

CHAPTER 6

INTEGRATED SOLUTIONS

The purpose of this chapter is to examine how the principles described in Chapter 4 and the measures set out in Chapter 5 can be used in different situations. The aim is to provide, through examples, some vision of what environmentally adapted Main Streets might look like.

In Chapter 2 a categorisation of Main Streets was proposed which produced 15 different situations. As it is impractical to address them all, three hypothetical situations are examined in this Chapter. They are:

- Width of reservation 20 metres, small centre (core less than 400 metres) and moderate traffic function (7,000 vpd);
- Width of reservation 30 metres, large centre (core more than 400 metres) and moderate traffic function (4,000 vpd); and
- Width of reservation 40 metres, large centre (core more than 400 metres) and a local traffic function (5,000 vpd).

Assumptions have been made for each situation. They relate to problem identification, performance indicators, objectives, strategies and implementation measures.

The case studies are suggestive of typical conditions for country towns. It must not be assumed that the solutions presented are necessarily the most appropriate in a real situation. Each situation is unique and requires individual study and community involvement.

The hypothetical studies are not complete; more data should be available than could be included in this overview.

It has also been assumed that public utility services and stormwater drainage facilities are adequate and in good condition. It is important, in developing proposals, to plan well in advance for the upgrading of such services to avoid costly restoration and disruption to completed works at a later date.

For each study there is a brief description of the Main Street and a plan showing its location in relation to the town. The main problems are identified.

It is assumed in all cases that there is no significant junction of regional routes in the centre itself.

Introduction

Assumptions

Performance indicators

Performance indicators are given for the following variables:

- width of reservation, carriageway, traffic lanes and footpaths.
- Vehicle speed in the core zone and in the approach zones close to the core. It is important to identify not only the mean speed, but also the maximum speed recorded and the 85 percentile speed (V85). Vehicle speeds can vary during the day and should be observed at times of pedestrian activity. It is assumed that the speeds included in the insert boxes apply to times of average pedestrian activity.
- The pedestrian frontage is further divided in intensive and low level of pedestrian activity. Intensive activity normally occurs in the core zone where there is continuity in shopping frontage; low level activity occurs at outlying shops interspersed with other land uses and secondary retailing areas.
- Traffic volumes need to be known at both the pedestrian and vehicle peak hour. Data are needed on vehicles, pedestrians crossing (all types), jay-walkers and on jay-runners in particular. Separate information on pedestrians is normally needed for segments of about 200 metres, but this is ignored in the examples.

'Each situation is unique and requires individual study and community involvement.'

- Traffic composition is important in order to detect the proportion of heavy vehicles. This, too, can vary during the day (which is not shown).
- The peak hour for vehicles and pedestrians need to be recorded separately.
- The activity function is expressed in the length of pedestrian-oriented, vehicle-oriented frontage and a combination. Vehicle-oriented frontage is defined as frontage with drive-in facilities.
- Accident data need to be taken over a period of three years or more as before and after comparison on a yearly basis is not meaningful. A distinction should be made between fatalities, injuries and property damage (unreported minor accidents remain a problem for the analyst).
- Information on the method of parking is necessary; and
- Access for service vehicles, buses and taxis should be identified.

Levels of consideration

There is a need to consider environmental adaptation in both a broad and a specific context. At the broad level, attention can be given to establishing speed and activity profiles and any spill-over effects can be addressed. At this level, any chan-

ges to zoning or development control should also be considered.

At the specific level, particularly in the core zone where shared street space proposals may be contemplated, a range of

measures must be considered and the implications assessed.

In the following examples, three options are outlined in which different measures are used. There will be different consequences in detail which are not further analysed.

Indicative costs

In order to provide an indication of comparative costs, some estimates (1992 dollars) are given.

It must be stressed that the estimates are based on the use of materials most commonly specified and do not allow for alteration of utility service mains or cables and stormwater drainage facilities. Such items will significantly affect the estimates and need to be considered on a site-specific basis. It should further be stressed that in actual situations much care must be given to engineering details, such as visibility, safety and construction aspects.

Legend to diagrams

	<i>Pedestrian-oriented - Intensive</i>
	<i>Pedestrian-oriented - low level of activity</i>
	<i>Vehicle & Pedestrian-oriented</i>
	<i>Vehicle-oriented</i>
	<i>Legal pedestrian crossing</i>
	<i>Shared pavement</i>
	<i>Carriageway edge</i>
	<i>Parking bay edge</i>
	<i>Road reservation boundary</i>
	<i>Traffic dividing line</i>
	<i>Small traffic island</i>
	<i>Stopping sign</i>

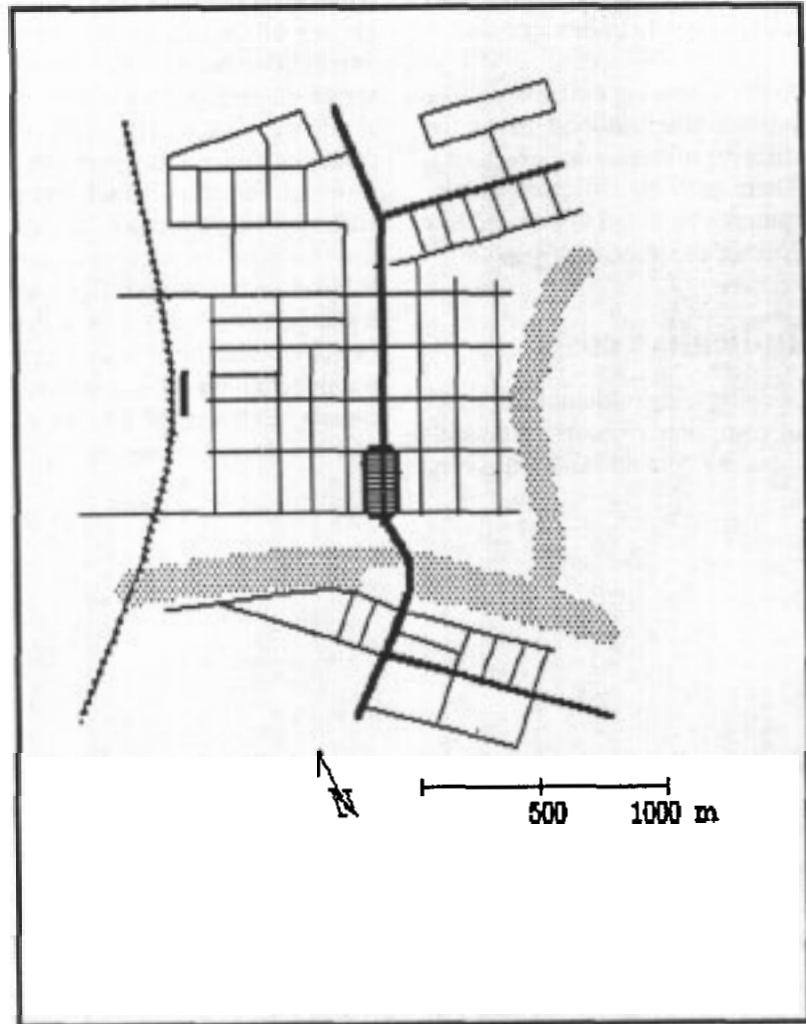
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DESCRIPTION

The town has a population of 2,000. The Main Street straddles a regional highway which carries 7000 vpd, of which about 80 per cent is through traffic. There are buildings with heritage value and the local business community has converted them during the last few years to tourist facilities. As a result, the Main Street is increasingly becoming a stop-over point for through traffic.

Traffic speeds are relatively high despite 60 km/h signs at the outskirts, and speed limits are exceeded, particularly at night. The highway carries heavy vehicles both at night and during the day, but an external by-pass is not contemplated for at least 10 years.

The commercial function is disjointed, but there is a core of about 200 metres which is used intensively by pedestrians. There is a zebra crossing in the middle of the core, but most pedestrians jay walk. There is a high incidence of jay-running.

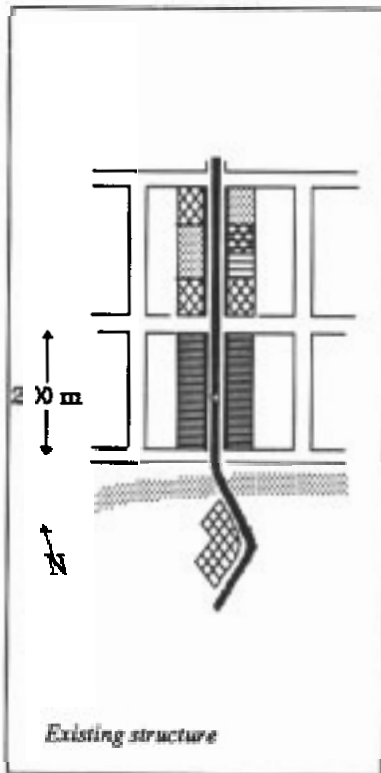


PROBLEM IDENTIFICATION

- Excessive traffic speeds at times of pedestrian activity;
- There is conflict between heavy vehicles and pedestrians crossing;
- Parking manoeuvring at peak visiting periods causes congestion;
- Inadequate parking space during peak visiting periods;
- There are development applications for new 'heritage' shops on the approaches to the core;
- The restoration of individual buildings has not created a unified Main Street image; and
- Lack of weather protection.

PERFORMANCE INDICATORS

Width		Vehicle-oriented	200 m
reservation	20 metres	Veh. & Ped.-oriented	50 m
carriageway	14 metres		
lanes	7 metres (2)		
footpaths	3 metres		
Speed	Core	Approach	
V average	40	60 km/h	
V ₈₅	45		
V _{max}	75		
	65		
	85		
Traffic Composition			
7% Heavy Vehicles			
Peak hour			
Vehicles	16.00 - 17.00		
Pedestrians	12.30 - 13.30		
Activity	average length		
Pedestrian-oriented			
intensive	200 m		
low	100 m		
		Traffic Volumes	
		at veh	at ped.
		peak hr	peak hr
		Vehicles	700
		550	
		Peds crossing	
		in core	100
		212	
		Jaywalkers	70
		130	
		Jayrunners	19
		20	
		Vehicle Accidents (3y av)	
		Fatalities	1
		Injuries	10
		Property	18
		Parking	
		Parallel	
		Off-street parking 'remote'	
		Veh. Access	80% frontage



OBJECTIVES

- To create a safe environment for all Main Street users;
- To provide additional on-street parking nearby and to require off-street parking as part of any development proposal;
- To concentrate retailing in the core;
- To enhance the identity of the centre; and
- To provide weather protection consistent with the heritage character.

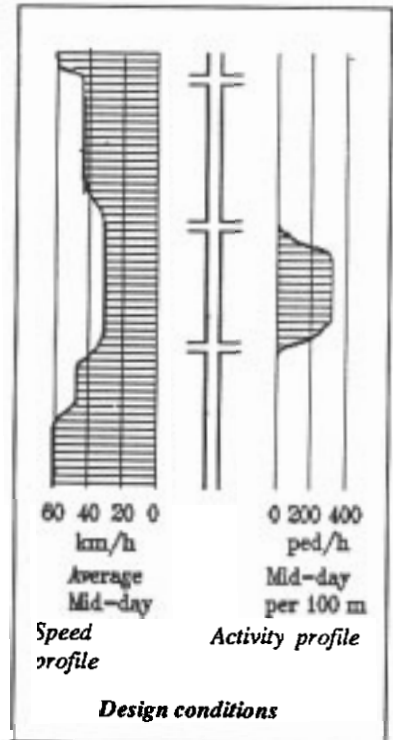
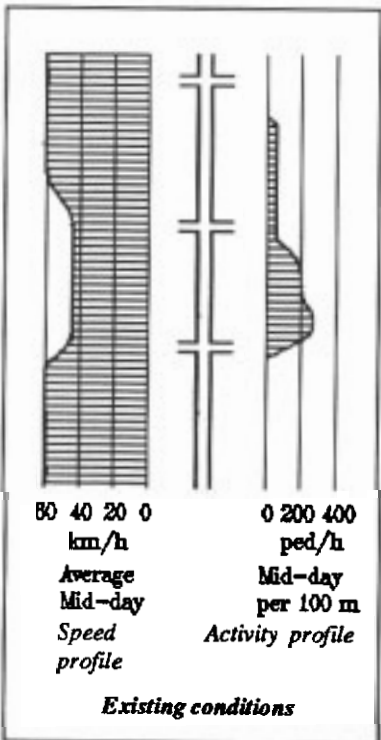
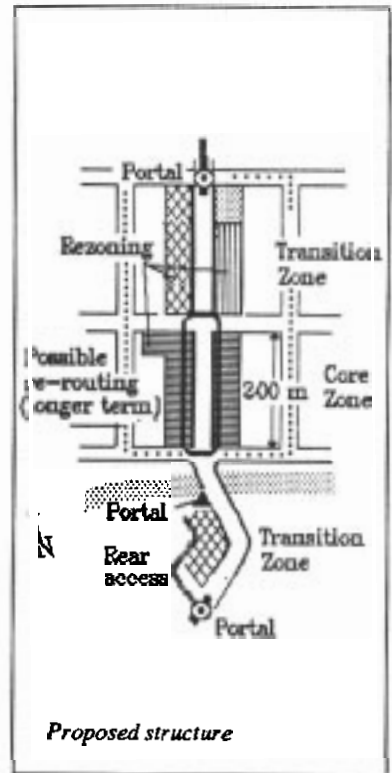
ASSUMPTIONS

It has been assumed that there may be an opportunity to reroute the heavy vehicles, but the options shown do not depend on this.

Alternative assumptions have been made regarding the scope for modifying the existing zoning, the probability of further development within the core zone, and funds available for adaptation.

STRATEGIES

In all options safety considerations are paramount. The speed profile is to be lowered and portals are introduced to alert the driver to the need for a change in driver behaviour. Changes in zoning are also proposed in the transition zone to ensure that no further pedestrian generating activities will occur. There may be an alternative route for heavy vehicles, but this may have spill-over effects which require further study.



