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From transport disadvantage to transport choice: women, transport and urban structure

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Abstract:

The post-war model of suburbia, predicated on the separation of work and home and the affordability of the motor car, is currently being questioned and revised in the search for more sustainable and equitable urban forms However, women are owning and driving cars in increasing numbers, as its convenience suits their busy lifestyles, and in particular, the multiple, linked trips which they undertake.

This paper will explore how a focus on accessibility, rather than mobility, and renewed emphasis on the integration of transport, land use and urban design, has the potential to provide women with transport choice. It will discuss the main characteristics of women's travel behaviour, the key principles of accessible development and argue the need for a focus on "transport choice" – access to a wide range of travel modes – in land use planning, urban design and traffic engineering practice.

While improved planning and engineering alone, will not provide a cure for car dependence, they form part of a broader policy package which can moderate car dependence and improve accessibility by walking, cycling and public transport.

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Introduction

The post-war model of suburbia, predicated on the separation of work and home and the affordability of the motor car, is currently being questioned and revised in the search for more sustainable and equitable urban forms. However, women are owning and driving cars in increasing numbers, as the car's convenience suits their busy lifestyles, and in particular, the multiple, linked trips which they undertake.

This paper explores how a focus on accessibility, rather than mobility, and renewed emphasis on the integration of transport, land use and urban design, has the potential to provide women with transport choice. It discusses the main characteristics of women's travel behaviour, the key principles of accessible development and argues the need for a focus on "transport choice"- access to a wide range of travel modes - in land use planning, urban design and traffic engineering practice.

This paper updates and further develops two papers by the author, "Women, Transport and Urban Structure" given to the 1995 On the Move Conference in Adelaide, South Australia and "Planning for Transport Choice", given to the Regional Conference of the Institution of Transportation Engineers in Melbourne in 1996.

Women's travel behaviour and transport issues

Recent Australian studies have confirmed that women's travel behaviour does differ from men's (Lang 1992, Perrot Lyon Mathieson 1995, Dowling and Gollner 1997). This is also supported by international studies (Rosenbloom 1989;1993; Whipp and Grieco 1989; Niemeier and Morita 1996). The significant characteristics of women's travel can be summarised as:

- The journey to work is of lesser significance for women. For example, the 1991 New South Wales Home Interview Survey (HIS) found that the journey to work accounts for only 13 percent of all trips made by women, but more than a quarter of all trips made by men (Dowling and Gollner 1997). The same data shows that women make the majority of non-work trips (Battelino 1997)

- Women travel less distance than men do, their trips are more localised and less likely to be in the evening (Lang 1992, Morris, Richardson and McPherson 1996, Dowling and Gollner 1997, Turner and Niemeier 1997).

- While historically, women have used public transport more than men do, this may be changing. Roughly equal proportions of men and women travelled to work by public transport across the Sydney region (9.6 compared to 9.3 per cent) according to the 1996 Census. However, increasing numbers of women are driving a car as part of their journey to work (Smith 1994). Women using "car as driver" for the journey to work in the Sydney region increased slightly by 2.4 per cent between 1991 and 1996, compared to an increase of 0.8 per cent for men. In terms of all trips, Dowling and

Gollner 1997 found that between 1981 and 1991, the number of trips by women as vehicle drivers increased by about 25 percent.

- However, in 1991, a significant proportion of women lived in households without a car, mainly due to age or income. 14 percent of women in the Greater Metropolitan Region of Sydney, Newcastle and Wollongong lived in households without a car, compared with 10 percent of men (1991 HIS). It will be important to monitor any change in this indicator when the results of the 1998 HIS are available.

- Women's travel patterns are more complex in duration, time of day and mode, due mainly to their family and domestic responsibilities (Lang 1992, Smith 1994, Dowling and Gollner 1997). The 1991 HIS showed that greater proportions of women than men undertook "serve passenger", shopping and social/recreation trips before or after work on an average weekday in the Sydney Statistical Subdivision.

- It is therefore logical that women are more likely to be accompanied by children and/or parcels and baggage when travelling.

