TECHNICAL PAPER

NZS 4404 LAND DEVELOPMENT AND SUBDIVISION ENGINEERING UPDATE AND NEW STANDARD

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ABSTRACT:

NZS4404 Standard for Subdivision Engineering has undergone a significant review over the last year. The committee challenged itself to develop an amendment that:

- encourages sustainable modern design
- incorporates urban design principles for living street networks
- provides some certainty for designers and TA's
- prevents poor outcomes that can arise when the sole focus is on cost minimisation and compliance with minimum standards

By the time of the conference, the submissions will be closed and the committee will be considering specific and final recommendations for the standard.

This presentation will outline some of the critical thinking and influencing directions that have directed outcomes, detail the key changes (which are significant for the transport area) and advise on the latest recommendations of the committee. These will be just ahead of finalising the Standard, expected in May or June 2010.

Introduction

This new revised standard is a revision of NZS4404:2004. Following about eleven months of development by a multi representative committee, it was published in draft form for public comment in November 2009, and submissions were to be received by the 5th February 2010. There are significant changes and the committee encouraged all users to study it and to make submissions. To this end, a national series of workshops was coordinated jointly between the New Zealand Planning Institute (NZPI) and the Institution of Professional Engineers (IPENZ). The overall objective was to get design outcomes for communities that emphasised liveable and quality environments.

In analysing the 2004 version, its objectives appear to be reasonable and permissive of alternative solutions. However in practice, it had become apparent that well designed alternatives, and in particular those that were seeking to include urban design based outcomes, were often treated differently in the RMA process, and therefore encounter greater difficulty in gaining consent. To that extent innovation has been discouraged.

The review committee challenged itself to develop an amendment that:

- Encourages sustainable and modern design;
- Provides some certainty for designers and territorial authorities; and
- Prevents the poor outcomes that could arise when the sole focus of a development is cost minimisation and compliance with minimum standards.

The impetus for the review of NZS4404 came from the NZ Transport Agency (NZTA), Local Government New Zealand (LGNZ), the Ministry for the Environment (MfE), pipe manufacturers, some territorial authorities and a number of individual uses of the standard. As a result, NZTA, LGNZ and MfE agreed to sponsor a review with the scope to:

- Make editorial corrections;
- Make changes suggested by users;
- Update terminology to align with National Road;
- Incorporate good and safe design principles; and
- Include consequential changes to figures and drawings.

It quickly became evident that there would need to be significant changes to the road and stormwater sections of the document. NZS4404:2004 was completed about the time new thinking in urban design was finding its way into the consciousness of planners, surveyors and engineers involved in land development, but was not developed sufficiently in the New Zealand context to be able to be incorporated at that time.

Sustainable urban design contributes to liveability and economic development, and is now a goal of reputable developers, forward thinking designers and territorial authorities. The review committee members all agreed that the new standard needed to strongly encourage that aspiration and remove road blocks to it.

The review has therefore become more than simply an update to the 2004 version. It proposes to significantly change the way roads are classified and designed, and change the emphasis on how we manage stormwater. The sections on landscaping and reserves have been combined and significantly re-written.

Key changes include:

- Removing engineering from the title of the standard to emphasise that collaboration among a number of disciplines is important for good land development outcomes;
- Requiring that road design allow context or place to be given significant emphasis, and that roads be designed to achieve safe (slower) operating speeds;

- A new emphasis on managing and treating stormwater (before it gets into the pipe, by the use of grassed swales, natural or artificial waterways, ponds and wet lands); and
- A requirement to consider climate change and potential sea level rise.

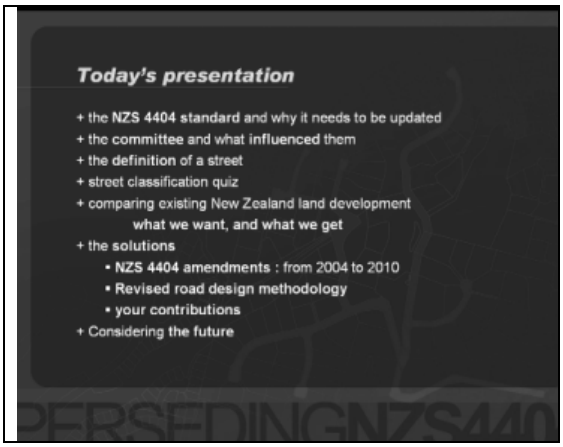
Users should also note that Standards New Zealand (SNZ) Handbook 44:2001 is still relevant and is not amended by this review of NZS4404:2010.

