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Emerging Models for Delivering Transportation Programs and Services: A Report of the Transportation Agency Organization and Management Scan Tour

This digest summarizes the findings of an international technology scanning review conducted with the support of NCHRP Project 20-36, "Highway Research and Technology—International Information Sharing." The scanning review team consisted of representatives from U.S. federal, state, and private sector agencies. This digest was prepared by Dr. C. Michael Walton, Report Facilitator for the review.

SUMMARY

This digest describes the findings of an international scanning review undertaken to examine how other developed countries are coping with budgetary constraints that lead to downsizing and restructuring of their transportation agencies. In the United States, the state departments of transportation (DOTs) face similar challenges. In response, many are considering techniques such as increased outsourcing, privatization of some agency functions, turnkey operations that transfer some cost risk to the private sector, and operation of some public-sector functions as profit centers or publicly-owned enterprises. Additionally, agencies are considering the use of newer management tools, including enhanced attention to customer service, performance measures, and cost-benefit analysis. The scanning team focused on the experience of agencies in other countries in implementing these techniques and tools, how well they have delivered the cost savings originally envisioned, and their potential for adoption within the context of U.S. public policy and the service expectations of the "customers" of state DOTs.

Many transportation agencies in countries throughout the world—including the United States—are feeling pressures of privatization in the wake of current government restructuring and downsizing. In short, transportation agencies are being required to do more with fewer resources. This trend is part of a larger redefinition of government and business functions and is by no means confined to the transportation sector. A number of countries have already implemented comprehensive restructuring of their transportation departments, and their experiences present useful input regarding similar issues in the United States.

The Transportation Organization and Management Scan Tour was formed to study some of these agencies in Australia, New Zealand, Sweden, and the United Kingdom, that are in the midst of change and have been identified as having notably responded to these conditions. In order to more closely examine and compare their experiences in the restructuring of the road sector, a group of representatives from the U.S. Federal Highway Administration (FHWA), American Association of State Highway and Transportation Officials (AASHTO), Transportation Research Board (TRB), and American Road and Transportation Builders Association (ARTBA) traveled to these four countries from August 25 to September 5, 1997, to meet directly with officials engaged in transportation agency

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management as well as other transportation-related groups in each country.

The road sector reforms observed in all countries are part of an effort to make government more responsive by treating the public more as a customer. It is a given that making the distribution of resources and contracts more competitive will improve the efficiency and cost-effectiveness of providers, transportation authorities, and the transportation network itself. Regulatory methods are being redefined in relation to the private sector (i.e., generally becoming more "light-handed" and results-oriented, to allow for innovative approaches) although there has been concern that privatization will require more careful monitoring. There is a move toward greater accountability of government agencies and the use of more objective, careful, and inclusive real-cost accounting as a means of allocating scarcer resources. Under consideration is the use of cost-benefit ratios and performance measures.

Another concern that penetrated discussion was the issue of public trust. It was apparent that maintaining public trust was a key issue in guiding and shaping the role of public agencies after restructuring or reorganization. In fact, it became the basis of debate regarding the degree and nature of privatization and deregulation that should be adopted.

Transportation reforms in all countries surveyed were found to be part of an overall reevaluation of the appropriate nature and extent of government activity, in response to a government mandate or some degree of financial crisis. In reorganization of government, there has been a greater distinction drawn between policy formation and management and the delivery of services and facilities. The decision that has been made, to a greater or lesser extent, is that service delivery is best provided by the private sector, partly in response to governmental reforms and demands for greater cost-effectiveness. In all four countries, reform began with a reevaluation and clarification of their transportation agencies' core functions and responsibilities, of roles within the organization, and identification of those functions best transferred to the private sector. As an alternative to total outsourcing, public policy in some countries allows, if not requires, providers to operate as profit centers or publicly owned enterprises, which compete directly with private companies, collect a profit, and pay taxes. Sweden has adopted this approach, at least in principle, as a means to maintain quality standards and prevent the very few major private roadworks contractors from behaving as an oligopoly. One of the most important and successful changes in structure adopted by the countries surveyed was an explicit separation of buying and selling roles within the agency, forcing project decisions to be made more carefully and reducing conflict of interest.

There is also an effort to transfer some of the public risk in transportation infrastructure development to the private sector as well, as evidenced by several trends: a variety of turnkey programs are being used successfully in the United Kingdom and Australia, variously referred to as DBFO (design-build-finance-operate); BOT (build-operate-transfer); BOOT (build-own-operate-transfer); and DCM (design-construct-maintain) according to their specified contractual obligations. The United Kingdom particularly has seen significant cost savings with its first eight DBFO contracts in comparison with its standard system that routinely ran over budget. In principle, these contracts are deliberately made rather long-term (up to 30 years of operations) and comprehensive in scope to apply the same incentives and responsibilities to the private company that a public authority would have to operate under.

The four countries also are beginning to outsource maintenance work under similar contracts (3 to 5 years) that are more "performance-based" rather than "specification-based." The United Kingdom also uses "lane rental contract" clauses to keep as many lanes open as possible during maintenance and construction activities. Other than through the DBFO projects, the idea of transferring design activities to the private sector is treated very cautiously, out of concern for maintaining consistent safety and quality standards, and because there may not be enough highway design work in the smaller countries to support more than a limited number of private companies. Most do, however, express interest in having foreign firms compete in the design area as well.

Transportation departments in the countries surveyed were under great pressure for financial accountability, and although this has spurred an impressive variety of practices to increase efficiency, the Study Tour did not observe any new or previously unknown funding mechanisms. Tolls, except for bridges, were generally disliked, although they were being reconsidered, and there was some warmth toward the use of electronically assessed tolls, which might also be used to distribute traffic by encouraging the use of alternate routes. It was observed that only New Zealand had dedicated funding sources comprised of user fees for transportation (although Australia's transportation funding at the federal level is intended to correspond to income from fuel taxes and registration fees; strictly speaking, the monies come from general revenue), but the transportation agency must compete for funding with other government agencies each budgeting period, because highway user fees may be used for nonhighway or transport-related purposes. While fees from highway users are collected in all countries, the fees typically accrue to the account of the general fund for allocation during the normal budget cycle.

Generally, there seemed to be only little, though growing, acknowledgment of the importance of transportation infrastructure to economic growth, especially by national governments (other than Australia, which considered it instrumental and invested heavily in its highway system through the 1980s). Sweden explicitly considers transportation investment an important means to equalize regional development, and Wales recently decided

to double its transportation investment, and saw greatly increased economic growth compared to the rest of the United Kingdom.

Cost-benefit analysis has been one of the major ways in which this business-like approach has been expressed. Such analysis systems are increasingly being used to prioritize projects and allocate resources more objectively. However, costs included in this analysis vary: some include costs related to noise, environmental degradation, aesthetics, and delays and some do not. Some include comparison with the costs of a do-nothing option. Most all include items related to safety. There is interest in making these analyses very generic to facilitate comparison between regions and internationally. These analyses are very much works-in-progress, but are being pursued enthusiastically.

This new business-like approach has allowed the public sector to level the playing field with the private sector in certain circumstances. In some cases, the public sector has been allowed to compete with private sector firms, most notably in Sweden and Australia, and the public sector has been able to hold its own and gain a number of contracts on its own merits. In both of these countries, the public sector firms must allow for certain rates of profit and pay taxes in a manner that makes them operate with many of the same constraints as their private sector competitors. Although there have been discussions about the lack of equality between private and public sector firms in Australia, VicRoads (Victoria's road agency) has let its in-house teams compete and has seen them compete well. The experiences of each country suggest that there have been mixed results to date; however, most officials agreed that the overall direction has yielded short-term benefits.

Some agencies have set goals for their units in competing with the private sector and this has proven to be both successful and viable. However, several areas of concern were discussed. One concern was the retention of core competencies within the transportation agencies, many of which had been drastically downsized. All agencies placed a high priority on retaining their experts, such as contract writers (especially important when contract arrangements and types are changing because of the reforms). Another concern was the sense that privatization necessitates more careful monitoring. Research efforts of the countries surveyed have generally suffered under privatization, except in Sweden, where transportation research is supported by the Swedish National Roads Administration (SNRA) and through grants distributed by the Swedish Transport and Communications Research Board (KFB). Finally, the countries also expressed concern for the training of future transportation professionals.

The major component to operating in a business-like atmosphere is the effect of competition. It is a common perception in all the countries surveyed that making service provision subject to competitive tendering is the most significant means to increase efficiency and encourage innovation. It, therefore, is important that there be enough firms to provide sufficient competition to offset tendencies toward oligopoly, which is a significant issue for some of the smaller countries.

Since this current business-like state is evolving, it is impossible to foresee its future direction. However, some trends have begun to emerge. The over-reliance on a cost-benefit analysis tends to encourage short-term or sub-optimal decisions unless some mechanism is in place to allow for long-term implications to be more readily factored into the process. With the changing roles of the public units, training of personnel is affected. Historically, the public agencies have been a source of human capital for the private firms. They have traditionally provided formal instruction and training coupled with on-the-job experience. The reform and its impact on the traditional public agency has altered this process both in the quantity of technically and professionally qualified people and in the training activities. As a result, private companies have recognized the mandate to include training in their annual budget process. Similar trends are occurring in the research area, as private sectors recognize that they must include research and development in their activities as the public agencies scale down their own involvement. With the shift of emphasis from the public to the private sector, the public sector has dropped its lead role in both of these areas. It is now up to the private sector to fill the void.

Because of the increasing influence of the private sector, a check is needed to ensure that the job that it is doing meets requisite quality and efficiency. The governments of the four countries are moving toward a system of performance measures that would allow them to oversee the areas of the road system that are operating with fewer employees. The performance-based approach is intended to ensure receiving the quality of work contracted for. The four countries still find themselves in the developmental stages of creating such a performance-based system, but believe that such a system will enable internal comparisons to be made thus ensuring a quality return on public investment.

All countries were and are in significant transitional periods, all to varying degrees moving toward lighter regulation and adoption of business strategies of the private sector. Change in all agencies was initiated either by crisis or government mandate, rather than from within the transport authority itself. While their experiences offer some valuable lessons, it is important to remember that these reforms are considered works in progress; their long-term implications have not yet played out.

1.0 INTRODUCTION

1.1 Background

The Transportation Agency Organization and Management Scan began as a way to investigate how other

countries were coping with budgetary constraints and their use of newer management tools, including performance measures and cost-benefit analysis. Members of the scanning committee visited four countries: New Zealand, Australia, Sweden, and the United Kingdom between August 25 and September 5, 1997. These counties had been identified as having successful and innovative programs for transportation agency reform. The scan consisted of 13 high-level executives representing the FHWA, AASHTO, TRB, and ARTBA. This document was assembled using both their experiences obtained from the tour and literature gathered from the countries visited.

1.2 Purpose of Study

Transportation agencies within the United States are undergoing reform as pressures for "reinventing government" and "downsizing-rightsizing" coincide with budgetary constraints and an increased focus on agency and system performance, quality, and customer service. New Zealand, Australia, Sweden, and the United Kingdom were selected as having dynamic programs of agency reform in those areas. The scan was organized to enable the U.S. transportation community to learn from their experiences. The panel was charged with reviewing and documenting innovative approaches to transportation agency management abroad and focusing on new ideas and concepts that have potential for application in the United States. The topics of interest to the panel included

- Respective roles of government and the private sector in the delivery of transportation facilities and the maintenance of the facilities;
- Use of performance measures for producing programs and products, and allocating resources;
- Intergovernmental and intermodal relationships in organizational structure and programs delivery;
- Innovative approaches for developing and implementing highway programs; and
- Other related topics.

These major topics were later studied in detail through the use of amplifying questions raised by the panel.

2.0 OBSERVATIONS

2.1 Respective Roles of Government and the Private Sector in the Delivery and Maintenance of Transportation Facilities

The four countries visited are undergoing an evolution in government. In response to budget cuts and other financial pressures, they are applying the rules of business from the private sector to government operations, including transportation systems. In the countries surveyed, the private sector is active in all phases of road design, construction, and maintenance, and consequently governments have been exploring ways to use the private sector most effectively. The governments have increasingly adopted business-like management methods and used tools such as cost-benefit ratios and performance measures to increase efficiency. They have begun to separate policymaking and management activities, and have focused more on their core business. The move toward deregulation and privatization in transportation is part of a larger trend in government and business, spurred in part by global competition. This survey was designed to study a range of responses to these conditions in countries that have different transportation needs, priorities, and circumstances.

The following sections outline the role of the public and private sectors in the core functions of transportation infrastructure development and maintenance.

2.1.1 Planning

Planning is an area in which governments have considerable influence in the transportation sector. The national governments surveyed have taken major strides in developing policies that have radically reshaped their transportation systems. Other than Australia, most have moved to a top-down approach in the management of transportation systems, in which the national government has the most power in establishing policy and guidelines under which the system operates. Local and regional governments may still exercise influence over the specific expression of the project in the landscape, however. This allows the involvement of the private sector acting in accordance with specifications prescribed by the policy agent.

In New Zealand, government activities are limited to policy formation; all construction, maintenance, and operations are performed by the private sector. The limitations of the planning process have resulted in a certain lack of systemic vision. Several aspects of the planning system have the effect of limiting system coordination and inhibiting long-range planning.

The strict adherence to cost-benefit ratios also inhibits long-range coordination of planning efforts. These ratios are usually the determining factors in deciding which projects are funded. This procedure tends to encourage a project-oriented approach rather than a comprehensive national planning system.

Sweden's planning process is the most integrated of the four countries. The national government is in the lead, and its primary focus is on the national road system. A 10-year plan is created, which is updated every 4 years. This enables the plan to look toward the future and allow for changes as needed. A cost-benefit ratio is used to prioritize both projects and policies, but is not as pivotal a consideration as in the New Zealand system. In New Zealand, cost-benefit ratios are used in the prioritization of both policies and projects, and they are the bottom-line determinants.

The United Kingdom also has a strong central government. The Highways Authority (HA) in England manages the national trunk roads and motorway network and reports to the Department of the Environment, Transport, and the Regions. Responsibility for transportation planning in Scotland, Northern Ireland, and Wales rests directly with their respective Secretaries of State. Recently, the central government has begun assigning more planning responsibilities generally (not just in transportation) to local and regional governments. Exactly what the newly elected (May 1997) Labour Party's policies will be in regard to transportation was not entirely clear at the time of the scan tour, although there has been a push for greater integration of transit modes and systems, and improvements for cyclists and pedestrians. Wales recently, and successfully, decided to increase its investment in transportation infrastructure as part of its overall economic development. Regional governments in the Manchester area have similarly improved their local transportation systems in several modes—air and light rail as well as road—also with great success. The national government is responsible for the trunk road system, which has suffered a public backlash, and most of the cost cutting in the system has been at its expense. Because of political opposition relating to environmental and financial concerns, expansion of the trunk road system is not a priority, although significant investments are being made in safety, bearing capacity, and improvements in existing systems. Cost-benefit ratios are used but are not always the primary mechanisms employed to allocate funds. A system is currently being devised to make better use of these ratios.

