

Guidelines for the Conduct of Urban Transport Corridor Studies

Occasional Paper

This Paper presents a methodology for conducting transport corridor studies for urban areas and is intended primarily to assist State Road Authorities (SRAs) with the generation and evaluation of major road improvement projects. The paper does not attempt to provide a 'blueprint' for corridor studies, but concentrates on developing a framework which, if accepted, would provide at least some measure of consistency between studies undertaken by different authorities.

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BUREAU OF TRANSPORT ECONOMICS

GUIDELINES FOR THE CONDUCT OF URBAN TRANSPORT CORRIDOR STUDIES

By:

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in association with

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FOREWORD

In 1976 the Commonwealth Bureau of Roads commissioned A.M. Voorhees and Partners in association with John Patterson Urban Systems to undertake a study aimed at the development of guidelines for the conduct of urban transport corridor studies. The project arose from a review of the assessment procedures used by the Bureau in preparation of its report 'Roads in Australia 1975'. The main objective was to produce a document to assist State Road Authorities in the generation and evaluation of major urban road improvement projects.

This paper is the result of that commission, which was completed after the amalgamation of the Commonwealth Bureau of Roads with the Bureau of Transport Economics.

The paper attempts to demonstrate the need for corridor studies and also to provide some guidance for those undertaking such studies. Thus, it may have an audience rather wider than that originally envisaged and is published as a contribution to developing ideas in this area of planning activity, although it is stressed that the views expressed are not necessarily those of the BTE.

The paper is broad in nature, recognising that analysts conducting particular corridor studies must design approaches appropriate to the unique conditions of each specific study, and is not intended as a methodological "cookbook". The major thrust is towards adoption of a problem-oriented approach to corridor studies rather than the more common project approach.

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March 1980

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SUMMARY

This paper presents a methodology for conducting transport corridor studies for urban areas and is intended primarily to assist State Road Authorities (SRAs) with the generation and evaluation of major road improvement projects. The paper does not attempt to provide a 'blueprint' for corridor studies, but concentrates on developing a framework which, if accepted, would provide at least some measure of consistency between studies undertaken by different authorities.

An examination of current practice revealed that the scope and procedures used in evaluation varies widely between SRAs. This is not surprising given the wide variety of circumstances within which various authorities operate, but, from a Federal Government viewpoint, some greater degree of uniformity would be desirable. A general framework for the conduct of corridor studies is developed with this in mind while recognising that particular studies must take account of the unique nature of each individual problem.

The planning process is seen as involving four main steps with a very high degree of feedback between stages. These steps are

- (a) Problem definition
- (b) Generation and initial screening of conceptual alternatives
- (c) Sketchplanning of alternatives
- (d) Detailed refinement and evaluation

The methodology developed from this approach is based on the view that planning and decision making should be an iterative process in order to take proper cognizance of social, economic and environmental factors, as well as financial constraints and the likelihood that new information will emerge as planning proceeds.

The definition of a transport corridor for study purposes is not always easy. Different boundaries may be adopted for different purposes within the same study and the corridor definition may

need to be changed as information accumulates. It is emphasised that there are usually practical advantages in conforming with existing administrative and statistical boundaries. Whatever is done in this line, however, it must be remembered that corridor definitions adopted need to be explained and justified as part of the reporting procedure.

Problem, as distinct from project, definition is seen as central to effective transport planning. Indeed studies aimed specifically at defining general regional problems may be warranted before transportation problems can be delineated.

With regard to the generation and initial screening of alternatives the importance is stressed of considering a wider range of options than the engineering centred solutions which have sufficed in the past. It is concluded that some discussion of issues with authorities and sources outside the study team is desirable at this stage, although 'open' public participation is not advocated.

Even after careful screening the sketch planning and preliminary assessment phase is likely to involve analysis of a large number of alternatives, and so choice of criteria and method of measurement must be tailored closely to the resources available for this stage of planning.

The evaluation process itself is seen as a complex, iterative one which permeates all levels of the planning process. The need for post project appraisal, to monitor the success of a particular chosen line in meeting the goals of the planner, is emphasised.

The problem of community involvement is discussed at some length. The achievement of effective community involvement is seen as requiring attention to four main areas

- (a) Establishing the legitimacy of the study and study team
- (b) Alerting and informing those whose interests are affected

- (c) Collection and dissemination of data on community perceptions, needs and priorities, as well as on the full implications of specific decisions
- (d) Paving the way for a decision to be made and implemented

Community participation is seen as presenting considerable difficulty, but it must be recognised that there is no way that an agency can, in the long term, insulate itself from pressures for public information and consultation.

The problems of land use transport interaction are recognised, but not discussed in any depth in this paper.

CHAPTER 1 - INTRODUCTION

Following the completion of its Report on Roads⁽¹⁾ in late 1975, the Commonwealth Bureau of Roads (CBR) instituted a review of the assessment procedures used in making its recommendations in regard to arterial roads in urban areas. In particular, it found that its procedures in regard to arterial road projects where significant right of way expansion is required were deficient when assessed relative to the perspectives outlined in paragraphs 6.32 to 6.36 of its 1975 Report.

The major implication of this assessment was that the CBR would need more comprehensive evaluation procedures to assist it in making its recommendations in the future. The Bureau did not believe it could, or should, carry out such evaluations. Rather, the Bureau's function, as noted in its 1975 Report, was seen to be the development in co-operation with State authorities of transport planning processes for developing and evaluating major projects in urban areas⁽²⁾. A similar position was adopted by the Bureau of Transport Economics in its work on urban public transport⁽³⁾.

In light of this, the CBR concluded that any new assessment procedure for major road projects in urban areas would have to make use of evaluation results generated by the States' own planning processes.

To this end, prior to their amalgamation with the Bureau of Transport Economics, staff of the Commonwealth Bureau of Roads undertook a preliminary survey of the nature and scope of the planning and evaluation studies currently performed by the State Road Authorities (SRAs) with special emphasis on major projects. The results of this survey are reported in Chapter 3 of this paper.

(1) Commonwealth Bureau of Roads Report on Roads in Australia 1975, Melbourne, 1975.

(2) Ibid, para. 6.61.

(3) Bureau of Transport Economics, Urban Transport: Capital Requirements 1977-78 to 1979-80, AGPS, Canberra, 1977.

The survey, which included discussions with SRAs in Western Australia, New South Wales, Victoria and Queensland, showed that current SRA planning and evaluation practices for major road projects in urban areas differ widely between States. Ultimately the comprehensiveness of SRA planning and evaluation procedures, like the timing of them, is determined by SRA's own requirements. Clearly this means considering only those factors which can influence the decision(s) they face.

Circumstances vary widely with regard to public awareness, environmental impact legislative requirements, competition for funds with other public purposes, etc. and accordingly the scope of evaluations necessarily varies widely.

The review of SRA's current procedures revealed that almost all the likely corridor level evaluation requirements of the Bureau are currently carried out by the SRA's, in one way or another, at some time or another, between the conception of a network and the construction of individual projects. The approach adopted here is to accept that major differences in scope and detail exist between SRA's procedures at present and to develop guidelines to provide a basis for improvement in the quality of the procedures.

To this end the CBR initiated a research project to develop a comprehensive methodology for conducting corridor studies in urban areas. The methodology was to assist State road planning authorities to generate and evaluate major urban road improvement projects. Chapters 3 through 9 present the results of these investigations.

The corridor level was selected as the focus of this study as it is at this level that the rather abstract strategic (metropolitan wide) network plans are translated into well defined plans for the solution of specific regional transport problems. It is at this level of planning that a decision to implement a specific solution out of all alternative solutions to the problem at hand is generally made. The additional detail inherent in project design

and implementation stages of the planning process would be surplus to the Bureau's needs in relation to the role defined earlier in this Chapter.

CHAPTER 2 - OVERVIEW OF THE PLANNING PROCESS

TRADITIONAL PROCEDURES

This section provides a brief description of the transportation planning process as generally practised in the past. By necessity, a generalised overview of complex procedures overlooks many unique issues and specific considerations which may arise when the procedures are applied to given problems.

One of the problems in developing a generalised description of the transportation planning process is the overlapping and occasionally conflicting terminology transportation planners have used. There are, however, three major levels of transportation planning which are generally recognised and which have traditionally been applied in a sequential fashion. These are:

- . strategic planning of transport systems
- . corridor planning
- . project planning or "route design".

Strategic planning basically involves broad investigations of transport interactions and future needs over relatively large areas. It is conducted along more multi-disciplinary lines than the other two levels of transport planning. To be effective, systems planning must be carried out with the aim of meeting a series of broad social and economic goals including transportation policies. In corridor planning the transportation problem is usually more narrowly defined on an area, modal, design, cost and impact basis. Project planning traditionally considers specific designs and routes of actual project alternatives.

This overview of transport planning procedures includes consideration of these three levels of planning. The chapters which follow then concentrate on corridor level studies to provide guidance to SRAs on the planning procedures considered desirable

by the Bureau. Because any study is to a large extent unique, the usual major features of each level of study are not discussed but simply listed.

Strategic Planning

Strategic planning has historically been conducted as an "area transportation study" and embraced a co-ordinated transport system. These studies have generally included all of the following characteristics:

- (i) a long range time horizon (20 to 30 years);
- (ii) a broad geographic scale, regional or metropolitan area;
- (iii) consideration of major social, economic and demographic trends, as well as public policy alternatives which would reinforce or counter those trends;
- (iv) identification of existing and future problems, expressed primarily in terms of travel demands;
- (v) formulation and evaluation of multi-mode transportation networks as opposed to single-mode projects;
- (vi) identification of long term transportation improvement priorities, and implementation schedules which reflect those priorities;
- (vii) selection of specific improvement corridors or projects for further detailed planning and design analysis according to the schedule of priorities.

Corridor Planning

Strategic planning is usually followed by a corridor location phase which has traditionally been defined in terms of:

- (i) a mid range time horizon (5 to 12 years);
- (ii) a limited geographic study area, varying from a width of several city blocks in dense urban areas, to several miles in suburban or rural areas;
- (iii) primary (although not necessarily exclusive) emphasis on a "preferred" transportation mode;
- (iv) primary emphasis on the analysis and display of impacts attributable to the various alternatives, as opposed to analysis of the needs to be served;
- (v) identification and evaluation of location alternatives and measures to minimise harm for the preferred option, with lesser attention given to other modes;
- (vi) preparation of conceptual relocation plans;
- (vii) more extensive community involvement and public agency co-ordination;
- (viii) refinement of project cost and implementation schedule estimates;
- (ix) build or no-build decisions based on the feasibility and desirability of carrying out a proposed project and the priority its design should be given.

Project Planning

Finally, the corridor location phase is succeeded by a design study phase, which can be characterised by:

- (i) a short range time horizon (2 to 6 years);
- (ii) an essentially fixed study area, involving only minor shifts in alignment location;
- (iii) principal focus on engineering design concerns;
- (iv) design refinement, final commitment to implementation and measures to minimise harm;
- (v) continuation of community and public agency involvement;
- (vi) additional but limited impact assessment analysis;
- (vii) ratification - except where unusual or unanticipated problems are identified - of decisions to proceed reached at the conclusion of the corridor location phase;
- (viii) programming of the project for final design and construction.

NEW CONCEPTS FOR PLANNING

The foregoing definitions of the three major steps in transportation planning do not adequately reflect a number of emerging planning concepts and technical approaches which are an essential part of planning. Over time, as the complex interactions between transport systems, their components and communities become increasingly apparent, aspects of the strategic type approach are being more and more included in corridor and project studies. Similarly, strategic studies are becoming more intensive and complex.

The implication of the above approach, that there is a one-way progression from broad-scale network planning to increasingly more detailed project location and design studies, is therefore misleading. It fails to account for the frequent feedback, or "recycling", of issues relating to problem definition, project location and designs, in the essentially continuous nature of system planning and review activities. In addition, the introduction of environmental concerns and legislation at State and Federal levels places requirements upon the planning process which have not previously been explicitly required.

The view of transportation planning and decision making as an iterative process rather than a sequential progression of tasks is due in large measure to environmental and other review requirements which tend to keep open (or reopen) basic decisions as to the feasibility of alternative courses of action at each succeeding phase of study. The iterative view of the process also recognises the likelihood that new information will emerge as planning proceeds, as well as the possibility that public policies and priorities or community sentiment will change over time⁽¹⁾.

A major flaw in early transportation planning processes was the extent to which transportation considerations were isolated from social, economic and environmental planning and the over-looking of financial constraints in the generation and evaluation of alternatives.

As a result of these changes in transportation planning a sub-area study approach has developed, which merges attributes of both traditional system and corridor planning⁽²⁾. The sub-area transportation study is aimed at considering alternative modes and

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- (1) See for example Boyce, D.E. et al, Metropolitan Plan Making Philadelphia, P.A., Regional Science Research Institute, 1970.
- (2) Starkie, D.N.M., Transportation Planning and Public Policy, Progress in Planning, Vol. 1, Part 4, 1973; and Deen, T.B. and Skinner, R.E., Responses to Alternative Analysis Requirements, Transit Journal No. 4, Vol. 2, November 1976.

facility designs at a scale smaller than is considered in the systems planning phase. It facilitates the integration of both system-wide performance as well as localised impact evaluation criteria in the definition of problems, generation and assessment of alternative proposals.

This approach also permits more efficient utilisation of the skills of an inter-disciplinary study team and provides a context to which members of the public can more effectively relate. It is this scale of planning which seems appropriate to the study of major projects under consideration by SRAs. Nevertheless, in Australia these studies have tended to emphasise design aspects to the detriment of system considerations. As such, they still include the flaws of the traditional planning processes since they either neglect or implicitly accept unstated goals of society. Projects based upon such planning are likely to result in misdirection of government activity and misallocation of resources in general.

Following the review of existing SRA practices in Chapter 3 the report provides an overview of the new approach to transportation planning and presents guidelines for each major study component.

CHAPTER 3 - STATE ROAD AUTHORITY PRACTICE

INTRODUCTION

A survey of the nature and scope of the planning and evaluation processes currently employed by the State Road Authorities was undertaken by staff of the Commonwealth Bureau of Roads in early 1977. Particular emphasis was placed on processes used for major arterial road projects in urban areas. These are projects where significant right of way expansion is required. The bulk of urban arterial road projects are of a small to medium scale and usually take place within established rights of way.

Discussions were held with SRAs in Western Australia, New South Wales, Victoria and Queensland on aspects of their planning practice including:

- (a) identification of transport problems;
- (b) development of alternative solutions;
- (c) evaluation of alternatives;
- (d) implementation of proposals (programming);
- (e) monitoring.

IDENTIFICATION OF PROBLEMS

In all States visited the SRAs are working to complete a high class arterial network according to a strategy plan devised or developed during some earlier transportation and/or land use study. Apart from extension of these plans outward (with development of the urban area) it appears that few significant additions have occurred or are contemplated. Deletions appear to occur by default (ie. by indefinitely delayed construction) rather than by explicit decision never to build, although there are some notable exceptions to this general position.

Generally, there are no on-going strategic studies to enable revision or rationalisation of the accepted network. Nor are there any formal processes consistently used for the identification of the most urgently required links in each city. Priorities are established, somewhat flexibly, taking the following factors into account:

- (i) political support or concerns;
- (ii) concentration of surface street problems in one area;
- (iii) deterioration of existing streets;
- (iv) local concerns;
- (v) development catching up (ie. anticipated lack of capacity);
- (vi) recurrent problems at end of completed links;
- (vii) resolution of reservations (if required to enable development to proceed);
- (viii) problems reported by divisional engineers.

Each of the plans has been determined at particular points of time. None are continuously under review. Therefore, changing economic, social and political circumstances will not be taken into account until any subsequent study is undertaken. Goals are therefore maintained on what is purely a historical basis and which therefore may become markedly out of date.

Furthermore, these plans generally address only proposals for an ultimate network of road links. They ignore the wider, but over-riding important questions of transport and land use policy, which will determine the ultimate implementation and viability of such networks. Consequently SRAs, rail, bus and ferry authorities

independently strive to achieve their individual goals with little co-ordination between them and the current use of the term "corridor studies" is often a misnomer in the strictest sense.

GENERATION OF ALTERNATIVES

Arterial master plans generally consist of a network of proposed high standard (ie. freeway or near freeway) facilities and currently there are no rigorous methods used to generate link alternatives. At the corridor level it appears that a range of roading alternatives from the "no build" to the freeway are considered. When a formal corridor study is carried out this range now tends to include options which maximise the use of existing streets and rights of way, minimise housing resumption, etc. With freeway alternatives, it is common practice to establish the ultimate and then to consider a range of construction stages as alternatives. Such alternatives may involve reduced width, access control or pavement strength while still allowing for eventual completion of the ultimate facility.

