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Transportation as a Social Environment:
Can We Change a Tradition?

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SECTION 5. HUMAN AND SOCIAL FACTORS IN TRANSPORTATION AND PLANNING

In the second half of this volume the human and social aspects of transportation which have often been touched on in the previous papers become the central focus of concern. All four papers in Section 5 argue in different ways that psychology and sociology have essential contributions to make to transportation planning.

Appleyard's paper is policy-oriented. Every transport decision is assumed to have a social impact. Traditional, technical variables need to be tied into their social context. Possible future policies for transportation are discussed in the light of how far they satisfy the needs and aspirations both of travellers and of those who are otherwise affected by transport systems. Attention is given to specifying priorities not only for meeting deficiencies in transportation, but also for building on its existing advantages. In addition to new policies, however, the basic concepts and values of transportation planning will need to be reformed. Transport should be considered as a user- and neighbour-oriented service, rather than a facility whose problems are defined by the supplier. Appleyard's final recommendations for a move to multi-disciplinary and open, participative planning are taken up in greater detail in subsequent papers.

The introduction of social policy as a major concern in transportation is complemented by Michon's review of the place of behavioural research and theory. Environmental psychology and behavioural modelling are beginning to meet the increasing demand for behavioural science theory and data in the field of transportation. The former has admittedly not yet found clearly delineated tasks when applied to traffic and transport problems. But it has the advantage of strong theoretical sources in main-stream general psychology. On the other hand, although behavioural modelling is a much more clearly defined approach, it lacks sound roots in behavioural theory. The two approaches should be seen as complementing one another.

The plea for inputs from psychology and sociology is repeated by Warman. But both he and Latchford and Pickering present the case from the less academic viewpoint of transportation consultants. He sees the role of the social scientist as one of mediator between the public and other professionals in the planning team. The programme and techniques that might be used are outlined in the context of their application to a pedestrianisation project.

Environmental assessments which compare predicted environmental impacts with the existing situation may sometimes need to be carried out without the relatively slow and expensive direct approaches to the public advocated by Warman. Aids are now being developed, as Latchford and Pickering explain, which enable technicians to measure and predict environmental factors rapidly and cheaply. They briefly describe some studies of the impacts of noise, visual intrusion and severance as they arise from road traffic, in cases where environmental assessment made an important and positive contribution to the search for a future land-use transportation strategy. We may expect such assessments to become routine features of transportation planning. Some more detailed examples of them are given in the next section.

TRANSPORTATION AS A SOCIAL ENVIRONMENT: CAN WE CHANGE A
TRADITION?

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Transportation planning inexorably tends to screen out the richness and relevance of everyday life in favour of a restricted set of given quantifiable variables which are seen as the essence of the transportation problem. These variables reduce transportation quality to a limited number of terms like 'accident rates', 'traffic volumes', 'ridership', 'costs' and 'decibels', while issues like comfort, privacy, amenity, politics and other less tangible, but often more important, variables are ignored or termed 'residuals'. These limited variables are used to set standards for design and then the 'building' syndrome sets in. Another set of technical variables such as 'right-of-way width', 'alignment', 'concrete mixes', 'curvatures', 'signaling' come into play, and we get even further away from the people whom transportation systems are meant to serve.

Transportation systems, once in operation, are primarily social environments. But their social, environmental and political meanings are suppressed in the 'technicalization' of the planning process. Transport systems have many more impacts on the quality of life than the few variables now being used acknowledge.

We not only have to make the intangibles tangible, we have to change the style of transportation thought, by tying variables already used into their social context. Every transport decision, whether it be about modal split, a right of way width or the height of a railing, has some social impact.

The fundamental questions to be asked in every transport decision, however small and 'technical' it may appear to be are: who will gain and who will lose? and which qualities of life will

it encourage or discourage? Then, and only then, should we ask which systems, structures or policies can best serve these people and these values.

Such questions depend on some understanding of social life, human values and what the quality of life means. The philosophical nature of these questions makes them difficult to link to everyday decisions, but there have been efforts to operationalize these values into transport criteria (Appleyard & Okamoto, 1968). This paper will concentrate more on priorities and potential policies for transportation in the immediate future.

Two basic population groups are affected in transport systems—existing and potential travellers, existing and potential neighbours. Each group has urgent and essential needs and equally essential aspirations. Life is only worth living if both are satisfied. We shall therefore consider transport environments under four headings:

- A1 Spreading transportation service to deprived population groups.
- A2 Increasing the choice and quality of travel for the whole population.
- B1 Reducing the negative impacts of transportation systems on the social and physical environment.
- B2 Contributing to environmental quality through transportation planning.