In Australia, the strongest branch in terms of planning and implementation is the state governments where most of the power in the system is derived. This power can be traced to the formation of the country whereby the national government has historically had a lack of power relative to the states. In contrast to the other countries surveyed, the Australian states have the most influence in transportation planning, in part, because of the country's genesis as a collection of independent colonies using different systems (e.g., different rail gauges). The National Highway System (NHS) is under the jurisdiction of the national government, but the other roads are the responsibility of the road-controlling authorities of the states or local governments. Connectivity of the national system receives more emphasis than regional or metropolitan mobility, which has left a need for additional urban highway capacity especially in the larger cities. Cost-benefit ratios are used but generally are not decisive in allocating funds. The emphasis on and effectiveness of long-range planning varies from state to state depending on its road-controlling authority.

The planning influence of local governments was generally confined to local projects, and to some degree the expression of larger projects in the local landscape. The United Kingdom and Sweden allow or encourage local authorities to control their own road and multimodal transit systems, but the localities have little power when dealing with national-scale roads. It should be noted that planning processes in all four countries have undergone significant change in the past decade as part of general administrative restructuring, and under the new systems a more long-range approach may be favored.

Another significant government influence, in the cases of the United Kingdom and Sweden, is the newly formed European Union (EU). The EU coordinates international transit and freight systems and standards, sets objectives for accessing remote rural areas, gives grants to countries for regional infrastructure development, and sets emission limits for member nations. A major project is the development of a continental highway system. The EU is expected to become increasingly influential in the transportation systems of the continent.

2.1.2 Financing

Of the four countries, only New Zealand uses dedicated user funds to aid in the support of its transportation network. A dedicated fuel tax of 9.4¢/litre is accrued for use in road construction, maintenance, and safety projects or activities. An additional levy on fuel of 20.8¢/litre goes directly to the general fund of the government. There is a weight/distance charge for heavy trucks and all diesel engine vehicles are required to pay an extra fee. Further, all vehicle owners pay an initial registration fee and an annual vehicle license fee that also goes directly to the National Roads Fund for use in road construction, maintenance, and road safety services. Interestingly, a portion of the National Roads Fund (i.e., vehicle registration, license fees, and fuel tax) is used to support the no-fault Accident Compensation Program. Local authorities use fuel and property taxes to support local roads.

In Sweden, although there is no specific dedicated funding, a percentage of the road user tax is used for transportation purposes. Borrowing is permitted under current laws. Currently, there is negative public opinion regarding tolling or BOOT projects. While tolls are currently being used on only one bridge, they are under consideration for the new ring road and tunnel system that will encircle Stockholm.

Australia is the only country making significant use of road tolls and their use is increasing, especially in New South Wales. The states provide the greatest share of transportation funding (about 40 percent), but this could change as one court has ruled that a gas tax at the state level is not constitutional.

Currently, the trunk roads in England are free; tolls are collected only at some estuarial crossings, though this is likely to change. Under some of the new DBFO contracts, part of the maintenance fee the government pays the builder/operator is a "shadow toll," based on use level. Tying funding to the use level of the road is intended to (1)

encourage the construction of only those road improvements and bypasses that are most necessary and (2) ensure continued proper maintenance. Eventually, shadow tolls may be replaced or supplemented with real tolls when it becomes feasible to do so electronically. There are currently eight separate DBFO projects completed and another 15 that have been approved.

2.1.3 Design

In the area of designing the transportation systems, the four countries split on their methods. In the United Kingdom and New Zealand, all roads are designed by private consultants, while private and public design teams compete for contracts in Sweden and Australia.

In the United Kingdom, design contracts are awarded in a "two-envelope system," which takes into account both quality and price. First, the bid prices are separated from the design proposals and firm qualifications and sealed in an envelope. Then all bids are evaluated by their qualifications and proposal for the work in question. The best proposal is selected, and a second choice is given a percentage rating; for example a 10 percent rating indicates that the second-choice firm should win if the bid price is 10 percent lower than the first choice firm. Only then are the actual bid prices compared and the contract awarded accordingly. An effort is made to award projects to a variety of firms instead of what might otherwise appear to be a favored few.

New Zealand also has all design projects outsourced, but it has a slightly different way of choosing the contractor. Firms selected are required to have ISO 9000 and like certification, or a weighted average method is used in determining successful tenders. The weighted average method uses scores awarded in such categories as methodology, experience, management skills, and price to determine the winning bid.

In Sweden, public design teams compete directly with private and foreign firms for contracts. The state-owned firms are expected to return a 15 percent profit on their bids so as not to undercut private firms, and generally win approximately 50 percent of all contracts.

The method of awarding design contracts in Australia, as in most other areas of government activity, varies greatly from state to state. Some allow for competition between private sector and in-house units, others allow for solely private sector bidding, and still others allow for only in-house work. Since 1981, the national government has allowed open tender on all road projects. Individual states have variations on this law.

2.1.4 Construction

As contrasted with the United States where virtually all construction is performed by the private sector and has been for decades, the practice in all four countries is relatively recent. The present policy is that almost all road construction in the four countries is competitively outsourced. Competition is especially encouraged in this area to prevent the formation of monopolies. Companies involved in construction must use some form of Total Quality Management (TQM) and some countries require ISO 9000 or comparable certification to be considered for bids.

The surveyed countries are moving toward performance-based contracts to help secure satisfactory end results. The long-range durability of roads has been a major issue, especially who has the liability for these roads.

For its size, New Zealand has active competition in the area of road construction. There are currently 10 major contractors, two of which each handle one-third of the work. There is no prequalification in order to bid, although ISO 9000 or equivalent is used and can heavily favor these applicants. As with most of the other countries, New Zealand has moved to performance-based contracts to help further secure positive end results.

In Australia, almost all road construction is outsourced, although some states still have in-house teams perform work and use the private sector only to pick up the slack at busier periods. The federal government outsources the greatest percentage of work, with less occurring at the state level and significantly less at the local level.

The United Kingdom contracts its construction projects. As stated earlier, DBFO arrangements have been used eight times and are being considered for 15 more projects.

Sweden currently has only three major companies bidding for construction projects (recently consolidated from nearly 30), and the fear is that the number will slip to only two, which will severely limit competition. To prevent rural areas from being underserved and prevent price gouging, the SNRA has been allowed to bid competitively for construction contracts. All projects are open tender and the SNRA construction centers win approximately 20 percent of the work.

2.1.5 Maintenance

All of the countries use private firms for all or some of the maintenance activities on their roads. New Zealand is the only country that has all of its maintenance outsourced. The remaining countries have in-house maintenance groups that compete with the private sector for work. Maintenance contracts are usually awarded for a particular geographic area for a given length of time, approximately 3 to 5 years. The length of these contracts has been growing as countries and the firms have grown accustomed to the terms and know what their costs and profits will be with more certainty. Competition is also a key to the maintenance arena and must be preserved for the system to be at its most efficient.

New Zealand prioritizes maintenance over new construction, generally dedicated by cost-benefit analysis

process. All maintenance projects must be funded before new construction projects are considered. Thus, 63 percent of the transportation budget is used for maintenance purposes. Most contracts are for 3-year periods for a specific geographic area. The country is currently moving toward greater performance specifications that should ensure contracts are followed more precisely. The variations in the terrain of New Zealand make it difficult to set prices and compare the costs of maintenance in different areas of the country. Rough terrain exacerbated by severe winters makes maintenance a significant expense in Sweden also, and improved road materials, construction, and maintenance techniques are a topic of continuing research. Sweden handles snow removal and treatment as a separate item outside fixed-price maintenance contracts.

2.1.6 Safety

Safety is a major priority in all the visited countries, especially those that have switched to a more privatized system. The perception is that the private sector does not have the same responsibility for safety unless certain guidelines are included in contracts that enforce levels of safety. Of the four countries surveyed, Sweden has the most impressive safety program with dedicated funding called Vision Zero for its goal of zero automobile fatalities or serious injuries. The program takes a very broad view of road safety, and it has led to some significant and innovative safety improvements. For instance, the use of safer cars has had an effect on the number of fatalities. The other countries use "Black Spot" programs, targeted to improve specific areas that cause the most accidents. In Australia, citizens can propose Black Spot projects themselves, which has helped to increase political support for highway programs.

Safety is factored into most countries' cost-benefit ratios, ensuring that safety will be taken into account when evaluating the design of new roads and planning future routes. New Zealand uses a dollar amount of $2.2 million for each life when figuring cost-benefit ratios.

2.1.7 Research and Innovation

The Swedish government supports research related to transportation through the SNRA and KFB. The KFB commissions or conducts mostly theoretical research relating to traffic, construction, special needs of remote areas, energy and environmental issues, alternative fuels, driver motivation, and the policy and legal issues relating to communications and information technology. The SNRA compiles statistics and conducts research in safety, road design, and other areas that relate to its regulatory duties. Research programs also exist in Australia and the United Kingdom; however, the recent requirement for the Transport Research Laboratory (United Kingdom) has been to compete for its funding support.

In the other countries, however, the shift to the private sector of highway functions has been accompanied by significant reductions in government-supported highway research. The research activity that remains is highly applied, with a short-term horizon for implementation. It remains to be seen whether the private sector, as it takes on added highway functions, will support research on its own, and whether the governments in these countries will at some point decide to renew support for long-term highway and transportation research.

2.2 Use of Performance Measures and Performance Targets to Allocate Resources and Enhance the Delivery of Programs and Products

Performance indicators were introduced in the surveyed countries' transportation departments beginning in the late 1980s, generally as part of a broader reform of government (and business) practices. Many countries have found that improved performance assessment is a necessary consequence of privatizing road construction and services. All the countries surveyed have implemented a program of performance measurement to evaluate construction and improvements projects, and some are experimenting with performance measurement systems in other transport-related areas such as road safety.

2.2.1 Performance Measures and Performance Targets

Performance measures are part of England's recent efforts to make government at all levels more responsive to the actual (and changing) needs of the public. In response to the 1991 Citizens' Charter, the Audit Commission drew up a list of Suggested Indicative Performance Measures/Indicators to assess the performance of road administrations and contractors covering context, new road works, road maintenance works, bridge works, winter maintenance, environmental activity, street lighting, and traffic. Target levels for each indicator are specific to each local Authority. The Authorities are then awarded Charter Marks in recognition of service achievements against these goals. Goals are generally short term (5 years) but some are determined for terms up to 20 years. There is interest in developing similar indicator schedules to compare their performance against other countries. The HA produces an annual Business Plan that includes Network Performance Indicators and a program of projects for the national trunk roadways. Similarly, environmental impact assessments are now required and published for all significant projects as outlined in *Sustainable Development, the UK Strategy*.

In Sweden, performance objectives are declared in terms of intended impact (outcomes) and the outputs defined to support them. Broad outcome areas include (1) system efficiency, (2) accessibility, (3) safety, and (4) environment. They have measured trends on conventional

indicators as elsewhere against both specific and "soft" targets. Through this process, they have declared defensible targets and related resource commitments in each of these areas. There is evidence that resource decisions have followed these performance target decisions, as reflected in a shift in funds for the next 10 years compared to the previous 10, indicating an evolutionary approach. It has also become apparent that a performance indicator may not be equally relevant in all areas of the country; for example, road smoothness is very important on high-traffic roads, but according to users is not so important on less-traveled roads.

New Zealand considers performance measures the most efficient way for the Ministry of Transport to monitor services provided by the Crown Entities (CEs). Every year, the CEs negotiate an Annual Performance Agreement and are monitored against it. It is also used to track all aspects of their responsibilities including expenditures, customer service, efficiency, and aspects particular to their functions. Each output class contains specific items for which they have set a target, and against which they are checked and must provide a report every year. A 5-year strategic plan is also created to give long-term guidance. This system has been in place only since 1995, and the Ministry is still collecting data to determine the appropriate baseline levels for these indicators. In addition to performance targets, New Zealand uses QA methods, which tend to be preferred by industry. These methods are less direct and take 2 or 3 years before the benefits are fully realized.

The greatest obstacle in implementing performance indicators relates to the varied terrain of New Zealand; it is difficult to compare the cost of roads in the mountains to those on the coast. They are collaborating with the Australians on a system to make these comparisons easy and relevant. To further this research, the Land Transport Pricing Study was formed to better understand the costs and pricing of transportation and outline options for future privatization options and research.

In 1993, Austroads developed a set of 29 National Performance Indicators for road systems and authorities to measure the effectiveness of road system management and objectives. The indicators include items on road safety, environment, user transactions, travel time, road maintenance, and road construction effectiveness and are used more as benchmarks, to assess performance of what has been completed rather than as indicators of what should be done. In practice, the states are responsible for providing the data; however, if the data are not forthcoming, which has often been the experience, no national database is available. The objective is that the performance against each indicator is to be published annually for public review and for comparison over time.

The Australian Industry Commission is conducting a study on international benchmarking of road provision due (at the time of the tour) by February 1998. It will evaluate the institutional frameworks and processes by which the commonwealth, state, territory, and local governments in Australia fund, provide, and manage road infrastructures as compared with international best practices.

2.2.2 Customer Review and Satisfaction Surveys

Sweden's SNRA frequently employs road user surveys to assess user priorities and satisfaction with road conditions. England's HA conducts an annual survey of highway users, which is supplemented with formal consultation and input from focus groups to understand which aspects of the road experience are most important to users, to check public opinion of its performance, and to produce another set of performance targets for the trunk road systems. National commitments are made based on performance data. Progress against these indicators is published quarterly, except for certain key indicators and financial data, which are produced daily. Some road user concerns illuminated through these methods are a great discomfort with the increasing aggressiveness of the road environment, and that most of the frustration of road delays stems from lack of information or explanation in time to avoid them.

2.2.3 Monitoring

All the countries surveyed found that turning transportation services over to the private sector has created an increased need for monitoring progress and quality. In Sweden, receiving a private road grant is conditional on maintaining it for its intended level of use. Although all recognized the value of a standardized monitoring procedure, none were entirely satisfied with their methods, and are continuing their development.