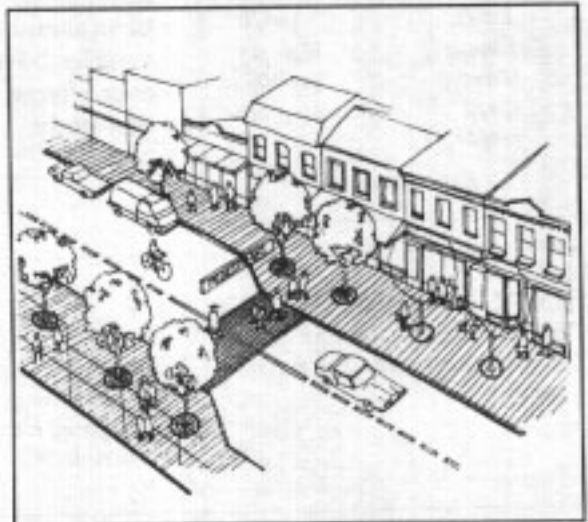
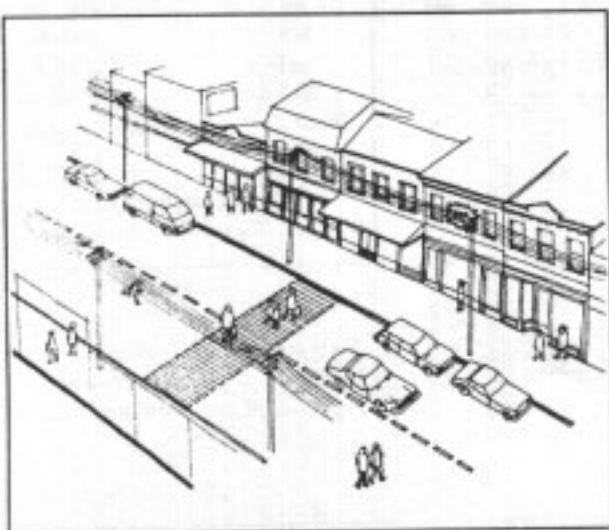
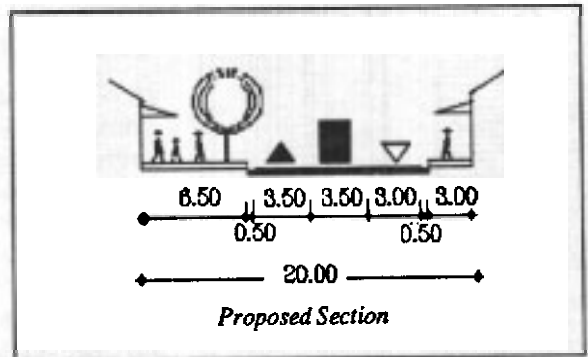
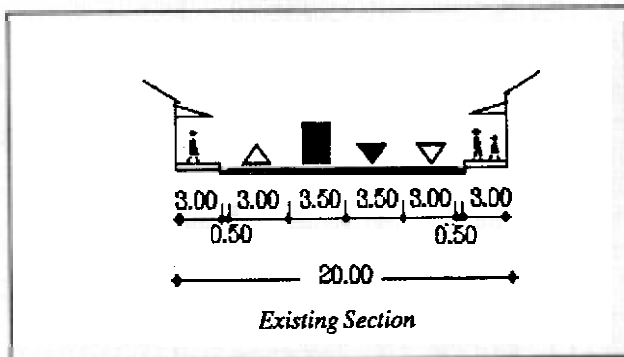
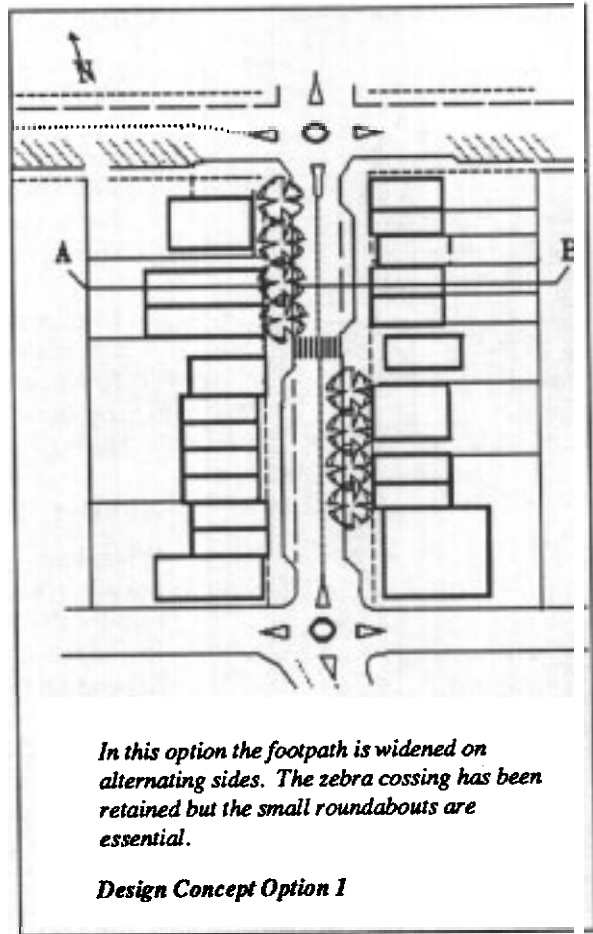
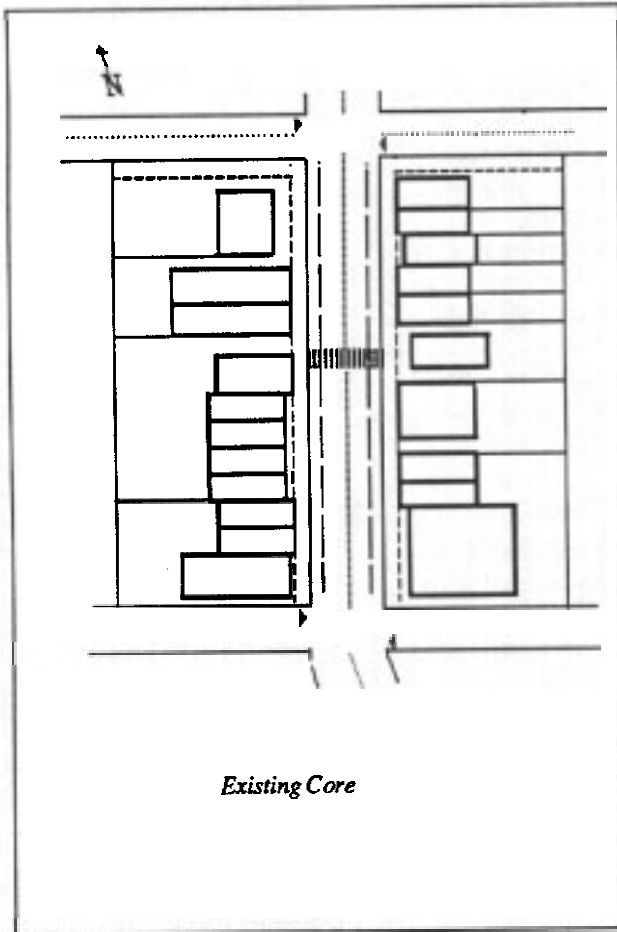
IMPLEMENTATION

Speed reduction through portal development should be given priority.

A Development Control Plan including a Local Area Traffic Management Plan should be prepared for the centre and its surrounds.

On the basis of this Plan, a refurbishment plan for the core zone is prepared and implemented.

W=20m



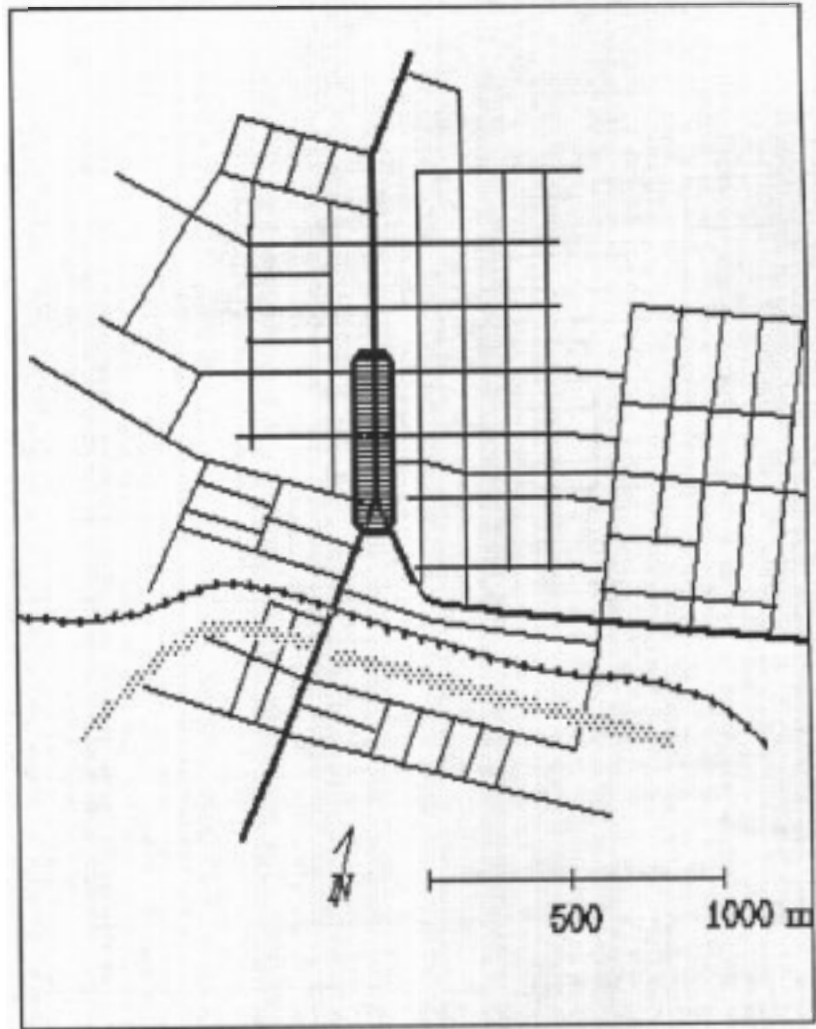
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DESCRIPTION

The town has a population of 4,500 and is a regional centre in a rural district. It is strategically located in relation to the inter-regional rural transport networks and is likely to remain a strong centre. The Main Street runs through the middle of the town and has both a major traffic and commercial function.

The Main Street carries 4000 vpd and about 20 percent of this traffic is regional through traffic. Heavy vehicles are a concern but there may be an alternative route for such vehicles.

The commercial function is compact and the retail frontage is about 500 metres long. The core of the centre is 200 metres long and intensively used by pedestrians. There is a considerable amount of jaywalking but vehicle speeds are relatively low, partly because of angle parking in the Main Street which causes friction to traffic.

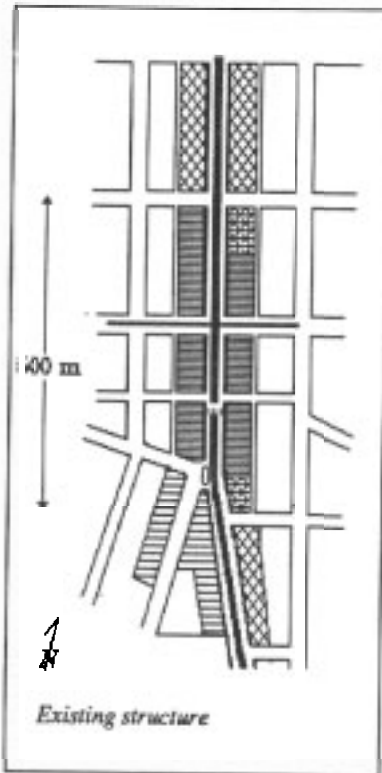


PROBLEM IDENTIFICATION

- The heavy vehicles do not mix with the pedestrian function of the street;
- Crossing distance for aged people;
- High incidence of accidents with property damage, associated with angle parking;
- Business is affected by the fumes from rear parked vehicles;
- The footpath width is restricted by the rear of parked vehicles;
- There is confusion at four-way intersections; and
- Lack of a town focus and unattractive pedestrian environment.

PERFORMANCE INDICATORS

Width		low	150 m
reservation	30 metres	Vehicle-oriented	300 m
carrageway	24 metres		
lanes	7 metres (2)	Traffic	at veh
footpaths	3 metres	Volumes	peak hr
		Vehicles	620
		Peds crossing	at ped.
		in core	240
		Jaywalkers	102
		Jayrunners	4
		Property	37
Speed		Vehicle Accidents (3y av)	
V average	Core 25	Fatalities	1
V ₈₅	Approach 50	Injuries	8
V _{max}	30		
	56	Parking	
	80	Angle	60 degrees
		Off-street parking	nearby
Traffic Composition		Vehicular Access	from rear
5 % Heavy Vehicles			
Peak hour			
Vehicles	16.45 - 17.45		
Pedestrians	12.30 - 13.30		
Activity	average length		
Pedestrian-oriented			
intensive	500 m		

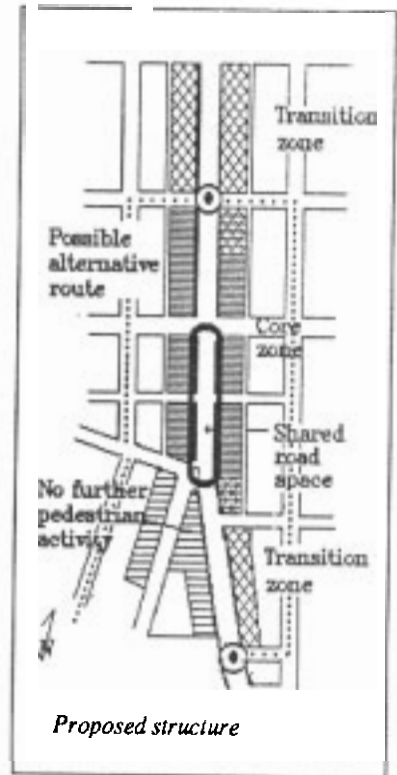


OBJECTIVES

- 1 Re-route heavy vehicles
- 2 Reduce vehicle speed
- 3 Reduce angle parking
- 4 Improve pedestrian crossing
- 5 Eliminate confusion
- 6 Improve the quality of the environment

ASSUMPTIONS

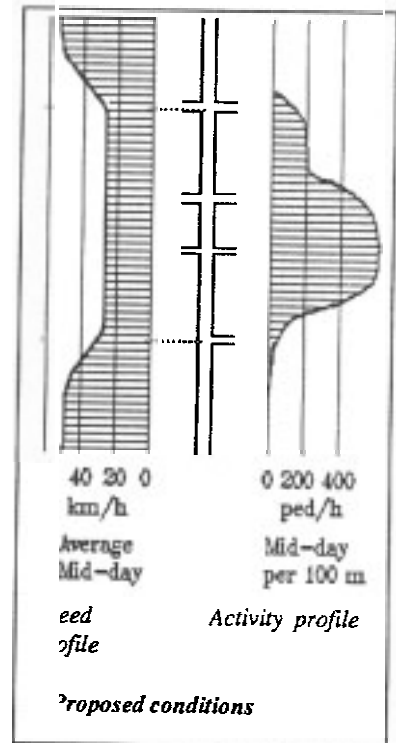
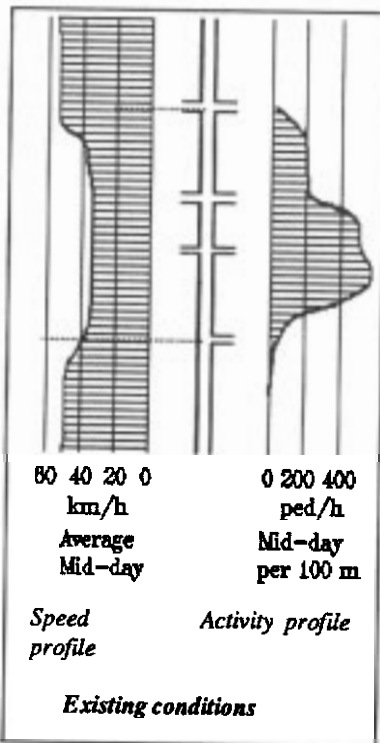
It is assumed that there is an alternative route for heavy vehicles without significant impact on the environment. There is a considerable amount of pedestrian activity in the core zone. It is assumed that traffic volumes and the proportion of through traffic are such that the creation of a shared road space for a length of 200 metres at low speeds is feasible.



STRATEGIES

Lowering and smoothing out of the speed profile through entry portals and managed friction in the core zone. Reduction in the number of intersections.

No further pedestrian-generating activities in the transition zone; any further expansion of retailing through lateral development, especially arcades.



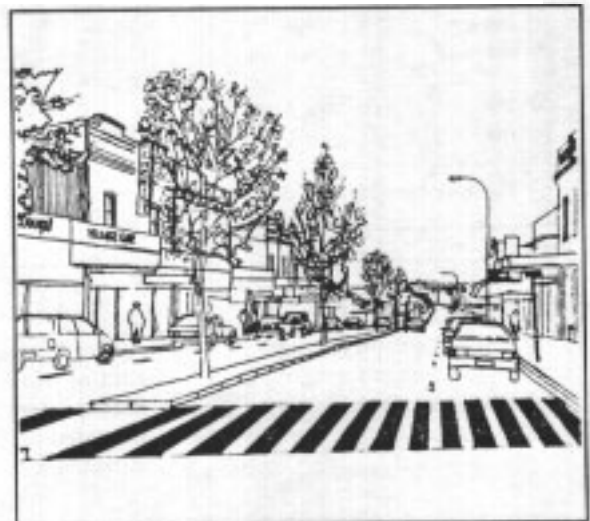
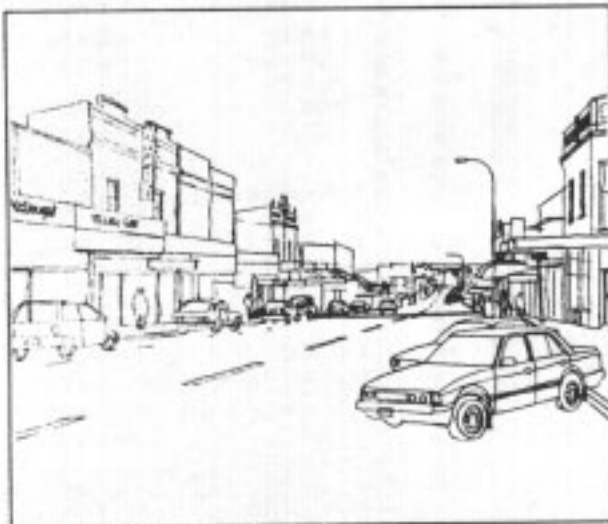
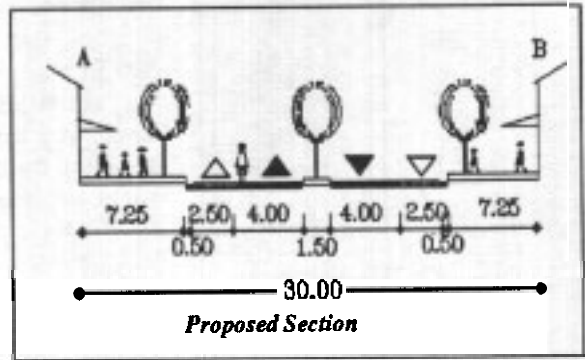
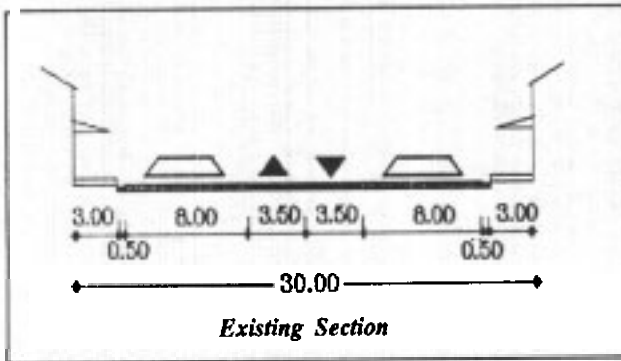
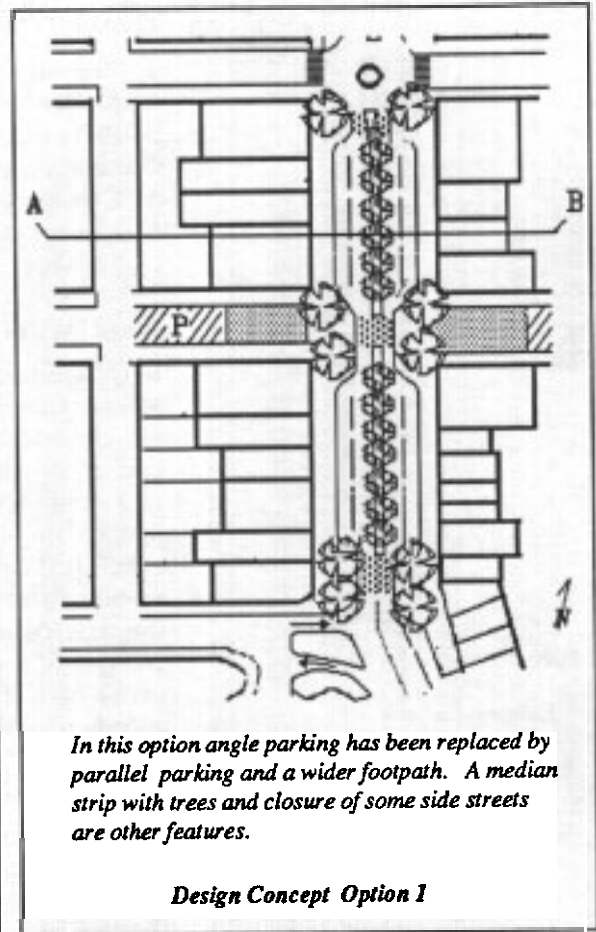
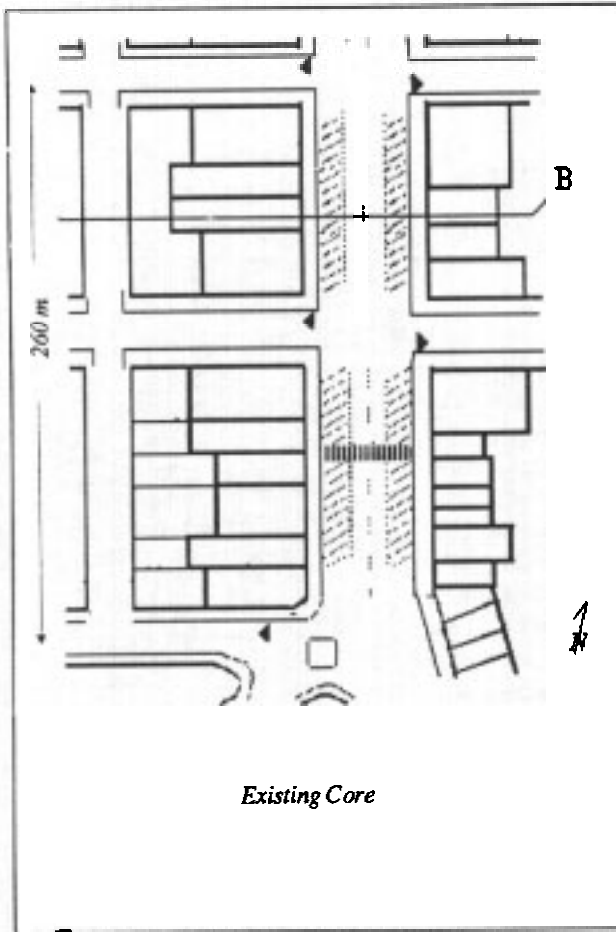
IMPLEMENTATION

