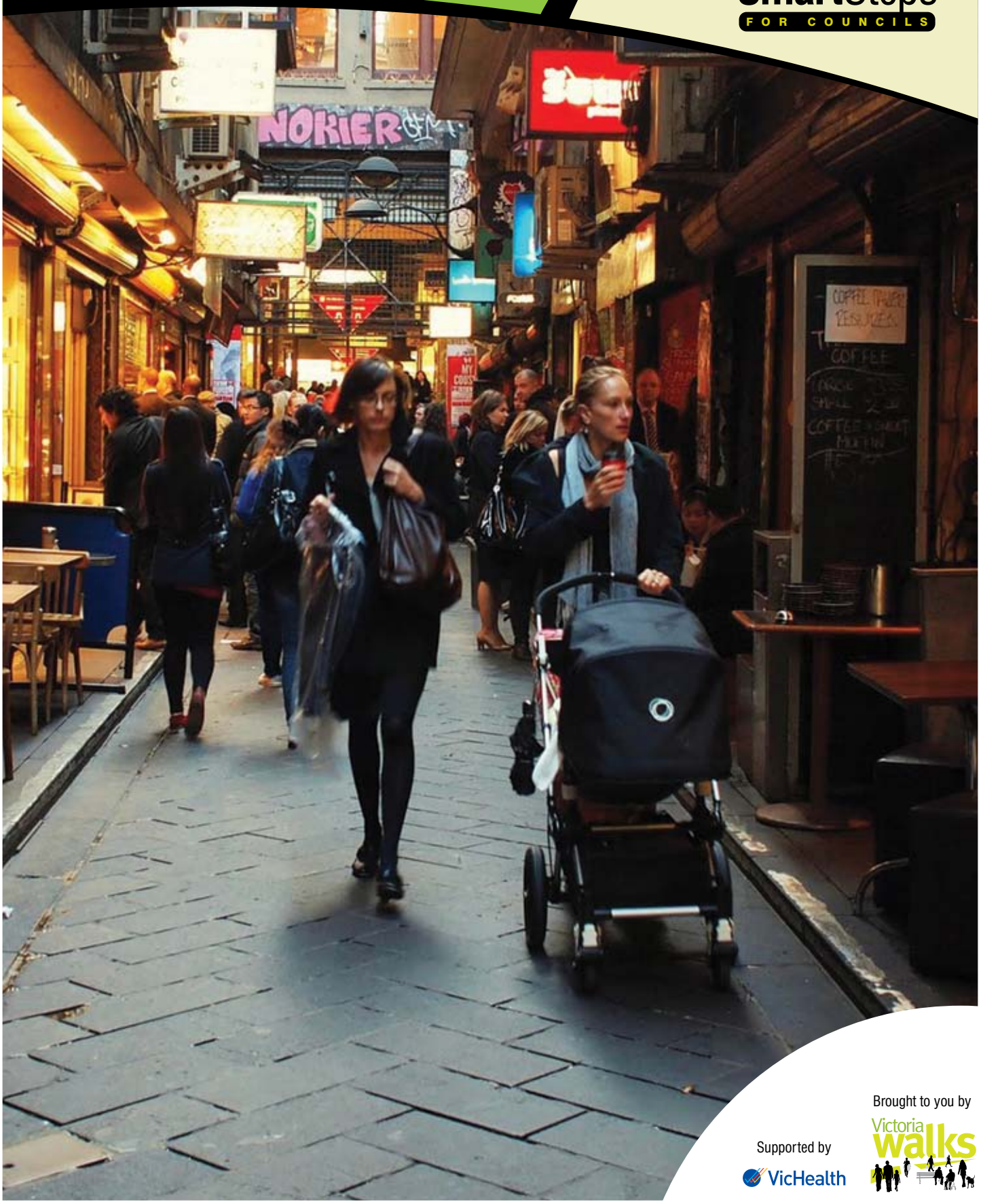
Measuring Walking

A Guide for Councils

SmartSteps® FOR COUNCILS



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Victoria Walks Inc is a walking health promotion charity working to get more Victorians walking every day. Our vision is for vibrant, supportive and strong neighbourhoods and communities where people can and do choose to walk wherever possible.

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1 Overview of this Guide

The *Guide to Measuring Walking* has been developed to make measuring walking activity relatively straightforward and affordable for councils. It provides a rigorous analysis of the advantages and disadvantages of different techniques for measuring walking, as well as recommending the best methodologies to use for a range of common scenarios.

This Guide is intended as a reference document and it may not be necessary to read it from beginning to end. For example, guidance on how to go about measuring walking as part of project evaluation is provided in Section 7.1 and can be read in isolation from the rest of the document. For quick advice on how to measure walking in a given scenario, it may be helpful to refer immediately to Section 7.

Every section can be referenced independently. In brief, each section outlines the following:

- **Introduction.** Outlines why measuring walking is important.
- **Existing Sources of Walking Data** (p. 7). An overview of existing data about walking collected on a large scale (usually state and federal level), often on a regular basis.
- **What to Measure?** (p. 9). An outline of metrics that may be considered to provide a more comprehensive understanding about walking in a local area.
- **Where and When to Measure** (p. 10). The context of the situation (location, reason for measuring, what is being measured) will influence the most appropriate method and accuracy.
- **How to Measure** (p. 11). This section provides an outline of existing methodologies and discusses the advantages and disadvantages of different methods in different situations.
- **Recommended Methodologies for Common Situations** (p. 18). Provides direction on measuring for common scenarios and purposes. Sample walking participation surveys are provided in the attachments.
- **Case Studies for Measuring Walking** (p. 32). These showcase examples of methodologies that have been used to measure walking.
- **Measuring Walkability** (p. 42). While not the main focus of this Guide, a brief overview of measuring the walkability of environments is provided.

The Guide does not cover planning and design for pedestrian amenity; however, more information on all aspects of creating walkable environments can be found on the Victoria Walks website, under **for Councils**.

2 Introduction

Effective planning for walking demands an understanding of pedestrian movement and activity. Yet walking is often not measured, and when it is the measurement is typically undertaken in an ad hoc way.

Measuring walking can often be a complex and confusing task with a wide range of information available. In Victoria Walks' work to develop *Smart Steps: for Councils*, local authorities have indicated that they find measuring walking difficult and that this is a particular area where guidance is needed. Development of a guide to measuring walking was also identified as a need by the Victorian Pedestrian Advisory Council.

The *Guide to Measuring Walking* has been developed to make measuring walking activity relatively straightforward and affordable for councils.

2.1 Purpose

There is a broad range of information available on measuring walking internationally, but there is no standard methodology for undertaking pedestrian counts or measuring walking activity in Australia. Councils and others who seek to measure walking are often forced to 'reinvent the wheel', with mixed results. The key purposes of this Guide are to provide:

- An understanding of why measuring walking is important and how data can be used to improve walking.
- An understanding of the methods and technologies available to measure walking.
- Guidance on the most appropriate methods for common situations encountered by councils in Victoria.
- A sample walking participation survey.

By providing clear direction, this Guide will enable councils to either measure walking themselves or engage consultants with more confidence.

Providing recommended techniques for measuring walking has benefits beyond simply making it easier for councils. The use of standard methodologies between various councils and others measuring walking has the advantage of providing comparability of findings between different groups and over time.

2.2 Why measure?

"Only what is counted counts!" – Making Walking Count (Walk 21), 2009 Benchmarking presentation

The purpose of collecting information about walking may be broad, related to the objectives of government policy (e.g. health, mobility, equity, legitimacy), or specific, for example to provide baseline data against which to measure the success of an intervention. Understanding the purpose for measuring walking is important to avoid expending time and effort collecting data which will not be used or will not help achieve the goal.

It is important for councils to measure the impact of projects and activities designed to encourage walking. Demonstrating the benefits makes it much easier to justify further action in the future. New York's City's **Measuring the Street** provides an illustration of the value of measuring the impact of council activities in communicating success and the need for change.

It is important to collect and understand data on walking for many reasons, as outlined in Table 1. Without data, in the best-case scenarios decisions are made based on feelings or personal experiences. In the worst case walking is ignored or forgotten altogether, resulting in a continuation of the status quo. The case studies in Section 8, p. 32 provide examples of what walking activities various organisations have measured and the value for them in doing so, be it to understand existing conditions and dispel misconceptions or gather evidence for supporting change.

2. Introduction (continued).

Table 1: Some of the reasons for measuring walking

Purpose	Key questions	Examples
Evaluation of: • Performance	*"How is this area/infrastructure performing?"* Data on walking can assist in deciding whether any intervention is necessary.	• Crowding (e.g. plaza, strip shopping centre, crossing) • Barriers to walking • Equal access for people of all abilities
• Prioritising intervention options or locations	*"Is it worth spending money on this project/ at this location?"* Walking measurements can help inform funding priority for a list of improvements. They can also inform where interventions are best located to maximise benefits.	• Walking strategy • Action plan • VicRoads' warrants • Development of Principal Pedestrian Networks
• Project outcomes against the intended goals	*"Did this project succeed?"* Having a plan for how and what data will be collected early in a project ensures the effects of interventions can be accurately understood, including whether they performed as intended.	Any project with the aim of improving walking conditions e.g. • Installation of pedestrian signals • Raised median • Longer green time for crossing at a wide intersection.
Track performance over time	*"How are we going compared to previous years?"* or *"How are we tracking against our target?"*	• Targets for mode share • Targets for growth in walking • Informing decisions
Compare performance against others	*"How busy is this location in comparison with other sites?"*	• Walking rates in different localities of a council • Walking rates in different councils
Quantify and raise the profile of walking	*"How many people are getting around by walking compared to being moved by other modes?"* Professionals often give more weight to factors that are measured than those that are expressed only in descriptive terms (e.g. "a crowd of 4,000" is more memorable and quotable than 'a large crowd').	• "Spatial justice" – Space allocation based on proportion of users (e.g. before improvements along Broadway in New York, there were 4.5 times as many people walking as there were vehicles but only 11% of the space was allocated to pedestrians)[1]. • Provide a case for the allocation of additional funds to walking improvements • Counts can be used in pedestrian models, either as an input or to validate a model • Network Fit Assessment (see Section 7.3, p. 23) • Economic assessment

Purpose	Key questions	Examples
Inform the design of new or upgraded infrastructure or programs	*"What are the requirements of this infrastructure to ensure it meets the needs of those who will use it?" or "How can we encourage more people to walk to key destinations?"*	• Determining locations and routes for wayfinding signage • Developing Green Travel Plans • Footpath/footbridge width • Alignment of paths • Provision of ramps/stairs • Number of ticket barriers at railway stations
Understand pedestrian safety/exposure	*"How safe is it to walk here?"*	• Identification of pedestrian crash "hot spots" • Understanding the problem so targeted treatments can be applied • Safety-related targets

1 New York City Department of Transport 2009, *Broadway Pilot Program: Improving Traffic Flow and Safety in the Heart of Midtown*, available online www.nyc.gov/html/dot/downloads/pdf/broadway_0223409.pdf

2. Introduction (continued).

2.2.1 Measuring safety

Understanding pedestrian safety, both real and perceived, is very important in informing decision makers about the most appropriate course of action. This provides a strong case for making funds and resources available to measure walking and provides baseline data about existing conditions.

Measuring pedestrian safety, particularly at intersections, is often poorly researched and carried out. Studies that look at pedestrian crash rates without the broader context (such as traffic and pedestrian volumes) do not provide an accurate reflection of overall safety. In this type of study, a location which is not used by pedestrians will appear to be the safest. However, it could be that pedestrians avoid it because they feel unsafe. This is one significant issue with set thresholds that require a certain number of pedestrians to be present before an intervention will be investigated or funded.

Crash rates are also required for long periods of time, often five years or more, to make any meaningful conclusions about changes. This is too long to wait to evaluate the impact of a change in the pedestrian environment because of the many other factors that will change in that time which are not related to the intervention. Other metrics can be used in place of crashes: e.g. conflicts, potential conflicts, feelings of safety, awareness of other users (measured by head checks).