2.2.4 Cost-Benefit Analysis

The evaluation of road projects that involve central government funding is a legal requirement in New Zealand. The 1989 Transit New Zealand Act (amended) requires that government funding for public roads is to occur by way of a National Roading Programme managed by Transfund New Zealand (Transfund NZ), which is the national funding and audit entity. The purpose of the act is to identify and prioritize those projects that increase the nation's wealth. All road projects undergo cost-benefit analysis, with the intent of investing in those.

The Social Cost-Benefit Analysis is similar to financial analysis, but with a national viewpoint. It does not consider the distribution of costs and benefits on different sectors of the public, but does include externalities to the road system, such as environmental quality. Project evaluation involves the comparison of different project alternatives, including doing nothing other than maintaining the current system (called the do-minimum). Transfund NZ publishes a Project Evaluation Manual, which lists all the specifications for

analyzing the costs and benefits of all given road projects. The purpose of the Project Evaluation Manual is to

- Ensure that Project Evaluations are presented in a consistent format for ease of comparison and checking,
- Assist in the identification of costs and benefits to guide the analysis,
- Provide standard values whenever possible, and
- Provide a guide to the appropriate level of detail necessary.

Costs accounted for in the Project Evaluation Manual include project design and supervision fees, property acquisition, construction, and changes in maintenance. The primary benefits to road users included are travel time savings, road accident cost savings, vehicle operating cost savings, and comfort benefits from sealing unsealed roads.

Delays and disruption are not considered costs but rather negative benefits. Costs are calculated to reflect not only actual dollar amount but also any disruptive social and environmental effects. Projects with a cost-benefit ratio of 4:1 or better were funded for the 1997-98 year. It is estimated that at current funding levels, the cost-benefit ratio for projects in the 1998-99 fiscal year will need to be 6:1, and 7:1 for the following year. Project evaluation is most easily applied to construction or improvements, as these are discrete in extent and time, and easily seen as investment. The same concepts can be applied to maintenance and rehabilitation work, which in New Zealand make up over 60 percent of road expenditures.

Cost-benefit analysis in the United Kingdom is based on a computer program used to compare user benefits, addressing travel time, vehicle operating costs, and projected future traffic levels. It does not evaluate environmental costs. The University of Birmingham is conducting research expanding on a program used by the World Bank (HDM3) to permit project evaluation and budget planning in a broader range of environments. The aim is to develop a more generic system capable of making better comparisons with other countries.

In Sweden, a cost-benefit analysis is used to decide investment levels for individual projects and policies. Evaluation is based on overall social utility, time savings, environmental impact (including aesthetic and ecological aspects), total safety, and effect on regional balance. Performance measures are used to evaluate the success of a project and to clarify the needs for investment direction. Goals for the year 2000 are assigned a socioeconomic cost-savings value, and include efficiency, road safety, accessibility, environmental quality, and regional balance.

2.2.5 Financial Reporting

The restriction of funding has resulted in greater attention to initiatives with higher payoffs as opposed to popular or special interest projects; performance comes to be defined by efficacy according to the cost-benefit analysis. In Sweden, this target-driven investment has resulted in a focus on safety programs and fewer truck-restricted roads rather than on regular road construction. The creation of profit centers has necessitated the development of new financial reporting schemes, referred to as the operating discourse, including Profit and Loss statements and their supporting financial measurements. One sector of New Zealand's performance indicators is under the scope of Audit New Zealand (a division of Transfund NZ), which verifies the financial statements of other authorities.

2.2.6 Summary Comments

Members of the study group made the following observations regarding the development and use of performance targets:

- All the countries surveyed (and others) are moving toward the increased use of performance targets in directing and managing their transportation programs. It is clear that government reform, especially within the transportation sector, began by defining and analyzing core responsibilities, separating policy and management responsibilities from the delivery of programs and services, and gaining a better understanding of the costs involved.
- There was general agreement that moving toward the use of performance measures is a difficult process and takes at least several years.
- The separation of client and provider roles within transit organizations was noted as having produced a variety of benefits and is worthy of closer examination.
- The use of performance measures has not resulted in increased funding but in a redistribution of resources.
- There is some evidence that budgets are driving performance targets.
- A lesson learned from the reform experience is the importance of having accurate and complete baseline data before initiating substantial changes.
- Most countries are finding that their current performance measurement systems are not as adequate as they would like.
- Reform of government and transportation policies have led to increased competition among public agencies and private firms.
- There is incentive to move toward quality management techniques, especially ISO 9000, because it supports performance-based management, and because there is sufficient political and public support for these programs.

- Long-term performance agreements cannot be managed like low-bid contracts. These agreements must be created in a business environment, but the working relationship, over extended years, needs to exist under partnership principles.
- The creation of incentives has had mixed results.
- Performance goals in lieu of prescription can generate "out of the box" thinking, and progress toward outcomes.
- Business-like approach is a useful skill in this new environment, and is practiced sufficiently by engineers.
- Performance measures can become mere paperwork exercises if they are not used to manage.

2.3 Innovative Approaches for Developing and Implementing Highway Transportation Products and Services

- The Integrated Transport Policy Initiative was recently launched by the United Kingdom's new Labour Party, which holds that the key to a successful transport strategy is smooth integration of different levels of government, areas of the country, modes of transport, and operating companies. A document on integrated policy was scheduled to be released in July 1998, which examined issues of land use, alternative funding, cross-modal relationships, the best use of existing systems, and the framework of regulation and accountability. Special attention was given to issues of intermodal connections, public transit, and accessibility.
- The Dennis Agreement was adopted in 1992 by Stockholm County and 25 municipal governments as a program of comprehensive coordinated measures to improve the environment, increase accessibility, and promote regional development within the Stockholm area road and public transit infrastructure. The SNRA has overall responsibility for the roadway portions of the projects under the agreement, which will be financed through loans and state guarantees, and paid for with tolls. The largest project under the agreement is the planned construction of a ring road around central Stockholm to be constructed between 1997-2006.
- Performance of the first eight DBFO contracts in the United Kingdom has been very promising: contracts for projects that routinely ran over budget by as much as 28 percent have been shown to undercut public comparisons by an average of 15 percent. Instead of being paid by measured progress against specific goals, a DBFO company is paid on completion of the project, and is then paid to operate it for the remainder of the 30-year contract. It is expected that this arrangement will create incentives for innovation, cost-effectiveness, and foresight in construction, and that the length of the contract will permit flexibility in funding arrangements. Already a secondary market of maintenance companies is emerging to buy operations and maintenance contracts of completed works. However, government commitments to pay for these projects through shadow tolls is limiting its ability to fund new projects. There are issues concerning the use of this method to fund future projects, which may rely on actual toll financing.
- A similar BOOT arrangement was successful in Melbourne for the building of a 22-km roadway that connects three major freeways that run through the city. The project is owned by a private consortium called Transurban, which will return the road to the Melbourne City Link Authority after 34 years.

3.0 OBSERVATIONS AND CONCLUSIONS

3.1 Government Reform

Reform in government is sweeping many countries and affects the transportation sector as the process affects all aspects of government programs. The process, in different stages of resolution and varieties of form, is very much a "work in progress." Elements common to all of the countries' reform policies include:

- Defining the agency's responsibilities,
- Separating policy and management from the delivery of programs and services,
- Reducing public sector employment,
- Increasing competition (e.g., outsourcing, client [purchaser]-provider model),
- Increasing competition between traditional public agencies and private firms, and
- Linking performance measures to competition.

In addition to redefining the role of government in defining and implementing transportation policies and delivering services and programs, reform raises the following fundamental issues:

- Public Trust: Is the public interest served as well under the agencies' new roles?
- Funding Constraints: How best to cope with general reductions in public funds.
- Business Approach: Applying strategies of the private sector to the public sector.
- Long-Term Implications: What are the eventual consequences of these changes?

- Transfer of Risk: Requiring the private sector to assume risks traditionally borne by the public sector.
- Discourse on the Size of Government: Finding the appropriate extent of its roles.
- Monitoring Core Competencies in Critical Areas.
- Increased Competition.
- Competition Among Public Agencies and With Private Firms, Domestically, and Internationally.
- Adoption of International Standards of Quality.
- Importance of Accountability and Use of Performance Measures.

4.0 AUSTRALIA

4.1 General Background and Organizational Structure

Australia is a large country with a small, highly decentralized population. Most of the population resides in pockets along the coasts. For this reason, roads are essential to the health of the national economy. The sparse populations located in the interior creates problems for an efficient transportation system. Businesses that depend on just-in-time delivery systems and other efficient systems of inventory management rely heavily on roads. In addition, 88 percent of all domestic residents and 42 percent of international tourists use roadways for travel making the industry of tourism dependent on the road system as well.

Australians believe that one of the pillars of economic success is a strong national transport system. In an age in which competition has moved to a global theater, the Australians feel that their transport system must ensure that they can compete in this new global marketplace. The National Highway System (NHS) was created to link all of the state capitals, provincial areas, and national arterial roads to promote trade and commerce as efficiently as possible. More than 70 percent of Australian goods are transported by roads; thus, having a system connect all major cities allows the most cost-effective approach. Efficiency is targeted at three major goals: (1) encourage a better "modal mix" of road and rail use, (2) reduce urban congestion, and (3) implement better informed pavement and other asset preservation systems to reduce maintenance costs.

As with other counties, the Australian government has been forced to do more with less. In the transportation sector, this involved scaling back the workforce and allowing increased private sector involvement based on the belief that private sector firms operate in cheaper and more cost-effective terms. The national government and several state governments have turned to these firms in hopes of reducing expenditures while maintaining the same levels of service.

The observations reported herein are the result of the review of pertinent secondary materials, and visits to Sydney, New South Wales, and Melbourne, Victoria—the two most populous states—and to Canberra.

4.2 Roles of Government and the Private Sector in the Delivery and Maintenance of Transportation Facilities

The transportation system in Australia is based on the federal model. The NHS is controlled by the federal government with the local roads controlled by the individual states or local municipalities.

4.2.1 Federal Government and the National Highway System

The federal government, as stated above, is responsible for the national highway system. The NHS is very important to Australia because these national roads connect its urban centers. Most Australians live in the large cities and the national highways allow both native Australians and tourists to move from city to city with greater ease than ever before. The NHS is a network of approximately 18,479 km of roads and connects all Australian States and Capitals. The federal government is currently responsible for approximately one-third of all road expenditures, but that amount has been decreasing in recent years.

The NHS has been developed with three main goals in mind:

- Developing a safe and efficient transport system that meets the toughest environmental standards,
- Providing all Australians with an opportunity for reasonable access to services, and
- Implementing the system in an efficient and socially-effective manner.

The amount of traffic varies greatly on the NHS. The largest traffic appears in New South Wales, because of the urban traffic of Sydney and Canberra, which handles an average of 10,000 vehicles daily. The lowest traffic appears in the Northern Territory, which has an average daily traffic count of only 450. This huge variation is due to Australia's population distribution. More than 80 percent of road use occurs on less than 20 percent of the road network.

Reasonable access has been provided by the NHS. This is demonstrated by the fact that at least 77 percent of the population in all states and territories live within 40 km of the National Highway (see Figure 1).

The NHS was the first of the road segments to require open tender for the construction of all roads. Since 1981, all construction projects for the NHS are required to be put into the tender process and all maintenance projects since 1991 are required to do the same. Because of some loopholes, not all projects are actually put up to tender. For example, contracts less than $2 million for routine maintenance or works that need to be carried out quickly in

case of emergencies are not required to be put to tender. In 1994/95, almost 70 percent of the roadworks on the NHS were carried out by the private sector.

4.2.2 State Governments

State governments are totally responsible for construction and maintenance of all roads except the NHS and local access roads that are managed by the local governments. The states manage a network consisting of 151,867 km of roads. Historically, these governments had been paying approximately 33 percent of the entire road system cost, but this percentage has been rising and now they are paying for approximately 40 percent.

Each state government sets up its own road management system. In Victoria for example, the governing body is called VicRoads, and in New South Wales, it is called the Road and Traffic Authority (RTA). Each of these systems sets up its own partnerships, with both local governments and the private sector. These governments monitor themselves while taking the lead from the national government. Each is responsible for its own licensing system, both for drivers and vehicles, and is able to receive tolls for roads as they see fit. These state governments act as the individual states in the United States would.

Because of the nature of the various state systems, they are free to be more creative and try different approaches to road funding, planning, and construction. There has been increasing involvement by the private sector in the construction and maintenance of state roads. The most common policy is to have in-house teams provide as much work as possible and rely on the private sector to pick up whatever slack is left over. Few states allow in-house teams to directly bid against private sector firms because of the perception of impropriety. The industry does not believe that all bids are judged fairly against the in-house competition, and, for this reason, most states do not attempt such a system. Most states separate in-house units, both legally and physically, from the rest of the transportation organization to alleviate some of these concerns. More detail will provided on the provinces of New South Wales and Victoria.

4.2.3 Road and Traffic Authority of New South Wales

New South Wales has almost entirely reformed its system in the past 10 years. It has moved from a system that involved limited accountability, use of day labor, and over-employment to a system that makes better use of its resources through improved planning and implementation of Quality System Management. As the community and government have moved toward expecting more for their money and greater fiscal accountability (a sentiment mirrored in the United States), New South Wales has used more private sector resources to slim down its operations.

It has improved planning and management, used contracts to complete major projects, and implemented Quality System Management to improve results through competition in a commercial environment to get the best value for the money. While still maintaining in-house units and allowing some competition between private sector and its own teams, the private sector has been very successful in competing for contracts put to tender. It is felt that in-house teams are necessary to maintain core competencies and technical expertise. These teams are necessary in the tender process even if the work is to be performed by the private sector.

The RTA of New South Wales began contracting for maintenance of roads in 1991 with limited involvement of the private sector until 1995, when a 10-year contract paying AU$200 million was awarded to maintain roads in northern Sydney. This contract is seen as a major test case not only for the RTA, but also for others inside and outside of Australia. Many people are evaluating this contractual agreement and its results to determine whether this approach will become more widespread in the future. This performance-based contract is advantageous to the government for a number of reasons: It provides for a known amount of funding eliminating the uncertainty of the future, saves the government approximately $40-80 million, is about 30 percent less expensive than the in-house option, and also transfers the risk to the contractor for the roadway.

