MANAGING DEMAND ON THE STATE HIGHWAY NETWORK – AN ACHIEVABLE BALANCE?

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ABSTRACT : Ensuring sustainability across the transport sector is perhaps the biggest single challenge facing the profession at the current time. For Transit, as planner, provider and manager of the state highway system the challenge represents many complex and sometimes conflicting issues.

Transit is in the unenviable position of ensuring it provides the infrastructure to facilitate the movement necessary for supporting economic and social objectives while taking all possible courses to minimise the impact of that movement. To achieve this balancing act Transit has developed its own policy and guidelines for managing the demand for travel on the state highway network.

The key to achieving the objectives of the New Zealand Transport Strategy and developing a sustainable transport system is about facilitating as wide a range of access and mobility options and employing more innovative and creative measures to break the trend of both longer, and more frequent trips. This concept is at the heart of Transit's approach to managing demand. This paper sets out how Transit seeks to achieve this fine balance of facilitating economic growth while minimising traffic growth and its associated impacts and so ensuring the state highway system makes a real contribution to transport sustainability.

1. NEW ZEALAND'S CHANGING TRANSPORT ENVIRONMENT

1.1 We live in an age of many competing factors and demands. Economic prosperity is the goal of both governments and individuals. This economic prosperity however can often mean compromises in other areas. For the transport sector, it is perhaps fair to say that, put very simply, the traditional view has been that more movement means more business and therefore a stronger economy and to facilitate this movement more capacity is needed.

1.2 Economic development at any cost however is becoming unacceptable and this traditional approach is changing to ensure we achieve the kind of society and future we want and are proud of. The New Zealand Transport Strategy (NZTS) and Land Transport Management Act (LTMA) both recognise this and seek to achieve an integrated, multi modal transport system that supports economic development while minimising impacts on the environment and society in general.

2. THE BALANCE WE NEED TO ACHIEVE

2.1 Transit New Zealand (Transit) has a significant role to play in helping achieve the objectives of the NZTS. Transit plans, designs, builds, operates and maintains New Zealand's state highway network. The function of the state highway system is to provide safe and efficient access across the country in a way that supports economic development, integration with the wider transport sector and environmental sustainability.

2.2 Getting the balance right to contribute to each of the objectives of the New Zealand Transport Strategy is challenging. This challenge is centred round the fact that some of the objectives we are trying to achieve can often conflict with each other. In addition projects are becoming increasingly complex, particularly in urban areas where these conflicts can be heightened by the sheer number of issues involved.

3. STATE HIGHWAY NETWORK CONTRIBUTION

3.1 Transit has developed its approach in response to the NZTS and LTMA. The National State Highway Strategy (NSHS) encapsulates this approach and has eight underlying principles guiding how Transit goes about implementing government policy with respect to the state highway system. These principles are:

- Safety;
- Operating the network;
- Asset management;
- Managing demand;
- The environment and communities;
- Integrated planning;
- Education; and,
- Continual improvement.

3.2 The areas of managing demand, our approach to the environment and communities, and integrated planning are primarily aimed at ensuring Transit does achieve the right balance between facilitating movement to support economic and social objectives and minimising the impact of that movement. This paper will consider how Transit's approach to managing demand on the state highway network contributes to achieving that balance and hence providing a more sustainable transport system for New Zealand.

4. STATE HIGHWAYS AND TRAVEL DEMAND MANAGEMENT

4.1 Transit has developed its own policy on managing the demand for travel. This is centred round:

a. how we manage demand on the state highway network through, building, maintaining and operating state highways; and,
b. how we interact with other agencies to achieve network wide outcomes primarily through the integration of land use planning and transport planning.

4.2 To enable the practical implementation of its travel demand management policy and assist staff with interpreting and implementing the demand management principle set out in the National State Highway Strategy, Transit has developed a Travel Demand Management Manual. This manual defines what managing travel demand is for Transit as well as giving practical guidance on how to ensure we include demand management across all aspects of our business.

4.3 The manual will also assist Transit's regional staff to develop the demand management aspect of regional state highway strategies and contribute to corridor and network plans. One recent example of this is a demand management study carried out for the Waikato region that Transit will use to feed into the Regional Land Transport Strategy.

4.4 For Transit travel demand management is:

> *any initiative that modifies travel decisions so as to reduce the negative impacts of road transport.*

4.5 This definition is loosely based on an Austroads view. It is a fairly wide ranging definition that includes the "hard" side of demand management in terms of provision of facilities and integrating land use and transport planning as well as the "softer "side such as travel behaviour change initiatives.