It is important to distinguish between *safe for pedestrians and good for pedestrians*. Unsignalised midblock pedestrian crossings may be perceived as less safe than signals for example, but they are very convenient as there is no delay in crossing the road. Therefore any evaluation of pedestrian infrastructure should be broader than simply crash rates and consider factors like the number of people walking, level of compliance with signals, pedestrian convenience and opinions. Sometimes simply asking pedestrians what they do or do not like can result in answers that were not apparent to those conducting the survey.

2.3 Other Guides in the series

This Guide has been produced as part of a package of walking information resources prepared by Victoria Walks – *Smart Steps: for Councils*. These resources are primarily designed for councils but will also be useful for consultants, government agencies, students, researchers and interested members of the community. This Guide in particular is designed to provide guidance to councils in measuring walking in a robust and consistent way.

This Guide is designed to complement other work undertaken by Victoria Walks. **Developing a Walking Strategy: A Guide for Councils** provides an overview of issues and approaches for promoting walking and walkable environments.

The Victoria Walks website provides a comprehensive online **toolkit for councils** on how to promote walking and walkable environments, covering everything from pedestrian network planning to urban design, road management and behaviour change programs.

3 Existing Sources of Walking Data

Data about walking is not routinely collected in the way that it is for vehicles e.g. through the use of SCATS[2] on most arterial roads in Melbourne. However, there are some examples of surveys which collect information about walking on a large scale. The main value in these regular surveys is to provide broad information and baseline data and plot the way in which walking has changed over long periods of time.

3.1 Large-scale surveys routinely conducted

These surveys collect data about walking on a large scale (state or federal), councils do not have to choose to actively participate (the surveys are conducted regardless) and the results are generally publicly available. They have traditionally been the primary tool used by councils to understand walking and can provide a good summary of walking at a high level. However, because of the scale, they are unable to capture details at the local level, such as routes taken and specific issues with infrastructure or amenity that create barriers to walking.

Examples of large-scale surveys which are routinely conducted include:

- **Census**. The Australian Bureau of Statistics (ABS) conducts the Census once every five years (last in 2011). This includes a question about the mode of travel to work[3]; however walking is only considered for trips that are made entirely by walking e.g. from home to work place. In 2011, the Census found that 3.7% of all employed people aged 15 years and over walked to work. Where walking forms only part of the trip, it is not included e.g. walking to the train station and then catching the train, even if the person spends more time walking than on the train. This results in lower walking figures than if all walking trips were included. The Census allows information about walking to be cross-referenced with other information collected such as:
  - Gender
  - Age
  - Location (to a level of collection districts; about 225 dwellings)
  - Education
  - Occupation and status (e.g. full time).
- **Multipurpose Household Survey**. The ABS conducts this survey annually. It covers a range of topics which change year to year. The 2011–12 survey included the topic *Participation in Sport and Physical Recreation*, which is the most recent year this topic has been included. It found that walking for exercise was the most popular physical recreation activity and included

2 Sydney Coordinated Adaptive Traffic System. Inductive loops at intersections are able to continuously record the number of vehicles, direction and lane of travel in 15-minute periods.

3 Data about method of travel to work can be found for any Australian location from the ABS website under **2011 Census Community Profiles**, Working Population Profile, Topic *W22 Method of Travel to Work by Age by Sex*. Further information about Method of Travel to Work can be found in the **Census Dictionary**.

information about:

- Type of participation (organised and non-organised activity)
- Frequency of participation
- Facilities used.

- **VISTA**. The Victorian Integrated Survey of Travel and Activity has been conducted by the Victorian State Government on a regular basis since 2007. This surveys a random selection of households about their daily travel and activity (e.g. from taking the dog for a walk to interstate flights). Between 1994 and 1999, the Victorian Activity and Travel Survey (VATS) collated similar information.
- **CrashStats**. VicRoads maintain a database of crashes on Victorian roads which result in injury. This application allows users to view crashes by a range of variables, including road user type (e.g. pedestrian), location, severity, age, sex, etc.
- **Station patronage data**. PTV (Public Transport Victoria) routinely collects information about access to train stations and has recently released data for all 204 metropolitan train stations in Melbourne. This includes information on access mode and shows the proportion of people using each station who walked all the way.
- **Benchmark Park User Satisfaction Survey**. Integrated Open Space Services (IOSS) conducts these surveys to understand information about park users, including their mode of travel to parks. IOSS have also started carrying out Streetscape User Satisfaction Surveys which include mode of travel to shopping centres.

3.2 Surveys conducted for a particular purpose

Pedestrian counts are often undertaken for a particular purpose at a particular time. In most cases these counts are not readily available in consolidated databases and their availability relies on the personal knowledge and generosity of the staff within these organisations. Therefore, it is unusual to have walking data for a particular location at regular intervals over a long period of time.

Examples of these one-off counts collected by organisations other than councils (although sometimes on their behalf) include:

- **VicRoads' intersection turning movement counts**. Usually these are focussed on motorised traffic movements at an intersection; however, they sometimes also include counts of bicycles and/or pedestrians.
- **SCATS activation of pedestrian crossings**. In addition to providing information about motorised travel, SCATS is also able to provide data on when pedestrian signals linked into the system are activated. This provides an indication of pedestrian demand at the signals: e.g. outside a school people may be pressing the button constantly in the lead-up to school start time and then only irregularly in the period after that. The information is automatically generated; however, requests have to be made to VicRoads in advance for it to be recorded and stored (data can't be obtained for the past).
- **Public transport passenger data**. In addition to the routinely collected station patronage data, information is also collected for particular studies relevant at a particular time by PTV and bus, tram and train operators. Generally this data includes counts of passengers boarding or disembarking at bus and tram stops and train stations.
- **Super Sunday**. Bicycle Network Victoria conduct surveys of people using recreational trails and paths, including people walking. These surveys are conducted annually on a Sunday in November at sites nominated by participating councils (for a fee).

Information collected by or on behalf of the council itself also provides broader information about walking and its context. Examples include:

- Counts conducted by council to justify new infrastructure such as supervised crossings, zebra crossings or pedestrian-operated traffic signals and school crossing supervisors
- Other pedestrian data collected by other council divisions as part of their work: e.g. transport and traffic, recreation, urban design, economic development, local laws
- Council-commissioned household surveys
- Issues with infrastructure identified through community complaints procedures
- Demographic information in **local community profiles**.

4 What to Measure?

There are several sources of information for understanding current walking behaviours and patterns. Some are collected on an ongoing basis as outlined in the previous section, but most are collected only as part of specific projects. This section looks at aspects of pedestrian activity that might be measured.

4.1 Walking-related activities that can be measured

Measuring walking is much broader than simply counting people, although this is often a key component. Figure 1 shows some of the walking-related activities that can be measured or quantified.

Figure 1: Examples of walking-related activities that may be measured

How many people are walking?

- Number of people walking
- Number of people engaged in stationary activites
- Number of people within an area (crowding)

Who is walking?

- Age
- Gender
- Ability (e.g. vision impairment, physical disability and types of walking aids used)
- Recognition of closely related modes (e.g. in-line skating, scooters, skateboards, joggers, mobility scooters, wheelchairs)

What are people doing?

- Duration of stay
- Public space and public life surveys
- Pedestrian behaviour and city dynamics
- Window shopping
- Waiting
- Resting
- Queuing for services
- Talking with others
- Comfort break
- Understanding shoppers
- Visitor behaviour
- Travelling between destinations
- Amount spent

When are people walking?

- Frequency
- Time of day
- Day of week
- Season of year

Where are people walking?

- Route choice
- Origin
- Destination
- Distance and time walked
- Informal paths (e.g. “goat tracks”)

What do people think of the walking environment?

- Level of service
- Comfort
- Opinions and perceptions of problems
- Barriers to walking, both infrastructure (e.g. alternatives to cross a busy road, trip hazards) and others (e.g. weather)

5 Where and When to Measure?

5.1 Where to measure

The location of people walking greatly influences the best method for measuring. Consider the following contexts in which people walk:

- **Strip shopping centre**. People are generally walking along designated footpaths parallel to the road. They may conduct a variety of activities in addition to walking: e.g. stop on the footpath to talk or 'window shop', sit, walk in and out of stores, wait for a bus or tram. There will also be people crossing the road at both formal (e.g. pedestrian signals) and informal (e.g. a median) locations.
- **Train station**. Weekday pedestrian activity at train stations is usually "tidal", i.e. in the morning people are coming to the station and catching a train into the city; in the evening people are usually catching a train out of the city and then going home. They may also be in a hurry, be familiar with the station and walk using the most direct route.
- **Plaza**. There may be no formalised paths and people will use the space to wander, sit and observe.
- **University**. Within this one location there are a range of destinations and routes.

The best locations to set up measuring technologies depend on the site. A straightforward linear count may provide sufficient information or a more complex set-up considering cordons and/or densities may be needed where people do not walk along defined paths.

5.1.1 Linear counts

Linear counts consider the number of people passing a specified point. These counts are most appropriate where people are walking along a designated path or restricted to a limited area, meaning most of them will pass the designated location. This could include locations such as along a footpath in an activity centre, across a road at a designated crossing point or at a choke point such as ticket barriers providing entry to a stadium or tourist attraction.

5.1.2 Cordon counts

Cordon counts consider the number of people entering (or exiting) an area. They are most appropriate for locations where several entrance and exit points provide access to the area. This includes locations such as parks and shopping centres. Depending on the layout, it may not be possible to count all people entering and exiting the area. In this case, surveying the main entrance/exit points would provide an estimate of the number of people using the area.

5.2 When to measure

The time of day/week/year, duration and number of surveys will also influence the results. Longer duration and repeated surveys will give a more accurate understanding of the walking activity. For example, one-day manual counts of volumes can be highly sensitive to weather variations, whereas automatic counts conducted over longer periods of time will give more accurate results. There will also be seasonal variations in counts conducted at different times of year, as often people prefer to walk in nicer weather.

5.3 Accuracy

Accuracy in the measuring methodology is important when volumes are low, as one person represents a greater proportion of the total than when volumes are greater. Accuracy of various technologies and methodologies depend on details such as site selection and survey set-up.

Accuracy is also important where thresholds have to be met. For example, the following warrants[4] need to be met (among other considerations) in order for VicRoads to provide subsidies for a children's crossing supervisor at a primary school crossing:

- Minimum of 20 primary school children per hour
- Minimum of 100 vehicles in the same hour
- When multiplied together exceeds 5000.

If a one-off survey counts volumes close to but just below the threshold, there may be value in repeating it on another day or during a different time period (e.g. morning rather than afternoon).

More details about accuracy are provided in Table 2 (p. 26) and further guidance about when and where to measure are discussed in the context of specific methods in Section 7 (p. 18).

4 From *Traffic Engineering Manual*, Volume 1, Chapter 4: Pedestrian Facilities. More information about warrants for pedestrian facility funding are available in this document.

6 How to Measure?

The best method for measuring walking depends on what is being measured (refer Section 4, p. 9). This section describes existing and emerging methodologies for measuring walking.

6.1 Outline of available methodologies

There are many methods available for measuring walking, many which focus on counting pedestrians. Some are able to consider not just people who are walking, but also those that are not; others provide an understanding of the barriers that stop people walking and why people who could have walked chose not to.

The following tables outline these methodologies; Table 2 considers methods for counting pedestrians and Table 3 considers methods for measuring other walking-related activities. Both tables consider:

- **What is being measured?** Refer back to Section 4.1, p. 9 for discussion of commonly measured walking activities.
- **Auto/manual**. Manual technologies generally require staff to be present for some or all of the survey period, often resulting in increased effort and cost. Furthermore, they will be subject to weather-related fluctuations. Automatic technologies can be set up and then left to record. Sometimes a person is required to come back to the site to download the data, or it may be transferred remotely.
- **Permanent/temporary**. Permanent technologies can be set up and then left, often recording on a continuous basis. Temporary survey methods generally only record a snapshot in time. Some methodologies are capable of being used on either a permanent or temporary basis, depending on the set-up.
- **Accuracy**. Three ticks in the tables represent the most accurate methodologies whereas one tick represents the least. Note that the accuracy of a technology can be significantly affected by site characteristics and installation and calibration details. Often, increased accuracy comes at an increased price.
- **Ability to distinguish characteristics**. Summarises whether or not the technology is able to distinguish varying characteristics about pedestrians, e.g. age, gender. A tick represents a methodology that is able to distinguish characteristics about those walking, whereas a cross means it cannot (and in fact may not even be able to distinguish a pedestrian from other modes, e.g. cyclists).
- **Relative cost**. The relative upfront and ongoing costs to purchase, set up, operate and maintain the technology. Three dollar signs represent the most expensive methodologies, notionally more than $10,000, and one dollar sign represents the least, notionally less than $5,000. However, the cost will vary depending on how the technology is applied, how many sites are included or interviews conducted, time periods, etc.

