



Pedestrian Comfort Guidance for London

Guidance Document



MAYOR OF LONDON

Transport for London





Pedestrian Comfort Level Guidance

First Edition 2010

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Introduction

Who should use this guide?

This guide and accompanying spreadsheet is aimed at anyone involved in the planning of London's streets, whether TfL staff, local authority officers, elected members, consultants assessing the impact of development proposals, developers, or their agents. It is intended to ensure that the design of pedestrian footways and crossings are appropriate to the volume and type of users of that environment. The guidance is applicable whether evaluating a new design or assessing an existing footway.

What is the guide for?

The primary objective of the guidance is to assist those responsible for planning London's streets to create excellent pedestrian environments through a clear, consistent process during the planning and implementation of transport improvement projects.

For **existing sites**; undertaking a comfort assessment will identify priorities for action or attention, the cause of these issues and help to identify mitigation measures to make the site more comfortable.

For **schemes in development**; undertaking a comfort assessment will identify any potential problems at an early stage. Mitigation measures, such as the relocation of street furniture, can then be decided upon if required.

Why this guide is important

Footway provision is an essential factor in encouraging or hindering walking. Providing appropriate footways is important as:

- They encourage walking. The research underpinning this guidance has found that lack of comfort on footways discourages use of an area by pedestrians.
- In London, encouraging people to walk short trips will relieve pressure on public transport and promote more sustainable, environmentally friendly travel, with added health benefits. Moreover, regularly making trips on foot benefits the health of individuals as well as bringing wider economic and community benefits.
- Journeys conducted entirely on foot make up 24% of all trips in London. In addition, most other trips involve some walking (for example from the bus stop to home and vice versa). Therefore creating well designed pedestrian environments benefits everyone.

How to use this guide

Recognising this, TfL has developed this guidance to improve the planning and design of the pedestrian environment and encourage walking. This guidance is tailored to the needs of London and provides a comprehensive approach by:

- Taking into account different user behaviour within a variety of area types, from high streets to transport interchanges.
- Including the real impact of street furniture and static pedestrians, for example, window shoppers.
- Going further than existing measures such as Fruin Level of Service which simply assess crowding. This guidance is based on comfort and takes into account user perceptions as well as observed behaviours.
- Providing a standard approach for the assessment and review of comfort on footways and crossings.
- Providing a template for recording data and generating results.

The Pedestrian Comfort Level for London should be considered when assessing both footways and formal pedestrian crossings. The provision of comfortable crossing facilities supports road crossing in a planned manner and may reduce the number of informal crossings that occur. Although tailored to London, as the guidance is based on area types it is applicable in other locations.

This guidance document contains the method for carrying out a comfort assessment and guidance on reviewing the results. This has been designed with an accompanying spreadsheet for recording data and calculating the results.

The spreadsheet is available to download from <http://boroughs.tfl.gov.uk/I058.aspx>

If the design is at an early stage, **recommended minimum widths** can be found on page 25 in the appendix. This information provides an initial indication as to comfortable footway widths in different environments in advance of a full comfort assessment.

Undertaking a comfort assessment


Pedestrian Comfort Levels classify the level of comfort based on the level of crowding a pedestrian experiences on the street. Guidance is provided for different area types and times of day.

Pedestrian crowding is measured in pedestrians per metre of clear footway width per minute. This is calculated from data on pedestrian activity and the street environment.


This Pedestrian Comfort Level Guidance caters for both footways and pedestrian crossing points to ensure that the full pedestrian environment is assessed and reviewed. Figure 1 summarises this assessment and review process which is detailed on the following pages.

Although use of this tool for internal reviews during the design cycle is encouraged, it is assumed that some schemes will be subject to an external review from a reviewing authority. This is likely to be the planning or highway authority responsible for the site. The scope of the assessment and any assumptions should be agreed with the reviewing authority before the process begins.

Step 1 Assess Footway Comfort

- 
- 1.1 Select site, visit site and select locations
 - 1.2 Categorise area type
 - 1.3 Collect activity data required
 - 1.4 Collect measurements
 - 1.5 Spreadsheet Assessment
 - 1.6 Review and interpret results

Step 2 Assess Crossing Comfort

- 
- 2.1 Select site, visit site and select locations
 - 2.2 Collect data required
 - 2.3 Collect activity data required
 - 2.4 Collect measurements
 - 2.5 Spreadsheet Assessment
 - 2.6 Review and interpret results

Step 3 Review Impact on Scheme

Figure 1 Pedestrian Comfort Level Assessment and Review Process

Step 1 Assess Footway Comfort

STEP 1.1

Select Site and Locations

The aim of a pedestrian comfort assessment is to understand the pedestrian experience as people walk along the street. Therefore a number of locations along a street (the site) are assessed to understand the level of comfort, and how this may change due to street furniture or changes in width for example. A Pedestrian Comfort Level (PCL) is calculated for each location, allowing a review of the whole site as well as individual problem areas. The assessment does not look at the quality of the footway or associated issues such as maintenance and rubbish that may affect the use of an area. Other assessments exist for these issues.

The site for the comfort assessment will be defined at the outset of the process in agreement with the reviewing authority. A site visit should then be undertaken to agree the boundaries of the site, the locations for assessments and to consider the following questions:

- What area type is the site (see step 1.2)?
- Are there any locations with high static activity (e.g. meeting friends, queuing, taking photographs) that may require a static activity survey? For more information see Appendix D: Measuring Pedestrian Activity on page 33.
- Do people cross away from the formal crossing facilities?
- Are there signs that the site is a route to and from school? This could include school age children, school crossing wardens and other indicators such as “only two schoolchildren at a time” signs on the local shops.
- Any other notes about pedestrian activity and behaviours that may be relevant.

If the scheme is in development and a site visit is impossible, or the scheme is going to significantly change the flow and activity profile in the area (e.g. a new shopping centre) assumptions should be agreed with the reviewing authority before the assessment begins.

The number of locations assessed will be specific to each site, but may include (where appropriate):

- A location with the typical footway width for the site and no street furniture.
- Locations where full footway width changes, and there is no street furniture.
- Locations which include the typical street furniture.
- Locations where there are bus stops, cafes, market stalls or other locations where there are high levels of people waiting.
- Locations where the street furniture are not aligned parallel to the building edge or kerb edge or there are more than two pieces within a length of three metres.

STEP 1.2

Categorise Area Type

Following the site visit, classify your site as one of the following area types. This will inform the data requirements for the assessment, and later, the impact of the results.

Not all sites fall into a distinct area type, for example a site could include a tourist attraction and commercial office buildings. In this situation, agree with the reviewing authority how you are going to conduct the data collection and assessment.

High Street

Areas dominated by a range of retail and food and drink premises represent a focus for the communities that use the services they offer.

Peak Pedestrian Time: Saturday 14:00 to 18:00, although weekday flows often have similar levels

Office and Retail

Areas dominated by substantial government and/or commercial office buildings. These streets experience high volumes of pedestrians.

Peak Pedestrian Time: Weekday 08:00 to 10:00 or 16:00 to 19:00

Residential

These areas are characterised by privately owned properties facing directly onto the street.

Peak Pedestrian Time: Weekday 14:00 to 19:00

Tourist Attraction

An area with high tourist activity. This could include attractions such as Madame Tussauds or renowned “sights” such as the South Bank, the Royal Parks etc.

Peak Pedestrian Time: Saturday 12:00 to 17:00

Transport Interchange

Transport Interchanges help to provide seamless journeys for people travelling in London. They range from local interchange between rail and bus to National Rail interchanges.

Peak Pedestrian Time: Weekday 08:00 to 10:00, 16:00 to 19:00

STEP 1.3

Collect Activity Data

To carry out a Pedestrian Comfort assessment, the following pedestrian activity data is required. A methodology for collecting this data can be found in Appendix C: Street Furniture on page 26.

- Pedestrian flow data for footways and crossings.
- A static activity survey to record the reduction in space available for walking from static activity unrelated to street furniture (meeting friends, queuing, taking photographs) is recommended at regional retail centres and tourist attractions as these areas tend to generate a lot of this activity.
- Also note any other relevant activity (e.g. delivery operating times if a loading bay is present).

STEP 1.4

Collect Measurements

To carry out a Pedestrian Comfort assessment, data on the footway width and the location and type of street furniture is required. This is used to calculate the clear footway width, which is the space available for walking after street furniture and its associated buffers are taken into account. This can be measured on site or from suitable records (e.g. a topographic survey). An explanation of the buffers for different street furniture can be found in Appendix C.

When collecting the measurements you may find it useful to mark up a plan with the buffers around each of the objects, as shown in the example below. This allows any space between object buffers that is less than 0.6m (standard body ellipse) to be identified as this should not be included in the clear footway width. The example below can also be found on the footway tab of the spreadsheet.