SPREADING TRANSPORTATION SERVICE TO DEPRIVED POPULATION GROUPS

Transport planning has concentrated too much on the majority and on average travellers, neglecting those least able to cope with the modern city. The poor and the aged have become the subject of some attention in recent years. The most serious problem for the poor is lack of access. Suburbanizing industry has moved away from their inner city residential areas; infrequent, slow, radially-oriented transit service can take up to two-and-a-half hours to move between home and work place; they can only afford secondhand cars.

The problems of these groups reach into all aspects of transportation: the lack of a particular transit connection, long distances to be travelled daily under hot and crowded conditions, the fear of waiting at a bus stop, a feeling of 'lostness' in the transportation system, the height of steps on buses (Carp, 1970).

Some can be resolved by the provision of new systems. Much can be done by the modification of existing systems and changes in land-use patterns (Owen, 1972).

But there are other neglected groups besides the poor and aged: the physically handicapped and poor in health, children and teenagers in suburban areas who cannot drive cars, housewives who must drive all the time, strangers to the city, - especially non-native speaking immigrants and tourists - those who by personality live in fear, need privacy, or are esthetically sensitive, and those who travel in families or large groups. These and others may rightly demand equal travel rights in the coming years. We are still relatively ignorant of their transportation needs.

Suggested Policies

a. A Social Impact Report, similar to the environmental impact reports required by the U.S. National Environmental Policy Act 1969, should be required of every major transportation project. Such a report should include an assessment of whether the project will aid or further deprive various designated populations. It should be reviewed by representatives of deprived groups.

b. Ways of ensuring that there be a systematic concern for the 'left-outs' must be found. Reviews of the characteristic transportation needs and problems of all potentially deprived traveller groups should identify gaps in knowledge and develop criteria for the successful transportation of deprived groups. A survey we carried out in the Bay Area examined the travel perceptions and needs of low income, aged, teenagers, housewives and various handicapped groups (Carp & Appleyard, 1973). We found, for instance, that working women are more transportation-deprived than housewives. Such reviews should be summarized in reports on each deprived group, should be updated as new research findings come in, and should be used to evaluate future investments.

c. Transportation planners should acknowledge and cooperate more with the consumer and citizen organizations who represent various deprived groups, encouraging them to identify their transportation needs and participate in system management and design.

d. Systematic efforts to identify transportation programmes, components and systems that would help the poor, handicapped, and otherwise deprived should be undertaken and adequately funded. While the problems of the deprived are multifarious, the solutions to their problems are likely to be even more varied, ranging from the redesign of buses to accommodate the handicapped to guidelines for sign systems, from various forms of fare subsidy to priority bus lanes and dual-mode personal transit systems.

INCREASING THE CHOICE AND QUALITY OF TRAVEL FOR ALL

Transportation planning has habitually taken a narrow view of what travel is all about. The expressed concerns of transportation planning have been geared to moving the traveller from origin to destination in the cheapest and most convenient way. The numbers of travellers on any system have been taken as the sole measure of its success.

Transportation surveys conduct thousands of interviews, in order to record travel patterns. Typically, no questions on traveller satisfaction are asked. It is assumed. So long as he travels on the system the traveller has done his bit. Yet surveys which ask questions about satisfaction find that people are frequently dissatisfied with the systems they must travel on.

Commuter travel is seldom an enjoyable activity. It can be unsafe, frightening, stressful, tiring, uncomfortable, disorienting, monotonous, dirty, overstimulating, trivial, dominating, depressing, and more. I can think of only a few urban freeways, and almost no transit systems or arterial streets in any country which possess pleasurable qualities during rush-hour. A few exotic forms of transport like ferries, cable-cars, and minitrains are still enjoyable. Urban freeways are nerve-racking, subways are gloomy, buses are noisy and jerky, city streets are crowded and unsafe. No profound assessment of the quality of a metropolitan transportation system has to my knowledge ever been carried out. It is clear, however, that we have a long way to go before the present transportation systems are safe, convenient, comfortable, clean, pleasant, interesting, civilized forms of travel.