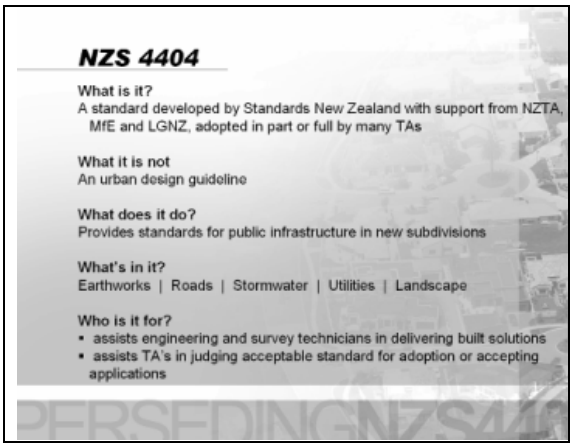
Finally, a note of thanks. We all need to be amazed and grateful for the hours and effort committee members contributed to this review. Some will have spent well in excess of 300 hours by the time the committee completes its work.

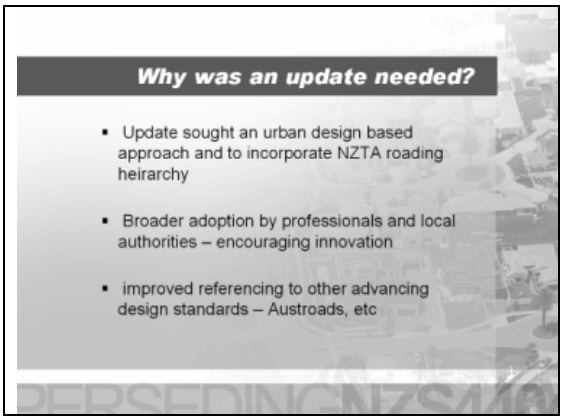
By way of a summary, the following paper will outline the content of the series of national workshops that were held as part of facilitating and informing the submissions process. The more directed presentation that performs part of the IPENZ Transportation Conference Presentation will focus on the post submissions changes and provide a more up to date basis on the status of the changes and potential adoption of the standard.

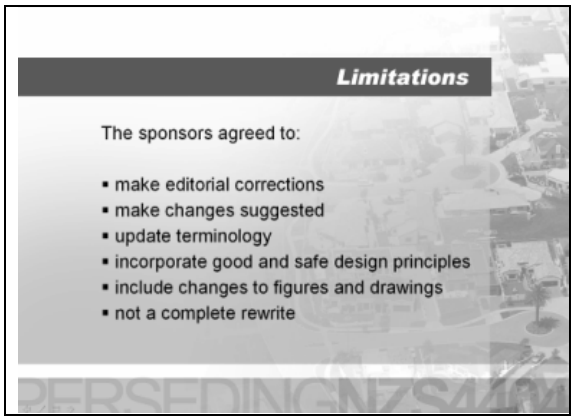
Outline to the National Series of Workshops

The following slides, and their individual content are relatively self explanatory and describe the basis of the approach by the committee to advancing the standard.









Make up of the Committee

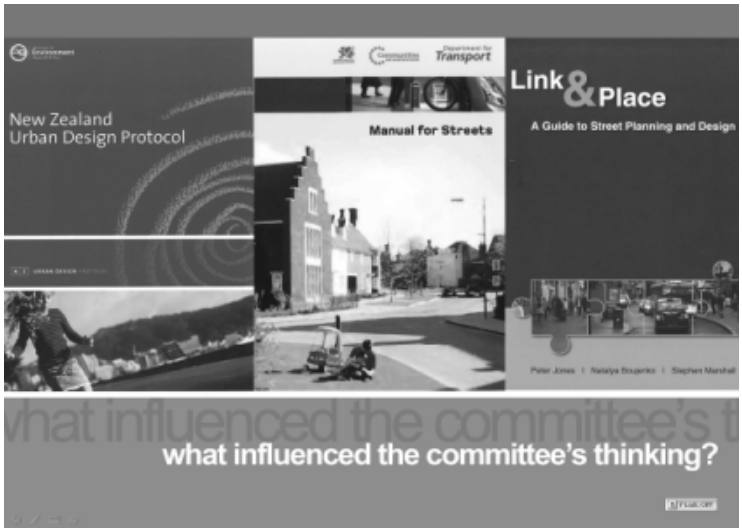
The following slide summarises the inter-disciplinary contributions to the Review Committee.