Diagram showing how to collect measurement data:

- A) This location is the typical width for the street. It has no street furniture, therefore you simply need to enter the total width (9.7m) into the spreadsheet. The spreadsheet will then deduct the standard kerb and building edge buffer (both 0.2m) to calculate the clear width (9.3m).
- B) This location has two pieces of street furniture. First enter the total width into the spreadsheet (8.3m). Then enter the size of the street furniture and the buffers around them. Finally, from the marked up plan, check that the smaller spaces e.g. between the signal box and cycle parking is more than 0.6m (standard body ellipse). In this case the space between the space between the signal box buffer and the kerb buffer is 0.45m. This is entered into the spreadsheet as “unusable space” and is not included in the clear footway width.
- C) As with location B, enter the total width and the size of the street furniture and associated buffers. Finally, double check that the space between the cycle parking buffers and the kerb and building line buffer is more than 0.6m (it is 0.85m).
- D) As with location A this location does not have any street furniture but is measured as it represents a significant change in width from the rest of the street. Simply enter the total width into the spreadsheet to work out the clear footway width.

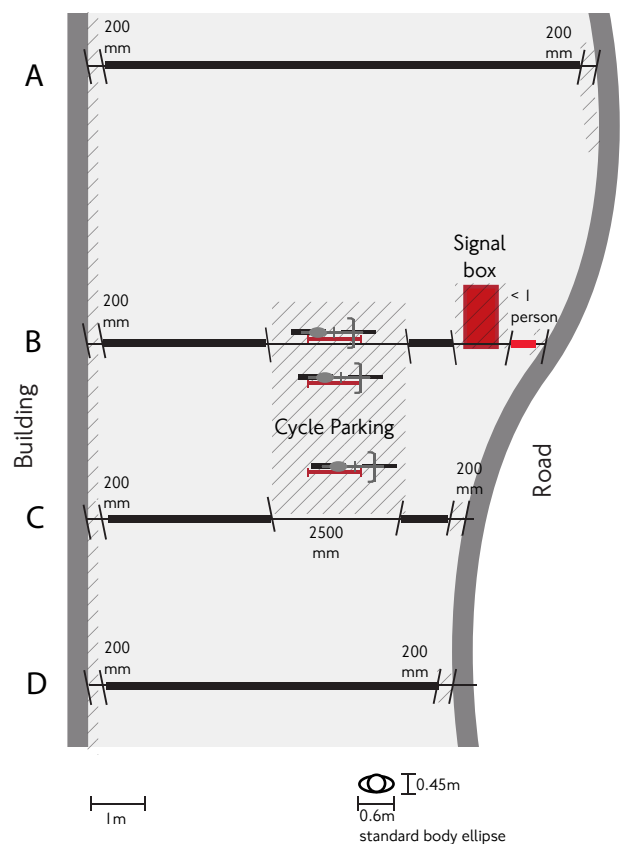


Figure 2 Example of marking up a site for assessment

Using the data and information collected in steps 1.1 to 1.5, use the “Worksheet (Footway)” tab of the spreadsheet to calculate the crowding and therefore the Pedestrian Comfort Level for each of the locations on your site. Figure 3 below shows how the spreadsheet looks.

1. Input Activity Data

For each location enter the activity data for the site

- Location name - this is defined by you.
- Area Type - this is a drop down box.
- Average Flow - average of all the samples taken throughout the survey hours.
- Peak Hour Flow- average of the samples recorded in the peak hour.
- Average of Maximum Activity - this is automatically calculated by the spreadsheet as a check. It is based on an average of the busiest 10 second samples from the research underpinning the project.

2. Input Measurement Data

Using your measurements taken on site or from records such as a topographic survey and the buffer zones from street furniture (outlined in Appendix C) complete the measurement data for each location - this is columns J to V and is measured in metres.

If, after the consideration of street furniture and its buffer zone, there is any space for movement that is less than 0.6m wide (a standard body ellipse) this should be entered into column M “Any unusable width” in metres.

3. Calculations

The spreadsheet will then automatically calculate the following:

- Clear Footway Width - This is the space left for walking after the standard wall and kerb buffers and any street furniture is taken into account
- Crowding - Pedestrian crowding is measured in pedestrians per metre of clear footway width per minute (ppmm) and is calculated using the following formula:

$$\text{people per hour} \div 60 \div \text{clear footway width in m}$$

This is calculated for Average Flow, Peak Hour Flow and Average of Maximum activity

- Pedestrian Comfort Level Categorisation - The crowding level (ppmm) is then categorised according to the Pedestrian Comfort Level scale. See page 13 for more information on this scale.
- Clear Footway Width required for PCL B+ - The spreadsheet also calculates the clear footway width required to achieve a PCL of B+. This is to aid decision making, as PCL B+ is the recommended level of comfort for most area types.

PEDESTRIAN COMFORT ASSESSMENT: FOOTWAY COMFORT																							
Clear Examples										Street Furniture 1			Street Furniture 2			Street Furniture 3							
Location Name		Location Type	Area Type	Average Flow	Peak Hour Flow	Ave of Max Activity	Total Width	Building Edge?	Kerb Edge?	Any unusable width (<0.6m)	Type	Width of Furniture	Buffer	Type	Width of Furniture	Buffer	Type	Width of Furniture	Buffer	Clear Footway Width	Average Flow Crowding (ppmm)	Peak Hour Flow Crowding (ppmm)	Ave of Max Activity Crowding (ppmm)
1	Guidance p 9 Location A	Static Activity	High Street	1800	2800	5400	9.7	Yes	Yes											9.3	3	5	10
2	Guidance p 9 Location B	Street Furniture (Multiple)	High Street	1800	2800	5400	8.3	Yes	Yes	0.45	Cycle Parking	2.5		Signal Box	0.6	0.4				3.95	8	12	23
3	Guidance p 9 Location C	Street Furniture (Single)	High Street	1800	2800	5400	6.9	Yes	Yes		Cycle Parking	2.5								4	8	12	23
4	Guidance p 9 Location D	Full Footway Width	High Street	1800	2800	5400	6.6	Yes	Yes											6.2	5	8	15
5																							

Figure 3 The “Worksheet (Footway)” tab

After completing the calculations, change to the “Print Sheet (Footway)” tab of the spreadsheet. This sheet summarises the results for each location and has four main sections.

Summary Information

This section summarises the key information about each location including the area type, activity levels, the space available for movement and the footway space used by street furniture and its associated buffers (impact of street furniture).

Summary Info	Location Name	Guidance p 9 Location A
	Location Type	Static Activity
	Area Type	High Street
	Average Flow (PPH)	1,800
	Peak Hour Flow (PPH)	2,800
	Total Footway Width	9.7m
	Clear Footway Width	9.3m
	Total Street Furniture Impact	0m

Figure 4 Summary information as shown on printing tab

Pedestrian Comfort Level

This section highlights the Pedestrian Comfort Level (PCL) the site operates at during the **Peak Hour Flow**. Footways should be designed to operate comfortably during the peak hour. This is colour coded to aid understanding. As well as identifying the PCL this section highlights the clear width required for PCL B+ and the total width required for PCL B+ (assuming the street furniture at the site remains the same).

A guide to the Pedestrian Comfort Levels can be found on page 13.

This section also highlights the PCL for the **Average of Maximum Activity**. This is included as a check to allow you to understand how the footway may feel in the busiest times. This will only impact your review of the footway if the results are significantly different than the peak hour flow. More information is included in the impact section.

Pedestrian Comfort (At peak hour flow levels)	Pedestrian Comfort Level (PCL)	A : 5 ppm
	Total Width Required for PCL B+	4.29
	Clear Width Required For PCL B+	3.89
Pedestrian Comfort (Average of Maximum Activity)	Pedestrian Comfort Level (PCL)	B+ : 10 ppm
	Total Width Required for PCL B+	7.91
	Clear Width Required For PCL B+	7.51

Figure 5 Pedestrian Comfort Level results

Impact

Using the PCL and area type, the spreadsheet provides an explanation of the impact of the Pedestrian Comfort Level at each location for both Peak Hour Flow and the Average of Maximum Activity. This is to inform your decision making in the next stage.

The information and recommendations provided in this section are based on the guidance outlined in the table on page 14.

Impact	Pedestrian Comfort at Peak Hour Flow	The footway on this site should be comfortable for its intended use at most times. However, you may need to reassess the site in future.
Impact	Pedestrian Comfort at Average of Maximum Activity	Even when under additional stress, the footway on this site should be comfortable.

Figure 6 Example of impact section on printing tab

Notes and Mitigation

This section allows you to provide extra information to inform the discussion with the reviewing authority. The notes field can be used to highlight issues such as a high number of conflicts at the site, or additional footway reduction caused by illegally parked bikes or rubbish etc.

The mitigation section is where suggestions for action and agreed action points should be recorded. More about this can be found overleaf.

Impact	Notes	
Impact	Mitigation	

Figure 7 Example of Mitigation section on printing tab

Mitigation Measures

Once the assessment is complete, it may be necessary to consider mitigation measures to ensure the footway is as comfortable as possible. This should be done for individual locations (e.g. relocate or remove a post) but it is important to consider how consistent the comfort level is as people walk along the street. This section summarises what type of actions may be considered.

All Locations are Comfortable

If all the locations within your site meet the recommended comfort level for the area type the footway on this site should be comfortable for its intended use at most times. However you may need to reassess the site in the future:

- If temporary obstructions such as road blocks or hoardings are erected
- If significant changes occur in land use or pedestrian activity
- If new street furniture is installed such as wayfinding signs

A Single Location is Uncomfortable

If a single location within your site does not meet the recommended comfort level the first action is to create additional footway space by either removing or repositioning street furniture or increasing the footway width. This is especially important if the PCL is Level D or E as the footway will be extremely uncomfortable at this location.

