

The Missing Link: Parking as the integration of transportation and land use

Authors

Julie Anne Genter (presenter). BA (1st class) MPlanPrac (1st class) GNZPI, MIPENZ (Transport). Transportation Planner, McCormick Rankin Cagney. (Contact: jgenter@mrcagney.com)

Lorelei Schmitt (co-presenter). BA MPlan (Distinction) GNZPI, MIPENZ (Transport). Graduate Transport Planner, Sinclair Knight Merz. (Contact: lschmitt@skm.co.nz)

Stuart Donovan. BE/BA (Hons) ME (1st class) GIPENZ. Transportation Engineer, McCormick Rankin Cagney. (Contact: sdonovan@mrcagney.com)

Abstract

Parking regulations in district plans (based on trip generation standards) mandate that each new development provide ample off-street parking; usually 85th – 95th percentile of peak demand for un-priced parking. These requirements subsidise single-occupant motor vehicle trips, increase living costs, and act as a barrier to land use intensification. Reform of parking management offers a fantastic opportunity to achieve many of the goals of sustainable development at low cost. This paper first explains the history of minimum parking requirements and their unintended consequences on our contemporary sprawling urban form. We then outline a number of cutting-edge parking management strategies, and provide a guide for reducing parking provision according to each strategy employed and/or other site-specific factors. Finally, because parking reform can be a politically and emotionally charged issue, best practice techniques for facilitating public understanding and travel behaviour change are described.

Introduction

Since the mass production of motor vehicles first made cars affordable to the average household, New Zealand, like many affluent countries, has experienced steadily increasing rates of vehicle ownership, and decreasing mode share for all other forms of transport. The corollary of rising vehicle use has been sprawling urban development; which has made public transport, walking and cycling comparatively inefficient, unaffordable, impractical and unpleasant. In the last decade, research has made it ever clearer that a host of problems stem from this automobile dependency – our profligate use of the private car is detrimental to our cities, economy, health and environment (Burchell et al., 1998; Newman and Kenworthy, 1999; Litman and Laube, 2002; Banister, 2005; Shoup, 2005; Litman, 2006b; Ewing et al., 2007). Congestion is limiting economic growth and worsening air pollution (Auckland Regional Growth Forum, 1999; MOT, 2006). Since 1990, domestic transportation has been the fastest growing sector of rising greenhouse gas emissions. Lack of incidental physical activity is responsible for rapid increases in obesity and chronic diseases, and most recently, petrol prices have stretched household budgets to their limit. Furthermore, heavily trafficked urban roads and prolific parking lots deteriorate communities, creating non-community cohesive ‘concrete jungles’ (Alexander et al., 1977; Gehl and Gemzøe, 2000; Gehl, 2001; Gärling and Steg, 2007).

Local, regional and central government have grappled with these issues, searching for a means to battle urban sprawl and car dependency, and to encourage the use of other transport modes. Recent strategic growth documents proclaim the virtues of integrating land use and transport and pursuing “smart growth”, that is, mixed-use development at medium and high densities clustered around transit nodes (Auckland Regional Growth Forum, 1999; MOT, 2002; Ministry for the Environment, 2005). The rationale is that if development is more compact and oriented around train or bus lines, people can easily access public transport (PT), and the increased density and subsequent patronage will support the transport network. Likewise, if our neighbourhoods are zoned for mixed-use, people can walk or cycle to the shops, or work closer to home, decreasing the length of trips and hence the quantity of vehicle-dependent trips. These solutions are well-founded, and are certainly an important part of the journey towards less car-dependent development. Yet they have overlooked one of the single biggest drivers of urban sprawl and single-occupant vehicle trips: minimum parking requirements.

The origin of Minimum Parking Requirements

It is a common assumption that ample free parking has been deliberately provided by big box retail and employers to attract customers and employees. However, while it may be true now that a new development needs to provide free parking to compete with existing development, the reality is that most parking has been provided in accordance with city planning rules that require a minimum number of parking spaces. These planning rules are based on traffic engineering standards that have been in place and refined over the last half-century (Shoup, 2005; Litman, 2006a), and which were originally designed to avoid the need for local councils to worry about parking management.