The methodologies listed here are those that are currently commercially available in measuring walking, but they are certain to change and evolve over time. Like any survey method, there are advantages and disadvantages to each. All methodologies can be used to provide representative samples of the population, provided the right quotas are put in place and respondents are screened. Alternatively, anyone may be able to complete the survey, in which case the analysis of results should take into account any biases in the sample.

Note – the tables below examine the advantages and disadvantages of numerous different techniques. Readers interested in which methodology applies best to a particular situation may choose to move straight to Section 7, p. 18, as this provides recommended methodologies for common scenarios that council will face.

6 How to Measure? (continued).

Table 2: Comparison of the various methodologies for counting pedestrians

Methodology	Description	What is being measured?	Auto/ manual	Permanent/ temporary	Accuracy
On-site surveys	Surveyors observe and record pedestrian movements in real time.	Various, including counts, demographics, behaviour and routes	Manual	Temporary	✓✓✓
Manual video surveys	Video cameras are erected specifically for the purpose and footage is reviewed by a person at a later time. CCTV footage may also be used.	Various, including counts, demographics, behaviour and routes	Manual	Temporary	✓✓✓
Video recognition software	Video footage is processed by software to detect people.	Count	Auto	May be permanent or temporary	✓✓✓
Pedestrian crossing activation	For crossings linked to SCATS, the number of times a signal is called is recorded.	Proxy measure for count	Auto	Permanent, but must be requested in advance	✓
Break-beam (photoelectric, active infrared)	Emitter and detector on opposite sides of a path; detector records when beam is broken.	Count	Auto	Permanent	✓[6]

Ability to distinguish characteristics	Relative cost	Examples of technology/ company where applicable	Comments
✓	$–$$$[5]		May be paper based or the observer may use a mobile device to enter data instantaneously (e.g. iPad). Paper-based surveys have an additional data entry requirement. Also able to consider those who used a mode other than walking. On-site surveys can also consider physical conditions which indicate walking preferences, such as informal paths ("goat tracks") which indicate pedestrian desire lines.
✓	$–$$$[5]		Requires artificial lighting for night-time counting if a standard video camera is used, or alternatively a thermal camera is required. Also able to consider those who used a mode other than walking. Particularly suited to "before and after" studies when it is hard to predict what sort of behaviour will change. The before videos can be rerun and re-analysed to investigate aspects which unexpectedly changed. Still images from the video or short video snippets can provide compelling evidence of walking or driver behaviour.
×	$$$ Nominally $15K	SenSen	Requires artificial lighting for night-time counting if a standard video camera is used, or alternatively a thermal camera is required. Video recognition software is generally accurate even for large groups of people.
×	Minimal if anything		This is not a count of pedestrians but provides an indication of the level of demand at the crossing. It is simple and cheap to obtain.
×	$ Nominally $3K per site	Centratech (Omni-Beam Q45), TrailMaster, Chambers RBX8	Requires two devices. Generally easy to install with minimal power requirements and no overhead gantries. The technology is established; however, the physical device and user interface vary, which can make use difficult, particularly between different devices or staff members.

6 How to Measure? (continued).

Methodology	Description	What is being measured?	Auto/ manual	Permanent/ temporary	Accuracy
Acoustic slab	Detects weight of object on pad using piezoelectric sensors in the ground.	Count	Auto	Permanent	✓✓
Side-mounted passive infrared detector	Detects heat differential between a person and the background. Note that this class of devices detect recent changes in heat gradients; a static heat gradient will appear to be constant to the sensor.	Count	Auto	Permanent	✓✓[5]
Overhead mounted passive infrared detector	Detects heat differential between a person and the background.	Count	Auto	Permanent	✓✓✓
Laser scanner	Detects objects moving across laser sheet.	Count	Auto	Permanent	✓✓✓

5 Depends on what is being measured and the sample size.
6 Lower accuracy when there are high volumes of pedestrians.

Ability to distinguish characteristics	Relative cost	Examples of technology/ company where applicable	Comments
×	$$	Eco Acoustic SLAB	Tend to be infrastructure-intensive, requiring the removal of the pavement for installation.
×	$ Nominally $3K per detector	Eco PYRO	Generally easy to install with minimal power requirements and no overhead gantries. They have a wider detection field than break-beam technology, providing slightly better accuracy for counting groups of people. They are also less likely than break-beam counters to be confused by objects other than people (e.g. a falling leaf). The EcoPYRO technology includes a user-friendly online interface, making continuity of use easy (e.g. if a staff member leaves the organisation).
×	$$	Irisys	Are widely used, particularly in indoor situations such as shopping centres and universities. They generally provide a high level of accuracy even for groups of people.
×	$$$ Nominally $10–$15K per counter	PeopleCounter	Laser scanners are generally very accurate, including for counting groups of people. A single sensor is capable of covering a reasonably wide path, up to 8 m for some devices.

6 How to Measure? (continued).

Table 3: Comparison of the various methodologies for measuring other walking activities

Methodology	Description	What is being measured?	Auto/ manual	Permanent/ temporary	Accuracy
Mobile device detection (e.g. Bluetooth, Wi-Fi)	Detects mobile devices with Bluetooth (in discoverable mode) and/ or Wi-Fi enabled devices.	Log position in time to understand how people move about an area and how long they spend[7]	Auto	Permanent or temporary	✓✓✓[8]
GPS technology	Track location using GPS devices.	Log position in time to understand how people move about an area and how long they spend[6]	Auto[10]	Permanent	✓✓✓[11]
Face to face interviews (intercept surveys)	An interviewer intercepts pedestrians, usually in the street, to ask them questions.	Various, including demographics, routes, purpose and opinions	Manual	Temporary	✓✓✓[12]
Phone surveys	Households which have passed a screening questionnaire are surveyed over the phone.	Various, including demographics, routes, purpose and opinions	Usually manual, although can be automatic	Temporary	✓✓✓[14]
Online surveys	Selected participants are directed to a web address to complete a survey.	Various, including demographics, routes, purpose and opinions	Auto	Temporary	✓✓✓[13]
Mail-out surveys	Paper survey forms are mailed to selected households.	Various, including demographics, routes, purpose and opinions	Manual	Temporary	✓✓✓[13]
Focus group discussions	A group of interviewees meet with a facilitator to discuss a predetermined topic.	Various, although often focussing on opinions	Manual	Temporary	✓✓✓[13]

7 Not suitable for conducting counts.
8 Only detects people who are (a) carrying a device, and (b) have Bluetooth and/or Wi-Fi enabled.
9 Path Intelligence is US/UK based and focusses on detecting pedestrians in retail environments.
10 Requires active participation of individuals.

Ability to distinguish characteristics	Relative cost	Examples of technology/ company where applicable	Comments
×	$$	DAS, Path Intelligence[9]	Multiple detections are required for each device to infer direction of movement.
×	$$		Similar to **Riderlog** for cyclists
✓	$–$$$[13]		May be paper based or the interviewer may use a mobile device to enter data instantaneously (e.g. iPad). Paper based surveys have an additional data entry requirement. Also able to consider those who used a mode other than walking.
✓	$–$$$[15] Nominally $10 per interview	Methodology: Making Walking Count (Walk 21) Survey Companies: Roy Morgan Research, I-view	Also able to consider those who used a mode other than walking or who did not travel. Can be used to target representative samples.
✓	$–$$ Nominally $3 per interview		Can be completed in participants' own time. Can include complex question logic (e.g. what question a person is asked depends on their answer to a previous question). Simple to repeat reduces data entry and hence potential for error. Also able to consider those who used a mode other than walking or who did not travel.
✓	$–$$$[14]		Also able to consider those who used a mode other than walking or who did not travel.
✓	$–$$		Focus groups can target existing groups of people. For example, local walking groups and seniors groups have good insight and local knowledge in regards to walkability of key areas. Disability groups have a good understanding of barriers to walking. Also able to consider those who used a mode other than walking or who did not travel.

11 High accuracy for information such as opinion, but not for information which requires self-reporting and recall such as length of time spent walking.
12 Depending on the number and length of interviews conducted.
13 High accuracy for information such as opinion, but not for information which requires self-reporting and recall such as length of time spent walking.
14 Depends on what is being measured and the sample size.
15 Only detects those who (a) have a GPS enabled device and (b) choose to actively participate.

7 Recommended Methodologies for Common Situations

This section provides guidance as to the most appropriate methodology for several common situations where councils measure walking. The advantage of employing the same technique for similar situations means that data can be easily compared across locations, at varying times and between projects. However, as the recommendations are necessarily broad, there may be more appropriate methodologies or survey times for a particular situation than are outlined here. No single technology or methodology will work satisfactorily in all situations.

7.1 Project evaluation and one-off counts

Project evaluation is often completed when new infrastructure or programs are implemented. It requires an understanding of the conditions both before and after intervention to determine whether the intervention achieved its goals. It is important to understand whether the treatment has had the intended effect as well as identify any unforeseen consequences and improvements that could be made, at that location or for future use. If successful, the results can be used to justify similar interventions elsewhere. The cost of project evaluation should be included up front in the initial project budget.

The methodology described here is mainly focused on infrastructure or operating changes (e.g. new signals, changes to signal operation), but could also be employed to evaluate the success of programs (e.g. an education campaign). It is best used for significant interventions that are likely to be noticed by (at least the target group of) pedestrians and influence their behaviour and opinions as a result. For example, it would be appropriate for evaluating the installation of a new pedestrian crossing across a busy road, but is probably excessive for installation of a pram ramp in a local residential street.

This methodology can also be used where one off-counts are needed; e.g. for providing baseline data or prioritising a list of projects. It may also be appropriate for time series counts, depending on how regularly they need to be collected and the available budget. Permanent counters may be a better option.

Pedestrian counts can also be used to measure the level of crowding in locations such as squeeze points on footpaths, near train station and stadium entrances, in strip shopping centres and along recreational paths and trails. The counts per area can be compared with standard crowding measurements (also called level of service or comfort) such as **Fruin** and Transport for London's **Pedestrian Comfort Guidance** (see also break-out box at end of this section for more details on this methodology).

A case study is included in Section 8.1, p. 32, showing how intercept surveys were used to gauge pedestrian opinions following changes at a busy roundabout.

What to measure?

Counts

- How many people are walking?
- May include direction

Demographics

- Age group
- Gender
- Ability (e.g. use of walking aids)

Opinions (for project evaluation)

- Has the intervention been noticed?
- What do people think of it, particularly in comparison to the before situation? Do people feel safer? Is it more convenient?

How to measure?

Manual video surveys

- Counts

Intercept surveys (required only after intervention)

- Demographics
- Opinions

Where to measure?

For project evaluation:

- At location of intervention

For one-off counts:

- Wherever the count is required, e.g. recreational trail, intersection, activity centre

When to measure?

Before intervention and for one-off counts

Video footage should be recorded prior to the intervention taking place to understand existing conditions. The best times to record video depends on the location, but should focus on peak pedestrian times. Recommended survey times and durations vary by location:

- Commuter area – 7:30 to 9:30 am or 4:00 to 6:00 pm on a typical weekday (Monday to Thursday)[16]
- Shopping area – 1:00 to 3:00 pm on a typical weekday or Saturday
- School area – 8:00 to 9:30 am or 2:30 to 4:00 pm on a typical school day.

When doing surveys for project evaluation, it is best to err on the side of overdoing the coverage of the before video surveys because, unlike the after surveys, the before surveys cannot be repeated.

After intervention

Video footage should be recorded and analysed for the same periods as before the intervention. Intercept surveys only need to be conducted after the intervention is in place and would usually be carried out at the same time that someone is on site to install or remove the video cameras.