Key Influences to the Standard

The committee undertook a wide range of research in contributing to the development of the standard. In very broad terms, the key documents that influenced thinking around the ideas of integrating land use concepts with both transport outcomes were as follows:

- The New Zealand Urban Design Protocol, and including not only the protocol concepts but also the relevant New Zealand Case Studies references; and
- The UK Manual Streets; and Link and Place: A Guide to Street Planning and Design, also from the UK.

By way of broad reference the covers to these documents are shown on the attached slide.



Integrating Land Use and Transport

One of the key objectives of advancing the standard was to develop a better link between the activities of land uses and the provision of related transport links. Broadly, and in general terms as indicated within the matrix based road network hierarchy shown in the manual for streets, a broad recognition of the role and function of movement (not just movement involving vehicles but also the movement of people) has been expanded to incorporate the broad spectrum of places. Indicatively, the related hierarchy within the movement and place matrix is indicated on the following slide.

Understanding Road and Street

The current standard effectively recognises the road as a safe place to drive at an appropriate speed, and also a place within which to provide utilities necessary for the servicing of land.

In contrast, the urban design based approach recognises a broader street function including:

- A forum for interaction, supporting:

  - exchanges between people (liability)
  - facilitate economic activity (commerce)
  - access to place (buildings, lots etc)
- A forum for movement, prioritising:
  - pedestrians;
  - cyclists;
  - public transport;
  - goods; and
  - cars.

This generic hierarchy of movement reflects:

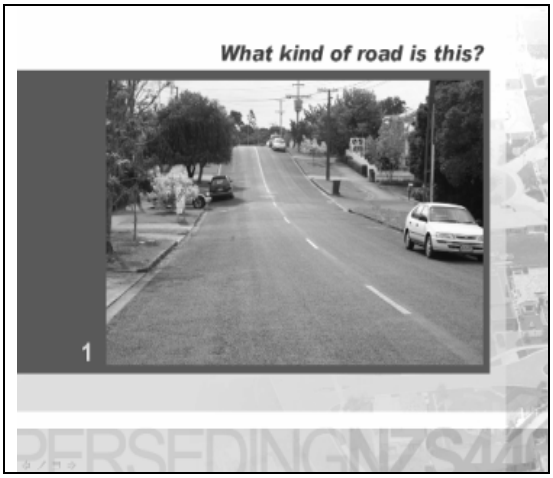
- The most energy efficient to the most energy intensive transport modes:
  - the most vulnerable to the least vulnerable; and
  - generally the shortest to the longest trips that are made via the network.

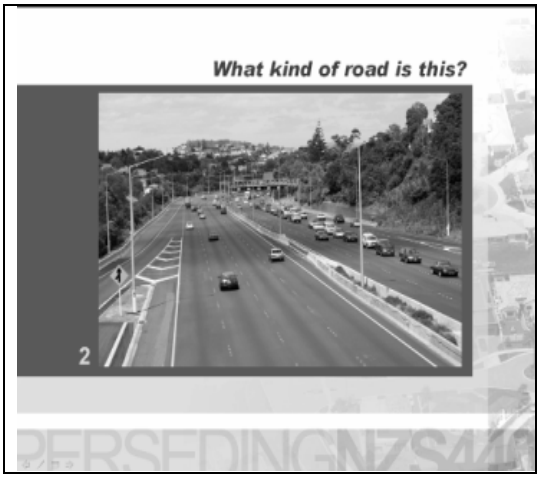
Road Network Hierarchy

Presenting the workshop to assist and inform the making of submissions to the draft document, the presenters outline the road network hierarchy quiz to be undertaken by the workshop attendees. In essence, the survey outlined five generic road hierarchy types comprising:

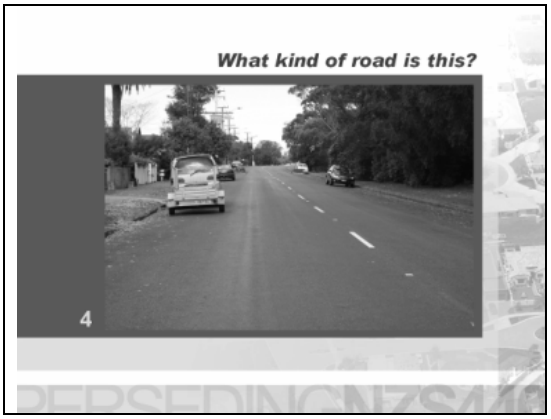
- Motorway;
- Major arterial;
- Minor arterial;
- Collector; and
- Local Road.

The survey showed a series of photographs (ten in total) and questioned the audience to determine the defined hierarchy within which it has been defined. The ten road types are shown in the following slides.






What kind of road is this?
3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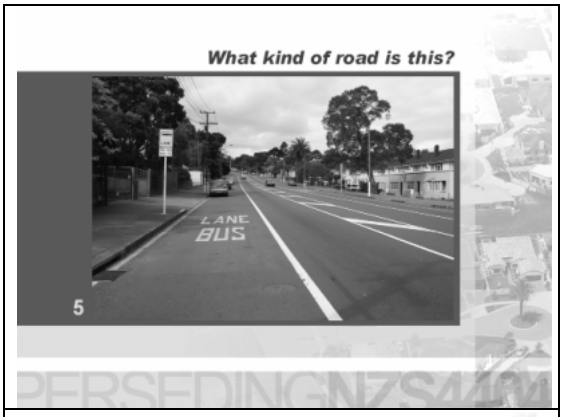
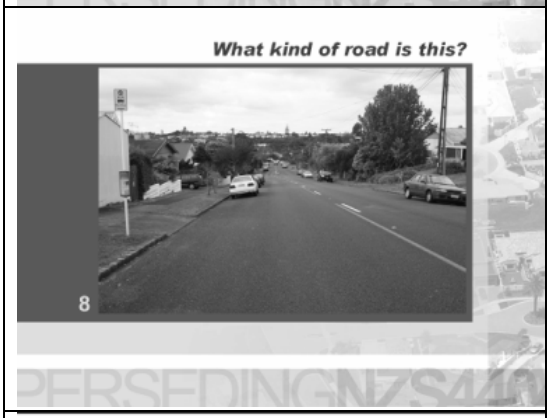
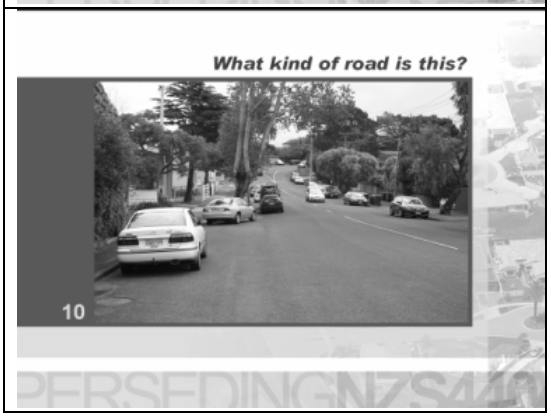

What kind of road is this?
LANE
BUS
5


What kind of road is this?
LANE
BUS
6


What kind of road is this?
7


What kind of road is this?
8


What kind of road is this?
9


What kind of road is this?
10

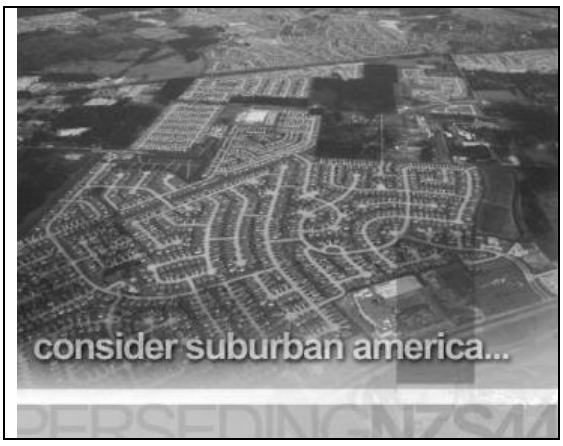
By way of a summary of the road type definitions, the answers to the questionnaire are shown in the following slide.

