Design for disabled road users: It's time to up our game

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ABSTRACT

Though seventeen per cent of New Zealanders identified themselves as having a disability in the 2006 census, our built environment repeatedly fails to take account of disabled users' needs. The paper outlines deficiencies in the way that current design creates barriers for disabled people, and highlights improvements that can be made in the way we approach the design task.

The purpose of this paper is to outline, for transportation engineers:
a. why the needs of disabled road users need to be considered to a greater degree than they are currently;
b. why guidelines and standards are not enough, and what we as decision makers can do to improve access and safety for disabled road users, and
c. where more specific emphasis can be applied for the needs of disabled road users in the road safety audit process, and in approval and auditing of temporary traffic management plans.

The paper will outline the range of disabilities requiring consideration and how we can meet these users' needs from an accessible journey viewpoint. It summarises our local and national guidelines and standards and invites discussion on the best way forward to improve the transportation system for all road users.

INTRODUCTION

There appears to be inconsistency in the way traffic engineers cater for the needs of disabled road users in New Zealand. There is limited training, and written guidance material is sparse, particularly in relation to the needs of the mobility impaired. The result of this lack of training and guidance over many decades has resulted in transport networks in our urban areas that do little to aid disabled users' safety and accessibility. While many individual traffic engineers make concerted efforts to provide for disabled road users in their projects, the nature of a journey being from an origin to a destination means that one barrier in this journey makes it an inaccessible one. Many of our traffic engineering projects focus on the footpath and road reserve in the immediate vicinity of a development, or a site such as an intersection is investigated and upgraded with little consideration given to its place in a journey.

This paper looks to set the current scene in terms of summarising New Zealand guidance, literature and training related to traffic engineering design for disabled road users. It investigates traffic engineers' and disabled peoples' views of what is currently provided, and makes recommendations to improve aspects of the design system, so that accessibility and safety for disabled road users might be improved.

While there are many issues relating to the mobility of disabled people as vehicle drivers and passengers, this paper focuses primarily on traffic engineering design for disabled pedestrians.

PROBLEM BACKGROUND

Disabled sector in New Zealand

As traffic engineers we value data which provides a picture of aspects of the transportation system. Unfortunately, the data collected about disabled road users is very limited. Furthermore, disabilities vary significantly in the way that they affect peoples' lives. A disability can range from a temporary injury with minimal effect on mobility, to serious injuries or conditions resulting in permanent bed-rest, totally extinguishing a person's ability to travel independently.

Disabilities can be temporary or permanent, and the nature of one person's disability often changes over time. Many disabled people identify with having more than one disability. Disabilities can exist at birth, or as a result of a genetic condition or disease, materialise or worsen through a person's life. Accidents and injuries are a significant source of temporary and permanent disability.

Statistics New Zealand collects data on people with disabilities. The 2006 census (Statistics New Zealand, 2006a) included a general questions on disability (*Do you have any disability or handicap that is long term (lasting 6 months or more)?).* The 2006 census found that 17% of New Zealand's population, or around 630,000 people, reported a permanent disability on average, including 45% of those older than the age of 65.

The 2006 Household Disability Survey (available for download from the Statistics New Zealand website) aimed to measure the prevalence of disability among the resident New

Zealand population living in households. The 2006 survey used a functional concept of disability, defined as:

" … any restriction or lack (resulting from impairment) of ability to perform an activity in the manner or within the range considered normal for a human being."

It is noted that this definition excludes temporary disabilities, and those that can be corrected, for example with glasses. It is also noted that subjects' responses to surveys such as these are based on their perceptions of their own experiences and are therefore by their nature subjective. The following high-level categories of disabilities were included:

Sensory – includes people with hearing and/or seeing disabilities.
Physical – includes people with mobility and/or agility disabilities.
Intellectual – includes people previously defined as having intellectual disability.
Psychiatric/Psychological – includes people previously defined as having psychiatric or psychological disability.
Other – includes people with speaking disabilities and/or disabilities classified above as other.

