

D5 Monitoring and evaluating pedestrian facilities

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Purpose

This module emphasises that monitoring of pedestrian facilities is essential to ensure timely detection and correction of problems affecting usage, safety and structural condition of the facilities.

Review of existing facilities is also important as part of an overall strategy to ensure that walking facilities provide acceptable levels of connectivity and demonstrate design consistency.

Introduction

Evaluation of pedestrian facilities is important for two reasons. First, it is useful to determine whether specific aspects of a facility are detracting from the overall walking experience and hence inhibiting use of the facility. It may be possible and cost-effective to rectify particular features of a facility in the short term, increasing satisfaction and encouraging greater use. Second, it is important to determine how well a facility is fulfilling its intended objectives. This will inform decisions regarding the useful life of the facility and the provision of similar facilities in the future.

D5.1 Audit tools and guidelines

The ability to measure and monitor the performance of existing facilities is important to ensure that the facility is able to service the needs of pedestrians. This inspection and monitoring also highlights council's duty of care to users of the facilities.

Inspections form the basis of any good management strategies, with three categories recommended:

- ▶ safety inspections, designed to identify all defects likely to create danger or serious inconvenience to users of the network or wider community. Defects may include debris, vandalism, pavement defects, damaged drainage and other 'ironwork', street furniture, overgrown or fallen vegetation, and standing water.
- ▶ service inspections and audits, designed to ensure that the network meets the needs of users and that serviceability requirements are met. The Queensland Transport audit guidelines highlighted below may help identify the appropriate design features to inspect. Issues may include pavement condition, drainage features, width, crossing points, connectivity and security.
- ▶ condition inspections, primarily aimed at identifying deficiencies in the infrastructure that may adversely affect the network value of the asset. Inspections may cover items that directly impact serviceability, such as surface distress, or relate to long-term performance, such as structural failure of pavement layers, or deterioration of structural elements in major structures, for example bridges and subways.

Inspection frequency

Inspection frequency will depend on the nature and use of the pedestrian facility and the risk assessment activities completed as part of developing the maintenance strategy (see *Maintenance plan development* in D3.2 *Maintenance practice* and Table D5-1). Local conditions and events (such as storms) may trigger different inspection types. Routine maintenance activities, monitoring and response to public information should be ongoing.

Inspection regimes should be tailored to the local area's needs and resources. The need for a well-funded and well-supported inspection program must be recognised by councils.



Table D5-1
Example of inspection frequency framework

Category/risk level	Inspection frequency		
	Safety	Service	Condition
Pedestrian hub — Risk level 1	1 day to 1 week	3 months	1 year
Pedestrian hub — Risk level 2	2 weeks	6 months	2 years
Pedestrian hub — Event-driven	Pre-/post-event	6 months	1 year
Primary collector — Risk level 1	1 week	6 months	2 years
Primary collector — Risk level 2	4 weeks	1 year	2 years
Primary collector — Risk level 3	3 months	2 years	5 years
Urban access — Risk level 1	4 weeks	1 year	2 years

Audit tools and guidelines

Formal auditing of facilities may use a range of different resources, including the three discussed below.

Queensland Transport's Pedestrian safety and accessibility audit tools and guidelines

These tools and guidelines have been recently developed and trialled, and will be available from the Main Roads website in 2005. The tools provide a checklist to help assess a range of issues relevant to pedestrians, including:

- ▶ land use and pedestrian context
- ▶ footpaths
- ▶ pedestrian facilities and accessibility
- ▶ catering for pedestrian target groups
- ▶ pedestrian and traffic volumes
- ▶ areas around schools
- ▶ traffic and road environments
- ▶ temporary roadworks
- ▶ signing
- ▶ pavement marking
- ▶ lighting (see Figure D5-1)
- ▶ visibility/sight distance (see Figure D5-1)
- ▶ pedestrian fencing
- ▶ pedestrian amenity.