If this is not possible it is important that the footway in the immediate area (6m either side) is clear of obstructions to ensure this pinch point is not perceived as a reason to avoid the area.

Multiple Locations are Uncomfortable

If more than one location within your site does not meet the recommended comfort level the perception of comfort at the site may be very low. A review of the street furniture on the site should be undertaken to create as much footway space for walking as possible. If there are locations where street furniture cannot be moved (e.g. signal posts) it is important to create free space for movement in the immediate area (6m length either side) to avoid the creation of a “slalom” for walking where pedestrians need to keep adjusting their route to bypass different street furniture objects.

All Locations are Uncomfortable

If all the locations within your site do not meet the recommended comfort level for the area type it is important that the space for walking is increased by moving or repositioning street furniture and/or increasing the footway width.

If the inadequate footway space is caused by static activity (people standing, sitting or queuing) the footway width may have to be increased. If this is not possible, it is important that the footway is kept clear of unnecessary street furniture. In addition, soft measures could be used to reduce the amount of static behaviour e.g. the operation of a queue could be discussed with the owner of an attraction or a meeting point in a less busy area could be created.

There are some situations where a lower level of comfort can be acceptable. For example, the vitality provided by on street cafe seating could compensate for a lower comfort level at that section of footway. However, even in this situation the PCL should not be lower than C+ at peak times.



Figure 8 Pedestrian Comfort Levels on Footways

Figure 9 summarises which Pedestrian Comfort Level is suitable for different area types for use in the peak hour, and for the Average Maximum Activity level. This table informs the comments generated by the spreadsheet.

	HIGH STREET		OFFICE AND RETAIL		RESIDENTIAL		TOURIST ATTRACTION		TRANSPORT INTERCHANGE							
	Peak	Ave of Max	Peak	Ave of Max	Peak	Ave of Max	Peak	Ave of Max	Peak	Ave of Max						
A	COMFORTABLE		COMFORTABLE		COMFORTABLE		COMFORTABLE		COMFORTABLE							
B+	ACCEPTABLE		ACCEPTABLE		ACCEPTABLE		ACCEPTABLE		ACCEPTABLE							
B																
B-																
C+	UNACCEPTABLE/ UNCOMFORTABLE		ACCEPTABLE		AT RISK	AT RISK	UNACCEPTABLE/ UNCOMFORTABLE		ACCEPTABLE							
C-			AT RISK	AT RISK	UNACCEPTABLE/ UNCOMFORTABLE				AT RISK	AT RISK						
D			AT RISK	AT RISK					AT RISK	AT RISK						
E																
	Peak and Average of Maximum Activity levels have similar guidance as people visiting retail areas stated they were particularly sensitive to crowding.		The “at risk” level is set at a lower PCL during the Average of Maximum Activity than peak flows. This is because of the greater number of single travellers and the short duration of maximum activity.		The “at risk” level is set at a lower PCL than peak flows in Residential Areas to reflect the short time this is likely to occur. A site visit to Residential sites is particularly important to check if there is school activity or a bus stand in the area.		Peak and Average of Maximum Activity levels have similar guidance as people visiting tourist areas are likely to be particularly sensitive to crowding		The “at risk” level is set at a lower PCL during the Average of Maximum Activity than peak flows. This is because of the greater number of single travellers and the short duration of maximum activity.							

Figure 9 Guidance for different area types

Step 2 Assess Pedestrian Crossings

STEP 2.1

Select Site

The aim of a pedestrian comfort assessment on a crossing is to understand whether the infrastructure for crossing the road is comfortable for users. This is important to review as it will influence both the level of compliance on the crossing and how pedestrians perceive severance in the area. The crossing assessment evaluates three aspects of comfort when crossing the road:

- Is it comfortable to cross from one footway to another (or to the road island) in the space provided by the crossing arm?
- If the crossing has an island, is it comfortable to walk from one arm of the crossing to the other?
- How many rows of people will form when waiting to cross from the island to the footway?

All three aspects of the crossing should be shown to be comfortable, otherwise the design of the crossing may need to be reconsidered.

Note that a range of factors influence road crossing behaviour on signal controlled crossings and the assessment does not consider other important factors such as whether the crossing is aligned with pedestrian desire lines, or the impact of people waiting to cross on the clear footway width.

The research for this project was undertaken on pelican crossings. It is anticipated that this will be applicable to puffin crossings, although further research may be required due to the different signal timings and location of the pedestrian green man signal.

If you are undertaking an assessment of a crossing as part of a wider site assessment, you will already have visited the site as part of step 1.1. If you are undertaking the crossing assessment as a stand alone assessment you should visit the site to consider the following questions as these may affect the data you collect:

- What area type is the site (see step 1.2)?
- Are there signs that the site is a route to and from school? This could include school age children, school crossing wardens and other indicators such as “only two schoolchildren at a time” signs on the local shops.
- Do people cross away from the formal crossing facilities?
- Does the size of the queue waiting to cross significantly interfere with people walking along the footway?
- Any other notes about pedestrian activity and behaviours that may be relevant.

STEP 2.2

Collect Data Required

To undertake the crossing assessment the following data is required:

- The total demand for crossing the road. This includes people crossing during the green man, blackout and red man pedestrian phases. The methodology for collecting this data can be found in Appendix D.

The signal timings for the pedestrian phases of crossings (green man, blackout and red man) in seconds. If the crossing has a variable cycle length a number of cycles should be recorded and the median taken.

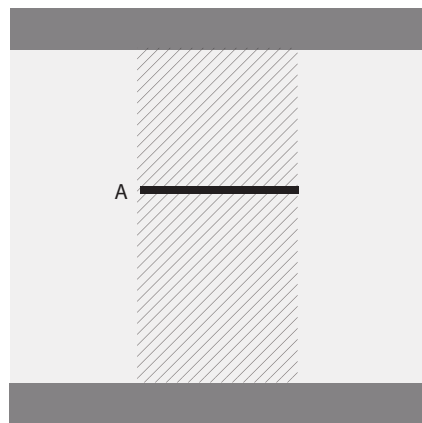
- Measurements of the crossing arms and island, if present, in metres.

The diagrams on this page show what measurements are required for different types of crossings.

Straight Across Crossing

A) The comfort of the crossing arm is assessed using the width of the arm (stud to stud) in metres.

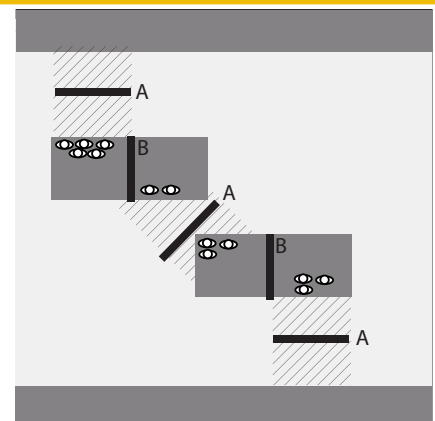
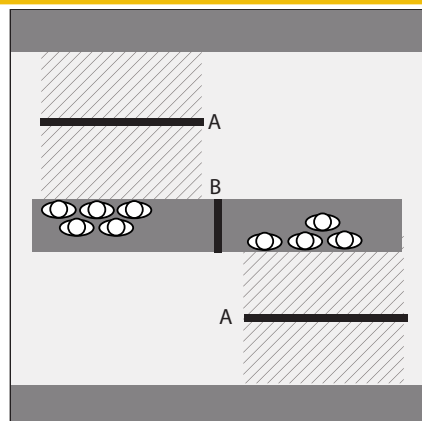
On straight across crossings, islands are designed to provide temporary shelter and are therefore not assessed.



Staggered and Multi-Armed Crossing

A) The comfort of the crossing arm is assessed using the width of the arm (stud to stud) and the demand for crossing the road. This measure is also used to assess the number of rows that form on the island as people wait to cross from the island to the footway.

B) The width of the crossing island (between guard rail if present) is used to assess the comfort of the island as people walk from one arm of the crossing to the other.



Note that on staggered and multi-arm crossings, each arm and its associated queue on the island will be assessed separately, although the results are reviewed together. That is, if any one part of the assessment is found to be uncomfortable the design of the whole crossing should be reconsidered.

Using the data collected in step 2.2 use the “Worksheet(Crossings)” tab of the spreadsheet to calculate the crowding and therefore the Pedestrian Comfort Level for each of the locations on your site.

1. Input Activity Data

For each location enter the activity data for the site:

- Location name /Arm.
- Average Flow - average of all the samples taken throughout the survey hours.
- Peak Flow- average of the samples recorded in the peak hour.

2. Input Measurement & Signal Time Data

Measurements for each arm should be taken on site or from a suitable record such as a topographic survey in metres, and entered into the spreadsheet (columns G to H).

Record the green man, red man and blackout time in seconds in column I to K. The total signal time will then be calculated from these numbers.