Travel plays many roles beyond moving a person from one place to another, although we know little about those roles. Travel is an escape from the world of home and work; travel can be a rest from more disciplined activities; travel can be the time to meet people or the time for privacy. It can be a time to plan the day's work or a time to sleep it off. Travel can be an exciting adventure or a relaxing hobby. It can be an education. For many, the commute is the only time they see other people or the city or have contact with the natural environment. On one U.S. commuter system people can study for professional degrees. But little research has been carried out on these potential values of travel.

Travel can also make a contribution to the problems and aspirations of a democratic society. Equality of travel opportunity should clearly be a transportation goal, but there are other societal functions that transportation systems might perform. Transportation systems can affect the physical and perhaps mental health of the population. The diminution of walking is an obvious threat to physical health. Transportation can perform a social function,

bringing together or further fragmenting the various groups in society. Before the automobile, the street was a meeting place. It was common ground and neutral territory, a place where major events were celebrated. Since the automobile, friendships have spread, but they have become more selective. In the automobile society, people live more with those of similar interest and status. The private and mobile nature of the automobile allows people to escape meeting other social groups - an isolation that emphasizes, at its worst, intolerance or paranoia about other social groups, at its best, a posture of unreal romanticism. It would be revealing to compare the social structure of cities which have dominantly transit and dominantly automobile systems.

The educational value of transportation systems has been neglected, yet the degree to which travellers comprehend the structure and meaning of cities and society, and to which transport systems encourage democratic values and responses - such as tolerance, freedom, and feelings of personal individuality may be more significant than we realize. The impersonality of relations between people travelling in automobiles is symptomatic of the growing impersonality of our society.

Finally, in this age of energy shortage and inflation we must seriously reconsider the values of mobility and choice, which have been the gospel and justification for transportation projects over the past twenty years. While mobility allows us to have conferences like this one, mobility has also contributed to the eclipse of local communities, the destruction of many beautiful places, and the possibility of global war. Do we need it so much? Just as some are arguing for a return to smaller-scale enterprise and society, so there are many arguments for restricting mobility on a selective basis. This, of course, will be easier to contemplate for us who already have the choice, than for those who are still waiting to purchase their first automobile or fly their first aeroplane.

Suggested Policies

a. Criteria other than economics, accessibility, function, safety, or ridership must be included in system design and evaluation. The identification of travel values, many of them latent or emergent, is the task of more careful research than the usual attitudinal survey. Research efforts to uncover the whole array of present and emergent traveller values and their incidence among various population groups should be launched. These could then be converted into quality criteria for transportation systems. Such 'civilized' criteria should also be built into the environmental and social evaluations of transportation proposals (Appleyard & Okamoto, 1968).

b. The restoration of neglected systems should be seriously considered. Systems that have not met efficiency criteria have fallen by the wayside in our headlong rush towards mobility. For example, in the interests of health alone, national needs for walking and cycling systems should be reassessed.

The lot of the pedestrian in the American city is not an enviable one. Yet a recent study in San Francisco found that between two-thirds and three-quarters of those over sixty must walk to get their groceries. By night the pedestrian travels at his peril along poorly lit streets. By day, in suburban areas, he is suspect. He trips over decaying sidewalks, he risks his life to cross the street and parking lot, he picks his way through the concrete caverns of parking garages, he is attacked by fumes and noise, he freezes at bus stops, he bakes on asphalt wastes, there are no benches on which to rest. It is more dangerous for the children, for they are less aware of the hazards. And still the environment continues to decline, the sidewalks are narrowed or eliminated to accommodate more traffic, garages and parking lots grow larger, trees are cut down.

Outside the relatively small areas of 'pedestrianization', the European city dweller fares little better. In Rome's narrow streets with no sidewalks, the pedestrian must creep along between the parked cars and fast-moving traffic. The development of safe, well-lit, continuously surfaced, ample, pleasant and agreeable pedestrian path systems with adequate resting places and assistance vehicles should be a much more important transportation goal than it is at present. Turning one commercial street over to pedestrians in a whole city is hardly enough.

Cycling, a transportation system which is available to youngsters of all ages who cannot drive cars, is not yet being considered as a serious commuter transport system in the United States. Safe and continuous cycling networks can be created, especially in cities which have river and valley systems, and in new extensions to cities. But they will cost more than most cities contemplate. If there were more continuous auto-free path systems, other forms of recreational travel such as horse-back riding (as in San Diego) and cross-city skiing (as occurs in Oslo) could be contemplated.