4.2.4 VicRoads

VicRoads is the road agency in Victoria. Included in its Corporate Plan is a strategy to increase private sector partnerships. VicRoads feels that these private partnerships are crucial to developing roads that are more efficient. Use of these private contracts may result in better quality roads for less money. All major projects in Victoria are done by private contract, and an increasing number of maintenance work and smaller projects are conducted by private firms.

VicRoads has undergone a dramatic transformation during the 1990s. In 1990-91, there was no private sector involvement in road construction or maintenance in Victoria. By 1995-96, there was near 100 percent private sector involvement in construction of roads and 65 percent involvement in the maintenance of roads. This has reduced the number of employees by 60 percent (4,300 employees). VicRoads does allow for in-house competition with the private sector firms, and it is this competition that is the root of the transformation. The in-house teams must include a minimum rate of return in their bids in order to level the playing field with the private sector. VicRoads also contracts for information technologies, plant hirings, legal services, and administrative services. This allows their bidding process to keep the private sector on more of an equal footing since so much work is contracted out to the private sector.

4.2.5 Local Governments

Local governments are typically responsible only for local access roads. These local roads make up 630,955 km of the total road network that is just over 800,000 km in length. Despite being the longest segment of roads, they receive less than one-third of the funding for all roads. The local governments retain responsibility for roads that are not maintained by the state or federal government.

Local governments have been the most reluctant to involve the private sector in construction and maintenance of roads. In 1994-95, only 25 percent of work on local roads was performed by the private sector with in-house units accounting for 70 percent of the roadworks. Much of the use of the private sector has come about because either the in-house team was occupied or special capabilities were required that the in-house team could not manage.

4.2.6 Austroads

Austroads is the national association of road, transport, and traffic authorities in Australia. Austroads is governed by a council consisting of 11 executives (or other chosen members) representing the roads and traffic authorities of Australia's six states and two territories, the Commonwealth Department of Transport and Communications, the Australian Local Government Association, and Transit New Zealand. Austroads is a central organization that promotes national uniformity and harmony and emphasizes greater efficiency of all Australian roads. It tries to avoid overlap by coordinating the different road systems.

Australia, because of its history of independent colonies, has always had a problem with uniformity. The lack of uniform road signs, safety standards, and road design has been a big problem in the development of a national highway system, and Austroads has been instrumental in developing a uniform system. It has taken the lead in developing National Performance Indicators, as the next section will explain.

4.2.7 Role of the Private Sector

As has been stated in previous sections, the private sector has an expanding role in roadworks throughout the country. The amount of involvement decreases as the focus shifts from the national level, to the state level, and to the local level. This shift is due generally to laws concerning the tendering of projects. The major factors in determining the amount of private sector involvement are the purchasing policies and practices of the different governments. The more projects that are put up for open tender, the more projects will be carried out by the private sector in the realm of roadworks.

The private sector has no official role in the financing of roadways. There have been numerous projects concerning tunnels, toll roads, and other infrastructure projects that have received no government funding, yet there is a lack of specific policies concerning private investment in infrastructure financing. The private sector performs jobs, on a national level, on a case by case basis. This has resulted in larger projects being carried out by the private sector when the public expenditure would have been too costly. The projects have taken the form of build, operate, own, and transfer (BOOT). The private firms would build, operate and own a road from which they could collect a toll and then transfer the road to the government after a specified period of time (usually 30 years). The federal government tries to avoid tolls on the NHS, so they pay the tolls rather than passing the cost on to the consumer.

One innovative project that uses a BOOT arrangement is under development in Melbourne. A roadway will connect the three major freeways that run through the city and provide greater access to their airport, central business district, and Docklands area. This 22-km road is planned to feature six electronic toll booths and a traffic management system. A 3.5-km tunnel is also being built, making it one of the longest three-lane vehicular tunnels in the world. Extensive landscaping and cut and cover construction are being used, as well as a 300-m noise reduction tube to minimize the impacts on the neighborhoods. The road should bring increased economic prosperity for the city along with reduced traffic on arterial streets. The project is owned by a private consortium called Transurban, which will return the road to the Melbourne City Link Authority after 34 years.

4.3 Use of Performance Measures

In Australia, there are two distinct reasons for using performance measures: (a) to monitor change within a single road-controlling authority and (b) to compare performance among road-controlling authorities. Many of the performance measures developed are suitable for the former but have difficulty in providing comparisons of the latter. Because of the large number of variables involved such as climate, soil type, typography, and traffic composition, performance measures can be very misleading when comparing different road controlling authorities.

"National Performance Indicators" is a publication containing information gathered by Austroads. In 1993, it developed a program to implement a set of indicators for road systems and authorities. A set of 29 nationally based indicators was developed to measure the effectiveness of road system management and investment. The performance measures were developed after consulting with key stakeholders in the transportation community. Through the end of 1996, Austroads has published data in six main areas:

- Road Safety (eight indicators);
- Environment (one);
- User Transactions (two);

- Travel Time (four);
- Road Maintenance (two); and
- Road Construction Effectiveness (two).

Each of the performance indicators is to be published yearly to allow for time-series comparisons of each of the regions. Austroads intended to publish data for 10 more areas by the end of 1997, but it has been hindered by a lack of requested data from the states.

In the future, with increased reliance on the private sector, performance indicators will become more valuable to the road-controlling authorities, in order to ensure that stakeholders are getting a sufficient return on their funds.

4.4 Summary Comments

Australia is trying to remain globally competitive as it moves into the next century. One of the backbones of this new era will be an efficient transportation system. With this increased efficiency, goods will be transported throughout the country with greater ease resulting in lower prices. In addition, the inclusion of the private sector in more roadworks will result in more competition and will force the in-house units to economize and act as efficiently as their private sector counterparts. Already, private sector involvement has reduced project costs and decreased the number of public employees. With a number of larger private sector projects running as test cases, the results are likely to determine the future viability of greater dependence on the private sector.

5.0 NEW ZEALAND

5.1 General Background and Organizational Structure

The country of New Zealand went through an astounding metamorphosis during the mid-1980s and 1990s. Before the reforms, the government had played a large role in a range of the country's functions. The New Zealand Government owned and operated approximately 12.5 percent of the nation's economy including some of the nation's largest banks, its largest automobile insurer, the largest farm-mortgage lender, the entire telecommunications industry, all wholesale electricity distribution, all the ports, the rail system, the national airline, a national shipping line, the only television channels, and a major hotel chain.

New Zealand had great wealth during the 1950s, with the third highest per-capita income in the entire world. By the 1970s, large public subsidies had begun to catch up with the nation. By the early 1980s, unemployment had reached 5 percent (when it had been virtually zero during the 1960s); New Zealand was ranked twenty-first in per-capita income; inflation had reached 15 percent; and the national budget had reached 40 percent of the gross domestic product.

Both of the country's major political parties believed in a system of active intervention in the nation's economic affairs. Extensive amounts of public subsidies, high tariffs, and a social safety net that subsidized health care, housing, and college education created a closed system, which was spending large amounts of money to keep itself running. Interest payments on national debt equaled 20 percent of overall government spending, and the nation was considered to be heading for bankruptcy.

Something needed to be done to spur the economy and reverse its worsening direction. A recovery process began when the Treasury Department issued a report titled "Economic Management," which advocated the end of direct government control and massive economic deregulation. The Government decided to pursue this direction and turned many of the public corporations into State-Owned Enterprises (SOEs). These SOEs would face market pressures, be run by an independent board of directors, and have to pay taxes but they would still be owned by the government. Nine of these SOEs came into being on Big Bang Day (April 1, 1987), and the results have been stunning. The average SOE increased revenue by 15 percent and quadrupled their profits in the first 5 years. They were also paying approximately NZ$1 billion in dividends and taxes.

These stunning results pushed for even further deregulation and though not always smooth, more privatization did occur. The SOEs began to be sold off to private companies so that even further efficiency could take place and more revenue could be raised to pay off the national debt.

By trying to manage businesses and industries throughout the country, many felt that the government had lost focus of its core responsibilities. Most of the reforms were intended to return the government to its simplest form, away from delivery and focused on policy. The adoption of the State Sector Act of 1988 and Public Finance Act of 1989 pushed the need for greater accountability of government in terms of its performance for the people. A system was created that had minimal levels of governmental employment. Their roles would be supervisory to ensure the policy that they set forth would be carried out sufficiently.

The transportation sector was another area that was due for reform. A new organizational structure was adopted, which gave the government, through the Ministry of Transport, the power to dictate policy and allowed for that execution of policy by the private sector. It was felt that this "hands-off" approach would inspire competition and innovation after years of government ownership.

The strategy of the transportation system became "building safe, sustainable transit at a reasonable cost." All policy dealing with transportation, including highways, has stemmed from this statement.

5.2 Roles of Government and the Private Sector in the Delivery and Maintenance of Transportation Facilities

New Zealand created a transportation system that allowed for certain degrees of public and private control and placed these relationships on a sliding scale. In between the areas of wholly public and wholly private are Crown Entities (CEs) and SOEs. The chart in Figure 2 represents the relationships of the four areas.

5.2.1 Public Sector—Ministry of Transport

The Ministry of Transport (MoT) is the only completely public department in the transportation sector. The size of the MoT has been greatly reduced and currently employs approximately 60 people. The role of the MoT is largely in the policy arena. It is responsible for issuing policy reports on various sectors of transportation, as well as developing any legislation deemed necessary. The MoT is responsible for making sure that the government receives, from its CEs, safe, sustainable transport at a reasonable cost.

5.2.2 Crown Entities

The government transport sector contains a number of CEs managed at arm's length through the MoT. These CEs negotiate an Annual Performance Agreement with the MoT, and are monitored against that agreement every year. A document titled "Protocols and Guidelines" illustrates the relationship between the Minister of Transport, MoT, and the CEs. Six CEs are managed as if they are private companies, having their own Board of Directors, and are responsible for efficient management as if they were a private company. Unlike private companies, they do not generate a profit nor conceive any policy, and they report directly to the Minister of Transport.

5.2.3 Transfund New Zealand

Transfund New Zealand (Transfund NZ), established in 1995, is responsible for allocating money from the National Roads Account to highway agencies and others to achieve a safe and efficient road system. The National Roads Account is made up of money collected through road user fees, a fuel excise tax, and motor vehicle registration fees. Transfund NZ is managed as a corporation and charged with dispersing these funds in as equitable a manner as possible. The strategy for funding programs comes primarily from cost-benefit ratios. Transfund NZ publishes a Project Evaluation Manual, which has all the specifications for analyzing the costs and benefits of any given road project. The costs of a project are calculated not only by its actual dollar amount, but also by its disruptive social and environmental effects. The benefits are fewer accidents, shorter travel time, and lower vehicle operating costs. These factors give each project a cost-benefit ratio, and projects with a ratio of 4:1 or better were funded for the 1997-98 fiscal year. Additional benefits are added to each project's cost-benefit ratios that add to the long-range planning done under NHS because these roads will benefit the entire country. It is estimated that at current funding levels, the cost-benefit ratio for projects in the 1998-99 fiscal year will need to be a 6:1 ratio and 7:1 for the 1999-2000 fiscal year (see Figure 3).

Transfund NZ was created to provide a clear separation of road funding from the physical planning, construction, and maintenance of roads. Transfund NZ is supposed to be neutral in that it does not favor National Highways over local roads, all of which are funded under the same criteria: to get the most benefits per cost. Another benefit of Transfund NZ is that it creates a revolving door on the National Roads Account. The money no longer has to be allocated in a national budget but can be dispersed as Transfund determines, although it is subject to an appropriations vote, and is accountable to the audit agency for expenditures.

Transfund NZ is not only responsible for funding highways and other roads: "The Transfund Board is authorized to fund outputs under the National Roads Programme that consider or develop efficient alternatives to the provision or maintenance of roading." (Transfund NZ Amendment Act, Part 1A, Section 3D). This section allows Transfund NZ to try and overcome the inherent distortions in road pricing and allows some funding for experimentation. Without this, Transfund NZ could only use its strict cost-benefit ratio, but by allowing this provision, the system becomes a little more flexible.

5.2.4 Transit New Zealand

Transit New Zealand (Transit NZ) is responsible for the safe and efficient control and management of the State Highways system throughout New Zealand. Transit NZ, being a CE established in October of 1989, acts independently in regard to establishing a State Highway System. Transit NZ is not guaranteed an operating budget for new roads as these proposals are reviewed by Transfund NZ. Each year, Transit NZ creates a list of its projects, which is then submitted to Transfund NZ for review of funding. Transfund also retains the right to alter or change any submission as it sees fit. The list of projects submitted by Transit NZ, known as the National Sate Highway Programme, competes against local roads submitted by individual states to decide which projects will be undertaken.

Transit NZ does not perform any physical construction. All work is contacted to private construction companies on a competitive bidding process. Transit NZ sets the guidelines and criteria for the roads that must be followed by the construction companies. Under this type of system, it

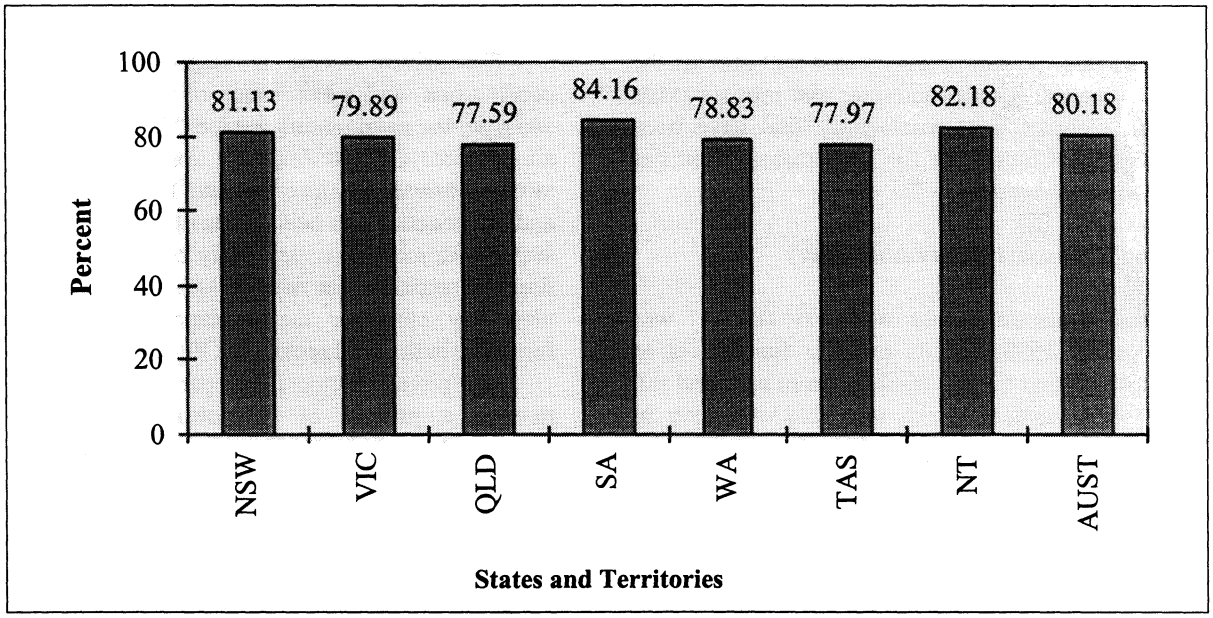

Figure 1. Percentage of Population Living Within 40 km of the National Highway (Australia).