In addition to permanent disabilities identified by the census, an estimated 166,300 adults aged 15 years and over had disabilities caused by accidents or injuries, with the most common type of injury occurring in the workplace (Statistics NZ, 2010).

Ageing population

New Zealand's population is predicted to age in the coming fifty years, such that by 2061 the proportion of the population aged over 65 will be 27%, compared to approximately 13% in 2011 (Statistics New Zealand, 2006b). Refer Figure 1. The number of people aged over 65 is predicted to more than double from some 580,000 currently, to over 1.2 million in 2061. With 45% of the over-65 age group reporting permanent disability in the 2006 census, this demographic trend compounds the need for consideration of disabilities in transportation projects.

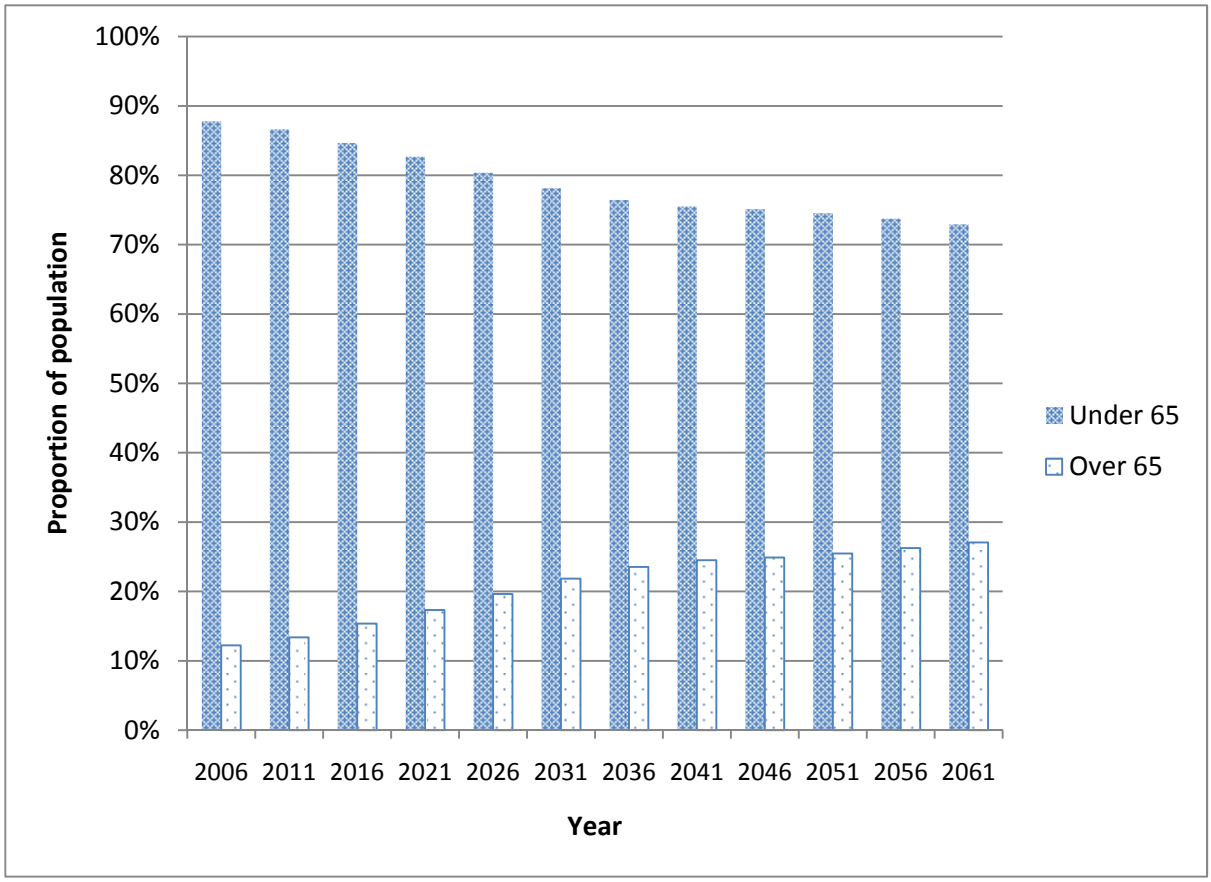

Figure 1 Proportion of New Zealand population aged over and under 65 years (2006 Census)

INVESTIGATIONS: TRAFFIC ENGINEERS AND THE DISABLED SECTOR

Existing Guides and Standards

There are several New Zealand-specific guides and standards used by traffic engineers in design generally, and in considering the needs of disabled road users in particular. Examples of these are detailed in Table 1.