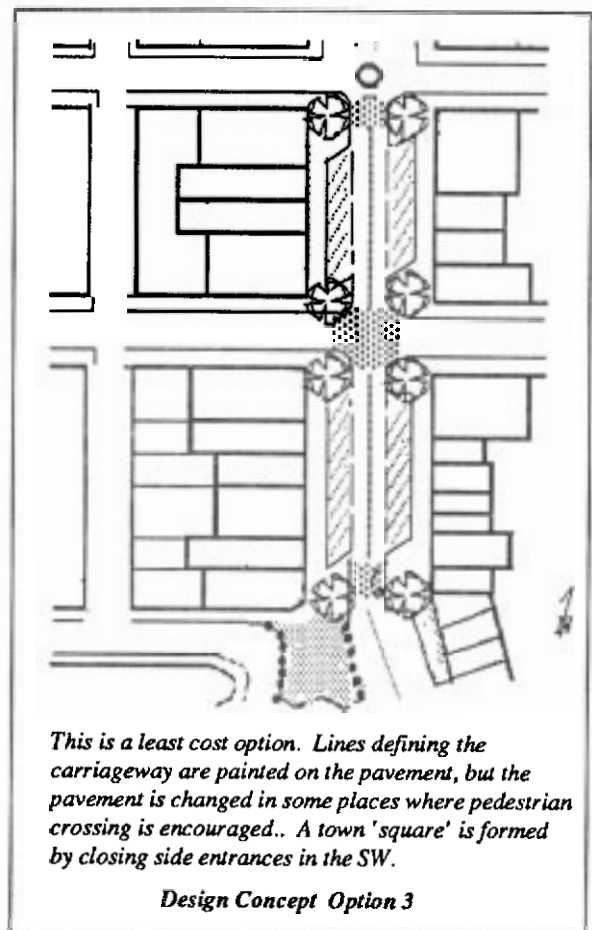
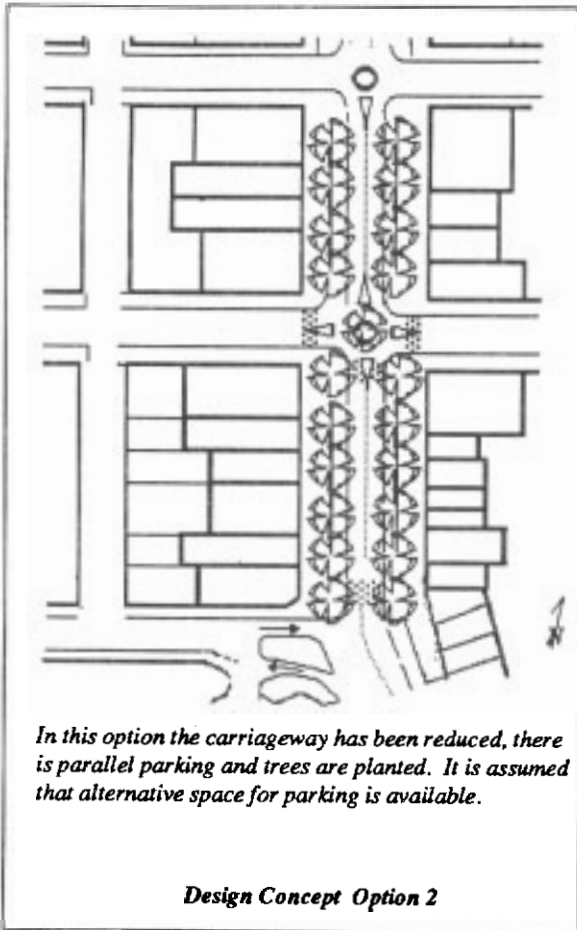
Portal development prepares drivers for changed conditions and should be given priority.

A Development Control Plan including a Local Area Traffic Management Plan should be prepared for the centre and its surrounds.

On the basis of this Plan, a refurbishment plan for the core zone is prepared and implemented

W=30m





OPTIONS FOR THE CORE ZONE

In all options for the core zone, vehicle speeds are reduced and pedestrian crossing is facilitated. The quality of the environment is also enhanced.

In the first option, angle parking on one side is converted to parallel parking and the footpath is widened.

In the second option, angle parking is replaced by parallel parking, the footpaths are widened and street trees are used to establish a shady and attractive streetscape.

In the third option, existing kerb lines and angle parking are retained, footpaths are extended where there are pedestrian crossings and a town 'square' is created through a street closure.

INDICATIVE COSTS

Item	Unit	Option		
		1	2	3
C1	Chanellisation	30,000	30,000	
D7	Roundabout	90,000 (1)	160,000 (1)	90,000 (1)
D10	Raised pavement in intersection		90,000 (1)	
D 12	Tree planting in median	34,000 (200m)		7,000 (1)
D18	Side street closure	60,000 (2)		
D19	Raised pedestrian crossing	25,000 (1)	50,000 (2)	50,000 (2)
D21	Carriageway narrowing		250,000 (500m)	
D23	Tree planting in extended kerb			60,000
D 26	Tree planting	2,000		2,000
	Town square			60,000
	Road pavement adjustment	10,000	10,000	10,000
	Signs, line marking	5,000	5,000	5,000
Total		\$306,000	\$595,000	\$284,000

Additional items for consideration

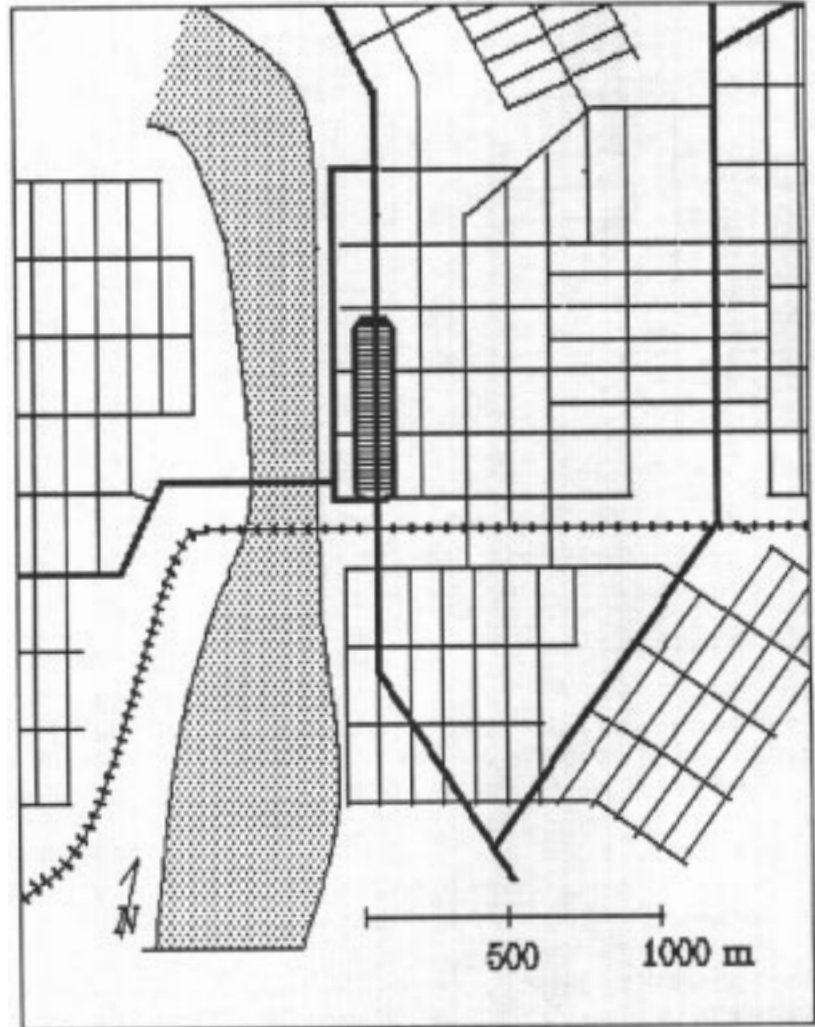
- Replacement/alteration of utility mains and services
- Augmentation/alteration of stormwater drainage
- Street lighting
- Street furniture, bus shelters, awnings etc.
- Replacement of balance of footpaths with paving blocks
- Condition of existing road pavement.

DESCRIPTION

The town has a population of 20,000 and is the major regional centre in a rural district. It is also a historical town with a number of heritage buildings in the Main Street. An internal by-pass has removed through traffic from the Main Street.

The Main Street is 40 metres wide and carries 5000 vpd which is mostly local traffic. The only heavy vehicles are vehicles serving the centre. There are opportunities for redirecting some traffic, but the street will continue to perform an important local traffic function.

The commercial function is elongated; the retail frontage is about 700 metres long. The core of the centre is 400 metres long and intensively used by pedestrians but not pedestrian-friendly. The Main Street is forty metres wide and difficult to cross, especially for elderly people. Visibility of vehicular traffic is poor.



PROBLEM IDENTIFICATION

- There are no clearly identified pedestrian crossings and older people do not feel safe crossing
- High incidence of accidents with property damage, associated with 2 moving lanes in each direction and right-angle parking in the median;
- There is no quality in the pedestrian environment: the street is wide and unattractive;
- The space is almost wholly devoted to vehicles; the footpath is just over 3 metres wide.
- There is a considerable amount of congestion arising from searching for a parking space which is insufficient at peak periods;
- There are individual buildings with heritage value, but a lack

PERFORMANCE INDICATORS

Width
 reservation 40 metres
 carriageway 33 metres
 lanes 8.5 x 2 metres (4)
 footpaths 3 metres

Speed Core Approach
 V average 30 50
 V₈₅ 40 60
 V_{max} 60 80

Traffic Composition
 2 % Heavy Vehicles

Peak hour
 Vehicles 16.45 - 17.45
 Pedestrians 12.30 - 13.30

Activity average length
Pedestrian-oriented
 intensive 700 m
 low 200 m

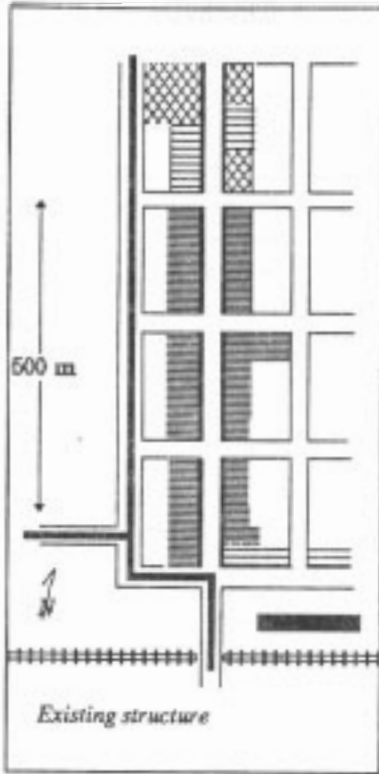
Vehicle-oriented 500 m

Traffic at veh at ped.
Volumes peak hr
 Vehicles 600 500
 Peds crossing
 in core 320 823
 Jaywalkers 200 420
 Jayrunners 30 25

Vehicle Accidents (3y av)
 Fatalities 1
 Injuries 12
 Property 79

Parking
 Angle (kerb) 60 degrees
 Right angle in median

Vehicular Access mixed
 mostly from rear



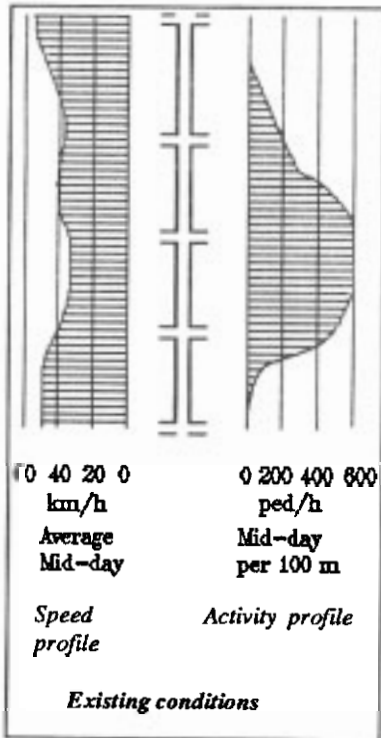
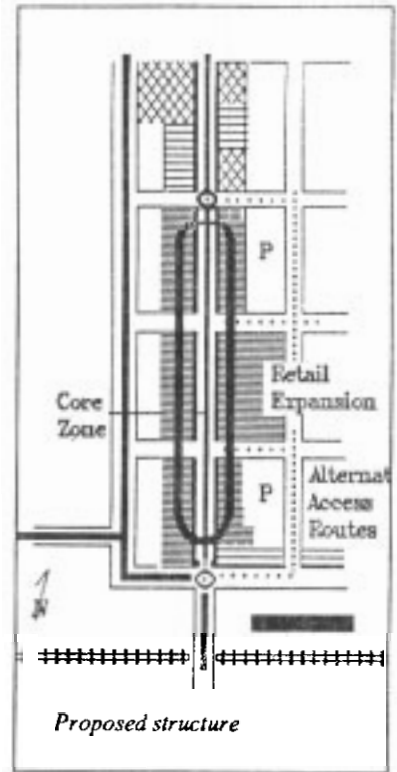
of focus and character in the road space.

OBJECTIVES

- 1 Improve pedestrian crossing
- 2 Reduce accidents
- 3 Concentrate the pedestrian activity
- 4 Reduce vehicle speed
- 5 Reduce the impact of vehicles
- 6 Enhance the quality of the environment

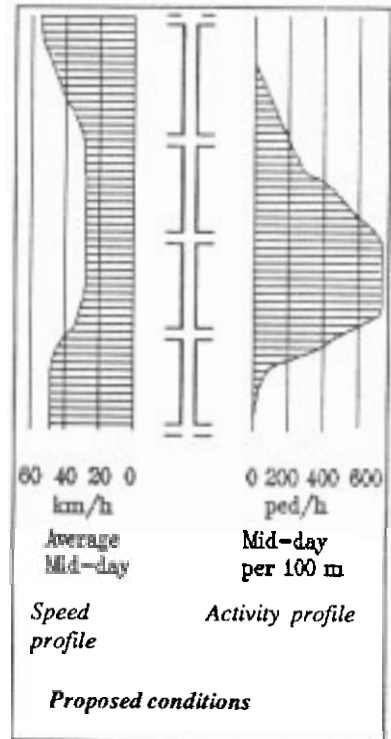
ASSUMPTIONS

It is assumed that any further traffic associated with the growth of the centre can be accommodated elsewhere and that the impact on traffic arising from any measures to improve the pedestrian environment can be managed through minor changes in the surrounding road network.