4.6 Travel demand management for Transit also represents a spectrum of approaches to achieving the desired objectives. This ranges from provision of facilities to make certain travel options more attractive at one end, to measures to specifically reduce the attractiveness of specific modes, mainly being single occupant car trips, at the other. This spectrum can be broken down into three main strands with one common theme of Transit's participation in land use planning running across them. This is illustrated in Figure 1.

4.5 The next section sets out in detail the main practical ways in which Transit implements and promotes demand management across its business.

5. MANAGING DEMAND ON THE STATE HIGHWAY NETWORK

Encouraging the use of multi-modal transport

5.1 This is about providing better facilities across the various modes of travel. Over a number of decades transport policy has for a large part been concerned with ensuring movement by car is well catered for with other modes receiving less attention. Increasing congestion as well as increasing awareness of the impacts of road transport has led to a desire to be more efficient in our travel behaviour. A more multi-modal transport system can help reduce some of the impacts of our current travel patterns.

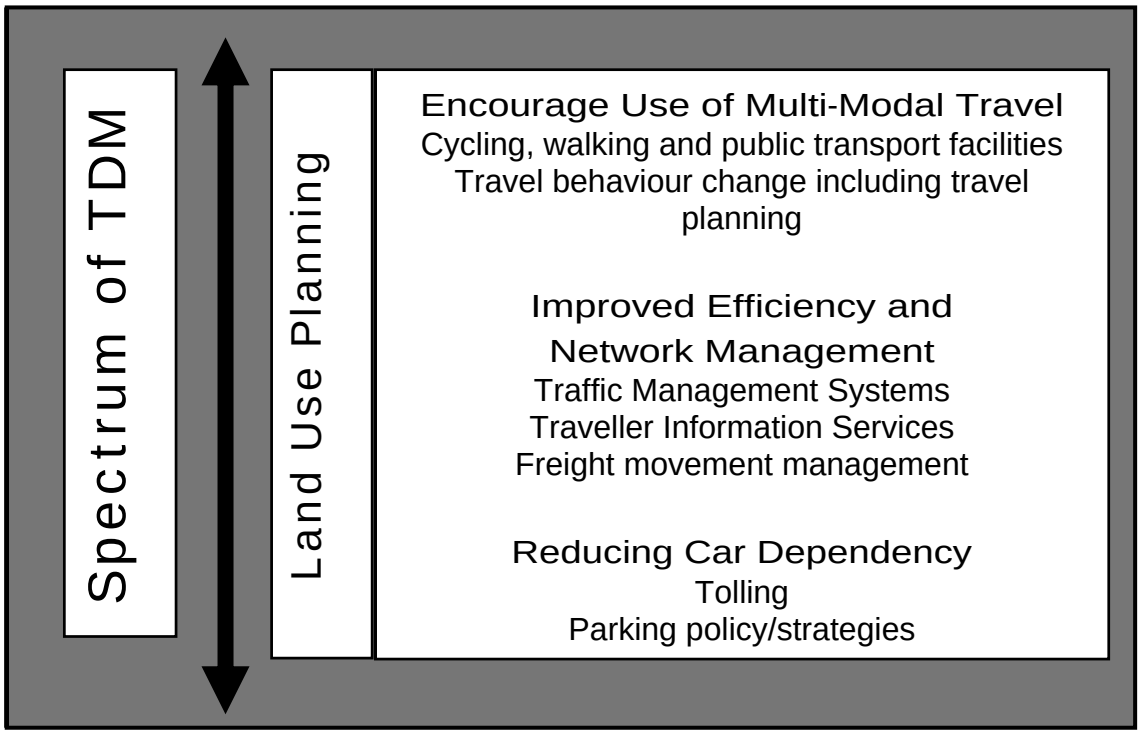

Figure 1 Spectrum of TDM

5.2 For Transit encouraging use of multi-modal travel is about providing new facilities on state highways to improve journey time reliability, avoid congestion, improve safety and conspicuity of certain modes. Basically it is about increasing the attractiveness of travel by a number of modes. In practice for bus travel this involves providing the following types of facilities where they are appropriate:

- dedicated busways;
- bus lanes on state highways to ensure quicker and more reliable journey times by allowing buses to bypass congestion;
- linking bus priority with facilities such as park and ride;
- selective vehicle detection at traffic signals to allow buses quicker passage through an intersection;

- clearways at bus stops; and,
- associated infrastructure such as shelters and bus lay-bys.