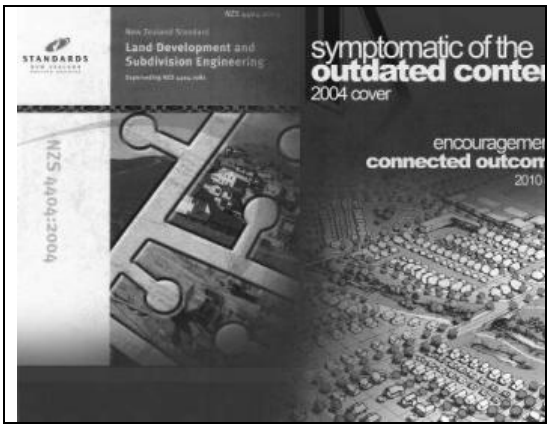
By way of a broad summary of the findings of the results, it was evident that there is not a clear application of the road network hierarchy, nor a clear understanding of it currently within the New Zealand context. In general terms, the road hierarchy was able to be defined less than 60% of the time.

Urban Network Formations

A series of three slides introduced the urban design context section of the presentation. Key parallels were drawn between the discontinuous and moderately accessible suburban American street network, and the practice adopted quite widely within the New Zealand context. Contrast was drawn between these disbursed and disconnected networks with the more substantive, more intensively developed walkable communities of historic European centres. There was recognition of the substantive difference in development intensity, the age of European centres and the fazes of development, and in particular non motorised based development, that has influenced their development. Nonetheless, it is evident that those communities continue to function well without significant reliance on motorised transport.

The following four slides show that contrast, and also show the change that is proposed for the cover of the new standard.





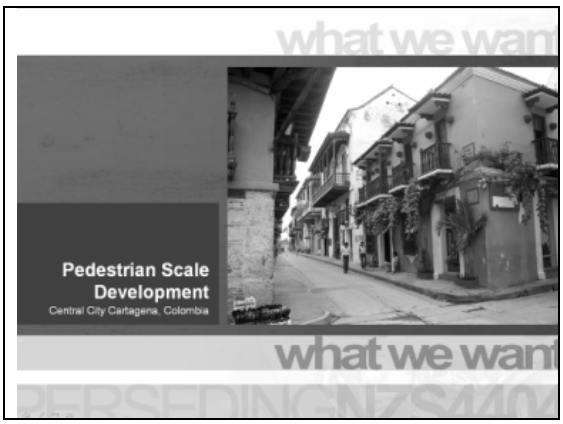
A series of further slides, sourced both locally and internationally, were then presented to demonstrate contrasts between what it was perceived the New Zealand Standard is currently delivering and the sort of new, urban based design approach that the developed standard would provide some guidance on, and enable.


Shared Use Spaces
Denver's 16th Street Mall
(buses and pedestrians)
what we want


Separated Spaces,
Car Dominated
what we get


Walkability in Mixed Use Urban Neighbourhoods
Chancery, Auckland City
what we want


Unpleasant walkin
mixed use,
Car dominated
what we get


Pedestrian Scale Development
Central City Cartagena, Colombia
what we want


Vehicle dominate
what we get


Shared Use Streets
A suburban retail/entertainment area in Bogotá, Colombia
what we want