3. Calculations

The spreadsheet will then automatically calculate the following:

- % time available to cross - This is the proportion of time in a signal cycle that people can cross the road (during the green man and blackout periods).
- Relative People Per Hour (rpph) - This figure is calculated to use in the assessments, as the people per hour (pph) figure used on footways assumes that movement along the street is distributed evenly, i.e. 60pph means that 1 person will pass a point each minute. On crossings this is not the case as people should only cross during the pedestrian crossing phases. To reflect this the “relative pph” is calculated by dividing the pph by the

% of time available to cross. Therefore a pph of 60 where people can cross the road 20% of the time is equivalent to 300pph.

- Crowding on the crossing arm - Pedestrian crowding is measured in people per metre minute of the width of the crossing arm (ppmm) and is calculated using the following formula:
relative people per hour ÷ 60 ÷ crossing arm width in m
- Crowding on the Crossing Island - Pedestrian crowding is also measured in ppmm using the width of the crossing island (ppmm) and is calculated using the following formula:
relative people per hour ÷ 60 ÷ crossing arm width in m
- Pedestrian Comfort Level Categorisation - The crowding level (ppmm) is then categorised according to the Pedestrian Comfort Level scale for both the crossing arm and the crossing island which is found on page 20.
- Queues on the crossing island -This section first works out how many people can queue parallel to the road (a row), based on the width of the crossing arm and the standard body ellipse. Then, based on the demand for crossing the road and the number of cycles per hour, it works out the average people waiting to cross per cycle. This is the average size of the queue. Finally the number of rows that are likely to form is calculated by dividing the average size of queue by the number of people in a row.
- Pedestrian Comfort Level Categorisation for Number of People Queuing - The number of rows that is likely to form in each cycle is then categorised according to the Pedestrian Comfort Level for crossing islands. As the queues that form would be very dense, it was found that more than three rows encouraged crossing outside of the island.

After completing the calculations, change to the “Print Sheet (Crossing)” tab of the spreadsheet. This sheet summarises the results for each location and has four main sections.

Summary Information

This section summarises the key information about each arm of the crossing.

Summary Info	Location Name		Location 1 Eastern Arm		
	Area Type		Office Retail		
	Average Flow (PPH)		149		
	Peak Hour Flow (PPH)		166		
	Width of Crossing Arm		4m		
	Width of Island (for people to pass)		2.6m		
Signal Timings		Green Man 4.5s	Interblack 5s	Red man 50s	

Figure 10 Summary information shown on printing tab

Notes and Mitigation

This section allows you to provide extra information to inform the discussion with the reviewing authority. The notes field can be used to highlight issues such as a high number of cyclists or that traffic often waits across the stop line, blocking the crossing.

The mitigation section is where suggestions for action and agreed action points should be recorded.

If any aspect of the crossing is uncomfortable, the design of the crossing may need to be reconsidered or the signal timings adjusted.

Results for each assessment

The spreadsheet then highlights the Pedestrian Comfort Level (PCL) for each assessment, and provides an explanation of the impact of the Pedestrian Comfort Level at peak times. This is to inform your decision making in the next stage.

A guide to the Pedestrian Comfort Levels for each assessment can be found on Figure 12 on page 20.

Pedestrian Level of Comfort (PCL) (Crossing Arm)	PCL for Average Flows	A: 4 ppmm
	PCL for Peak Hour Flows	
Impact	Pedestrian Level of Comfort (PCL) (Crossing Arm) at Peak Hour Flows	The crossing should be comfortable for its intended use, at most times. However you may need to re-assess the crossing in future if significant changes occur in land use or pedestrian activity.

Figure 11 PCL result and impact as shown on printing tab

Mitigation Measures

Once the assessment is complete, it may be necessary to consider mitigation measures to ensure the crossing is as comfortable as possible. This section summarises what type of actions may be considered.

Pedestrian Comfort Level on the Crossing arm is C-, D or E

The Pedestrian Comfort Level could be improved by adjusting the signal timings, increasing the width of the crossing or a combination of these two measures.

The crossing should then be re-assessed to ensure the solution will be comfortable for users.

Pedestrian Comfort Level when using the island (space to pass) is C-, D or E

The Pedestrian Comfort Level could be improved by adjusting the signal timings, increasing the width of the island or a combination of these two measures. The design of the crossing could also be reconsidered as a straight across crossing may work better in this situation.

The crossing should then be re-assessed to ensure the solution will be comfortable for users.

More than two rows of people form on the island when waiting to cross

Three rows of people are likely to be acceptable at peak times. However if this is happening throughout the day, or the spreadsheet predicts more than three rows of people, it is important to try and reduce the number of rows forming to ensure the crossing is comfortable. This can be achieved by adjusting the signal timings, increasing the width of the crossing, or a combination of these two measures. The design of the crossing could also be reconsidered. A straight across crossing may work better in this situation.

The crossing should then be re-assessed to ensure the solution will be comfortable for users.

Comfortable
↑
↓
Uncomfortable

PCL A COMFORTABLE FOR ALL AREAS



A+ < 3ppmm
< 3% Restricted Movement



A 3 to 5 ppmm
13% Restricted Movement



A- 6 to 8 ppmm
22% Restricted Movement

The crossing is very comfortable at PCL A+ to A- with plenty of space for people to walk at the speed and that they choose.

PCL B PCL B- RECOMMENDED



B+ 9 to 11ppmm
31% Restricted Movement



B 12 to 14ppmm
41% Restricted Movement



B- 15 to 18 ppmm
50% Restricted Movement

The crossing continues to be comfortable at PCL B+ to B- . **PCL B- is the recommended level of comfort for crossing arm and the space required for people to cross on an island (if present).**

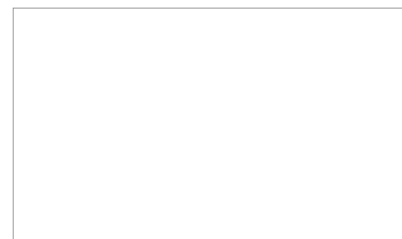
PCL C, D, E INCREASINGLY UNCOMFORTABLE



C 18 to 26ppmm
59% Restricted Movement



D 27 to 35ppmm
100% Restricted Movement



E >35 ppmm
100% Restricted Movement

If a crossing operates at PCL C, D or E the level of crowding may encourage users to cross away from the formal facilities.

Figure 12 PCL for Crossing Arm & Space to Pass on Island

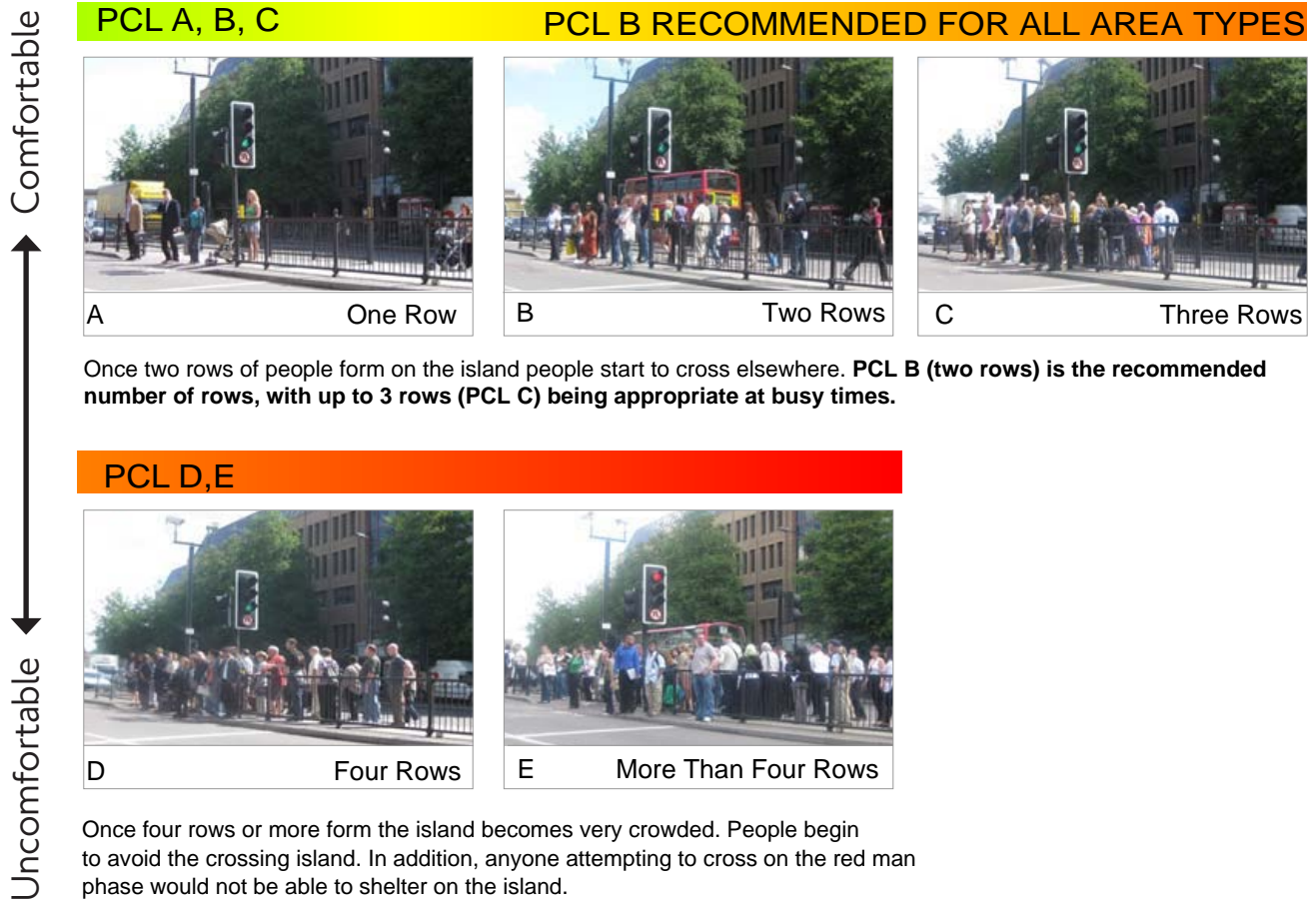


Figure 13 PCL for Queues on Crossing Islands



Step 3 Review Impact on Scheme

This Pedestrian Comfort Level Guidance is designed to be a useful tool in both internal design processes and in dialogue with a reviewing authority. This is likely to be the planning or highway authority responsible for the site.

