Measuring Pedestrian Activity

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01 CONTEXT

- 1.1.1 London is committed to becoming one of the most walkable cities in the world by 2015. Promoting walking improves health, reduces congestion and emissions, and improves the vitality and security of London's streets. The task of improving the walking environment is therefore of high priority. This document aims to provide a concise summary of relevant data collection techniques.
- 1.1.2 Colin Buchanan was commissioned by TfL to produce Monitoring Walking Schemes: Best Practice Guidance in 2006. Given the wide range of delivery mechanisms for pedestrian improvements, this abridged document aims to present the technical elements of this guidance in a more general context. The full document can be obtained from Colin Buchanan (see contact details at the end of this document).
- 1.1.3 The measurement of pedestrian activity occurs for different reasons and at different scales. This document aims to include elements applicable to all of these purposes:

Longer term monitoring

- 1.1.4 There is a need to monitor against policy objectives over the longer term. For example, performance indicators are included in the Local Implementation Plan (LIP) to assess progress against policy objectives. Other examples include:
 - Regular assessment of crime and accident statistics
 - Travel trends and modal split information, e.g. LATS





- Town centre performance indicators
- Permanent pedestrian counter installations

Scheme development

- 1.1.5 Pedestrian movement patterns and their use of public space are key inputs for informing the design process. These can range from assessing pedestrian desire lines and footway capacity issues to understanding and providing for social spaces in the public realm.
- **1.1.6** Pedestrian counts may also be required to prioritise investment between schemes and in the development of robust business cases.

Scheme monitoring

- 1.1.7 When measures are introduced to improve the walking environment, monitoring can aid the design of new walking projects and can ensure that projects meet their objectives. However, walking schemes typically have relatively low capital expenditure and it is not cost-effective to monitor all schemes. Therefore a sample of LIP-funded walking schemes are monitored each year. These should fulfil three criteria the objectives must be:
 - Manifest clearly linked to scheme objectives
 - Measurable allowing comparison over time
 - Meaningful to a wider audience thus informing Best Practice
- 1.1.8 This document is structured around three categories of methodology:
 - Counting pedestrians
 - Observational methods
 - Attitudinal surveys

02 COUNTING PEDESTRIANS

2.1 WALKING TRIP RATES / MODAL SPLIT

2.1.1 Travel diary surveys such as the London Area Travel Survey (LATS) or the National Travel Survey (NTS) provide walking trip rates and modal split figures. However, these are to be treated with caution as only walk-only trips are generally included. Additionally, some diaries exclude very short walking trips, and even when included the results are extremely sensitive to the quality of the data collection process. In reality, every trip includes a walking element and walking to access other modes is a vital element in London's transport mix.

2.2 PERMANENT PEDESTRIAN COUNTERS

- 2.2.1 A variety of automatic pedestrian counting systems are available for permanent installation at important sites. A number of these operate at key town centre sites and the Strategic Walk Network has also employed counters on leisure routes to monitor trends.
- 2.2.2 Automatic counters can achieve a good degree of accuracy. However, they require a substantial effort on initial calibration and subsequent maintenance. Therefore in general they are only suited to long term or permanent installation.
- 2.2.3Further information on such counters can be obtained from Colin Buchanan or from Central London Partnership who have undertaken research into the use of automatic pedestrian counters (please contact Matthew Mace mmace@c-london.co.uk).





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2.3 PEDESTRIAN COUNTS

2.3.1 Pedestrian counts can be required for a number of purposes. The sample size required depends on the accuracy needed for the scheme and this should be agreed at the outset. It is worth noting, in particular, that for the purpose of before and after monitoring, relatively large samples are required to pick up changes in pedestrian flows.

24-hour weekday flows

- 2.3.2 The following 'rule of thumb' methodologies, employed to estimate a 24-hour average weekday count for the time of year, may prove helpful.
- 2.3.3 These rules of thumb work well for most urban sites with daily usage above 1,000 pedestrians. However, variation is much higher at sites with high leisure or tourist flows.

TABLE 2.1 "RULE OF THUMB" PEDESTRIAN COUNT SAMPLING

	ACCURACY LEVEL 1	ACCURACY LEVEL 2	ACCURACY LEVEL 3
Context	An initial rough estimate is needed	To compare relative usage between sites or change over time (expected change > +/- 10%)	To measure change over time
Margin of error (from average weekday total for the time of year)	+/-25%	+/-5%	+/-4%
Confidence interval	90%	90%	95%
Method	Two one-hour long counts (10:00 –11:00 and 16:00 – 17:00) on one weekday	Every 5th 15-minute period should be counted (i.e. periods rotating 'around the hour') on one weekday 07:00 – 22:00	Full 07:00 – 22:00 count for 3 weekdays
Scaling factors	Scaling using reliable factors from similar streets (generally between 600% and 900%)	Scaling using reliable factors from similar streets (generally between 500% and 600%). Simple linear interpolation gives the same accuracy in many cases.	Scaling using reliable factors from similar streets (generally around 104% but up to 112% where night or early morning flows are high)

NOTE: All count sites experience daily fluctuations, and even accuracy level 3 only refers to a 95% confidence interval, i.e. 1 in 20 observations will lie outside the +/-4% margin of error quoted.