The length of time to wait to conduct the surveys after the intervention has taken place depends on what has changed. Generally at least a month should have passed since the intervention to allow a new 'normal' to be established, but no more than six months, to ensure people can recall the before situation as well as minimise changes that occur due to the passage of time (and so are not attributable to the intervention).

General comments about video surveys

- Survey days and times should be consistent during both the before and after periods.
- Surveys should represent a 'typical' day and therefore be conducted during the school term and not on a rainy day.
- At least four hours of footage should be reviewed for each of the before and after situations, although this will vary depending on the pedestrian volumes. As it is simple to record longer periods of footage once the cameras are in place, it may be worthwhile recording over several periods or days but only reviewing some of the footage. This way, back-up video is available if something occurs to affect the results (e.g. it rains).
- The greater the number of people observed, the greater the statistical significance of results and the ability to detect smaller changes in behaviour. A sample size of 100+ should be obtained where possible.

General comments about intercept surveys

- If conducting intercept surveys to elicit pedestrian opinions, these should be undertaken only after the intervention has been implemented.
- Intercept surveys should ask about perceptions of convenience and safety towards the intervention (depending on what it is), and possibly about any changes in frequency of walking that may have occurred as a result of the intervention. Furthermore, if there is likely to have been some mode-shift (i.e. the intervention is of a significant nature) then it may be worthwhile asking either (a) what mode they would previously have used for this journey, or (b) what mode they would use if the intervention were not present.
- Intercept surveys generally need to be short. This way people can be interviewed while they are already stopped, such as when waiting at a crossing or for public transport. This provides a better response rate than simply stopping people on the street.

16 Vehicle volumes on Fridays are often slightly different than other days of the week, and a similar pattern is likely to be true for commuting pedestrians.

7 Recommended Methodologies for Common Situations (continued).

PEDESTRIAN COMFORT GUIDANCE

The **pedestrian comfort assessment**, developed in the UK, quantifies how crowded (and hence comfortable) an area is by measuring the number of people within a defined space which then ranks the space on a scale from A to E. Level A is defined as the 'best' with plenty of space for people to move around and walk at their preferred speed. It equates to eight people per metre width (e.g. of footpath) per minute or less. At the other end of the scale is level E, the 'worst', where people feel crowded and uncomfortable and may have difficultly moving in their preferred direction. This is defined as more than 35 people per metre width per minute. Figure 2 shows the acceptable thresholds for each category depending on the location.

While crowding is unlikely to be a concern in most suburban areas, it may be a significant issue in locations such as central business districts, shopping areas, university campuses, school entrances and public transport stops.

Figure 2: Acceptable Pedestrian Comfort Levels for different area types (Transport for London, 2010)

This methodology assumes that people want to be able to walk at their own speed without being delayed by others. While this is the case for most walking for transport (e.g. to get somewhere by the shortest route in the quickest time), it may not always be the primary concern. Personal safety is also a high priority for most pedestrians, which may result in people preferring to walk in areas where there are other pedestrians. The level of service concept used in this methodology results in irrational assessments for dark, back alleyways which area avoided by pedestrians because they feel unsafe there. Ideally a comprehensive assessment of pedestrian areas would also take into account other factors such as personal safety.

7.2 Demand for pedestrian facilities

New pedestrian crossing facilities or provision of crossing supervisors are generally required to meet warrants outlined by VicRoads in the **Traffic Engineering Manual** to be eligible for VicRoads' funding or support (where funded by council). Funding agencies such as VicRoads often use warrant criteria to provide an objective process for prioritisation of treatments between different jurisdictions and for allocation of funds. They are sometimes misinterpreted when minimum levels are referred to as 'warrants'.

Just because a site does not meet the warrants does not mean that there is no justification for improvement. For example, at a busy arterial road people may not feel safe crossing the road and so cross elsewhere or just don't cross at all, meaning the warrants for new pedestrian signals would not be met at that location. However, were new signals installed, it is possible the number of people crossing would be in excess of the warrants. In these situations, it may be worthwhile to submit an application to VicRoads anyway, outlining the situation. Including any supporting evidence such as intercept survey results detailing pedestrian perceptions and travel patterns can strengthen the case to justify the proposed change.

Councils must measure pedestrian volumes to determine whether there is sufficient demand to meet these warrants for:

- Children's crossings
- Zebra crossings
- Pedestrian-operated signals
- Grade-separated pedestrian facilities.

Note that in addition to pedestrian volumes, vehicle volumes are often required (not covered as part of the scope of this document).

What to measure?

Counts

- How many people are crossing the road?

Demographics

- Age (primary school age, elderly)
- Walking related disability

Demographics are important for certain situations. VicRoads recommend that each older person, person with a disability and unaccompanied child of primary school age should count as two (refer to VicRoads' *Traffic Engineering Manual* for more details).

How to measure?

Manual on-site counts

Where to measure?

Count the number of people crossing the road at the existing (for crossing supervisors) or proposed location for the crossing (for new infrastructure). Where the site includes multiple legs (such as at an intersection), the legs can be counted separately or combined for people walking in the same direction.

Include people crossing within 20 m either side[17]. A wider distance may be appropriate if it is likely that walkers would be attracted to a new, formal crossing, particularly if it is difficult to cross at the current location.

17 As outlined in the *Traffic Engineering Manual*. The Victorian Road Rules state that a pedestrian must not cross a road within 20 m of a crossing (e.g. anyone crossing within 20 m should be using the crossing).

7 Recommended Methodologies for Common Situations (continued).

When to measure?

The best times to measure pedestrian activity depends on the location, but should focus on peak pedestrian times. Recommended survey times and durations vary by location:

School area – 8:00 to 9:00 am (or 45 minutes prior to the school start time) on a typical school day

Commuter area – 8:00 to 9:00 am on a typical weekday

Shopping area – 1:00 to 2:00 pm on a typical weekday or Saturday.

Although surveys are more accurate when conducted over longer periods (especially counts), the data for meeting VicRoads' warrants is required as an hourly count. Therefore, for consistency only a single hourly period is listed here.

If there is uncertainty as to when the peak pedestrian time is, the survey can be conducted over a longer period (say, an additional 15 or 30 minutes either side) in 15-minute intervals to determine the peak. In outer suburban areas, the commuter peak may be shifted to earlier in the morning (e.g. people walk to the station to catch the train and get into the CBD by 8:00 am) or later in the evening.

Where the number of people counted is just short of the required threshold, it may be worthwhile repeating the survey on another day or at a different time (e.g. morning instead of afternoon).

Surveys should represent a 'typical' day and therefore be conducted during the school term and not on a rainy day.

In determining eligibility for funding for a crossing supervisor, surveys are required to be repeated on a regular basis.

7.3 Network Fit Assessment

Network Fit Assessments (NFAs) are used to assess the extent to which a proposed change to the road network supports the:

- Strategic intent (objectives of the road use hierarchy). For example, this may mean encouraging walking, cycling and use of public transport in activity areas while discouraging general traffic.
- Network operational objectives (time of day priorities). For example, this may mean giving pedestrians better priority outside of the peak traffic times.

An NFA provides an analytical, objective tool for considering the impacts of a proposed change on all modes. The level of priority given to pedestrians is determined by:

- **SmartRoads Network Operating Plans (NOPs)**. These maps have been developed for all Melbourne councils and provide a high-level indication of where walking is a priority mode, usually limited to strip shopping centres and educational institutes.
- **Principal Pedestrian Networks (PPNs)**. These identify a network of routes to support walking for transport (e.g. into and around an activity centre), similar to networks for other modes such as the Principal Public Transport Network and the Principal Bicycle Network. By identifying key walking routes beyond shopping strips, the PPN enables walking to be prioritised in road management, such as signal phasing.

For further information on the NFA process, contact VicRoads' Network Operations group.

Due to the scope of this Guide, only the pedestrian-related requirements are considered here. However, other modes will need to be considered as part of the complete NFA.

What to measure?

Counts

- How many people are crossing the road?

Average crossing delay

- On average, how long do pedestrians wait to cross the road?

This information is used in a NFA to determine the pedestrian level of service.

How to measure?

Manual video surveys

- These can also be used to gather information about other modes of transport

Where to measure?

The current NFA tool only considers pedestrians within an activity centre or on the principal pedestrian network, where it has been defined.

Pedestrians should be counted at the location of the proposed change at existing or proposed safe crossing areas. VicRoads include the following examples of safe crossing areas:

- Signalised intersections/crossings
- Zebra crossings
- Formalised unsignalised crossings (e.g. pram ramps)
- School crossings.

People crossing within 20 m either side of the proposed change should also be included in the count[18]. A wider distance may be appropriate if it is likely that walkers would be attracted to a new, formal crossing, particularly if it is difficult to cross at the current location.

18 The Victorian Road Rules state that a pedestrian must not cross a road within 20 m of a crossing (e.g. anyone crossing within 20 m should be using the crossing).

7 Recommended Methodologies for Common Situations (continued).

When to measure?

The best times to measure pedestrian activity depends on the location, but should focus on peak pedestrian times (there may be more than one). Where the proposed change is time dependent (e.g. prohibiting parking during certain periods), the surveys should be conducted during the proposed time of the change. If the proposed change is not time dependent (e.g. new traffic signals), recommended survey times and durations are:

School area – 8:00 to 9:00 am (or 45 minutes prior to the school start time) on a typical school day

Commuter area – 8:00 to 9:00 am or 5:00 to 6:00 pm on a typical weekday

Shopping area – 1:00 to 2:00 pm on a typical weekday or Saturday.

Although surveys are more accurate when conducted over longer periods (especially counts), the data for conducting Network Fit Assessments is required as an hourly count. Therefore for consistency only single, hourly periods are listed here. A different survey period may be imposed based on the peak hour for other modes where they are the primary consideration of the assessment.

If there is uncertainty as to when the peak pedestrian time is, the survey can be conducted over a longer period (say, an additional 15 or 30 minutes either side) in 15-minute intervals to determine the peak. In outer suburban areas, the commuter peak may be shifted to earlier in the morning (e.g. people walk to the station to catch the train and get into the CBD by 8:00 am) or later in the evening (e.g. people leave the CBD at 5:00 pm and so do not start their walk home from the station until after 6:00 pm).

Surveys should represent a “typical” day and therefore be conducted during the school term and not on a rainy day.

7.4 Traffic signal operation and compliance

Often traffic signals on busy roads can be key delay points along pedestrian routes. Understanding how traffic signals operate and pedestrian behaviour at the crossing can assist in improving the signal operation for pedestrians. Changes in traffic signal operation could include:

- More frequent or longer pedestrian phases
- Automatic walk calls and/or late introduction at intersections
- Automatic head start at intersections
- Upgrading standard midblock pedestrian signals to puffins, which actively detect pedestrians on the crossing and adjust the signals accordingly.

Infrastructure and traffic management changes could include kerb build-outs, wider crosswalk markings, speed limit reductions and parking bans.

Higher compliance is normally taken as safer behaviour. However, there are no recognised standards for what constitutes an acceptable level of compliance. Compliance levels are often used as a proxy for the change in safety in before and after studies. Thorough evaluation should also consider pedestrian convenience.

A case study is included in Section 8.2, p. 33, showing how video and intercept surveys were used to count pedestrians at midblock crossings and understand signal operation and pedestrian opinions.

What to measure?

Counts

- Number of people crossing
- May include direction

Behaviour and compliance

- Gait (e.g. walk, run)
- Compliance with the crossing area
  - » How many people are crossing outside of the marked crossing but within 20 m?
- Compliance with the signal display
  - » What signal was displayed upon starting crossing?

Signal operation

- Average delay at signals
  - » How long do people wait before the green pedestrian signal is displayed?
- Signal display upon completing crossing
  - » Do people have enough time to get across the road before the solid red is displayed?

Demographics

- Ability (e.g. use of walking aids)
- Age group
- Gender

Opinions

- What do people think of the signal operation?
- Is the wait time reasonable?
- Why do people choose to cross away from the signals (if applicable)?

7 Recommended Methodologies for Common Situations (continued).

How to measure?

Manual video surveys

- Counts
- Demographics (optional, can also be measured from intercept surveys)
- Behaviour and compliance
- Signal operation

Intercept surveys

- Demographics (optional, can also be measured from video surveys)
- Opinions (e.g. length of time spent waiting, length of time provided for crossing, feelings of safety)

Where to measure?