Other older systems - tramcars, cable cars, jitneys are ripe for resurrection, though in many cities at this moment they are about to be eliminated. Where cities are on water, ferry systems might become as popular again as they are now in San Francisco and Seattle.

c. The rehabilitation of transportation systems to create more dignified travel environments should be another priority. Perhaps the most seriously neglected system in the American city

is that of the arterial streets. These streets have been in the hands of impoverished city departments for years, and everywhere they have created a blight on travel and on the urban environment. They are poorly maintained, lined with indiscriminate curb cuts, multifarious and disjunctive uses, parking lots, signs, and disorderly arrays of street furniture. They have been the prime target of conservationists. Although some have a brash excitement of their own, most are dull, tedious, depressing.

The same can be said for many of the urban freeways constructed over the last ten years. During the massive freeway programs of the 1950's and '60's, many mistakes were made, but few attempts to remedy them have come forth. Highway designers rarely go back over their old projects. They have been too preoccupied with building new ones. A freeway renewal programme would evaluate the quality of existing urban freeways, with the intent of eliminating danger spots, improving orientation, and the appearance of signs and street furniture, of landscaping, guard-rails, and side walls. Views which have been unwittingly blocked, for instance on the older bridges, should be opened up.

Neither should we forget country roads. The U.S. Scenic Roads programme was oriented to the building of new scenic roads, rather than to the care of existing roads, - a likely way of destroying the very scenic qualities that were to be revealed.

The rehabilitation of subway systems, many of which in the U.S. are a national disgrace, has scarcely begun. It has been left to enterprising youngsters ('vandals' they are called) to decorate the drab subway trains and stations of New York and Philadelphia.

d. New technologies which offer multi-functional qualities of service are of course still worth exploring. Demand-actuated mini-bus systems, people-movers of various kinds, designed to reduce absolute reliance on automobile travel, look promising. Responsive systems that allow a degree of personal control, choice and convenience, without deleterious impacts on the environment, should be encouraged. But I emphasize the renovation and resurrection of old systems, because too much attention is paid to new systems, too little to that which we have. The 'build-at-all-costs' syndrome is one of the main reasons why transportation planning is unpopular today.

REDUCING THE NEGATIVE IMPACTS OF TRANSPORTATION SYSTEMS

During the last ten years protests from the public have halted transportation projects in many countries. Transportation planners at first were defensive and bewildered. Then conferences were called, and research projects were financed. Concerns broadened from the narrow right-of-way to the transportation-corridor, and

joint-design teams were initiated. Later, some cities like Boston embraced massive programmes of citizen participation.

Since the passing of the National Environmental Policy Act in 1969, the environmental impact of transportation systems has become a national concern. Environmental impacts have become a matter for more or less systematic assessment and a whole new industry of impact assessors has sprung into existence. While this has made transportation planners more sensitive to environmental issues, the social impacts have often been overridden or forgotten. The natural environment has more powerful defenders than have low-income neighbourhoods, and in many cases it is easier to assess impacts on the natural environment than the social environment. The scars of erosion, the demise of a rare species or the pollution of streams are easier to discern than disruptions in community life.

There has also been a tendency to concentrate on the impacts of large projects like freeways and transit systems while the incremental but vastly more pervasive effects of traffic on city streets have been neglected. In the San Francisco metropolitan area we have found that 40 to 55 percent of the population sample were annoyed at the noise produced by local traffic, whereas only 24 percent were disturbed by noise from freeways and major roads (Carp et al, 1975). In a current study we are discovering just how deeply traffic has affected neighbourhood life. Besides the more obvious dangers to children and old people of noise, fumes, dirt and vibration, we find that traffic forces a withdrawal from the street, a reduction in the sense of home territory and therefore responsibility for what goes on in the streets. Local friendships are reduced, children must be accompanied to school, forbidden to go beyond the block, nearly all activities cease. Our residential streets are more dead than alive (Appleyard et al, 1975).

Transportation agencies should consider not only social impacts such as losses in housing, jobs, job opportunities, but also various dangers and discomforts from noise, fumes, dirt, visual intrusion, parking, friendship patterns, neighbourhood functioning, enforced adaptations, and changes in density, heterogeneity, and mobility.

Neglected, too, are the more indirect secondary and system impacts of transportation facilities. The primary impacts of transportation channels and facilities are often immediate, visible and identifiable. The secondary impacts - the traffic and development generated by their presence - and system-wide impacts - on the form and growth of metropolitan areas over the long term - are complex and elusive, but usually more significant. For instance, those who live around the BART stations in San Francisco are more

concerned about future development which will raise rents or evict them from their homes than about the environmental impact of the system itself.

