhead bridges	High	Green	Green	Green	Green	Green	Clear views through, can be direct, convenient and feel safe to use.	When isolated and without clear views through, can feel unsafe and less likely to be used.
	Medium	Green	Green	Green	Green	Green		
	Low	Green	Green	Green	Green	Green		

Generally Acceptable (Green) Design With Caution (Yellow) Generally Unacceptable (Red)

14.1.3. The following factors are most likely to have a bearing on the choice of pedestrian crossing type:

- difficulty in crossing,
- vehicle delays during peak periods,
- carriageway capacity,
- local representations,
- cost (including maintenance), and
- vehicle speeds.

Uncontrolled junctions and crossings – Highway Code changes Rule H2

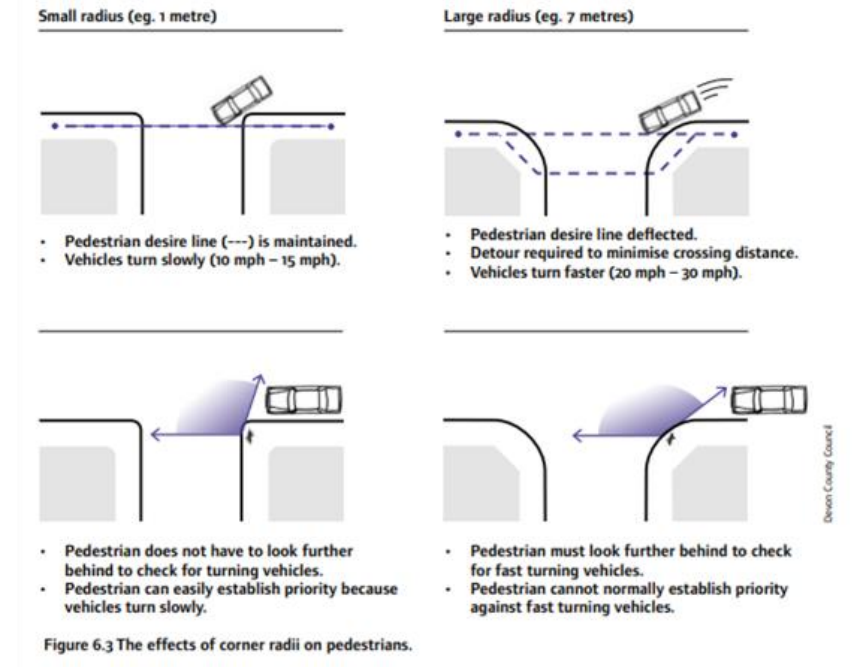


Rule H2: For drivers, motorcyclists, horse drawn vehicles, horse riders and cyclists

- At a junction you should give way to pedestrians **crossing or waiting to cross** a road into which or from which you are turning.
- You **MUST** give way to pedestrians on a zebra crossing, and to pedestrians and cyclists on a parallel crossing (see Rule 195).
- Pedestrians have priority when on a zebra crossing, on a parallel crossing or at light controlled crossings when they have a green signal.
- You should give way to pedestrians **waiting to cross** a zebra crossing, and to pedestrians and cyclists waiting to cross a parallel crossing.
- Horse riders should also give way to pedestrians on a zebra crossing, and to pedestrians and cyclists on a parallel crossing.
- Cyclists should give way to pedestrians on shared use cycle tracks and to horse riders on bridleways.
- Only pedestrians may use the pavement. Pedestrians include wheelchair and mobility scooter users.
- Pedestrians may use any part of the road and use cycle tracks as well as the pavement, unless there are signs prohibiting pedestrians.