At the crossing

When to measure?

The best times to record video depends on the location, but should focus on peak pedestrian times and aim to capture any variations in signal operation (e.g. some signals will give pedestrians better priority outside peak traffic periods). Recommended survey times and durations vary by location:

Commuter area – 7:30 to 9:30 am or 4:00 to 6:00 pm on a typical weekday (Monday to Thursday[19])

Shopping area – 1:00 to 3:00 pm on a typical weekday or Saturday

School area – 8:00 to 9:30 am or 2:30 to 4:00 pm on a typical school day.

Surveys should represent a "typical" day and therefore be conducted during the school term and not on a rainy day.

19 Vehicle volumes on Fridays are often slightly lower than other days of the week, and a similar pattern is likely to be true for commuting pedestrians.

7.5 Mode of travel

Understanding the mode of transport people take to access places and services can assist in planning and decision making about competing priorities. These surveys measure walking to or from a particular location relative to other transport modes (e.g. car driver, public transport, cycle).

The most appropriate method depends on the location. Three different situations are presented here:

- Schools or any other place where large groups of people can be addressed at once
- Other locations where there are limited, designated entrances/exits e.g. shopping centre, train station, restaurant, community facility, fitness centre.
- Locations without defined entrances/exits or a large number of entrances/exits e.g. strip shopping centre, plaza, large parks without fences.

Case studies are included in Section 8.3, p. 34, showing various methods that were used to measure mode of travel to particular locations.

What to measure?

Mode of travel

- Access (going to a destination)
- Egress (leaving a destination)
- Unless there is a reason to believe these will be significantly different, it is usually enough to just measure one.

How to measure?

Schools

Hands-up surveys. If the school is cooperative, the easiest way to measure mode of travel to (and from) school is to go into the classrooms or school assembly and ask children to put their hands up to indicate how they travelled to school, e.g. “Hands up if you came to school today by car/bike/train/walked”.

How to measure?

Other locations with limited, designated entrances/exits

Pedestrian following surveys – observe where a person goes when they leave the location.

- Measures only mode of egress
- Fast and easy to conduct, so more people can be sampled compared to intercept surveys
- Good where transport modes are within a short distance (e.g. from restaurant to car park, train station, etc)
- Does not capture people walking between multiple locations. For example, pedestrian following surveys are not able to determine the mode of travel for someone followed from the supermarket to the library. Therefore, in places with multiple destinations, such as strip shopping centres, information about mode of travel is best obtained using intercept surveys.

Locations without defined entrances/exits

Pedestrian intercept surveys. If these are being conducted it is often worthwhile broadening the scope of the survey to understand factors other than mode of travel such as amount spent in retail areas or issues with walking in the area.

Where to measure?

At the location of interest

When to measure?

School

During the school day at a time convenient for teachers. Generally not during the first few weeks of a new school year as travel patterns are still being established.

Other

The surveys should be conducted during peak pedestrian times. Suggestions include:

Commuter area – 7:30 to 9:30 am or 4:00 to 6:00 pm on a typical weekday

Shopping area – 1:00 to 3:00 pm on a typical weekday or Saturday.

Surveys should represent a “typical” day and therefore be conducted during the school term and not on a rainy day.

7 Recommended Methodologies for Common Situations (continued).

7.6 Travel and economic analysis

Understanding the local economic impacts of a proposed change can assist with the decision-making process. This is often important in communicating benefits to those likely to be impacted, particularly for traders who may be concerned that their business will suffer as a result.

An example is the replacement of on-street car parking or traffic lanes with a wider footpath and additional street furniture in a strip shopping centre. Traders may be concerned about a loss of customers as a result. A case study is provided in section 8.7

What to measure?

Pedestrian behaviours. What should be measured will depend on the circumstances of the specific proposal, however examples include:

- Mode of travel
- Frequency of visits
- Length of current visit
- Places/stores visited
- Total spend.

Footpath occupancy

- This gives a snapshot of the number of people passing a certain point or within a particular area to give an indication of the level of activity.

How to measure?

Face to face interviews

- Of shoppers/visitors
- Of retailers

On site manual counts

- Footpath occupancy

Mobile device detection (if affordable)

- For duration of stay and places visited (in a local area)
- More accurate in determining these factors than self-reported behaviour (face to face interviews), which requires recall and is subject to human error
- Will probably be most economical for large-scale surveys

Where to measure?

At the location of the proposed change

When to measure?

The face to face interviews and on-site manual counts should focus on peak pedestrian times. As economic analysis would generally be conducted for shopping areas, recommended survey periods are:

1:00 to 3:00 pm on a typical weekday

10:00 am to 2:00 pm on a typical Saturday.

Surveys should represent a “typical” day and therefore be conducted during the school term and not on a rainy day.

Mobile device detection is a continuous form of monitoring which will provide information about places visited and duration of stay for all time periods.

7.7 Ongoing pedestrian count

Permanent pedestrian counters provide information about the number of people walking on a continuous basis, often 24 hours a day, seven days a week. This information can be used to provide baseline data and inform decision making.

A case study is included in Section 8.4, p. 36, discussing a trial of various automatic pedestrian counters in parks in Melbourne.

What to measure?

Counts

- How many people are walking?
- May include direction

How to measure?

Automatic pedestrian counters.

- Refer to Table 2, p. 12 for details on automatic pedestrian counters.
- Can be expensive; the cheapest devices start at around $2,000 and range up to $15,000 or more. All will tend to undercount pedestrians in large groups.
- Cheaper devices face sideways and will not be able to count groups of pedestrians accurately. However, they will work well in situations where pedestrian demand is low (say less than 30 pedestrians in the peak 15 minutes) and few pedestrians are in groups.
- Where pedestrian volumes are much higher, and a very accurate count is desired, an overhead detector is essential. This may be a passive infrared detector that is located over the middle of the path, laser scanners or computer vision systems.
- Side-facing passive infrared sensors tend to provide a good compromise between cost and accuracy. There are relatively few pedestrian counters currently installed across Melbourne (including suburbs) meaning very little data is available on pedestrian volumes, except as part of specific projects (usually at one location and one point in time). Several side-facing passive infrared sensors can be installed for the same price as a single, more expensive technology (such as a laser scanner). Although the accuracy is not as high, this results in the availability of some data at more sites. In locations where accuracy is important, it may be worthwhile to use more accurate technologies, provided they are correctly positioned and operating.

Where to measure?

Permanent pedestrian counters should be installed along key walking routes, generally those with high pedestrian volumes. Examples include:

- Activity centres, including strip shopping centres
- Near key public transport nodes
- Entrances to public places such as plazas, squares and gardens.

All automatic counters have a detection area within which they count pedestrians. The best counter locations will be where pedestrians are being funnelled between barriers, such as on a bridge. This will reduce the undercounting due to pedestrians walking informally away from (say) a designated path, and reduce the required detection width.

Consideration should be given to the risk of double-counting pedestrians who circulate through an area on multiple occasions (but do not necessarily reflect new "unique" visits). This will require some understanding of pedestrian movement patterns and siting counters accordingly.

In locations where there are likely to be significant numbers of bicycle riders, consideration will need to be given towards how these should be treated. Some devices are capable of separately classifying pedestrians and riders, while others will classify them together.

As the counters require a power source, this may influence the final location. Some devices (such as laser scanners) are highly power intensive and so will always require mains power, while others (such as passive infrared) can often be powered by a battery and solar panel.

When to measure?

Once installed and operating, the counters monitor pedestrian volumes continuously so do not need to be switched on and off. The busiest times of day for pedestrian activity can be calculated from the data.

7 Recommended Methodologies for Common Situations (continued).


Photo: City of Port Phillip

7.8 Stationary pedestrian activities

Sometimes it is useful to know how many people are making use of the public realm for activities other than walking. This data can be used to support changes such as increased formal and informal seating if it has been shown to lead to an increase in the number of people in the area, making it more vibrant and increasing retail expenditure. Examples of stationary pedestrian activities include:

- Outdoor dining
- Sitting
- Chatting
- Watching others
- Playing.

A case study is included in Section 8.5, p. 38, outlining how stationary pedestrian activities were surveyed as part of the Places for People work conducted for City of Melbourne.

What to measure?

Counts

- Number of people engaged in stationary activities

Demographics

- Ability (e.g. use of walking aids)
- Age group
- Gender

How to measure?

On-site surveys

Where to measure?

At locations of high pedestrian activity e.g. town centres, strip shopping centres, tourist areas

When to measure?

Surveys should be conducted during peak pedestrian times. Recommended survey times and durations for stationary activity surveys are between 1:00 to 3:00 pm on a typical weekday or Saturday.

Surveys should represent a “typical” day and therefore be conducted during the school term and not on a rainy day.

7.9 Walking participation survey

Walking participation surveys systematically collect information about people's walking activities for a snapshot in time. This is similar to the **National Cycling Participation Survey** conducted annually, but on a smaller scale. It provides baseline data for a council at a community level rather than just at a certain location, as many of the other surveys do.

The case study in Section 8.6, p. 39, outlines how large-scale telephone surveys were used to measure walking and opinions about walking at the community level.

As part of this Guide an example survey form for a walking participation survey has been developed. It is included in Appendix A.

What to measure?

Walking in public spaces (e.g. footpaths/roads, parks)

- Involvement in walking
- Where people are walking
- Purpose for walking
- Time spent walking

Opinions and perceptions

- Perceptions of walking
- Suggested improvements

Demographics

- Who is walking
- Access to car/other transport

How to measure?

Use the example survey form (attached). This would ideally be conducted as an online survey.

- Easy to administer
- Can be completed in interviewee's own time
- Can include complex question logic (e.g. what question a person is asked depends on their answer to a previous question)
- Simple to repeat
- Low cost
- Reduces data entry requirements (and hence potential for error).

There are some concerns about internet availability skewing the sample of respondents. Like any other survey method, the demographics of respondents should be compared against the broader population to ensure a representative sample of the wider population.

Where to measure?

N/A

When to measure?

Annually. Try to do at the same time each year for consistency.

8 Case Studies for Measuring Walking

This section describes how some of the methodologies discussed in Section 7 have been used in real-life situations to measure different aspects of walking. These case studies have a greater focus on the methodology used (the purpose of this Guide) rather than the results, although these are also reported.

8.1 Project evaluation and one-off counts

Port Phillip Roundabout Treatments

Pedestrian Intercept Surveys

Roundabouts can be difficult and confusing for pedestrians to navigate as they have different rules to other intersections. Roundabouts are not conducive to pedestrian mobility as pedestrians must give way to all vehicles, which makes crossing more difficult than at a conventional crossing.

At a busy suburban roundabout in Port Phillip in 2005, interventions for improving pedestrian safety and convenience were installed. This included raised zebra crossings at each of the legs in line with pedestrian desire lines.

A survey conducted at the roundabout after the intervention found that users believed:

- The roundabout crossing was safe (24% before, 64% after)
- The pedestrian crossings were easy to use (54% before, 89% after)
- The waiting time was convenient (15% before, 76% after)
- Vehicle travel speeds were more acceptable (47% before, 66% after)
- More drivers were giving way to pedestrians (30% before, 78% after).

For more information see the report **'Evaluation of an Alternative Pedestrian Treatment at a Roundabout'**.