In the early 1950s, local authorities in the United States were grappling with the sudden increase in the number of vehicles on the road (Shoup, 2005). Illegal parking would at times obstruct the flow of traffic, create safety hazards, and spill over into residential neighbourhoods. This problem was defined as not having enough off-street parking. The city council’s traffic engineers responded to this problem by requiring that each new development provide sufficient on-site car parks to cater for the demand it would generate (Shoup, 2005). Demand for parking

was assumed to be a constant; growth in car use could be expected, regardless of the supply of car parks or the price charged to use them. Thus it was thought that one could empirically study trip generation and accurately predict the amount of car park demand a development would generate (Shoup, 2005). Taking this traditional conservative engineering approach meant designing so there would never be a shortfall of parking supply. Planning regulations in many countries have since followed the USA's lead and have generally mandated that developments provide for the 85th to 95th percentile demand (Shoup, 2005). In other words, provide plenty of car parking that would only be utilised in full 5 – 15% of the time, if ever.

In the United States, the Institute of Transport Engineers (ITE) conducted research and published guidance on the relationship between land use and parking demand (ITE, 1987 & 2004; Shoup, 2005; Litman, 2006a). Similar research has been conducted and published in Australia by the New South Wales Roads and Traffic Authority (RTA), called the Guide to Traffic Generating Developments. One shortcoming of the research approach (employed both by the ITE and the RTA) is that it links parking demand uniquely to the land use of each individual building, ignoring the supply of neighbouring developments that may have complimentary peak hours and failing to recognise the ease of access by other transport modes (Shoup, 2005; Litman, 2006a). According to these standards, therefore, a cinema will generate the same level of demand for parking whether it is located in a town centre within easy walking distance of high density residential areas and a train line, or if it is located in a low density suburb with poor public transport services. Moreover, the new cinema must provide enough car parks to cater for its peak demand, even if there is an office park right next door that has a large supply of car parks that are empty and unused precisely during the cinema's peak hours. A second mistake was the assumption that demand for parking is inelastic – that is to say, not influenced by price (Shoup, 2005; Litman, 2006a). Standards have been based on the demand for free parking, and thus reinforce the provision of parking at a higher rate than demand would be if parking were priced at their true cost. ITE trip generation rates and parking standards have thus become a self-fulfilling prophecy. Every few years, surveys are undertaken in suburban areas that have low PT and active mode shares, and the subsequent identified demand for “free” parking becomes the newest benchmark (Shoup, 2005). Developments have been required to provide more and more parking, irrespective of the existing supply. This has resulted in a vast oversupply of parking in most areas; one survey demonstrated that in a suburban commercial centre, parking was fully utilised only 19 hours a year (Shoup, 2005), which will be illustrated in a New Zealand context below.

What's the problem with Minimum Parking Requirements and free parking?

We all relish getting something for free – and parking is certainly no exception. For example, in large companies, employer-provided car parks are often a sign of privilege, and thus much sought after. At a large engineering firm in Auckland in 2007, a survey was conducted by Placemakers about relocation of offices to a new building. Car parking was ranked (along with PT access) as one of the issues most important to employees. In other words, many employees felt that it would be desirable to locate somewhere where all employees had the option of parking without having to pay. But the old maxim, “there is no such thing as a free lunch”, is just as true with parking as with any other resource. The fact is that we are paying for parking, the question is, how?

Minimum parking requirements have led to an oversupply because they are based on the demand for free parking at that development's peak hour, and they are required for each

individual new building. By assuming that parking should be free and accommodate peak hour demand, it considerably undervalues the land required. This has three consequences:

1) It drives up the costs of land for dwellings, businesses and open space—

At a time when land values in our urban areas have become prohibitive for home buyers and local authorities seeking to provide open space, minimum parking requirements drive up the costs of land and redevelopment (Shoup, 2005; Litman, 2006a).

2) Because of high compliance costs, it pushes development to the urban fringe where land is cheaper, thereby exacerbating sprawl—

As previously mentioned, many growth strategies in New Zealand seek compact city form with mixed use and higher residential density. Minimum parking requirements are an active and considerable barrier to the type of intensification that is necessary for compact city development (Shoup, 2005).

3) It subsidises driving over other modes—

The cost of providing parking is spread throughout the economy, in the form of higher cost for goods, services and rents (Shoup, 2005; Litman, 2006a). Therefore, we are all paying for free parking, even if we choose not to drive. Free parking is a significant subsidy to single-occupancy motor vehicles, and undermines transport strategies and policies that seek to reduce reliance on private vehicles (Shoup, 2005).