Side road junctions – pedestrian perspective

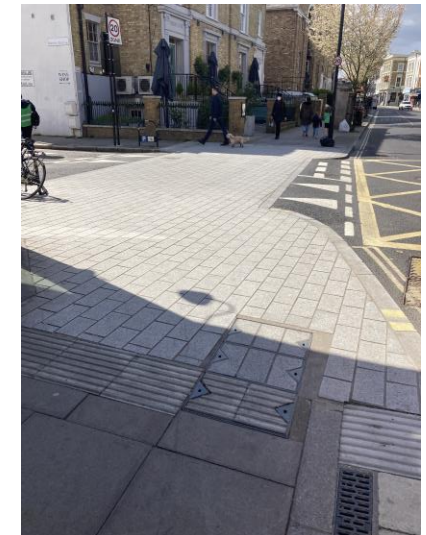
- Designers should consider if their arrangement supports compliance with the Highway Code and safety
- Tighter radii
 - reduces vehicle turning speed (and severity of potential crashes)
 - Reduces diversion or crossing distance
 - Easier look back
 - Supports Highway Code compliance
- Beware of over designing for infrequent HGV movements
- Consider buses
- Overrun areas can slow vehicles but don't reduce pedestrian disbenefits
- Central island can provide improved crossing experience if correct size



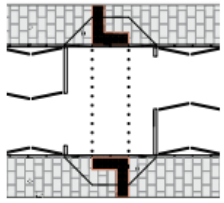
- Manual for Streets p66

Side road junctions – continuous footways

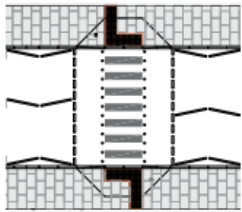
- Been implemented in UK for decades (Red routes in London)
- Significant evolution over recent years
- Inconsistent application depending on authority
- Maintenance/drainage issues
- Key issues:
 - Tactiles yes or no?
 - Yellow lines – across or through
 - Give Way line
 - Kerb types
- Need for clearer guidance from approval authorities



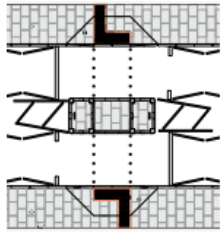
Controlled crossing



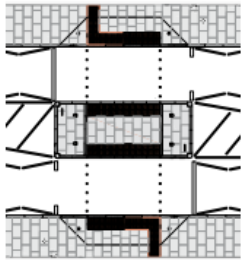
Single stage signal controlled



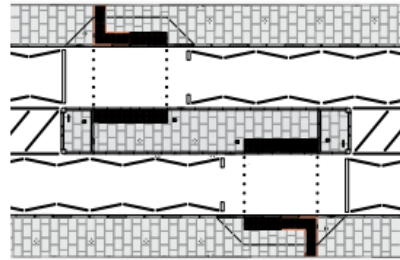
Zebra crossing



Single stage signal controlled with central refuge



Straight across two stage crossing



Two stage staggered

Source: Streetscape guidance – Transport for London p142



Key additional design considerations

- Flows of all modes
- Widths for waiting and crossing
- Space
- Movements and desire lines
- Passing movements and friction