Table 1: Existing Guideline Examples

Guide	Description
Pedestrian Planning and Design Guide	The Pedestrian Planning and Design Guide is New Zealand's comprehensive official guide to planning and design for walking. It sets out ways to improve New Zealand's walking environment.
Austroads Guide to Traffic Management Austroads Guide to Road Design	Part of the widely used Austroads series, the 'Guide to Traffic Engineering Practice: Part 13 Pedestrians' has now been incorporated into general guides for traffic management and road design.
RTS14: Design for the Visually Impaired	This standard provides guidance for design of infrastructure to aid those with visual impairments including those without any vision.

The information contained within the guides listed in Table 1 is useful as far as their advice is implemented. Often, traffic engineering projects are designed and constructed within constraints (for example, funding constraints) that prescribe the extent of design somewhat. Furthermore, as discussed above, the nature of project delivery as isolated sites means that barriers to accessible journeys often go unidentified. A well-designed intersection that provides accessible links and crossing points can only be part of an accessible route if all links and crossing points within the journey are also accessible.

Existing training

There are several worthwhile and helpful training courses available for traffic engineers. Usually, design for disabled road users is taught in conjunction with design for pedestrians generally. The following training courses include some aspect of design for disabled road users:

- NZTA Road Safety Engineering Workshop, convened twice per year in recent times
- Fundamentals of Planning and Design for Walking, run by ViaStrada
- Various postgraduate courses in Sustainable Travel, including for example ENTR614 Sustainable Transport Planning (University of Canterbury) and CIVIL773 Sustainable Transport: Planning and Design (University of Auckland)

The Barrier Free Trust (www.barrierfreenz.org.nz) holds training courses for designers, architects, assessors of disabled people's environments, and other people who are interested to learn more about the Accessible Journey. To date these courses have primarily attracted people from the buildings industry, though the Trust welcomes interest and participation from traffic engineers. Their half-day seminar for architects and designers is particularly recommended as an introduction to needs of the disabled community.

Non-motorized user audits and Community Street Reviews, outlined in the Pedestrian Planning and Design Guide and during courses listed in Table 1, are consultation and investigation tools available for traffic engineers to determine the existing standards of pedestrian links and crossings. The forms used for recording these activities are detailed

and allow for analysis in terms of the views and experiences of disabled road users. This input however, depends on disabled road users being involved in the audits and reviews.

Temporary Traffic Management

The Code of Practice for Temporary Traffic Management states:

C13.3 Temporary Paths and Detours

In urban areas where pedestrian or cycle paths become unusable due to the work activity a temporary path must be provided… …Allowance must be made for the use of temporary paths by mobility vehicles, wheelchairs, pushchairs, cyclists and the like using temporary ramps as appropriate." (NZTA, 2004)

Despite the requirement for navigable temporary paths, temporary traffic management is a significant hazard in safety terms, and a frequent barrier to access, for disabled people. In particular, the temporary warning sign TW-31 (Footpath closed: please use other side) is often placed without adequate access provided to the footpath on the 'other side', if it indeed exists.

Survey on the experiences of disabled road users

To investigate disabled road users' views on how disabled road users are catered for in the design of pedestrian networks, a survey were carried out. Results of interest are discussed here. The full survey and a spreadsheet summarizing all responses are available from the authors on request.

The survey had 17 responses. Thirteen of these were from people who were unable to walk unaided.

The clearest outcome of this survey, despite the low number of responses, was the diverse nature of peoples' disabilities, and the wide range of issues affecting their accessibility. Respondents included those using manual wheelchairs, power wheelchairs, walking frame and crutches, as well as two respondents with good walking ability.