That there is an oversupply of parking in many urban areas in New Zealand becomes apparent upon the observation of the vast expanses of parking lots that go unoccupied for all but a few hours each day. A recent update of the 2004 New Lynn parking study (SKM, 2008) undertaken for Waitakere City Council confirms this intuition. New Lynn, one of the fastest growing town centres in Waitakere City, is situated just west of Auckland City on the Western Train Line and has been identified as an area suitable for intensification (Auckland Regional Growth Forum, 1999). The parking study found the total off and on-street parking supply to be roughly 11,200 spaces. Over the town centre as a whole, the maximum (peak) occupancy was found to be approximately 6,100 spaces or 54% of the estimated available supply. Interestingly, the available supply is significantly lower than that which is required by existing Waitakere City district plan rules. In other words, even at peak hour, the demand for car parks is just over half the existing supply, and it would be even less than that if all the development in New Lynn complied with the current minimum parking regulations! The study also noted that the predicted maximum demand for “free” parking in 2021 was, in the most conservative projection, only slightly more than the current existing supply, despite forecasted increases in employment in the area.

This outcome is not surprising, given the shortcomings in the approach to predicting parking demand discussed earlier in this paper. That there is usually no cost to use a car park should not be a surprise, as economic theory suggests that when supply outstrips demand, prices fall. Given the high value of land in urban centres, it stands to reason that the land under a car park would have a much higher value if it was not compulsory for it to be used as a car park, and that this would stimulate the development of more economically productive uses of land (i.e., residential, commercial and retail), were the provision of parking left to developers to determine. The flow-on effects associated with allowing the price of parking to reflect its true cost are great:

demand for single-occupant vehicles falls. Less public money is therefore required to manage traffic and expand road capacity, public transport (PT) patronage increases substantially leading to decreased dependence on subsidies, and more people choose walking and cycling for short trips (Shoup, 2005). All of these outcomes are goals of central government strategies and the regional and local policy under them.

Regulatory responses for sustainable parking management

Reform of parking management offers a fantastic opportunity to achieve many of the goals of local authorities at low cost. This section outlines the different strategies that are available and discuss the merits and disadvantages of each. These strategies are developed based on the following ten principles that Litman (2006a) proposes to guide the development and application of parking strategies:

1. **Consumer choice:** Consumers are allowed to choose between travel options in an economically neutral environment, which directly rewards those who choose to travel by less resource-intensive transport modes.
2. **Pricing:** As much as possible, users should pay directly for the costs of providing parking facilities, particularly the opportunity costs associated with land it occupies. This principle supports consumer choice, by rewarding efforts to reduce demand for parking.
3. **Prioritisation:** The most desirable spaces should be managed to favour higher-priority uses, such as commercial vehicles and the mobility impaired. This principle effectively seeks to establish a hierarchy of parking users.
4. **Sharing:** Parking facilities should serve multiple users and destinations. This allows for parking resources to accommodate variations in peak demand profiles associated with different land uses.
5. **Efficient utilisation:** Parking facilities should be sized and managed so spaces are frequently occupied. Policies should facilitate the redevelopment and/or conversion of inefficiently used parking facilities.
6. **User information:** Users are well informed of the location, availability, prices, regulations, and penalties associated with the use of parking facilities.
7. **Flexibility:** Parking management practices flexibly accommodate uncertainty and change.
8. **Peak demand management:** Special efforts should be made to deal with major peaks in demand. This acknowledges the negative side effects of excess demand for parking, such as driver frustration, illegal parking, and increased traffic congestion.
9. **Emphasis on quality:** The quality of parking facilities is considered as important as quantity. This principle aims for parking facilities to provide acceptable levels of security, accessibility, and user information.
10. **Comprehensive analysis:** All significant costs and benefits should be considered in the planning and provision of parking resources, including the capital opportunity cost of land used for parking. This principle allows the identification of the most cost-effective strategy for managing parking resources.

As will be discussed further in this paper, parking reform must take place in a political environment, and many people have become accustomed to free parking and come to view it as a right. The ten principles above should be clearly articulated to and discussed with community stakeholders to help facilitate the public understanding and acceptance of the recommended strategies.

Reform Strategies

The reform strategies that follow are optimally implemented as a package of policies and initiatives. Local councils may want to develop a specific parking management plan that will identify the most suitable constellation of programmes to meet their development goals.

1. Remove Minimum Parking Requirements

Removing minimum parking requirements allows developers the freedom to determine the marginal value of providing car-parks. In this way, the market is allowed to price out unnecessary demand and/or supply in favour of more efficient land uses. Removing parking requirements is expected to result in:

- The development of land that is currently used for parking into more productive activities, resulting in higher development densities; and
- The adaptive reuse of older buildings, particularly in town centres, where affordable residential accommodation, such as loft apartments, may be incorporated onto floors above ground level.

Without a vast surplus of unused parking, it will be necessary to employ a number of management techniques to ensure that demand is appropriately managed. The rest of the section describes some of the strategies that can be implemented in lieu of requiring minimums in accordance with current ITE and RTA guidelines.