The Pedestrian Comfort Assessment is designed to inform a dialogue about a scheme by understanding how the scheme operates in practice, how this is perceived by users and what the impact of this is. For example, extreme crowding on a retail site is likely to put people off visiting the area in future. This will allow a more informed balance between the needs of different road users and a design that will work for all users.

Appendix A: About the research

This research was commissioned as TfL identified a need for consistent guidance for what footway widths should be used for comfortable movement in different situations, tailored to the needs of London.

The work and research undertaken by Fruin, and the Highway Capacity Manual, provided a basis for assessing footway comfort. However, as new ideas and research have arisen in the last ten years a range of new and innovative methods were used to understand and analyse pedestrian comfort.

Therefore a detailed study of over 75 sites across the Transport for London Road Network was undertaken to measure the following aspects of pedestrian behaviour:

- Detailed pedestrian flow information. This provided information on the level of pedestrian movement throughout the day, how the direction of movement changed throughout the day and what peaks were experienced.
- The speed of pedestrians was measured at peak and inter peak hours to assess the impact of the number of people and the direction in which they were travelling.
- The number of people who experienced restricted movement was recorded. Restricted movement is when people had to change their speed, route, experienced “shoulder brushing” or bumped into other users.
- The distance people leave between each other and between street furniture, the “passing distance”, was measured accurately using CCTV and a detailed topographic survey.
- A questionnaire survey was undertaken in a number of sites to assess peoples’ perception of comfort and how this may affect their actions.

The results of these studies were used in a comprehensive assessment of comfort in different area types, the tolerance to different comfort levels, and the passing distances people leave between each other and street furniture. This was then used to determine the guidance in this document.

The studies were undertaken using CCTV footage and through on-site surveys of pedestrian perceptions. Full details of the assessments can be found in the Pedestrian Comfort Guidance for London: Technical Report and Appendix.

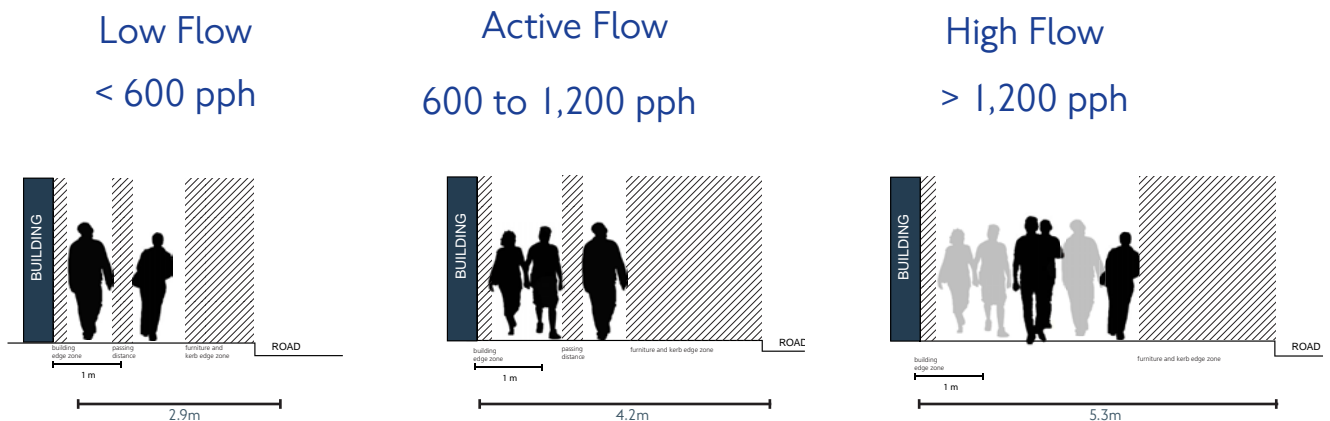
Although the research was focused on TLRN roads, the results and methods are transferable across other parts of London as the guidance is organised and applied on an area type basis.

Appendix B: Recommended Widths

This diagram shows recommended footway widths for different levels of flow, based on the research carried out for this project. They show the total width of the footway rather than the clear footway width.

This information provides an initial indication as to comfortable footway widths in different environments in advance of a full Pedestrian Comfort Assessment.

Pedestrian comfort levels are defined on Figure 8 on page 13.



The recommended minimum footway width (total width) for a site with low flows is **2.9 m**. This is enough space for comfortable movement and a large piece of street furniture such as guard rail, cycle parking (parallel with the road), a bus flag for a low activity bus stop or a busy pedestrian crossing.

In high street or tourist areas the total width can be reduced to **2.6m** if there is no street furniture (except street lights) to allow space for people walking in couples or families and with prams etc.

In other areas, low flow streets can be **2m** wide if there is no street furniture. This total width is required for two users to pass comfortably and to meet DfT minimum standards.

The recommended minimum footway width (total width) for a site with active flows is **4.2m**. This is enough space for comfortable movement and a large piece of street furniture such as a wayfinding sign, a bench or a bus shelter.

In high street or tourist areas the width can be reduced to **3.3m** if there is no street furniture (except street lights). This width allows two groups to pass.

In other areas, active flow streets can be **2.2m** wide if there is no street furniture. This width is required for the level of flow and to meet DfT minimum standards.

At this level of flow the recommended minimum footway width (total width) is **5.3 m**. This is enough space for comfortable movement up to 2,000 pph and a large piece of street furniture such as a wayfinding sign, a bench, a bus shelter or a busy pedestrian crossing.

In areas such as transport interchanges more space may be required if there are multiple bus stops on one footway. See Appendix B: Street Furniture on page 26 for more information.

If there is no street furniture, the width can be reduced to **3.3m**. This is enough space for comfortable movement up to 2,000 pph.

Appendix C: Street Furniture

A key part of the research into pedestrian comfort on footways was to investigate the real impact of street furniture on peoples' behaviour and the amount of space on the footway. For example: How much space do people leave between each other and street furniture? Where do people gather around street furniture? How many people and how do they behave? What type of street furniture generates static pedestrian activity?

Firstly, the research looked at the space people leave between themselves and the building and kerb edges. It was found that, if the footway was not busy, people tend to walk along the centre of the footway leaving a generous buffer between themselves and the building edge and kerb. However, if the footway is busy, people keep at least 200mm between the building edge or kerb and their position.

Therefore a standard buffer of 200mm has been identified for the building edge, and 200mm for the kerb edge. This means that on a footway with no street furniture the clear footway width is the total width minus 400mm.

Note that, if street furniture is placed against the wall or kerb edge, the street furniture will act as a new wall or kerb edge (i.e. buffer is not counted twice). In this situation the wall or kerb edge column in the spreadsheet should be marked "no" and the street furniture buffers used.

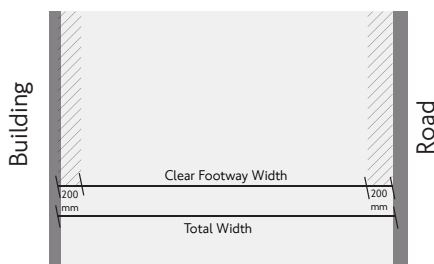


Figure 14 Unobstructed Footway



Figure 15 Examples of Location Where Guard Rail Replaces Kerb Buffer

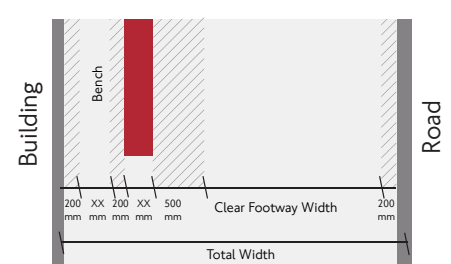


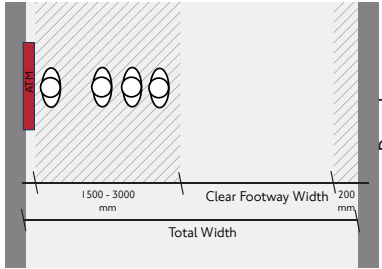
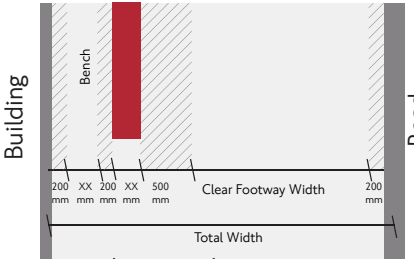
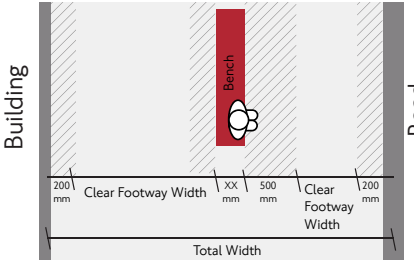
Figure 16 Examples of Location Where Bench Replaces Building Buffer

Secondly, this "passing distance" analysis was repeated for standard types of street furniture found on London's streets such as posts, bus stops, ATMs, market stalls and loading or parking bays.