STRATEGIES

Reducing the width of the carriageway for vehicular traffic and widening footpaths. Improving pedestrian crossing by reducing the number of lanes to be crossed and by lowering and smoothing out of the speed profile through entry portals and managed friction in the core zone. No further pedestrian-generating activities in the transition zone; any further expansion of retailing through lateral development, especially arcades. Provision of further off-street parking spaces.



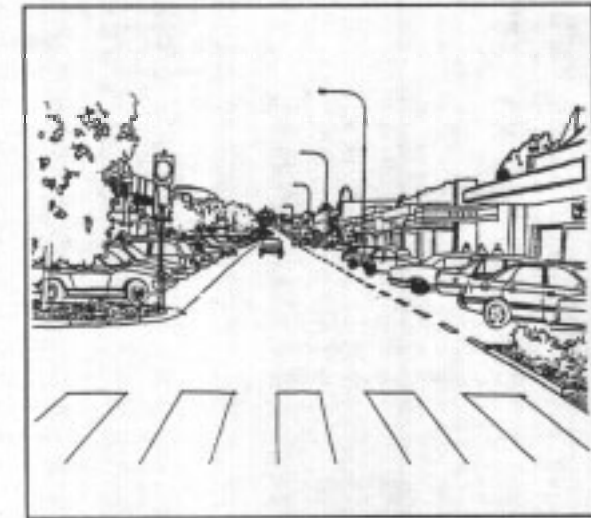
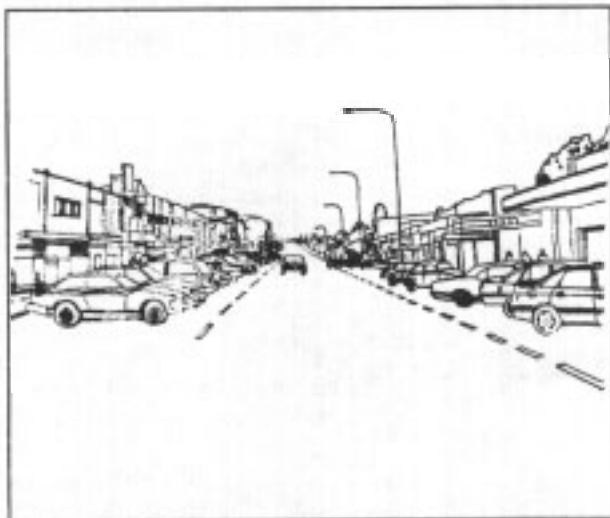
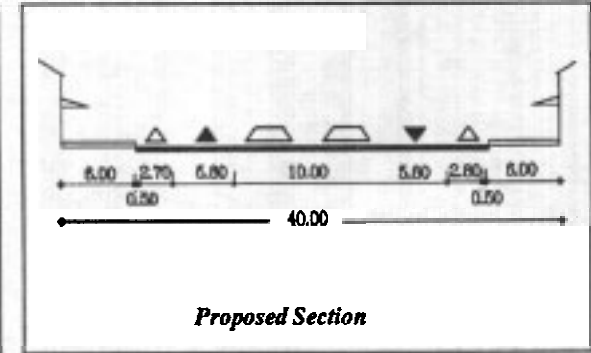
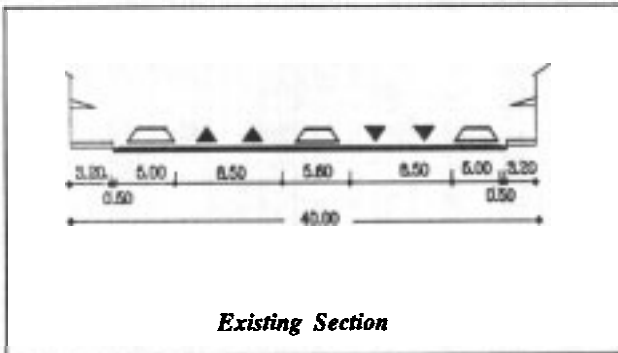
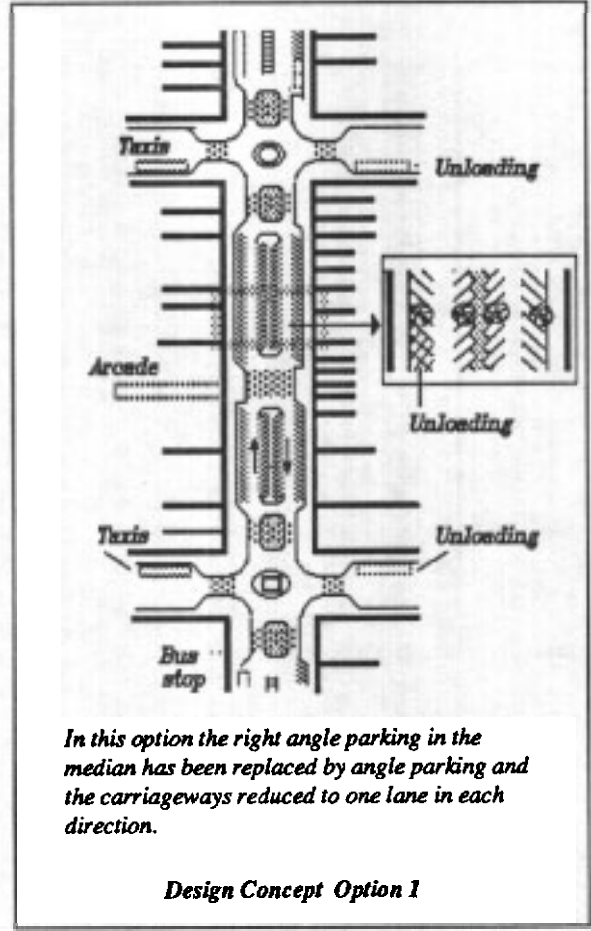
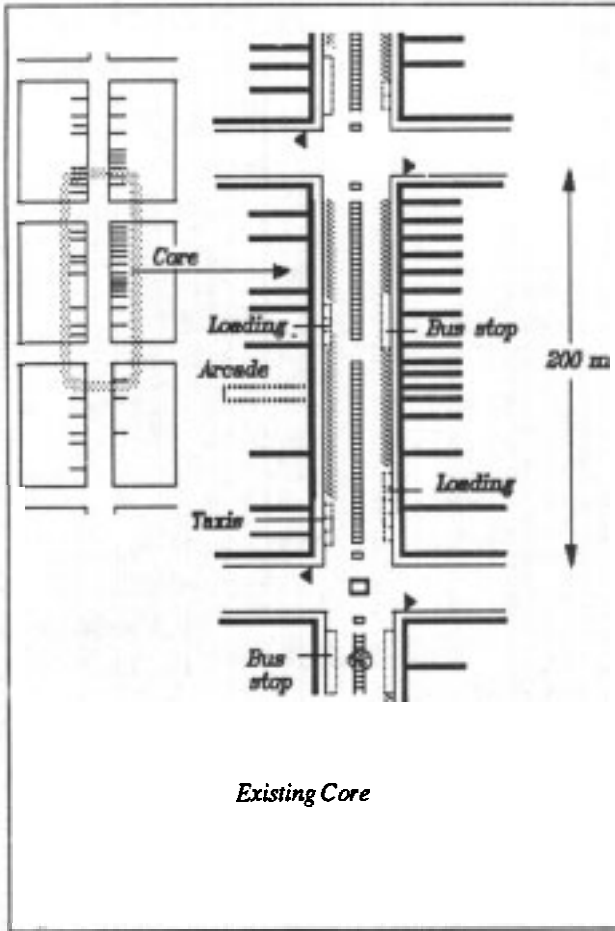
IMPLEMENTATION

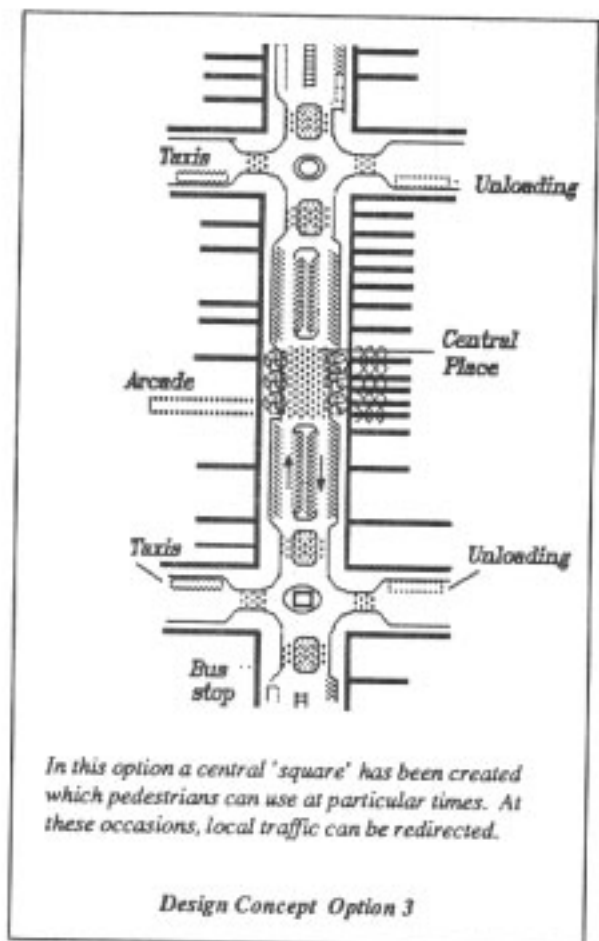
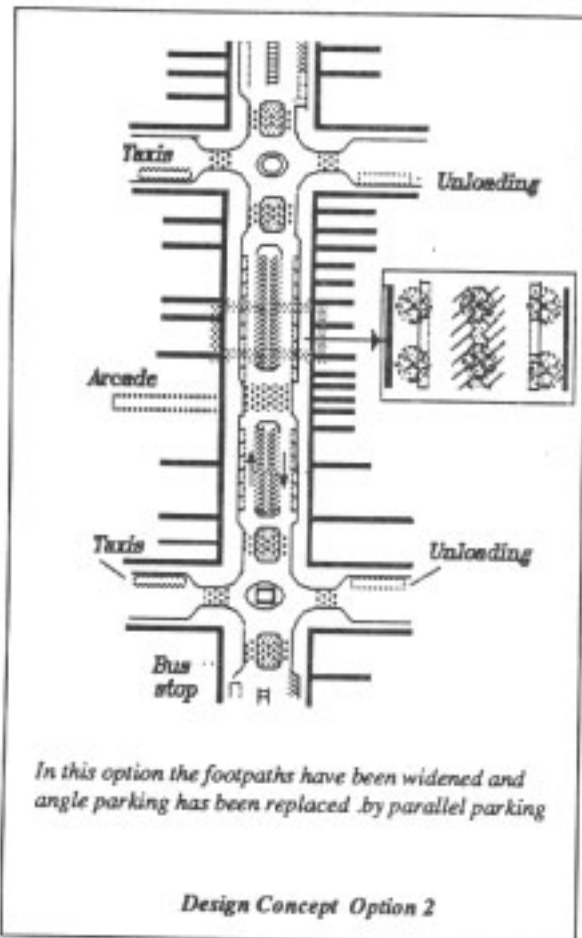
Portal development prepares drivers for changed conditions and should be given priority.

A Development Control Plan including a Local Area Traffic Management Plan should be prepared for the centre and its surrounds.

On the basis of this Plan, a refurbishment plan for the core zone is prepared and implemented..

W=40m





OPTIONS FOR THE CORE ZONE

In all options for the core zone, the two moving lanes are replaced by single lanes, vehicle speeds are reduced and pedestrian crossing is facilitated. The quality of environment is also enhanced.

In the first option, right-angle parking in the median is converted to parallel parking.

In the second option, angle parking near the footpaths is replaced by parallel parking, the footpaths are widened and street trees create a shady and attractive streetscape.

The third option a central space is created for a town 'square' which can be used for pedestrians at special times. Partial Main Street closure would apply at such times.

INDICATIVE COSTS

Item	Option		
	1	2	3
D7 Roundabout	200,000 (2)	200,000 (2)	200,000 (2)
D19 Raised pedestrian crossing	270,000 (1)	270,000 (1)	240,000 (1)
D21 Carriageway narrowing	100,000 (200m)	240,000 (600m)	240,000 (600m)
Landscaping	50,000	50,000	50,000
Town square			60,000
Road pavement adjustment	40,000	40,000	40,000
Signs, line marking	10,000	10,000	10,000
Total	\$670,000	\$810,000	\$940,000

Additional items for consideration

- Replacement/alteration of utility mains and services
- Augmentation/alteration of stormwater drainage
- Street lighting
- Street furniture, bus shelters, awnings etc.
- Replacement of balance of footpaths with paving blocks
- Condition of existing road pavement.

CHAPTER 7

PUBLIC INVOLVEMENT AND DECISION MAKING

Effective public involvement and consultation in the development of traffic management schemes remains an issue. However, it is a matter that needs to be resolved early in investigation stages if there is to be broad community support for the eventual proposals.

The situation can be very difficult in the case of Main Street projects because of the number of players involved with many of them having high financial interest in the success of the scheme. The scheme is likely to affect shop keepers, owners and tenants, office and shop-workers, delivery vehicle drivers, tourists and visitors and the citizens of the town, both young and old. Consideration must also be given to public transport, access for emergency vehicles, refuse collection, street

and gutter cleansing and the maintenance of street furniture and landscaping.

Striking the proper balance between the often competing and sometimes conflicting interests of all of these groups will therefore require careful consideration.

It is also essential to consider carefully the appropriate level of community consultation commensurate with the particular project and to budget for the cost of this phase of the investigations. This is a matter that is often overlooked in planning the project. If the level of consultation is not selected carefully and the costs built into the project budget, then cutbacks may have to be made during the construction phase, which may reduce the quality of the project.

Introduction

Setting Objectives

The most important initial step in minimising problems and gaining acceptance from the local community is to identify and clearly define the objectives of the scheme and provide some vision for what might be achieved.

It is also important to place these objectives into their relative priority and to reach some agreement with the community on this, as it provides the basis for comparing and evaluating alternatives later. Without such a clear understanding, assess-

ment of proposals will always be subjective and may be divisive.

Some of the objectives applicable to Main Street projects are listed in Table 7-1. The list is not meant to be exhaustive and the objectives used should be tailored to suit the local circumstances.

The setting of objectives follows the initial collection of data and an assessment of the need for a scheme. The data requirements are summarised in Table 7-2.

Table 7-1

Examples of Study Objectives for the Environmental Adaptation of Main Streets

- 1 To create an environment within the Main Street precinct which will encourage motorists to drive with care and an awareness of safety of other road users such as pedestrians and cyclists.
- 2 To improve the physical environment by reducing traffic noise, vibration and vehicle generated air pollution, and to improve the visual appearance of the Main Street.
3. To reduce the number and severity of pedestrian and vehicle accidents in the Main Street.
4. To reduce the volume of through traffic and unnecessary heavy vehicular traffic using the Main Street.
5. To reduce the speed of traffic using the Main Street to a level commensurate with the pedestrian functions of the shopping centre.
6. To encourage the development of land uses within the core of the Main Street precinct which are compatible with the higher level of anticipated pedestrian activity.
7. To maintain an acceptable level of accessibility for all residents, customers, emergency vehicles, delivery and maintenance services and public transport within the Main Street precinct.
8. To increase the availability of on-street parking in the Main Street close to the shops and businesses.
9. To improve and/or encourage the opportunities for street-wide social contact within the Main Street.
10. To obtain a vehicle free environment for pedestrians and to improve the use of public space for social interaction.
11. Ensure that the cost of the project is affordable within the Council's budget and that, if necessary, the works can be provided in stages.
12. Ensure that any construction works required as part of the scheme incorporate a high level of landscaping and that as far as possible the works blend into the existing streetscape or the theme adopted for the project.
13. Encourage improvements to the buildings and structures in the Main Street in keeping with the theme adopted for the project.

Table 7-2

Initial Study Data Requirements

<p>PHYSICAL ENVIRONMENT Traffic Data Accidents Volume Movement patterns Composition Speed Traffic generators Public transport routes Parking Pedestrian movements</p> <p>Built environment Land uses</p>	<p>Existing development controls Road condition Existing traffic controls Streetscape and street quality Street lighting Street furniture Stormwater Drainage Heritage assessment</p> <p>SOCIAL ENVIRONMENT Perceived problems Community concerns and issues</p>	<p>Objectives and priorities- Street activities Community characteristics</p> <p>ECONOMIC ENVIRONMENT Viability of Main Street businesses Property values Population and economic growth patterns Redevelopment potential</p>
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Community Consultation

Community participation in most local government projects is a multi-staged process. The impetus for a project usually comes from community concerns about some aspect of their environment. This concern can be registered through their elected representatives or directly to the Councils by personal, telephone or written submissions. It is usually a build-up of such representations that generates the need for action and this certainly is the case in Main Street projects.