One question asked: **To what extent do the following aspects of the transport network affect your accessibility (ability to participate in activities)?**

The range of responses are shown in Figure 2.

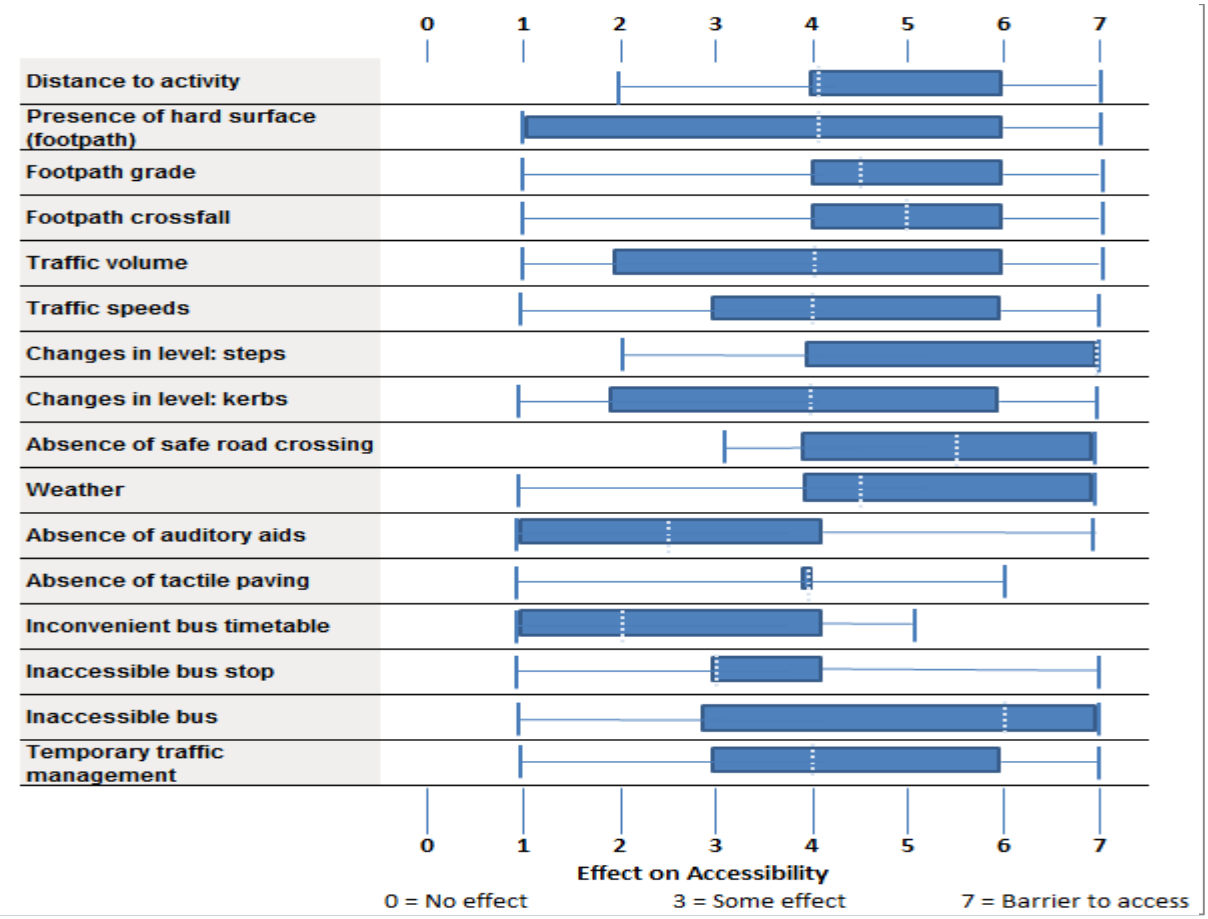

Figure 2 Disabled Road Users' Perceptions on Factors Affecting Accessibility

Of interest in Figure 2 are those aspects of the transport network that disabled road users consider have the greatest effect on their accessibility. These are related to changes in level (steps), absence of safe crossings, weather, and inaccessible buses.