- Don't just provide minimums i.e. 2.4m wide
- Consider delay/wait times

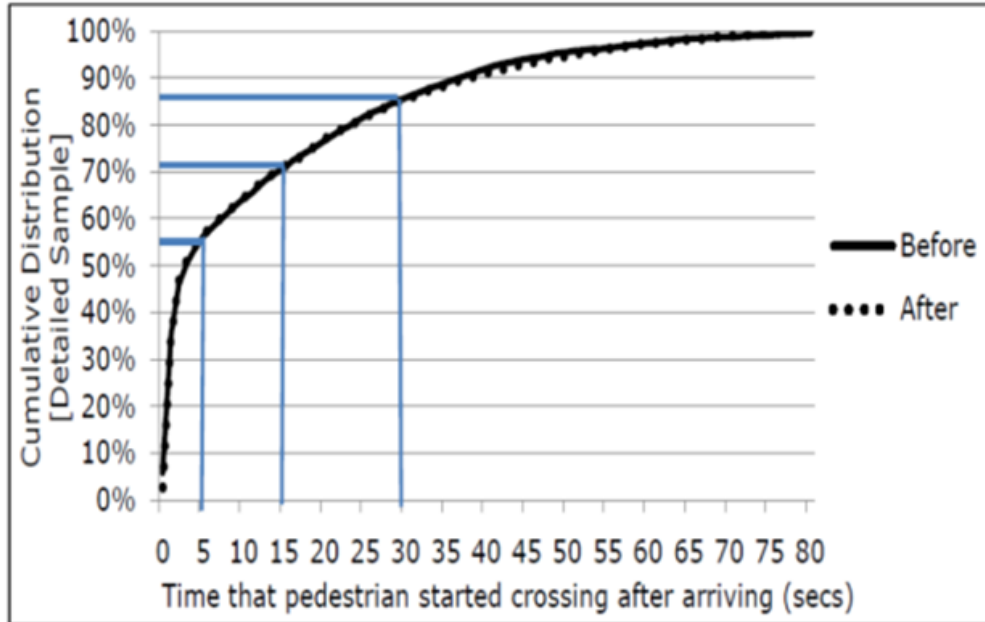
Think creatively



- Crossing restricted to 10m max
- Set back stop lines create informal crossing area
- Raised crossing area
- Use of different materials



Traffic signals crossing times



TfL research on pedestrian crossings indicated pedestrians reluctant to wait for green lights – approx. 85% cross within first 30 seconds of arrival

- Crossing times are based on standard speed of 1.2 m/s (or 1.0m/s)
- Concerns this does not give sufficient time for some users
- Use of Puffins and Countdown timers can mitigate
- Consider use of “rest on red” or “green authority” for pedestrian/cycle crossings i.e. on red for vehicles unless demanded for priority areas

**1.2 METRES
PER SECOND**

The speed crossing times assume we cross at (set in the 1950s)