The audit tool kit also includes a pedestrian questionnaire and pedestrian behaviour observation sheet that can be used by practitioners to reach a better understanding of local issues.



Figure D5-1
Poor visibility and lighting at subways and underpasses can create safety and security issues for pedestrians

Austrroads Road safety audit guidelines

Depending on the type of audit (design or existing road review), the guidelines provide a series of checklists to help with the assessment. While the entire audit process considers all users, additional checklist issues target the specific needs of pedestrians and cyclists. The audit toolkit is currently being developed as an online Internet application by ARRB Transport Research and is available for use at <www.rsatoolkit.com.au>.

Austrroads 'Part 13: Pedestrians, Appendix C', Guide to traffic engineering practice

The guide provides an example of a pedestrian safety audit checklist. Potential safety issues are highlighted as a series of questions in relation to different users (all pedestrians, senior pedestrians, young pedestrians, intoxicated pedestrians and people with disabilities).

D5.2 Monitoring pedestrian usage of facilities

Important indicators in measuring the effectiveness of pedestrian strategies are the number of pedestrians and their behaviours in different environments. A range of different counts may be considered for pedestrian activities, including:

- ▶ pedestrian crossing volumes
- ▶ origin and destination counts
- ▶ pedestrian flow past a point/entrance to a facility (see the case study 'Horizontal infra-red pedestrian counting in Queen Street Mall')
- ▶ intersection counts, generally in conjunction with a traffic survey.

Regardless of the type of survey being undertaken, survey design is the most critical element of the activity. Appropriate design will ensure that the required information is collected, that data collection methods suit the application, and that there is confidence in the accuracy of the data collected.

For most applications at the local level, manual counting will suffice. This may be completed with the aid of a single, three- or six-bank 'clicker-board', depending on the number of different movement types being recorded. Other proprietary products have been developed to help with manual data collection, enabling direct recording and download to office computers and analysis software. Further details on survey methods are available in Chapter 5 of 'Part 3: Traffic Studies' in the Austrroads *Guide to traffic engineering practice series* (Austrroads 2004).

A report prepared for the US Department of Transportation Federal Highway Administration (FHWA 2003) outlined a variety of bicycle and pedestrian detection technologies and evaluated their performance in different environments. Detection technologies included microwave, ultrasonic, infra-red and video sensors, and inductive loops.

The capabilities and limitations of each technology should be considered carefully in the survey design phase. Factors to consider include:

- ▶ cost and availability of the technology
- ▶ impact of environmental factors (e.g. heat, rain, sun, shade)
- ▶ ability to count in crowded environments
- ▶ accuracy of the counting device
- ▶ links to analysis tools
- ▶ availability of remote access for easy download and monitoring of data.

The completion of a manual count during the calibration/testing stage is highly recommended. For most devices (e.g. overhead infra-red detectors on entry to shopping centres), an adjustment factor is generally applied.

Portable video trailers also provide the opportunity to remotely monitor pedestrian numbers and behaviour, and can provide a safe method of analysing pedestrian behaviours in crowded locations such as nightclub areas and intersections. As a permanent record, the footage can provide a useful tool to help with the presentation of findings. This record can also serve as a source for quality control of analysis results.

Case study: Horizontal infra-red pedestrian counting in Queen Street Mall

Pedestrian numbers are counted at a number of locations in the Queen Street Mall, Brisbane. The horizontal infra-red devices and associated reflectors are located in the information pillars within the mall precinct (see Figure D5-2). Data is transferred by radio modem to an office near the mall.



Source: Global Counting Systems

Figure D5-2
Queen Street Mall, Brisbane: pedestrian counting sensors



Case study: Evaluation of the Perth Pedestrian Strategy

Ker (2001) investigated methods to measure the benefits and economic impacts of the Perth Pedestrian Strategy.

The analysis estimated present value benefits of about \$57 million achieved through an increase of 449,000 walk trips per day by 2029 (compared to the trend value at that time).

Assuming the mode shift targets can be achieved, the study found that an investment of \$1 million to \$2 million per year in the walking strategy would return benefits to the community of approximately 4:1.