Some key transport issues are consistently raised in consultations with women about transport and especially public transport:

- Personal safety is the most significant concern of women using any mode other than a car. This centres not just on the journey on public transport but also at either end, for example, waiting at a bus stop or walking from the station to a parked car.
- Safety of children is another major concern, in using public transport and walking in neighbourhood streets. Tranter (1994) has documented the reduced independent mobility of girls in the last 20 years.
- Women, and in particular working women, have less time to achieve more activities, such as work, study, and family responsibilities. As a result, convenience is the key factor and tends to favour the car.

Recent Australian reviews of data on women's travel behaviour have noted the need to shift from a focus on women's transport disadvantage, particularly in relation to public transport, to a more realistic understanding of the role of the car in working women's lives; as a management tool which helps them to juggle competing demands when time is scarce (Morris, Richardson and McPherson 1996, Dowling and Gollner 1997).

Urban Structure and Travel

The post-war model of suburbia is no longer seen as a sustainable form of development near the end of the 21st century (Calthorpe 1993, Kaufman and Morris 1995, Newman and Kenworthy 1995). This model, typical of the outer suburbs of Australian cities, was dedicated on the separation of work and home and the mobility offered by the affordability of the motor car, not to mention lower workforce participation rates for women.

There are now environmental, economic and social imperatives to moderate dependence on the private car and promote walking, cycling and public transport as alternative travel modes. These imperatives include declining air quality, increasing traffic congestion, and the demand for quality urban environments for both economic and social reasons. Critiques of conventional suburbia also note the mismatch of the form of conventional suburban development, designed for the traditional family unit, with current trends of an aging population and a declining proportion of households with children.

Kemp (1995) argues that the "post-industrial economy" requires a new type of urban form. There have been fundamental changes in the sources of employment, the way we work and in the structure of society. The greatest increases in employment are taking place in the service sector, especially involving female and part-time employment. He argues that "the growth in part-time, lower paid and service sector jobs means the typical urban sprawl and widely separated land uses are no longer economically or socially sustainable."

Cervero (1997) has framed this shift in focus as a paradigm shift from enhancing *automobility* to enhancing *accessibility*, in order to recognise that people and places are what matters, not the movement of vehicles. Accessibility, in this context, is the ability to undertake a variety of daily activities with a minimum of travel.

Recent research, particularly in the USA, has been exploring how urban structure, or the form of urban areas, influences how we travel. In the USA, much of this research has been in response to a new focus on transit, triggered by the requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA) and the desire to test the principles of the "New Urbanism". This movement calls for a return to town making, to compact neighbourhoods with connected, walkable streets, mixed land uses and a pedestrian focus (Morris and Kaufman 1995). The terms "urban village" and "traditional neighbourhood" are often used to describe such urban forms.

Various simulation and descriptive studies have tended to support the transport benefits of accessible, traditional neighbourhood design, indicating higher proportions of walking and transit use and shorter trip lengths in traditional neighbourhoods compared with conventional suburban neighbourhoods (Crane 1996, Cervero and Radisch 1996).

Analysis of the 1991 Home Interview Survey in Greater Sydney echoes the findings of this research. A comparison of three types of neighbourhoods - high density development around stations, traditional neighbourhood (originally tram-based), and conventional suburban development on the urban fringe – indicates fewer overall trips per person, fewer vehicle trips and a higher proportion of public transport and walking trips in high density and traditional neighbourhoods (Rosenkrantz 1995). Battelino (1997) confirms that those local government areas in the Sydney Region which have a higher use of public transport also display characteristics identified by the New Urbanists as supporting public transport use, including higher population and dwelling density, traditional street patterns and lower average numbers of vehicles per household.

However, the extent of the influence of planning and design is dependent on the local context, including such factors as: the size and location of the urban area; the location of major destinations; the type of street networks (interconnected or cul-de-sacs); relative density and public transport service levels; and the socio-economic characteristics of residents.

Clearly, new traditional neighbourhoods located in isolated, urban fringe locations without frequent, trunk public transport to major destinations, will not reduce car travel at the sub-regional level, although non-work walk and cycle trips are likely to increase. This is a criticism of some "new urbanist" developments in the USA, including Laguna West in California and Seaside in Florida.

In addition, Steiner (1996) notes that the aforementioned studies have not separated out the other factors, such as income, household size, life cycle characteristics or household members, and other land use characteristics for which density may be a proxy. Crane (1996) also argues that, while worthwhile, the transport benefits of neotraditonal design have tended to be overstated.