A further question asked: **How would the following changes to the transport network improve your accessibility?**

The range of responses, for the ten highest-rated responses on average, (that is, those with the most potential to improve accessibility) are shown in Figure 3.

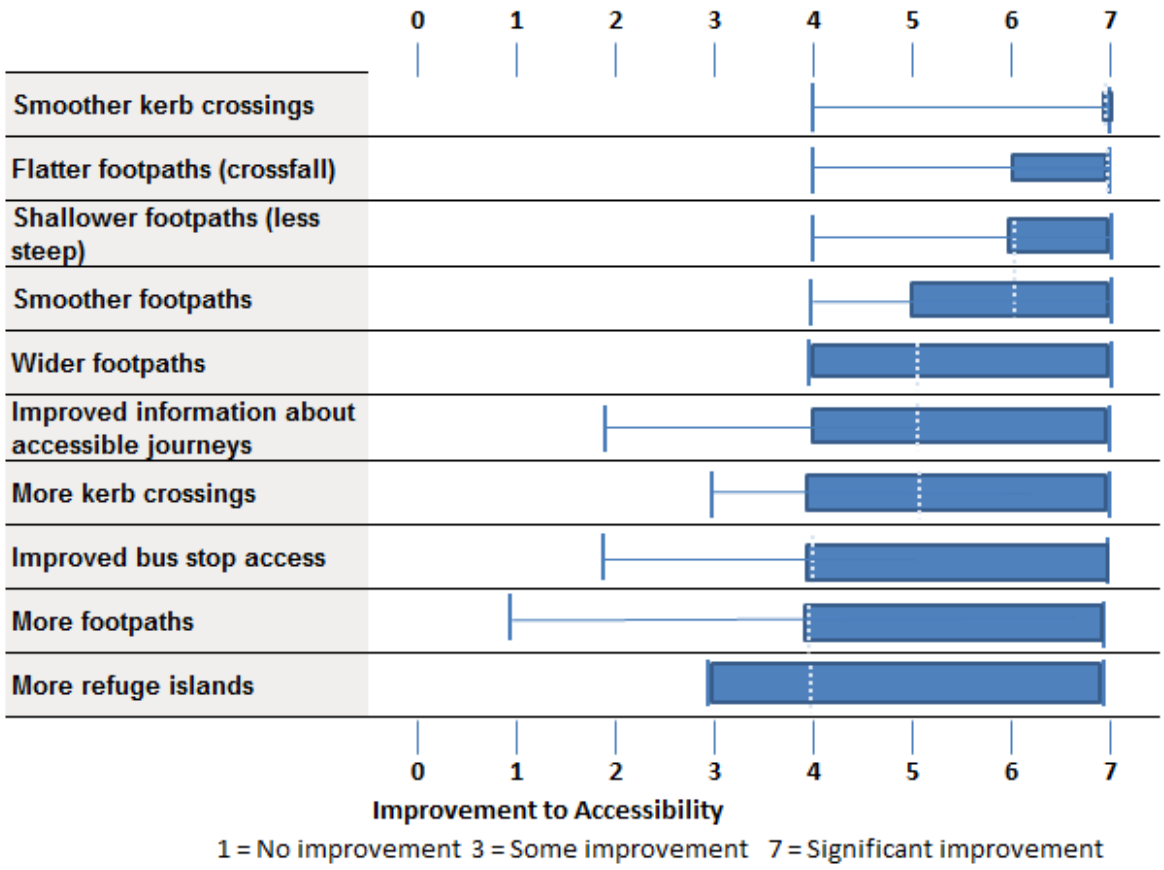

Figure 3 Disabled road users' perceptions on infrastructure to improve their accessibility

Of interest in Figure 3 is that disabled road users perceive that smoother kerb crossings and flatter footpaths would improve their accessibility as much or more than any other improvement to infrastructure. These relatively simple components of the transport network have the potential to make or break an accessible journey for a disabled road user.

Survey on traffic engineers' perceptions of design for disabled road users

A total of 23 responses from traffic engineers were analysed. Findings of interest are discussed below.