Following this analysis, and users' stated perceptions of crowding from questionnaire surveys on a selection of sites, it has been possible to determine the buffers that need to be taken into consideration when calculating Pedestrian Comfort on footways with street furniture.

Details and diagrams of these buffers can be found on the following pages. Where a distance is marked as "xx" for example in the Bench diagram above, this is because the size of the object or its location on the footway is variable. **N.B The diagrams are not to scale.**

Finally, the research carried out did not evaluate the effect of restricted footway along a length of footway (e.g. a number of pieces of street furniture or multiple bus stops). Current Department for Transport guidance states that restricted footway length should be no longer than 6m. This concurs with user perceptions of street furniture. For example ATM queues and individual bus stops are not perceived to be a problem by users, whereas multiple bus stops are. Therefore this guidance should be used when undertaking Pedestrian Comfort assessments.

Obstruction	Description	Buffer	Diagram
ATMs	<p>ATMs were not perceived to be a problem by users, probably as they expect these areas to be busy and the impact on movement is highly localised. However, queues around the ATM can reduce the clear footway width by between 1,500mm and 3000mm of space depending on the area and number of machines available.</p> <p>The buffer should be decided following a site visit, and if necessary a static survey.</p>	1,500 to 3000mm from ATM edge	 <p>ATM</p>
Benches	<p>Benches reduce the clear footway width by the bench width, plus an additional 500mm in the direction of seating when in use (legs, bags etc). Note that for the bench to be attractive to people there needs to be room for two people to pass between the bench zone and the kerb or building line (1500mm clear footway width).</p> <p>If the bench is placed in the middle of the footway, with people able to sit facing one direction only, the reduction is 500mm plus 200mm on the other side.</p> <p>If you can sit facing either way the buffer would be 1,000mm (500mm either side).</p>	<p>500mm from Bench edge for direction of seating, 200mm on non-seating side</p> <p>If seating is in both directions, 1,000mm (500mm either side)</p>	 <p>Bench (near wall)</p>  <p>Bench (middle of footway)</p>

Obstruction	Description	Diagram
Bus Stands		
Individual: General Comments	Individual Bus Stands are not perceived as causing crowding problems. However there are some points to note about the queuing patterns around each bus stop type as queuing is not restricted to the bus stand area.	
Individual: Bus Flag	Queues around this type of Bus Stand form around the flag parallel to the road, and at busy sites parallel to the building line as well. The impact depends on how busy the bus stop is but it was seen to be in the range of 1,600 to 2,200 mm at the road edge and one person deep (460mm) at the building edge.	<p>Building</p> <p>Bus Flag</p> <p>Road</p> <p>460 mm 200 mm Clear Footway Width 200 mm 1600 to 2200 mm</p> <p>Total Width</p>
Individual: Back to Building	Queues around this type of Bus Stand form between the stand and the kerb edge as well as on either side of the stand (see dark grey zone around stand). The impact depends on how busy the bus stop is but was seen to be in the range of 600 to 1,200 mm.	<p>Building</p> <p>Bus Stand</p> <p>Road</p> <p>600 to 1200 mm 200 mm Clear Footway Width 200 mm</p> <p>Total Width</p>
Individual: Back to Footway	Queues around this type of Bus Stand form predominantly on either side of the stand leaving the footway clear for free movement.	<p>Building</p> <p>Bus Stand</p> <p>Road</p> <p>200 mm Clear Footway Width 200 mm</p> <p>Total Width</p>
Individual: Back to Road	This has a similar queuing pattern as to back to footway stands but the queue was seen to stretch between 600 and 1,300mm outside of the stand.	<p>Building</p> <p>Bus Stand</p> <p>Road</p> <p>200 mm Clear Footway Width 200 mm 600 to 1300 mm 200 mm</p> <p>Total Width</p>
Multiple Bus Shelters	Although individual bus stands are not perceived as causing problems, groups of bus stands create crowding pressures on footways. Previous research by Atkins found that it is important that there are no other blockages, e.g. telephone boxes, that block sight lines, as this encourages people to queue further from the shelter in order to see the bus approaching.	<p>Building</p> <p>Bus Stand- Back to Road</p> <p>Road</p>

Obstruction	Description	Buffer	Diagram
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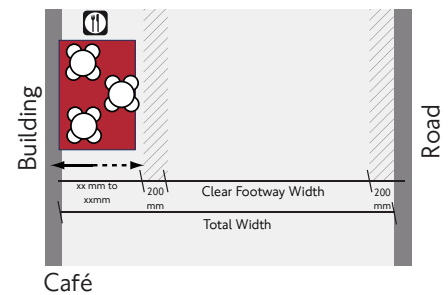
Cafés

Café seating areas act like a wall, so the usable footway width is the width from the kerb to the edge of the Café zone plus the standard buffer.

Note that the area around Café seating is flexible - tables may be intended for two but extra chairs may be introduced by both customers and vendors to seat a larger group.

It is also important to consider additional obstructions such as advertisement boards as these can reduce footway width further.

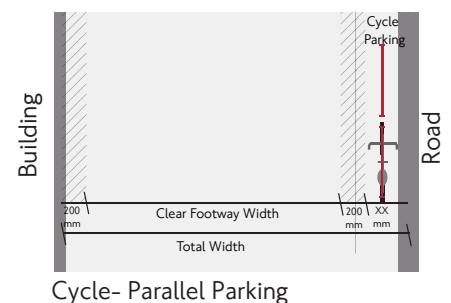
200mm from edge of café seating zone



Cycle Parking *This is for non-hire sites only.
Cycle Hire Sites should be reviewed on a case by case basis.*

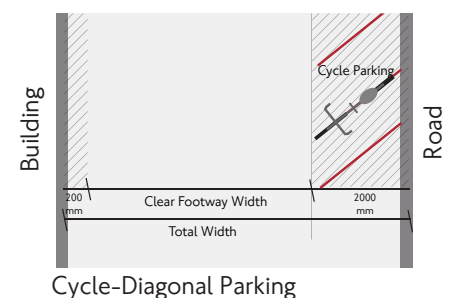
Parallel Cycle Parking If parallel to the road, cycle parking forms a barrier and is treated by pedestrians as a wall so the usable footway width is the width from the building to the edge of the cycle stands plus 200mm.

200mm from edge of Cycle stands



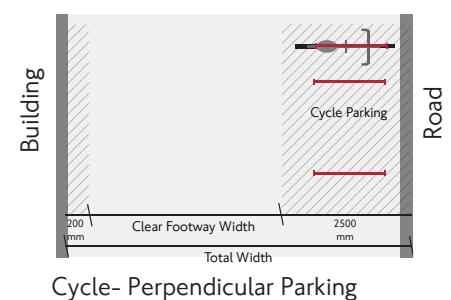
Diagonal Cycle Parking If the cycle stand is positioned diagonally to the road, the reduction in clear footway width is approximately 2000mm.