The motivating issues in Main Street projects can be initiated by concerns such as:

- high accident rates
- traffic noise or pollution
- lack of parking and
- a deteriorating shopping environment.

The first stage in the community participation process is gathering of this initial information which can then be used in preparing a broad strategy for the development of a proposal. The second stage will generally be a more formally structured process and is explained later in some detail. The last stage involves the assessment of the completed project to see whether the community's concerns have been satisfied and the objectives set have been met.

Community feeling, pride and attachment can only come about if people have an opportunity to participate in shaping the future of their Main Street, the symbolic centre of the community.

Community participation is an essential feature of the process. It has the following purposes:

- Informing the community of the vision, nature and scope of the proposed investigations and of the opportunities for community involvement.
- Informing the community of the overall issues and the problems expected to be addressed.
- Identifying community concerns and perceived problems.
- Identifying any potential additional data requirements.

Efforts should be made to establish the views and aspirations of the 'silent' groups in the community. Care should be taken that the most vocal groups within the community are not over-represented in community participation programs.

Appropriately managed participation at this local level can result in useful information and responses to problems which planners initially regarded as unimportant.

Process

Effective community consultation is a two way investigation and learning process between the study team and the community. The process should be designed with this basic principle in mind.

It is a process of collecting and analysing the relevant facts, presenting the collected data, results and conclusions to the community and obtaining the views and responses of the community to the information.

Whilst the objective should be to ensure the views of all individuals, interest groups, agencies and other bodies are taken into account, it is also necessary to balance those views and needs to obtain a clear idea of the areas of agreement, of disagreement, and of compromise.

The extent of community consultation for each project should be appropriate to the particular circumstances. In general, this will depend upon the economic, social and environmental factors involved and on the degree of controversy likely to be generated for the project.

Data collected in the initial surveys will assist in establishing the type of public participation process to be used. It is expected that the process would be developed from the following techniques:

- Meetings with groups of interested business people such as the Chamber of Commerce, Apex and Rotary Clubs
- Public displays of data collected during the initial surveys with provision for comment from the community
- Issue of questionnaires, information brochures, etc.
- Street interviews
- Street walks
- Home interviews, postcard or other appropriate surveys
- Establishing an information or contact centre in the Main Street
- Regular local press releases
- Public meetings, discussion groups, seminars or workshops with key players and resident groups
- Ideas competitions
- Formation of a community advisory committee
- Innovative participation techniques.

In establishing the community consultation process it is important to remember that it will usually be difficult to generate responses in writing and that this part of the project can involve a large expenditure from the project budget.

It is therefore necessary to identify the likely costs of the techniques proposed to be used and to provide an appropriate amount in the budget. Also establish the time and resources to be allocated within the overall work programme.

The adopted consultation process should at least be sufficient to clearly establish the project objectives mentioned earlier and to ensure that the business people and the residents understand and endorse those objectives. Once this is achieved, the professional staff of the Council, or consultants, can proceed to develop solutions to the identified problems.

The extent to which the solutions are developed with the local community again depends upon the project budget and the degree of community consultation adopted.

It is obviously preferable for the solutions to be developed in regular consultation with the community. In a Main Street project however the interested community will be diverse and extensive and it will therefore be very time consuming and expensive to fully consult with it.

In simple schemes it may therefore be possible to develop the scheme and present it in the form of a public exhibition as solutions to the agreed objectives. This is obviously an economical way of producing a scheme but is open to the claim that it has been prepared by the Council and is not completely

"owned" by the people and stakeholders most affected.

In other cases, a representative committee could be used to develop the scheme with the Council staff or its consultant. This will be more time consuming and may prove to be more costly but is also more likely to be accepted as the community's solution.

Innovative participatory techniques, including the Delphi method of brainstorming, can also be used. Again, these involve time and resources, but they are effective in achieving community acceptance of schemes.

There are many variations of these methods and the Council must ultimately decide which to use in the light of the local political climate. In making such a decision it is important to remember that complete community support is most unlikely to be achieved; that compromises will almost certainly be needed and that the Council must eventually be the decision maker as it has to allocate the necessary funds.

Irrespective of the form of consultation used, the community should be advised of the nature and timing of the proposed works. It is likely that there will be disruption to vehicular and pedestrian traffic patterns and possibly business activities.

Whilst the aim will be to keep this disruption to a minimum, the public and the business community must have an opportunity to adjust their operations if possible. The works should, for example, be programmed to avoid commercially busy periods of the year or special events on the community's calendar.

Main Street Programme (NSW)

In 1989, the NSW Department of Planning released the Main Street Handbook as part of its Main Street Programme. This Programme was initiated to encourage local communities to do something to improve and revitalise their commercial centres.

Since its introduction, the concept has been taken up by a number of country towns and urban areas of Sydney. The Programme is driven by the local community and its success depends upon active partnership between local businesses, the Council and the Community. The Department of Planning acts as a catalyst and provides advice.

The Main Street Handbook is recommended reading as the matters encompassed by the Programme complement those addressed in these Guidelines. It also contains an excellent bibliography for further information on the five main features of its approach:

- Organisation
- Design
- Heritage Conservation
- Business Development
- Promotion

The Main Street Programme proposes a comprehensive approach to community consultation and participation in the revitalisation of the town centre.

The focus of these guidelines is on the Main Street and its adjoining land uses but does not address the issues referred to in this Report. There are therefore considerable advantages in combining the Main Street program with environmental adaptation.

Selection of the Preferred Scheme

When the issues have been identified it will be possible to prepare strategies to address them. Alternate schemes can then be developed by varying the emphasis on the strategies and using different techniques to implement the chosen strategies.

There are various ways of assessing the alternate proposals and for presenting the results to the community and the decision makers. It is necessary to ensure that the form of presentation is clear and understandable to this group which will generally include those who are unfamiliar with economic analysis and evaluation.

It is fundamental that all of the benefits and disbenefits of each scheme be identified and weighed against each other and against the defined objectives. Compromises and balancing trade-offs can then be made to arrive at the preferred scheme.

While a number of formal ranking procedures are available and used by some authorities, their rigorous use has not been widely adopted in the past. In many cases, programmes and projects have been based on a balance of formal procedures and professional judgement.

However with increasing demands upon the Council's and the government's resources, there is the need to justify the often large expenditure involved in projects and formal ranking and economic evaluation methods will be required to demonstrate the economic benefit of the selected proposal.

The traditional methods of economic evaluation which

may be used in ranking various proposals and developing a preferred programme of works are:

• *Benefit Cost Ratio (BCR)*

This method is often used in selecting a measure from a range of options as well as valuating the economic worth of an overall programme.

It is calculated by dividing the net present benefit (NPB) by the net present cost (NPC)

$$BCR = NPB/NPC$$

In the Main Street situation, assumptions must be made to obtain the NPB and can be based on the savings in such things as accident costs, reduced noise and fume pollution and increased business activity. The NPC will of course include the cost of the works, but should also consider the direct costs that can occur in a variety of items including increased travel time and relocation of some businesses.

• *Present Value (NPV)*

This is defined as the net present benefit (NPB) minus the net present cost (NPC)

$$NPV = NPB - NPC$$

It should be pointed out that cost-benefit analysis is not an optimising technique in itself. Rather it is up to the Council to ensure that all feasible solutions to the problems identified are considered in developing the Main Street project. The traditional systems approach is still useful in this regard, viz.,

- define the problem
- define the alternate solutions
- evaluate the alternatives
- select the best alternative

In evaluating the solutions, the proposals should be considered in relation to (a) internal effectiveness and (b) external impact.

The scheme must be feasible:

- functionally
- aesthetically
- financially and economically
- socially
- politically
- legally

For ease of comparison the various factors and their related impacts can be best set out in a tabulated form. This can allow the overall picture to be seen. Figure 7-1 shows a possible format for such a tabulation.

This treatment is suitable for an initial assessment and assists in selecting 'short-listed' options. No attempt has been made in this example to provide a weighting to the assessment criteria as this involves value judgements which must be made by elected representatives.

As stated earlier, costs will not be the only factor that will influence the selection of a scheme. Potential benefits are also important. Some may be short-term benefits, while others may be long-term benefits. Costs and benefits may not affect sections of the community equally.

Treasury requires that benefit-cost analyses be used in assessing the value of projects attracting Government funds. However, the benefits and costs associated with a Main Street project will often include matters which will be difficult to value realistically. It is therefore suggested that a better overall result will come from the use of a Planning Balance Sheet.

The Planning Balance Sheet is an extension of cost-benefit

analysis to the evaluation of comprehensive proposals (Litchfield, N., Kettle P. and Whitbread, M. (1975) Evaluation in the Planning Process, Pergamon Press, London). It estimates the costs and benefits for a wide range of public investments, sector by sector, for each plan alternative. Where they cannot be computed in monetary terms, the approach calls for non-monetary quantitative terms. Where costs and benefits are intangible, estimates are made or the results are listed as unknown.

The important feature of the approach is that all possible impacts are shown either as a cost or a benefit (even if not quantifiable), the items are listed separately for producers

(developers, public agencies etc.) and consumers (displaced users, new users, surrounding owners, the public at large etc.) and that for each item there is a balance and determination of advantage in respect of the alternatives considered. This approach was followed in the Leitch Report (1977), (Report of the Advisory Committee on Trunk Road Assessment, HMSO, London).

Monitoring and Post-Facto valuation

It is important to monitor the project as it is implemented to ensure that it is meeting its objectives. Where there are unexpected and unacceptable impacts from the works the


desirable changes should be identified and assessed.


The evaluation process will also provide the Council and, if adequately documented, other Councils with useful information on the measures used which may assist in the development of other schemes.


The process will involve repeating some of the surveys conducted in the preliminary stages. It can also include surveying the community for its views on the effectiveness of the scheme. It is important, however, that an adequate settling in period is allowed to permit traffic and business to re-establish and so avoid reaching biased conclusions.

Figure 7-1 Comparison between Alternatives

ASSESSMENT CRITERIA	OPTION 1 Entry roundabout and footpath widening	OPTION 2 Entry thresholds and raised pavement treatment	OPTION 3 Entry thresholds and angled parking
Reduce through traffic volume	●	●	●
Reduce heavy vehicle usage	●	●	●
Improve pedestrian crossings	●	●	●
Increase Main Street parking	●	●	●
Reduce traffic speeds	●	●	●
Increase pedestrian amenity	●	●	●
Increase landscape area	●	●	●

 **High**

 **Medium**

 **Low**

NOTE This technique is suitable only for initial assessment. No attempt has been made in this example to provide a weighting to the assessment criteria

CHAPTER 8

BRINGING IT TOGETHER

This chapter represents a summary of the process which has been developed in detail in previous chapters. It focuses on the practical steps which should be taken to develop and implement a project for the environmental adaptation of the Main Street.

A number of schemes for environmental adaptation have al-

In its simplest form, the process of bringing it together starts with the identification of a problem or set of problems and concludes with the implementation of a series of integrated measures designed to resolve them.

But, as this report shows, the reality is not so simple. There are different stakeholders: motorists travelling through the centre, people living in the region visiting the centre, the business community, the residents in the town who value the quality of their Main Street, the Council and the Roads and Traffic Authority. They may see the problems differently and any solution may have different impact on them (incident analysis should determine this).

It would be inadvisable, therefore, to proceed with the development of a preferred scheme without opportunities for interaction with the different stakeholders during this process. Alternatives may be overlooked and the assessment of alternatives may proceed without proper consideration of the factors which the

ready been implemented in Australian towns but there is no documentation on the performance of these schemes. The chapter, therefore, concludes with proposals for monitoring their performance so that experience can be shared and data bases be established.

stakeholders consider important.

There are three other issues with a great bearing on the process: responsibility; costs and benefits; and financing proposals for environmental adaptation.

The *responsibility* for implementation of a proposal may lie with Council alone or it may be shared with the appropriate State Road Authority. Where the responsibility is shared, there will be a need to formulate a common basis for environmental adaptation and this should be clarified at the beginning. Such an agreement will need to embrace not only matters of design and control of the kind discussed in this report, but also issues regarding the funding and staging of the implementation.

Another issue is that of *costs and benefits* of any proposals for environmental adaptation. Whilst construction costs can be estimated accurately, this cannot be done with some indirect costs and many benefits. A planning balance sheet (see Chapter 7) provides a sys-

Introduction

Need for a staged process

tematic way of comparing alternatives, but in the end a judgment has to be made on the basis of relative worth and affordability.

The third issue is that of *financing* a proposal for environmental adaptation. Irrespective of whether or not the responsibility is shared between the Council and the Roads and Traffic Authority, questions arise about the contribution which the business community could be expected to make and which proportion should be shared by the rate-payers.

It is clear that it is not useful to proceed with the development of designs first and then to consider how the preferred solution might be implemented. As Chapter 6 shows, there often are options for environmental adaptation. They have different price tags and suggest different forms of implementation. It is advisable, therefore to consider design and implementation options together throughout the process. There also are options for staging the implementation of a project. All of these matters should be considered.

A three-staged process

A staged approach involving three steps is recommended.

- 1 **Needs study:** common understanding and acceptance of the problems, alternative visions of how these problems might be addressed, agreement on the matters to be considered in the assessment of alternatives, clarification of responsibilities, identification of possible funding sources for study and implementation, and the organisation and management of a feasibility study.
- 2 **Feasibility study:** undertaking of the necessary surveys, development of design and implementation options, assess-

ment and comparison, evaluation of these options and their impacts with the stakeholders, budget and implementation schedule together with proposed funding for the preferred scheme.

- 3 **Implementation** of the preferred scheme and monitoring of its effects.

If required, Stage 2 can be further broken down into discrete phases. The first phase concludes with the presentation of the options so as to permit discussion and modification before the assessment is undertaken. The second phase consists of the assessment and the third phase is the evaluation.

Table 8-1: Information Required during Stage 1.

1. Name of Council/Town/City
2. Road Classification
3. Physical location of proposal
4. Description of the major problems (see Chapter 2)
5. Alternative visions of how these problems might be addressed (see Chapters 5 & 6)
6. Evidence of preliminary consultation (see Chapter 7) including level of support by council and by other stakeholders.
7. Agreement on the matters to be considered in the assessment of alternatives
8. Clarification of responsibilities
9. Identification of funding sources for study and implementation
10. The organisation and management of a feasibility study.

The three stages in the process (see Figure 8-1) can also be used in the event that the Roads and Traffic Authority would make funds available to assist with the environmental adaptation of the Main Street. Stage 1 could be the preparation of documentation for a bid for funding support for undertaking a feasibility study (Table 8-1); Stage 2 could be the preparation of documentation for a bid for funding support for implementation (Table 8-2).

Table 8-2 Information Required during Stage 2

Using the guidelines described in Chapters 2 to 7.

- 1 Summary of Problems
- 2 Objectives
- 3 Establish Assessment Criteria
- 4 Undertake Surveys and Analyse Results
- 5 Generate Design Option(s) - Chapters 5 & 6
- 6 Consider Implementation Option(s) - Chapter 7
- 7 Itemise Capital Costs of Measures
- 8 Identify Unmeasured Costs and Benefits
- 9 Consider Staging Options
- 10 Assess Option(s) and Compare with Do-nothing Situation
- 11 Conduct Sensitivity Analyses
- 12 Prepare Planning Balance Sheet - Chapter 7
- 13 Public Display and Stakeholder Participation in Evaluation
- 14 Modify Options if Required
- 15 Budget and Implementation Schedule together with Proposed Financing
- 16 Council Ratification
- 17 Report and Basic Data

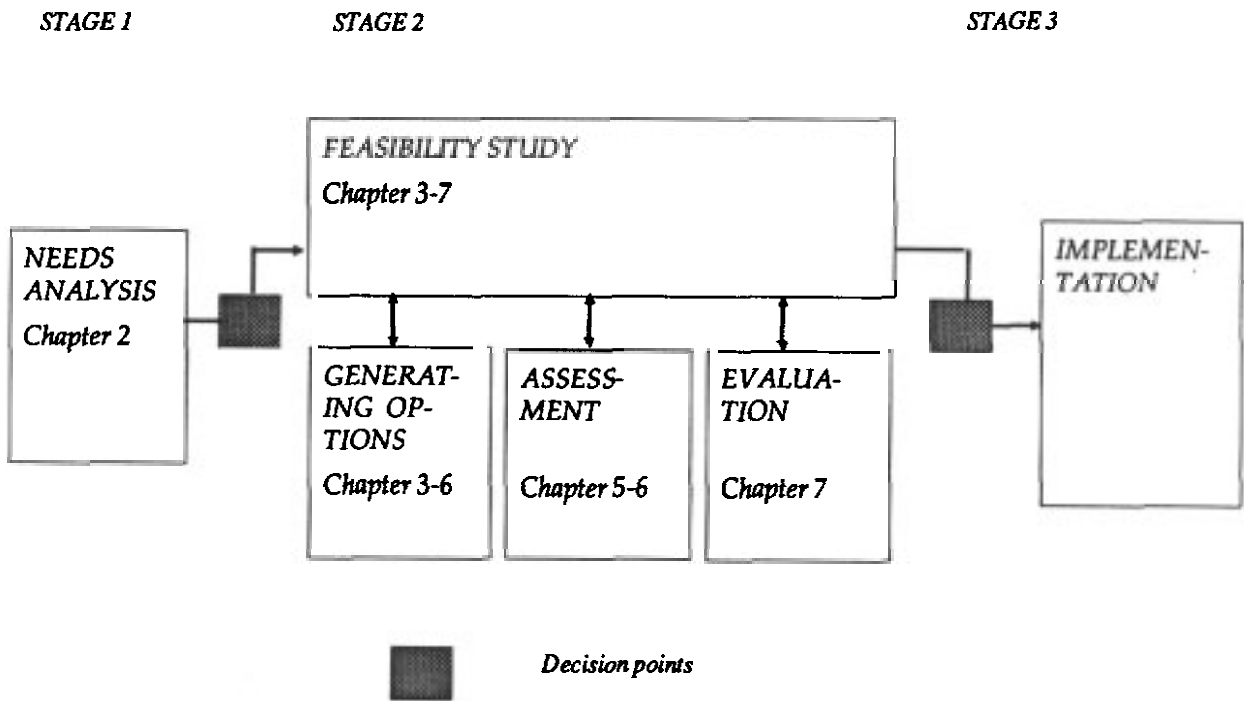


Figure 8-1 Process for Development and Implementation

Monitoring by the Federal Office of Road Safety (FORS)

A number of Main Streets in Australia have implemented schemes for environmental adaptation. However, there is a lack of information about the performance of these schemes.