2. Price Controls

Priced parking has been shown to be an extremely effective demand management strategy (Booz Allen Hamilton, 2001; Shoup, 2005). The advantage of pricing is that it provides for high priority customers while discouraging the inefficient use of convenient parking resources by long stay users such as commuters. Priced parking is most appropriately implemented in areas experiencing more than 85% maximum occupancy, in that pricing is first and foremost a demand management tool rather than a mechanism for gathering revenue (Litman, 2006a). The price level set will thus aim to keep occupancy levels high, but not saturated, resulting in a situation where a few car-parks are almost always available for those who are willing to pay for them.

Most elastic responses to price parking are in the order of 10-30%. However, the elastic response of parking demand to price varies significantly depending on length of stay. In an Auckland-specific report, Booze Allen Hamilton (Booz Allen Hamilton, 2001) suggests the following elastic response:

- 0-2 hours -0.1
- 2-4 hours -0.3
- 4-7 hours -0.5
- 7+ hours -0.9

These sample elasticities suggest that demand for long stay parking is highly elastic to price, while short stay demand is relatively inelastic.

Those discouraged from travelling by vehicle may respond in a variety of ways, including:

<i>Short term</i>	<i>Long term</i>
Car-pooling	Move home or work to be more accessible to town centre by alternative modes.
Switch to alternative mode	
Travel outside of peak times	
Link trips with other errands	
Trip avoidance	
Discouraged from visiting	

It is important to emphasise that these elasticities are not necessarily constant over time. In many instances the short term impacts of those who are discouraged from visiting the commercial centre reduces over time as new behavioural patterns emerge. These delayed adjustments can be as simple as allowing time for people to familiarise themselves with PT timetables or coordinate car-pooling. For this reason, the number of people discouraged from visiting the shops due to parking prices may reduce over time.

3. Increase Efficiency of Existing Supply

Providing the same number of parks using a smaller land area frees up opportunities for alternative uses of land. When considering off-street supply, this may involve redesigning access-ways and circulatory routes so as to minimise the land required to facilitate access to parking facilities. For example, a one-way circulation system within a parking area may allow for additional parking in the same area. In town centres suffering from vehicle congestion, it may also be possible to develop one-way streets which both improve flow and facilitate additional parking.

4. Shared Parking

Shared parking is a management strategy that seeks to ensure that parking resources are, where possible, accessible to a range of users. Catering for peak demand in a shared way allows for more efficient parking utilisation than can usually be achieved by parking provision by individual sites. Shared parking can be implemented in New Zealand towns and cities in two ways:

- Regulated through the District Plan; or
- Allowing a market for parking resources to emerge that encourages shared parking in order to realise financial savings.

The first, regulating shared parking through the District Plan, may be difficult due to the transient nature of access arrangements to parking owned by someone else. It may be impossible, for example, for a development to secure access to car-parks for longer than 12 months. In this instance, shared parking can be considered a relatively transient strategy.

Shared parking can emerge without regulation, whereby adjacent land uses with off-set peak demand profiles may collaborate to minimise their need to provide parking resources. For

example, the car-park on the corner of Kingdon and Short Streets in Newmarket, Auckland, is made available for retail customers during the day and then restaurant customers in an adjacent restaurant at night. In this way both the restaurant and the retail business benefit from sharing parking resources. Local authorities can assist with this process through education and non-coercive incentives.

5. Unbundled Parking

Unbundled parking refers to the strategy of separating the costs of purchasing or leasing residential and commercial property from parking resources. For example, in a medium density residential development, dwellings may be purchased separately from the car-parks. This “unbundles” the cost of parking from the cost of living and supports the principle of consumer choice. For example, unbundled car-parks associated with residential development in Auckland City typically cost an additional \$50,000. Costs of this magnitude account for between 20-25% of the total purchase price of smaller dwellings. Unbundled parking is somewhat dependent on the availability of effective parking brokerage services so that in the event of a parking surplus (i.e. not all car-parks provided with a particular development are purchased) then the building owner or body corporate committee is able to lease the car-parks to other users. Opportunities for unbundling are therefore enhanced by the existence of a Transport Management Authority (TMA).

6. Overflow and Spill-over Parking Plans

Overflow and spill-over parking plans seek to manage the effects of excessive parking demands that may arise during special events and peak retail season, such as Christmas and Easter, or as a result of changes in parking management in adjacent areas.

These plans can help mitigate the potential negative effects associated with excessive parking demand, such as increased vehicle congestion; unsafe and/or illegal parking on streets, footpaths, and grass verges; and driver frustration.