Key factors used in the evaluation of the strategy were:

- ▶ reduced private vehicle operating costs (valued at 17.2 cents per kilometre of mode shift change from car to walking)
- ▶ improved health and fitness due to exercise (valued at 18 cents per kilometre of health benefits)
- ▶ increased road trauma (increased walking is associated with a negative impact, reflecting a higher risk per kilometre travelled)
- ▶ reduced road trauma (a positive benefit to pedestrians from reduced car traffic)
- ▶ reduced air pollution
- ▶ reduced greenhouse gas emission
- ▶ reduced traffic noise
- ▶ reduced water pollution.

D5.3 Evaluation principles

Sustainable development and the increasing appreciation of the need for triple bottom line outcomes (economic, environmental and social) in the provision of public infrastructure need to be considered when evaluating pedestrian strategies and programs (see the case study 'Evaluation of the Perth Pedestrian Strategy').

Program and project evaluation

In evaluating pedestrian programs and projects, *Walking – making it happen* (London Walking Forum n.d.) outlines the following areas to help focus the evaluation and to ensure that it includes both how the project was run and the results it achieved:

- ▶ achievements and failings (linked to key project or program objectives and relevant performance indicators)

- ▶ impact – was the project worth doing?
- ▶ efficiency – were resources used effectively?
- ▶ future – what still remains to be done?
- ▶ spin-offs – were there unanticipated benefits?

The evaluation framework for a project or program should be designed well before the project starts. This will ensure that relevant data can be collected before the project if required, and key indicators can be measured before, during and after construction or implementation. Table D5-2 outlines a framework which could be used for this purpose.

Project evaluation techniques

A wide variety of techniques has been developed for pedestrian project evaluation. The evaluation methodologies are generally tailored to local areas and closely related to the strategic objectives of council. Examples include:

- ▶ Austroads (2001) has developed a *Project evaluation compendium* to help guide project and program evaluations suitable for Australian applications. The document provides advice on the most appropriate evaluation method to use and how to interpret results, and describes core concepts involved in evaluations. Although focused on road projects, the methodologies and related references may assist in the design of a suitable evaluation for a pedestrian-related project.
- ▶ Where the desired level of service or facility is known, gap analysis measures the existing facilities to identify gaps or areas for improvement. See Gallin (2001) for an example of such an analysis.
- ▶ The pedestrian facility guidelines developed by Main Roads (2002, Part 3.13) provide an evaluation framework and spreadsheet tool to help with selection of traffic control devices in relation to pedestrian traffic on roads.
- ▶ A quantitative and qualitative assessment framework was developed for Main Roads Western Australia by ARRB Transport Research to help with the ranking of candidate pedestrian (and cycling) projects (McInerney 1998). The process included quantification of safety and health benefits, traffic delay impacts and project costs, in addition to a qualitative stakeholder and community assessment tool to consider level of service, coherence and directness, attractiveness and comfort, safety, environment, health and strategic issues.

Table D5-2

Outline of evaluation framework

Evaluation framework	
Study objectives	Define key objectives for the evaluation. Identify realistic performance indicators for the project/program.
Data collection	Investigate methods to obtain required information; budget and plan for relevant measurements to be taken. Determine methods of interpretation and reporting.
Stakeholder involvement	Identify key stakeholders involved in the project. These may include government, councillors, local community groups and general facility users. Determine information requirements from these groups. Obtain feedback and identify issues associated with knowledge of the program/project, use of the facility, condition of the facility and other issues impacting key performance indicators.
Reporting measures	Identify short-term and medium-term measures to allow progress to be monitored. Develop a communication plan for results to ensure that benefits of the evaluation (positive and negative) can be shared.
Review of practices	On the basis of the evaluation, review internal policy, processes and projects in the pipeline to identify improvements or refinements.

References

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For more information

Website: <<http://www.transport.qld.gov.au/pedestrian>>.

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