Consultation with local governments (and others - through any public participation exercise) provides ideas for alternatives which may or may not prove feasible.

There does not appear to be any process by which alternative modes (eg. public transport) are considered in detail because in most cases at the corridor level they are not considered by SRAs to be realistic alternatives. The manner in which corridors are identified for detailed investigations tends to suggest that the "no build" option is also unrealistic. Similarly, planning controls are not sufficiently reliable to allow land use options to be usefully considered as feasible alternatives to, say, additional capacity.

EVALUATION OF ALTERNATIVES

One current emphasis in transport planning is on refinement of the evaluation phase - extending the range of factors considered, improving the manner in which they are considered and measuring the impacts more exactly.

The practice of evaluation varies widely between the SRAs. Continuous striving to complete a network which has already been declared "required" tends to relegate detailed evaluation to the role of determining how and when, rather than if, construction should take place. With this sort of commitment evaluation becomes a second order problem carried out during the design period. In most States, unless specific problems arise, no formal evaluation "report" is generally available until the "eve of construction".

Cost effectiveness in a traffic or engineering sense, whether or not it is expressed in dollars, is the universal criterion. Formal economic evaluations are often carried out, but do not appear to greatly affect the decisions taken.

Environmental impact legislation, or foreshadowed legislation, in all States requires that environmental factors are taken into account. The sophistication of the environmental and social analyses (beyond, say, people, houses and businesses affected; open space required; noise and pollution levels) varies greatly. It appears unlikely that projects which were demonstrably cost effective would ever be rejected outright on environmental grounds. Nevertheless significant modifications to preserve or enhance environmental features, reduce noise, etc. are commonly made.

The degree to which public response is taken into account in assessing the worth of projects varies even more widely than that

of objective environmental analysis⁽¹⁾. A number of problems have been encountered with the practice of public participation. The most commonly referred to are:

- (i) that public participation stirs up opposition to proposals, thus aiding anti-development minority groups;
- (ii) that public participation unnecessarily worries people now who may (or may not) be affected by proposals many years in the future and creates unnecessary opposition;
- (iii) that public participation in the early planning phase does not succeed as people cannot appreciate the implications of projects which are many years off and only show their true reaction (perhaps) many years later when a commitment to construction has been irreversibly made.

In general, SRAs are reluctant to expose projects to public scrutiny until they have been well researched and proved feasible. It is considered that some projects might be "killed" if floated too early. The situation in some States is improving as experience with public participation is increased.

IMPLEMENTATION AND PROGRAMMING

The SRAs appear to have a huge pool of medium to small projects which are coming up through the system. These are related to improvement of the existing road network. They contrast with the very few large scale projects, which are by and large additions to the existing network.

(1) A useful review of public involvement in transport planning in Australia is given in A. Sinclair, Public Participation in Transport Planning (in Australia, Occasional Paper 20, Bureau of Transport Economics, AGPS, Canberra, 1978.

Priorities for all works tend to be established on a cost effectiveness basis (taking into account the alternatives) at a fairly general level. Programming, the realisation of these priorities, takes more specific factors into account. These include:

- (i) continuity of gang employment;
- (ii) continuity of resource supplies;
- (iii) timing of services adjustment;
- (iv) rate of purchase of land (limited by acquisition procedures and availability of funds);
- (v) limited resources available for design (and other manpower constraints);
- (vi) political concerns;
- (vii) inadequacies on existing roads (including current rate of deterioration);
- (viii) connections to existing roads; and ultimately
- (ix) availability of funds and likely flow of funds.

SRAs work on relatively few major projects at any one time, but the complexity of programming means that it is not apparent or certain three years in advance, say, which projects will be proceeded with in any one year and how much of those projects proceeded with would be attempted. Similarly, detailed information about major projects several years in advance is not readily available, as projects tend to develop and alter over time. In many cases a list of projects ear-marked for construction activity three years hence represents only the best judgement of the SRA at that time and not necessarily a real and binding list of impending future works.

MONITORING

Monitoring of the effectiveness of road expenditure receives little attention in any of the States. Recording of traffic on arterial roads and residential streets is done as a matter of course, but the changes are seldom explicitly related to expenditure on roadworks in the area.

Accident rates on existing and proposed roads are considered in evaluation, but this is rarely reviewed after construction unless unexpected circumstances arise.

Some SRAs are currently monitoring noise levels before, during and after road improvements and are measuring the effectiveness of expenditure on environmental impact mitigation techniques for use in future evaluation exercises.

Monitoring can be expensive and, considering the limited funds available for transport, it is understandable that, since immediate returns from monitoring cannot be demonstrated, it is not popular with SRAs. Nevertheless, monitoring is likely to be vital to the future planning and evaluation of transport investment if diminishing funds are to be spread effectively over the spectrum of road improvements.

CONCLUSION

The process of major road planning and design does not lend itself readily to a single evaluation. Current SRA practice involves a continuum or series of evaluations during the evolution of a project. In general, three levels of evaluation which the States should conduct can be distinguished:

- (i) strategy level - considering system wide transport objectives;

- (ii) corridor level - considering parts of the network in terms of regional objectives;
- (iii) project level - considering links in detail prior to construction.

Strategy and corridor level evaluations (i) and (ii) are relevant to the Bureau of Transport Economics' role of analysing funding levels. They may require considerably less information than level (iii) evaluations and are amenable to overviewing by an outside agency (eg. the Bureau).

Project level evaluation (iii) may be relevant to the administration of Federal grants once established, but this possibility need not be discussed here.

It is clear that there are at least two major problems with the direct application of current SRA planning and evaluation practices. These are:

- (a) the procedures and scope of project evaluation varies widely between the SRAs;
- (b) the programming procedure is so complex and ultimately flexible that it is unlikely that it would be known some three years in advance precisely which projects would be constructed in the funding period.

As indicated previously, system level studies are rarely done outside large scale metropolitan transportation studies. In contrast, a corridor level study involves the first of the evaluations carried out by the SRAs for the express purpose of deciding whether or not to proceed with link design. In practice, the decision whether or not to build may not be made until much later. Economic, environmental and social factors are not currently considered until much later (and in some cases not at all).

Nevertheless, the judgement of designers and planners not to explicitly consider some factors at this stage may in itself be an evaluation. If this is so, it needs substantiation and documentation.

For different reasons public response is not tested early in the planning process, and public participation, if practised, has tended to occur when a preferred alternative has reached an advanced stage of design. This situation is changing in some States as experience with public participation increases.

Ultimately, the comprehensiveness of SRA planning and evaluation procedures, like the timing of them, is determined by SRA's own requirements. Clearly this means considering only those factors which can influence the decision(s) they face.

Circumstances vary widely with regard to public awareness, environmental impact legislative requirements, competition for funds with other public purpose, etc. and accordingly the scope of evaluations necessarily varies widely. It would be highly desirable if some degree of uniformity existed. However, it would be unreasonable to spell out detailed evaluation requirements which are the same for all States. Not only would some SRAs be unwilling, or unable, to comply with such requirements, but there is some value in diversity of approach which takes account of local factors. Similarly it would also be undesirable to specify an approach based upon a lowest common denominator as this would encourage some SRAs to do less evaluation than at present.

Nevertheless, from the Bureau standpoint it would be desirable to encourage ongoing strategic studies at the system level which emphasise the interaction between modes and infrastructural requirements in relation to the changing needs of relevant communities. Such studies will require co-operation between Ministry of Transport, SRAs and authorities administering other modes and should be conducted within the framework of State transport policy guidelines.

The review of SRAs current procedures revealed that almost all the likely corridor level evaluation requirements are currently carried out by the SRAs in one way or another at some time or another, between the conception of a network and the construction of individual projects. The approach adopted here is to accept that major differences in scope and detail exist between SRA procedures at present and to provide guidelines to ensure that the quality of the procedures are gradually improved.

If the Bureau is to utilise directly the SRAs own evaluation then the first major problem is really one of getting the whole evaluation together at one time three years before construction (or major funding allocation). The other major problem is then that of predicting which projects are likely to be constructed in the next funding period and which should therefore be evaluated. It is unlikely that any SRA would be prepared to commit itself to work on those projects and only those projects which it nominated several years ahead. It appears unreasonable that they should.

The Bureau is therefore interested in details of those projects which are likely to be constructed during the funding period, assuming some margin for error in funding levels, changing public concerns and political priorities.

In addition to a need for better and more uniform transport planning approaches, there is also a need for monitoring of projects following implementation. Any planning and funding process is not complete without a continuous review of performance as compared with the original proposals. Such feedback is necessary as an input to improving analyses and also as an aid to SRAs in bettering their proposals. As well as expenditure, the monitoring process should also embrace traffic levels, benefits, social costs and other impacts of each project.

CHAPTER 4 - THE CORRIDOR PLANNING FRAMEWORK

INTRODUCTION

This part of the report is designed to provide the underlying philosophy of a corridor planning process and to identify in broad terms the steps in the process.

THE STUDY FRAMEWORK

Any transportation study should be undertaken in the context of the widest socio-economic complex that it will effect. The alternatives should evolve from a set of public and private goals relating to the broader aspirations of the community at large. Ideally, such goals should be explicit. However, this is not always the case and client participation programmes at either the executive or public level or both are usually required in order to incorporate implicit social goals in the study.

Transportation studies should therefore be undertaken within the wide context of society's goals. These encompass a large number of factors such as:

- (i) regional topographical structure and resource base including climatic factors;
- (ii) population characteristics and dispersal;
- (iii) urbanisation, regional and community services;
- (iv) recreation and social interaction;
- (v) the economic base at primary, secondary and tertiary levels with government and private sectors;
- (vi) current plans and policy making/planning institutions and processes;

- (vii) fiscal and monetary considerations including economic outlooks;
- (viii) interactions with other regions through trade, migration and communications.

STEPS IN THE PROCESS

The flow chart depicted in Figure 4.1 has been developed to encompass the full range of considerations relevant to transportation planning following study design and initiation. As such it relates equally to strategic and corridor planning and project planning approaches. Because of the complex interactions of transport with other socio-economic factors, the model is also applicable to policy formation and project evaluation in general.

The emphasis placed upon different stages in any particular study will vary markedly depending upon the nature of the problems encountered. For instance, in strategic studies the emphasis may be more upon problem definition than that relevant to project planning studies. In the latter case, detailed refinement and evaluation would normally encompass most of the work carried out.

The various steps included in Figure 4.1 are discussed briefly below in order to place them in context. They are reviewed in detail later in this report.

Step 1: Problem Definition

The problem definition step involves a systematic compilation and analysis of goals, objectives, policies, issues and concerns which will serve as the basis for generating and evaluating transportation alternatives and for identifying areas of high-priority concern requiring particular attention during the planning process. This step also involves:

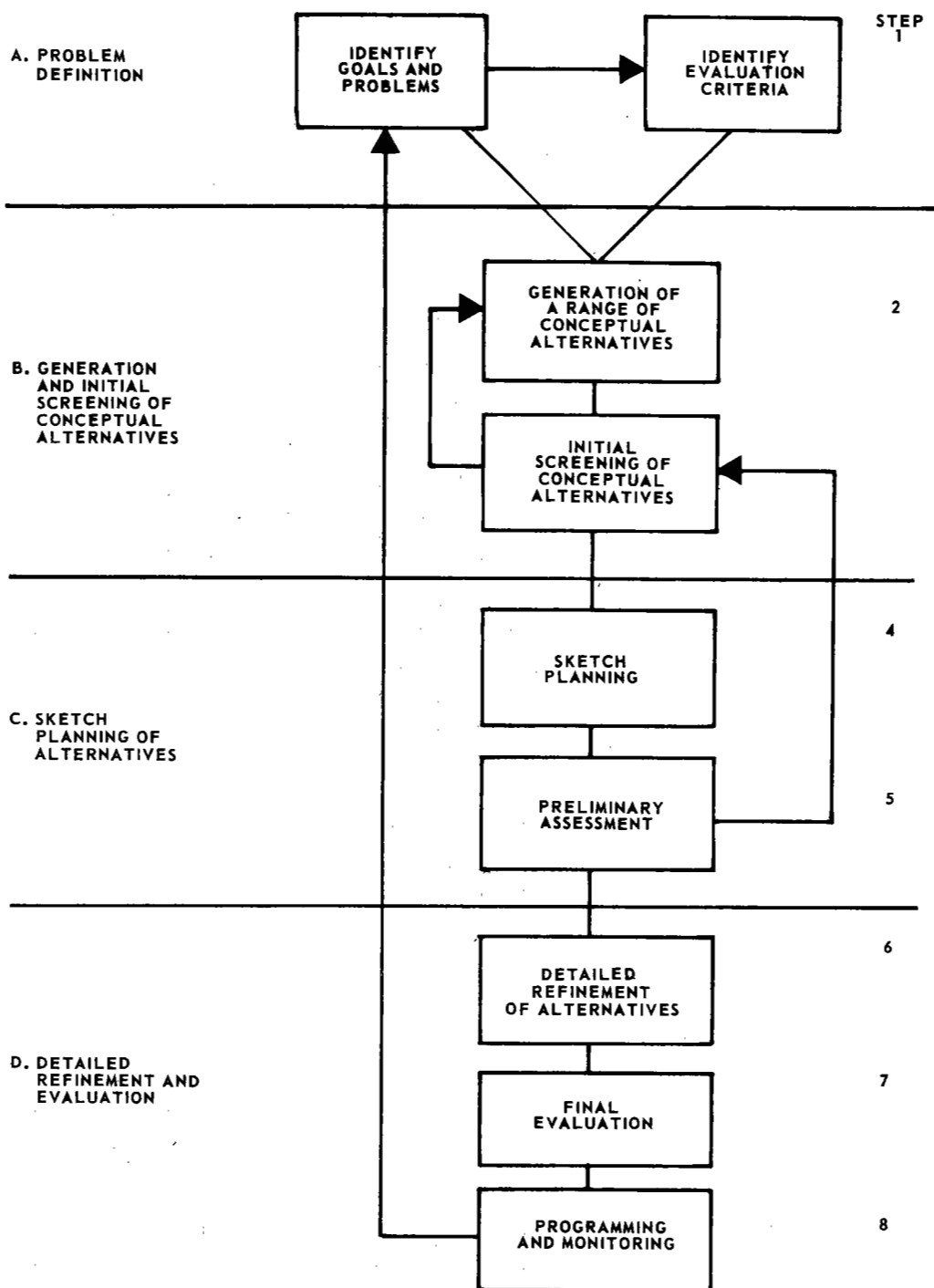


FIGURE 4.1 TRANSPORT PLANNING PROCESS

- (a) identifying goals and objectives including both transportation and non-transportation issues; particular attention should be given to the identification of areas of agreement and disagreement so that alternatives can be generated which respond to the concerns of diverse interest groups;
- (b) identifying broad evaluation criteria for reviewing and deciding among alternatives, which could include pecuniary investment criteria, such as internal rate of return, methods of ranking intangible effects, physical measures of pollution etc., or perhaps, more loosely, number of vehicles carried per year, etc.

The iterative nature of the planning process may however result in the refinement and/or modification of problem statements, goals and objectives as planning proceeds.

Step 2: Generation of a Range of Conceptual Alternatives

A broad range of system or project-scale options should be identified and roughly diagrammed at this stage. Initial concept alternatives should address the problems defined during Step 1 and thus be responsible to both area wide transportation system performance needs as well as identified corridor and local scale, social, economic and environmental problems and concerns. In many cases a proper problem definition will enable attention to be focussed on a fairly small set of alternatives.

Step 3: Initial Screening of Conceptual Alternatives

Using the generalised evaluation criteria formulated during Step 1, conceptual alternatives should be reviewed and screened in concert with public and private participants in the study process. Clearly unreasonable or unacceptable options should be discarded, although care should be taken not to prematurely delete alternatives which have few but adamant supporters. In order to aid

public presentation and to clarify physical juxtaposition with major natural and man-made features, alternatives should be graphically displayed on appropriate base maps, or aerial photographs.

Step 4: Sketch Planning

Alternatives which survive the initial screening step should proceed to a multi-disciplinary sketch plan process intended to yield sufficient data on their relative merits to permit informed assessment and selection of those alternatives which should be further studied. Analyses should be carried out in sufficient depth to determine basic engineering feasibility, transportation service characteristics, costs and major anticipated social, economic and environmental impacts. Findings should be expressed in terms of a potential range of impacts and identified as tentative pending further analysis. Intuitive or subjective judgements may often substitute for detailed studies at this step. Short-cut analytic techniques based on clearly identified assumptions can also be used to generate essential data.