Overflow parking plans should involve some of the following components:

- Signage to identify when parking areas are full, as well as to direct vehicles to alternative parking areas. This increases the utilisation of existing parking resources;
- Identification of appropriate temporary parking that may be shared, such as opening up parking at a high school for the period immediately before Christmas when schools are out. This temporarily increases the supply of parking through identifying shared parking opportunities;
- Including the cost of PT passes in the ticket price for special events, such as sports and cultural events. This encourages the use of PT for travel to major events; and
- Retailer funded reimbursement of PT travel costs. This encourages the use of PT for travel during high retail seasons.

Residential Parking Permits (RPP) are a possible tool for managing the impacts of spill over and overflow parking in residential areas adjacent to town centres and growth corridors in those areas where residents can demonstrate a reliance on on-street parking. RPP allows residents to park on-street in areas where other vehicles are subject to parking regulations and pricing. RPP create additional administration costs, which should ideally be recouped by annual fees paid by residents for the privilege of the parking permit. It is emphasised that RPP should only be implemented in areas where residents have priority over employees and visitors. These are

another example of a parking management strategy that could be developed and administered by TMA.

7. Directional Signs

Directional signs provide real time information on the location and availability of parking resources. These signs should be placed on key access roads into town centres and inform drivers of the locations, availability, and potentially the price and maximum duration of stay associated with off-street parking facilities. This information allows drivers to, firstly, identify the nearest available parking facilities and, secondly, evaluate the relative value associated with different parking areas.

8. Transport Management Associations

Transport management associations (TMA) are usually formed to manage the provision of transport within a particular geographical area. They frequently involve both public and commercial stakeholders so as to connect strategic directions with on the ground community interests.

Possible functions of TMA may include:

- Parking brokerage services – designed to connect demand for parking with surplus private off-street parking resources. The availability of parking brokerage services is crucial to the viability of demand reduction strategies, such as financial incentives (parking cash-out, subsidised PT passes) and unbundled parking.
- Input into the allocation of parking revenues – TMA provide an interface through which community projects can be identified and funded using parking revenues.
- Overseeing the management and implementation of travel plans and overflow plans for times of peak demand, such as special events and seasonal shopping patterns.

A market for parking brokerage services may emerge as the value of car-parking transactions increases. However TMA would be expected to deliver more rapid benefits due to its higher level of coordination and community involvement.

Lloyd District in Portland, Oregon, has had a TMA operating for approximately 10 years (www.lloydtma.com). This encompasses 650 business and 21,000 employees. The Lloyd TMA lists the following headline accomplishments for the period 1997 to 2006:

- Drive alone trips have reduced from 60% to 42%; and
- PT mode share has almost doubled from 21% to 39%.

The reductions in drive alone trips has significant implications for the amount of parking required to support land use in the Lloyd District. The increased efficiencies catalysed both by the reduced demand for parking and the increased transport accessibility has facilitated the addition of 20,000 employees and 4,000 housing units.

9. Car-share Organisations

Car-sharing organisations are based around the management of a pool of vehicles parked at numerous locations around a community. Auckland's first car-sharing operation (City Hop,

www.cityhop.co.nz) has recently been established in the CBD and inner city suburbs such as Parnell and Newmarket, as is planning to expand to Wellington. Members of the organisation are able to book vehicles online and then gain access to the vehicles via electronic swipe cards. One car-share vehicle is typically utilised by a large number of people, thereby distributing the costs of car-ownership, such as maintenance and parking, across a larger number of people. Membership to a car-share organisation is considered most attractive to households that do not rely on vehicles for home-to-work commuting, or small to medium sized companies that do not need to manage their own pool car fleet. In this way, car-share vehicles are frequently used for commercial purposes during the day and residential needs during off-peak hours.

Numerous studies have indicated that members of car-sharing organisations have more sustainable travel patterns, with higher reliance on walking, cycling, and PT. As discussed above, residential use of vehicles is typically reduced to off-peak trips, such as grocery shopping and recreational visits. By sharing vehicles, car-sharing organisations may reduce demand for residential and commercial parking by 5 –10% (Litman, 2006a). The emergence of commercial car-sharing organisations is thus considered to strengthen the case for removing minimum parking requirements altogether, particularly in town centres.