Monitoring of such schemes is important so that the effectiveness and any unwanted effects of the scheme can be identified. Such information is valuable in obtaining experience in the planning, design, evaluation and operation of future schemes for environmental adaptation. Road safety, traffic operations, perceptions of the scheme by locals and motorists and environmental improvements are important aspects of monitoring.

It is recommended that the Federal Office of Road Safety allocate funds to allow an 'after' study to be conducted of some of these schemes. It is assumed that sufficient information can be obtained on the 'before' situation to facilitate a comparison to be made. It is further suggested that the classification proposed in Chapter 2 be used as the basis for selecting a range of Main Streets for demonstration projects.

The data base which would be established could later form the springboard of producing a computer-based expert system to help designers with the environmental adaptation of roads in urban areas, as well in country towns.

Glossary

Activity function (p.4, p.14) - Main Streets attract visitors to the land-use activities and pedestrian movements are a measure of the activity of a centre.

Core (p.14) - pedestrian-oriented zone of attraction.

Entry portal (p.14) - reinforced by the introduction of special features (a portal), it marks the beginning of an area where a speed profile for vehicles applies.

Environmental adaptation (p.10) - the process for adapting the Main Street to the needs of all of its users and visitors using land-use and transport measures to satisfy objectives of road safety, traffic operations, amenity and cost-effectiveness.

Incident analysis (p.12 Appendix C) - determining the scope and extent of project impact on different groups within the community.

Jay walking (p.4) - any crossing of the road carriage that is made at a non-designated crossing place such as zebra and pelican crossings or at signalised intersections.

Transition zone (p.14) - that section of the road and associated land-uses between an entry portal and the core, containing vehicle-oriented uses with drive-in, drive out access..

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Appendix A

**ANNOTATED
BIBLIOGRAPHY**



ANDERSON, S. (ed.) (1978), *On Streets*, (Cambridge: the MIT Press.)

With the help of over 300 illustrations, this study examines streets as spatial structures in a social and historical context. Streets are seen as rooms of the city, accommodating a wide range of human activities, and their walls are interpreted as the interface between public and private use. The central chapters discuss man's place in the street environment and the streets' role in providing continuity, differentiation and disruption of the urban fabric. The book also contains a demonstration project about streets in the central area of a small Tunisian city.

ANTILL, J. and FARMER, B. (1991) *Engineering Management*, 3rd Edition (Sydney: McGraw-Hill).

Engineering Management provides information on the techniques used in project cost estimation, evaluation of options and design management.

ANTONIOU, J. (1971), *Environmental Management, Planning for Traffic* (London: McGraw-Hill).

The author groups together various techniques which could help to resolve the damaging effects of traffic, including noise, air pollution, visual intrusion and community disruption. It is to provide and support the overriding needs of pedestrians moving through the urban area and using it for a variety of functions. A case study is also presented which deals in detail with the practical application of these principles. The book with its comprehensive and practical approach is a well documented and illustrated contribution to the subject.

ARNOLD, H. (1980), *Trees in Urban Design* (New York: Van Nostrand Reinhold).

This book provides a thoughtful approach to the use of trees in urban streets and parks. It provides bold and practical solutions to important problems of economics, planning and maintenance of urban plantings. Design implications are considered in terms of tree growth, the arrangement and the spacing of trees. The author gives statistical information about composition, spacing, size and age of exemplary tree planting found throughout cities in America.

ATTEWELL, R.G. and DOWSE, J. (1992) "Fatal Crash Types: Summary Report. - Analysis of 1988 Fatality File", Transport and Communications, Federal Office Of Road Safety, CR 104.

The aim of the report is to describe and characterise different types of fatal crashes occurring in Australia. These are the crash types: 'pedestrian', 'bicycle', 'motorcycle', 'bus', 'articulated truck', 'single passenger vehicle rural high speed', 'single passenger vehicle urban low speed', 'multiple passenger vehicle rural high speed', 'multiple passenger vehicle urban low speed', and 'crashes involving children'. Aspects of each crash type covered frequency, time, location, road and driving conditions, vehicle characteristics, crash event, fault and contributory factors, persons involved and medical details.

Chapter 2, on fatal pedestrian crashes, is reviewed here with specific reference to urban areas where possible. Most fatalities occurred in urban areas - 89 percent - and 87 percent occurred where there were no marked crossings. Nearly one-quarter of night time urban pedestrian crashes occurred in areas with no street lights. A high proportion (69 percent) of pedestrians were considered solely responsible for the crash. There were relatively high percentages of older persons and children among the pedestrians killed. Most pedestrian crashes occurred between 3pm and 8pm.

BENTLEY, J. ALCOCK, A., MURRAIN, P. McGLYNN, S. and SMITH, G.. (1985), *Responsive Environments* (London: The Architectural Press).

The unique contribution of this book is to show, with a wealth of diagrams and illustrations, how social qualities can be designed into urban environments. After the introduction to the notion of choice and the physical qualities that support it, the manual provides a step-by-step guide on how to achieve it in real life design.

BLACK, J. (1981) *Urban Transport Planning: Theory and Practice* (London: Croom Helm).

This book is structured around the systems approach to urban land-use and transport planning and emphasises methodology. The part on practice is divided into chapters on long-term, strategic planning, planning for public transport, short-term transport planning and traffic management, and local area transport planning.

This latter chapter, covers in an introductory way planning for pedestrians - goals and objectives, data collection, space requirements and levels of service. Level of service concepts for footpaths are based on Fruin's work but modified into only four levels of service.

BLACK, J. A. (1989) "Data Collection and Analysis", Vehicles, Pedestrians, or Both? A Symposium on the Environmental Adaptation of Shopping Centres Along Major Traffic Routes, School of Town Planning, University of New South Wales, 17-18 November, pp. 11-1 to 11-14.

The paper is based on field work experience in several shopping strings along main traffic routes. It summarises the traffic-related, road-space related and frontage/environment related information that is required. The type, purpose, method and priority of data collection is summarised. The following surveys are described: pedestrian questionnaire design; monitoring vehicle activity; vehicle number plates; vehicle speeds; and land use. An indication of resources required, both manpower and duration, for data collection and analysis is presented. Video observations, although time consuming and tedious to analyse, are of considerable value.

BLACK, J.A. and WESTERMAN, H.L. (1989) "Pedestrian/Vehicle Conflict in the Main Street of Country Towns", *The Environmental Planning and Management Series, School of Town Planning Publication, Vol. 89/1* (Kensington: School of Town Planning, University of New South Wales).

The focus of this study is on main roads and their frontage development in country towns. The objectives were to develop a single process of analysis of friction and impact and of generating options; to test alternative techniques of data collection and analysis; and to add to the knowledge about pedestrian and vehicle conflict. The conceptual basis for the study is the conflict of pedestrians and vehicles and the causes, and possible effects of impact and friction.

The conceptual framework was tested in two country towns of New South Wales - Moss Vale and Parkes. The report describes the study areas and explains the methods of data collection. Conflict is analysed in terms of accidents, pedestrian/vehicle conflict, vehicle - vehicle conflicts, and manoeuvring vehicle conflicts. Interviews of visitors were undertaken to obtain a better understanding of perceptions of pedestrians about the Main Street environment. Suggestions specific to Moss Vale and Parkes were made on how to reduce vehicle/pedestrian conflicts.

Preliminary guidelines are developed as a basis for assessing the nature and extent of both negative and positive associations between vehicular traffic and activities in the Main Street, and for developing and evaluating options for reducing conflict and re-inforcing positive associations.

BRAMBILLA, R. and LONGO, G. (1977) *For Pedestrians Only: Planning Design and Management of Traffic-Free Zones* (New York: Billboard Publications).

This book provides case studies on the planning, plan preparation, evaluation and implementation of traffic-free zones. Details of such schemes are extensively illustrated.

CITY OF SYDNEY COUNCIL (1991) "Street Tree Management Plan", Council of the City of Sydney, 1991. Unpublished report for the Council of the City of Sydney.

This report covers designs for street trees, a range of species considered suitable for the streets of Sydney, planting details specifications and the appropriate maintenance for street trees.

CANADA, MINISTRY OF HOUSING (1980), *Main Street Planning and Design Guidelines* (Ottawa: Ministry of Housing).

Canada has been pioneering in community renewal and main street improvements. The first guidelines of its kind was produced to assist interested communities in planning and designing appropriate improvements. The guidelines contain much practical information, including hypothetical case studies.

CROFT, P.G. (1991) "Road Safety Management in Regional Centres and Rural Areas", paper presented to Australian Institute of Traffic Planning and Management, Regional Seminar, held in Orange, 18 October.

Analysis of accidents in NSW for 1989 to 1990 found that 15 per cent of all recorded accidents and 17 per cent of the serious casualty accidents occurred in urbanised centres outside of Sydney, Newcastle and Wollongong. For the smaller country towns, the accident situation is largely that on the main route passing through the locality whereas in the provincial or regional centres, accidents are also distributed across the local urban road network. Analysis of the two years of accident data in Bathurst, Coffs Harbour, Dubbo, Lismore, Orange and Tamworth shows that accidents on the main thoroughfares of these urban areas account for 24 per cent to 37 per cent of all accidents. On the main roads, rear-end vehicular accidents and those involving pedestrians play a proportionately greater role than on other urban roads.

The paper outlines different safety management approaches for a range of road environments. It suggests that there is need for continued research into the applicability of measures of "environmental adaptation" in different situations, and for the conduct of properly controlled demonstrations projects to test them in practice.

CROFT, P and McNAMARA, B. (1989) "Shopping Centres on Traffic Routes: From Concern to Concert", unpublished paper to Symposium on Vehicles, Pedestrians, or Both? The Environmental Adaptation of Shopping Centres Along Major Traffic Routes, School of Town Planning, University of New South Wales, 17-18 November.

The paper outlines the broadening of perspectives within the Roads and Traffic Authority, NSW, to include road safety concerns. The authors argue that pedestrian-vehicle conflict is perhaps most complex and variable on urban routes where the traffic - both pedestrian and vehicular - generated by retail and commercial centres must interact with vehicular traffic passing through the precinct. The effects are deterioration of vehicular traffic flow, deterioration of safety, and loss of local amenity.

In the light of current safety concerns, the RTA is keen to enter into some demonstration projects, perhaps on a joint basis with particular councils, as a necessary step in assessing some of the possible solutions and refining their applicability.

CULLEN, G. (1971) *The Concise Townscape*, (London: The Architectural Press).

The concepts of giving visual coherence and organisation to the jumble of buildings and spaces were first developed by the author. This superbly illustrated book provides analytical discussion about the elements of townscape and their relationships being both practical and philosophical.

DEPARTMENT OF PLANNING, NEW SOUTH WALES (1990) *Street Trees in N.S.W. - Guidelines for Conservation and Management*,

This is a summary of the work done by Armstrong and Burton on the Street Tree Survey of NSW Country Towns for the Heritage Branch, Department of Planning. It provides details on how to assess the value of trees, street tree management and action plans. It is a useful technical paper with a particular bent towards the cultural heritage of street trees.

DEPARTMENT OF PLANNING SYDNEY, DEPARTMENT OF PLANNING AND HOUSING, STATE GOVERNMENT OF VICTORIA, MELBOURNE (1991) *Outdoor Advertising*, Sydney.

Outdoor advertising is a highly visible feature of today's cities and towns. It is often a significant contributor of the prevailing visual clutter in our townscapes. These guidelines are intended to help applicants and planners prepare and assess outdoor advertising sign proposals. They help to identify possible locations for signs taking into account the wider environment in different settings.

DEPARTMENT OF PLANNING NEW SOUTH WALES (1989), *Main Street NSW Handbook* (Sydney: Department of Planning, New South Wales).

The purpose of the handbook is to assist people interested in their Main Street as the heart of their community to get organised and formulate workable plans. The methodology is comprehensive, gradual and community-based. The five point approach stresses the importance of organisation, design, heritage, business and promotion, and has been based on Canadian and US experiences. The book also contains a sourcebook section with information on other sources and topics relevant to Main Street projects.

DOLDISSEN, A. and DRAEGER, W. (1990) "Environmental Traffic Management Strategies in Buxtehude, West Germany", in R. Tolley (ed.) *The Greening of Urban Transport: Planning for Walking and Cycling in Western Cities* (London: Belhaven Press) pp. 266-284.

The authors outline the German inter-ministerial research programme on environmental traffic management schemes started in 1980, and the planning process and overall concept for one of the six model areas - Buxtehude, located on the railway line between Hamburg and Cuxhaven. Individual measures to improve conditions for pedestrians and cyclists are described.

Prior to the project, the main shopping street, Bahnhofstrasse, carried daily flows of 10,000 motor vehicles, 1700 cyclists and 45,000 pedestrians. There was a speed limit of 50 km/h. The main carriageway was reduced to 6.5m to allow space for cycle paths on both sides of the road. The road has been incorporated into the 30 km/h zone. Vehicular traffic has reduced because of the construction of a tunnel by-pass. Publicity measures were an integral part of the whole environmental traffic management project.

EL-HAZOURI, B.S. (1992) "Interaction between Vehicular and Pedestrian Traffic Streams Along Shopping Strings at Country Towns: A Comparison of Survey Results with Sydney Metropolitan Area", unpublished research report, Department of Transport Engineering, University of New South Wales.

This research-in-progress investigates vehicle-pedestrian interaction in metropolitan and non-metropolitan areas at signalised intersections, pelican crossings, zebra crossings and at undesignated pedestrian crossing points. Five sites were surveyed in NSW country towns: George Street, Bathurst; Princes Highway, Corrimal; Katoomba Street, Katoomba; Terralong Street, Kiama; and Summer Street, Orange. Field observations were made at the four types of crossing facility in each town from 8 to 9.30 am, from 12 to 1.30 pm and from 4- 5.30 pm. The following measurements were taken: road width; number of lanes; vehicular traffic volume; vehicular approach speed 80m and 30m ahead of the crossing; vehicular delays caused by pedestrians; pedestrian volumes; walking speeds; pedestrian delays; and pedestrian violations at traffic signals.

Vehicle approach speeds at zebra crossings in Katoomba and Kiama were from 12 to 16 km/h lower than in Bathurst. Road carriageway widths are reduced in the first two sites to reduce pedestrian exposure. Higher approach speeds (at 80m) result in higher speeds 30m in front of a zebra crossing. When pedestrians are present on the zebra crossing there is an influence on drivers: approach speeds at 80m are lower with vehicles at 30m slowing down anticipating a stop. Regression analysis has been undertaken to quantify these effects. At undesignated (mid-block) crossings in the five country towns there was virtually no speed reduction from 80m to 30m in front of the crossing point, even when pedestrians were present.

Vehicle delays at pedestrian facilities are a function of facility type and traffic flow (increasing in a non-linear way). Mean delays are typically 5 to 6 seconds at zebra crossings, 16 to 17 seconds at pelican crossings, and 20 to 22 seconds at signalised intersections. The mean delay caused by jay-walking pedestrians is from 0.2 to 0.5 seconds.

Pedestrian mean delays also differ by facility type being the lowest at zebra crossings - from 1.4 to 2.5 seconds. They are highest for the legal use of pelican crossings (17 to 20 seconds) and signalised intersections (11 to 15 seconds). The mean delay to pedestrians crossing mid-block is from 4 to 6 seconds. Pedestrian delays increase with increasing vehicular traffic volumes. The least delay for a pedestrian is to use a zebra or cross mid-block and such delays can be minimised if the mean approach speed of vehicles is reduced to about 30 km/h.