Step 5: Preliminary Assessment

Evaluation criteria developed during Step 1 should be refined and supplemented with more detailed criteria and standards. Sketch plan alternatives and related findings should be reviewed and evaluated in order to discard the least promising alternatives. For remaining alternatives a review should be made to identify their problems and shortcomings in order to decide whether to introduce modified or new alternatives into the process or whether to proceed to Step 6 for a detailed analysis of remaining alternatives.

Step 6: Detailed Refinement of Alternatives

Each remaining alternative should be accorded detailed analysis which produces data and documentation appropriate to the scale of planning involved. All impact categories need to be addressed at a level of detail appropriate to the significance of the anticipated impact; particular attention being accorded to issues or impacts that have been identified by participants in the study process as being important. A draft study report should be prepared and circulated informally among all participants.

Step 7: Final Evaluation

Study findings contained in the draft report should be supplemented by an evaluation chapter. A final study report (which may take the form of a tentative systems plan, a draft EIS, a preliminary project design report, etc, depending on the nature of the study) is prepared, circulated for formal review and comment, and presented for public scrutiny.

Step 8: Programming and Monitoring

The programming of major projects which emerge from this type of study process must enter the project programming process along with projects generated from other processes and which also compete for scarce funds. However, projects receiving the extent of public exposure implied by this process must have a high probability of early implementation since the impact evaluations are often specific to the present conditions and may require complete reassessment if implementation is delayed even a few years. In addition, a plan for monitoring each particular project should be established and implemented at this stage.

The flow chart (Figure 4.1) shows major linkages between the different stages. However, in any successful study, informal feedback occurs at all stages as knowledge comes to hand. This

enables the continuous reassessment and refinement of steps which have previously been undertaken and adds input to future studies.

PROJECT VERSUS PROBLEM ORIENTED STUDIES

In a project oriented planning approach, the range of alternatives which might be considered include location, design and no-build options. With a problem oriented approach by contrast, the range of alternatives that can be developed to address the problem is broadened. Alternatives might include (in addition to location, design and no-build options):

- . alternative transportation modes;
- . transportation policies and programmes which reduce or re-distribute travel demand;
- . longer term land use planning strategies.

The difference between the two approaches can be seen clearly in the planning process diagram described earlier in Figure 4.1. Under its most narrow definition, a project oriented approach might be limited in practice to Steps 7 and 8, which involve the detailed development and final evaluation of alternatives, although Steps 1 to 6 would be implicitly carried out. (Most SRA corridor studies conducted to date have had this project orientation.) A problem oriented planning approach would, in all cases, extend throughout the entire work process (Steps 1 to 8) even if the emphasis on each of the Steps 1 to 6 is small. Its success would depend in large measure on the ability of the study team to effectively identify, disaggregate and restate the goals, problems and other issues of concern to all persons and institutions affected by or involved in the transportation decision making process. This data provides the basic material from which alternatives are generated and indicates the areas deserving the highest degree of attention in the evaluation and successive refinement of those alternatives.

While acknowledging the importance of a "problem" orientation, it is emphasised that there are likely to be many cases where a project orientation may be appropriate. An escalation of study activities to consider clearly unpopular or infeasible alternatives may generate unnecessary public discontent and consume valuable study resources.

FUNDAMENTAL INFORMATION

Such factors provide a framework in which the transport planner must collect information and make forecasts of future events about three main types of phenomena. These are:

- (i) Desire line patterns - existing and expected future origin and destination patterns (based upon socio-economic and land use data).
- (ii) Service availability - expectations of appropriate future levels of transportation service and access to different sub modes by various user groups.
- (iii) Range of transportation systems and facilities - various facilities, modes, systems, vehicles and service requirements.

These elements form the focus for information gathering and analysis which contribute to the definition of problems, the generation and evaluation of alternative transportation projects. Alternative solutions are developed and successively refined from initial rough concepts to preliminary sketch plans and then to preliminary decisions as to which alternatives, if any, should proceed into detailed development. New or modified alternatives may be introduced at any point. After the final round of analysis, one or more alternatives may seem sufficiently desirable to merit programming for design and construction studies.

Alternatives at all levels of analysis shown in the figure should consist of a solution package which integrates the objectives of the transportation improvement with the social, economic and environmental concerns as expressed in the planning context.

STUDY DESIGN AND INITIATION

Study design and initiation activities include the creation or clarification of the roles and responsibilities of the various participants in the planning and decision making process. Study organisation is dealt with in detail later in this report but the following items all require specific attention:

- (i) define public agency roles - prepare inter-agency agreements or memoranda of understanding, designate a policy and decision group and a technical advisory group to monitor the technical study process;
- (ii) establish a community involvement programme - identify and initiate contacts with community organisations and other public and private interest groups appropriate to the problems, projects and possible impacts being addressed;
- (iii) assemble an interdisciplinary study team - determine professional specialists required, secure project management personnel, select technical staff and consultants (if required) and establish technical co-ordination programme;
- (iv) prepare statement of work - identify range of study elements and subjects to be examined, including environmental, social, economic, transportation, urban design, political and legal factors; assess degree of emphasis to be placed on various study elements;
- (v) review funding commitments - assess likely availability of funding by private and public sectors for both physical and non-physical improvement alternatives;

- (vi) prepare planning schedule - define sequence of work programme elements and identify major review, evaluation and decision points;
- (vii) clarify decision making process - define decision making role of public and private participants in the process.

In the preparation of the study design it is expected that components of all of the eight major study steps outlined in Figure 4.1 will be included, even though some may only be treated in an implicit fashion. As mentioned previously, each step is discussed in detail in later sections of this paper.

STUDY ORGANISATION

The most appropriate organisational structure for any particular study will be different in each State and for different scales of projects, however Hansen and Lockwood's recommendation⁽¹⁾ for study organisation still provides valuable guidance.

"... The study structure ... must:

- . avoid spurious distinctions between "technical" and "community" representation;
- . strike an appropriate balance between political representation of the affected subregions and the regional interest;
- . establish direct communication between the technical process and the ultimate decision maker;
- . maintain continuity between an institutional structure established for the study purposes and the on-going implementation and operating agencies;

(1) Hansen, W.G. and Lockwood, S.C., Transportation Planning in a Changing Environment; Principles for a New Process, A.M. Voorhees, Technical Notes, Vol. 1, No. 17, July 1, 1974.

- . permit the representation or direct participation of interest groups representing the complete range of values in the planning process;
- . include within the decision making structure institutions responsible for land use planning both at regional and local scales."

All transport studies fit within a hierarchy of studies which range from the broad regional level to the project specific level. The process described herein provides guidance for the procedures that should be used. As stated previously, the way in which the transport proposals complement or contrast with regional plans, objectives and policies must be tested in the study process as well as the direct net benefits from the transport alternatives.

Experience has shown that only corridor scale design will produce sufficiently detailed information to which affected groups or individuals can respond. Strategic planning is conceptually too complex while project planning studies involve too many technicalities for the public to effectively participate. Conversely, the results of ad hoc corridor studies implemented without reference to their regional land use and transport implications are likely to shift problems from one area to another. Strategic level planning must therefore be an on-going function rather than a fixed framework within which the corridor studies must fit. As mentioned previously, there is a marked need for these at the broad policy co-ordination level.

In most States the regional level strategies are being rethought and these activities (and participants) should become "one element or component of an evaluation process"⁽¹⁾. The three major functions of the strategic level studies are:

(1) Hansen, W.G. and Lockwood, S.C. *ibid.*

- (i) to formulate alternative land use systems as possible futures for the purpose of testing transportation demands;
- (ii) to formulate alternative regional functionally consistent transport policies and systems;
- (iii) to identify possible corridor studies.

Discussion so far of the content and methodology of corridor studies implies a much broader representation in the study process of groups and agencies than has been practised in the past.

There is a strong need for the committee directing the corridor study to have some measure of continuity or permanence. Where a metropolitan transport planning agency exists, it is clear that this agency could provide this framework. Where one individual agency (e.g. the State Road Authority) initiates the study, a co-operative committee will need to be established. It is clearly more difficult to maintain the necessary continuity with an ad hoc committee, but in most States such co-operative approaches have been achieved on once-off projects. The corridor planning approach presented in this document would require the formalisation of the co-operative approach. The Joint Road Planning Group in Victoria is one example of this approach.

STUDY MANAGEMENT

"Any study process comprises three interrelated components - organisation and staffing, technical approach and the detailed methodology ... The effectiveness of a study is more related to the balance achieved between these components than the strength and weakness of any one of them." (1)

(1) Hansen, W.G. & Lockwood, S.C. *ibid.*

The success of the individual phases of the study process depend to a large degree upon the existence of a truly multi-disciplinary planning team and a strong, respected study leader who has direct access to the decision makers.

The study leader has a large public responsibility, since:

"His small mistakes are embarrassments to the Government, his big mistakes could be disasters. Without absolute faith in the team leader's ability and judgement, the man at the top can only see a potential problem..." (1)

The study manager should therefore have ready access to the decision makers even though they will not be concerned with any but the major policy decisions. The direct contact will ensure a steady flow of information to them since he must not only know the technical facts surrounding a particular decision but also the response to these facts by the various groups which comprise the affected community. For these reasons it is best that the review team and decision makers meet with the study leader on a regular basis from the outset of the study.

Within the confines of the study guidelines, as laid down in consultation with the committee, the study leader should have complete freedom to allocate tasks to team members and to determine details of methodology and associated technical matters.

Much of the work involved in carrying out transportation studies now involves the interaction and co-operation of professionally oriented individuals. It has been shown in many case studies that such persons are best left to work together and communicate in an informal manner. Study guidelines (ie. goals, work quality and deadlines) must be well defined and maintained throughout the study. This is preferably obtained through flexible supervision

(1) Washington (State) Planning and Community Affairs Agency, Multi-discipline Design Terms for Transportation Facilities Olympia, 1972, (ITS PCAA Information Series No 3).

by a study leader who will be a senior professional, responsible to a review committee. The latter should be both highly respected by the study team and principally consist of decision makers rather than senior professionals per se so that the study is firmly directed towards goal achievement. In the past, many study tasks and particularly those involving data assembly and the technicalities of physical design were basically repetitive tasks. These were undertaken by non-professional staff, but, currently, are being carried out by computer. Studies have shown that such individuals require formal structures if they are to function efficiently. A hierarchical supervisory structure dominated by the study team and the enforcement of rules regarding communications between individuals, their work approach and conditions of employment are generally considered necessary. These conditions should be less formal as the professionalism (viz. training and initiative) required by their tasks increases.

SUMMARY

It must be emphasised that the process described above and illustrated by Figure 4.1 is intended only to provide an overview of an idealised transportation planning process. Clearly, the process must respond to the specific planning problems at hand, which may range from highly complex to relatively straightforward situations. Each problem is unique and the way the planning process is applied depends upon the nature of the problem. As stated earlier, the steps of the process remain the same but the application of the steps - region of analysis involved etc. - varies with problem type.

In actual practice, the planning process is more dynamic and fluid than that indicated by the above summary description. The completion of any step does not preclude a recycling of that step as a result of subsequent findings and analysis. For example, the problem definition (Step 2) can be, and often is, modified or reformulated during the course of a study in response to the increasingly more detailed and revealing information generated by

the initial screening, preliminary evaluation and final evaluation steps. Similarly the sketch planning and preliminary evaluation Steps (5 and 6) may undergo several iterations until a consensus emerges as to which alternatives should be carried through detailed development and evaluation. In addition, informal links and feedback between all steps arises in a well conducted study.

Despite these qualifications, the planning process described herein illustrates the sequence of activities required to identify and progressively refine transportation alternatives. It provides a context for distinguishing between the different types of alternatives - conceptual, sketch plan and detailed - as they develop during the course of the transportation planning process.

The following chapters take each of the major study steps in turn and suggest guidelines for their conduct in the context of a problem oriented corridor study.

CHAPTER 5 - PROBLEM DEFINITION

INTRODUCTION

Investments in major transportation infrastructure projects should be generated in response to a perceived "problem". Problem definition is, however, dependent upon the viewpoint and expectations of the observer.

In the past, each major urban area has conducted a regional transportation study to consider regional problems and propose long-term projects (usually in the form of major networks of arterial roads and freeways and public transport investments). The problem definition phase of these studies has typically been based upon a forecast or forecasts of future travel demands and an examination of the ability of the transport system to meet the demands at some desired level of service. Projects were generally developed as a response to lack of system capacity or level of service (measured in terms of average speed or delay).

As a result of these studies the State Road Authorities have a large number of potential projects on their books. Available funding levels have not been sufficient to allow the construction of these recommended projects.

The intention of this report is not to suggest that projects determined by previous planning studies be scrapped, but that:

- (a) in the setting of priorities for the programming of these existing project proposals a serious examination be made of the problem(s) which the projects are attempting to solve; and
- (b) when identifying new projects, a problem definition procedure following the guidelines set down herein be used.

The definition of transport problems can be formalised into a sequence of procedures which are discussed in the following sections.

PHILOSOPHY

Recent planning literature has emphasised the need to consider transport within the context of the total community in which it operates. This has been emphasised in previous sections of this report and a number of articles dwell on the need to consider the distributional impacts of transport proposals. Wider socio-economic impacts of transport upon labour force participation and the regional economic base are also emphasised in recent literature⁽¹⁾.

The extent to which such factors should be taken into account depends upon the level and nature of the problem being analysed. Such factors would generally be of greater importance at the strategic level than in the project planning phase.

The methodology of problem definition is not shown in Figure 4.1. It is indicated that goals and evaluation criteria should be determined and this implies that problems are readily recognisable. This is the case when say traffic congestion on a particular link at a particular time is evident. However, at the strategic level of planning this is not necessarily so.

Problem definition basically involves the identification of undesirable market or non-market gaps, which either currently exist and are expected to continue or which are anticipated to arise in the future. These types of situations have recently been discussed and graphically demonstrated in the BTE's cost recovery report. As emphasised in that report, the criteria for attempting

(1) Hansen, N.M. Rural Poverty and the Urban Crisis Indiana University Press, Bloomington 1971; and Harvey S. Perloff, Common Goals and the Linking of Physical and Social Planning in Urban Planning and Social Policy, B.J. Frieden and R Morris (Eds) Basic Books Inc., New York 1968.

to close such gaps through investment, regulation, pricing, subsidies, or taxation policies is the enhancement of social welfare. Net pecuniary and non pecuniary benefits should, as far as possible, be weighed against costs, often in a subjective fashion. In order to do so effectively all potential impacts must be taken into account.

Problem definition at its most all embracing fashion such as that faced in regional development studies, is a very complex process. It usually commences with an inventory stage in which relevant past and current data is assembled and collated as a basis for assessing existing problems and for forecasting. The forecasts are then used in constructing development scenarios which delineate potential future market and non-market gaps. These may or may not constitute problems, depending upon the relevant society's goals. Problem definition under these wider circumstances involves implicitly, or directly, considerable value judgement, which depends upon assessment of society's stated and implicit goals. Problem definition at the project planning level is more easily carried out, but nevertheless the same philosophical steps apply.

PROCEDURE

The general overview of the planning process outlined in Chapter 4 emphasised the need for feedback and informal links throughout the planning process to enable successive refinement. In this sense the project oriented study which begins with a specific project should be thought of as a study which begins at an intermediate point in the process. Feedback to problem definition should follow the detailing of the project, to ensure that the evaluation process reflects the extent to which the project solves the identified problems. If this results in finding that the project does not match the problems (and that the do-nothing alternative is superior), then the study can and should be widened in scope to include the generation of new alternatives. If the project is truly sensitive to the identified problems than the it has an increased probability of moving forward to implementation with the backing of the participating agencies and the public.

As previously discussed, two types of study orientations are possible:

- . project oriented
- . problem oriented.

Problem Definition - Project Oriented Studies

Project orientation will occur where a study is considering a project which has been brought forward from previous decisions. Problem definition is therefore theoretically complete. However, a restatement of the problem(s) which the project is aimed at resolving should be a necessary part of the study process. The statement of problems and the objectives of the project should then form the basis for the selection of the evaluation criteria. The effectiveness of the project in solving the stated problems can then be weighed against the other implications of the project and scope provided for considering variations to the project or, if necessary, completely new projects.

In the project oriented study the focus on impacts, rather than on basic problems and issues, has validity and usefulness only in those limited situations where no major disagreement or controversy exists with respect to the general need for, or desirability of, a proposed project. Where disagreement does exist, the project oriented approach is insufficient and a problem oriented approach should be adopted.

Because of these shortcomings the project oriented approach is unlikely to satisfy the Federal and State environmental project assessment requirements. These require consideration of a wider range of benefits and costs, and hence alternatives, than the more traditional engineering project demands.