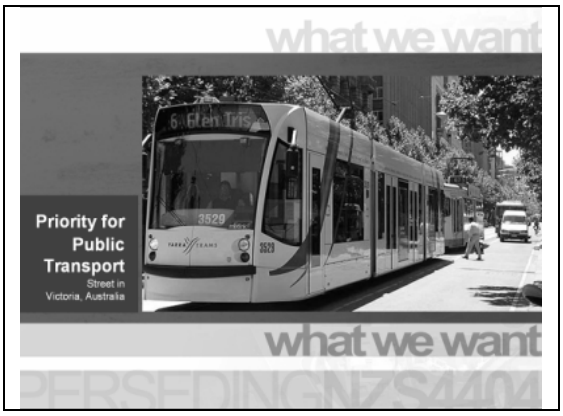

Vehicle dominate
what we get


what we want
Walking and Cycling
A bikeway in Christchurch, New Zealand
what we want

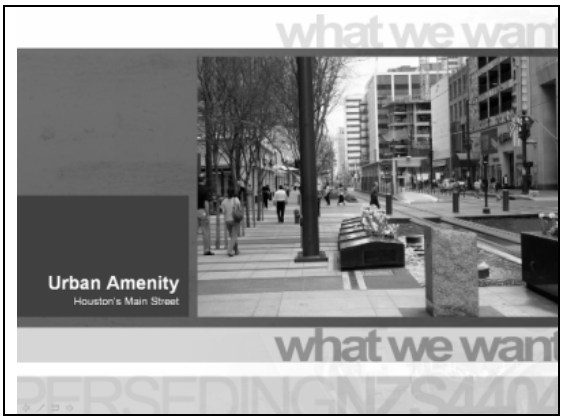

what we get
TARMACGEDDO


Alternatives to Property Access
Rear lane vehicle access in Addison, Papakura
what we wa


Rear section infill
what we get
TARMACGEDDO


what we want
Priority for Public Transport
Street in Victoria, Australia
what we want


30
Token measures
what we get
TARMACGEDDO



Principle Changes to the Standard

A series of slides were then shown and discussed. These slides outlined more specifically some of the particular area changes to the standard and contrasted the current standard with some of the key advances. The following slides describe some of those key changes in the following areas:

- Hydro Sustainability;
- Modern design and materials;
- Cost minimisation and value;
- "Lazy" compliance;
- Motor vehicle versus people movement;
- Carbon sustainability and connected networks;
- Liveability and economy (the integration of land use with transportation);
- Urban design;
- Climate change;
- Network connectivity;
- Design and access statement;
- Target operating speed;
- Low speed environments and self explaining roads.

Road Design Methodology

A significant change has been made within the new standard to integrate the concept of land use planning and transportation. In broad terms, the rationale was to provide methodology for designers that requires consideration of both the place and link elements of the environment. The process essentially involves the following:

- Identifying an area type and place context;
- Considering the link function of the street;
- Confirmation of the design environment and street elements;
- Development of a suitable street cross section that has regard for the broader function a street provides in relation to the land use that it services; and
- A new requirement to outline and demonstrate an understanding of the design process through a design and access statement report.

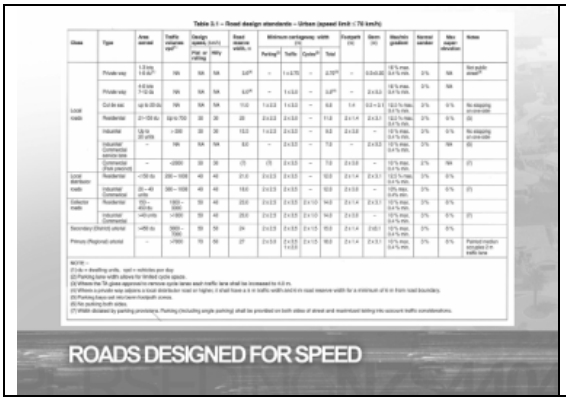
In general terms, the current standard enables the provision of rural and urban roads. By contrast, the new standard will first require an understanding of the land use context. This will be established as follows:

- Through four contexts of increasing development density (linked to the volume and mode of transport trips); and
- Four contexts of land uses (linked to transport trip characteristics and purpose).

Only after having considered, and understood, these land use based environments, can the designer then proceed to develop the context of the street environment and its elemental mode based components. In essence, the advanced road design standards tables required:

- Thinking based design considering the use of space;
- Design based versus code based approach;
- An opportunity to vary design with minimums or maximum criteria described;
- Supply and demand based approach to provision of off street parking;
- A component or elemental approach to the development of the link or street elements;
- An understanding and consideration for the potential to adopt a shared use approach to the road and verge areas of the street environment; and
- A broader design based thinking approach to the development of the streetscape.