The intervention at this roundabout gives pedestrians priority over vehicles

8.2 Traffic signal operation and compliance

Pedestrian Level of Service at Midblock Pedestrian Signals (SKM, 2009b)

Manual video surveys and intercept surveys

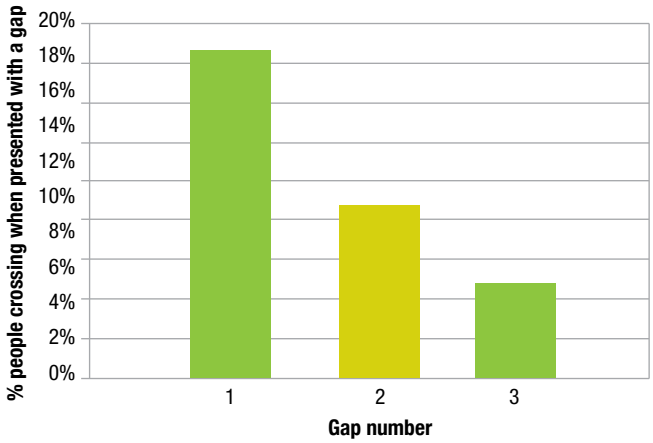
This project aimed to understand the nature of pedestrian wait behaviour and wait times at midblock pedestrian-operated signals. Video cameras were temporarily erected at 21 signalised midblock crossings around Melbourne and the footage was reviewed manually. Over 9,500 pedestrians were observed crossing during various times of day and days of the week. Observations made directly from the video included:

- The arrival time of the pedestrian
- The time the pedestrian started crossing (to calculate wait time)
- The signal display upon commencement of crossing (to determine pedestrian compliance)
- Wait behaviours (such as repeated pressing of the button)
- Demographics (gender, age)
- Number of people walking in a group
- When there was a gap in traffic but the pedestrian signal remained red.

Intercept surveys were also conducted at nine of the 21 sites. A random selection of pedestrians were approached after they had finished crossing and asked about their crossing experience, including:

- The level of impatience they felt
- Their perceived waiting time
- What represents a reasonable wait time.

The project found that people do not cross against red because they have waited "too long" but rather because the opportunity (e.g. a gap in traffic) is there



Note: gap number denotes how many crossing opportunities the person waiting has been presented with. For example, gap number three means the person chose to continue waiting on two previous occasions when presented with a gap in traffic in which they could have crossed (against red) and are now presented with a third opportunity.

Video footage was used to observe pedestrian behaviours such as the repeated pressing of the button and waiting on the roadway

8 Case Studies for Measuring Walking (continued).

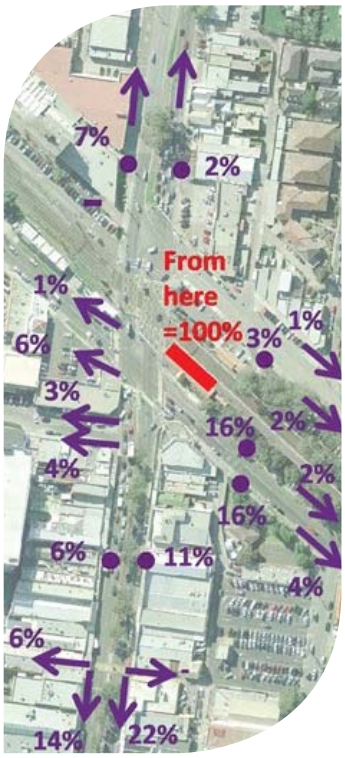
8.3 Mode of travel

Springvale Grade Separation Project (SKM, 2011)

Pedestrian Following Surveys

As part of this project, a greater understanding of where people were walking from the Springvale train station was needed. Surveyors followed people alighting from trains and recorded where they stopped or crossed a previously defined cordon. The results are shown below. A dot indicates that the person waited at the bus stop located there. An arrow indicates that the person was walking in the direction shown when leaving the survey area.

Passengers alighting an outbound train (from city)



Passengers alighting an inbound train (towards city)

Travel to shopping areas in Darebin (Darebin City Council 2007)

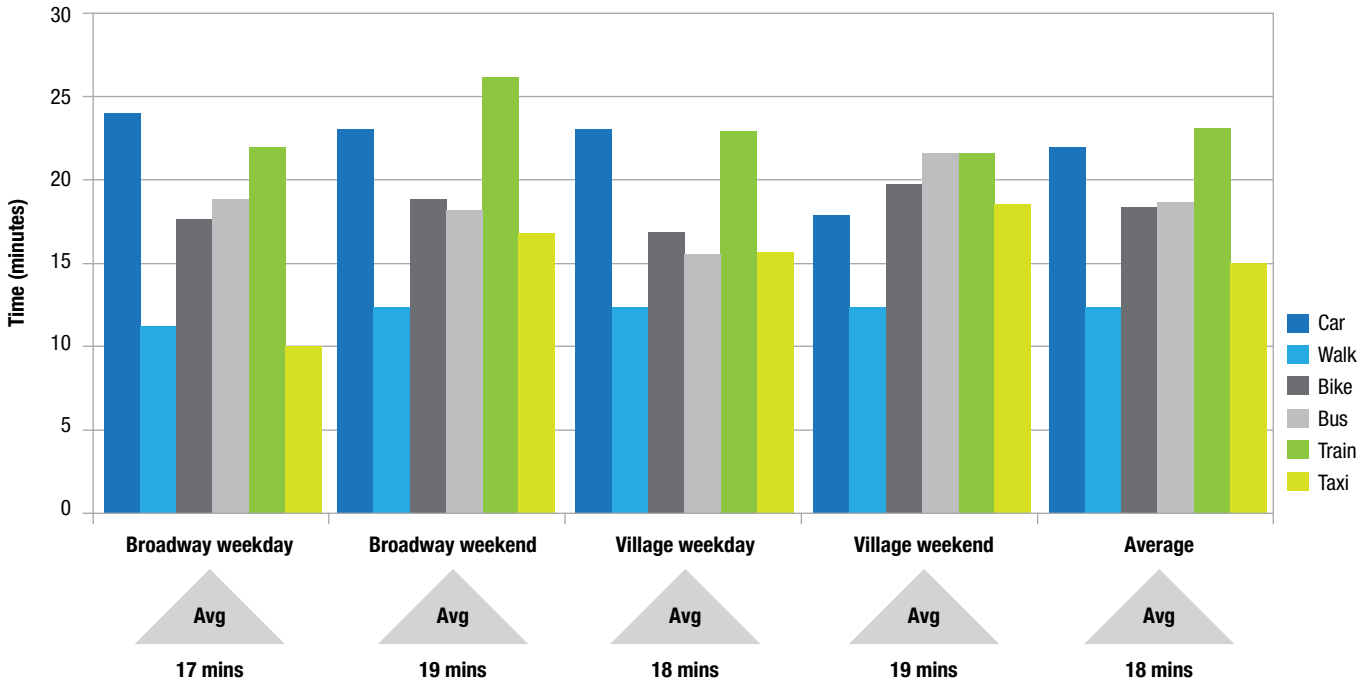
Pedestrian Intercept Surveys

There can be a tendency to overestimate the proportion of people who drive to access retail services and underestimate the proportion of those who walk. Measuring how people access shopping areas can therefore be a good way of highlighting the need to cater for pedestrians in urban design.

In 2007 Darebin City Council surveyed 100 shoppers at Fairfield Village, a middle suburban centre in Melbourne. Amongst other things, they found that walking was the most common form of travel to the centre (32%), followed by car (27%) and train (21%). Of those who walked to the centre, 65% listed convenience as the reason for their choice. Surveys of local residents found 69% said they usually travelled to the shops by walking.

Darebin City Council also conducted intercept surveys at two locations in Reservoir – further from the CBD – in 2010. The number of drivers was higher, but still less than half of those present (42%), while 28% walked. The **surveys** also asked about:

- Trip purpose
- Origin and destination (by postcode)
- Trip duration
- Length of time spent in the town centre
- Number of trips per week
- The main centre they use for food and grocery shopping
- Mode shift potential
- Satisfaction with pedestrian infrastructure.



The intercept surveys provided information about people's trip duration by mode

8 Case Studies for Measuring Walking (continued).

8.4 Ongoing pedestrian count

Pedestrian Counting in Parks and Gardens (CDM Research 2013)

Automatic pedestrian counts

The City of Melbourne has been collecting and publishing data about pedestrian volumes since mid 2009 (see www.pedestrian.melbourne.vic.gov.au/). They have installed 18 automatic counters in the CBD and Docklands which monitor the number of people passing each point 24 hours a day, seven days a week. These are located on footpaths in busy areas and utilise a variety of technologies.

This study by CDM Research evaluated commercially available counting technologies for future use in Council's parks and gardens, including the following:

- Photoelectric break-beam sensors,
- Side-facing passive infrared sensors,
- Overhead passive infrared sensors,
- Overhead laser curtain,
- Computer vision-based systems.
- Bluetooth and Wi-Fi detection systems.

The evaluation provided insight into the current state-of-the-art in automatic pedestrian counting technologies. Among the most pertinent findings were:

- As a general rule, the more accurate the counting required, the more expensive and infrastructure intensive (i.e. overhead sensors, mains power) the solution.
- Counting at sites with pedestrian volumes less than about 30 pedestrians per 15 minute period can be accomplished with adequate accuracy (>90%) using fairly low cost, simple side facing sensors.
- At higher volume sites overhead sensors are necessary in order to achieve adequate accuracy.
  - » Overhead passive infrared technologies are the most mature, but require central overhead mounting and multiple sensors are required where the path is wider than around 3.5 - 4 m.
  - » Overhead laser curtain systems are expensive and have high power consumption. However, they can be very accurate in very busy areas.
  - » Computer vision-based systems offer potential in very complex pedestrian situations (e.g. along malls or wide pedestrian thoroughfares). These systems are rapidly developing, but they remain fairly immature in outdoor environments and therefore present greater technical risks.
  - » Some computer vision systems require a central overhead position, which necessitates a pole and arm. Other systems can be positioned to the side of a path, eliminating the need for an overhead gantry or arm.

Overall, the study found that there are a wide range of devices available across a range of budgets (from around $3,000 to more than $15,000 per unit) to meet different applications. Count accuracy in very busy environments, where there are many pedestrians walking within close proximity, will still be limited (perhaps around 85% accuracy). Finally, the installation details are critical to ensuring a reliable count.

A passive infrared (overhead) pedestrian sensor at Victoria Point, 768 Bourke Road, Docklands and a laser sheet (overhead) pedestrian sensor at Webb Bridge, Docklands

Lilydale Principal Pedestrian Network (Yarra Ranges Shire Council 2013)

Automatic pedestrian counts

The Lilydale Principal Pedestrian Network Project is funded by the Commonwealth Government Liveable Cities Unit, Victorian Department of Transport, Planning and Local Infrastructure and Yarra Ranges Council, with an overarching aim to improve the legibility and walkability of Lilydale Township. The project has modelled pedestrian movements through extensive site analysis and review of data. The physical outcome of the project involves capital improvements to the public realm at identified key locations. Together with a Vulnerable Road Users Community Safety Project, the PPN project supports a combination of engineering, environmental, urban design, education, enforcement and awareness raising approaches.

Most importantly, the collection of pre- and post-project walking data allows the comprehensive value of investment in walking infrastructure to be quantified.

Suburban pedestrians were counted by Jonathon Marsden Data at three locations close to where they converge on a major path to a rail station and town centre. Time of day and temperature were also recorded.

Infrared movement activated digital cameras, commonly used in wild animal hunting, were used to count pedestrians. The rechargeable battery operated camera takes an image when anyone moves past providing not only a count, but other detailed information, during the day or night.

Cameras were strap-mounted discretely in trees and aim down at the path and clear of branches and moving obstructions so that non-pedestrian movement is all but eliminated.

In this case, pedestrians were counted for two weeks. Camera batteries can last for approximately 5,000 frames, so the period of recording depends on the approximate number of pedestrians. Batteries can be replaced if longer time recording is required.

The resulting data is highly detailed beyond simple number record. Direction, time of day, temperature, weather, activity (walking for transport or recreation), pet walking, cycling, groups, singles, gender, age etc are also captured.

The cost in this case was $1,000 including data cleaning (removal of false activation images), but not analysis of images, which was done in house. Allow 4 hours per 1,000 photographs for image analysis.