2.3.4 Estimates of flows for shorter periods, e.g. for one of the peak periods, can be subject to much higher variation. Where a high degree of accuracy is required, three days of counts of the survey period are recommended.

Weather and seasonal variation

- 2.3.5 Variation in pedestrian counts due to weather is relatively small at sites with predominantly commuters, shoppers etc. At sites with many leisure users and tourists, variation may be higher. Most sites encounter significant seasonal variation. Therefore, the following principles should always apply:
- Surveys should be undertaken in neutral periods (outside of school holidays and the pre-Christmas period)
- Where pedestrian counts are to be compared, e.g. before / after monitoring, counts should take place at the same time of the year.

Survey days

- 2.3.6 It is often suggested that Tuesday and Thursday constitute the most representative weekdays. This principle can be followed where no further information about the nature of pedestrian flows caused by adjacent land uses exists.
- 2.3.7 Saturday and Sunday pedestrian flows are generally characterised by higher variation, both daily and seasonal. Therefore before and after comparisons of weekend pedestrian flows should be avoided where possible. Where accurate Saturday or Sunday counts

are required, an average of three d recommended. Comparisons shou carried out at the same time of year. Weather conditions and the impacts of any special events should be recorded.

Manual vs. CCTV

2.3.8 Counting pedestrians from CCTV footage can be more cost-effective than manual counts in some cases. Furthermore, where very high volumes are counted, footage can be slowed down or rewound to increase accuracy.

Choice of count sites

- **2.3.9** A number of factors should be taken into account when choosing a site for a count:
- Representative pedestrian flows can vary significantly over short sections especially in proximity to large trip generators yet counts cannot be carried out every few metres. The sites chosen should be approximately representative of the pedestrian link they are situated on.
- Practical pedestrian flows are best measured at points with few conflicting movements, e.g. not right next to a busy bus stop.
- Defined the actual count cordon should be at a defined, identifiable, and relatively permanent point on the footway.
- 2.3.10 An exact reference of the count cordon should always be recorded on a map for future reference.

03 OBSERVATIONAL METHODS

3.1 PEDESTRIAN DESIRE LINES

3.1.1 It is vital to ensure that pedestrians' desire lines and their interaction with vehicular traffic are properly assessed. Environments built with no consideration of pedestrian movement patterns can lead to potentially dangerous conflicting movements and can discourage walking.

Pedestrian Turning And Crossing Counts

3.1.2 In a limited number of cases pedestrian movements can be assessed using simple counts. For example, the relative number of pedestrians turning from one street into another street can easily be counted. Pedestrian crossing movements are often counted at a specific crossing and within 50 metres either side of the crossing point. This type of assessment is only suitable for very simple interventions. Where pedestrian access and/or local area vitality are key objectives, pedestrian tracing is strongly recommended in order to capture desire lines correctly.

Pedestrian Tracing

- 3.1.3 This technique involves recording the path of pedestrians' movements. This can be undertaken on-site or from CCTV footage. The latter is firstly more precise as footage can be viewed repeatedly and secondly pedestrians do not feel they are being observed. Pedestrian paths can be recorded in a GIS-database.
- **3.1.4** Crossing compliance should be measured in terms of crossing:
- At or away from designated points; and
- During the green or red pedestrian phase. Sampling
- **3.1.5** Where absolute user numbers are required, e.g. total turning or crossing counts, the same sampling rules apply as for other pedestrian counts (see section 2.3).

- **3.1.6** However, in most cases only a relative assessment of behaviour is sought. The total number of observations required will depend on the complexity of the pedestrian movements assessed. For a simple assessment of where people cross on one section of road, a sample of at least 100 observations per day may be sufficient. However, as the complexity of the survey area or junction increases, the range of potential crossing movements increases, and correspondingly a larger sample will be necessary.
- 3.1.7 In practice at sites with very low footfall it may be preferable to record all crossings over one or two weekdays 07:00 to 19:00. At busier sites, it may be possible to achieve the required number of observations from a shorter period every hour, e.g. 10-min or 15-min 'gates'. Gates should always be rotated around the hour in order to account for periodic patterns, e.g. 07:00 07:15, 08:15 08:30, 09:30 09:45 etc. Survey hours from 07:00 to 22:00 are recommended at busy sites.
- 3.1.8 At many sites a weekday assessment is sufficient. However, in locations near to major leisure, cultural and shopping destinations, pedestrian patterns may vary substantially on Saturday or Sunday and should be measured separately. Finally, in areas with a strong night-time economy, pedestrians may be walking in larger groups and may be under the influence of alcohol. Therefore, a further late evening sample is recommended.

3.2 ACTIVITIES IN PUBLIC SPACE ANALYSIS (APSA)

- 3.2.1 Methods to quantify the use of public space are increasingly being employed as tools both in the design of spaces and to monitor the effectiveness of design solutions. Similar methods have been pioneered by Jan Gehl and Project for Public Spaces amongst others, although the term Activities in Public Space Analysis (APSA) is employed here. Recording the use of public space can take place onsite or using CCTV footage. Results can be displayed graphically using GIS.
- **3.2.2** The technique involves recording 'snapshots' of all the stationary persons in a public space. By overlaying these snapshots it is possible to develop a picture of how the public space is used both over time and spatially. It is recommended that activities are recorded using (1) a standard activity classification for benchmarking purposes and (2) a place-specific classification of actions deemed to be of interest in the area.

