THE IMPACT OF TRANSPORT ON URBAN FORM

Andrew Olszewski

SUMMARY OF ACTIONS TOWARDS SUSTAINABLE OUTCOMES

Environmental Issues/Principal Impacts

- The sustainability of towns and cities is fast emerging as the key challenge for all stakeholders in the urban development process. The result of such a comprehensive approach to the problem is the need to resolve and improve broader urban systems, such as an entire suburb or growth corridor, before improving specific design details.
- While the new suburban approach is a great offender in sustainability terms, the main opportunity for positive action exists within the current urbanised areas and in particular within the city centre and inner suburbs. These areas offer a very high level of opportunity for urban regeneration according to Ecologically Sustainable Development (ESD) parameters.

Basic Strategies

In many design situations, boundaries and constraints limit the application of cutting EDGe actions. In these circumstances, designers should at least consider the following:

The new, sustainable urban development paradigm must overcome the shortcomings discussed above through:

- general increase of density of uses and activities within urban areas
- effective utilisation of existing infrastructure including public transport
- diversity of urban design models
- generation of greater synergy between different uses, limiting needs for transportation and supporting greater community forms
- application of ESD principles to all new projects including issues such as heating, cooling or solar orientation.

Sustainable urban development requires a high level of connectivity for all social and economic reasons. The key factors supporting a high level of accessibility are:

- adequacy and clarity of all public movement systems
- legibility of all options within the hierarchy of movement systems
- high standards of public safety and amenities
- effective interchanges between different modes of movement/transport.

Cutting EDGe Strategies

- At the project level, there are a whole range of design responses to accessibility, legibility, public safety and environmental impacts, which could offer better integration of transport and built form.
- Equally, careful attention to the needs of pedestrians and users of all forms of transport could have a significant effect on the overall functioning of an urban node.
- Developments that are characterised by the pedestrian oriented approach will reap the reward of enhanced values as the community becomes ever more discerning about the quality of the urban environment.

Synergies and References

- BDP Environment Design Guide: GEN 45, GEN 46, GEN 47, GEN 48, DES 46, CAS 27, DES 16
- Department of Infrastructure, 1999, Urban Design Planning Notes, No 3: Urban Design Frameworks, Department of Infrastructure, Melbourne, Victoria
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Design professionals are very well positioned to influence urban development decisions. This paper offers a general discussion and specific design directions in relation to sustainable urban design models promoting synergy between transport and urban form.

1.0 INTRODUCTION

The growth of cities and towns is shaped by a wide range of factors such as local and global economic trends, social and cultural drivers, local climate and environment. The local response to these factors within the existing policy framework is responsible for the individual character of each urban centre. The very nature of any town or city is characterised by the concentration of activities and the density of urban fabric. The pattern of urban development requires a clear movement and accessibility strategy that includes the need for public space, pedestrian movement and the functions of an integrated transport system that provide for people and goods movement, social interaction and recreation.

2.0 CURRENT URBAN DEVELOPMENT CONDITIONS

The sustainability of towns and cities is fast emerging as the key challenge for all stakeholders in the urban development process. It is widely recognised that successful strategies for sustainable development must address social and cultural, economic and environmental aspects concurrently.

The result of such a comprehensive approach to the problem is the need to resolve and improve broader urban systems, such as an entire suburb or growth corridor, before improving specific design details. Equally, the level of synergy between the variety of transport and urban form should be considered both at the strategic level (i.e. the development of specific policy or strategy, such as Urban Villages) and at the project level where the design decisions could lead to better accessibility and to increased support for public transport.

Historically, transport has always shaped the development of urban centres. The emergence of the automobile and its growing role as a form of transport in Australian cities has significantly changed the nature of relationship between the public space (square, street, road etc) and the associated built form. The spatial needs associated with car transport are enormous, including land taken for the road surface or parking. In order to accommodate these needs, our cities are moving from denser, pedestrian and public transport friendly places, with a very livable tradition, towards the very low density suburban American model. The negative effects of this trend on economic, social and environmental aspects of Australian cities are widely discussed and documented.

- The first report of the Metropolitan Planning Commission (1925) indicates that the overall residential density of the 26 metropolitan municipalities of Melbourne was approximately 1,500 persons per square kilometre.
- In 1998, the Melbourne metropolitan density, according to Department of Infrastructure, was 355 persons per square kilometre.
- The average density of European cities in 1981, according to Moving Melbourne: A Public Transport Strategy for Inner Melbourne (IMRA 1991), was 5,400 persons per square kilometre.