10. Travel Plans

Travel plans are a management tool designed to assist organisations and businesses reduce inefficient travel demands associated with both home-to-work and work-based travel. Travel plans help to address organisational issues affecting how people choose to travel, such as company cars and free parking. In many instances changes in company policy have been shown to catalyse large reductions in employee vehicle use (Shoup, 2005; Litman, 2006a). Travel plans typically audit home-to-work and work based travel demands, and recommend ongoing management strategies to reduce demand for private vehicle travel, including:

- Parking cash-out – provides commuters who normally receive free parking to take cash instead;
- Company car cash-out – as per parking cash-out except for company cars;
- PT passes – provides employees with a subsidised PT pass in place of a free car-park; and
- End of trip facilities for cyclists, including showers and lockers.

Travel plans thus support other parking strategies by undertaking a detailed assessment of the institutional barriers to shifting mode. The motivation to conduct travel plans is best provided by the accurate realisation of the costs associated with vehicle travel. For this reason, the use of travel plans is expected to increase when the perceived value of parking reflects its true costs. The removal of minimum parking requirements may encourage existing property owners to use travel plans to free up land to provide redevelopment opportunities.

Guidelines on the reductions in parking supply

Engineers and planners may require guidance on advising developers about the appropriate amount of parking to supply, particularly in the transition period before minimum requirements have been removed. The following table can be used as a guide to reduce the current ITE and RTA standards based on both the management strategies described above, and demographic or park supply factors of a given site.

Table 1 Parking provision adjustment factors

Factor	Typical adjustment	References
Pricing	Reduce parking supply 10-30% where parking is priced	Kuzmyak, 2003; Litman, 2006a; Booze Allen Hamilton, 2006.
Shared parking	Reduce parking supply where shared parking is available	ITE, 1995; ITE, 1999; Stein Engineering, 1997; Kuzmyak, 2003.
Unbundled parking	Reduce parking supply 10-30% where parking is unbundled	Baker, 2002; Nelson, 2002; Russo, 2001; Shoup, 2005.
Car-sharing	Reduce residential and commercial parking supply by 5-10% if a car-sharing service is located within 750m	Carplus, 2003.
Workplace travel plan	Reduce commercial parking supply by 10-20% where workplace travel plans are implemented	Carplus, 2003; LTNZ, 2006.
PT accessibility	Reduce parking supply 10% for housing and employment located within 750m of frequent bus service, and 20% for housing and employment located within 750m of rail transit station	Litman, 2007a.
Active mode accessibility	Reduce parking supply 5-10% in walkable communities, with additional reductions if walking improvements allow more shared and off-site parking Reduce commercial parking supply by 5% where end of trip facilities are available, such as showers and lockers are available	Cervero and Radisich, 1995; Litman, 2007b.
Availability of nearby parking	Reduce parking supply depending on the surplus of parking available in surrounding area. The magnitude of effect of this strategy is highly site specific.	N/A
Travel patterns	Adjust parking supply to reflect variations in vehicle ownership and trip rates in area	Litman, 2006a.
Residential density	Reduce parking supply by 2.2% for each resident per hectare	Litman, 2006a.
Employment density	Reduce parking supply 10-15% in areas with 120 or more employees per gross hectare	Litman, 2006a.
Land-use mix	Reduce parking supply 5-10% in mixed use developments, with additional reductions if parking resources are shared	Litman, 2006a.
Type of land-use	Reduce parking supply in response to the type of land use and demographic profile of the target market	Litman, 2006a.
Mobility	Reduce parking supply by 20-40% for housing or developments designed to serve young, elderly, or disabled users	Litman, 2006a.
Income	Reduce parking supply 10-20% for the lowest 20% income households and 20-30% for the lowest 10% income households	Litman, 2006a.

Implementing regulatory parking reforms in a political environment

Parking can be a contentious, impassioned issue, and for this reason, requires special attention to ensure political viability. This section provides a number of recommendations for adopting reforms in a way that will ensure more public acceptability and political success.

Fuel prices have been steadily increasing for nearly a decade. According to Jeanette Fitzsimons (as cited in the New Zealand Energy Efficiency and Conservation Strategy, 2007:4), "Since...2001, oil prices have tripled and climate change has accelerated". Authorities must therefore be sympathetic to the fact that car users may already feel anxiety about the cost of driving. It is recommended (and probably only viable) to phase in parking reforms in conjunction with perception-shift campaigns. That is – begin by with marketing/travel awareness campaign, undertake community consultation and then begin to institute reforms. These reforms will reduce the supply of parking over a period of time, allowing people to adjust mode choice, and for complementary land use planning and development to occur.