Cervero and Radisch (1996) also conclude that neighbourhood design is a stronger predictor of mode choice for non-work trips than for commute (or journey to work) trips.

Nevertheless, the problems posed to efficient public transport operations by conventional suburban planning and street design are highlighted by the work of Fleming and Pund (1993). This analysis of a bus company's operations in two parts of Western Sydney shows the negative effect of "island suburbs" with circuitous street networks and few connections, on bus service directness, frequency and profitability, when compared with an area of similar socio-economic status, but a more traditional street network.

Despite this evidence of the importance of urban structure and urban form to travel, it must be noted that land use planning and urban design cannot significantly influence travel demand on their own, but need to be considered as part of package of measures. For example, improvements to the quality, convenience and comfort of public transport, walking and cycling is necessary and market-based, less politically acceptable measures, such as pricing car travel and restricting parking in accessible centres are likely to be effective.

Planning for Transport Choice

The new paradigm of planning for accessibility rather than automobility needs also to be seen as planning for transport choice. Planning for transport choice is planning for all relevant modes, including the private car, but with renewed emphasis on improving access by walking, cycling and public transport. Transport choice is an important concept when planning for women's travel for two main reasons.

Conventional land use planning and traffic engineering can be seen as planning "out" transport choice, especially in suburban development. Even if one wants to, the street network and separation of land uses in conventional residential estates, prevent anyone from easily walking, cycling or being able to catch a bus to relatively nearby activities. This is well illustrated by the walking catchment analysis of part of a 1980's housing release, Glenmore Park, in the City of Penrith in Sydney's outer western suburbs (Figure 1). Compare this with the walking catchment of a part of Merrylands in Sydney's mid-western suburbs, built in the 1940's (Figure 2) (Stapleton 1998).

On the other hand, transport choice is also important to ensure that women's logical attachment to the car as a safe, convenient and flexible form of transport is recognised. Particularly in the environmental movement, there has been a tendency to a simplistic dichotomy – the car as the problem; public transport as the solution (Huxley 1995). While new and more flexible public transport technologies and networks are developing (and should be encouraged), it is unlikely that they will supplant the car for women who have access to one, without such fuel and car use pricing policies as are now being implemented in the United Kingdom and more severely in Singapore.