76%

Men over 65 who walk more slowly

85%

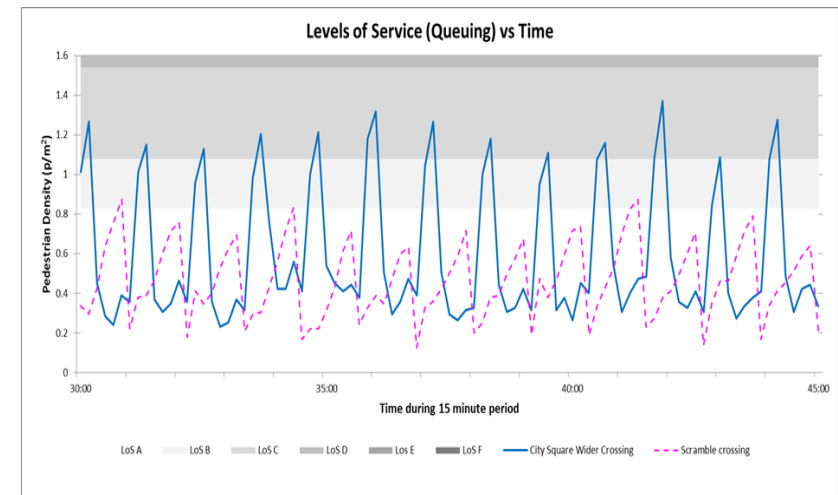
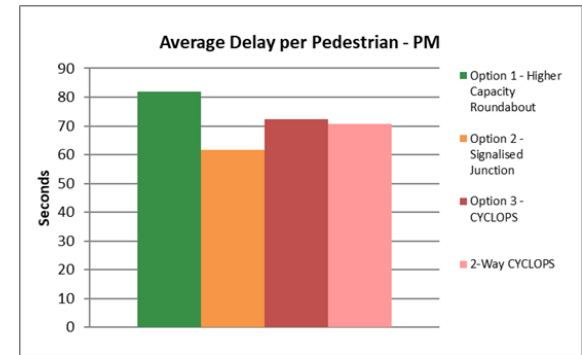
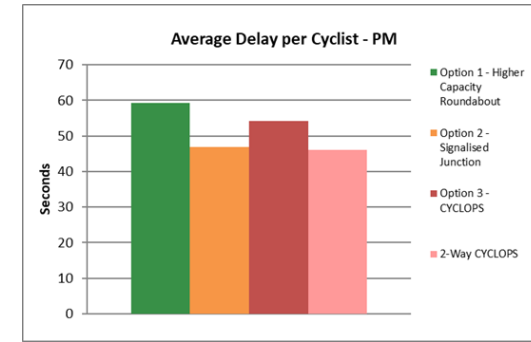
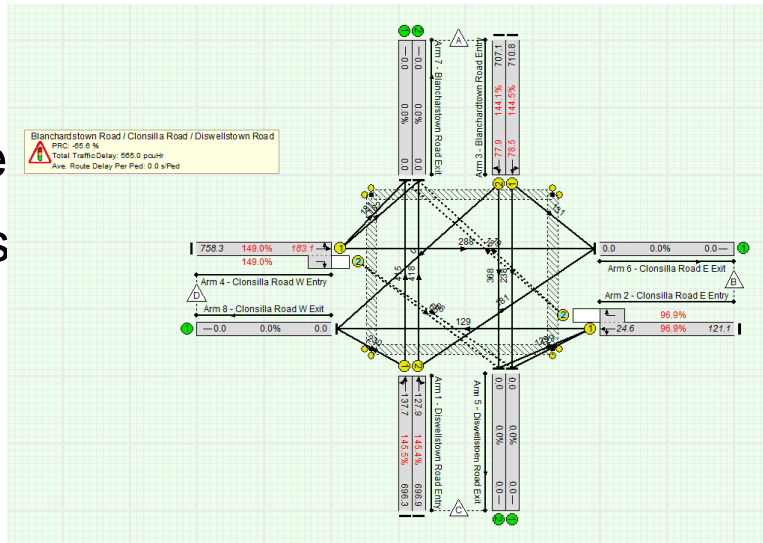
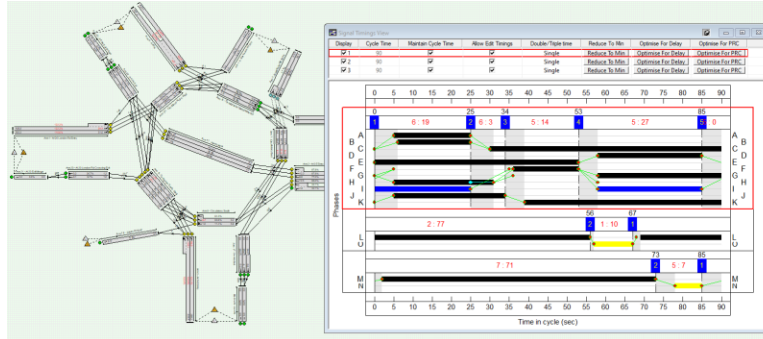
Women over 65 who walk more slowly