Problem Definition - Problem Oriented Studies

Defining corridor transport problems requires the planning team to consider the full range of:

- . possible types of transport problems (eg. efficiency, equity problems);
- . viewpoints (eg. community groups, politicians, government agencies, planners, etc) and hence impacts other than those related solely to transport operations;
- . time periods (eg. today's problems versus potential problems 20 years hence);
- . scales (eg. intersection delays, corridor wide level of service, etc).

This concept of problem definition in relation to transportation is identified in Table 5.1. This table indicates the various dimensions of transportation problems or market gaps. 'Type' refers to the general nature of such problems. Efficiency problems concern the extent of the physical, economic or social impacts of transportation systems in relation to the resources they employ. On the other hand, equity relates to the distribution of transportation impacts amongst groups and individuals in society. 'Viewpoint' essentially refers to the geographical or institutional nature of groups while the time and scale dimensions are self-explanatory.

Economic viability studies are traditionally used to analyse transport efficiency problems. Equity is the concern of "incidence analysis". Current thinking, as discussed above, is that almost all analyses of transport problems should embrace both equity and efficiency considerations.

There exists a range of techniques for dealing with equity problems. These range from simple consultation with the various groups (or viewpoints) through to sophisticated analytical techniques.

In all cases, however, there exists some criterion or standard against which the transport service is compared in order to identify the problem. The resident of a local community perceives that his standard of "acceptable" traffic noise is exceeded. The train traveller experiences longer than "tolerable" waiting times in commuting to work. The politician perceives that the rail operation is experiencing declining patronage levels and "excessive" operating deficits. The housewife in the one car household experiences an "unacceptable" level of access to shopping or job opportunities.

These examples represent a range of transport problems in terms of type, viewpoint, timing and scale. However, it is likely that these are all representative of real problems which could be defined in any urban corridor. Solutions to such a range of problems are unlikely to lie in a single project, but rather in a package of measures including various capital projects, management policies, modes and possibly non-transport actions.

In order to develop a full range of solutions for consideration it is vital that the dimensions of the problems be defined as explicitly as possible; not only in the initial phases of the study, but during the progress of the study. The continual processing of new data and detailing of alternatives may allow refinement and restatement of problem definitions.

Methods available for problem definition are discussed in more detail in Chapter 10.

Forecasting is basic to all problem definition since all transport studies with policy orientations concern the future. Forecasting methods appropriate to each problem solving study vary according

TABLE 5.1 - DIMENSIONS OF TRANSPORT PROBLEMS

Type	System Efficiency
	Equity of Service
Viewpoint	Region as a Whole
	Corridor Population
	Sub groups within the Corridor Population
	Business/Freight Interests
	Planning Authority
Time Period	Existing Problems
	Short term (5-10 years)
	Long Term (15-20 years)
Scale	Intersection
	Street
	Block
	Municipality
	Corridor
	Regional

to its aims, the complexity of the problem, the finance available for the study and the risk that the decision makers are prepared to bear. It is generally accepted that the reliability of forecasts improves with information quality about past and present events and interactions. A cost/reliability trade-off therefore exists between the marginal cost of assembling and analysing data for making forecasts and the resultant net benefit arising from any social improvement of the decision (in this case the problem definition) which utilises those forecasts. This trade-off is equally relevant to evaluation practices and policy decisions.

CONCLUSION

Transportation studies may be classified as being either problem or project oriented. Project oriented studies per se are becoming less popular since they do not consider the wider social issues in which governments are becoming more involved as time passes.

Problem definition is basic to the effective outcome of any transportation planning. Without it a study cannot be efficiently planned and executed. In many studies, problems are clearly defined, particularly at the project planning level. At the systems level, this is more rarely so and specific studies aimed purely at defining general regional problems may be warranted before transportation problems can be delineated.

Transport problems can be conveniently described by four dimensions: type, viewpoint, time period and scale. Consideration of all four dimensions provides framework considered essential for adequate problem definition.

The problem definition stage concludes with the documentation of the identified problems with supporting data, analyses, records of formal and informal interviews, discussions, etc. Maps of the corridor at suitable scale should be used to record in graphical

form the extent and distribution of the defined problems. This material forms the basis for the development of solutions and also provides the basis for developing information suitable for community contact.

CHAPTER 6 - GENERATION AND INITIAL SCREENING OF ALTERNATIVES

INTRODUCTION

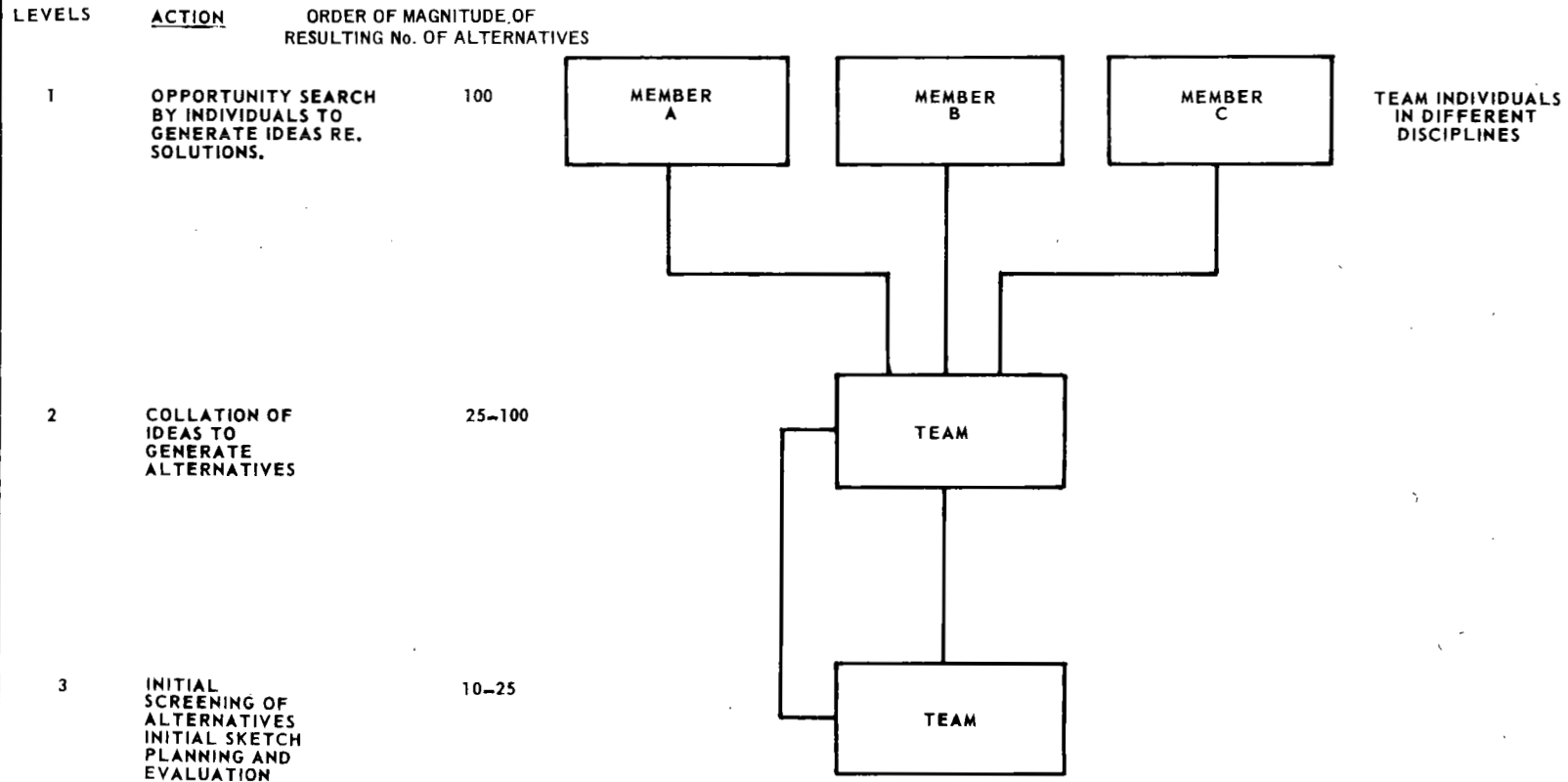
This chapter is broad and general in nature. This stage of a planning study is necessarily carried on in an informal fashion. The nature of the process is the important consideration. Techniques in the accepted sense are not really relevant since the procedure involves the generation of potential solutions on the basis of prior knowledge and experience rather than analysis. Furthermore, each planning problem is unique and hence relevant factors can only be meaningfully reviewed in a general and therefore relatively brief way. An outline of the process is shown in Figure 6.1.

GENERATION OF A RANGE OF CONCEPTUAL ALTERNATIVES

This stage of the process can be broken up into two stages or levels. These are an opportunity search for solutions by individual professionals of the study team and the collation of these ideas as a whole to generate a set of initial alternatives.

Level 1

Maps at the same scale will have already been prepared, showing the identified problems and the physical characteristics and social and economic activity patterns. Individual members of the planning team will develop alternatives using a four dimensional framework which includes investment levels, modes, policies and implementation timing. Each individual's set of alternatives will emerge after acceptance and rejection of possible alternatives based upon his or her perception of suitability and viability. Members of the planning team will actually draw alternative systems on base maps of the area.



**FIGURE 6.1 PROCESS OF GENERATION AND INITIAL
SCREENING OF ALTERNATIVES**

Level 2

The ideas of each of the team members must be brought together, collated and sifted in order to provide a co-ordinated source list of possible projects.

This process will be conducted within the planning team, resulting over time in modification, additions and rejections to the candidate list. The practical number of combinations of alternatives, given the limits of interpersonal communications, is likely to be about 25-100 system concepts. A greater number than this will result in an inordinate amount of time being spent in group meetings.

Demands for progress will require minimisation of the time spent on this level of solution generation in most instances.

Constraints upon Generating Alternatives

An "alternative" may be defined as a candidate means for providing a solution to the identified problem(s). The number of reasonable alternatives available in any particular corridor is almost limitless because each can be a combination of alignments, operating strategies, investment levels, etc. Each solution component presents an opportunity for developing additional alternatives.

Other transportation modes, traffic management and "non-physical" solutions (car pooling, road pricing, staggering work hours, etc.) may also provide viable solutions to the problems being addressed.

A broad ranging approach to alternative identification requires that the planning team be multi-disciplinary and therefore capable of an informed approach to the range of available alternatives. For example, the road designer is unlikely to have knowledge of non-physical alternatives just as the economist is unlikely to be aware of traffic signal control technologies.

The planning team can begin sketching alternatives as soon as the problem definition phase is complete and the team has become familiar with the:

- . regional land use scenarios;
- . physical constraints; and
- . financial and institutional constraints.

It is obvious that alternatives which seriously affect current land use patterns and/or require zoning changes may not be practicable in the short run. Regional land use therefore places a major constraint upon the range of alternative solutions selected.

Likewise physical constraints limit potential solutions. For instance, there are many cases of studies which have proposed alternatives which are based upon underdeveloped and/or unproven technology or very expensive infrastructure in difficult terrain. To investigate such options in depth is a waste of resources. Obviously, physical constraints also include physical capacity. For example, a new bicycle path alone would not be sufficient to alleviate congestion in a major motor artery.

Financial and institutional constraints are too often the overriding factors in selecting alternatives. To some extent such constraints, even if the implementation of alternatives requires alteration of the Constitution, could be regarded as essentially constraints of time. Where these constraints impose unreasonable restrictions on the development of strongly supportable long term solutions, the planning team should take the opportunity to identify the implications of the constraints. If there is sufficient support for the relaxation of the constraints (either financial, legal or institutional) then the planning team may include one or more alternatives for evaluation which involve the removal (either wholly or partly) of one or more of the constraints.

Problems of land acquisition, availability of finance, political attitudes to the construction of and toll collection on rights of way by private concerns are some other factors that have limited the selection of alternatives in Australia by SRAs. An emerging major institutional factor is environmental requirements. Alternatives which were acceptable are no longer viable. A knowledge of environmental requirements is also therefore an important prerequisite for alternative generation.

A recent major change of emphasis from previous studies which must be encouraged is the explicit recognition of the budget constraints. Past planning studies have lacked adequate guidance concerning the financial limitation on implementation of the planned project. Rather it is a constraint upon timing if considered in limit. If the planning team begins its search for alternatives with a clear understanding of the range of likely available funds, then a more sensible set of choices will be carried through to the decision maker. Simply stated, it is impossible to make a right decision with the wrong projects.

The alternatives which are generated in this climate of financial constraint are likely to be different from the "grand plan" schemes of the 1960's studies which most SRAs are now struggling to implement with inadequate funds. Instead of resulting in well balanced development of the transport system it is not unfair to comment that what has resulted from past plans is disjointed development of large projects which will not be completed within the planning horizon and may well remain as unconnected parts of a system.

GENERAL FRAMEWORK FOR ALTERNATIVE GENERATION

Despite these constraints there remains a broad range of potential alternatives. An organising framework is required to ensure that the chance of overlooking good alternatives is reduced. The major emphasis should be on developing a wide array of alternatives that span the conceivable yet reasonable range as measured on several dimensions:

- . investment levels - alternatives should be included which involve small, medium and large investments (but recognising the historical trends in available funding levels from the various sources);
- . modes - alternatives involving all reasonably available mode technologies should be considered;
- . policies - the range of non-physical (or policy) alternatives such as parking pricing, car pooling, public transport fare structures; and, at the broader level, government attitudes to subsidies and taxation of particular modes and enterprises, energy policy, the vehicle manufacturing industries, etc.);
- . implementation timing - alternatives which provide a range of action timing should be included.

As the planning team reviews alternatives, they will be continually considering and rejecting or accepting alternatives based upon their conception of cost, service and what they perceive as the priorities. By using the organising theme suggested by the four major points listed above the chance of missing viable alternatives will be reduced.

While it is desirable to ensure that viable alternatives are not missed, there is a great difficulty in keeping the number of alternatives within manageable bounds. This is particularly important for major projects which require the preparation of an environmental impact statement. The sufficiency of these reports are often challenged on the grounds that viable alternatives have been overlooked or dismissed on inadequate information.

INITIAL SCREENING OF ALTERNATIVES BY THE STUDY TEAM

The number of alternatives must be reduced in order to clarify issues pertaining to the analysis and to reduce the scope of the study to a manageable level. Throughout the screening process the

study team will continually refer back to those alternatives established in "Level 2" of this phase (ie. collation of ideas and concepts). The initial screening process can be defined as a third level of refinement of alternatives as follows.

Level 3

Discussions of the alternatives will be conducted within the planning team, resulting over time in modifications, additions and rejections to the candidate list. It is important here to recognise that an "alternative" will consist of several solution components. The screening activity can therefore be compared with the process of designing a scientific experiment. It is impossible to analyse every combination of components (indeed many combinations are nonsensical); however the judicious selection of alternatives will allow subsequent analysis of intermediate solutions by interpolation. In this way, the option to include new alternatives later in the study will be preserved.

Just how many alternatives can or should be retained for sketch planning depends upon the timing of the study and the resources available to the study team in relation to the team's own assessment of the complexity of the problem and the number of substantive issues that require exposure. The final number normally includes 10-25 system concepts. These will ultimately be narrowed to 3-10 for detailed technical evaluation following sketch planning and preliminary assessment.

A further aim of this level of alternative generation is to narrow the alternatives to a manageable number before presentation to the non-technical people involved in the study. These usually include individuals (or a committee of officials) specified by the client and groups involved in public participation. This reduction of alternatives must take into account the practical limits of study funds and deadlines as well as the limited time available for subsequent study participation by officials and participant

community groups. One commonly used technique is the formulation of "solution packages" using a matrix formulation.

CONCLUSION

The development of ideas concerning solutions and their pruning to a workable number in a preliminary phase is necessarily one for the professional study team, which should be a multi-disciplinary group familiar with transportation problem solving activities.

An emerging facet of their work in this part of the study is to consider a wider range of options than the engineering centred solutions that have been sufficient in the past. These three levels of a study could therefore involve some discussions with authorities and sources outside the study team about issues but not alternatives. Senior executives in relevant agencies and organisations are appropriate people.

It is probably inappropriate that "open" public participation be invited at this stage of the work. However, the use of public contact techniques directed at specific user groups, interest groups and groups representing the range of viewpoints considered appropriate to the identified problems, should be used. The issues of solution generation and the large number of alternatives considered at this stage involve complexity that can only lead to frustration and a breakdown in communications with, and confidence of, the general public at this stage. Confronting officials and the community with dozens of alternatives without any apparent way to identify the superiority of any is likely to confirm the "fuzzy headed dreamer" image planners sometimes enjoy⁽¹⁾.