In Bathurst, Katoomba and Kiama the ratio of pedestrians using a zebra crossing to those not using a facility ranged from 1.2 to 1.7. The number of pedestrians who cross at pelican and signalised intersections in Corrimal and Orange depends on the location of the facility relative to the main pedestrian traffic generators. The illegal use of these facilities were from 14 to 20 per cent of crossers at signalised intersection in Orange and from 28 to 37 percent of crossers at pelican crossings in Corrimal. These percentages of illegal crossers decrease with increasing volumes.

ENERGY AUTHORITY OF NSW (1985), *Guidelines for Tree Planting and Maintaining Safety Clearance near Power Lines* (Sydney: Energy Authority of NSW).

ENGWICHT, D. (1992) *Towards an Eco-City: Calming the Traffic* (Sydney: Envirobook).

This book is a personal view of "eco-rational thinking", the nature of the "eco-city" and how to rebuild an "eco-city". Eco-rational thinking, the ecological world view of the post modern view of the world, are not new perspectives, but this polemic applies this perspective to traffic calming in urban areas. The author emphasises that the qualities of urban life are based on exchange (broadly defined), that is eroded by traffic intrusion.

FRUIN, J.J. (1971) *Pedestrian Planning and Design* (New York: Metropolitan Association of Urban Designers and Environmental Planners).

This book is the most important source for an analytical approach to the pedestrian environment. It covers the fundamentals of human locomotion (including gait and psychology), the theory of pedestrian flow, level of service concepts for walkways, intersections, waiting areas and stairways, and design case studies. Valuable statistics are provided such as mean walking speeds (and their distribution) for different population groups and the influence of flow concentration on walking speeds.

GOULBURN CITY COUNCIL (1990), "Street Tree Master Plan", Goulburn City Council, unpublished report for Goulburn City Council.

This report investigates the heritage significance of the street trees in Goulburn and provides a detailed master plan for the Goulburn streets which is closely integrated with other heritage and town studies in Goulburn.

HANNA, J. "Feet First: Putting People at the Centre of Planning"; in R. Tolley (ed.) *The Greening of Urban Transport: Planning for Walking and Cycling in Western Cities* (London: Belhaven Press), pp. 88-96.

This presents the views of a UK pressure group, Transport 2000, to increase the awareness of the importance of walking, to improve the pedestrian environment, and to provide technical options which can be used to improve access on foot in the areas where people live, shop, work and play. She argues that in busy shopping streets, pedestrian activity outnumbers motor vehicle activity, but that the design and layout of most shopping streets still give dominance to motor traffic. Statements that roads have multiple uses are given lip-service by government and planners, but pedestrian movements or activities are not routinely counted.

HILLMAN, M. and WHALLEY, A. (1981) " The Relevance of Walking to the Formulation of Transport Policy", in D. Banister and P. Hall (eds) *Transport and Public Policy Planning* (London: Mansell Publishing). pp. 106-108.

The authors argue that in transport planning practice and methodology in the U.K. the role of walking has, at the very least, been inadequately recognised, if not overlooked. They point out from comprehensive surveys of personal travel, one in three of the journeys that people make each day are on foot, and that walks of under 800 m are equivalent in number to all forms of public transport journeys combined over all distance.

The role that the non-motorised modes play, and could play, should be comprehensively assessed. First, walking is under-represented in transport and planning policy. Secondly, it is becoming progressively harder for people to meet their daily travel needs on foot. Thirdly, walking is becoming more hazardous. Fourthly, both public and private costs are increased with a transfer from walking to motorised modes. Fifthly, any modal transfer entails extra energy costs. Finally, walking is a transport mode from which the community at large benefits if its members make more rather than less use of it.

HMSO (1977) "Report of the Advisory Committee on Trunk Road Assessment" ('Leitch Report'), (London: HMSO).

The report uses the planning balance sheet approach (see Litchfield, 1975) as a means of comparing the impact of alternative trunk routes.

HOPKINSON, P. MAY, A.D., BERRETT, B. and LEAKE, G.R. (1989) "The Identification and Development of an Environmental Traffic Management Strategy for a Heavily Trafficked Shopping Street", paper presented at PTRC: Summer Annual Meeting, University of Sussex, pp 57-68.

The paper reports on the process of developing a traffic management strategy for a heavily trafficked shopping street in Sowerby Bridge, Yorkshire, England. The identification of traffic and environmental problems and solutions included participatory techniques such as group discussions, brainstorming and questionnaires. Face-to-face questionnaires were administered to pedestrians and road users, and mail back questionnaires were given to a sample of retailers and employees. The objective was to allow people to describe the aspects that they liked or disliked. A conventional semantic differential rating scale was used to gauge the severity of responses. The main problems were perceived differently by each group, but could be categorised as: traffic congestion; pedestrian/vehicle conflict (danger crossing the road, severance and crossing difficulties and narrowness of footpaths); parking and access; and poor overall image of the town. Independent measurements were taken to compare perceived problems with physical data.

Solution identification involved face-to-face interviews with: (a) local people who had identified problems in the first stage - using group discussions; (b) local people, not previously involved - using face-to-face interviews; (c) planners and designers with expertise in traffic management - using group discussions; and (d) staff from the Institute of Transport Studies, University of Leeds, - using group discussions. The solutions generated revealed that local people dealt almost exclusively with solutions for specific locations, and that all groups produced a number of innovative or unusual solutions.

HOWIE, D. (1992) "Transport and the environment - towards a research strategy for ARRB", *Road and Transport Research*, vol. 1, no. 1, pp. 52-62.

The Australian Road Research Board (ARRB) stimulates and conducts research to assist road authorities to respond to community concerns, such as the environmental consequences of transport activities. This paper outlines the results of work commissioned by ARRB to provide a basis for the development of a research strategy for transport and the environment.

Of relevance to the environmental adaptation of roads, the paper quotes the Roads and Traffic Authority corporate objective of "to ensure that the roads and traffic system is developed and managed in harmony with the natural and social environment while meeting the needs for the

movement of people and goods". Research priorities include the interactions between travel demand, environmental consequences and road safety. A key issue is to include the other transport system users (pedestrians, cyclists) in measures of exposure to potentially unsafe outcomes of travel demand.

HUNT, J.G. and GRIFFITHS, J. D. (1990) "Accident Rates and Pedestrians Crossings in Hertfordshire", Transport and Road Research Laboratory, Contractor Report 154 (Crothorne: Traffic Management Division, Transport and Road Research Laboratory).

A study was made of zebra and pelican crossings in Hertfordshire, England. The best fit models for predicting the annual frequency of accidents at pedestrian crossings were based on three explanatory variables: 5 hour afternoon counts (2-7pm) of pedestrians and of vehicles and road width in metres. The functional form was an estimate of accidents per year as the dependable variable and a set of three multiplicative explanatory variables. Of the locational and environmental parameters, site type (town centre, shopping string, residential, school, etc.) provided a significant improvement in fit for the zebra model and proximity to an intersection provided a significant improvement in fit for the pelican model.

It is worth noting here that for the zebra model, at constant pedestrian and vehicle counts at 25 locations, an increase in road width is associated with a decrease in predicted annual accident frequency.

HURSTVILLE CITY COUNCIL (1990), "Street Tree Management Plan", Hurstville City Council, unpublished report for Hurstville City Council.

This report covers three important aspects about urban street tree planting; designs for community participation workshops, analysis of solutions to overhead powerlines; and a street tree management plan with staging and costings. This is an interesting study which addresses many street tree problems.

KELLER, H.H. (1989) "Three Generations of Traffic Calming in the Federal Republic of Germany", paper presented at PTRC: Summer Annual Meeting, University of Sussex, pp. 15-31.

"Traffic calming" is defined as all traffic control and construction measures to produce changes in streets and the adjacent private properties likely to attenuate the negative effects of motor vehicles on traffic conditions, on urban development and the environment. The author reviews the accomplishments with the first generation of traffic calming in residential areas, the second generation of traffic calming in parts of towns (the six model areas of Berlin- Moabit, Mainz-Bretzenheim, Ingolstadt, Esslingen, Buxtehude, and Borghentreich) and, since 1985, the third generation of city-wide traffic calming.

All six model areas had clear symptoms of desolated urban structures, partially deteriorating buildings, dismal squares, and shops and businesses whose existence was threatened. For example, in Buxtehude, shopping activity has increased, and its improved physical appearance had started attracting tourists. The speed limit in the shopping street was reduced from 50 km/h to 30 km/h and cycling lanes and parking strips were installed on both sides of the street. A wide avenue for pedestrians was constructed. Maximum vehicle flows are 1000 veh/h for cars and 500 pedestrians/h. The conflict between business interests and traffic calming has not been settled, but there are examples (Borghentreich and Berlin) where traffic calming solutions are compatible with commercial interests.

The short-term strategy underpinning city-wide traffic calming is the 30 km/h speed restriction zone. Surveys in Hamburg indicate: a modest speed reduction of 3.3 km/h for the mean speed and 4.6 km/h for the 85th percentile speed. However, these city-wide 30km/h speed limits had greater impact on the small and middle-sized towns. Supporting measures - narrowing the roadway, or speed humps - appear to assist in speed reduction. The 30km/h speed limit zones lead to a steadier driving pattern with less braking and accelerating than at the 50 km/h speed limit - with lower noise and less vehicle emissions.

Traffic calming by means of construction measures has a greater impact on accidents than traffic calming only by means of the 30km/h speed regulation. Casualties have been reduced by 10 to 30 per cent. Numbers have remained unchanged but the severity of the accident has been reduced.

LITCHFIELD, N., KETTLE P. and WHITBREAD, M. (1975) *Evaluation in the Planning Process* (London: Pergamon Press)

The book introduced a new approach, involving what was called a Planning Balance Sheet, towards the evaluation of proposals to take account of matters which are not amenable to conventional cost-benefit analysis. The Planning Balance Sheet permits the evaluation of comprehensive proposals. It estimates the costs and benefits for a wide range of public investments, sector by sector, for each plan alternative. Where they cannot be computed in monetary terms, the approach calls for non-monetary quantitative terms. Where costs and benefits are intangible, estimates are made or the results are listed as unknown. The important feature of the approach is that all possible impacts are shown either as a cost or a benefit (even if not quantifiable), the items are listed separately for producers (developers, public agencies etc.) and consumers (displaced users, new users, surrounding owners, the public at large etc.) and that for each item there is a balance and determination of advantage in respect of the alternatives considered.

McCLUSKEY, J. (1979), *Road Form and Townscape* (London: the Architectural Press).

The book underlies that roads are not just routes of movement but integral part of the outside environment. There is a need, during the design process, to integrate all aspects of road design so that the end product will be a coherent whole, enjoyable part of the built environment. The chapters cover subjects of various disciplines: townscape alignment; aesthetics of road alignment; land forms and planting; materials and appendices with technical data. With the extensive use of photographs and diagrams the presentation convey a large amount of environmental information.

MONHEIM, R. (1990) "The Evolution and Impact of Pedestrian Areas in the Federal Republic of West Germany", in R. Tolley (ed.) *The Greening of Urban Transport: Planning for Walking and Cycling in Western Cities* (London: Belhaven Press), pp. 244-254.

In many small and medium-sized towns of Germany retailers and the car lobby rejected pedestrian areas even though the community wanted them. One way out of this impasse was to introduce traffic-calmed streets using the traffic regulations which were developed originally for local residential area traffic management.

Today, there are well over 1000 pedestrian areas and traffic-calmed town centres in (West) Germany. There was a boom in the development of traffic-calmed shopping streets in the 1980's but nevertheless many planners and politicians are still unfamiliar with them, especially as many transitional forms were developed to suit different local conditions.

Traffic-calmed streets are preferred in smaller towns because parking is still used in the immediate vicinity of the destinations. Special traffic signs give equal rights to all forms of traffic: pedestrians can use the whole street for walking or standing around while cars must travel at walking pace and park in specially designated parking spaces. All road users must be considerate to one another.

Where main streets have developed into a commercial strip there are still functions which need to be protected and numerous pedestrians who must frequently cross the street. Footpaths have been widened, aids to the pedestrian to cross provided (road narrowing, medians) and trees, benches, flowers and street lamps, all carefully in proportion, are installed. Traffic speeds are decreased. Main roads can still cope with considerable amounts of traffic since road capacity is limited by the intersections.

Traffic-calmed main streets fit into two situations. One, in the main centre of larger towns, they extend the pedestrian-friendly space along roads mostly designed as boulevards or lead from pedestrian malls to nearby important pedestrian destinations, such as the railway station. Two, in the district centres of large towns and centres of smaller towns, main thoroughfares have frequently developed as commercial strips. Pedestrian-friendly arrangements are important to prevent any devaluation of properties in the district.

MOUDON, A.V. (ed). (1987), *Public Streets for Public Use*, (New York: Van Nostrand Reinhold Company).

The book contains a series of well-illustrated essays by prominent authors covering a wide range of issues related to urban streets including: politics of streets, pedestrian use, pedestrianising suburbs, selective history, European experiences, selected European and North Tunisian case studies, changing standards and successful design processes.

MOUDON, A. V., (1990) "Designing the Urban Village", Proceedings Eleventh International Pedestrian Conference, University of Washington, Seattle.

MOUDON, A.V. (n.d.) "Designing for Pedestrians in Neighbourhood Commercial Streets and Suburban Settings" (mimeo), pp 237-242.

Three streets in Seattle were observed with respect to pedestrian and driver behaviour in the commercial area. The wider the street, the higher the volume and the speed of cars passing by, and the lower the volume of pedestrians. Furthermore, the wider the street, the more aggressive the drivers' behaviour.

Although the reported number of pedestrian accidents over a five-year period was relatively low, it is shown that the risk of being involved in a pedestrian accident (relating pedestrian accidents to pedestrian flows) is almost 3 times as high in the wide street than in the narrow street.

A critical mass of pedestrian activity is about 380 pedestrians per hour at both sides of the street. Jaywalking occurs only in the narrow street indicating the pedestrian's willingness and ability to negotiate with drivers and so share the road space. A speed of 40 km/h is suggested.

The paper concludes with elements of pedestrian friendly design, although the data is specific to North American cities.

NAASRA (1988) *Guide to Traffic Engineering Practice* (Sydney: National Association of State Road Authorities).

All 12 parts of this series provide useful information in the preparation of Main Street projects. They cover aspects from traffic surveys, the theory of traffic flow to the selection design and evaluation of traffic measures.

POLUS, A. and CRAUS, J. (1988) "Planning Considerations and Evaluation Methodology for Shared Streets", *Transportation Quarterly*, vol. 42, no. 4, pp. 587-597.

The paper introduces a general planning and design process for pedestrian facilities. Four interrelationships are fundamental elements of the system: the pedestrian; the pathway; the traffic; and the environment. A flow diagram summaries the general planning process for a pedestrian system.

In order to evaluate the performance characteristics of a shared street. There are four prominent attributes: pedestrian flow and activities; vehicular traffic flow and manoeuvrability; safety to pedestrians; and parking patterns.

PRESTON, B. (1990) "The Safety of Walking and Cycling in Different Countries", in R. Tolley (ed.) *The Greening of Urban Transport: Planning for Walking and Cycling in Western Cities* (London: Belhaven Press), pp. 47-63.

Differences in travel patterns and approaches to safety measures in different countries are compared to see whether they affect road casualties. A comparison is made of cyclists' death rates, pedestrian's death rates and accidents involving children in some 25 countries. (Difficulties in making valid comparisons are highlighted).

The author singles out speed of the traffic as a very important factor for the safety of pedestrians. Pedestrians as a whole, ignoring age effects, are likely to survive impact speeds of less than 50 km/h while speeds greater than 55 km/h are likely to be lethal. For those aged over 60 years these critical speeds are reduced by 7.5 km/h. She quotes the effect on reducing road deaths of up to 28 per cent by reducing urban speed limits from 60 to 50 km/h based on a study of 22 countries. Slower speeds are important for the safety of pedestrians and other road users but speed limits are difficult to enforce.

RALLIS, T. (1988) *City Transport in Developed and Developing Countries* (London: MacMillan Press).

This book is aimed at students of civic engineering who want to know about city transport - its transport modes, networks, capacities, economic and environmental factors. A distinction is drawn between link carrying capacity of all modes, including pedestrians, and the environmental capacity of streets.

The book includes a brief description of a before and after study of Oxford Street in London. Before 1972 this was the most dangerous road in Britain with a 2km length having about 10 times as many injury accidents (half involving pedestrians) as the average for other main roads. Vehicular flows in the one-way street were 2500 veh/h with some 15,000 to 30,000 pedestrians per hour. In November, 1972, the footpaths were widened, trees planted and benches installed and the road was made two-way for buses, taxis and cyclists. Accidents were reduced 42 per cent for pedestrians.

RAPOPOST, A. (1977) *Human Aspects of Urban Form* (Oxford: Pergamon Press).

This important reference in urban design explores the various aspects of man-environment relationships. It includes discussions about nature, urban design, environmental perception and cognition, symbolism and cultural variables. The most relevant part is the chapter on visual perception revealing relationships between speed and perception and speed and the level of environmental complexity.

RICHARDS, B. (1990) *Transport in Cities* (London: Architecture Design and Technology Press)

This book is about all modes of urban transport and contains a chapter on walking. From a layout and design perspective, the chapter outlines pedestrian streets, transit streets, traffic calming (including the relative costs of this treatment compared with pedestrian-only streets), segregation, elevated walkways, and underground streets.

ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES (1989) *Environmental Adaptation of Roads and Frontages: Towards Guidelines for Retail Centres Along Traffic Routes* (Rosebery: Road Safety Bureau, Roads and Traffic Authority of New South Wales).

This publication provides a summary of the research undertaken in the development of guidelines for the environmental adaptation of retail centres along traffic routes. The report covers: the conceptual aspects; information needs and survey approaches; a summary of the research findings (friction and impact, parking manoeuvres, crossability, and road space utilisation); and the control measures. The report summarises what needs to be done - research and development, and the need for demonstration projects.

SCHWEIG, K.H. (1989) "New Approaches to a Compatible Urban Transportation in German cities: Pedestrian Related Goals and Innovations, Step by Step", *Urban Futures*, Vol. 2, no. 2, pp. 5-16.

Analysis of accident data in urban areas of the Federal Republic of Germany in 1986 reveals that the majority of accidents are a result of motor vehicle - pedestrian conflicts. Pedestrians account for 49 per cent of all fatalities, 27 per cent of all those seriously injured, and 11 per cent of those slightly injured. Traffic should be less dense and travel at lower speeds to make car traffic more compatible to the city and less dangerous.

The paper traces the various measures introduced over time to pedestrian-orientated traffic: (a) pedestrian zones; (b) traffic restricted areas (Woonerf); (c) area-wide traffic restriction (model experiments in six cities); and (d) traffic restriction by means of change in the behaviour of road users. The latter is a prerequisite to realise city-compatible traffic: "traffic restriction in our own heads is absolutely necessary to achieve more safety, more freedom of movement for pedestrians and an ecologically sensible city.

SCHWEIG, K.H. (1990) "Pedestrian-Related Goals and Innovations, Step by Step", *Transportation Quarterly*, vol. 44, no. 4, pp. 595-606.

A review of the relationship between traffic speed and pedestrian casualties is made. The solution to make vehicular traffic more compatible to the city and less dangerous to pedestrians is less traffic and lower speeds. The paper reviews pedestrian zones, traffic restricted (Woonerf) and the model experiments in Berlin, Mainz, Esslingen, Ingolstadt, Buxtehude and Borgenreich in Germany. Since 1985, these towns have a zone speed limit of 30km/h. Traffic restriction is achieved by attractive street design using trees, single elements from the Woonerf scheme very slightly adapted in their construction, and vehicle parking in the street area. On average this method costs between 30 and 100 DM per square metre.

In streets with heavy vehicular flows and high speeds it is necessary to offer pedestrians crossing aids at points of distinctive pedestrian importance. Such aids include zebra stripes on raised pavements, paving together with traffic signals, and paving, signals and a central island to permit one half of the street to be crossed.

In Hamm (Westphalia) a "pedestrian zone crosses a main traffic thoroughfare" plan was proposed for a four-lane traffic route carrying about: 1800 veh/h and 4,700 pedestrians per hour. The present situation and the plan are illustrated. In Saarbrücken, Lebacher Strasse carries 26,000 veh/day and the wide carriageway was reduced with a central reservation for pedestrian pavements.

The author introduces a research study at the University of Kaiserslautern funded by the German Ministry of Transport that investigates the design principle of soft separation. The study in progress examines the speed behaviour of motorists, crossing habits of pedestrians and cyclists and the interaction of road users. Soft separation describes a transitional form between the extreme principles of separation and mixing. A typical feature of this form is that the carriageway and the lateral areas are not separated by curbs, but are softly indicated by varied surfacing, paving, shallow gutters and bollards.

SIKSNA, A. (1981) *The Australian Main Street: A Rich but Ignored Vernacular*, Royal Australian Planning Institute Journal, Vol. 19, no. 2, pp 68-69.

The author discusses the urban design aspects of this uniquely Australian space, arguing that the potential it offers have been largely ignored.

SIMPSON, B.J. (1988) *City Centre Planning and Public Transport : Case Studies from Britain, West Germany and France* (Wokingham, Berks: Van Nostrand Reinhold (UK) Co. Ltd).

This emphasis of this book is on public transport planning, legislation, and physical planning principles. Two pages refer to pedestrianisation and to pedestrian access to public transport. There are case studies of Birmingham, Coventry, London, Redditch and Burnley (England),

Paris, Lyon, Marseille and Lille (France), and Hamburg, Frankfurt, Bremen and Lubeck (Germany).

TOLLEY, R. (1989) *Calming Traffic in Residential Areas* (Llanddewi Brefi, Tregaron: Brefi Press).

The book is primarily about creating safe and attractive streets around our home, but it also addresses town centres. It reviews the concept of "traffic calming". The most relevant parts of the book are Chapter 5 on the development of traffic calming in West Germany, and how these ideas are being tested with a Federal research programme in West Germany (Chapter 6). The six case studies described were chosen because of their contrast in type of area: Berlin (large town, edge of city); Borgentreich (village, whole area); Buxtehude (middle sized town, centre and surroundings); Esslingen (middle sized town, edge of central area); Ingolstadt (middle sized town, central area); and Mainz (large town suburbs, old village). Results of evaluating the schemes are presented.

TRAFFIC AUTHORITY OF NSW (1987), *Guidelines for Tree Planting and Maintenance on Urban Roads* (Sydney: Traffic Authority of NSW).

UHLIG, K. (1979) *Die Fußgängerfreundliche Stadt* (Stuttgart: Verlag Gerd Hatje).

This bilingual (German and English) book reviews the principles and practices of "pedestrian oriented towns". Besides the functional aspects and the range of facilities, well-illustrated case studies/examples are also provided from three continents.

UNDERWOOD, R. (1990) *Traffic Management - An Introduction* (Melbourne: Hargreen).

This book is an introduction to traffic management, written in lay person's language and assuming no background knowledge of the subject. It is useful for Aldermen and Councillors, general practitioners and members of community interest groups.

WESTERMAN, H. L. (1990) "Roads and Environments", Proceedings 15th ARRB Conference, Part 1, pp. 79-96.

Observations are made on the basic conflict associated with roads and the land-use environment, and the scope for resolving conflict. A typology of road types is introduced, and notions of friction and impact are explained. The paper summarises empirical research into friction and impact on arterial and sub-arterial roads - both in Sydney and in country towns of New South Wales. Policies for reducing impact and friction are outlined and implementation models are discussed.

WHITELEGG, J. (1990) "The Principle of Environmental Traffic Management". in R. Tolley (ed.) *The Greening of Urban Transport: Planning for Walking and Cycling in Western Cities* (London: Belhaven Press), pp. 75-87.

A review is made of the scale of urban traffic problems in Germany. Principles on which to take radical action are outlined: (a) motorised means of transport are unwelcome in cities; (b) residential areas must be improved by a combined process involving housing, street design, environmental improvements and reducing motor traffic; (c) public transport must be improved. The following measures are advocated: 30 km/h speed limits in all residential streets; 50 km/h speed limits in towns; increased street capacity for bus, light rail, pedestrians and cyclists at the expense of the motor vehicle; detailed improvements for pedestrian, cyclist and public transport facilities; and de-commissioning of some streets to improve the quality of life for residents.

The way in which such principles are applied is through the concept of traffic calming (Verkehrs - beruhigung). There is a good bibliography of 21 references but most of these are in German. Tables show the relationship between the type of street, the type of problem and the measures taken. Traffic calming can take place on streets of any size and function, although two successfully traffic-calmed main streets are Niedersprockhovel and Bielefeld, both in Nordrhein-Westfalen. Diagrams and plans of two sections of the main street in Niedersprockhovel are given.

The general benefits of traffic calming in Germany have been measured by empirical research, mainly concerned with noise, vehicular speeds and accidents. There is extensive evidence on speed reduction effects. There are also benefits to road safety.

WOOD, A.A. (1977) "Foot Streets and Public Transport". in R. Cresswell (ed.) *Passenger Transport and the Environment: The Integration of Public Passenger Transport with the Urban Environment* (London: Leonard Hill), pp.95-114.

The author argues that it will not be possible nor desirable to redevelop centres on a multi-level basis to segregate pedestrians and vehicles, and that future directions should be based on sensitive management of the surroundings, with some restraints on the use of cars in town centres, and eventual public transport domination.

The paper concentrates on streets closed to vehicular traffic, and summarises the findings of Monheim's study in 1975 for the German Association of Cities of 143 pedestrianisation schemes in German cities. The author outlines requirements for vehicular traffic-free areas as function, accessibility, character, comfort and aesthetics.

Appendix B

COST ESTIMATES

COST ESTIMATES OF CONTROL MEASURES (June 1992)

TRAFFIC CONTROL

C1	Channelisation	Likely to range from \$20,000 - \$50,000
C2	Cross pavement markings	\$3 to \$5 per linear metre
C3	Speed zoning	Cost of sign posting and enforcement
C4	Management of on-street parking	Cost of sign posting and enforcement
C5	Management of on-street loading	Cost of sign posting and enforcement
C6	Light traffic thoroughfare	Cost of sign posting and enforcement
C7	One-way road system	Cost of sign posting and enforcement
C8	Traffic signals	Midblock \$70,000; Tee Junction \$90,000; Cross intersection \$110,000
C9	Pedestrian crossings	\$1500

DEVELOPMENT CONTROL

C10	Detailed zoning
C11	Frontage width control
C12	Floor space ratio control
C13	Control of business hours
C14	Off-street vehicular access/parking
C15	Infill/redevelopment
C16	Footpath utilisation
C17	Advertisement control
C18	Streetscape
C19	Views and vistas
C20	Heritage conservation

*Estimates not applicable except for
specific situations*

VEHICULAR SPACE RELATED

D1	Off-line bays	See D21 and D23 for costing
D2	Different carriageway pavement	\$70 - \$120 per m2
D3	Raised pavement	\$20,000 (13m pavement) - \$30,000 (20m pavement)
D4	Bypass roads (including LATM in the Main Street)	cost specific to particular situation
D5	Staggered roadway	See D21 and D23 for costing
D6	Roundabouts	\$30,000 to \$200,000 depending on size and site conditions
D7	T Junction rearrangement	\$10,000 to \$30,000
D8	Staggered junctions	\$15,000 to \$50,000
D9	Raised pavement within intersection	\$50,000 (13m pavement) - \$90,000 (20m pavement)
D10	Two lane entry threshold	\$10,000 to \$30,000
D11	Gateway	\$10,000 upwards
D12	Tree planting in median strip	\$170/m (2m wide)
D13	Tree planting in road shoulder	\$100 each

PEDESTRIAN & VEHICULAR SPACE RELATED

D14	Shared space	\$100,000 - \$500,000 per 100m (13m pavement), \$200,000 - \$700,000 per 100m (20m pavement)
D15	Road closure - Main Street	\$30,000 upwards
D16	Side street closure	\$30,000 upwards
D17	Shared/raised pedestrian crossing	\$20,000 (13m pav't) to \$30,000 (20m pav't)
D18	Street lighting	\$250 to \$500 per light and columns \$550 - \$1600 each
D19	Carriageway/lane narrowing	\$40,000 to \$50,000 per 100m depending on width
D20	Railing of footpath/median	\$100 per metre
D21	Grade separated pedestrian crossing	\$1000 - \$1500 per metre

PEDESTRIAN SPACE RELATED

D22	Footpath design (including extension)	\$50 - \$100 per sqm
D23	Awning/verandah	\$120 sq m
D24	Tree planting in footpath	\$40 - \$500 each, depending on use of grilles

Appendix C

CRITERIA FOR ASSESSING PROPOSALS

**RELATED TO PROJECTS INVOLVING THE
ENVIRONMENTAL ADAPTATION OF ROADS AND
FRONTAGES IN THE MAIN STREET OF RURAL TOWNS**



CRITERIA FOR ASSESSING PROPOSALS

RELATED TO PROJECTS INVOLVING THE ENVIRONMENTAL ADAPTATION OF ROADS AND FRONTAGES IN THE MAIN STREET OF RURAL TOWNS

Introduction

This appendix represents a summary of points that have been developed in more detail in chapters of this report. It covers three areas:

- guidelines to assist local government in preparing a case for a demonstration project to be submitted to the Roads and Traffic Authority, NSW;
- a summary of project assessment to assist the Roads and Traffic Authority, NSW with criteria for selecting suitable demonstration projects and for reporting on these projects; and
- a mechanism for monitoring the before and after situation with a demonstration project; and the development of a national data bank on environmental adaptation of roads.

The aim is to outline how a potential demonstration project should be prepared in order to qualify for a grant. A three stage approach for requesting funds by Local Government to the RTA is proposed. The aim is also to outline the assessment criteria for such proposals.

There are three stages for Local Government.

Stage 1

The first stage is an expression of interest. The information required is summarised in Table C-1. A pro-forma for a draft project follows. It is recommended that the RTA promote a series of regional workshops to promote the concept of the environmental adaptation of roads and frontages, before seeking such expression of interest from Councils.

Table C-1: Expression of Interest - Information Required for Stage 1.

1. Name of Council/Town/City.
2. Physical location of proposal and road classification.
3. Outline of the major problems (see Chapter 2).
4. Project description and initial objectives (see Chapters 5 & 6).
5. Evidence of preliminary consultation (see Chapter 7) including level of support by council (unanimous, clear majority, marginal support) and by other stakeholders.
6. Description of the likely benefits expected from implementing the project.
7. Indication of the proposed organisation and management of a feasibility study.

**Council Proposed Works on Classified Roads
Environmental Adaptation - Pro Forma**

Council	RTA Division	Proposal No.
Road No.	Road Name	Agreed Class

Project Name:

Project Description

Estimated cost (\$ 92/93)

Construction Start: Construction End:

Funding Profile	Prior	1992/93	93/94	94/95
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Locality Sketch

Other Comments

Funding Criteria

- (a) Road User Economic Performance
- (b) Contribution to Road Safety
- (c) Contribution to Network Efficiency
- (d) Contribution to Reduction of Road Maintenance Costs
- (e) Contribution to Surrounding Environment
- (f) Contribution to Tourism and Economic Development
- (g) Impact on Preserving the Integrity of Communities

Signature (by Authorised Officer on behalf of Council)

Date:

Stage 2

Stage 2 represents the documentation of the feasibility of undertaking an integrated project. It is essential that the guidelines of this report are used to prepare the documentation. The involvement of a range of stakeholders - traffic committees, Chambers of Commerce, community groups - is also essential and their contribution should be included in the documentation. It is suggested that a shorter version of the main body of this text be suitable as a resource document for Council in preparing Stage 2.

Table C-2 Documentation Required at Stage 2

Using the guidelines described in Chapters 2 to 7:

- 1 Problem definition, consultation and objectives
- 2 Description of surveys and analysis of results
- 3 Generating of design option(s) - Chapters 5 & 6
- 4 Consideration of implementation option(s) - Chapter 7
- 5 Itemising capital costs of measures
- 6 Identification of unmeasured costs and benefits (e.g. traffic noise, perceived pedestrian safety, environmental issues and equity considerations)
- 9 Consideration of staging options
- 10 Assessment of option(s) and comparison with do-nothing situation
- 11 Conduct sensitivity analyses
- 12 Preparation of planning balance sheet - Chapter 7
- 13 Public display and stakeholder participation in evaluation
- 14 Modification of options if required
- 15 Budget and implementation schedule together with proposed financing
- 16 Council ratification
- 17 Report and basic data

Criteria for Assessment by the Roads and Traffic

Authority at Stage 2

The Roads and Traffic Authority requires a method to assess the detailed proposals in Stage 2. Improvements in environmental quality and in road safety (perceived and actual) are issues underpinning any assessment. Criteria are developed below within the general framework of improving overall community well-being with respect to safety, traffic operations and the environment.

- Clarity in understanding problems and how principles of environmental adaptation may be applied to help solve these problems;
- Magnitude of expected benefits (quantitative and qualitative);
- Extent of support for the study in stage 2; and
- Resource support pledged for stage 2.

The NSW Treasury Guidelines and the RTA Economic Analysis Manual (1990) specify levels of reporting for different sizes of investment. Therefore, the results of an appraisal will need to form a part of a submission for funding explaining the case for a particular proposal. It should provide an overview of the whole process of investigation leading to the recommendation.

This submission should cover:

- A description of the problems which the scheme has been designed to remedy and a brief account of how these were identified.
- The essential features of the various options examined and their rationale (i.e. their link to identified problems).
- A discussion of the process of reducing these options to the preferred one. This should include the various evaluation stages gone through.
- A discussion of the effects of the scheme.

The recommendation and ultimate decision by the RTA will normally be made by reference to the greatest net benefit for the community. Quantitative and qualitative descriptions should be given as appropriate, indicating numbers affected by the impact and using categories such as slight, moderate or severe where practicable. A tabular framework - planning balance sheet approaches (see Chapter 7) - is a useful means of presenting the non-economic impacts.

Stage 3

Stage 3 is worked out in consultation with the RTA Regional Office and the local council for those projects that have been selected at Stage 2. This represents documentation on the actual works undertaken in a comprehensive approach to the environmental adaptation of the Main Street in rural towns. The aim is that such schemes act as a model for other parts of New South Wales and for Australian towns.