Marketing / Travel Awareness campaign

Jepson & Ferreira (1999:14) suggest a "well thought out education and information campaign" as a means of mitigating adverse public perception when travel space is reallocated. Travel awareness campaigns should include the following:

- Focus on providing information about the adverse effects of car-use
- Promote of schemes like walk-to-school week or leave-the-car-at-home days.
- That communities will benefit from parking regulation reforms
- Highlight the effectiveness of promoting modal shifts through parking regulations
- Exemplify that regulatory reforms are removing the subsidies to parking, establishing the true market prices of parking and promoting an equitable market to all modal users
- Case studies where parking reform has been effective in influencing travel behaviour change (e.g. Calgary)
- Highlighting politicians or other well-known members of communities stepping out of their cars to model other modal travel, being attention to the campaign and deter any feelings of hypocrisy.

If such marketing campaigns are well-executed, they will lead to increased levels of knowledge about the adverse effects associated with driving and stimulate a perception shift, providing the foundation for transitional parking reforms and travel behaviour change. As an analogy, anti-smoking campaigns have led to huge reductions in smoking rates and made increased taxes on tobacco seem more logical.

Public Transport and Active Modes

Reliable and efficient alternatives to the private car will facilitate acceptance of parking reform, while parking reform will further support these alternative modes. Reducing the supply of parking is a coercive demand management strategy, thus it must be partnered with non-coercive measures. Transitioning transportation networks from car dependence to sustainable, integrated systems with strong public transport systems will not happen overnight. It is a lengthy process, which can be an advantage as people need time to adjust and come to the conclusion that travelling by modes other than the car may be the best choice. For this transition to take place, a sound public transport system, with the potential to expand, needs to be in place. This system must have a level of service, convenience and comfort that is at least as attractive mode as the private car. Implementing parking controls will help to ensure its success, and policy makers should make this clear. Regulatory measures will in turn help ensure the success of public transport; with increased patronage, public transport services can run more frequently, thus becoming more reliable, convenient and attractive. The same is true of active modes. Providing expanded facilities for walking and cycling encourages their uptake, while increased numbers of people walking and cycling increase safety and security, further

encouraging uptake (Turner et al., 2006). Hence, there is a virtuous cycle of sustainable transport that will be supported by parking reform.

Community Consultation – Travel Blending

Local authorities and government agencies should be transparent and communicative with the public when adopting the proposed parking strategies. Consultation is critical. This proactive approach will ensure that the community will not have an adverse, reactive response. Ampt (1997) explains three ways that people be approached to reduce car use; regulation, awareness and understanding. Regulation alone may bring about change, but with it a sense of resentment and lack of clear understanding.

One means of undertaking consultation is through a process called “Travel Blending”, which Ampt (1997) suggests is the key to making regulation more palatable. Travel blending focuses on getting people to understand their current behaviour by measuring their current car use, giving them personalised options to change, and then observing actual change (reduction) in the use of the car. The process involves (Rose and Ampt, 1997 as cited in Ampt, 1997):

- 1) *thinking about activities and travel in advance* (i.e. in what order can activities be done, who should do them, where should they be done etc.) and then
- 2) *blending modes* (i.e. sometimes car, sometimes walk, sometimes public transport etc.), or
- 3) *blending activities* (i.e. doing as many things as possible in the same place, or on the same journey),
or
- 4) *blending over time* (i.e. making small sustainable changes over time on a weekly or fortnightly basis).

Travel Blending creates a climate in which people understand the need for change in a way that is more tangible – i.e., in terms of something that affects their everyday life, making change more acceptable or even desirable. For example, research has revealed that if people are thinking about things that annoy them about travelling (as travel blending allows them to), then it is likely that some people will find parking annoying and will try to find ways around this (occasionally working at home, or getting someone else to do something on an existing trip etc.). Blending emphasises making sensible choices about journeys for which the car will remain appropriate (sometimes the only option), and those for which other modes are possible or even more logical. This approach makes change less intimidating and gives individuals the chance to make small achievements immediately.

Conclusion

Current parking standards have unintended negative consequences that affect infrastructure provision, for transport and other services, and will inhibit desired land use and transport patterns. It is urgent that minimum parking requirements be rolled back, and that local authorities adopt new techniques for managing parking demand and resources. This paper has covered the current best practice principles and strategies of the new parking management paradigm, but each community will determine the package that will best achieve their goals. This will enable communities to achieve sustainable development goals at low cost. Consultation and education campaigns will be an essential part of parking reform, and techniques such as travel blending have been demonstrated to be effective in travel education.