1. To what extent do you believe training has helped your awareness in design for disabled road users?

70% of respondents to this question indicated that despite having attended formal training in several aspects of traffic engineering design generally, they had received no or very little training specifically in design for disabled road users.

One respondent stated that their hands-on experience through a postgraduate course in Sustainable Transport Planning, where they physically used wheelchairs and crutches to negotiate traffic environments, was particularly useful and significant in their approach to design generally.

2. Do you think that more, or less, consultation with the disability sector (e.g. CCS Disability Action, Foundation of the Blind) would be useful in improving accessibility for disabled road users?

All respondents indicated that either the same (40% of respondents) or more (60%) consultation with the disabled sector would be beneficial. Reasons discussed included:

- more consultation being more suited to site-specific conditions

- better understanding of disabled sector viewpoints and experiences

- perhaps not to go too far with consultation, as it may result in unrealistic expectations or costs on projects already limited for funding

3. How well or poorly do you think that the needs of disabled road users are considered in design, approval and use of Temporary Traffic Management plans, in general?

Over 62% of respondents thought that the needs of disabled road users are poorly or very poorly considered in design, approval and use of Temporary Traffic Management plans.

Despite this, in response to the next survey question: (**How well do you think that you personally take account of disabled road users, and in particular those on foot or in a wheelchair, in your design and/or approval of temporary traffic management plans?) ,** the same proportion of respondents (62.5%) stated that they personally 'often' or 'always' consider the needs of disabled road users.

4. How do you think that we as traffic engineers could improve the way we design, and/or the way we deliver projects, to improve accessibility for disabled people?

Responses to this question were based around a theme of increased awareness, mindfulness, and training for engineers, and more project-specific consultation with the disabled sector. It appears that there are gaps in traffic engineers' understanding and awareness of the needs of disabled road users. Standards and guidelines exist, but they are only referred to when the consulting engineer knows that this is necessary, worthwhile, and will be an action appreciated by their client and funded appropriately in terms of professional services fees, and construction funding for any recommendations.

DISCUSSION

Common arguments against including provision for disabled road users in projects involving traffic engineering include ‘don’t the standards allow for that anyway?’, ‘it is not practical’, ‘there aren’t any disabled people in this area’, or ‘that is outside of the scope of this project’. Provision for disabled road users is rarely mentioned in investigation reports, with the exception of some mention of tactile paving for the vision impaired. It appears that traffic engineers either assume that by following local authority standards and guidelines, that their designs will be accessible for all, or that they have not explicitly considered disabled access and safety.

The survey responses from the disabled sector suggest that standards and guidelines alone are not providing a safe and accessible network, from their perspective. This paper therefore recommends (I think ‘contends’ OR ‘recommends’ is better word here) that more emphasis be placed on traffic engineers’ awareness of disabled road users’ needs, for the reasons of prevalence of disability and the ageing population as discussed, and also for the following reasons.

- The *UN Convention on the Rights of Persons with Disabilities*

The NZ Government has ratified the UN Convention on the Rights of Persons with Disabilities. Article 9 discussing Accessibility states, ‘ To enable persons with disabilities to live independently and participate in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation ….’ (United Nations, 2008)

- Crash statistics do not fully account for the inherent lack of safety in our pedestrian networks

Many road accidents involving disabled people go unreported as they involve only the disabled person themselves, often as a result of tipping due to steep crossfall, or change in level at a kerb, vehicle crossing or refuge island. Furthermore, the lack of crash statistics on a route may be a result of the lack of suitably accessible infrastructure provided.

- Many new safety features are engineered obstacles for the disabled community

Compliance with local and international design standards and guidelines does not ensure safe access for disabled road users. For example, raised pedestrian refuge islands provide an obstacle for disabled people to negotiate and help to prevent ‘wheeled pedestrians’ moving quickly through the traffic flow.

- Disabled road users can’t just ‘walk around it’

A barrier such as a long footpath with greater than 1% crossfall, or a refuge island with a change in level from the road to the refuge, presents a barrier in a disabled person’s route. When confronted with barriers in their route, most pedestrians will simply walk over or around the obstacle, or speed up to reduce their risk. Many disabled road users do not have these options.