5.3 Priority lanes on state highways can provide benefits in terms of journey time reliability and reductions, particularly in our more congested urban areas. The options for priority lanes are considerable. They can cater for buses only, or can also accommodate high occupancy vehicles. High occupancy toll lanes are another option as are freight lanes. Priority lanes can operate for varying periods according to the circumstances, for instance they can operate all day or for peak hours only.

5.4 To support cycling the options available to Transit are provision of:

- On state highway cycle lanes;
- Off state highway facilities in the form of cycle paths segregated from the road;
- Shared use pedestrian/cyclist paths, for example clip on bridges;
- State highway crossing facilities to assist cyclists;
- Specific traffic management to improve cyclist safety, for example cyclist activated sign to warn drivers of the presence of cyclists on narrow bridge or section of highway.

5.5 In addition to the above, the travel demand management manual encourages the possibility of implementing advanced stoplines at traffic signal intersections and toucan crossings. These are signal controlled crossings for pedestrians and cyclists, hence "two can" cross. These types of facility are only likely to be appropriate in urban areas.

5.6 For pedestrians the travel demand management manual gives advice on how to ensure state highways do not cause unnecessary severance by providing adequate at-grade or grade separated crossings. There is also a role for Transit in working with the local road controlling authority to ensure adequate pedestrian facilities along the state highway.

Improved efficiency and network management

5.7 This aspect of managing the demand for travel is about ensuring we get the most from the asset we have, namely, the state highway network. By improving efficiency and better managing that asset we delay the point at which congestion occurs, flow breaks down and there is a need to provide new infrastructure. In the meantime other demand management initiatives may start to have an impact and ultimately, the need for that new infrastructure is delayed.

5.8 Improving network efficiency is principally achieved through the application of technology to manage traffic flows and the effects of congestion on the network. It is implemented through monitoring and detection in order to identify incidents and problems on the network and put in place action to manage and respond to those incidents. Incidents may be crashes, a general build up of congestion, a specific one-off event or adverse weather conditions. Examples of the types of technology that can be applied include:

- Variable message signing and lane control signals;

- Variable speed limits;
- Ramp signalling; and,
- Selective vehicle detection at traffic signals.

5.9 Much of the above is about responding to and managing network events. Another aspect to improving network efficiency is centred round the provision of real time travel information. This can be achieved through a range of media and can be accessed before or during travel. Travel information through radio or television broadcast, websites or mobile phones are all tools that can assist in influencing travel behaviour by permitting an informed decision on when, where and how to travel, and ultimately, if to travel at all. Transit's current initiatives in this area include:

- A freephone telephone number for real time travel information
- traffic information web cameras for Auckland, Wellington and Tauranga;
- an Auckland traffic information web site;
- a partnership with The Radio Network providing broadcast traffic reports in Auckland and Wellington every 15 minutes during peak periods; and
- a partnership with the AA who host a web site providing state highway incident information on a national basis.

5.10 At present Transit's website has around 20-25,000 hits per month seeking information on traffic conditions on the network. In addition to this, a website operated by another party uses Transit real time data to provide information on conditions on Auckland's motorways and this site has on average 2,500 hits per day. A study carried out in 2007 into attitudes to traveller information[1] found that people predominantly sought visual real time travel information to assist their travel decisions. The study also found that travellers are looking for consistency in their travel experience, as well as consistency with the information they receive about this. This covers aspects from consistency of travel time to the message itself and the terminology used. Transit proposes to extend a number of its traveller information services in terms of both geographic area covered, scope of information and range of media used.

5.11 Maximising network efficiency can also be about providing for and managing specific movements on the state highway network so as to ensure a high level of service for that movement while minimising any negative impact for other state highway users. An example would be a freight movement strategy. Transit is currently developing such a strategy for the state highway network.

Reducing car dependence

5.12 This aspect of the TDM spectrum for Transit is about disincentives to car use as opposed to encouraging the use of non car and high occupancy modes of travel. It represents what we could perhaps term as the "stick" rather than the "carrot" of better alternative travel options to the single occupant car trip.

[1] WILKINSON, G.S. (2007), *More Communication, Less Traffic: the influence of traffic information on Auckland travellers' attitudes and behavioural intentions*, Victoria University Wellington

5.13 The first aspect of reducing car dependence Transit can consider is that of road tolling. At present in New Zealand legislation permits tolling of roads to raise revenue to fund infrastructure or bring projects forward. A secondary benefit of this however could potentially be in terms of demand management. Legislation allows for the application of variable toll charges to be made that can start to have demand management effects by influencing, when, where and even if a trip is made. The charges can be varied according to a number of factors such as time of day and hence related to level of congestion, and class of vehicle. Road pricing is currently not legislated for in New Zealand.