1 STANDARD ACTIVITY CLASSIFICATION

- Standing
- Café sitting
- Formal sitting (benches etc.)
- Informal sitting (ledges etc.)
- Commercial activity (e.g. street vendor)
- Cultural / political activity (e.g. busker)

3.2.3 Three key indicators of the popularity and inclusiveness of a space that should always be recorded are:

- Gender women are more selective and less likely to dwell in an area that feels uncomfortable or insecure;
- Age popular and inclusive spaces encourage a mix of ages to dwell; and
- Groups people in groups indicate that a space successfully fulfils a social function.

2 EXAMPLE OF PLACE-SPECIFIC CLASSIFICATION

- Public drinking (alcohol)
- Eating / drinking
- Talking
- Reading
- Affection
- Children's games

Sampling

- 3.2.4 The number of snapshots required can depend on the level of activity per snapshot. As a guide, it is recommended that one to three snapshots per hour are recorded for two weekdays (snapshots rotating around the hour, e.g. 07:00, 08:05, 09:10 etc.). Saturday and Sunday APSA analyses can additionally be recorded where activity patterns are likely to differ.
- 3.2.5 Where snapshots are displayed graphically, it is recommended that between 150 and 400 observations provide a meaningful sample to highlight clusters. If there are more observations, sub-samples by time period or user type can be displayed separately.

3.3 DEMOGRAPHIC CLASSIFICATION

3.3.1 User characteristics should be recorded whenever observation surveys are undertaken. There is a limit to the complexity of information that can be recorded by sight and this will always be associated with some error. The following classifications are recommended.

TABLE 3.1USER CLASSIFICATION

CLASSIFICATION	CATEGORIES
GENDER	M / F
AGE (GENERAL)	Under 18 / 18-65 / over 65
AGE (IN PROXIMITY TO SCHOOL ROUTES)	Under 11 accompanied / under 11 unaccompanied / secondary school age 11-18 / 18-65 / over 65
NUMBER OF PEOPLE IN GROUP	1 / 2 / 3

- 3.3.2 It is generally advisable to record the persons with an obvious mobility impairment (e.g. in a wheelchair or using a walking aid) or pushing a pram, although the numbers will not generally be sufficient for a statistically robust comparison over time.
- **3.3.3** In exceptional cases additional information such as business or casual dress may be of interest as an indicator of journey purpose.
- **3.3.4** Walking and cycling may be surveyed in parallel, in which case cycle movements should also be recorded.

04 ATTITUDINAL SURVEYS

4.1 USER ATTITUDES

- 4.1.1 It is possible to measure pedestrians' attitudes towards the walking environment through surveys. However, questions should focus on specific and tangible elements of the environment, and should be formulated in simple terms. Attitudinal surveys should avoid complex and intangible concepts such as legibility and permeability.
- 4.1.2 Attitudinal surveys should focus on a coherent, legible and homogenous area, such as one street or plaza. Ideally, surveyors should present a map of the area during the interview.
- 4.1.3 Interval response scales can be presented either as numeric or worded scales. For satisfaction surveys, a 5-point scale is commonly used. However, for before and after monitoring it is recommended that a 4-point scale is used as small changes in perceptions can be more easily picked up.

4.1.4 It is good practice to include an unprompted, open-ended question at the end of any short survey. This helps to ensure that user opinions are taken into account and may reveal issues of importance that were not included in the structured questions.

Sampling Issues

- 4.1.5 As a rule of thumb, a sample of 100 responses is often adequate for a short survey measuring users' attitudes. Where user groups vary greatly between times, e.g. between weekdays and weekends, a sample of 100 respondents from each is recommended.
- 4.1.6 It is good practice to record user demographics of respondents and of refusals to ensure that the sample is not skewed.

Journey Purpose

4.1.7 In order to facilitate comparisons, it is recommended that classifications from the National Travel Survey (NTS) are used.

NTS Journey purpose categories:

- Commuting
- Personal business
- Business (in course of work)
- Social or entertainment
- Other work (from origin other than home)
- Holidays / day trips
- Education
- Just walk
- Shopping
- Escorting others

4.2 GENERAL RECOMMENDATIONS

- 4.2.1 Although commonly used, attitudinal surveys are limited in their applicability. Responses can depend heavily on the formulation of questions and the manner they are posed. Furthermore, a number of the key concepts relevant to improving the walking environment are actually difficult to express in questionnaires (legibility, permeability, crowding, perceived security). Finally, attitudinal surveys do not capture the spatial dimension of user perceptions and preferences. Therefore in many cases observation of pedestrian behaviour provides much greater insight.
- **4.2.2** Respondents' recall of their exact past or future walking movements is extremely sketchy. It is strongly recommended that pedestrian movement patterns are recorded using pedestrian tracing methods instead (see section 3.1).

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