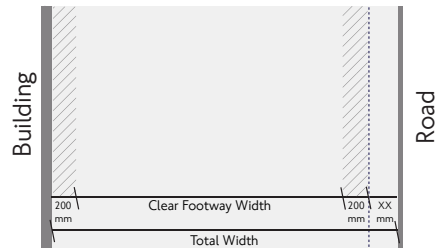
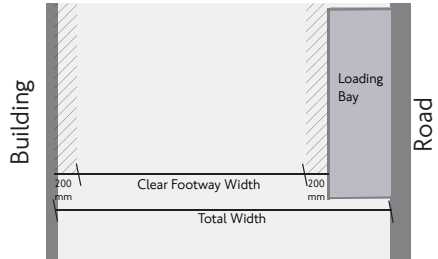
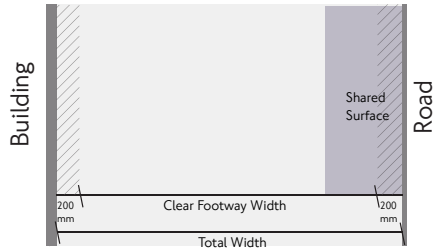
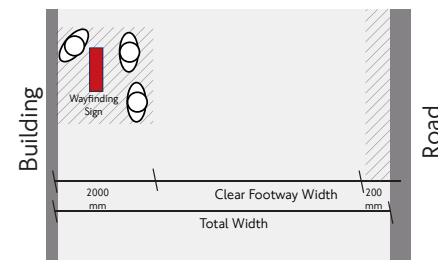
Total reduction of clear footway width by around 2000mm

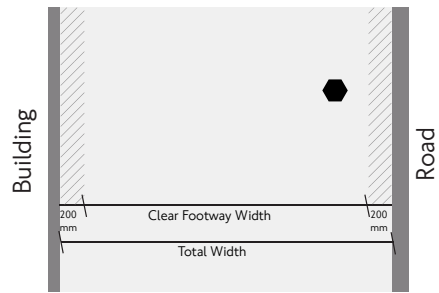
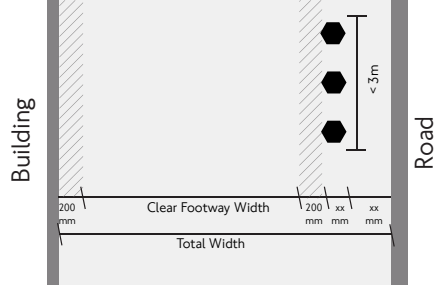


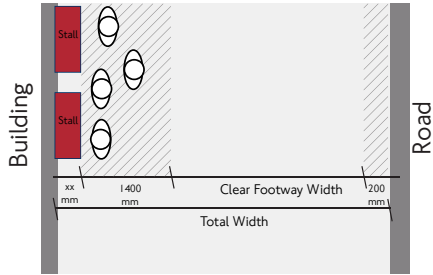
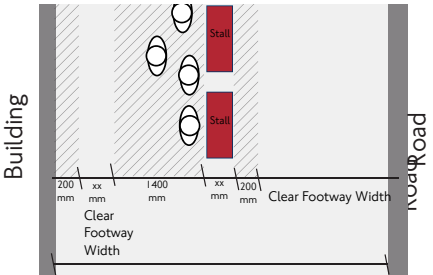

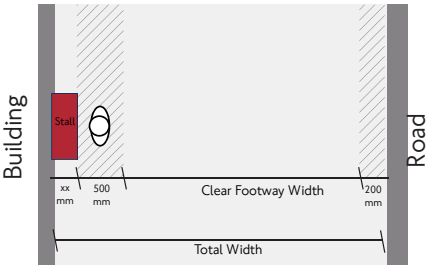
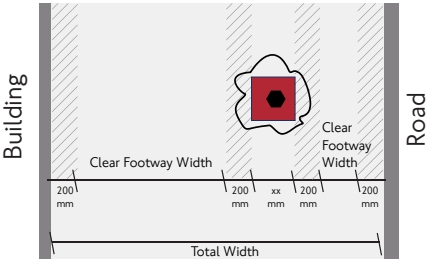
Perpendicular Cycle Parking If the cycle stand is positioned perpendicular to the road, the reduction in clear footway width is approximately 2,500mm.

Total reduction of clear footway width by around 2,500mm



Obstruction	Description	Buffer	Diagram
Guard Rail			
	For guard rail, a 200mm buffer should be added from its placement on the footway. At some locations people wait around the guard rail (near building entrances, tourist areas) and this static activity can reduce the clear footway width further.	200mm from guard rail	 <p>Guard Rail</p>
Loading Bay			
Loading Bay: Segregated	Where loading bay stops are delimited with a kerb, pedestrians only use the main footway section. Therefore the clear footway width is from the building line to the kerb with the normal buffer.	200mm from kerb edge	 <p>Loading Bays - segregated</p>
Loading Bay: Shared Surface	Where loading bay stops share the same surface as the footway pedestrians tend to use the full footway width. The assessment of the clear footway width should be carried out with and without a vehicle parked in the space. This is because the bay may be operational during peak pedestrian movement hours or, if it is not, there may be non-compliance with the operational times.	200mm from road edge	 <p>Loading Bays- shared surface</p>
Map Based Wayfinding Signs			
	For both mini-lith and mono-lith sign types the reduction in clear footway width is 2m ² . This is the space used by pedestrians reading the sign on both sides. This can be a significant reduction of the clear footway width and was seen to cause an increase of bumps and deviations at busy sites.	2000mm ² from the sign	 <p>Wayfinding Sign</p>

Obstruction	Description	Buffer	Diagram
Posts	<i>The guidance for posts is suitable for similar items of street furniture such as signal boxes and bins.</i>		
Individual Posts	<p>Individual posts have a limited effect on clear footway width. Posts and bollards should be aligned with other street furniture to minimise impact.</p> <p>If the posts are located in the middle of the footway it creates a visual interruption and re-siting should be considered. The clear footway width either side should be checked to ensure that there is sufficient space for free movement.</p>	N/A	 <p>Individual Post</p>
Multiple Posts	<p>Where there are multiple posts within a length of 300mm they form an obstruction, similar to guard rail.</p> <p>If the posts are placed near the road or the wall edge, a 200mm buffer should be added from its placement on the footway.</p> <p>If the posts are located in the middle of the footway the buffer should be the width of the post plus 400mm (200mm either side).</p>	<p>200mm from placement of post</p> <p>Or 400mm plus width of post</p>	 <p>Multiple Posts</p>

Obstruction	Description	Buffer	Diagram
Street Vendors			
Market Vendors	<p>Where there is an on-street market or concentration of vendors the clear footway width is reduced by the stall footprint plus an additional 1,400mm to reflect people browsing and queuing around the stall.</p> <p>If the market stalls are located in the middle of the footway the reduction in width is the width of the stall, 1,400mm in the direction people are served and 200mm at the “closed” side of the stall. If the stall is open at both sides the reduction in width would be the width of the stall plus 2,800mm.</p> <p>If the market stalls are located parallel to the road the clear footway width is reduced by the stall footprint plus an additional 1,400mm to reflect people browsing and queuing around the stall.</p>	1400mm from stall edge	 <p>Street Vendors: Market Vendors Parallel to Building</p>  <p>Street Vendors: Market Vendors Middle of Footway</p>  <p>Street Vendors: Market Vendors Parallel to Road</p>
Individual Vendor	<p>The impact of individual street vendors is less than in a market but the clear footway width is still reduced by the stall footprint plus an additional 500mm to reflect people browsing and queuing at the stall.</p> <p>If the stall is located elsewhere on the footway the reduction will be the stall footprint, plus 500mm plus the standard building/kerb buffer of 200mm.</p>	500mm from stall edge	 <p>Street Vendors: Individual Vendor</p>
Tree	<p>For a single tree, the footway width should be reduced by the planting area plus a buffer of 400mm (200mm either side of the planting area)</p>	200mm either side of the planting area	 <p>Tree</p>

Appendix D: Measuring Pedestrian Activity

Introduction

This section explains the method for collecting pedestrian data, for both footways and crossings, before detailing the specific data needs for each area type. This method is suitable for Pedestrian Comfort Level (PCL) Assessments.

Site Visit

Before carrying out data collection and the Pedestrian Comfort Level assessment you should first visit your site. When on site you should assess:

- Is the site the area type you thought it was?
- Do the peak hours seem appropriate for the full survey?
- Are there any locations with high static activity (meeting friends, queuing, taking photographs) that may require a static activity survey?
- Do people cross away from the formal crossing facilities?
- Are there signs that the site is a route to and from school? This could include school age children, school crossing wardens and other indicators such as “only two schoolchildren at a time” signs on the local shops.
- Any other notes about pedestrian activity.

You should follow the Health and Safety procedures of your organisation when going on site.

Footways

A number of factors should be taken into account when conducting a pedestrian activity survey for a footway:

- How many locations and where? Pedestrian flows can vary significantly over short sections, especially in areas with high levels of demand such as shopping centres, or near transport connections. Ideally samples will be taken in 2-3 locations on both sides of the carriageway. Moreover, it is important to avoid areas with conflicting movements, such as a bus stop or tube station exit.
- Recording the location: An exact reference for the sample location(s) should always be recorded on a map with a text description (e.g. stand in front of Halifax, facing WH Smith) and photograph for future reference.
- Performing the counts: The counts should be taken using the “stationary gate method” whereby all pedestrians who cross an imaginary line perpendicular to the footway are counted. Ideally the direction that pedestrians are walking in is also noted. This can be seen in the photograph below. It is advisable to use tally counters to record this information, particularly on busy sites. Weather conditions and unusual activity should be recorded throughout the survey hours. For example, a short spell of rain at 16:00, large tourist group passed at 13:30.
The person conducting the count should try to stand so that they do not disrupt normal activity.
- Sample length and hours of survey: This will depend on the purpose of the study. Suggested sample periods and survey hours suitable for Pedestrian Comfort Level assessments, are found on page 37 to page 41, organised by area type.
- If there are outstanding circumstances that will affect counts, e.g. significant underground closures or delays, the study should be redone on another representative day.



Figure 17 Photograph showing stationary gate method

Static Activity

A key part of the research into pedestrian comfort on footways was to investigate the real impact of street furniture on peoples' behaviour and the amount of space on the footway. Therefore the buffers defined for each type of street furniture include the average "static activity" associated with the furniture, that is, people waiting, queuing, talking, taking photographs etc.