5.14 The other main aspect to reducing car dependence that Transit can participate in is parking management. While Transit has limited direct involvement in managing parking with the exception of where on-state highway parking occurs, it can have a role as a consultee to regional and local parking policy development. This will primarily affect our larger urban areas, for example, Transit is participating in the development of Auckland Region's parking strategy.

5.15 Individual circumstances will be the main influencing factor in what is included in a parking strategy, however the types of measure Transit would support include the following:

- A cap on public parking provision in the urban area;
- Parking charges;
- Time restricted parking;
- Removal of minimum parking requirements for new developments;
- Maximum parking requirements for new developments;
- Parking for cyclists and people with disabilities.

6. ENGAGING WITH TRANSPORT PARTNERS TO BETTER INTEGRATE LAND USE PLANNING AND TRANSPORT PLANNING

"Joined up" projects

6.1 This area of Transit's involvement in demand management is about working with our transport and planning partners to bring about network wide solutions thus making a more effective contribution to the sustainable transport agenda.

6.2 The first area Transit can contribute here is to work with partners to deliver projects that complement local transport initiatives. Examples would be providing bus priority either through priority lanes on state highway or busways downstream of a park and ride facility as is the case in Auckland with the Northern Busway initiative. Other examples are providing cycle facilities on state highways to link into the local cycle network and ensuring pedestrian and cycle crossing facilities are adequate to avoid community severance or discontinuation of local networks.

Local and regional policy development

6.3 Transit is often consulted on local and regional policy and strategy development. This can include regional policy and growth statements, regional land transport strategies, districts plans and parking strategies. In its

position as a consultee Transit has the opportunity to advocate for and encourage the implementation of travel demand management and sustainable transport initiatives where these are appropriate.

Resource management processes

6.4 Transit is also consulted on development proposals that could have an impact on the state highway network. As an affected party, again Transit is in the position to advocate for and encourage the inclusion of demand management measures for the purpose of minimising any impact on the state highway network. Transit's Planning Policy Manual (PPM) sets out in detail how Transit will engage in the resource management process and from the travel demand management point of view, gives guidance on provision for multi modal transport and freight in connection with new developments.

6.5 The PPM also sets out the process for requesting an Integrated Transport Assessment (ITA) for major trip generating developments. The purpose of an ITA is to assess the likely level of impact as well as identify potential measures to mitigate, avoid or remedy those impacts. Part of any mitigation measures could include the provision of travel demand management measures such as walking, cycling and public transport facilities to help reduce the impact on the state highway network. Another potential mitigation measure could be the requirement for the site occupier to develop a travel plan.

6.6 A travel plan is a package of measures designed for a specific location aimed at widening travel choice and reducing car dependency in accessing that location. Transit's role where the need for a travel plan is identified as a mitigating measure for a proposal to which Transit is an affected party, is to work with the appropriate local authority to encourage that this requirement is placed on the site occupier.

7. TRANSIT'S TDM CONTRIBUTION TO ACHIEVING THE BALANCE

7.1 The above outlines how Transit approaches managing the demand for travel across its work. This approach covers both state highway projects as well as working with our transport partners to progress the objectives of the NZTS.

7.2 In terms of achieving the balance in facilitating movement to meet economic and social objectives while minimising the impact of that movement, Transit's approach offers a solid start. The impacts of increasing movement, and in particular increasing movement by car, can be broadly classed as follows:

a) environmental – both locally, for example storm water run off, or globally in terms of contribution to climate change
b) social – more car dependence can lead to poorer health as people are less physically active. Emissions from vehicles also impact on health and heavy traffic through local communities can lead to mental health problems caused by noise and vibration as well as contributing to community severance. Also as society becomes more car dependent those who do not have access to a car can become socially excluded as they cannot access the services they require.

c) Economic – increasing congestion costs business money and ultimately makes New Zealand less competitive. It can also impact on health by inducing stress.

7.3 The measures Transit implements and promotes as described earlier potentially contribute to alleviating some or all of these impacts. An assessment of how the initiatives Transit implements under its travel demand management policy contribute to each of the New Zealand Transport Strategy objectives is provided in Table 1 below. From this table it can be seen that the approaches Transit is taking in implementing demand management positively contribute to each of the NZTS objectives with particular emphasis on environmental sustainability and economic development.