The level 3 procedure should particularly explore solutions which may be acceptable for environmental reasons. Environmental agencies and community groups often cannot judge whether a

(1) Deen, T.B. and Skinner, R.E. Responses to Alternative Analysis Requirements, Transit Journal No. 4, Vol. 2, November 1976.

"complete" range of alternatives has been investigated by the professional team members. The only way to overcome this problem is to fully document the generation and initial screening process so that a concise but complete report can be prepared that demonstrates the process used and the constraints and considerations taken into account.

CHAPTER 7 - SKETCH PLANNING AND PRELIMINARY ASSESSMENT OF ALTERNATIVES

This phase of a transportation study is aimed at further reducing the preliminary list of potential solutions or alternatives to a workable level for detailed investigation as shown in Figure 4.1. This phase involves two levels of operation. Sketch planning is followed by a preliminary assessment phase.

SKETCH PLANNING

The operative goal of this step is to translate the conceptual alternatives generated by the study team into descriptions which can be recognised and evaluated by participants in the study. Sketch planning analysis should be undertaken to produce order-of-magnitude results, accepting a moderate level of confidence in the product. On occasion the results may not be sufficient in themselves to allow a final selection of a candidate short list to be made. When this happens, the sketch planning exercise is not wasted since the analyses conducted will help identify how the detailed analysis should be approached, which analysis steps will be the most critical, and which pieces of input data are the most important. However, in most cases useful results about strategy effectiveness and sensitivity can be obtained from sketch planning in a relatively short time.

The criteria or measures of effectiveness will be unique to each study and will be developed from explicit or implicit objective statements. The criteria should be consistent with the overall evaluation framework (discussed in Chapter 8) and will in general terms consist of a short list of criteria which will be measured in an aggregated way. For example, project costs would be estimated on the basis of average cost rates (such as per kilometre of road, per intersection, etc.) rather than involving detailed costing studies. The demand impacts of the alternatives should be assessed using sketch planning "models", either manual or automated. The models used in this stage of the planning process must be tailored to provide:

- (a) the information required for assessment of the alternatives, ie. measurements of the criteria; and
- (b) consistency (in a theoretical and mathematical sense) with more detailed models used at the detailed evaluation stage.

The appropriate depth of sketch planning depends upon the nature of the study and the problem(s) which it embraces. For studies at the strategic level, sketch plans would normally be broad in scope and contain little detail. At the project level, however, they could be relatively detailed and limited in scope, possibly, to the extent that they mainly consist of engineering data. All sketch plans should contain "ball park" estimates of costs and some assessment of benefits albeit intuitive.

A variety of sketch planning techniques are available ranging from manual methods to computer aided methods. In general, however, the sketch planning process must develop order-of-magnitude estimates of the likely supply and demand impacts of alternatives. These would generally include measures of those parameters which are relevant to the decision being made (ie. the selection of a short list of candidate alternatives for detailed evaluation). A selection of such parameters typically used at this stage are listed below:

. Supply impacts

- public transport fleet requirements
- land consumed
- houses/businesses displaced
- etc.

. Demand impacts

- number of travellers and vehicles
- passenger or vehicle kilometres travelled
- extent of mode switching

. Economic impacts

- capital costs
- operating costs (for users and operators)
- fare revenues and pricing
- journey time savings (private and commercial vehicles)
- accessibility improvements

. Environmental impacts

- pollutant emissions
- noise levels

Manual methods have been developed and documented, as well as computer aided methods. The most relevant computer models for sketch planning are summarised in Table 7.1 and discussed in more detail in Chapter 10.

PRELIMINARY ASSESSMENT

Preliminary assessment is an evaluation process which accepts the sketch planning information about a broad spectrum of effects that the alternatives have on the people, communities, environment and economy. The information produced is designed to permit individuals with widely varying points of view to evaluate alternatives in accordance with their values. The evaluation criteria have been chosen to reflect this broad range of values and concerns encompassed by participants in the study.

The criteria should also be selected to reveal the differences in impacts among the alternatives and incidence of transport induced costs and benefits with respect to various geographic areas, communities or user groups. The method of presentation of alternatives and the results of the sketch planning analyses should be consistent with the interests and expectations of the participants and follow the general evaluation framework discussed in Chapter 8.

TABLE 7.1 - CHARACTERISTICS OF AUTOMATED TECHNIQUES FOR SKETCH PLANNING

Name	Acronym	Function	Capacity	Comments
Transportation Integrated Modelling System	TRIMS	A simplified version of UTPS/PLANPAC. Accepts district population and land use data, produces trip tables and link data.	150 Analysis Zones	Must interface with UTPS or PLANPAC data bases. Produces aggregate results.
Short Range Generalised Policy Analysis	SRGP	Predicts impact of pooling, pricing and auto disincentives; and transit improvements.	Uses household sample of approx. 100	Produces aggregate results on autos owned, mode choice, and trip data by purpose.
Community Aggregate Planning Model	CAPM	Assessment of system performance in terms of socio-economic data, costs, and supply and demand characteristics.	10 square-mile communities	Lacks direct transit output.

The aim of this phase is to reduce the number of alternatives to a practicable level for detailed analysis, say 3 to 10 options. At this level, participation in the planning process is widened to include persons other than professional study team members. These include representatives of the client and members⁽¹⁾ of the affected community.

Separately and together these groups will consider the sketch plans in order to select the most viable and acceptable subgroup of alternatives. They also should be given the opportunity to suggest alternatives which have not been included in the preferred set by the professional study team. When this circumstance arises, it will be necessary for the team to go back to the initial screening stage, and upon successful vetting, produce sketch plans for further preliminary assessment. The phases therefore allow for a cyclic process of generation and review of potential solutions.

It is important that the numbers of alternatives posed to the officials and community groups be limited. They must fit their participation into already busy schedules. Too long an involvement by them will lead to a breakdown in relations between them and the study team.

It is also important that a consensus be reached at this stage regarding those options which should be evaluated in detail. The reviewers of feasibility studies often cannot judge whether the range of alternatives considered was complete. This can be overcome by carefully documenting the alternative generation, sifting, and selection process. Because of the informal nature of this process, such documentation is best carried out successively at the end of each level. Those involved, or interested, may then determine whether an objective, good-faith effort has been made to explore potential solutions to the problems identified.

(1) The selection of community representatives, of course, present problems of its own.

Documentation should include:

- . discussion of the community participation programme;
- . a list of persons, groups and agencies contacted and their role in the study;
- . a summary of alternatives considered but rejected with a short discussion of the basis for their rejection.

Preparation of a comprehensive problem definition statement followed by successive cycles of generating, evaluating and refining alternatives in concert with affected public agencies and groups, will permit the planning team to evolve a set of reasonable alternatives for presentation to the transportation decision maker.

SUMMARY

The sketch planning and preliminary assessment process involves the analysis of a large number of transportation (or possibly non-transportation) alternatives. Prescriptions for methods of analysis and criteria for assessment are therefore not possible. The cost of the analytical steps involved in this stage of the process has often frustrated attempts to consider a sufficiently wide range and number of alternatives. The choice of criteria and methods of measurement (ie. manual or automated) must therefore be tailored to the budget available and the needs of the specific project.

CHAPTER 8 - DETAILED REFINEMENT AND EVALUATION

AN EVALUATION FRAMEWORK

The ultimate purpose of evaluation in any transportation study is to provide decision-makers throughout the process with the basis upon which to discard the "least desirable" alternatives. The evaluation process should first define and measure the various factors (or criteria) that will influence how desirable any particular alternative may be and should then aid in illuminating the trade-offs among these factors in order to select a preferred alternative. An "evaluation" is implied at each of the study stages following problem definition. The evaluation process is therefore central to the overall planning procedure.

A general evaluation framework can be built around three principal dimensions of analysis. First are the evaluation factors of importance in the decision-making process. There will, in general, be a myriad of factors, at various levels of detail, which form a hierarchy. A key decision in analysis/evaluation is the selection of an appropriate level of the hierarchy for displaying the results of the analysis. The level selected should provide adequate information, but should not be more detailed than is reasonable in view of the data and depth of analysis required at each stage of the process. It is generally found that no more than ten factors can be considered at one time by a decision-maker before he will attempt to aggregate to a higher level.

The second principal dimension of analysis is the point of view which may be taken. The attitude towards various evaluation factors and their relative importance will vary among different study participants, users, non-users, etc. of the system. Within this dimension, the considerations of "scale" become important since the viewpoints generally range from the regional level down to the individual household level.

The third dimension is the timing of the impacts. Some impacts are apparent immediately and others not until well into the future. Some are continuous while others occur once only.

EVALUATION FACTORS (CRITERIA)

The simplest approach to evaluation would be to take net output, defined as output minus input as the criterion. Often, however, this approach can only be applied within very narrow limits because it is hard to measure, conceptualise or even identify. In virtually every evaluation a range of factors is important and there exists the problem of combining cardinal and ordinal measures or assessments of both tangible and intangible net outputs. There also exists the temptation to accept measurable outputs as being representative of all outputs. In most cases, such assumptions are inappropriate, the resulting bias leads to incorrect evaluation.

A second approach to ascertaining the quality of alternative solutions is to use secondary or approximate criteria. Such criteria consider only one aspect of each alternative and are chosen as being both highly correlated with and/or more measurable than dimensions of net output.

In most transportation analyses, both tangible and intangible inputs and outputs are involved. Single measures of net output therefore cannot be devised. Similarly, the use of single secondary criteria cannot be justified. In the past, an implicit assumption in most feasibility studies was that monetary income was an increasing function of human welfare.

Consequently, only investment criteria (eg. internal rate of return) calculated in financial terms were used to appraise alternatives. Developments in economic theory and the results of applied research have since shown that external effects may be too significant in the real world for this assumption to be sufficient in most cases.

The dimensions of net output, such as revenue less costs, net impacts upon income or the environment, etc. are not always helpful. Gross measures which must be "netted out" in the appraisal process often hide important considerations. For instance, gross costs in various time periods can be important where fiscal constraints are imposed.

THE PROCESS OF EVALUATION

"The merging philosophy focuses on evaluation, not forecasting as the key element in a cyclical not sequential process ... because of the significant degree of subjectivity, it is important that the evaluation process not remain in the hands of a small isolated group of planners, but should be exposed to a broad spectrum of the community.

A three dimensional matrix must be used as the framework for a full evaluation of an alternative, including the impacts ... the groups or areas impacted ... and the timing of these impacts ⁽¹⁾."

The process of evaluation foreshadowed by this quote is therefore very complex. A number of secondary parameters, each representing a dimension of net output, must be weighed against standards and each other in a three dimensional matrix covering impacts, incidence and timing. The dominating problem is the reduction of this mass of data to a level which is manageable, but which remains meaningful. In order to do this, a cyclical process is recommended.

The iterative nature of the process requires that evaluations be conducted at increasing degrees of complexity and detail as the process refines the alternatives under consideration. The overview of the planning process described in Chapter 4 indicates three levels of evaluation:

(1) Hansen, W.G. and Lockwood, S.C. Transportation Planning in a Changing Environment; Principles for a New Process. AMV Tech Notes, Vol. 1, No. 17, July 1, 1974.

- (a) initial screening of alternatives (100 to 10-25);
- (b) sketch planning and preliminary evaluation (10-25 to 3-10);
- (c) detailed evaluation (3-10 to 1).

An appropriate way of reducing the number of alternatives at each stage is to eliminate those which have at least one secondary criteria at an unacceptable level according to the standards adopted for appraisal.

As the number of alternatives is successively reduced, the scope, detail and accuracy of information used in the evaluation process increases. Consequently, options which were not considered to be viable in the early stages, may become more attractive as the process proceeds and more information becomes available. This possibility is most likely with options that were initially opposed politically, but which are technically sound. Opinion may change, as say the costs of initial "ideal" options become known.

As the process continues the number of secondary criteria and the levels of the standards applied to each can also be expected to change. As information quantity and quality improves, conceptions of the dimensions of net output can also be expected to alter. However, the three dimensional framework of impact, incidence and timing must be retained. If one or several of these factors are the same for all options, it should be clearly stated that this is so.

Hence the approach involves a continual review and recycling of ideas, information, analyses and value judgements. Its progress is illustrated by Table 8.1.

The evaluation factors in Table 8.1 are representative only of the broad categories of concern. For example, within the category of economic impact one might find sub categories such as tax and rate

revenue changes, businesses relocated, jobs displaced, etc. The planning team must ensure that the range of criteria used at each stage is appropriate to the decisions which have to be taken during that stage. For example, it is clearly not possible (nor is it necessary) to have an estimate of the resource value of travel savings for every alternative during the initial screening process.

The process appraisal of alternatives therefore usually involves a series of complicated tradeoffs. Hence it is important to select criteria which highlight the tradeoffs to be made.

There has evolved out of these dilemmas the practice of simultaneously using a number of secondary criteria for the evaluation of alternative transportation solutions. These criteria are used collectively, each representing a different dimension of quality or net output. They must be considered concurrently in order to select the "best" solution or alternative; a practice that requires that each be allocated explicit or implicit weights. The preferred alternative is generally a package of projects and policies rather than a single construction job.

The determination of such weights has been the subject of considerable research effort. Philosophically, only exploratory methods of analysis can be justified. Different weights are tried until a "sensible" answer is obtained. However, the value judgement indicated by sensibility of results makes the weight explorations redundant, ie. value judgements could have been used to appraise alternatives subjectively without the use of resources for exploratory analyses.

General practice is, therefore, that the weights of the different secondary criteria be implicitly allotted by the individuals carrying out the appraisal of alternatives. Such appraisal is carried out through them reaching a consensus using value judgements about the desirability of the various solutions. It is important that these judgements be consistent throughout the

TABLE 8.1 - LEVELS OF EVALUATION

	Initial Screening	Sketch Plan /Evaluation	Detailed Evaluation
<u>FACTOR</u>			
Total project cost	O	X	+
User Benefits: Perceived	O	X	+
Resource		O	+
Compatibility with regional growth scenarios	O	X	+
Social effects	O	X	+
Environmental impacts	O		+
Economic viability		O	+
Regional and national multiplier and debt effects		O	+
Income redistribution		O	+
<u>GROUPS AFFECTED</u>			
Existing users	O	X	+
New users		O	+
Non users	O	X	+
Minority groups		O	+
Political jurisdictions	O	X	+
Special interests (business institutions, etc.)		O	+
<u>TIMING</u>			
Implementation timing	O	X	+
Benefit Stream	O	X	+
Cost Stream	O	X	+

LEGEND: O = Assessment by estimation/judgement of planning team.
X = First assessment using quantitative techniques.
+ = Detailed assessment.

various evaluation steps (ie. between pairs of alternatives and between the initial screening and final evaluation). It is considered necessary to utilise an organising framework to ensure this consistency is achieved. For mutually exclusive alternatives, such as alternative route locations, a series of paired comparisons which weigh up the economic/financial impacts against a series of intangible impact ratings is a useful tool.

The decision concerning the "best" alternative is one of policy and therefore is best carried out by those held accountable for policy initiatives such as senior public executives and politicians.

MEASUREMENT OF IMPACTS

Detailed procedures for impact prediction and forecasting can be found in recent guidance manuals and it is not the intent of this document to duplicate this material. The three most recent and comprehensive are:

- (a) "Environmental Assessment Notebook Series", Volumes 1 to 7, available through NTIS Stock No. 050-000-00109-1
- (b) "Workbook and Resource Guide: Social and Economic Considerations in Highway Planning and Design" by Alan M. Voorhees & Associates, Inc. for the U.S. National Highway Institute.
- (c) "The Environmental Evaluation of Transport Plans" by A. Lassierre, Research Report No. 8, available from the U.K. Department of Environment.

In general, demand forecasting and user benefit (cost) estimating methods should conform to the state of the art. For the formal cost benefit analysis of major projects we recommend the use of

techniques which are similar to the methods proposed by Neuberger⁽¹⁾ and Nash⁽²⁾. These procedures are presently included in an operational model developed by the Commonwealth Bureau of Roads⁽³⁾; the Joint Road Planning Group in Victoria is already using this model. More detail can be found in Chapter 10 of this report.

Methods appropriate to assessing intangible impacts should be selected on a commonsense basis. At present there are a number of methods of numerical analysis which have great potential for application to the assessment of intangible impacts. They could be used to generate complex secondary vectors of tangibles from ordinal rankings to indicate intangible dimensions of net output. For instance, they have been used to determine relative measures of ethnicity, micro-environment, literacy, etc. in many previous academic style studies⁽⁴⁾.

CONCLUSION

The evaluation process is both complex and iterative. This is highlighted by Figure 4.1 which shows that it encompasses all four phases. It has been usual to consider that evaluation is principally carried out as a final stage. However, it should permeate the whole planning process and be repeated at various levels of details over and over again.