Accessible Development Principles

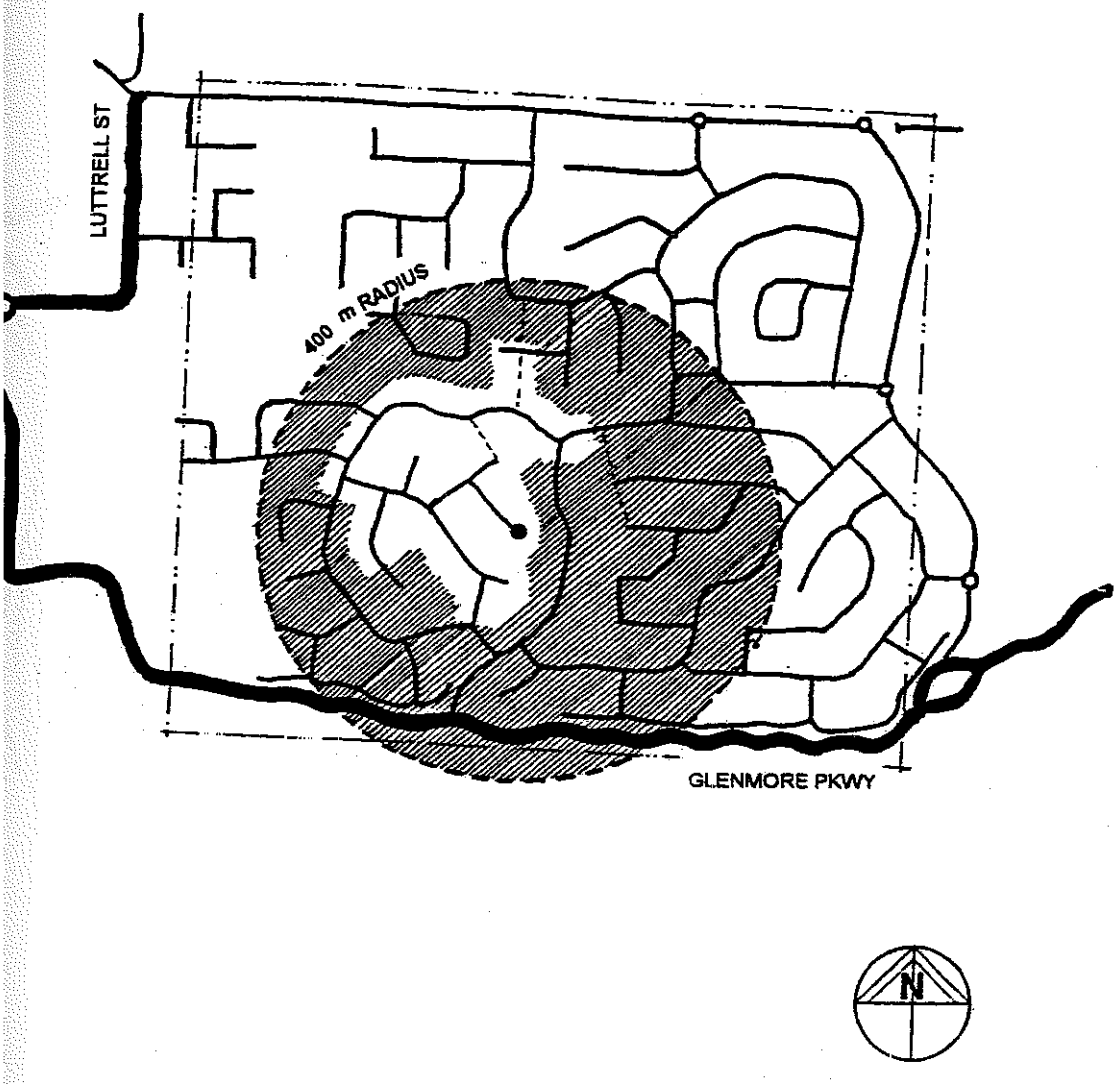
The aforementioned research on urban structure and travel, together with a review of Australian and international guidelines and handbooks prepared by public transport agencies in recent years, indicates that there are eight key accessible development principles. These principles will encourage transport choice by supporting development which will be highly accessible by walking, cycling and public transport, yet also by car (UK Department of Environment and Department of Transport 1995, JHK Associates 1995, Ministry of Transportation and Ministry of Municipal Affairs, Ontario 1992).

As noted earlier, women undertake the majority of non-work trips, excluding social/recreation, return home trips and childcare and education trips, which are predominantly taken by children (Battelino 1997). Research in the United States has suggested that the mode of non-work trips is influenced to a greater extent than work trips by local land use factors such as neighbourhood density, street patterns and a mix of land uses (Cervero and Radisch 1996).

Policies to influence women's travel behaviour to provide transport choice must therefore address the following accessible development principles.

1 *A. Develop concentrated centres, by placing the highest appropriate density of housing and employment within walking distance (400-800 metres) of major public transport nodes and corridors, such as rail stations and high frequency bus routes.*

B. Develop higher densities along major public transport corridors (including trunk bus routes).



igure 1: Walking Catchment of Glenmore Park, near Penrith (1980s)