The following slides show the form and context of the proposed road design standards table:



These slides generally indicate the nature of the design process moving from a place context through a designed environment development, through to development of the link context and establishment of a relevant road classification. The later two slides show an example of some of the content of the table and indicate the nature of the typical cross sections that indicate and inform the nature of the design process.

Design and Access Statement

A significant element of the new standard requires the development of a design and access statement. The purpose of the statement can be summarised as follows:

- To ensure that design and access processes have understood and addressed the road purpose, and its components;
- It is expected that the statement would be prepared and submitted with the consent application;
- The statement should show the basis for selection of the road dimensions, layouts, land use activities, and demands and their intensities; and
- The design and access statement is to cover the requirements and demonstrate an understanding of place, link and connectivity functions as set out and provided for within both the standard and the relevant District Plan documents.

Summary of Guidance for Submissions

In general terms, the nature of the workshops were to inform and then engage in discussions with a view to facilitating and encouraging distributed access knowledge as a process for informing submissions to the revised standard. In so doing, it was recognised that:

- No standard can prevent all undesirable outcomes, but that it will allow for good street designs and good outcomes to be developed;
- Submissions were seeking to identify from a broader pool of knowledge whether there were further guidance or directions that were desired or indeed missing from the standard;
- Some guidance as to whether the developed standards had advanced or set out desired requirements that either met, exceeded, or did not achieve the broad based range of potential outcomes including those associated with land use and transport integration, maintenance, management and whole of life planning, and potential cost or benefit imbalances; and
- The workshops facilitated and encouraged discussion about the nature of changes that had been proposed, the way in which these had been proposed and the extent to which they enabled or facilitated the potential uptake of the standard more widely by territorial authorities, in particular, discussions within this area related to how local authorities might go about adopting the standard and referencing it within either their codes of practice or directly within their District Plans.

Conclusions

The standard development process was a significant process involving multidisciplinary inputs. The development team are of the view it will significantly advance design outcomes for both Greenfield and new subdivision developments in New Zealand. The standard, currently the subject of submissions, will be finalised and subject to availability will be reported to the conference as lead information to inform the profession and to facilitate uptake and adoption of the standard by territorial local authorities.

Submissions and the Adopted Standard

At the time of writing this paper, submissions on the proposed standard were not available. It is likely that at the time of presenting the paper to the transportation conference, the submissions will have been received and determined by the committee. The nature of these submissions, the extent which they seek further incorporations within the standard and the latest device about the likely direction of the standard will take, and the timely of it's adoption will be outlined as part of the transportation conference paper.

References

Significant advancement within the proposed standard has been made around the inclusion of references to broader and more developed design standards. A comprehensive reference section has been updated and expanded in the proposed new standard. In particular, the standard now recommends reference to more recently available and more detailed New Zealand relevant design standards covering walking, cycling, passenger transport infrastructure, and the development of arterial road design. By way of a contrast, the standard now principally provides direction in relation to the following:

- Rural roads;
- Suburban road environments;
- Urban areas; and
- Centres based street environments.

In relation to land use types and their intensities, the standard now provides for consideration in relation to:

- Live and play environments;
- Shop and trade environments;
- Work and learn based environments;
- Make, grow and move environments; and
- Mixed use environments.

Acknowledgements

Broadly, the significant contributions of the committee, the supporting funding agencies that have been described, the representative industries and professional organisations, and the facilitating, support and guidance of Standards New Zealand warrant acknowledgement and recognition in the development and preparation of this standard's review.

Secondly, the paper acknowledgement the contributions made by:

- Keith Hall (CEO New Zealand Planning Institute);
- Greg McBride (representing the urban design forum); and
- Mark Apeldoorn (representing the Institution of Professional Engineers).

In volunteering their time and efforts in delivering workshops to the following centres;

- Auckland;
- Hamilton;
- Rotorua;
- Napier;
- Palmerston North;
- Wellington;
- Nelson;
- Christchurch;
- Dunedin;
- Queenstown; and
- Invercargill.