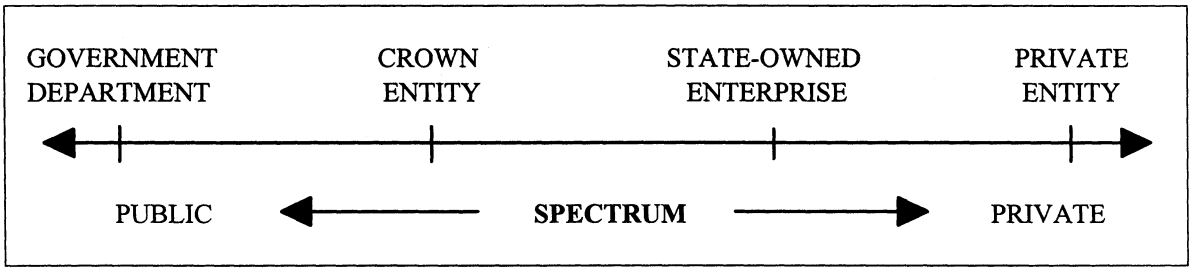

Figure 2. Relationship of the NZ transportation system.

	1996/97	1997/98	1998/99	1999/2000
Forecast Revenue (NZ$ Million)	724	763	795	827
Achievable Benefit/Cost Ratio	4.5	4.0	6.0	7.0

Figure 3. Cost-benefit ratios for selected fiscal years.

is feared that construction teams will only provide the minimums set forth by Transit NZ. Every step must be taken to ensure that the minimums created will provide the quality that is needed. Similar activities and process exists for outsourcing design and maintenance that have been deemed successful. Contracting for asset management has had less than desirable results.

5.2.5 Land Transport Safety Authority

The Land Transport Safety Authority (LTSA) was created in August 1993 and its primary function is to reduce the road toll and trauma resulting from road and rail crashes, the social cost of which was NZ$3.4 billion in 1995. Its purpose is to minimize this figure by making safer roads, rails, and drivers. The LTSA is also responsible for the management of vehicle, driver, and operator licensing and registration; publicity and education on safety matters; and collection of road user charges. The LTSA and other stand-alone safety authorities are self-funded and raise their revenue by levying direct charges on their specific transport mode. While there exists a national road fund, there is not a dedicated source fund for road safety. Currently the practice is to outsource approximately 85 percent of their activities while maintaining a staff of 400 employees. Contracts with police are difficult to evaluate and are considered unsatisfactory. The effectiveness of this model in providing a viable safety program is to be determined.

5.2.6 Others

The Civil Aviation Authority is responsible for the safety rules, licensing, standards enforcement, and aviation security service. The Maritime Safety Authority holds the same for the sea. The Transport Accident Investigation Commission is responsible for independent investigations of maritime, aviation, and rail accidents and may begin investigating certain road accidents.

5.2.7 State-Owned Enterprises

SOEs are more private than the CEs. These companies are owned by the government, are considered part of the government transport sector, and are monitored by the Crown Company Monitoring Unit. In addition, these companies are subject to the same regulations imposed on other corporations. These enterprises are allowed to generate a profit and are also managed by a Board of Directors. Some examples of current SOEs are The Meteorological Service of New Zealand, which provides weather forecasts and warnings; The Airways Corporation of New Zealand, which is responsible for air traffic control services; and Vehicle Testing New Zealand, which is responsible for vehicle testing and audit services.

5.2.8 Role of the Private Sector

The private sector is responsible for the design, construction, and maintenance of the highway system. In addition, the national rail service (Trans Rail); the national air services (Air New Zealand); and maritime services have all been privatized since the late 1980s. The deregulation and privatization has been gradually introduced in the road sector with more activities likely be more privatized in the future. Transit NZ has defined a six-phase process that will ultimately eliminate the government from the various functions in the road sector (see Figure 4).

The private sector firms compete with one another through a process of competitive pricing. There are currently 10 major contractors in New Zealand. Two of the largest contractors, Opus International Consultants and Works Civil Construction, started out as total public units, then became SOEs and were sold by the state to become completely private. Works Civil Construction was originally the Ministry of Works and Development before it was transformed into an SOE. This change has allowed more flexibility while being responsible for about one-third of all maintenance contracts awarded.

5.2.9 Tendering Procedures

There are two ways in which contracts are awarded for physical works. The first process is the Lowest Price Conforming Tender Method. This technique is used on projects priced below $50,000 and when the performance of the work is not of major consideration. In this method, all tenders are evaluated starting with the lowest bid. If the bid meets all of the requirements set forth in the Request for Tender, the bid is accepted and the remaining bids are not considered. If the lowest bid does not meet the minimums set forth in the project guidelines, the next lowest bid is examined and the procedure is repeated. This routine is repeated until a successful tender is accepted.

The other procedure that is used to award bids for physical works is called the Weighted Attribute Method. This operation is used on projects that are valued at greater than $50,000 and when the quality of the work performed will be a deciding factor. In this method, tenders are graded in different categories that are given a weight depending on how applicable it is to the project. Attributes that can be analyzed include relevant experience; track record; technical skills (personnel); resources (plants, equipment, and material); management skills; methodology; and price. Each non-price attribute is scored on a scale of 0 to 100 for each of the tenders. Any tender that receives a score of 35 or below for any attribute is removed from further consideration. For example, the score for price would be determined as follows:

$$\text{Grade} = 50 + 100 \times \frac{\text{Median Conforming Tender Price} - \text{Tender Price}}{\text{Median Conforming Tender Price}}$$

The second stage of the process involves converting the scores for each of the attributes into an index score. To determine an index score, its grade (determined in the first step) is multiplied by its allocated weight and divided by 100. The allocated weight is determined from project to project and all weights must equal 100. Figure 5 illustrates a sample scoring method.

The total score for this tender would be 74.2 and would be compared to other tenders. The highest score would be notified of receiving the project.

5.2.10 Competition

Competition is a major driving force behind the issue of privatizing. There is 100 percent competition on quality and price in the categories of maintenance, construction, and professional services. Through this competition, Transit NZ claims to realize certain benefits including innovation, flexibility, quality, contestability, and dollar savings. Competition is the driving force behind private sector involvement and is the factor that enables an efficient system. If the number of contractors starts to dwindle to only two or three, competition could suffer causing major problems in efficiency.

5.2.11 National Land Transport Strategy

In 1995, the government passed legislation that created the National Land Transport Strategy. This was created mainly for two reasons. The first was that it would provide some long-range planning into the building of roads. The strategy developed from 1996 to 1998 will guide the development of roads for the next 10 years. All 16 Regional Transport Councils, Transit NZ, Transfund NZ, The LTSA, and all other relevant agencies will have to use the guidelines set forth in this strategy. The other reason for creating the plan was to give the commercial sector some degree of certainty concerning the future.

5.2.12 Land Transport Pricing Study

The long-term goal of the transportation system of New Zealand is to have all transportation decisions based on the real costs of service. In order to have an efficient system run in a business-like manner, these costs need to be determined. This requires the cost of road use to be calculated along with the cost of public transportation. This is very difficult to ascertain, as there are many variables that can be interpreted many different ways. The Land Transport Pricing Study was formed to get a better understanding of the costs and pricing of transportation and outline options for the future in this scheme.

The study at this time has made some interesting determinations:

- The current system has road charges based on costs with little consideration of the benefits that it provides.
- Clearer implications on network properties need to be determined. For example, how does a lightly used rural road contribute to the overall network?
- Determining an accurate cost of maintenance is challenging. Economic depreciation has a limited scope of understanding and maintenance strategies are still evolving.

These are just some of the findings that the study has reported. The study lists a number of options that the transportation sector could research further. These options ranged from maintaining the status quo to commercializing the entire roading network. There were also a number of variations on the level of commercialization that could take place in the system as well. A call for responses to this study received over 13,000 responses that are being analyzed before the next step in this procedure is initiated.

5.3 Use of Performance Measures for Producing Programs and Products, and for Allocating Resources

New Zealand is very dependent on performance indicators. As the role of government is changing, there needs to be a way to readily monitor the services being provided by the CEs. Performance measures have been deemed a most efficient way to perform this monitoring. The MoT, with its limited staff, needs to be able to evaluate the different authorities to make sure that they are providing "safe, sustainable transit at a reasonable cost."

Performance measures are used by all of the authorities and track all aspects of their responsibilities. They track their expenditures, their customer service, their efficiency, and individual aspects of their functions. For example, the LTSA is judged on output classes such as policy advice, safety information and promotion, grants management, a safety audit (measuring the safety of land transport), and land transport licensing. Each class contains specific items on which they are checked and must provide a report every year. They must set out a target number each year in hopes of reaching that goal by years' end. A Strategic Plan is also created in which they show how they will be performing 5 years into the future to give additional long-term guidance. These reports and plans exist for each transport agency and are required by the Public Finance Act of 1989.

The difficulty of implementing performance measures for such evaluations lies in the varied nature of terrain and climate that exists in New Zealand. It would be inappropriate to measure the cost of a road in the mountains and compare to one located in the city, and vice versa. New Zealand is currently working on a system for translating the measures from one region to another, and to create a system, along with the Australians, by which these comparisons can be easily made and relevant.

Another sector of performance measures lies under the scope of Audit New Zealand. This authority was created to express an independent opinion on the financial statements of the various other authorities to make sure the information presented by them is authentic.

5.3.1 Cost-Benefit Ratio

All road projects are analyzed in an economic manner in New Zealand. This is done so that all considerations of costs and benefits are analyzed. Economic evaluation has been borrowed from the private sector and is a process with which they are familiar. Creating these economic cost to benefit ratios is also an effective way to justify the allocative decision. All projects are evaluated using the Project Evaluation Manual. This ensures that all projects are presented in a consistent manner for comparison and checking purposes. This also gives a guide to the amount of detail necessary and provides for standard values between projects.

The actual cost-benefit analysis allows projects to be analyzed and provides a basis for the monetary values of the consequences. The ratio is determined by dividing the public value gained by the expenditure of the road authority. All road projects must undergo this evaluation and only the projects with the highest ratios actually get built. More revenue would be required to fund projects with lower cost-benefit ratios since that would allow more projects to be funded. Currently a benefit/cost ratio of four or more is required for projects, but a score of three or more is considered optimal.

5.4 Summary Comments

The reformation that has begun and still is taking place in New Zealand has attracted interest from many countries of the world. Many countries are trying to eliminate peripheral functions while maintaining their core functions. New Zealand has become a leader in shedding these other duties. Its reformation process was highly organized and had the necessary leadership to undertake the task. The continuing process is being monitored by representatives from many countries interested in the separation of transportation policy from the delivery of services and programs in transportation. It remains an experiment in reform with lessons of interest to many.

The government of South Africa has indicated an interest in how a form of privatization in transportation, similar to New Zealand's model, could revitalize its system. Some of the government officials have visited New Zealand to assess its transportation system first-hand.

6.0 SWEDEN

6.1 General Background and Organizational Structure

Sweden's transportation system serves a variety of geographic conditions. There are densely-populated cities to the south, while the northern half of the country is forested and mountainous. Much of Stockholm, which is home to one-fifth of the population, consists of islands connected by bridges and ferries, and Göteborg has a significant water taxi service on its extensive canal system. Winter varies in length and severity, but cold-start emissions and road closures during the spring thaw are ongoing problems.

The overall costs of government in Sweden exploded between 1950 and 1990, due to expansion of services and the entrenchment of certain bureaucratic inefficiencies. Economic recession and entry into the EU spurred a minor economic upheaval in Sweden in the late 1980s and early 1990s, prompting review of bureaucratic structures and a streamlining of taxation and services. Parliament took action to make the public sector more efficient and more reliant on the private sector. Local government was consolidated recently from over 2,500 entities to 280 and again to 210, with further reductions planned. The Swedish National Road Administration (SNRA) has undergone similar restructuring in response to cost-reduction and efficiency considerations. So far organizational changes and competition appear to have both reduced costs and improved service, but it is not known whether these efficiencies can be sustained long-term.

The Swedish road network consists of state and county roads, which are funded by the SNRA; municipal roads, funded locally; and private roads (usually local access) which may be entitled to local grants (see Figure 6).

In 1996, 90 percent of passenger travel was by road, 80 percent by car. Nearly 60 percent of Swedes have drivers' licenses, and gas prices are around US$4.20 per gallon. Despite annual investment of over SEK 15 billion (US$1.9 billion) in improvements and maintenance, there are ongoing problems with winter road closures and roads and bridges too weak for heavy vehicles such as lumber trucks, which are important to the Swedish economy. As industry begins to use more efficient just-in-time inventory systems, reliable transport becomes critical.

6.2 Transportation Program and Investment Levels

Sweden considers investment in communication and transportation an important part of its long-term policy for welfare and durable economic growth. Its traffic policy goals can be summarized as "ensuring that citizens, industry and commerce in all parts of the country are to be offered a satisfactory, safe and environmentally compatible transport service at the lowest possible socio-economic cost." Transportation options are evaluated by their overall efficiency and impact on quality of life, not just their expediency.