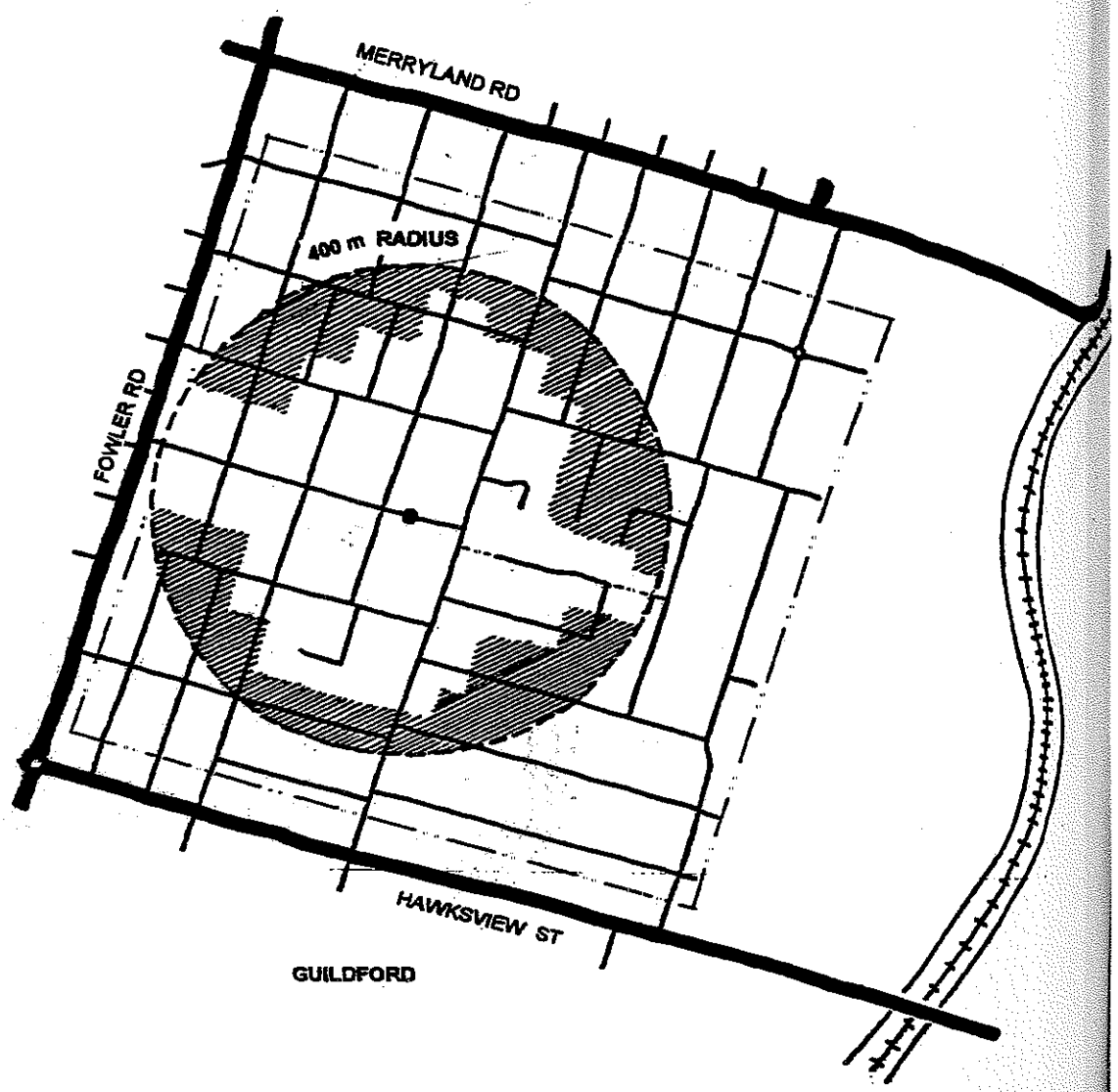


Figure 2: Walking Catchment of Merrylands near Parramatta (1940s)

Conventional public transport (rail, bus etc) can operate with higher frequencies when major travel generators are located at each end and along the route. This principle will therefore support existing public transport services and make new links or networks more viable. In addition, the concentration of housing and jobs within walking distance of public transport will allow women to more easily walk or cycle to the public transport stop or between it and a local centre or place of work, thus facilitating linked trips.

2. *Mix residential and employment uses with shopping opportunities and public facilities.*

Land uses need to be configured in a way that works with women's busy lifestyles and facilitate the linked trip making typical of women's travel behaviour. Increased road congestion, the financial and time costs of commuting and more women working means that low-paid, part-time jobs need to be close to workers' homes and other daily activities. The co-location of multiple compatible uses (for example, a TAFE and child care centre located adjacent to a rail station) can result in a higher level of walking, cycling and public transport use than segregated single use development.

The potential proximity of jobs to home can be enhanced by the encouragement of mixed use development through careful zoning and design controls. Home businesses, in particular, should be encouraged, to provide opportunities for women to work from home.

3. *Provide multiple and direct street connections to public transport stops and facilities.*

An inter-connected street system (including grids) can provide more direct and safe pedestrian links to facilities and public transport stops. This is important for all women in terms of personal safety, for older women who may have mobility impairments and for younger women with the likelihood of shopping and/or children in tow. A connected and permeable street network also provides greater flexibility in land use and traffic management. For example, streets in a grid can be opened and closed over time to meet the needs of the community. A cul-de-sac, while often considered safer for children and property, cannot be reconnected to the surrounding street network without significant cost. Conventional suburban development, often characterised by many cul-de-sacs and without footpaths, is difficult to walk in and to service with reasonable public transport frequencies.