Suggested Policies

a. Proper attention to social and environmental factors requires radical changes in the whole process of transportation planning. These factors should be considered right from the beginning of the planning process - from the system level down - if they are to be adequately recognized. They cannot be considered in the last phases of the process, as the 'frosting' on the engineering plans. This requires, for example, working out the detailed physical and social implications of regional transport decisions before they are fixed. The Boston transportation study proposals were displayed to neighbourhood groups at scales at which they could see how future routes would affect individual houses and neighbourhoods. In the past communities were unaware of the character of such projects until they were built.

b. The 'opening-up' of the planning process to include representatives of impacted populations and environments is the most direct way of understanding the impacts of existing transportation systems on everyday life. Many ways of involving citizens in the planning process are now being experimented with in North America, the Boston and Toronto transportation studies being good examples.

c. But citizen participation alone is not the solution to all social and environmental problems. Substantive knowledge in the methods of social and environmental assessment is needed. A system of guidelines for impact studies should be developed (Dickert & Domeny, 1973). Guidelines might include:

- i. a description of community, social and environmental values, as they are held by different population groups.
- ii. a checklist of possible social, psychological, physical and natural impacts and how they could impact different groups.
- iii. the setting of social and environmental performance standards which transportation facilities should meet.

- iv. methods of obtaining social and environmental information by which to assess and predict the consequences of impacts, including data sources, field survey methods and sample questionnaires.
- v. methods of recording, simulating and communicating such information for public understanding.
- vi. the identification of transportation system components and actions which create impacts.
- vii. methods of controlling and mitigating such impacts.

These guidelines should emphasize specificity and should aim for quantifiable indicators of environmental and social quality. But they must be tied back to people, to which groups gain and which groups lose. Most cost-benefit analyses shy away from identifying these social and political consequences of projects. It is too tempting only to talk of the gains. Even at the recent OECD Conference on "Better Towns with Less Traffic" (O.E.C.D., 1975), the possible social costs of traffic restraint schemes were suppressed in the general enthusiasm for a new cause. Guidelines should be couched at different levels of sophistication, and should be well-illustrated and comprehensible to the professional and the layman.

d. Efforts should be made to plan the primary impact zone of major routes more comprehensively and sufficient allocations to support adequate relocation and rehabilitation in those areas should be mandatory. Such plans must be worked out in close collaboration with city and local agencies and with local community groups who have control of funding.

CONTRIBUTING TO THE QUALITY OF THE SURROUNDING ENVIRONMENT

'Impact', the most commonly used term to describe the relation between transportation and its environment, implies a negative consequence. Transportation systems should be viewed also as potential benefactors to their surroundings. A transportation system should be like a Christmas tree on which many good things can be hung. Transportation facilities can be designed to include other functions than the travel function. Air rights developments and broader corridor planning in the United States have allowed housing, schools, public buildings and parks to be built over noxious freeways. Linear parks have been designed along the BART elevated tracks in the Bay Area and streets over the covered parts of the route have been landscaped with benches, fountains and other amenities. Tokyo has a shopping street under one of its freeways. By spreading investment in these ways, there is a

chance that major transportation routes could change the tradition that has created corridors of blight through our cities.

Suggested Policies

a. Multi-modal corridor planning in close collaboration with cities and citizen groups should be initiated in all areas where transportation facilities are to be built. Multi-modal planning would start with the transportation needs of the corridor without any preconceptions about modal solutions. Every modal alternative including the 'no-construction' alternative would be considered.

b. The use of air rights both under and over the right-of-way, for parallel transportation systems, for viewpoints, and for various uses that can serve the surrounding community should be encouraged to prevent blighted transportation corridors from forming. These improvements will depend a great deal on design ingenuity.

c. Transportation agencies should participate in broader regional and metropolitan planning. Such agencies should include regional highway, transit, airport, and port agencies. They should be oriented towards region-wide transportation planning which optimizes the social, environmental and land-use patterns of metropolitan areas.

CONCLUSIONS

A revolution is taking place in transportation planning due to public disenchantment with traditional planning methods and the closed nature of the old transport planning process. The revolution demands not merely the adoption of new policies, but a restructuring of the basic concepts and values of transportation planning; ways of thinking that it may be impossible for many to adopt without re-education.