There are four levels of government to deal with in relation to transportation issues: municipal, regional

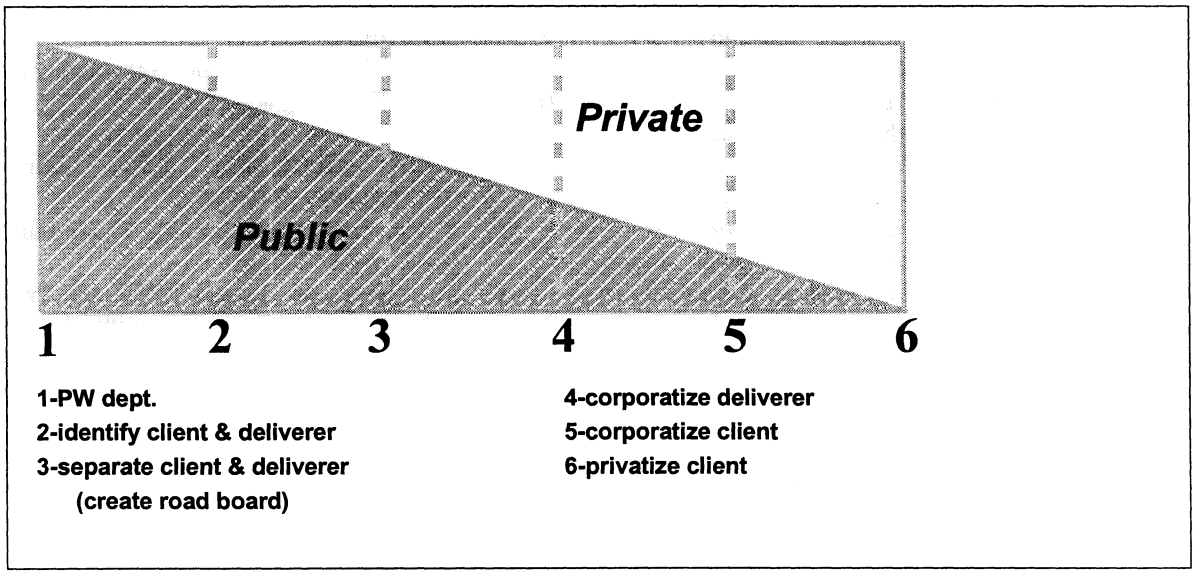

Figure 4. Phases of road reform (New Zealand).

Attribute	Weight	Grade	Index
Relevant Experience	10	100	10
Track Record	10	87	8.7
Technical Skills	25	62	15.5
Management Skills	20	75	15
Methodology	15	100	15
Price	20	50	10
TOTALS	100		74.2

Figure 5. Sample scoring method (New Zealand).

The Swedish Road Network and Distribution of Traffic

	Trunk Roads	County Roads	Other Nat'l Roads	Municipal Roads	Private Roads	
Length (km)	8,000	83,400	6,600	38,900	74,000	210,000
% traffic	32%	27%	11%	26%	3%	1%
funding sources	state	state	state	municipal	private/state	private

source: Vägverket, 1996. "Annual Report."

Figure 6. Swedish road network and distribution of traffic.

(county), state, and recently the EU, which coordinates international transit and freight systems, and sets limits on emissions. State agencies serve many functions including research, road design, statistics collection, and policy formation, although their construction, operation, and maintenance functions tend to be performed by regional offices or outsourced. In 1978, transit authorities were consolidated at the county level (there are 24 counties) to plan, finance, and procure public transportation service, fares, passenger information, and marketing, including all modes, local and regional (bus, train, boat, supplementary services). Municipal governments may own and administrate their own ports or transit systems, and usually have significant sway in decisions regarding the expression of transit projects in the landscape. The current trend is for the state to focus less on specific projects and more on policy formation.

Fuel and value-added taxes go directly to the general fund, which apportions funds to the SNRA and other agencies. The counties are generally responsible for provision of social services such as education, health care, and public housing, and collect an additional income tax (the national income tax is very small). Public transit is supported by both state agencies and county administration.

The SNRA has identified these priorities in relation to its transportation policy:

- Additional highway capacity, and improved bearing capacity of rural roads;
- Improved public transit, especially in urban areas, primarily funded at the local level;
- Improved environmental performance;
- Improved bearing capacity for freight transport;
- Reducing winter road closures due to spring thaw, which significantly impact the lumber industry; and
- Improved regional balance of services.

6.3 Respective Roles of Government and the Private Sector in the Delivery and Maintenance of Transportation Facilities

6.3.1 SNRA (Swedish National Road Administration, or Vägverket)

The SNRA is controlled by Parliament through the Ministry of Communication and has approximately 7,000 employees. There are seven regional offices for road construction and maintenance, and a central planning and financing office. The SNRA has overall responsibility for road safety, environmental impact, and the availability, accessibility, and efficiency of the entire national road system. It also supports the development of infrastructure in other modes of transportation (such as regional airports); compiles transportation statistics; manages vehicle and driver licensure and registration; and engages in the more applied areas of transportation research. In the late 1980s, along with other government agencies, the SNRA went through a significant restructuring that sought to reduce costs by opening its construction and operations contracts to more direct competition.

The SNRA 1996 expenditures are roughly as follows (total budget: US$2.1 billion):

- SNRA management 1.5-2 million SEK (US$190,000 - 260,000)
- SNRA direct responsibility 15-20 million SEK (US$1.9-2.6 million)
- Road Transport System Public and Private 150-200 million SEK (US$19-26 million)

The profit centers include not only production, maintenance, and operations functions, but also the Training and Development Center, Consulting, and Traffic Data.

The SNRA, established in 1841, has, since 1967, functioned as a technically oriented road construction and maintenance organization, and includes planning and services for many modes of transportation. Eventually it came to encompass comprehensive planning, design, construction, and maintenance of public roads; road safety authority; licensing; and operation of ferries. Operations were also contracted out to state, municipal, and private firms, although train and ferry operation stayed national. Under this system, many companies, both public and private, enjoyed long-standing contracts that did little to encourage cost-consciousness. Within the agency, purchasing and service provision roles were not adequately separated. These concessions were terminated on the agency's restructuring in 1989, and opened to purchase through competitive tendering.

These changes were the result of a review of the agency's management overall. A 1986 review found that its traditional system of planned management resulted in low productivity. The management system itself was reviewed in the spring of 1988 in comparison to new techniques of management-by-objectives. Reviewers found that the old system made poor use of opportunities in cases of foreseeable expenses and that it counted on amelioration potentials for capitalization, productivity, and cash management.

In 1988, the SNRA Director General published *Väginsären*, a strategy document applying new management-by-objectives techniques to the administration, which recommended the following:

- Separating the purchasing and selling roles within the administration,
- Improving the performance evaluation of contractors,
- Achieving goal-oriented accounting, and
- Placing road users at the center of activities and involving them in the planning and evaluation processes.

As of January 1, 1996, the production resources for road management (construction, consulting, and ferry services) were transferred to a separate, revenue-generating division within the SNRA and into direct competition with private firms. The SNRA regional construction offices are also in competition with each other, and foreign firms are expected to compete for contracts as well. Part of the reason that production and operations were not entirely outsourced is to provide sufficient competition for the private firms, which quickly merged into three large companies. Private companies have always been readily available to compete for planning, design, and construction after procurement (most residential roads are privately constructed and maintained), and the SNRA's construction organization has always handled its in-house tenders in the same manner as external tender, based on actual costs and the best technology. The production division is very competitive; so far only 15 percent of their invoicing is internal or 85 percent are not self-generated contracts, but were billed to private road maintenance, municipalities, and other SNRA offices.

County Transit Authorities now have contracting arrangements using a variety of combinations of private, state, and local companies. 60 percent of bus services are now competitively procured, with typical cost savings of 10 to 20 percent in rural areas, and 20 to 30 percent in cities. There are two basic models for competitive procurement: the county may invite tenders for all the county's services for a period of several years, or the county may be divided geographically, with separate tenders occurring on a staggered time frame. Local authorities can borrow for selected improvements on exceptionally slow terms; 40 years is considered a normal payback period.

The SNRA's corporate operations cover the SOEs it administers, including those that finance projects and those that do external commercial business. Some of these operations are specific to particular projects, locations, or agreements. AB Väginvest is the SNRA's investment company, and carries out financing, holding, and consulting functions relating to finance, costing, and auditing. In April 1995, at the request of the SNRA, the government temporarily took over management of the state's shares in Väginvest. Pricing for 1996 amounted to SEK 4.0 million (US$0.5 million), with a profit of SEK 2.6 million (US$0.34 million), including SEK 2.0 million (US$0.26 million) in dividends from SweRoad. SweRoad provides consulting services outside Sweden in the area of road administration, road management, and road safety.

6.3.2 Private Firms

As maintenance has been slowly outsourced, preliminary findings indicate improved performance and customer satisfaction. Contractors are not necessarily ISO 9000 certified but must submit quality assurance, quality control, and environmental plans, and are held to strict standards and regulations. Operations contracts are typically 5 to 10 years in length, and bidding companies are required by law to rehire all current employees at their previous benefit levels for at least a year. These constraints thus tend to reduce wages and lengthen the workweek for drivers, although it should be noted that Sweden has one of Europe's shortest workweeks. There is some concern that these savings cannot be sustained.

Some of the difficulties associated with bidding out maintenance work have been

- Major difficulties in measuring conditions before and after,
- Establishing methods to review the work performed by the contractor, and
- Concerns about sufficient competition because of the small number of major contractors.

After beginning privatization, large contract bidding caused smaller private construction, maintenance, and operations firms to quickly consolidate into a few large firms through mergers and acquisitions. The three major firms are Skanska, NCC, and PEAB. It was decided that the production division of the SNRA would remain open to prevent the formation of oligopoly and to protect necessary but less profitable projects in rural areas from being ignored or gouged. The regional SNRA offices are also to compete with each other.

6.3.3 KFB (Swedish Transport and Communications Research Board)

The KFB engages in the more theoretical aspects of communications and transportation research. It does so through grants issued mainly to universities and other institutions of higher education, and also to public research institutes, private foundations, consultants, non-profit organizations, and municipalities. It may commission research within specific areas. Its official areas of research include

- Strategic communications research: mobility, sustainability, internationalization, technological changes, rules and regulations, and planning models.
- Telematics/Information technology: also deals with legal issues arising from the use of telecommunications and the deregulation of the telemarket.
- Physical transports: traffic and building construction, energy and environmental issues, creating and improving a foundation for public transport, and problems relating to sparsely populated areas.
- Vehicles and fuel: biobased, electric, and hybrid fuel systems.

Specific areas of research include projects related to trucking to improve the competitiveness of Swedish industry; the use of communications technology for both planners and drivers to exploit road information to maximize travel efficiency; the need for compliance with EU environmental regulation; the conflict of transit needs and preserving buildings and satisfying aesthetic and historical values; the influence of global trends on travel patterns; and the effects of legal systems of regulation. KFB considers the study of traffic flow theory particularly urgent and pays special attention to basic logistics, optimization, and simulations studies. It also acts as co-financier, usually for major projects, and has an overall responsibility for information and publications relating to its research.

6.3.4 Local Authorities

Sweden's 24 counties are headed by popularly elected councils, and are responsible for most public services (health care, child and elder care, non-university education, utilities, and housing), which are financed through an income tax. Regional transportation administration for all modes was consolidated to a single authority for each of the 24 counties in 1978. All local authorities and counties are members of SK (Swedish Association of Local Authorities).

6.3.5 User Groups

User groups such as the Swedish Road Federation are generally supportive of government programs, but believe that more of use fees should be returned to the roads (currently one-fourth of the US$2.65 /gallon tax goes to roads).

6.4 Use of Performance Measures for Producing Programs and Products, and for Allocating Resources

Transportation infrastructure is also considered a means to promote balanced regional growth. Receiving a private road grant is conditional on maintaining it for its intended use, and maintenance is monitored. Grants are also awarded for other fixed infrastructures, such as the improvement of regional airports and harbors.

A cost-benefit analysis is used to decide investment levels in individual projects and policies. Criteria used to evaluate investment include timesavings, environmental impact (including aesthetics), total safety, and effect on regional balance. Stockholm uses a chart of "risk events," which included frequency predictions of major events.

Performance measures are mostly used to evaluate the success of a project and to clarify need to direct investment. Current goals for the year 2000 are assigned a cost/savings value that reflects specific goals relating to efficiency, road safety, environmental quality, regional balance, road management, road capital, and productivity. Vägverket also frequently employs road user surveys regarding user satisfaction with road condition.

It is considered vital to have clear and rigorous performance standards and enforcement set by municipalities, including those relating to environmental and aesthetic concerns. It is also considered essential to have a clear division of responsibility among planning, marketing and procurement. In the process of restructuring under privatization, the management process has been carefully screened for unintended incentives for inefficiency, and administrations are expected to look across modal boundaries for the most efficient overall provision of services.

6.5 Intergovernmental and Intermodal Relationships in Organizational Structure and Program Delivery

Sweden's railroads, airlines, and ports are still publicly owned and operated. The 10 major airports are owned by state aviation agencies and also operate as profit centers. The ports and harbors are owned by municipalities and operated as profit centers. Smaller airports are owned and operated by municipalities, and some are subsidized in accordance with policies to balance regional growth. The extensive ferry system is operated by the SNRA. There are no plans for privatizing the infrastructure of these modes, although there are plans to open commuter rail operation to competition in 2000 by leasing out individual lines. Private companies may maintain concession rights to extract tolls for bridges.

Passenger rail is important to long-distance travel. A high-speed rail line operates at 200 to 250 km/h between Stockholm and Gottebörg, and other lines are planned for the future. Half of all freight in Sweden is moved by rail.

In Stockholm, 70 percent of peak-hour traffic is on public transportation, and about 90 percent in the central business district. A $50 monthly pass allows unlimited ridership. The SNRA believes the best way to encourage the use of public transit is to improve its responsiveness to travelers' needs, and part of its mission is to design the overall transport system to the efficient use of society's resources (including travelers' time). Rural areas may employ on-demand services such as taxis. Special transit services for the elderly and handicapped are provided by the regional government. For example, up to 90 percent of taxi service was bought by government in lieu of buses for areas of low volume and services for the mobility impaired.

6.6 Innovative Approaches for Developing and Implementing Highway Programs

The Dennis Agreement was adopted in 1992 by the Stockholm county and municipal governments as a program of comprehensive, coordinated measures to improve the environment, increase accessibility, and

promote regional development within the Stockholm road and public transit infrastructure. The SNRA has overall responsibility for the roadway portions of the projects under the agreement, which will be financed through loans and state guarantees, and paid for with tolls.

The largest project under the Dennis Agreement is the planned construction of a ring road around central Stockholm to be constructed between 1997 and 2006. The SEK 14-billion (US$1.8 billion) project will link existing sections of roadway and construct 14 new km (approximately 40 km total), with more than 12 km underground in tunnels. Several existing interchanges have been redesigned and will be moved underground to restore the continuity of the cityscape at street level. The project poses a number of technical design challenges because it passes through different soil conditions, links several islands, and is mostly below the water table. The project is very thoroughly designed for legibility and safety, and also for aesthetic betterment of the city and the roadway itself. It is projected that the introduction of the bypass will reduce surface traffic through the central district by 20 percent by 2005, even though vehicle miles are projected to increase 10 to 20 percent, and improve safety above for pedestrians, cyclists, and buses. The project, if implemented, could be financed solely or in part through tolls collected at entrance ramps.