4. *Maximise access for pedestrians, including people with disabilities*

A significant proportion of all trips people make is on foot and a high proportion of all trips made by all means of travel is short and thus suitable for walking. About 19 per cent of all trips were by foot in 1991 (on an average day) and comprised about 4 per cent of work trips in 1996. For all trips (HIS 1991), a slightly higher proportion of women than men walked on both the average week and weekend days (51 per cent compared with 49

per cent). The proportion of walk trips on an average weekend day was lower (16.4 per cent) than on an average week day (20 per cent). Again, roughly equal proportions of men and women walked to work in the Sydney region in 1996.

A walkable environment is very important in generating public transport trips, as it can increase the catchment area for public transport and as all public transport users are pedestrians during parts of their journey. This requires attention to urban and traffic facilities design details, such as the orientation of uses to the street to provide natural surveillance, the provision of footpaths, kerb ramps, lighting, weather protection and shade, attention to gradients and landscaping and traffic signal timing.

5. *Maximise access for cyclists.*

Cycling is a cheap, efficient and clean mode of transport, which is well suited to trips of less than 10 km. As women's trips tend to be shorter than men's are, cycling may be a viable option for some women in urban areas which have a suitable topography and where there is adequate and direct road/path space, lighting and storage at destinations. However, it would appear that cycling is unpopular with women for the journey to work. In both 1991 and 1996, the number of men cycling to work in the Sydney region far outweighed the number of women, by about seven times. This may be attributed to the perceived danger of cycling on busy roads and the interest of men in cycling as a fitness pursuit, but may also relate to the restrictions the mode places on dress and appearance and the carrying of passengers or baggage.

6. *Manage parking supply and demand.*

The availability of parking has an adverse effect on the attractiveness of public transport. Further, large parking areas are difficult to traverse on foot from public transport stops and surrounding areas. In larger centres with good levels of public transport service, parking supply should be restricted and priced to encourage short stay parking (for shopping, recreation and personal business) over commuter parking. As fewer women than man have company cars and car spaces, consideration needs to be given to commuter parking at rail stations and major bus stops and to the location of employment in relation to public transport.

7. *Manage traffic flow to provide transport choice.*

Traffic management measures need to give more emphasis to the needs of pedestrians, cyclists and public transport vehicles. For example, speed control devices should be designed to allow the safe, direct and comfortable passage of buses on key routes.

8. *Ensure that site, building and streetscape design is sensitive to the needs of pedestrians, cyclists and public transport users.*

Urban design details do matter in encouraging travel by foot, cycle and public transport. These details can have a significant impact on the perception of personal safety, of

particular concern to women. For example, buildings that are human-scaled and oriented to the street with clear pedestrian entries, provide natural surveillance and a sense of security for pedestrians. While a car park or garage dominated streetscape is to be discouraged, there needs to be clear directional signage for car parking.

Approaches to Planning for Transport Choice

We cannot and should not force women (or anyone) to walk, cycle or use trains or even live at higher densities. We can, however, remove the barriers to choosing alternative transport modes, which will increase the liveability of urban areas – by planning for transport choice.

Planning for transport choice should be an integral part of land use and infrastructure planning, design and implementation. Plans and policies can then clearly reflect the current travel behaviour of women and the passengers they serve – mainly children - and thus benefit society generally.

Some key issues and directions that enable planning for transport choice are discussed below.

Accessibility mapping

The starting point for planning for transport choice is a good understanding of regional and local movement networks. An assessment of accessibility levels in an area is a valuable tool in planning for new development and encouraging transport choice. An emphasis on accessibility will ensure that better use is made of existing transport infrastructure, consideration is given to locating development in the right place and also to access to land uses by all modes of travel.

For example, relative accessibility can be expressed as the ratio of the population or the number of jobs that could be reached in a given time by car, to the population that could be reached by public transport in the same time.

Some councils in Australia, the USA and United Kingdom, have undertaken various forms of accessibility mapping, whereby access to areas by walking, cycling and public transport is mapped, to ascertain strengths, weaknesses and opportunities. For example, comparing a 400 metre radius around a rail station with actual walking distances can identify where pedestrian links must be improved to maximise the potential catchment. This technique is referred to the "walkable catchment technique" or "ped-sheds". This will assist in the identification of areas where trip generating development should be focused and areas requiring retrofitting to improve accessibility.