Following the programming and implementation of adopted alternatives post project appraisal should be used to monitor the degree of

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- (1) Neuberger, H. User Benefit in the Evaluation of Transport and Land Use Plans. Journal of Transport Economics and Policy, 1971. Neuberger, H. and Wilcox, W. Economic Appraisal of Land Use Plans. Journal of Transport Economics and Policy, September 1976.
 - (2) Nash, C.A. Proposed Methods for Estimation of the Urban Strategic Model. CBR Internal Paper, 1974.
 - (3) Urban Strategic Model - User Guide prepared by AMV for the Commonwealth Bureau of Roads, 1975.
 - (4) King, R.J. Social Differentiation as a Key to Assessing the Social Effects of Transport Related Projects. ARR No. 83, 1978.

success of the selected alternative in achieving the initial goals laid down for problem solution.

CHAPTER 9 - COMMUNITY INVOLVEMENT

INTRODUCTION

The international planning literature of the last ten or fifteen years abounds with detail on the importance and relevance of community information and consultation, and on the ideas and experience of those who have advocated or been involved in participatory planning of one sort or another. There is also substantial Australian literature on the subject; in relation to community involvement in road and/or transport planning, work commissioned or carried out by the Commonwealth Bureau of Roads (now the Bureau of Transport Economics) has been particularly important⁽¹⁾. As the preceding sections of this report make clear, appropriate action to inform and involve relevant sections of the community is to be seen as an integral part of modern transport planning, whether at strategic, corridor or project levels.

Facilitating constructive public involvement at any level is an art rather than a science, and (unlike some other, more "technical", aspects of planning) does not lend itself to the formulation of procedural rules of thumb. Fixed routines or procedures are in an important sense foreign to the very notion of participation: the prime demands with a participatory approach makes of a planning team or public authority are for honesty, sensitivity and flexibility.

Nor is there anything in the nature of corridor transport planning which raises participatory issues significantly different from those canvassed in the general literature on the subject. Nevertheless, for the sake of completeness it is useful here to add a

(1) See, for example, M.S.J. Keys Young, Public Participation in Transportation Planning, CBR. 1974; A. Sinclair, Public Participation in Transport Planning in Australia, BTE Occasional Paper 20, AGPS, 1978. For a detailed account of and commentary on a major Australian participatory study see John Paterson Urban Systems, Geelong Transportation Plan, Public Discussion Paper No. 2, Study Process, 1975.

specific section on community involvement, which seeks to offer at least some general guidelines within which the consultation requirements of a given project may be considered or reviewed. We examine a number of the main elements or variables which may help the decision maker to characterise the particular situation confronting him or her, and outline some possible outcomes or implications.

Some of the specific tools or mechanisms which have proved useful in participatory planning in Australia to date are listed in Chapter 10. We emphasise, however, that of themselves these have no special virtue and that what counts is a sensitive and realistic response to a specific situation.

The earlier sections of this report present a schematic model of the corridor transport planning process, involving problem definition, the generation and screening of alternatives, sketch planning, preliminary assessment, detailed refinement of alternatives and final evaluation. "Community involvement", needless to say, does not represent a separate stage or element of this kind: rather it is an aspect of the way each of them is approached. Furthermore, as the earlier sections emphasise, no given project is likely in reality to have so simple a shape as the model might suggest: typically the process will be a circular or iterative one with needs or problems, possible solutions and the costs and benefits of each gradually being clarified as information of various kinds is exchanged and assimilated. In this section of the report, therefore, most of the commentary is of a general nature, and reference to the separate elements of the study model is made only when it is clearly appropriate to do so.

PROBLEM ORIENTATION

To date most Australian experience of participatory planning has been in the course of studies which were more project oriented than problem oriented: there has been a tendency for government

agencies to encourage consultation only when public concern about specific schemes or options became sufficiently clear that further planning without community input appeared inconvenient or dangerous.

Community involvement in problem oriented studies is likely to rely on a range of techniques broadly similar to those typically used in project oriented work, but a problem orientation does raise some distinctive problems and opportunities. Public participation, for example, has a part to play in problem definition and the generation of alternatives, facets which are largely predetermined in a project oriented approach.

Both the difficulty and in a sense the success of participation in project related planning consist in the fact that people are typically motivated to involvement by some direct personal interest that they clearly perceive. When the focus is broader and purely personal interests are harder to identify, a more constructive discussion can perhaps be expected, but it may be more difficult to convince members of the public that it is worth their while to be involved at all, or to get very clear inputs from them. Of course, this depends in part on whether the "problem" seen by the planners is experienced as such by many members of the general public. Sometimes this will be so and sometimes not; geographical and time scales as well as the specific subject matter may be relevant here.

With a problem oriented study there is likely to be a relatively strong emphasis on the dissemination of information (perhaps including information on why the planners, at least, see a problem) and on the broad identification of relevant interests. Such members of the public as do contribute to an understanding of issues at this level may well do so as informants or commentators rather than as individuals personally affected.

Sooner or later a problem oriented approach must, of course, lead to specific options for consideration. At that stage, the rest of

the study process may come broadly to resemble the project oriented approach which is familiar from numbers of past participatory studies. It is reasonable to expect, however, that debate will remain more constructive and more realistic as the result of the decision to "let the public in" at an earlier stage of the planning process.

INTERESTS AND CONFLICTS OF INTEREST

In its widest sense, politics is about the "articulation" and the "resolution" of conflicts of interest within the community. The decision to adopt a consultative or participatory approach to public sector planning is a recognition, on the one hand, of the inherently political nature of such planning and, on the other, of the fact that the formal structures of representative democracy have not usually been sufficient to ensure either the full articulation or the resolution of all the interests relevant to a given issue.

The reasons for seeking thorough exposure of interests and conflicts of interest in a particular case may vary greatly; so too may the degree of frankness or clarity with which those reasons are set forth.

Public consultation is sometimes defended as an end in itself, a recognition of the dignity of the individual and of his or her need to exercise some control over surrounding community and environment; to "have a say". Often it is seen, however, as a means of improving the quality of planning, by making it more appropriate, more comprehensive and fairer. (The participation of interested individuals and groups both gives the planner more and better information and increases the likelihood of this being acted on.) Sometimes the public is consulted because decision makers (bureaucrats and/or politicians) fear the complaints or protests which might be made if a given course of action were followed without full public discussion, or indeed followed at all; we might call this "consultation as a necessary evil".

The "whys" of community involvement are considered at length in numbers of other publications and this report does not attempt to recover that same ground. It is worth emphasising though, that the needs and motivations of the various parties concerned will have a definite bearing on what is attempted in a project and how successfully⁽¹⁾.

What we concentrate on here is the sort of issues which are likely to call for attention once the need has been accepted for relevant interests to be faced in an open way and for conflicting interests, where possible, to be resolved or accommodated. It should be said at once that while such issues may sometimes be simple and straightforward to deal with, more often they raise questions of major difficulty and complexity, requiring the attention of those with relevant skills and attitudes of mind.

The adoption of a problem-oriented rather than a project oriented approach, as recommended in this report, does not mean that interests and conflicts of interest become any less real or important. What it does mean is that the definition of interests can and must be approached in a more open and more thorough way, and that it ought to be possible to explore trade-offs and compromises more constructively, before positions have become polarised.

SOME RELEVANT VARIABLES

The planning and conduct of a given participatory study will be affected by a multitude of factors. The following list is illustrative of the kinds of factors which may have a bearing on what is done in a particular case:

(1) The nature and implications of the needs of various parties to participatory planning is explored in some detail in A, Sinclair, *ibid*.

- . the relationship between the "authorities" on one hand and the citizens on the other, which is important in relation to the legitimacy of the study process;
- . the response of a small, concentrated number of potential "losers" versus that of a large, diffuse number of potential "gainers" (and the compensatory schemes which may be developed);
- . the nature and objectives of any other public agencies either overtly or covertly interested;
- . the status of the planning team and their work;
- . the extent to which various relevant participants, or "actors", are already aware of their interests;
- . whether the general interests of the many or the special interests of the few are involved;
- . whether some affected parties need particular assistance in understanding or articulating their interests;
- . spatial scale;
- . time scale;
- . the extent to which the matters to be canvassed or the questions to be answered are themselves negotiable⁽¹⁾;
- . the extent to which conflicts of interest are of a material nature (and thus financially compensable) rather than matters of principle.

(1) In a problem oriented project they should of course be negotiable.

Often the answers to the questions implied by these variables will be matters of degree rather than a simple yes/no. Nevertheless, posing such questions ought to ensure that attention is at least drawn to most of the significant dimensions of a particular discussion or controversy. The conclusions drawn initially on these matters need to remain open to reconsideration as the project proceeds and information accumulates in the cyclical fashion suggested in earlier parts of this report.

IMPLICATIONS FOR STUDY PLANNING

In planning and conducting a corridor study involving members of the general public, the choices made about such matters as staffing, budgeting, timing and specific techniques must display an awareness of the study goals and of how they might best be pursued and hopefully achieved.

We have emphasised that there is no mechanical way of ensuring this; a State Road Authority embarking on a participatory project can only try to ensure that it has, or gets, the best available talents and experience to do whatever work proves to be necessary. The remainder of this Chapter, however, pursues a series of the illustrative variables set out above, with the objective of demonstrating the ways in which issues may arise and may be dealt with in a given case.

Legitimacy and Agency Interests

In theory, of course, conflicts ought not to arise between public servants and the public they serve. However, the past history of participatory planning, in road construction, as in other fields, shows that controversies are sometimes interpreted in this way. Australian Road Authorities have not generally enjoyed a high degree of public confidence in recent years and it is only realistic for them to anticipate "image" problems and possible imputations of bad faith. Both their general staffing and their organisation of any given project need frankly to recognise this

problem. Establishing and maintaining the legitimacy of a corridor study may well demand departures from some established bureaucratic traditions. Where, as is often the case, the relevant public agency does itself have some professional or institutional interest in one outcome rather than another, there is little to be gained in the long run from attempting to deny or conceal this.

Public servants, of course, do not usually see planning issues as a citizens-versus-authorities matter. Typically the situation is that the bureaucrats or professionals see themselves as representing the interests of a wider public against sectional or ill-informed opposition. Where this is the case it is clearly in the authority's interest to take whatever steps it can to mobilise the alleged wider public. Planning problems and conflicts invariably involve trade-offs between variously perceived group and personal interests and also among the conflicting interests of the public or the community as a whole⁽¹⁾.

While it may be easier to preach than to achieve in practice, it is important that all relevant trade-offs should be articulated as clearly as possible in public discussion, and that the real spokesmen for such interests (if there are any) should plead their own cause rather than it being left to the authorities to do so.

One main reason why so many disputes do present themselves in a citizens-versus-authorities form is that (as noted previously) the decision to "go public" is frequently left until a time when the road construction agency (say) has already taken a preferred alternative to a fairly advanced stage of planning, or even until the time when a decision has already been announced and greeted by public outcry. Associated factors here are the extent to which public agencies and subsections of agencies tend to work on the basis of narrowly conceived goals and in isolation from each

(1) Politicians and planners alike try all too often to take refuge in the essentially phoney notion of a single "public interest" that can be defined and pursued.

other, and the fact that agencies and officers have usually been reluctant to expose themselves to public scrutiny on the basis of anything but a thoroughly researched and documented proposal.

In the long term it is important to work to reverse both these situations. The complexity and interdependence of our patterns of urban living make it imperative that there be constructive exchange of information among agencies. The left hand, in other words, must know what the right hand is doing. Past experience of community involvement has underlined what is already clear in other contexts, namely that co-operation and consultation between road planning authorities and other government instrumentalities needs to be strengthened. Further, the "siege mentality" which has afflicted some bureaucrats in recent years needs to disappear, so that it becomes possible for planners to offer to the client public a series of more open, more tentative, more debatable proposals (that is, so that problem orientation can replace project orientation).

Inter-agency conflicts can be highly threatening to public servants, raising significant threats to prestige and power. The need for more open and frank dealings between agencies is clear, however, as is the need for moves towards a situation where agencies see it as legitimate to test their varying perceptions of community interests through the public airing and examination of relevant problems. The scale of the corridor transport study generally provides a suitable medium for activity of this kind.

On the basis of an initial identification of likely actors and the likely general shape of the debate, then the legitimacy of the process of participation and discussion needs to be established, essentially by establishing the competence and good faith of the research or study team. If open conflict already exists, the team needs to demonstrate its independence from it. One of the common reasons for choosing private consultants to carry out community involvement projects is the fact that they can be seen by the participating public as independent of the bureaucracy's

control. Suspicion and doubt may remain, of course, on the basis that the consultants have been commissioned and will be paid by agencies which are perceived as having their own interests in the outcome of the work. It is easy to think of mechanisms which may tend to reduce this problem, though most would require some departures from traditional budgeting and control procedures. The simple device of having the study team answer to a public agency which is seen as having only a peripheral interest in the outcome has sometimes been used successfully.

If consultants or other outsiders are not to be involved, the inter-agency approach adopted recently in various major studies may be important in increasing public trust - or at least reducing public suspicion.

If the independence of the study team and thus the legitimacy of the study process and outcome do appear likely to be questioned or doubted (and it is rarely possible to avoid this entirely) then, in the planning and conduct of the study, sufficient emphasis needs to be given to clarifying the origins and nature of the work in the eyes of all interested parties, and in establishing the credibility of the study team as an end in itself. The status of the study team and of their ultimate recommendations also needs to be quite clear and clearly communicated.

Public Awareness and Opinion

Judgements about the extent to which potential actors are already aware of relevant planning proposals and the way in which these impinge on their own interests, raise rather more straightforward issues. Are those whose real or supposed interests are at stake well informed and active, or do they need to be reached with an information and educational programme? Are some but not all of those with relevant interests already active and, if not, how are the inactive to be defined, informed and motivated? Again, it is scarcely necessary to say that while solving the problem in

practice can be very difficult it is at least important to face this question in a non-fanciful way (that is, other than in terms of bland agency claims to a special brief to speak for "the silent majority").

Related questions arise about the ways in which information is to be distributed and public commentary and reaction gathered in. The level at which issues are raised the discussed needs obviously to take account of the existing knowledge and skills of the public (or publics) whose involvement is being sought, and of the nature of the process adopted for each particular study. A multitude of practical questions may arise here, ranging from the need to decide whether to distribute a multi-lingual pamphlet or bulletin, to the matter of what specialised skills need to be included in the study team in the initial stages. One situation may call for a major emphasis on supplying information (it has been suggested that with a problem orientation this will usually be the case), while in another the work of gathering and sorting through relevant ideas and information can begin with few such preliminaries.

An accurate understanding of how wide a cross-section of the public is likely to have an interest in the study may also raise implications for the definition of study area boundaries.

Specific decisions about techniques for encouraging community participation and involvement depend on an adequate understanding of the current state of play among actors and potential actors. To take but one example, it may be (or become) necessary to decide whether or not views which are voluntarily put forward are an accurate representation of views generally held in the study area, and thus whether formal random survey work needs to be undertaken on certain issues.

Organisational Arrangements

The process of community involvement and discussion tends to raise important questions about the style and behaviour of public

agencies. We have already suggested that traditions of secrecy and confidentiality may well need some modification in the interests of frank and well-informed public discussion; procedures for the "without prejudice" release of preliminary or provisional plans and documents may need to be developed, for example.

Similarly, traditional hierarchical arrangements within public instrumentalities have often proved clumsy and unworkable in participatory relationships with the community. Specifically, it is unlikely to be practical for the Commissioner or Departmental Head personally to bear the whole weight of public presentations, discussions or negotiations and there is therefore a strong practical need to develop procedures which enable those (often relatively junior) personnel who are actually dealing with the community face-to-face to make and abide by authoritative statements and commitments.

Once again, of course, it would be foolish to underestimate the difficulty or the ramifications of such changes, particularly in large, old established and essentially conservative agencies (into which category most State Road Authorities probably fall). Recent experience of decentralisation and regionalisation within a number of Victorian and New South Wales Departments, however, together with exploratory steps in South Australia towards less rigid hierarchical structures, illustrate that change is not impossible.

Many agencies have in the past made rods for their own back in public participation by adopting either an unnecessarily tough and uncompromising stance on particular issues, or by suggesting that it would be intolerable for any view but their own to prevail. There is much to gain simply by adopting a more conciliatory stance and by being prepared to yield on inessentials.