6.7 Related Topics

6.7.1 Road Safety

Sweden has defined road safety as a public health issue of national importance (health care is nationalized). Legislation includes mandatory rear seat belts and a blood alcohol limit of 0.02 (the U.S. limit varies between 0.08 and 0.10 by state). The SNRA's current safety campaign is Vision Zero; it aims to eliminate road fatalities and serious injury accidents. A priority is improving safety for pedestrians, bicycles, and mopeds.

Sweden has no highway patrol; all policing is local. Predictably, speeding is a problem, and efforts to improve safety are frequently frustrated because they permit people to drive faster. Safety research and development in SNRA and KFB includes improvements in road and vehicle design, perceptual traffic calming and techniques in motivating the public to change its driving habits. Traffic Safety Director Claes Tingvall has developed a graphic and analytical approach to crash reduction and is working on a 20-mi test project for safer two-lane roads.

6.7.2 Air Quality

The Swedish Road Federation reports that nitrogen oxide levels are lower than the levels in the other major European countries (other than Iceland) and decreasing, despite continued increases in vehicle miles driven. It also reports that most of the oxides are blown into Sweden from the continent, and that more oxides originate outside Sweden than are blown out of the country. The Swedish EPA's average winter limit for permissible nitrogen oxide levels is half the full year average permitted in the United States, yet Swedish levels in 1993 did not even approach 50 percent of their limit. Most of the decrease is due to introduction of catalytic converters and to otherwise more efficient vehicles. Vehicle emissions have declined enough that only horizontal/longitudinal ventilation will be used in a 4-km tunnel in the Stockholm ring road project, permitting a great reduction in tunnel costs.

Bilindustriföreningen, or BIL (the Association of Swedish Auto Manufacturers and Wholesalers) reports the results of scenarios indicating that both nitrogen oxide and carbon dioxide levels will continue to fall through 2020, and that the strongest determinant of how much they will decrease is the replacement of older vehicles and the presence of market incentives to do so (although it also considers the effects of proposed investments in public transport and development of biofuels).

6.7.3 Environmental Concerns

Environmental goals include not only emissions and noise control but also treating water runoff from roads, reducing the use of salt in winter, reducing noise pollution, and improving aesthetics. Warming stations have been installed in park-and-ride lots to reduce time, gas consumption, and emissions when starting one's car in winter.

6.7.4 ITS and Road Design

Swedish researchers at KFB are doing significant research into ITS systems, and have installed 600 temperature sensors to provide input on road conditions. There is a test track to research safer two-lane rural roads. Stockholm's ring road, soon to begin construction, incorporates many aspects of advanced highway design. Tunnel walls and surfaces are designed for visual stimulation (to decrease fatigue and aid orientation) and acoustic dampening. Some of the new interchanges will actually be suspended traffic circles, which save space without stopping traffic. The "Stockholm guard rail" is designed to reduce rollovers. Interchanges will be landscaped, and the ventilation towers will be architecturally designed glass and steel structures.

6.8 Summary Comments

Privatization has resulted in some savings while still delivering very high-quality services, but there are concerns that it may not be sustainable. The Swedish experience (so far) is that competitive tendering offers advantages and disadvantages. Public subsidies have been eliminated at the

national level, yet service quality has improved and operating costs declined.

Discernible trends so far include the following:

- There have been significant short run cost reductions due to a clear focus on cost containment and the sale of capital resources to outsourcing, but it is not clear that this advantage can be sustained.
- Strict adherence to quality measures and contract management are required to maintain characteristically high service standards. All areas are closely regulated.
- Planning of both policy and projects is extremely comprehensive and long-range, and subject to continual research and review. Human and aesthetic costs are considered as well as monetary.
- There is a clear tendency for large private operators to grow and smaller ones to be absorbed or go out of business, creating potential oligopoly.
- Contrary to other sectors of the Swedish economy, the length of the workweek has increased for transit workers as a result of cost-cutting measures.
- Major private companies (including foreign firms) have won major contracts, but have also lost to publicly owned companies, and neither sector seems to have a definite advantage.
- One concern is that there will be less training of future transportation professionals in the pared-down system.
- It seems prudent to operate publicly owned firms as profit centers rather than entirely outsourcing, to retain previous human and capital investments.

Future plans to 2002 include further decentralization, with county councils responsible for more infrastructure provision while the state focuses on research and policy development.

7.0 UNITED KINGDOM

7.1 General Background and Organizational Structure

Roads administration in the United Kingdom has recently undergone significant change at all levels. Major government reform initiatives have been passed to improve efficiency, responsiveness, and effectiveness by applying private sector management techniques to the public sector. The public sector itself has been encouraged to take on some of the risks in constructing, financing, and operating public works. TQM-style quality assurance methods have refocused attention on the road user's needs and wants. Performance targets have been formulated and a list of indicators published to assess progress toward those goals. Particular attention has been given to separating the initiators and providers of services and projects.

Next Steps Agencies have emerged in response to the 1988 Ibbs report, "Improving Management in Government: the Next Steps," to restructure bureaucratic control in a more responsive way. Over 100 agencies were created as units with clearly defined functions focused on the effective delivery of policies and services, and have a chief executive directly accountable to the Ministers. The HA was formed from the former Highways, Safety and Traffic (HST) command of the Department of Transport. The HA is using privatization, market testing, and outsourcing to make delivery of services subject to greater competition.

Most publicly held industries have been privatized since 1979, including British Steel, Airways, Telecom, Aerospace, and Gas. Several important industries are still publicly owned, including the railroads, coal mining, shipbuilding, and some utilities. Less government involvement generally is expected in the wake of the election of the Labor government in May. It should be emphasized that the visit to London occurred shortly after the election and while the new government was being formed. Therefore, it was difficult to surmise what the new policies might be, only what the most recent trends have been.

7.2 Transportation Program and Investment Levels

The stated aim for road transport is to provide an efficient, reliable, safe, and environmentally acceptable network that provides value for money for the taxpayer.

Over the last 40 years, passenger traffic by all modes has tripled, and while the car now accounts for 79 percent of all personal mileage, passenger rail travel has stayed the same, and coach and bus travel has declined. In the same period the volume of freight traffic more than doubled, so that 90 percent of passengers and overland freight go by road. Between 1982-1992, total road traffic grew 44 percent, doubling on motorways. Road demand is expected to increase. Reliability of the road system is of growing importance to industry and distribution systems as they have adopted just-in-time delivery schedules, and the increased number of heavy vehicles has also required a reassessment of all road bridges, some of which are centuries old, designed for horse and cart. Although total vehicle miles traveled is increasing by 4 percent a year, what is being done to increase capacity is being done by the private sector.

Although the national trunk road network, including motorways, represents only 4 percent of the total road network, it carries one-third of all traffic, and more than one-half of all heavy truck traffic. The trunk roads are funded directly by the central government, and administered by the HA in England, and by the Departments of State in Scotland, Wales, and Northern Ireland. Scotland, Wales, and Northern Ireland are

administered through separate Offices, each headed by a Secretary of State. The Offices are responsible for most domestic policy matters of their regions, with the exception of taxation, defense and international relations. For example, Scotland has a different legal system (based on Roman-French law), national church, education system, and judiciary.

Local roads are funded by a combination of local taxation and central government grants. Fuel and vehicle excise taxes are part of the general revenue and not specifically tied to road expenditures. All roads are free of charge to motorists, with the exception of some estuarial crossings, although it is expected that tolls will be charged on some motorways when it becomes possible to collect them electronically. The electronically administered tolls may be used to direct the flow of traffic with variable rates.

The Secretary of State for Wales has made improvement in road communications a priority, and invested in improvements at twice the rate of other parts of the United Kingdom. That Wales has attracted 20 percent of inward investment in the United Kingdom in recent years although it represents only 6 percent of the population attests to the soundness of this investment priority (McCowbrey 414).

7.3 Respective Roles of Government and the Private Sector in the Delivery and Maintenance of Transportation Facilities

7.3.1 National Government

The Secretary of State for Transport represents the United Kingdom in international relations relating to all modes of transport, introduces safety legislation to Parliament, regulates the road haulage industry, and is responsible for the testing and licensing of vehicles and drivers throughout the United Kingdom.

In 1997, the Department of Transport merged with the Department of the Environment to form the Department of the Environment, Transport and the Regions (DETR). In April 1994, responsibility for the construction and maintenance of the trunk roads in England was transferred from the Department of Transport to the HA, one of the newly created Next Steps Agencies established to be more flexible and responsive to public need and investment. In Northern Ireland, Scotland, and Wales, responsibility for the trunk roads lies with their respective Secretaries of State, though they are under review to determine whether a similar arrangement would be appropriate.

7.3.2 Highways Agency

The Secretary of State's aim is that the HA "secures the delivery of an efficient, safe and environmentally acceptable trunk road network." The HA's vision is that "The Highways Agency will be respected for excellence and environmental sensitivity in managing and developing our valuable national road network." Its key objectives are (1) serving the needs of road users (looking primarily at needs within 5 years, but also up to 20); (2) protecting the environment (including both emissions and aesthetic impact); (3) serving the taxpayer by involving private investment in public infrastructure, and (4) serving the public by improving communications through the Road Users' Committee, surveys, and an information line. It also engages in some research, mostly relating to needs assessment, future trends, and improvements in road services.

The HA was set up in April 1994 to manage England's 6,500 mi of trunk roads and motorways (main interurban routes) which carry more than 50 percent of lorry journeys. The network is currently worth £50 billion and the HA's emphasis is on efficiency in the maintenance and management of the system. The HA has 10 regional offices and employs nearly 1,700 staff, and has performed well, consistently delivering 95 percent of plan targets in addition to cutting costs.

The HA is a client agency of DETR through the Central Transport Group. To become a Next Steps agency it had to evaluate itself: whether its services were still necessary, if its functions would be better provided by the government, privately or outsourced, and whether it is structured to be an effective government agency. It was decided that it is best maintained as a government entity, but changes in policy were made to allow charging for the network and reinvestment. There has been little change in the scope of its contracting out; most was already done by the private sector.

New cost management schemes require frequent checks for financial authorization. Final decisions regarding the division of responsibility are set in the HA's Framework Document, a formal document agreement with the Secretary of State, Secretary of the Treasury, and the Office of Public Services. The Central Department has retained the capacity to advise the Ministers on policy, the size and shape of program, scheme entry, priorities, and statutory matters. Executive work on network management, maintenance, and delivery of programs lies within set parameters of cost and time. The Secretary of State makes decisions at standard approval stages: program entry, preferred route, statutory decision on orders, and the start of works.

7.3.3 Central Department

In accordance with the Ibbs report, the department's task is to set a framework for the job, specifying policies, objectives, required results and resources, and to develop performance indicators, but not to interfere in operational details, which are to be left to the executive agency.

7.3.4 Secretary of State

The creation of executive agencies does not change the normal accountability of the Secretary of State and

Ministers to Parliament, but operational responsibilities are to be transferred to the chief executive of the agency, who is personally accountable to the Secretary of State for its performance. The Secretary of State retains responsibility for overall government transport policy, policy on the trunk roads in England, and for determining the strategic framework within which the agency is to operate. The Secretary of State is supported by junior ministers, department officials through the Highways Agency Advisory Board (HAAB) and its subcommittee the National Road Schemes Committee (NRSC), and in day-to-day matters by the National Roads Policy Directorate (NRPD).

7.3.5 Highways Agency Advisory Board

The HAAB supports the Permanent Secretary in advising the Secretary of State. It meets quarterly and is chaired by the Permanent Secretary and consists of the Chief Executive, Agency Board members and CTG representatives. Two non-executive (private) members were appointed last year.

7.3.6 National Roads Policy Directorate

The NRPD provides the overview of policy options for national roads policy and manages the interface between the Central Department and the HA on a day-to-day basis. It acts as the client for the HA, supported by Government Offices in the regions, which act as local clients.

7.3.7 Technical Advisors Group

This professional association provides a coordinated and comprehensive service to local and Central Government and its agencies. Members are generally the Chief Officers directly responsible to their Councils for technical services, and have a variety of professional backgrounds relating to planning and management. Its aims are to improve its own members and services, work cooperatively with other professionals, and to influence government, national, and international bodies.

7.3.8 Initiatives from the New (Labour) Government

The Labour Party, elected May 1, 1997, is undertaking a formal review of five major areas that have implications for transportation and the HA: (1) an Integrated Transport Policy, (2) Trunks Roads Review, (3) Comprehensive Spending Review, (4) Regional Development Agencies and (5) a Greater London Authority. A White Paper setting out national strategy was to be published in spring 1998.

7.3.9 Local Government

Local administration generally has two tiers: region or county, and district. For large metropolitan areas they are combined. The main link between local and national government in England is the Department of the Environment, which is responsible for national policy on land use planning.

Outside of large metropolitan areas, the County Councils are the local HA for all local roads, including public highways but excluding the trunk roads and motorways. Arrangements in Northern Ireland, Scotland, and Wales are similar, connecting to the central government through their Secretaries of State. Local authorities may act as agents of the Secretaries of State for the maintenance of trunk roads in their areas, and some District councils act as agents to the County council in some aspect of service delivery to local roads. Priorities for road expenditure are determined by the highway authority based on specified appraisal techniques. The department of transport encourages bidding for grant support of transport measures that include public transport and other modes as a package with road improvements.

Proposals have been made to replace the two-tier local governments with one-tier systems in order to reduce waste, reduce confusion about responsibility, and facilitate strategic planning. An independent commission has reviewed the roles of local authorities and restructuring is to be implemented in 1997.

7.3.10 The Private Sector

Since the Private Finance Initiative, a closer partnership with the private sector has involved the transfer of construction and financial risk through increased use of design-and-build contracts and private finance. These arrangements give the private sector much more freedom to determine the most effective way to complete a project and give incentives for sound construction, because they will be responsible (and liable) for maintaining it. Previously, the private sector had little influence in the design of a project, and contractors were paid by measured progress against specific goals.