1. Transportation must be seen as a service rather than a facility. Too many in transportation planning are 'locked-in' conceptually to a system or a technology - whether it be freeway, bus, transit or automated highway - as the solution to the transportation problem. Too many have been trained only for the planning and construction of one product. Their viewpoint dominates transportation planning. Yet transportation should be a public service. The criteria for the success of transportation system should be user- and neighbour-oriented. Success should be measured in degrees of satisfaction and numbers satisfied rather than in amount built. There should be as much emphasis on management operations and incremental improvement as on the invention of new

technological systems.

2. Transportation systems should be seen as complementary rather than competitive. Yet transportation planning is characterized by rival systems aiming for permanence and/or profit. It is depressing and frustrating to find the highway, BART, and bus transit agencies in the Bay Area spurred on by press and public vying for ridership without any view of the overall public benefit. Multi-modal metropolitan and local transportation agencies appear to be essential to the resolution of such problems.

3. Transportation planning must be multi-functional and multi-disciplinary. Transportation decisions have multiple and simultaneous effects. A channel designed only for safety and traffic capacity may destroy a neighbourhood or create an eyesore. Good, safe street lighting can be a source of uncomfortable glare for neighbouring residents, a curve designed for 40 m.p.h. may take more property than one designed for 30 m.p.h. The clearing of trees from around the right-of-way in the cause of safety makes highway travel arid and monotonous. The engineering profession has a style of operating that focusses only on priority problems, often scorning other values. It performs extremely well in the planning and construction of transportation facilities and in the more quantifiable indicators of transportation success. Social values in a pluralistic society, environmental values based on the human psyche, or the natural ecology require a more complex, subtle, less precise view of the world. Transportation agencies have only begun to consider these factors.

4. The transportation planning process has to be more open to public participation than the present closed professional system of planning. The myth that we are value-free technicians able to make decisions on behalf of the public has surely been exposed by now. Every transportation standard or decision involves values and usually benefits some of the public while hurting others. Every decision is therefore a social and political decision - even if it be so apparently technical as the design speed of a highway or the creation of a one-way street system.

The transportation establishment has talked a great deal about public participation in transportation planning, and some progress has been made. But there is all the difference in the world between token participation aimed at selling the public a product, and a genuine effort to find out the public's needs and desires. Allowing the public access to the information on which decisions are based and participation in decisions, even to the point of veto, involves a sacrifice of power that cannot be made with good feelings unless the public is genuinely viewed as the clientele of the transportation agency.

Public participation is the most eagerly discussed issue in U.S. planning at this time. Debates on the nature and composition of citizen committees; or even on whether to have committees at all; discussions on how and when to have public hearings, on how much of a veto to give citizens groups and on the representativeness of citizens groups are intense. Yet professional dominance of planning seems inexorable, given the erratic nature of citizen interest and their understandable apathy when faced with obscure remote decisions which do not affect their own neighbourhoods. Planners often fail to realize that they have the responsibility of selflessly catalyzing citizen involvement.

The need for changes in the planning process suggest a number of changes in the transport planning profession.

1. A major re-education programme for engineers, planners, and administrators in transportation agencies should be undertaken. In-house training programmes to educate all personnel in environmental and social matters are a priority. Such a programme is presently being attempted by the California Transportation Agency (formerly the State Division of Highways) with help from the University of California. It is not easy. A sabbatical system whereby every seven years personnel could take a leave of absence for refresher courses might also be instituted. This could allow more upward mobility within agencies, since returnees could be moved up to different jobs and others would take their place. Such a programme would also require that universities and colleges reorient their academic or extension programmes towards the older professional.

2. The hiring of environmental and social professionals, environmental planners, landscape planners, urban designers, sociologists, community organizers, political scientists, psychologists, ecologists and others as full-time staff members in transportation agencies should be actively pursued.

3. A closer collaboration between schools of engineering, planning, architecture, environmental design, natural resources and the social sciences should begin. Service courses in environmental and social planning, science and design for engineering students should be provided, and they should be encouraged to take them. The new emphasis on the behavioural and natural sciences in the design and planning fields should spread to transportation engineering. Such programmes should also encourage those related professions and disciplines to become involved in transportation problems.

It is not that other professions and disciplines will be any better at transportation planning than those traditionally in the field. Every discipline suffers from isolated specialization, a phenomenon that is destructive to the quality of life in our cities.

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