The growing recognition of the transport infrastructure impact on the sustainability of the entire urban system brings new demands for more effective urban design approaches to the city building design task. A new level of understanding between the various stakeholders in urban design and the development process is needed. This should achieve a vibrant, safe and livable ‘urban place’ rather than efficiency of any singular element of its infrastructure.

There is a growing body of research that underscores the need to comprehend urban environments as complex systems. The individual elements, such as:
- physical form, arrangement of activities, distribution and design of public space
- cultural and social assets
- generators of economic activity etc, are all inter-related and cannot be treated in isolation.

For example, Cevero (1993) for the United States Federal Transit Administration develops design guidelines for transit-supportive development that concentrate on the physical structure required to support complex community needs, rather than simply maximising population density around transit nodes.

In a detailed review of 19 design guidelines from individual US cities, Cevero suggests the following as the main function of guidelines for transit related development:
- Provide technical information
  - dimensions and operating requirements for transit infrastructure
  - access requirements and linkages to surrounding development
  - design standards for transit stations, interchanges, etc.
- Enhance co-ordination among groups.
- Encourage long-range planning for transit.
• Advocate transit-supportive policy decisions.
• Sell ‘transit-supportive design’ to the private sector.
• Encourage transit considerations during project review.
• Educate the general public about transit issues (Cervero 1993 pp32-33).

Judging from the experience of car based models of urban development, such as Los Angeles or Houston, Australian cities could degenerate to semi-urban conurbations, with decreasing levels of efficiency and growing ecological liabilities. This scenario is made even more likely due to the rapidly decreasing household size and subsequent population loss in the traditionally denser inner city areas.

In short, all professions must positively engage with this agenda and play critical roles as agents for improvement on behalf of the public. Planners, architects and urban designers have particularly important opportunities to inform the urban development process and develop greater understanding of Ecologically Sustainable Development (ESD) principles amongst their clients and stakeholders.

Responses to the sustainability challenge at the policy level could be assisted by the reference to urban design criteria included in the 1997 Australian Local Government Association’s national urban design policy – Designing Competitive Places. In particular, the need to coordinate efforts of different professions:

Good urban design achieves its objectives through an interactive, multi-disciplinary approach, drawing on skills from diverse areas such as architecture, planning, engineering, the arts, economics, landscape design and the many specialist areas involved in urban development.

The same document puts a very strong focus on the overall synergy of conditions and activities affecting the specific area:

**The Integration Criterion**

The most important criterion is INTEGRATION. To meet the challenges facing modern towns and cities, new development must relate to strategic needs at both a local and a broader level. It must be coordinated with other initiatives so that shared opportunities (synergies) are identified and exploited.

All forms of urban development, including infrastructure (from roads to telecommunications to services), institutional developments and private speculative ventures, should be considered for the potential to capture the synergies available through better coordination.

It should respond to objectives across all departments of Council and be coordinated with other developments.

**The Economic Criterion**

New development should:

• use resources wisely and efficiently and make maximum use of shared opportunities and synergies
• contribute to overall efficiencies and stimulate new opportunities
• add to the overall quality of the environment and ensure the value of existing development is enhanced
• distribute benefits fairly and widely.

**The Cultural and Social Criterion**

New development should be relevant to the local community and respond to the cultural aspirations and needs of the people who will use it, thereby expressing and building on local diversity and achieving ownership by the community.

It should forge links with the past and provide a pointer towards the future.

**The Ecological Criterion**

New development should be climatically appropriate and respond to local conditions. It should use resources as effectively as possible, moving towards sustainability and minimising negative impacts on the natural environment.

### 3.0 SUSTAINABILITY – A NEW PARADIGM

The new city edge suburban development represents the greatest challenge to sustainability. Presently, these developments are likely to be highly dependent on private car use, with low density housing and stand alone shopping centres. For the relatively small reduction in the number of dwellings, outer suburban development is characterised by:

• loss of significant areas of natural landscape and agriculture use
• creation of a disproportionate (to the population gain) amount of impervious surfaces (roofs, roads) in turn undermining local underground water levels while generating high levels of urban run off
• lack of social and cultural resources for emerging communities, further escalated by the lack of other forms of accessibility, other than by private car
• the high energy consumption for private car transport and construction of new infrastructure systems, while existing systems are only partially utilised.

While the new suburban approach is a great offender in sustainability terms, the main opportunity for positive action exists within the current urbanised areas and, in particular, within the city centre and inner suburbs. These areas offer a very high level of opportunities for urban regeneration according to Ecologically Sustainable Development (ESD) parameters.