The London Borough of Hammersmith and Fulham has adopted an approach under which improved accessibility is rewarded with higher floor space ratios and tapered parking requirements. The Netherlands Government has adopted a business location

policy, "The Right Business in the Right Place" which seeks to match the accessibility of locations with the mobility requirements of business. For example, employee-intensive land uses with a high need for public transport must be located proximate to main public transport interchanges in town centres, with fast rail services and easy access by walking and cycling (UK Departments of Environment and Transport 1995).

Mixed use developments

As noted above, mixed use development fits the modern lifestyle, particularly for working women, whose numbers have been steadily increasing. Kemp (1995) demonstrates that employment growth in Australia has been in small, service businesses. This trend indicates a demand for small, flexible, multi-purpose business premises located in or close to residential areas. Sustainable enterprise development also requires the ability for home-based businesses to make the transition to small, cheap rental accommodation and then to larger, and eventually, more expensive premises within 5 kilometres.

Councils are now taking up the challenge of encouraging mixed use development in its many forms, from home business to mixed use neighbourhood and town centres, for example, Newcastle City Council's Mixed Use development control plan.

However, planning instruments alone will not produce the mixed use product. The market has generally been geared to produce commercial *or* residential property. Councils are concerned to maintain the viability of existing retail centres and are wary of the retail component of urban village proposals on redevelopment sites. This indicates that mixed use development (other than home businesses) should be appropriate and targeted to specific locations and that the development industry will need to be convinced of its profitability.

The proliferation of small businesses in local centres will make it difficult to provide high frequency public transport services to a greater range of destinations. This makes it imperative that mixed use centres are focussed on public transport nodes, that surrounding areas are walkable and that public transport services become more flexible.

Tranter (1994) has documented the declining independent mobility of children and the increasing role of women as "conscript chauffeurs". Walkable, mixed use neighbourhoods have the potential to provide opportunities for children to gain independent access to their own neighbourhood where they spend most of their time.

Streets and roads for all modes

The new paradigm requires a different approach to street and road design in order to balance car travel with a renewed emphasis on alternative modes. However, education

and expertise in designing highways and streets would appear to be much further advanced than in street and road design for all modes.

The classification of streets

It can be argued that conventional road hierarchies based on traffic volumes are insufficiently dynamic or multi-modal to support transport choice. Indeed new urbanists argue that they are obsolete and that connectivity should be encouraged. New models are required which are multi-dimensional and which enable transport planners to make trade offs between traffic flow, walkability, permeability for public transport and activity. These are starting to emerge, such as the "neighbourhood connector" and "distributor integrators" in Western Australia's Liveable Neighbourhoods Community Design Code (Western Australian Planning Commission 1997) which has been released for testing and review.

Pedestrian safety

In trying to reduce conflicts between vehicles and people (that is, separating them as much as possible), walking has been discouraged. Pedestrian only links between cul-de-sacs or in open space corridors are often unlit, lonely and without natural surveillance. The NSW Department of Housing has been retrofitting housing estates planned on the Radburn model to remove such "rape and pillage" opportunities" and re-orient town houses to streets, rather than open spaces which become "no-go" zones. In such ways, women feel safer walking in their local neighbourhood. Safety audits of public transport interchanges and town centres are another important tool in improving access by walking and public transport.

The footpath has been too often undervalued as a community asset, yet one that women and children find essential to their travel. Footpaths are essential on both sides of trunk public transport routes and at least on one side of connected residential streets. Traffic calming techniques can be used to successfully cue drivers that they are entering a pedestrian environment and arterial roads can be adapted to shared use (Roads and Traffic Authority of NSW and Federal Office of Road Safety1993). Such techniques have been taken up enthusiastically by many councils.

New ways of working

Andres Duany, one of the most well-known of the American New Urbanists, claims that in the latter half of the 20th century, cities have become degraded by specialisation - that the model of urban development began to fail with the separation of urban development disciplines, such as land use planners, surveyors, and traffic engineers. He claims that the principles of good neighbourhood design is so straight forward that it is "sub-professional" (Duany 1995). The separation of the land subdivision process from the site development process (e.g. house building) has also contributed to the lack of an

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