References

- Alexander, C., Ishikawa, S. & Silverstein, M. 1977. *A pattern language : towns, buildings, construction*, New York, Oxford University Press.
- Auckland Regional Growth Forum. 1999. Auckland Regional Growth Strategy: 2050.
- Baker, D. 2002. "Why it's a good idea to unbundle new urban housing and parking?", David Baker + Partners Architects, available at www.dbarchitect.com.
- Banister, D. 2005. *Unsustainable transport : city transport in the new century*, London ; New York, Spon Press.
- Booz Allen Hamilton. 2001. *Auckland regional parking study*, Auckland, N.Z., Auckland Regional Council.
- Booze Allen Hamilton. 2006. "International Approaches to tackling Transport Congestion – Paper 2 Parking Restraint Measures", report completed for the Victorian Competition and Efficiency Commission.
- Burchell, R., Shad, N. A. & et. al. 1998. Costs of Sprawl -- Revisited. IN Transit Cooperative Research Program (Ed.). Transportation Research Board.
- Carplus. 2005. "Getting Started: Carplus Reference Guide for Car-sharing and travel plans", Carplus (www.carplus.org.uk), available at www.carplus.org.uk/Resources/pdf/Carplus_reference_guide_%20car_sharing_&_travel_plans_a_utm_n_05.pdf.
- Cervero, R & Radisich, C. 1995. "Travel Choices in Pedestrian versus Automobile Oriented Neighbourhoods", UCTC 281, UC Transportation Centre (www.uctc.net).
- Ewing, R. H., Smart Growth America (Organization), Urban Land Institute., Center for Clean Air Policy (U.S.) & National Center for Smart Growth Research and Education (U.S.). 2007. Growing cooler the evidence on urban development and climate change. Washington, D.C., Smart Growth America ; Urban Land Institute ; Center for Clean Air Policy ; National Center for Smart Growth Research and Education.
- Gärting, T. & Steg, L. 2007. *Threats from car traffic to the quality of urban life : problems, causes, and solutions*, Amsterdam ; Oxford, Elsevier.
- Gehl, J. 2001. *Life between buildings : using public space*, [Copenhagen], Arkitektens Forlag. The Danish Architectural Press.
- Gehl, J. & Gemzøe, L. 2000. *New city spaces*, Copenhagen, The Danish Architectural Press.
- ITE. 1987 & 2004. Parking Generation Informational Report. Washington D.C., Institute of Transportation Engineers.
- ITE. 1995. Shared Parking Planning Guidelines, ITE (www.ite.org) Washington DC.
- ITE. 1999. Transportation Planning Handbook, ITE (www.ite.org) Washington DC.
- Kuzmyak, M. 2003. "Parking Management and Supply: Traveler response to Transport System Changes", *TCRP Report 95*, Transportation Research Board (www.trb.org), available online.
- Litman, T. 2006a. *Parking management best practices*, Chicago, Ill. , American Planning Association.

- Litman, T. 2006b. Win-Win Transportation Solutions. Victoria Transport Policy Institute.
- Litman, T. 2007a. "Transit Oriented Development – Using Public Transit to Create More Accessible and Liveable Communities", available at www.vtpi.org/tdm/tdm45.htm.
- Litman, T. 2007b. "Cycling Improvements – Strategies to make cycling convenient, safe, and pleasant", available at www.vtpi.org/tdm/tdm93.htm.
- Litman, T. & Laube, F. 2002. Automobile Dependency and Economic Development. Victoria Transport Policy Institute.
- LTNZ. 2007. Workplace Travel Plan Coordinators Guide, available at www.ltsa.govt.nz/sustainable-transport/guidelines/workplace-travel-plan.pdf.
- Ministry for the Environment. 2005. New Zealand Urban Design Protocol. Wellington.
- MOT. 2002. New Zealand Transport Strategy. Wellington, Ministry of Transport.
- MOT. 2006. Tackling Congestion in Auckland - Auckland Road Pricing Evaluation Study. Wellington, Ministry of Transport.
- Nelson/Nygaard Consulting. 2002. "Housing Shortage/Parking Surplus", Transportation and Land Use Coalition (www.transcoalition.org), available online.
- Newman, P. W. G. & Kenworthy, J. R. 1999. *Sustainability and cities : overcoming automobile dependence*, Washington, D.C., Island Press.
- Russo, R. 2001. "Planning for Residential Parking: A Guide for Housing Developers and Planners", The Non-Profit Housing Association of Northern California (www.nonprofithousing.org).
- Shoup, D. C. 2005. *The high cost of free parking*, Chicago, Planners Press, American Planning Association.
- Stein Engineering. 1997. Shared Parking Handbook, Portland, available online.
- Turner, S. A., Roozenburg, A. P. & Francis, T. 2006. Predicting accident rates for cyclists and pedestrians. *Land Transport New Zealand Research Report*.