**0.8 METRES
PER SECOND**

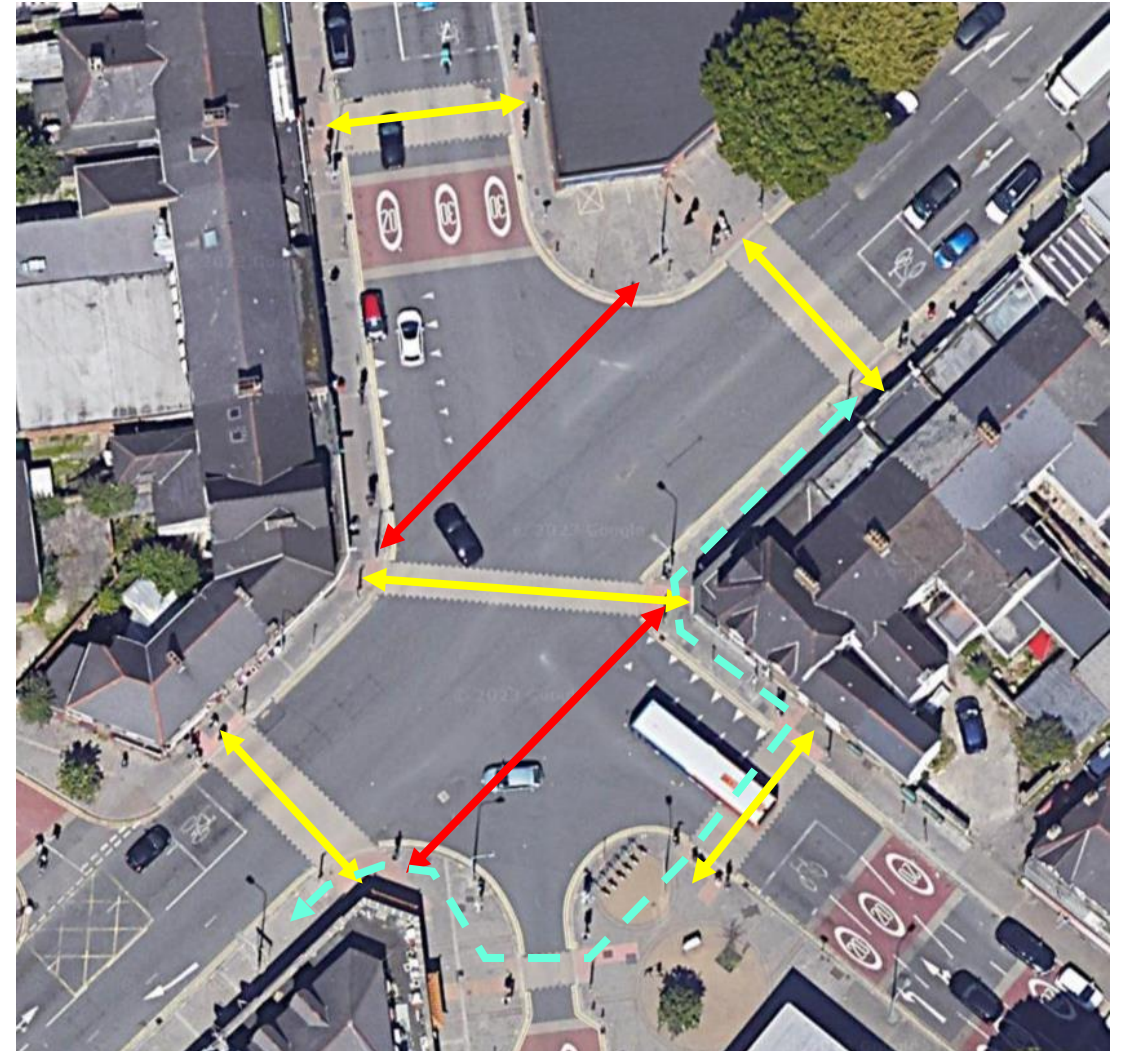
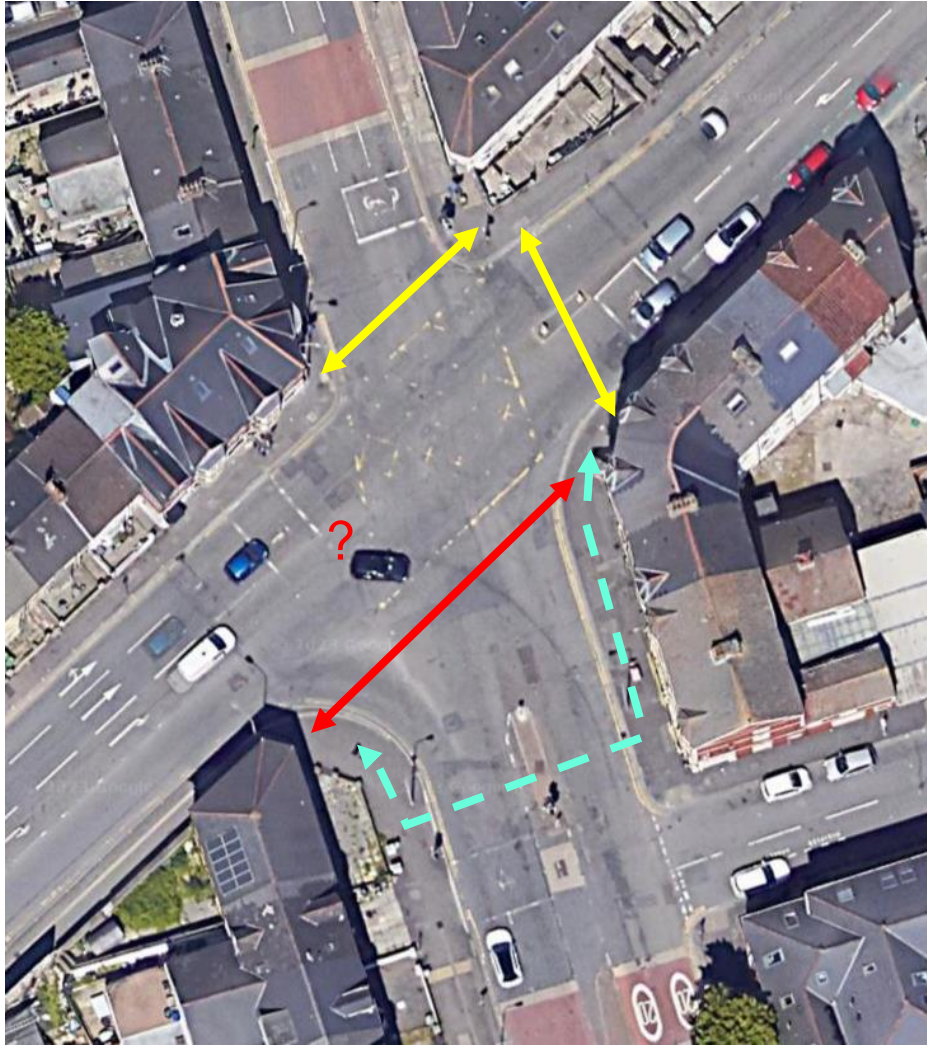
The actual speed many older people walk at - and some young children move even more slowly