The new, sustainable urban development paradigm must overcome the shortcomings discussed above through:

• general increase of density of uses and activities within urban areas
• effective utilisation of existing infrastructure including public transport
- diversity of urban design models
- generation of greater synergy between different uses, limiting needs for transportation and supporting greater community forms
- application of ESD principles to all new projects including issues such as heating, cooling or solar orientation.

This ESD approach demands a presence of a clear vision or framework, in order to capture strategic synergies. The ‘urban structure related’ approaches such as Urban Design Frameworks (Department of Infrastructure, 1999) offer a practical tool for the establishment of a clear agenda for the whole urban precinct and the specific briefs for individual projects.

4.0 AN ACCESSIBLE URBAN FORM

The sustainable urban development requires a high level of connectivity for all social and economic reasons. The key factors supporting a high level of accessibility are:

- adequacy and clarity of all public movement systems, such as:
  - pedestrian
  - bicycle
  - water based
  - streets and roads
  - places and squares
  - public transport corridors
- legibility of all options within the hierarchy of movement systems
- high standards of public safety and amenities
- effective interchanges between different modes of movement/transport.

ESD goals could be further assisted through an effective integration of urban form with the adjacent transport systems.

The aspects of urban fabric integration with movement systems may include:

- general increase of density of uses near the public transport station or interchange
- alignment of active frontages (retail, entertainment, food) with the pedestrian links to increase interest and safety
- greater mix of uses within walking distance, limiting the need to transport
- adoption of denser residential models such as new houses, town houses or a typical European 4-6 storey mode of apartments. These models are much more supportive of public transport use and other modes such as walking or bicycle
- effective incorporation and management of carparking (shared use between different functions such as commercial and entertainment)
- legible, well defined entries to buildings coinciding with pedestrian desire lines.

5.0 URBAN FORM TO ENCOURAGE SUSTAINABLE TRANSPORT

The private sector approach to urban development is to generate profit, which naturally focuses its effort on each individual project. In the Australian system it is the role of public authorities to ensure a sensible balance between the individual needs and broader public objectives. The exponential growth of community interest and desire to participate in the planning process is a relatively recent trend illustrated by the grass roots movement of Save Our Suburbs.

The size and complexity of private projects increased over the last two decades from individual buildings to complexes of buildings and, in some instances, to whole city blocks (Queen Victoria Hospital site, Casselden Place, both in Melbourne). The short term, profit oriented approach to planning of significant buildings or complexes of buildings often results in highly undesirable outcomes, such as privatisation of the public realm, loss of pedestrian accessibility and greater dependence on the private car. This situation, together with the growing public awareness of the ecological issues and the growing expectations of enhanced liveability, leads to conflict between public and private interests. The number of the planning decisions resolved by the Victorian Civil and Administrative Tribunal (VCAT) clearly illustrates this situation. Meanwhile, the great proportion of individual projects still miss the contextual clues. Every city in Australia has plenty of examples, such as the blank Flinders Lane facade of the Hyatt Hotel in Melbourne, which is in stark contrast with its lively Collins Street interface. The effect of this long, blank facade on the public realm is clearly visible in diminished vitality of the corresponding section of the lane. This example illustrates potential for conflict between the transport needs (carparking, loading) and the economic sustainability of the lane.

At the project level, there are a whole range of design responses to accessibility, legibility, public safety and environmental impacts, which could offer better integration between transport and the built form. Amongst other things, attention to building massing and orientation, location of entries, fenestration, lighting, visual communication and selection of building materials and finishes can greatly effect the outcome from transport oriented development.

Equally, careful attention to the needs of pedestrians and users of all forms of transport could have a significant effect on the overall functioning of an urban node. A very poor design tradition in this area, which produced places such as St Kilda Junction or Richmond Station, should be replaced by the pedestrian oriented approach, as practiced by many European cities such as Copenhagen, Amsterdam or Freiburg. In addition to functional benefits, the good European examples suggest that transport oriented development could act as an opportunity for major urban design improvements and a showcase for the most challenging architecture (Calatrava, Alsop, Piano).
There is a growing body of evidence that suggests that developments that are characterised by the pedestrian oriented approach will reap the reward of enhanced values as the community becomes ever more discerning about the quality of the urban environment. For example, Hawken (1999) discusses the value of ‘human capital’. He demonstrates from examples, such as Curitaba in Brazil, how investment in social and cultural infrastructure can lead to enhanced economic and social outcomes that are sustained despite a generally opposite trend in the broader region. The Property Council of Australia has demonstrated locally, in a review of recent developments in several Australian cities, that projects which contribute to and integrate with the local urban context (including all forms of transport infrastructure) achieve above average economic outcomes (Property Council, 1999). Low density cities such as in Australia are unlikely to be able to revert to a traditional European style city form, no matter how intense the environmental imperative. A more achievable objective is the multi-centred city, where there are urban density activity centres distributed across the metropolitan area. Axford (2001) proposes that a multi-centred city offers the most optimal solution for Australian cities, allowing everyone in a metropolitan area to be within a 20 minute vehicle trip of a high quality urban centre. He proposes that for activity centres to achieve the advantages of urban scale that will support transit services, they will have to acquire a mix of characteristics or factors that includes:

• population – the number of people, shops, businesses, visitors, etc
• robustness – the adaptability of the physical environment
• intensity – the concentration or density of activities and services
• mix – the variety and complexity of activities, developments, etc
• engagement – the degree to which the environment has an expression of local culture and history, linking to the identity and uniqueness of the place.

Each place will have its own mix of these ‘success’ factors, the combination leading to high value outcomes such as economic activity and the generation of local employment; healthy and safe communities; and a diversity of services and activities that will reduce personal travel requirements. He argues that individual developments can improve their own economic value by ensuring they contribute to the mix of factors, and seek to overcome any weaknesses. For example, if an activity centre has a very narrow population profile, such as a predominance of one demographic group, a new development could aim to include a different mix or residential types to attract a new demographic: the resulting more complex mix of population can support a wider range of businesses over a greater time period, leading to a more dynamic and interesting urban environment and a greater value for the development (Axford, 2002).

6.0 DESIGN INDICATORS

The design indicators which could be considered to measure effectiveness of the transport oriented development include:

• efficiency and accessibility of public transport
• level of user comfort and public safety
• legibility of urban node and its relation to transport infrastructure
• intensity of use, density of development
• range of activities and occupation types
• range of residential models
• level of synergy between the projects and activities within the node
• opportunities to develop local character specific to local cultural and heritage assets.

7.0 DESIGN DIRECTIONS

There are a number of guidelines for the design practitioner that can assist in forming design briefs for individual projects, as well as entire urban nodes. They include:

• Create a clear system of pedestrian links within approximately a 500m radius, concentrated on station or modal interchange.
• Form new or enhance existing public ‘place’ to extend the role of transport node and support community activities such as formal and informal meetings, clubs, cultural activities, etc.
• Maximise the range of uses and densities around the transport node.
• Ensure a range of activity and use types are provided – such as small to large shops; student accommodation through to family and retirement housing, etc.
• Create an attractive and legible hierarchy of urban forms.
• Establish the concept of principal frontages to resolve accidental mix of fronts and backs of developments.
• Maximise perception of public safety through the adoption of defensible spaces techniques with particular attention to overlooking and interaction with public access and activity spaces.
• Facilitate the easy exchange between alternative movement systems – so provision of bike paths and cycle storage near stations, etc.
• Facilitate the transfer of car users to public transport system.
8.0 CONCLUSION
Sustainability needs to be understood as a complex interaction between the community and the built environment. Successful transit oriented developments will provide the physical resources for a diverse population and range of uses. This article has only provided a very brief survey of the design indicators and directions that should identify successful transit oriented development. There are already many detailed guides available (for example Cervero, 1993; English Partnerships, 2000) and discussions examining the inter-relationship of the physical and non-physical elements of a healthy urban environment (for example, Hawken 1999 and Koolhaas 2001).

There is clearly a need for further work specific to the Australian context. There is a growing body of evidence which suggests that developments that do respond to the challenge of designing for a complex and sustainable outcome, will reap the reward of enhanced values as the community becomes ever more discerning about the quality of the urban environment.

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BIOGRAPHY
Andrew Olzeweiski is an architect and urban designer involved both in commercial and research aspects of the field of urban design. He is a Director of a National Consultancy firm, urbis Pty Ltd and Program Director of the Urban Design and Education Program at the UNESCO International Centre for Engineering Education. He is a co-author of the National ALGA Policy Designing Competitive Places. He has led a series of international urban design studios concentrating on key transport nodes of Melbourne (Footscray, St Kilda Junction, Richmond Station). In his commercial practice he is involved in some of the most significant transport related projects, such as the new port and associated city of Luchaoang, Shanghai, China.