If there is an unusual amount of static activity (e.g. because a bus stand is served by a large number of services) or, because of the area, people are standing and waiting in areas they normally would not (e.g. near guard rail in a tourist attraction or regional retail site), then an additional static survey is recommended.

A number of factors should be taken into account when conducting a static activity survey for a footway:

- How many locations and where? The initial site visit should have indicated locations where static activity occurs at the site. Locations near street furniture and transport connections are the usual locations. Samples should be taken within a 6m zone either side of your location.
- Recording the location: An exact reference for the sample location(s) should always be recorded on a map with a text description (e.g. stand in front of Halifax, facing WH Smith) and photograph for future reference.
- Performing the survey: The counts should be taken using the "snap shot" methodology whereby the observer records with a "x" on a printed map all pedestrians who are standing still within the survey location. This is like taking a photo of each section and the observer need only note what was happening when they first stopped and looked. The images below show a bus stop in Brixton and how a data collection book for the same scene is likely to look.
- Sample length and hours of survey: This will depend on the purpose of the study but should match the flow activity being collected. That is, once every half an hour if five minute samples are being collected or twice every half hour if 10 minute samples are being collected.
- Calculating the impact of static activity: Once the data has been collected the impact of the static pedestrians can be considered by either inputting the standing locations recorded into GIS using scaled people markers or if it is a simple queue that behaves consistently throughout the day by using a standard body ellipse (0.6m wide, 0.45m depth) plus 0.5 buffer (0.2m beside the wall or kerb and 0.3m between the static person and people walking by).



Figure 18 Brixton High Street looking South

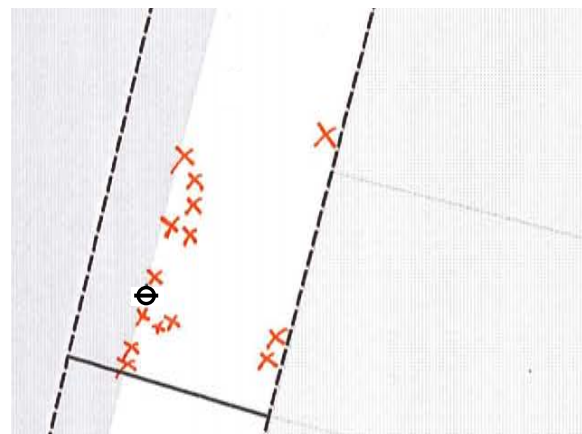


Figure 19 How a static survey of Figure 18 may look

Pedestrian Crossings

A number of factors should be taken into account when conducting a pedestrian activity survey for a crossing:

- Performing the counts: The counts should be taken using the “stationary gate method”, described on page 34, whereby all pedestrians who cross an imaginary line parallel to the crossing arm are counted. It is advisable to use tally counters to record this information, particularly on busy sites. Weather conditions and unusual activity should be recorded throughout the survey hours. E.g. short spell of rain at 16:00, large tourist group passed at 13:30 etc.

The best location to stand to record activity on the crossing will depend on the layout of the area, however beside the signal post is good for recording counts, as long as it is safe to do so.

- Samples should begin on the green man signal time and end when the next green man time begins. They should distinguish between people crossing on the green man and those crossing when the signal is red for pedestrians. It is not always possible to immediately record the next sample. If this is the case, the observer should wait until the next green man phase.
- Informal crossing: If there are a high number of people crossing adjacent to the crossing but not using the facility these should be included in the total demand for crossing the road.
This can be counted either by defining a zone in which all informal crossings will be recorded or by using the stationary gate method.
- Queues on the Crossing Island (if present): If possible, it is useful to note how many people are queuing on the island to cross the road. The aim is to understand, for each direction, what the maximum number of people waiting are. This allows the results of the assessment to be checked against what is happening in practice. In particularly busy areas you may want to record the size and composition of the queues on the footway, although this is integrated into the minimum width recommendations on page 25.
- Sample length and hours of survey: This will depend on the purpose of the study. Suggested sample periods and survey hours suitable for Pedestrian Comfort Level assessments, are found on page 37 to page 41, described by area type.

To calculate Pedestrians Per Hour

$$3,600 \div (\text{length of sample in seconds} \times \text{no of samples}) \times \text{total number of people recorded crossing the road in all samples}$$

High Street

Survey Information

Areas dominated by a range of retail and food and drink premises represent a focus for the communities that use the services they offer. The research behind the project identified the peak pedestrian hours for this area type.

Peak Pedestrian Hours (Minimum Survey Hours)

14:00 to 18:00

Flows are generally bi-directional on High Street sites as people visit multiple destinations.

Recommended Survey Hours

07:00 to 19:00

It is possible to have breaks at 10:30 to 11:30 and 14:30 to 15:30

Recommended Sample Duration

5 minutes every half an hour on footways 5 samples every half an hour on crossings

Recommended Sample Days

Saturday and one weekday (Tuesday, Wednesday or Thursday). If there is late night shopping (usually Thursday) the survey hours should be extended to capture this

School Holidays

If there is a school in the immediate area, the site should be surveyed during the school term. Longer sample periods are required at the start and end of the school day (30 minute sample)

Weather

Flows are likely to be affected by poor weather. If weather is poor there may be a need to repeat the survey

Office and Retail

Survey Information

Areas dominated by substantial government and/or commercial office buildings. These streets experience high volumes of pedestrians. The research behind the project identified the peak pedestrian hours for this area type.

Peak Pedestrian Hours (Minimum Survey Hours)

08:00 to 10:00 and 16:00 to 19:00

In the AM and PM peak, flows in Office and Retail sites will often be concentrated in one direction as people walk directly to work. However at lunch time, flows are generally bi-directional.

Recommended Survey Hours

07:00 to 19:00

It is possible to have breaks at 10:30 to 11:30 and 14:30 to 15:30

Recommended Sample Duration

10 minutes every half an hour on footways 10 samples every half an hour on crossings

Recommended Sample Days

One weekday (Tuesday, Wednesday or Thursday)

School Holidays

Surveys should be carried out in term time if possible

Weather

Flows are unlikely to be affected by poor weather

Residential

Survey Information

These areas are characterised by privately owned properties facing directly onto the street. The research behind the project identified the peak pedestrian hours for this area type.

Peak Pedestrian Hours (Minimum Survey Hours)

14:00 to 18:00

There is no significant directional bias found in residential areas. The exception to this are areas where a school is located where there may be a bias found as pupils walk to and from school.

Recommended Survey Hours

07:00 to 19:00

It is possible to have breaks at 10:30 to 11:30 and 14:30 to 15:30

Recommended Sample Duration

5 minutes every half an hour on footways 5 samples every half an hour on crossings

Recommended Sample Days

One weekday (Tuesday, Wednesday or Thursday) and as a comparator, Saturday (09:00 to 16:00)

School Holidays

If there is a school in the immediate area, the site should be surveyed during the school term. Longer sample periods are required at the start and end of the school day (30 minute sample)

Weather

Flows are likely to be affected by poor weather. If weather is poor there may be a need to repeat the survey for the minimum survey hours

Tourist Attraction

Survey Information

An area with high tourist activity. This could include attractions such as Madame Tussauds or renowned “sights” such as the South Bank, the Royal Parks etc. Note that the peak pedestrian hours for this area type can depend on the opening hours of the attraction, if appropriate.

Peak Pedestrian Hours (Minimum Survey Hours)

14:00 to 18:00

There was no significant directional bias found in areas with Tourist Attractions, however this will depend on the surrounding land uses.

Recommended Survey Hours

07:00 to 19:00

It is possible to have breaks at 10:30 to 11:30 and 14:30 to 15:30

Recommended Sample Duration

5 minutes every half an hour on footways 5 samples every half an hour on crossings

Recommended Sample Days

Saturday and/or any day particular to that attraction e.g. Borough Market opens Thursday, Friday and Saturday and Spittelfields market opens on Sunday

School Holidays

Tourist sites are often busiest during the school holidays so should be surveyed at this time

Weather

Flows are likely to be affected by poor weather. If weather is poor there may be a need to resurvey the minimum survey hours

Transport Interchange

Survey Information

Transport Interchanges help to provide seamless journeys for people travelling in London. They range from local interchange between rail and bus to National Rail interchanges. The research behind the project identified the peak pedestrian hours for this area type.

Peak Pedestrian Hours (Minimum Survey Hours)

08:00 to 10:00 and 16:00 to 19:00

In the AM and PM peak, flows in Transport Interchange sites will often be concentrated in one direction. However this is not as pronounced as in Office and Retail sites.

Recommended Survey Hours

07:00 to 19:00

It is possible to have breaks at 10:30 to 11:30 and 14:30 to 15:30

Recommended Sample Duration

10 minutes every half an hour on footways 10 samples every half an hour on crossings However, this is dependent on frequency. If it is a low frequency travel service sample periods may need to be extended

Recommended Sample Days

One weekday (Tuesday, Wednesday or Thursday)

School Holidays

Surveys should be carried out in term time if possible

Weather

Flows are unlikely to be affected by poor weather.