Spatial Scale

The implications of spatial scale for the selection of appropriate participatory techniques are obvious enough, but they have not

always been considered in a clear-headed way. Television, radio, the metropolitan press, local newspapers, public meetings, street meetings, search conferences, seminars, snowball opinion sampling, formal random surveys, letter-boxing, displays in schools, libraries and shopping centres, the setting up of a public office or offices, a telephone enquiry service, work with voluntary organisations - all these may have a place in the process of communication between planner and public, and the extent of the area over which communication is to be attempted is one of the most obvious factors which bear on the choices made.

Time Scale

Time scale is correctly seen as one of the most difficult elements in dialogue between planners and members of the public, essentially because major projects typically require firm commitments years in advance of construction or operation, while the private individual, his community organisations and in some cases his local government or parliamentary representatives tend to think more in terms of costs and benefits to be experienced in the relatively short term. Simply getting the likely time scale clear may be a major problem in itself. It falls to public agencies to perform the unenviable task of balancing the need for long term forward planning against the need for continuing flexibility and review, bearing in mind all the while the risks of planning blight, self-fulfilling prophecy in social or economic decline, and the unnecessary distress or anxiety among individuals that can be occasioned by premature discussion or action.

Generally speaking, the shorter the planning timescale, the more realistic and helpful public input can be expected to be.

Openness of Study Content

The definition of study boundaries has often been an issue of considerable significance in Australian participatory studies. Often studies have been initiated by specific agencies (including

State Road Authorities) with a firm perception of a desired outcome and with a clear and precise specification of the matters on which public commentary is to be sought or permitted. One of the major emphases of this report as a whole is that while it may sometimes be defensible to define firmly in advance the questions to be covered, it tends not to be so where the specialised and somewhat insular character of agency operations predisposes them to solutions of one specific kind only - for example, freeway or major arterial construction.

Once the alternative courses of action have been narrowed to a small compass by rational and defensible interagency planning, it may well be proper to define the scope of a later research project quite narrowly and to insist on following the brief in this regard. Where, however, as has so often been the case, the range of "alternatives" owes more to departmental specialisation or narrowness of objectives than to conscientious exploration of a full range of possibilities, it is predictable that affected groups and individuals will chafe at the arbitrary restrictions imposed by a rigid brief.

In the case of studies conducted by State Road Authorities, as indicated in earlier sections of this report, this question comes up most frequently as an issue of road building schemes as distinct from other approaches to transportation (for example, updating or extension of public transport services of one sort or another). Again the lesson of experience is that an appropriate amalgam of interagency co-ordination and public involvement is most likely to produce answers which are technically sound and politically defensible.

In the framing of a participatory brief there is much to be said for explicit recognition of the fact that public input may bring about changes in emphasis, topics or goals as the work proceeds. This is quite legitimate and thus needs to be allowed for from the outset. Such feedback has likewise been emphasised in previous

sections of this report. There are obvious implications here for budgeting and staffing. If the scope of the study is in fact to be rigidly defined, the reasons for this ought to be analysed and explained.

Compensation

Certain aspects of compensation arrangements are typically important in the context of community involvement in transport planning studies. The framing of any specific study must take account of what can and cannot realistically be accomplished within the existing framework.

CONCLUSIONS

Achieving effective community involvement in a planning programme calls for attention to four main objectives, namely:

- . establishing, and maintaining throughout, the legitimacy of the study both in the eyes of the public and of other relevant government agencies;
- . alerting, informing or educating those who may not fully grasp the nature or extent of the affects on their interests;
- . collecting relevant and accurate information about community perceptions, needs and priorities and about the full range of implications that may flow from decisions on specific issues;
- . paving the way for a decision ultimately to be taken and implemented.

The underlying theme of this section is that the technical expertise of Government Departments or statutory agencies does not necessarily equip them to operate successfully in a participatory planning environment. To do so requires staff with appropriate skills, experience and power, and an administrative and philosophical

flexibility which does not always characterise large bureaucracies. In any specific case, the participatory project calls for detailed and sensitive attention to the interests and conflicts of interest, both actual and potential, which it involves; no rules of thumb or set routines can substitute for this.

We close this section with a statement of the obvious: community involvement in transport planning is not a panacea which can ensure the implementation of an efficient and equitable scheme - let alone of a particular scheme close to the heart of the responsible agency. Its processes abound with difficulties, uncertainties and compromises. Nevertheless, in an educated democracy there is no way that an agency can, in the long term, insulate itself against pressures for public information and consultation; at the most pragmatic level, the problems and costs of trying to exclude interested communities are almost invariably far greater than the problems and costs of encouraging their participation.

CHAPTER 10 - SUPPLEMENTARY INFORMATION

INTRODUCTION

This part of the report has been prepared in order to advance the content of the report from the general concepts and philosophy of the corridor planning process into some of the implementation issues. It is by no means a guidebook suitable for application to any (or all) corridor studies. It provides supplementary information to assist the practitioner in developing a corridor study design from the general framework recommended in Chapter 4 of the report.

The question of study area definition is followed by a review of available techniques for problem definition. Analytical methods suitable for sketch planning are then reviewed and a detailed discussion of the methods appropriate to formal user benefit estimations is presented. Finally, the range of community involvement mechanisms available for use are discussed.

CORRIDOR DEFINITION

The corridor concept is a helpful planning tool and one which can make sense in terms of abstract network analysis, practical considerations of project planning, and community perceptions of social space. While the corridor is a useful construct from many points of view, however, it is important to insist that a given corridor exists only by definition on the basis of the objectives of the analysis for which that construct is required. There may be more suitable and less suitable corridor definitions for particular purposes, but there are no a priori foundations for defining any particular corridor; definition can only be derived from the problem at hand.

Asked to suggest appropriate study boundaries in a particular case, the traffic analyst, the environmentalist, the social planner, the design engineer, the landscape architect will

initially have quite different perspectives. The corridor identified by working down from a broad consideration of urban movement patterns and transport links (that is, from a problem oriented approach) is likely to differ significantly from one which derives up from a narrow range of route alternatives (or from a project orientation).

In some situations the urban corridor may largely define itself in an acceptably commonsense way; this is the more likely in large-scale work where major routes are being investigated. Such corridors or sectors have subjective reality in the minds of many urban dwellers. In most twentieth-century cities, which have inherited a radially dominated transport network from earlier times, a major proportion of total urban movement is radial in character, and radial corridors have a reality of their own which derives from the fact that for a given individual a series of locations along a radial corridor forms the dominant impression of what the city is like. Studies of residential mobility regularly indicate a strong within-corridor bias in patterns of private residential moves; young new households are likely to establish themselves either close to the city centre or on the same radial corridor as their parents. As the result of historical interaction between topography, settlement patterns, past transport planning, human perceptions and behaviour, it may be possible to obtain ready agreement to a particular corridor definition. This is by no means always the case, however, particularly at a smaller scale where it may well be that a problem has arisen precisely because historical network links and contemporary mobility patterns, say, do not match. Where this is so, there is no alternative but to build a corridor definition on an understanding of the issues raised by the matter at hand.

It has already been pointed out that varying professional orientations and varying study emphases will suggest "study areas" of varying dimensions and precision. As other sections of the chapter emphasise, the nature of the community interests and

interest conflicts seen as bearing on a particular planning question has obvious enough implications for the definition of study boundaries, be these boundaries relating to subject matter, parties entitled to be involved or geographical coverage.

In order to set some practical limits to research to be undertaken, it is of course common practice in project oriented work to define a study area covering the locations in which works are proposed or are considered feasible, together with some surrounding or adjoining territory. In recent years, pressure for more open and more comprehensive planning has tended towards promoting larger rather than smaller study areas, as consistent with recognition of implications and repercussions beyond immediate physical impacts. A problem orientation tends to mean a "bigger" study in some senses, but not always in area. Certainly it involves more documentation at the problem definition stage.

In principle there is no reason why the area within which residents or landowners, say, are entitled to consultation should correspond to the study area for "technical" investigations - or even for a "consultative" area to be defined at all. There are usually practical reasons, however, for seeking at least some rough correspondence between the area of investigations and the geographical area within which community consultation is to be encouraged and facilitated. For one thing, planners cannot be expected to react sensibly or sensitively to inputs reflecting geographically based interests of which they have no independent knowledge. Further, the sheer logistics of attempting to disseminate information and to gather in ideas and opinions normally tend to require some appropriate geographical focus for displays, enquiry offices, public meetings and the like. Typically then, planners should anticipate and facilitate community involvement from an area or a series of areas which bear some relation to the geographical boundaries of the area which they expect to study in some detail. This will not, however, preclude the involvement of non-local groups or individuals with relevant interest either of a material kind on matters of principle or policy.

Leaving aside participation criteria as such, it is not easy in general terms to go beyond the bland assertion that the study area should be large enough to ensure proper attention to all substantially relevant factors and interests, but small enough for limited resources to be used efficiently and for work to be carried out in sufficient detail. Some assistance may be gained from the body of academic literature on regionalisation and sub-regionalisation, but in practice a given study corridor definition is unlikely to involve anything more sophisticated than a reference to homogeneity and functional criteria⁽¹⁾. Defining a suitable study area or corridor may raise some homogeneity issues, but functional criteria are more likely to be relevant where transportation and mobility are our underlying concerns. Ideally the study area for a problem related to possible roadworks ought to encompass the locations of those who live, work or have other interests in and around the areas where the works are proposed, those with interests in any other areas where traffic volumes and patterns are likely to be significantly affected and the major origins and destinations of current or potential road-users.

This has not usually been achieved in the past. For various reasons it has been more common to define what might be called an impact corridor in the immediate vicinity of a proposed project or range of project alternatives and to concentrate both investigation and consultation there. This has the major disadvantage, in a participation context, of tending to play down the broad pattern of interests and interest conflicts which the project really raises. Important areas of trade-offs or bargaining tend to be ignored as a result. Such an approach also tends to yield the citizens versus authorities kind of debate and thus to limit the mobilisation of those in the wider community who might support a specific project.

(1) Geographers have distinguished between regions defined on the criterion of homogeneity and those defined on a functional basis. The boundaries of a region (an electorate, say) may be fixed either on the basis that the people within it all seem roughly similar to each other (in socio-economic terms, for example), or on the basis that it comprises a "working unit" of some kind (for instance, the areas where a given group of people live, work and do business).

The following three simple, but important, points are made concerning corridor definition:

- (i) There are usually practical advantages in respecting existing administrative and statistical boundaries - local government areas, census collectors' districts, electoral boundaries, traffic zones and the like.
- (ii) Not only may different boundaries be adopted for different purposes within the same study, but the possible need to modify a given corridor definition as the research planning progresses and information accumulates, ought to be kept explicitly in mind.
- (iii) Corridor definitions adopted for or during a study need to be explained and defended as part of the reporting procedure.

TECHNIQUES FOR PROBLEM DEFINITION

Review of Perceived Problems

In-depth discussion groups

An effective method of problem definition is to undertake a series of detailed discussions with a range of individuals, groups, or agencies, drawn from relevant associations and institutions in the study area. These discussions should be directed in such a way as to determine the perceived transportation problems of the area.

Relevant bodies from which participants can be drawn include:

- (a) Institutional, administrative and fiscal problems
 - transport ministries
 - transport regulators
 - transport operators
 - Federal departments

- (b) Local scale definition
 - progress associations
 - rate payer groups
 - senior citizen clubs
 - youth clubs
 - service clubs
 - chambers of commerce
 - retail trade associations
- (c) Delivery constraints
 - unions
 - automobile clubs

The major problem encountered in conducting such discussions is that the viewpoints presented are often quite narrow and not very representative of the vast majority of "silent" clients.

Market research surveys

Other methods of extracting the perceptions of motorists and the public transport users include the use of market research techniques similar to those used for soliciting views about consumer goods. These techniques are also useful in assessing the viewpoint of other groups which are not well organised, such as particular socio-economic groupings (0, 1 and multi car households, housewives, the handicapped, the young, the elderly, etc.]. They can also be applied to society in general, in order to assess the perceptions of those not active in organised groups or other associations.

Both of these approaches assess primarily current problems, but do give some indication of likely future events and market gaps. They are simple procedures which require interpretation by experienced planners. The following section briefly touches upon the more formal analytical techniques.

Analytical Techniques

System Efficiency

A range of techniques are available for analysing the existing public transport and road systems to estimate measures of efficiency or inefficiency. Efficiency criteria generally encompass:

Highway system criteria

- . vehicle link volumes/peak loads
- . intersection volume to capacity ratios
- . intersection delays
- . average private vehicle speed for particular trip purposes
- . energy consumed
- . pollutants emitted
- . accidents avoided
- . etc.

Public transport criteria

- . link volumes (maximum vehicle loadings)
- . volume to "capacity" ratios
- . average journey speed or time (including sub categories of in-vehicle and out-of-vehicle time)
- . driver productivity (eg. percentage of hours spent on revenue service)
- . revenue/cost comparison (ie. deficit level).

Land use/transport criteria

- . average trip length
- . vehicle kilometres travelled (by trip purpose)
- . person kilometres travelled (by trip purpose)
- . transport energy consumed
- . accessibility indices.

These types of efficiency measures can be estimated for the existing conditions by analysis of existing data or further observations (ie. surveys) and/or by simulation or computer models. Future values of these efficiency measures can be estimated by techniques ranging from simple extrapolation of trends to the use of complex models "calibrated" using "base year" data. These provide one further method for identifying trouble spots or problems which may need analysis in the corridor. These analytical techniques are well documented in the literature and are not repeated here.

Equity Problems

The preceding section has recounted criteria which basically uncover system efficiency problems. These do not generally provide an understanding of the differences in the levels of service available to various community groups. Methods used by the Bureau of Roads indicate the types of analytical procedures which are already in use in Australia to assist in defining existing equity or incidence problems⁽¹⁾.

Incidence analysis can be conducted in a large number of ways. The simplest form consists of the incorporation of published statistics and projections of income, vehicle ownership, personal disabilities, etc. into descriptive analyses based upon economic, sociological and other social science theories. A further step includes the use of specifically conducted surveys and the application of numerical or Delphi forecasting methods to the data collected.

More complicated approaches involve the comparison of various input/output tables forecast over time or the application of linear and dynamic programming to regional economic and social interactions. Such methods are reviewed in any modern text on regional development and therefore are not discussed here.

(1) An Approach to Developing Transport Improvement Proposals, Commonwealth Bureau of Roads Occasional Paper No. 2, 1976.

SKETCH PLANNING

Sketch planning has not been a regular component of previous studies and the number and types of alternatives tested have therefore been limited by the cost and procedural constraints of the traditional computer network models. The consideration of a much larger range of alternatives is envisaged by the recommended process and evaluation methods must therefore be tailored to meet this need. The sketch planning stage is conceived as a low cost evaluation process designed to give "order-of-magnitude" results sufficient to allow the selection of a short list of alternatives worthy of detailed evaluation. The basic tools for sketch planning activities must therefore be cheaper and quicker to apply than the traditional computer models. The following paragraphs identify and reference documents which describe manual sketch planning procedures and a brief illustrative description of three computer aided methods is also provided. As in each stage of the planning process the selection of techniques must follow a "horses for courses" philosophy. This section of the report assists in identifying a broader range of available techniques than those typically used or known to be available and applicable.

Three source documents which describe manual methods of sketch planning are:

- (a) "New Systems Requirements Analysis Program", prepared for the Urban MASS Transportation Administration, July 1973, by PRC Systems Sciences Company et al.
- (b) "Guidelines for Travel Demand Analysis of Program Measures to Promote Carpools, Vanpools and Public Transportation", prepared for the Federal Energy Administration by Cambridge Systematics, Inc.
- (c) "Handbook for Transportation System Management Planning", prepared for North Central Texas Council of Governments, by Alan M. Voorhees and Associates, Inc., March 1978.

The three most relevant automated sketch planning methods are:

- . TRIMS
- . SRGP
- . CAPM

The following sections provide a brief description of each package.

TRIMS⁽¹⁾

TRIMS (Transportation Integrated Modelling System) is a mathematical modelling technique used to project trip tables and traffic data. It is a simplified version of the standard PLANPAC/UTPS transportation forecasting models. TRIMS has the capacity to project car occupancy and peak hour traffic data. However, the technique is limited to dealing with 150 traffic zones and produces aggregated data. The model operates from the PLANPAC/UTPS data bases and must therefore be interfaced with them.

No new travel estimating approach has been used. Instead the traditional four-step approach to travel forecasting (trip generation, trip distribution, modal split and traffic assignment) is performed in one execution.

TRIMS also has the capability to do capacity restraints and selected link analysis within the same execution. Network formats are Federal Highway Administration (FHWA) formats and TRIMS has an option to read or write trip tables on tape in FHWA format. This permits TRIMS to interface with FHWA transportation planning programmes.