8 Case Studies for Measuring Walking (continued).

8.5 Stationary pedestrian activities

Places for People (City of Melbourne, 2004)

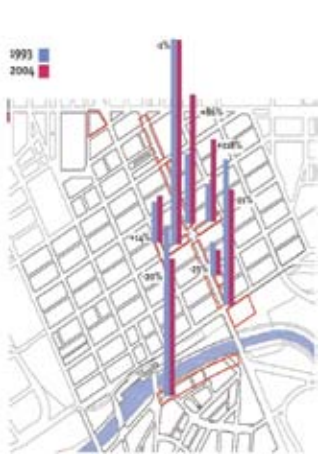
Stationary activities survey

As part of this work, surveyors measured the number of people involved in stationary activities at seven locations within the Melbourne CBD. **Stationary activities include "all the activities people engage in when not walking: standing, sitting, watching, leaning, listening, playing and so on. These are often regarded as 'incidental' activities that can truly reflect the value of a place to 'be in' for its own sake, rather than just move through as part of destination-oriented activities".**

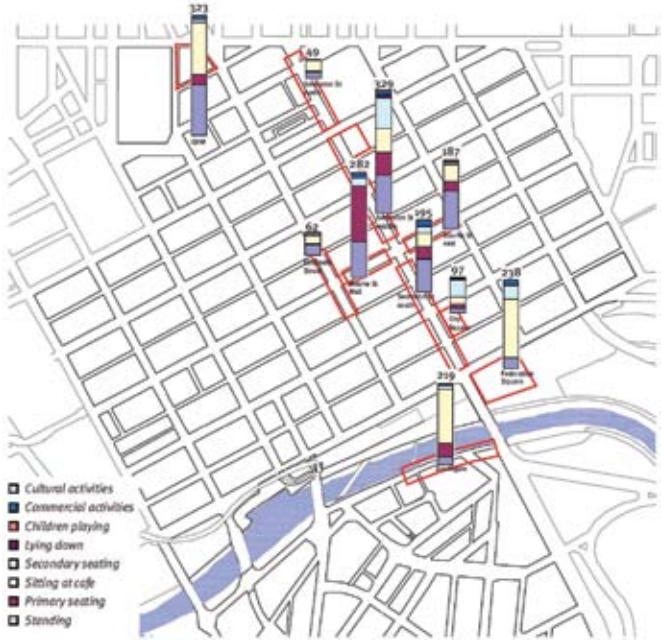
The 2004 results were compared with earlier surveys conducted in 1993 and are shown below. They show that where new outdoor dining areas between the two survey periods have been introduced (e.g. Bourke Street east), the number of people engaged in sitting outside has also increased. This data provides evidence for increasing the number of people spending time (and also money) in the city and helping make it a more vibrant place.

On a summer weekday

On a summer Saturday



The surveys also observed what types of stationary activities people were involved in. The diagram below shows the results for a summer weekday.



8.6 Walking participation survey

Making Walking Count – City of Port Phillip (SKM 2012)

Telephone interviews

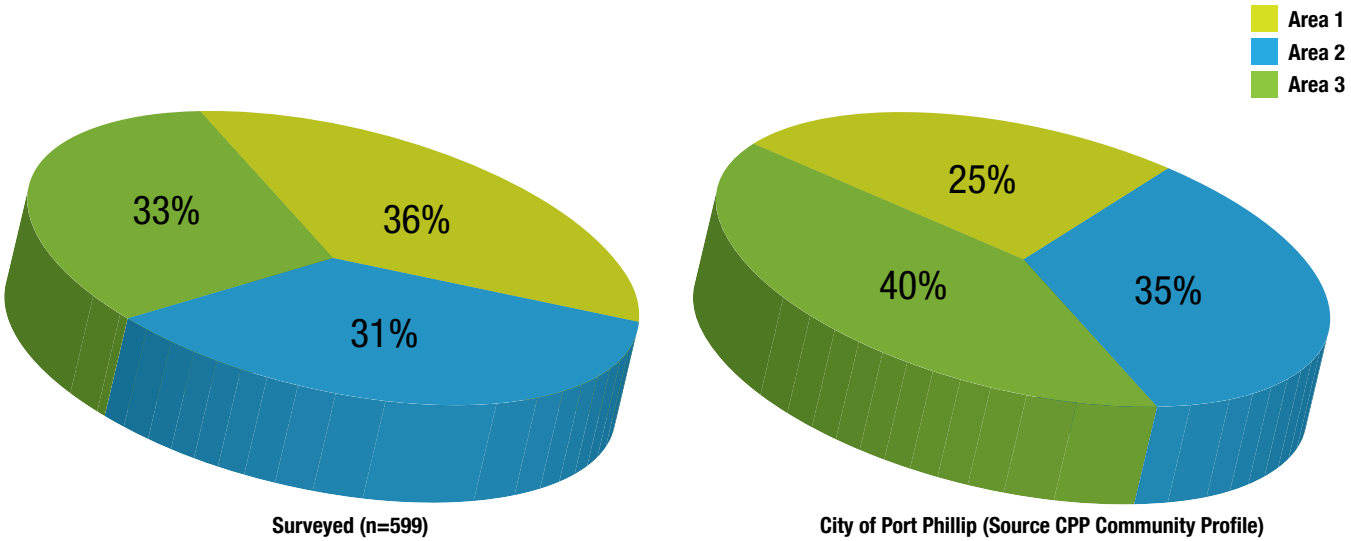
One of the most comprehensive methods for measuring walking at a community level is **Making Walking Count**. This methodology was developed as part of the Walk 21 conference series and has been used in various locations around the world. It uses a structured questionnaire and is conducted using telephone interviews of a large sample of respondents. The City of Port Phillip conducted this survey to provide an understanding of walkability in Port Phillip and citizens' attitudes to and opinions of walking.

Telephone interviews were conducted with nearly 600 Port Phillip residents. Quota controls ensured a representative sample of people were interviewed, considering:

- Gender
- Age
- Geographic area.

The telephone surveys asked questions about:

- Walking activity e.g. time spent walking
- Activity in the public realm e.g. visiting a park
- Local accessibility e.g. to local shops and services
- Motivations for walking
- Personal barriers to walking e.g. difficultly walking due to health
- Environmental barriers to walking e.g. security concerns
- Measures to improve the walking environment.



Surveyed (n=599) **City of Port Phillip (Source CPP Community Profile)**

The population distribution of telephone interviewees was controlled to approximate the profile of City of Port Phillip residents

8 Case Studies for Measuring Walking (continued).

8.7 Travel and economic analysis

Camberwell Access Plan – City of Boroondara 2013

Interview surveys

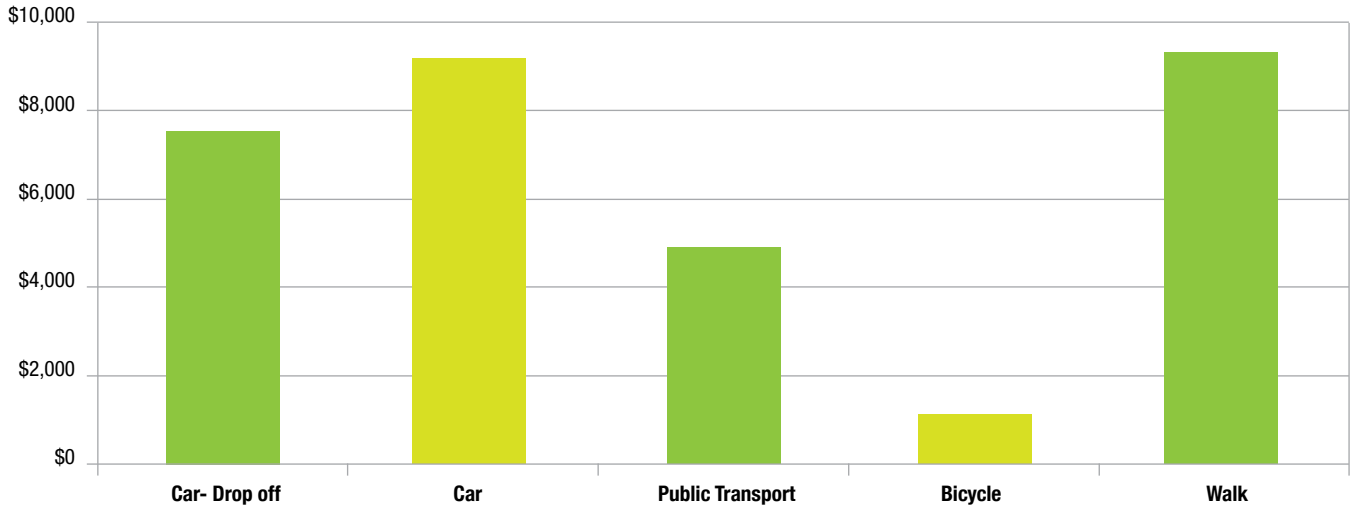
Pedestrians can have a significant economic impact associated with their large annual visitations.

The Access Plan for the Camberwell Junction Activity Area included interview surveys. The surveys were designed to capture information with respect to access which aim to understand the transport choices and characteristics of respondents and to provide strategic insights that support investment and improved mode choice.

At a number of interview locations during summer and winter conditions, pedestrians consistently represented a 20% mode share.

The interview surveys conducted included questions regarding the typical expenditure of visitors as well as the typical frequency of trips to the centre.

Those who had walked to the activity area did not spend as much as those who had arrived by car per visit. However pedestrians visited more often and in aggregate spent more annually than any other mode of transport.



Annual average spend at Camberwell by mode of travel

8.8 Pedestrian modelling and cordon counting

Camberwell Principal Pedestrian Network – City of Boroondara 2013

Pedestrian modelling of latent demand and cordon counting

The scale of pedestrian movement and the potential to increase walking is often unknown and overlooked. This is in contrast to planning for roads and traffic.

The Access Plan for the Camberwell Junction Activity Area (CJAA) included interview surveys and a cordon of pedestrian counts.

Interview surveys indicated that pedestrians represented a 20% mode share. A notable 20% of those who had driven and those that had used a tram indicated that they could have made a walking trip that day. This presents a potential pedestrian mode share in excess of 30%.

A cordon of pedestrian counts encircled the activity area capturing most pedestrian access corridors to the activity area. Count locations were chosen outside key car parking areas in order to primarily capture walking as a mode of transport to the activity area.

Pedestrian counts revealed that approximately 15,000 daily pedestrians (two-way count) enter and exit the CJAA area during a 12 hour period (7am-7pm). This represents a significant movement that provides a foundation for improving conditions for pedestrians.

The pedestrian counts further informed the development of a Principal Pedestrian Network (PPN) in line with a Department of Transport, Planning and Local Infrastructure (DTPLI) methodology.

The PPN is based on GIS modelling of housing and where people live in relation to a destination - in this case the CJAA. The GIS model presents the shortest path for residents to a destination along a pedestrian network. Paths aggregate as they approach a destination highlighting the most important direct paths to the nominated destination.

The aim is to prioritise pedestrian infrastructure investment along corridors that best serve the community that will encourage walking as a viable transport option for regular and essential daily trips.

9 Measuring Walkability

Walkability is not the focus of this Guide, but is important in understanding the broader walking picture. Therefore this section is included to provide a brief overview of walkability and direct users to resources which may be helpful in determining the walkability of an area.

In addition to measuring pedestrian activity, other information is sometimes also collected to provide a greater understanding of the walking environment. Walkability considers how "friendly" an area is for people walking and is related to factors such as:

- Infrastructure provided and its operation (e.g. pedestrian signals)
- Street furniture (e.g. places to sit)
- Wayfinding (e.g. maps and signage)
- Land use (e.g. the number of places of interest that are within walking distance)
- Number and behaviour of other road users (e.g. traffic volumes and speeds)
- Accessibility for the broad range of people who may want to walk (e.g. provision of ramps for people using wheelchairs, prams, etc)
- Safety, both actual and perceived (e.g. no alcoves or hiding spaces that could conceal someone).

Improving the walkability of an area is related to improvements in:

- Individual and community health
- Safety, both actual and perceived
- Sense of community
- Air quality
- Liveability
- Trade and tourism, boosting local economies.

Established methods for measuring walkability and resources for further information are outlined in Table 4.