Holistic assessment of junction performance

- Junction critical part of our networks
- Modelling general focus on vehicles and public transport
- Limited consideration of pedestrians/cyclists in performance metrics
- Limited industry standards to assess junctions for active travel
- Comparison across modes in its infancy
- Where done challenges pre-conceived ideas
- AECOM integrating this into our junction assessment work



Typical junction issues



Think creatively

All red scramble crossing make a big statement

But you can get creative in other ways



Pedestrians and roundabouts

- Roundabouts seen as pedestrian unfriendly
- Particular difficulty for pedestrians to negotiate uncontrolled
- Crossing can be provided to mitigate
- Crossings (zebra / pelican) should be located as close to roundabout as possible:
 - Vehicles are slowing on approach reducing speed and severity of potential crashes
 - Vehicles exiting are accelerating
 - Reduces diversion for pedestrians and potential crossing away from designated location



Photo 3.11.3: Zebra crossing close to mini-roundabout



Conclusions

Pedestrians do not get the attention they deserve based on mode share or position in road hierarchy

Things are changing and our approach needs to change

Industry lacks level of insight due to limited research compared to vehicles

Don't apply car based thinking e.g. only x many pedestrians an hour/day therefore...

Try to take a user perspective and consider outcomes and use

Should involve multi-disciplinary approach

Taster only for a very broad topic

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