7.4 Providing facilities on state highways to encourage more use of non car and high occupancy modes of travel provides more choice for a particular trip in a way that is likely to result in less congestion and positive benefits for health. More use of walking, cycling and public transport means less network congestion, fewer emissions and a more physically active population as people walk to the bus top or train station or make the trip by bike instead.

	Encouraging multi modal travel	Improving network efficiency	Reducing car dependency	Integrating land use and transport planning
Economic development	✔	✔ ✔	✔	✔
Environmental Sustainability	✔ ✔	✔	✔ ✔	✔
Mobility and Access	✔ ✔	✔	-	✔ ✔
Public Health	✔ ✔	✔	-	✔
Safety	-	✔ ✔	-	✔

Table 1 Transit's TDM Initiatives contribution to NZTS Objectives

KEY: - No impact
✔ Some positive impact
✔ ✔ Considerable positive impact

7.5 Improving network efficiency through management will primarily contribute to economic development by ensuring that those congested areas of highway, particularly in our larger urban areas, that disproportionately impact on freight movements, are kept moving as close to free flow conditions as possible. Where this is not possible either due to an incident or sheer traffic volumes, managing the network ensures that any disruption is minimised. The traffic management and traveller information that Transit provides can also positively contributes to safety by reducing the likelihood of secondary accidents where an incident has occurred or managing traffic flows in the most appropriate way to reflect highway and weather conditions.

7.6 When engaging with partner transport agencies, either through delivery of joint projects or in contributing to policy development or interacting in the resource management process, Transit is working to assist in the process of integrating land use and transport planning. Doing this means, that as an organisation, we are also focused on trying to prevent rather than merely cure some of the transport issues we currently face. Achieving such integration should mean that a wide variety of choice of travel mode exists for a higher proportion of trips than at present thus reducing our reliance on the single occupant car trip. This has the potential to reduce emissions and congestion hence aiding economic development and contributing to the health agenda. It also means that the need to travel overall could be reduced as mixed use developments cater for more local trips that can be undertaken on foot or by bike.

7.7 By encouraging travel demand management measures to be included as part of the mitigation for development proposals, Transit is again supporting the objectives of the NZTS. For example, where a travel plan is implemented as part of a development, car dependency can be reduced through more choice of travel options to the site and so positively contributing to congestion and emissions reduction, potentially providing health benefits and promoting access and mobility.

7.8 In encouraging more use of non-car and high occupancy modes of travel, we need to be aware of all of the potential implications to ensure we are providing for these modes in the most appropriate way. For instance, while there are considerable benefits in encouraging more walking and cycling, these groups tend to be the more vulnerable road users in terms of safety. We therefore need to ensure we are providing facilities that maximise safety for these road users and work with transport partners to raise awareness with other road users of the presence and needs of these groups.

7.9 There were just over 20 crashes involving cars per million vehicle kilometres travelled (vkt) on state highway during financial year 2006/07 and 0.7 crashes involving cyclists per million vkt. While this equates to the fact that it was just under 30 times more likely for a car occupant to be involved in a crash than a cyclist during that time period, it is also likely that the injury sustained by a cyclist will be more severe due to their lack of protection.

7.10 While some of the travel demand management measures Transit implements on the state highway network can have more impact on regular commuting trips, for example peak hour bus priority lanes or high occupancy vehicle lanes, most of the measures being promoted will operate to benefit both commuting and leisure/recreation trips which are a rapidly expanding area of travel demand. Network management in the form of incident management and traveller information, cycle and pedestrian facilities, the provision of multi-modal developments and many other aspects of travel demand management will provide benefits regardless of the trip type or purpose.

8. CONCLUSIONS

8.1 Transport is fundamentally about the movement of people and goods, rather than vehicles. Transit's approach to managing the demand for travel on the state highway network is about catering for trips by all modes of transport, making those trips as efficient as possible and interacting with partners to

ensure we are not merely building more of the same problems for ourselves in the future. This desired outcome is achieved through the integration of land use and transport planning.

8.2 While more can always be done, Transit is being proactive in this area by pursuing the various activities outlined in this paper and in doing so is seeking to achieve a balance between our increasing demand for hypermobility and the wider governmental objectives that add up to prosperity and quality of life. There is still a considerable way to go but Transit's approach to managing the demand for travel across its business is a solid foundation to achieving that balance.