TRIMS can provide sufficient detail for sketch planning at the district level (150 areas) and it can focus in on a particular area to provide detailed data for a zone level (500 areas) analysis. All traffic modelling is performed at the district level; the

(1) MANN, W.H. TRIMS - A Procedure for Quick Response Transportation Planning, Internal Report for the Washington Metropolitan Council of Governments, Washington D.C., 1975.

resulting trip table is then split to zone level (based on zone land activities) and assigned to the zone level network. These "zones" can be zone level throughout the region or they can be located in the sub-area only with the original districts outside the sub-area.

Computer costs are minimal. For \$100, TRIMS can process the highway and transit networks with 150 districts; it can cycle through all of the travel demand models; it can assign the total vehicle trips to the highway network using capacity restraint if desired; it can provide numerous trip table summaries such as trip end summaries, trip table compresses and trip length frequency distributions for all trip purposes and all trip modes; it can provide two different selected link summaries; and it can provide numerous summaries of vehicle miles of travel and highway mileage by speed range, route type, area codes and volume-to-capacity ratio in about six minutes of CPU time at 480 K on an IBM 370/158.

Staff requirements are also small. Only planning/analytical personnel are needed to run the programme; computer personnel are not required after an initial run. Anyone familiar with transportation planning techniques should be able to use the system.

The TRIMS model is a low-cost, quick turnaround transportation planning technique that has been refined over the years as a result of work done by the Transportation Planning Board, Metropolitan Washington Council of Governments for its member jurisdictions.

SRGP

SRGP is a computer programme which applies a set of travel demand models for "Short Range Generalised Policy" analysis. SRGP is designed to produce rapid turnaround estimates of the consequences of broadly defined transportation policy options. It can be applied for both sketch planning and for action impact evaluation.

SRGP processing and outputs are based on an input sample of home interview survey households which are used to represent a much larger population of potential travellers. The programme estimates the travel behaviour of the individual households subject to user-defined transportation policy effects and provides user-controlled facilities for expanding the results in whatever manner is appropriate for the population being analysed. This approach takes full advantage of the disaggregate nature of the demand models. Aggregation does not take place until the expansion, after all the estimation is complete, and can be straightforward and without bias.

The SRGP programme cycles over households in a small sample, assessing the impact of a given policy upon each household in terms of cars owned, worker mode choice, shopping and social-recreational trip frequency and mode and destination choices for shopping and social-recreational trips. This is accomplished by a set of linked travel demand models employed within the user-coded section of the UTPS programme UMODEL. The impacts on individual households are expanded and stratified to obtain policy impacts upon a region, subregions, or population segments.

The main drawback to SRGP is its small sample base. Regional level results are acceptable, but any use of SRGP at the district or zone level increases the risk of error. Its random sample enumeration approach limits the methodology to short-range applications. For example, longer-term impacts on residential or workplace locations are not reflected. It is a tool for broad assessment of policy impacts, particularly for policies of a non-transportation-network nature. The model has been installed and tested in the North Central Texas region (at NCTCOG) and in Washington, D.C. and in Birmingham, Alabama.

CAPM

The Community Aggregate Planning model (CAPM) provides a quick and easy means to assess the economic, social, environmental and

transportation system performance consequences of alternative transportation system implementation and operating policies.

CAPM provides means to address the following kinds of issues at a community level:

- (a) decisions about the location, magnitude, and function of urban transportation investments;
- (b) formulation of highway operating strategies to achieve environmental and system performance objectives;
- (c) examination of the transportation implications of future land development policies.

CAPM does not require the coding of extensive computer networks. Highway capacity is input as the number of lane miles. Supply representation is the community vehicle trip ends estimated directly from population and employment.

CAPM produces performance measures such as system cost, land consumption, residential and business relocations, system operating speeds and costs, air pollution emissions and energy consumption.

CAPM is composed of three basic modules: travel generation, travel distribution and performance evaluation. In the travel generation module, a system-sensitive estimate of total regional vehicular travel is obtained. The travel distributor takes this regional total and allocates it to the arterial and freeway system in each community. Given the vehicular travel on, and capacity of, the highway system, the performance module computes a full range of community level performance measures.

One problem with CAPM is the lack of direct transit output. Work is currently underway to remedy this by making the CAPM process multimodal and by including a set of transit outputs in the performance model (MCAPM).

CAPM is described in detail in Transportation Research Record 582 by Harry Schleifer, John Hamburg and Associates, Inc.; Samuel L. Zimmerman, Urban Mass Transportation Administration; and David S. Gendell, Federal Highway Administration, U.S. Department of Transportation.

Future Developments

A variety of new sketch-planning programmes are under development and will expand markedly the capability to quickly assess the broad impact of alternative transportation projects and strategies. These include:

- . RIDE - this sketch planning programme nearing final development for UMTA can analyse systems comprised of a major transit system with radial corridors providing rapid transit and carpool priority facilities. RIDE will provide for a parameter description of transit service (no network). It will contain a supply model for person trips, perform mode split, auto occupancy, and assignment and can be used to test carpool priorities.
- . MCAPM - a development of CAPM by UMTA staff, incorporating transit. CAPM is an aggregate highway sketch planning model with a non-network supply specification and incorporating supply-demand equilibrium.
- . SPATS - a strategic planning model based on interlinking of standard UTPS programmes incorporating a focusing feature. SPATS models non-ubiquitous aspects of transit which cannot be handled adequately with non-network models. The development is being conducted by UMTA staff.
- . ITAM - the Interactive Transit Assignment Model (ITAM) is a procedure for assigning or loading a transit origin-destination trip table onto a network. ITAM should be considered when the

planner has access to a cathode-ray tube terminal and sufficient information with which to estimate a trip table.

- . "The Model" (under development by the Institute of Transportation Studies, University of California, Berkeley) is a sketch planning methodology for testing the impact of various TSM measures at a systemwide scale. This methodology is multi-modal in character and permits the user to estimate the modal shares that will be captured by autos, carpools, buses and rail transit given specified operating regimes, urban densities and pricing rules.

ECONOMIC EVALUATION OF USER BENEFITS

As a first stage in the economic evaluation process, it is necessary to establish and cost the base option, with reference to which all evaluations will be conducted. The costs and benefits of adopting alternative improvement options may be subdivided broadly into the following categories:

- (a) Costs incurred in the provision of road and public transport services.
- (b) User Benefits.
- (c) Social effects.
- (d) Environmental effects.

This section is primarily concerned with item (b).

In most previous urban evaluations, SRAs have used as the measure of benefits the change in the total generalised cost of transport resulting from an improvement.

$$\text{ie. Benefits} = \sum_{ij} T_{ij} (C_{ij}^1 - C_{ij}^2)$$

where T_{ij} = number of trips from zone i to zone j

C_{ij} = generalised cost of trips from zone i to zone j

and where superscripts 1 and 2 refer to generalised costs before and after the improvement respectively.

This measure was appropriate where a fixed trip matrix was assumed regardless of the network provided. When modal split changes, this measure which becomes:

$$\sum_{ijk} T_{ijk}^1 C_{ijk}^1 - \sum_{ijk} T_{ijk}^2 C_{ijk}^2$$

where T_{ijk} = Trips from zone i to zone j via mode k

C_{ijk} = Generalised cost of trips from i to j via mode k.
Superscripts 1 and 2 refer to the before and after improvement cases respectively.

where k identifies the mode used in trips from zone i to zone j

is appropriate, only if all factors relevant to choice of modes are contained within the generalised cost function - in other words, when generalised costs are equal between modes, the probability of taking each mode must be equal. Otherwise, one could have a situation where an improvement on the more expensive mode systematically attracts passengers from a mode with lower generalised costs. The above measure would show this as a cost, whereas the persons diverting would not do so if they did not perceive a benefit from the diversion.

However, recent demand models permit not only mode of travel but also destination to vary according to the network provided. Destination is determined both by the attractiveness of alternative destinations and by the generalised costs of reaching them. It is quite possible that a reduction in the generalised cost of reaching an attractive destination will lead persons to divert from

less attractive destinations that may still be reached at lower generalised cost. Again, total user costs rise, but the extra benefits users perceive from having a more attractive destination must outweigh this rise.

Thus it is necessary to switch from a simple cost saving measure to a consumers' surplus measure, which measures what users are willing to pay for a certain set of network improvements, given the adjustments to mode and destination which these bring about. Using a generalised demand function such as:

$$T_{ijk} = \frac{O_i A_j^\alpha e^{-\beta C_{ijk}}}{\sum_{kj} A_j^\alpha e^{-\beta C_{ijk}}}$$

where O_i = number of trips originating in zone i

A_j = number of trip attractions at destination j

β = trip cost calibration parameter

α = trip attraction calibration parameter

Neuberger⁽¹⁾ has shown that the consumer surplus is given by:

$$CS_i = \frac{O_i}{\beta} \log \left[\frac{\sum_j A_j^\alpha e^{-\beta C_j^2}}{\sum_j A_j^\alpha e^{-\beta C_j^1}} \right]$$

where CS_i is the consumer surplus accrued in zone i

This expression may then be summed over all modes and all zones to give total consumers' surplus.

We have defined above a precise point estimate of user benefits. However, there are two reasons for treating such a degree of

(1) H. Neuberger, "User Benefit in the Evaluation of Transportation and Land Use Plans", Journal of Transport Economics and Policy, Vol. 5, 1971.

precision with some scepticism. In the first place, the value depends upon the shape of the demand curve assumed by the model. In most previous applications this has been linear.

Secondly, a problem remains with the consumers' surplus measure as an indicator of welfare in any case. As price change the purchasing power - and hence the marginal utility - of money changes as well. Thus in comparing money costs before and after a set of price changes we are not strictly comparing items measured in the same units.

It is normally still possible to set firm upper and lower estimates on the benefits. Suppose that we measure the cost saving to users assuming that they do not alter their trip-making habits:

$$\sum_{kij} T_{ijk}^1 (C_{ijk}^1 - C_{ijk}^2)$$

We know that the benefits are worth at least this figure, since users had the option of continuing with their old trips, but chose to make a new set of trips. Likewise, consider the cost savings assuming that users made their new set of trips in both cases:

$$\sum_{kij} T_{ijk}^2 (C_{ijk}^1 - C_{ijk}^2)$$

This represents an upper limit on the benefits, since we know that at the original set of costs users were at least as well off as is indicated by this comparison. For otherwise, they could have improved their position by switching from the set of trips T_{ijk}^1 to the set T_{ijk}^2 at the original set of costs. However, these arguments are less applicable when there is a discrepancy between perceived and resource costs, for the persons may freely but mistakenly adjust their trip-making patterns in such a way as to make themselves worse off.

Previous studies have suggested that private car users systematically underestimate the actual costs of using their car. This is because some of the costs - oil, maintenance, etc. - are not incurred at the time of use, although they are still related to the degree to which the car is used. This leads to a situation in which it is appropriate to use perceived costs for forecasting, but resource costs in estimating user costs before and after the improvement (for undirected, directed and generated traffic).

The argument for doing this is that although at the point of actually making the decision, persons are unaware of the true costs of that decision, if the transport network is altered in such a way that their money outlay on transport is reduced, they will perceive the benefits of devoting more money to other uses.

Since the above estimates of user benefits will be based on perceived costs, it is necessary to adjust them to allow for the fact that there may be other benefits in terms of reduced operating costs that are not perceived at the travel decision stage, but nevertheless do result in greater resources being available for other uses, and vice versa.

These adjustments take the following form.

From perceived user benefit as defined above;

Subtract perceived user benefit on trips that do not alter mode or destination;

Add resource cost savings on trips that do not alter mode or destination;

Subtract excess of resource cost over perceived cost for increase in trips.

$$\text{ie. } \sum_{ij} (C_r^2 - C_p^2) (T_{ij}^2 - T_{ij}^1)$$

where C_r^2 = resource cost under improvement option

C_p^2 = perceived cost under improvement option

It should be recognised that underlying this discussion of economic evaluation of user benefits there are still unresolved issues with regard to the appropriate techniques and values to use, some because of uncertainties with respect to future events and future tastes, others of a fundamentally ethical nature to which there is no unique answer. The implication of this is that a disaggregate method of presenting results, together with some sensitivity testing, is preferable to a simple reporting of present values or rates of return.

The above procedures are incorporated in the evaluation module of the Urban Strategic Model recently developed by the (then) Commonwealth Bureau of Roads⁽¹⁾.

MECHANISMS FOR COMMUNITY INVOLVEMENT

This final section of the chapter lists a series of techniques which have sometimes been used in participatory transport planning in Australia, with brief comments on some of the uses and/or limitations of each.

(i) Public meetings

These are the oldest and still perhaps the commonest mechanism for attempting to promote community involvement in planning. Their limitations are today widely recognised, however; their formality is rarely conducive to effective give and take of information or opinion, they easily create

(1) Urban Strategic Model - User Guide, prepared for the Commonwealth Bureau of Roads by Alan M. Voorhees & Partners, 1975.

an impression of tokenism, and they are easily dominated from the floor by articulate groups who would in any event have little difficulty in putting their views across in other ways. Sometimes they are desirable, however, if only to avoid the suspicion and accusation which might flow from not holding them.

(ii) Use of the media

Television, radio and the metropolitan or local press may have a significant role in disseminating information and encouraging active involvement. The larger the study area and the larger the study budget, the more desirable and practical their use becomes. If the co-operation of the media is going to be necessary for the success of the study's information programme, working relationships with relevant reporters and other staff need to be established, and the study team needs to be sensitive to what the media will or will not see as 'news'.

(iii) Other means of distributing information

Many and varied devices are available, both simple and elaborate. Letter-boxing, reaching parents through material distributed at schools, street or shop-window notices, handbills, fixed or portable displays, regular bulletins, telephone answering or enquiry services - any or all can have a role in a particular case, depending on funds available, the complexity of the issues, the sophistication of the community and its current level of knowledge, whether or not it is judged important to reach and interest the general public and so on.

(iv) Contact with voluntary organisations

The usefulness of existing networks of voluntary organisations and activists - of various sorts - should not be

overlooked. Very often the planner can learn a great deal in a relatively economical way by tapping into the resources of the many and varied groups which exist in most communities. Acceptance by leaders of community organisations can help to establish the bona fides of the study team.

(v) Representative or liaison committees

It will often be valuable partly to formalise public contact and involvement in the study by way of a committee structure of some kind. Members of such a committee can take a close and continuing interest in the study, provide alternative means to access to it for private citizens, provide planners with prompt and responsible feedback on wider issues which come up from time to time and a readily available pool of community knowledge. There are potential dangers, however, in inadvertently excluding some relevant groups or interests in a committee's being dominated by one or a few interests only, or in the study team's using the committee as a substitute for wider involvement. Mechanisms for setting up such a committee need to be designed with considerable care.

(vi) Seminars or search conferences

The search conference stands in some danger of becoming one of the cliches of public participation in Australia, which is a pity since there are many situations in which it is very valuable. The search might be described as a way of interviewing a range of perhaps thirty individuals, in detail, in an open-ended fashion, together rather than successively. Where the study team is attempting to get a rounded feel for salient local issues and for areas of agreement and disagreement, there will be much interest in interaction among individuals who reflect a diversity of relevant interest and experience. Such conferences have

the additional virtue that the knowledge generated can be shared by a whole planning team, whereas it would scarcely be possible for each member to interview each participant individually.

A search conference can have the particular merit of generating an ongoing process of involvement in the study or of community activity subsequent to it. Various other forms of small community meeting or specialist seminar may also have their place.

(vii) Panel discussions

Some of the functions (for instance, in relation to hypothesis generation), which may be served by a search conference can be achieved by smaller panel discussion groups organised by a team member with appropriate skills. Here the closest analogy is perhaps with the consumer panel interviewing which is a well established part of market and advertising research procedures.

(viii) Public or field office

In many instances there will be a good case for setting up a readily accessible public office (or offices) which can serve as a focus for public interest in the study and provide a continuing opportunity for anybody to gain access to team members or materials in an obviously open and unstructured way.

(ix) Street or other small group meetings

These differ from panel discussions in that attendance is less tightly limited and the agenda may be much more in the hands of the audience. Where local groups or individuals can be encouraged themselves to organise such gatherings

they can prove particularly effective, both for exchanging opinions and information and for building up mutual confidence.

(x) Formal surveys

These may or may not be regarded as an element in participation proper, but certainly prove in many situations a useful adjunct to information and ideas generated through informal consultation. Often, indeed, the community will expect surveys yielding quantifiable data as a proof of serious intent and reliability. For the planner, one major function of quantified attitudinal data is to provide a yardstick for the evaluation of opinions and preferences voluntarily expressed through the participation programme. In general terms, the statistical reliability of suitably designed surveys undertaken at suitable stages of the study usefully complements the richness and depth of qualitative data gathered informally.