Table 4: Some common methods for measuring walkability

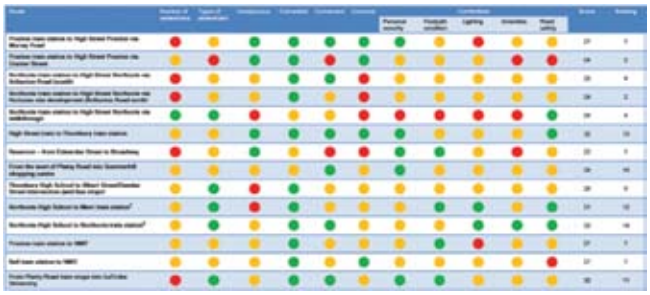
Walking audits
Site surveys of the local walking environment by organisations responsible for the area (e.g. councils), local users or walking advocates. Walking audits often culminate in a walkability score or map. Walkability Checklists developed by various organisations and used in various locations e.g. **Victoria Walks** **WA Walkability Audit Tool** used in Western Australia      **Pedestrian Environment Review System (PERS)** used in the UK   

Walking audits

The **five 'C's** checklist

- connected
- comfortable
- convenient
- convivial
- conspicuous

This is mainly used in the UK, but has also been used in Australia.



Desktop analysis

Maps generated based on information such as walking distances, routes, barriers, places of interest, etc.

Walk Score used in the USA, Canada and Australia. This measures one key aspect of walkability – the number of destinations nearby.

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Appendix A – Sample Walking Participation Survey

This sample walking participation and opinion survey on the following pages has been included to provide a standardised survey form which can be used by councils to better understand walking activity and perceptions at a high level. It is intended that the survey shown here would be a short survey to collect base information on walking activity, perceptions and opinions of walking in the council area and demographics. Additional questions can be included if council would like to know details about other walking-related matters. However, it is not intended to understand specific issues or behaviours (e.g. what people think of a particular location, how much they are spending at the shops). A separate intercept survey should be developed for these instances.

In practice, this type of survey could be administered as part of a larger routine survey of ratepayers that would monitor the performance of council on a wider range of issues. It would ideally be administered online and has been written for this purpose. If it were to be conducted as a mail-out, phone or in-person survey, relevant adjustments would have to be made.

For other examples of surveys conducted by councils, visit **www.victoriawalks.org.au/measuring/**

Appendix A – Sample Walking Participation Survey (continued).

We are conducting this walking participation survey to understand walking activity and opinions about walking in <insert relevant council>. It will take approximately 15 minutes to complete.

We are interested in walking in public areas within the <insert council> Council area <show map>. This includes footpaths, parks, shared paths and shopping centres. Please include both walking for recreation (e.g. taking the dog for a walk) and walking for transport (e.g. walking to the shops). A walking trip includes any trip where you moved from one location to another (even in a circuit e.g. walking the dog starts and ends at home) by walking, or if you are unable to walk, in a wheelchair or similar device. Walking as part of a trip which involved multiple modes of transport (e.g. walked to the bus stop then caught the bus) is also included.

Walking activity yesterday

1. Did you walk yesterday?

- Yes
- No

If no, redirect to Q6.

2. How many walking trips did you make yesterday where you:

- Walked all the way _____
- Walked part of the way and used private transport for the rest _____
- Walked part of the way and used public transport for the rest _____
- Used some other combination _____

Check total is more than zero.

3. How long did you spend walking for various purposes yesterday? Please provide your best estimate of the time spent walking and include as many reasons for walking as apply.

- To or from work _____ minutes
- To or from school, university or other place of study _____ minutes
- To or from shops or restaurants _____ minutes
- To get to community facilities (e.g. library, pool) _____ minutes
- To get to services (e.g. bank, doctor) _____ minutes
- To get to a train, tram or bus stop _____ minutes
- To visit friends or relatives _____ minutes
- For recreation or exercise _____ minutes
- Other [specify] _____ _____ minutes

4. Where did you walk yesterday? Please include as many as apply.

- Footpath
- Nature strip (no footpath)
- Road (no footpath)
- Park/reserve
- Shared path
- In a shopping centre
- Other [specify]

_____

5. Did you have access to a car for any of these walking trips?

- Yes, all
- Yes, some
- No
- Don't know

Walking activity in general

6. Is walking your only or main form of exercise?

- Yes
- No

7. What distance are you able to, or prepared to walk to get to:

	Up to 200 m	200 to 500 m	500 m to 1 km	1 to 2 km	More than 2 km	Not applicable
• Work	☐	☐	☐	☐	☐	☐
• School, university or other place of study	☐	☐	☐	☐	☐	☐
• Shops and restaurants	☐	☐	☐	☐	☐	☐
• Community facilities (e.g. library, pool)	☐	☐	☐	☐	☐	☐
• Services (e.g. bank, doctor)	☐	☐	☐	☐	☐	☐
• Public transport stop/station	☐	☐	☐	☐	☐	☐
• To visit friends or relatives	☐	☐	☐	☐	☐	☐

8. What types of surfaces do you prefer to walk on?

- Footpaths (sealed)
- Shared walking and cycling paths (sealed)
- Unsealed walking or hiking trails, tracks or paths
- Along roads with no sealed footpaths in urban areas
- Along roads with no sealed footpaths in regional/rural areas
- Indoors (e.g. shopping centre, gym)
- At the beach
- Other [specify]

Appendix A – Sample Walking Participation Survey (continued).

9. There are a number of barriers which put people off walking. Do any of the following stop you from walking or mean you walk less than you otherwise would?

	No	Yes, minor concern	Yes, moderate concern	Yes, major concern
Traffic safety				
• Too much traffic	☐	☐	☐	☐
• High speed traffic	☐	☐	☐	☐
• Crossing busy roads	☐	☐	☐	☐
• Drivers don't obey the road rules	☐	☐	☐	☐
Personal safety				
• Feeling threatened by others	☐	☐	☐	☐
• Feeling isolated/ vulnerable	☐	☐	☐	☐
• Not enough lighting at night	☐	☐	☐	☐
Pedestrian crossings				
• Not enough pedestrian crossings	☐	☐	☐	☐
• Long wait times	☐	☐	☐	☐
• Walk time too short	☐	☐	☐	☐
Footpaths				
• No footpath provided	☐	☐	☐	☐
• Poor quality footpaths	☐	☐	☐	☐
• Footpaths aren't complete/connected	☐	☐	☐	☐
• Obstructions	☐	☐	☐	☐
• Crossing difficulties at kerbs where ramps are not provided	☐	☐	☐	☐

	No	Yes, minor concern	Yes, moderate concern	Yes, major concern
Destinations				
• There's nothing within walking distance	☐	☐	☐	☐
• Poor signage about routes and walking times	☐	☐	☐	☐
• Nowhere to sit/rest	☐	☐	☐	☐
Environment				
• No protection from the weather (sun, rain, etc)	☐	☐	☐	☐
• Air pollution	☐	☐	☐	☐
• Loud traffic	☐	☐	☐	☐
• Litter, graffiti, etc	☐	☐	☐	☐
Personal reasons				
• Lack of time	☐	☐	☐	☐
• Difficulty carrying things	☐	☐	☐	☐
• Walking is inconvenient	☐	☐	☐	☐
• Health reasons	☐	☐	☐	☐
Shared paths				
• Bike riders	☐	☐	☐	☐
• Other [specify] _____	☐	☐	☐	☐

Appendix A – Sample Walking Participation Survey (continued).

Perceptions and opinions of walking within the council area

10. We would like you to think about how you feel when you walk within <Council>. Are you:

- Very comfortable
- Comfortable
- Neither comfortable nor uncomfortable
- Uncomfortable
- Very uncomfortable
- Don't know

11. How do you think walking conditions have changed in the past year within <council>?

- Much better
- Better
- No change
- Worse
- Much worse
- Don't know

12. Are there any places that you walk within <council> that you particularly enjoy walking?

- Yes [specify location and reason] _____
- No

13. Are there any places that you walk within <council> which you think need to be improved?

- Yes [specify location and improvement] _____
- No

14. Do you have any other comments about walking within <council>?

- Yes [open ended]
- No

_____

_____

_____

_____

_____

Demographics

15. Age group

- 15 – 17
- 18 – 24
- 25 – 29
- 30 – 39
- 40 – 49
- 50 – 59
- 60 – 69
- 70 years or older
- Rather not say

16. Gender

- Male
- Female
- Rather not say

17. Postcode where you live

- ____ ____ ____ ____
- Rather not say

18. Do you currently experience any issues which affect your ability to walk?

- Yes [specify] _____
- No
- Rather not say

If yes, continue to Q19, otherwise redirect to Q20.

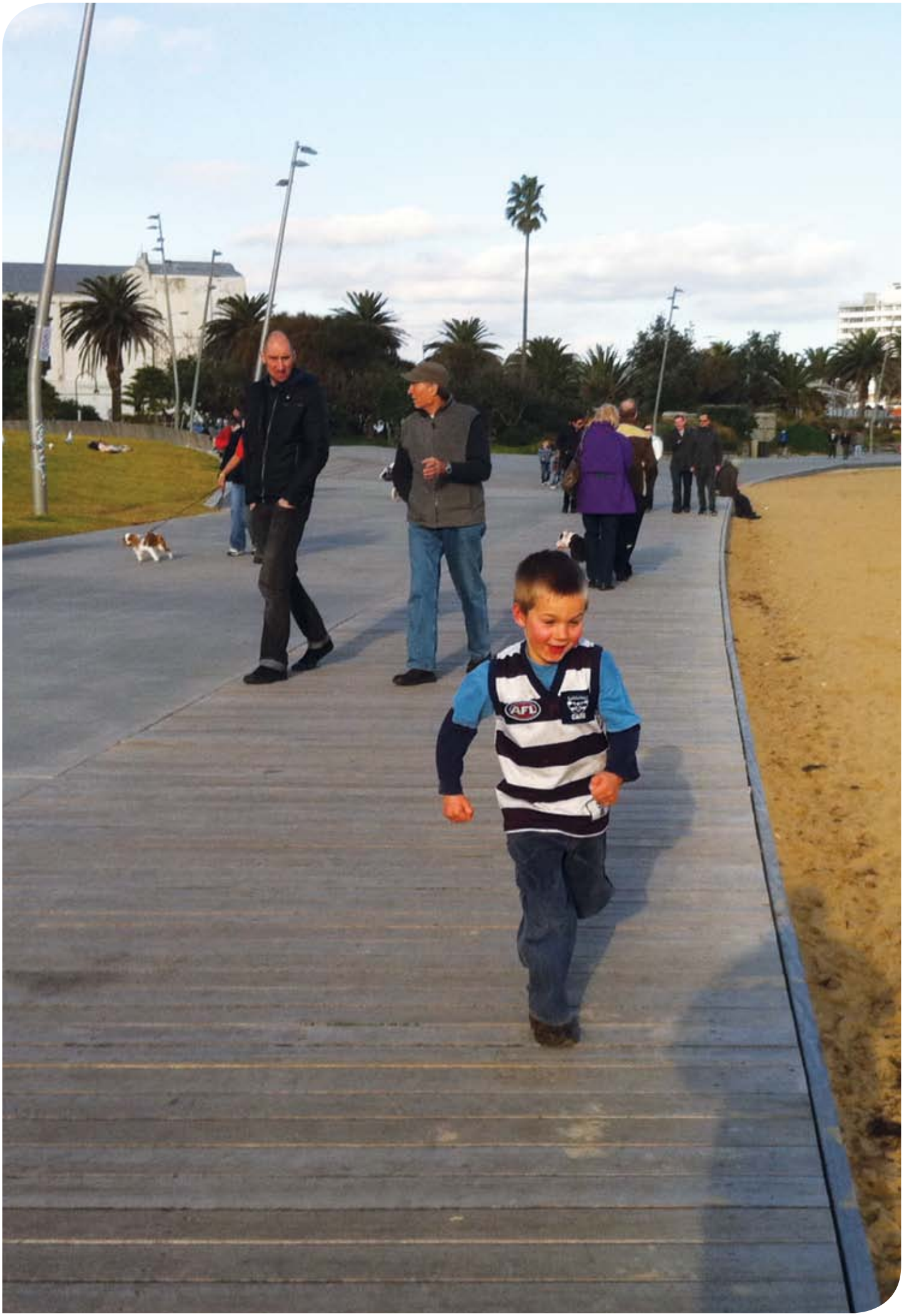
19. Do you use any mobility aids when walking?

- Yes [specify] _____
- No
- Rather not say

20. Do you have dependent children?

- Yes [specify age(s)] _____
- No

Thank you for completing this survey. If you have any questions about the survey please contact <contact details>.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P: 03 9662 3975 **E:** info@victoriawalks.org.au **W:** www.victoriawalks.org.au