- The NZTA Road User Hierarchy

In decreasing importance, the road user hierarchy (NZTA, 2009) ranks the following in terms of their need for consideration in traffic engineering design:

- Mobility-impaired pedestrians
- Pedestrians
- Cyclists
- Public transport users
- Powered two-wheeler users
- Commercial/Business travelers
- Car-borne travelers

It appears therefore that there is a gap between the disabled sector's access and safety needs, and provision for this access in the built environment. While the New Zealand Standard *NZS4121 2001: Design for Access and Mobility* (Standards New Zealand, 2001) provides guidance for access to public spaces, it focuses on buildings and adjacent infrastructure (for example, car parks). The means for a disabled person to get from their home to these places, that is, the footpath and street network, is in the hands of local authority engineers and their consultants. Aside from RTS14 (Guidelines for Facilities for Blind and Visually Impaired Pedestrians), nationally consistent guidelines are limited in terms of footpath and crossing details, such as crossfall, crossing locations and nature, or other important details such as colour contrast and information signs. Where guidelines do exist, there is much frustration in the disabled sector due to the inconsistency of their application.

RECOMMENDATIONS

The Accessible Route as a Project delivery Method

It is recommended that 'the accessible route' concept be used by designers when considering access routes to the built environment, such as transport systems, footpaths and the facilities and services that are provided within buildings.

It can be described as an unbroken link from the street boundary or transport facility (bus stop or car parking) to a facility and all the buildings and services that are provided. It must be able to be negotiated by an unaided user of a wheelchair, walking frame or guide dog. While initially conceived as a tool to design for disability access it is now being used by designers who want the maximum economic and social benefit from the facility they are constructing by ensuring everybody in the community can access and use it.

It is vital to consider pedestrian, cycle and public transport links to potential destinations in the initial planning stages. Accessible pedestrian routes, which link to adjoining communities, must be planned to avoid unsafe 'clashes' with other transport modes. This means that kerb cuts, street and road crossings, bus stops and car parking must be designed in such a way that all people, including children, cyclists, elderly people and those with disabilities can use a safe and accessible route to access services, facilities, parks, playgrounds and walkways.

The accessible route is an holistic method of project delivery that optimises both safety and access for all road users, compared to one-off site investigations, for example minor safety at mid-blocks or intersections, where barriers in a route may not be considered. Accessibility modelling is a useful tool for consideration of accessible routes.

Walking the Walk: Engineers experiencing disability

Many engineers responding to the survey for this paper reported that where they had been involved in 'real world' simulations of disabled journeys, for example using blindfolds, crutches and wheelchairs, their awareness of the needs of the disabled sector was greatly enhanced. It is recommended that councils and training organisations use this method as part of regular and ongoing training within their organisations. The exercise could be as simple as a lunchtime 'walk around' the area surrounding an office, or could be included as part of a seminar, workshop or even social event.

CONCLUSION

When should the needs of disabled road users be specifically considered?

The investigations summarised in this paper highlight the need for more consideration of disabled road users in traffic engineering design, and the lack of comprehensive training and culture among traffic engineers of providing for access for disabled road users.

For reference, particular consideration would be beneficial in the following circumstances:

- In reviews of District and Regional plans, specifications and strategies
- In reviews, updates and development of national standards and guidelines
- During consultation, at the investigation and at every design stage of new construction projects
- As part of every road safety audit
- When preparing and discussing construction methodology
- When preparing, reviewing and auditing Temporary Traffic Management Plans

More research in this area is warranted, particularly given the increasing prevalence of those in our society with age-related mobility and visual impairments in particular, and the potential among traffic engineering industry for advances to be made.

References

Austroads 2009 *Guide to Traffic Engineering Practice, Part 13: Pedestrians*

New Zealand Transport Agency *Code of Practice for Temporary Traffic Management* NZTA, 2004

New Zealand Transport Agency *Pedestrian Planning and Design Guide* NZTA, 2009

Standards New Zealand *Design for access and mobility: Buildings and associated facilities* 2001

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