When choosing contractors for new roadworks, the project is divided into three phases: predesign, design, and construction. Contracts are awarded by a "two-envelope" process. Without looking at the bid prices, contractors are evaluated and ranked by merit, and firms other than the first choice are given a percentage rating: a 10 percent rating indicates that the second choice will only be awarded the contract if its bid is at least 10 percent lower than the first choice, etc. Then the bids are opened and the contacts awarded on how they compare to the rankings. Maintenance contracts are awarded for sections of the trunk road system, and the contractor is required to meet certain performance criteria with lump sum bids.

Eight projects have been completed under DBFO (design-build-finance-operate) contracts, which so far appears to be a successful contractual option. In DBFO contracts, the contractor arranges financing and builds the

project, then operates and maintains it for a specified period of time, usually 30 years. The contractor is paid a lump sum when the project is opened for use and then receives income from the tolls for the remainder of the contract. The tolling mechanism used is "shadow tolls" where the contractor/operator is compensated by the government on the basis of the traffic volume rather than collecting fees directly from the motorist. Responsibility for maintenance encourages sound construction, and the contractor is given extra input into the design phase to encourage innovation. DBFO contracts are to be awarded on the basis of value for money, subject to the following specifications:

- Use of whole-life costing methods (under development), which includes accounting for maintenance and construction delays;
- Use of planning conferences to discuss road improvement options;
- Use of safety audits at several stages of the design process;
- Use of quality assurance techniques to British or European standards (increasingly required of contractors and consultants); and
- Use of service agreements between parts of government organization, in order to clarify their relationship and responsibilities where contracts are inappropriate.

7.3.11 User Groups

Several highway user groups complained that the government was collecting highway taxes several times higher than their highway investments. Their opinion is that the government isn't investing adequately in transportation and is unresponsive to their views. The groups would like policies to conform more to how people choose to live.

7.4 Use of Performance Measures for Producing Programs and Products, and for Allocating Resources

An annual Business Plan contains performance indicators and a program of projects for the national trunk roadways. The previous government leadership conducted multiyear policy and program reviews, which led to a "framework document," including objectives and performance indicators. The new Labour government has initiated "inquiries" at national, departmental, and agency levels regarding analytical work and consultation with the public. The current program budget has been reduced and agency direction is unclear.

The Citizen's Charter of 1991 was adopted to improve the responsiveness and accountability of public services. Performance indicators are set up to reflect each local authority's goals, and published. Authorities are awarded Charter Marks in recognition of service achievements. Similarly, as outlined in *Sustainable Development, the UK Strategy,* environmental impact assessments are now required and published for all significant projects. It is suggested that similar indicator schedules could be helpful in comparing performance with that of other countries.

In response to the Citizen's Charter, the Audit Commission drew up a list of Suggested Indicative Performance Measures/Indicators, covering

- Context (7 indicators);
- New road works (6 indicators);
- Road maintenance works (10 indicators);
- Bridge works (3 indicators);
- Winter maintenance (3 indicators);
- Environmental activity (5 indicators):
- Street lighting (3 indicators); and
- Traffic (5 indicators).

Target levels are specific to each local authority.

The HA makes an annual survey of highway users, which is supplemented with formal consultation and input from focus groups to produce another set of performance targets for the trunk road system. Progress against these indicators is reported and published quarterly, except for certain key indicators that are produced daily along with financial data. Some of the indicators proposed by users are as follows:

- Reduce fatalities by one-third by 2000;
- Provide clear information and directional signs;
- Start salting roads 2 hours before snow or ice is expected;
- Award major maintenance contracts on a lane rental basis;
- Provide emergency phones on motorways every 1.5 km, test every 4 weeks, and repair within 4 hours of reported failure; and
- Reply to letters within 15 working days.

Other indicators include measures of congestion, noise, residual pavement life, and skid resistance. Current conditions are displayed by route segment, and this information is used in gaining public support for improvements, and in programming projects for the trunk road system. Recent budget cuts have necessitated a reduction in the lump sum for maintenance and a corresponding change in the performance targets.

Cost-Benefit Analysis is based on the COBA computer program, and is used to compare user benefits, addressing travel time, accidents, vehicle operating costs, and projected future traffic levels. It cannot evaluate environmental costs. The developing world has used Total Transport Costs techniques through the World Bank's HDM3 and the United Kingdom Transport Research Lab's RTIM. The University of Birmingham is conducting research expanding on HDM3 to permit project evaluation and budget planning in a broader range of environments.

Lane Rental contracts have been used since 1984 to minimize traffic congestion due to roadworks by charging rent for each lane closed to traffic during maintenance. The rates are determined by the time of day.

The National Road Maintenance Condition Survey (NRMCS) was instigated in 1977 as an annual visual survey of road and footway defects according to specified indices, and has been used to prioritize repairs, and monitor conditions and maintenance.

7.5 Intergovernmental and Intermodal Relationships in Organizational Structure and Program Delivery

Government sets the framework within which public transport can contribute to an efficient transport system by providing financial support for rail services and other forms of urban transport. The Department of Transport encourages bidding for grant support of transport measures that include public transport and other modes as a package with road improvements.

The Department of Transport represents the United Kingdom in international relations relating to all modes of transport. Nearly all motorways, and one-third of the remaining trunk roads are part of the Trans-European Road Network, which connects to the Continent and to Northern Ireland and the Irish Republic via the European Sea Routes. The recently completed Channel Tunnel was built without public funds by a consortium of five British and five French contractors.

Airports are publicly owned, frequently by regional or municipal groups. Air and road freight has much increased. There is a feeling that they are not making the best use of their extensive existing rail infrastructure.

7.5.1 Public Transportation

There was limited opportunity to discuss the impact of the reform process on public transportation; however, the visit to Manchester provided information on the experience of one area. The city officials firmly believe that high quality public transit is required for travel to and from the major activity centers of the region. There was a commitment of the leadership of the various government units to work together for a viable transport system.

The public transportation system was deregulated in 1986. Previously it had been a highly regulated and subsidized bus system. After deregulation entry into the provision of transit service required only an operating license which took six weeks to process. The result was mass confusion—fares and schedules varied by each service provider with the customers at their mercy. On good lines there were up to 75 different operators competing while on less viable lines there were none. Ridership declined 30% while fares increased 30 percent and service worsened. It also led to several large nationwide monopolies among the companies that have survived intensified competition and mergers. Gradually the many licensed service providers began to collapse or merge to five or six providers with a return to more predictable, reliable service and fare structure.

The development of a light rail (tram) system has been a major success in creating a more viable public transportation system for the greater Manchester area consisting of light rail, heavy rail, and bus transit. The Manchester Regional Council is taking the decentralization message to heart by expanding its transit systems on its own initiative, with funds from a mix of national, international, and private sources. They have installed a light rail line, Metrolink, and plan to nearly triple its size in the next 10 years, linking to nearby cities and the airport. The Manchester Airport has met or exceeded its capacity, and plans to add a second runway. There are plans to complete a ring road when funds are available. The improvement of infrastructure is part of a strategy to promote regional development.

The first phase of Manchester's light rail system (tram), Metrolink, opened in 1992, and has become very successful. Its 19 mi of track served 13.4 million people in 1996, double the number that were served on the former heavy rail lines. 65 percent of Metrolink passengers have a car that they could otherwise have used, and traffic on parallel roads has decreased 6 percent while nearby traffic has generally increased. Nearly 20 percent of riders drive to the stations. The £145 million project was paid for with grants from the European Regional Development Fund (£13 m.), the European Investment Bank (£15 m.), the Department of Transport (£48 m.), the GMPTA (£69 m.), and a £5 m. concession fee from the operator. The entire project was constructed in 2 years under a DBOM contract with a three-firm consortium (GEC, Mowlem, and AMEC). Expansion plans propose to nearly triple the track length in the next 10 years, extending to Rochdale and the airport.

The use of private contractors to operate the Metrolink has led to various operating tactics that have increased user satisfaction and better use of the rail equipment. Recent operations have shown an increase from 21 vehicles entering the city to 30 vehicles at a reduced operating cost and increased customer satisfaction. Various tactics to increase the ridership include new pricing strategies to encourage short, local journeys. The formal franchise agreement with the operators is for a 7-year term. The priority at present is the need to generate increased utilization since the subsidy is declining.

Manchester Airport is publicly owned, with 55 percent of its shares owned by the Manchester City Council, and the other 45 percent split equally among the other nine Districts of Greater Manchester. Over the last 10 years, it has paid over £69 million in dividends to local authority shareholders, and has set up a £100,000 Community Trust Fund to support environmental projects in the areas surrounding the airport. The Airport puts significant effort

into environmental and physical enhancements, limits hours of operation and sets strict noise and pollution limits. It enjoys an unusual degree of public support and is seen as vital in supporting the region's economic growth. The Airport is currently operating over capacity, at 45 scheduled operations an hour, and 40 new flights a week added in 1996. It plans to add a second runway for £172 million, along with £520 Million in capital investments, without any taxpayer assistance.

7.6 Innovative Programs for Developing and Implementing Highway Programs

7.6.1 Integrated Transport Policy Initiative

An initiative of the new Labour Government considers integration of different modes and operators, different levels of government, and different areas of the country to be the key to a successful transport strategy (Deputy Prime Minister John Prescott). A document on integrated policy is to be published in July 1998, with inputs solicited from authorities from agencies throughout the United Kingdom. This consultation will examine issues of land use, alternative funding, cross-modal relationships, making the best use of the existing systems, and the framework of regulation and accountability. Special attention is given to issues of intermodal connections, public transit, and accessibility.

The highway authorities must consider the interests of a number of stakeholders they have identified in formulating their policies:

- Parliament (and other government agencies);
- All road users (private, business, cyclists, handicapped);
- Members of the public affected by road use (e.g., neighbors);
- Service providers (private contractors and consultants); and
- Professional institutions (engineering, etc.).

7.6.2 DBFO (Design, Build, Finance, and Operate) Contracts

The performance of the first eight DBFO contracts has so far been very promising: contracts that routinely ran over budget by as much as 28 percent have been shown to undercut public sector comparisons by an average of 15 percent. Instead of being paid by measured progress against specific goals, a DBFO company is paid 80 percent of the construction price when the project is opened for public use and the other 20 percent on completion, and then is paid to operate the roadwork through tolls for the remainder of its 30-year contract. Currently these are "shadow tolls" exacted from a general fund instead of directly from motorists, and are linked to the performance of the roadwork. The tolls are based on the level of use and are reduced when lanes are closed for maintenance.

Under a DBFO contract, a company not only builds a roadwork but is responsible for maintaining it for 30 years, creating an incentive for sound design and construction. The company is given more influence in the design of the work but also has the responsibility for financing construction, since it will not be paid until the work is usable, and in tolls thereafter. It is expected that this arrangement will create incentives for innovation, cost-effectiveness, and foresight in design and construction, and that the length of the contract will permit flexibility in funding arrangements. There have, however, been problems with shadow tolls putting a significant burden on future budgets.

7.7 Related Topics

7.7.1 Road Safety

The United Kingdom government has set a target of reducing road casualties by one-third compared to the average from 1981-1985 by the year 2000. This is to be accomplished through investment in road improvements, legislation to promote safer vehicles and driving, and more effective enforcement.

7.7.2 Public Liability

In Northern Ireland in the mid-1980s, "tripping" claims (personal injury claims) against public transit agencies increased and become a significant financial drain. Claims losses were halved through (1) improved construction and maintenance, (2) a coordinated and aggressive claims defense, (3) publicity of successful claims defenses to discourage future fraudulent claims, and (4) targeting maintenance to those areas with the greatest claims potential.

7.7.3 Research

There is a need to develop an overall efficiency indicator based on total transport costs in order to facilitate comparison between whole or parts of networks, including foreign networks. Also there is a need for a general cost-benefit analysis to assess the relative benefits of new projects and maintenance of existing roads. It is not yet possible to quantify the environmental impact of increased travel, the effects of the Trans-European Road Network, or new technologies.

7.7.4 Environmental Quality

The United Kingdom has summed up its commitment to environmental quality in *Sustainable Development—the*

UK Strategy that sets out a framework for all administrations, and includes techniques for environmental appraisal. Environmental impact assessments are now required of all major road schemes.

7.8 Summary Observations

During the time period of the scanning tour visit to London and the HA, there had been a recent change in the leadership of the national government. As a result, the new government was in the process of reviewing transportation policies and programs. Therefore a discussion on the Framework Document was considered to be delayed for about 1 year. Recent indications suggest that the trend toward government reform in transportation matters will continue with perhaps increased emphasis on integrated transport policy and programs. This includes increasing competition and private sector involvement in all aspects of highway transportation.

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8.0 BIBLIOGRAPHY

8.1 Cited References

--. 1997. Study tour notes from Mike Walton, Gene Ofstead, Clyde E. Pyers, working groups 1, 2, 3.

Austroads. 1997. *The Involvement of National Governments in the Funding and Provision of Roads: A Report on a Survey of Twelve National Governments.*

DRI/McGraw-Hill, for US Department of Transportation. 1994. *International Institutional Decision-Making Criteria & Procedures & Transportation Infrastructure Data - Phase I.* Lexington, MA. August 1994.

The Economist Intelligence Unit. 1996. "E.I.U.: The World in figures: Countries." *The Economist: The World in 1997.* London, UK. 1996. p. 83-90.

FHWA. 1994. *FHWA Study Tour for European Intermodal Programs: Planning, Policy and Technology.* Federal Highway Administration, USDOT. September, 1994. Publication No. FHWA-PL-94-038 HPI-10/9-94(3M)E.

FHWA. 1997. *FHWA Study Tour for European Traffic Monitoring Programs and Technologies.* Federal Highway Administration, USDOT. Washington DC. August, 1997. Publication # FHWA-PL-97-032 HPI-10/9-97 (1.2M)E.

FHWA. 1996. *FHWA Study Tour for Highway/Commercial Vehicle Interaction.* Federal Highway Administration, USDOT. September 1996. Publication # FHWA-PL-96-027 HPI-10/11-96(1M)E.

Industry Commission (Australia). 1997. *Scoping Paper: International benchmarking of road provision.* Melbourne, Australia, 1997.

Lockwood, Steve. 1997. *Institutional Change for 21st Century Transportation Infrastructure Services (Deaft: 1/7/97).* Transportation Research Board. Washington DC, 1997.

Lockwood, Steve. 1995. "Public-Private Partnerships in US Highway Finance: ISTEA and Beyond." *Transportation Quarterly.* Lansdowne, VA. Winter, 1995.

Organisation for Economic Co-operation and Development, Scientific Expert Group IR7. 1997. *Performance Indicators for the Road Sector (Final Draft).* Paris, France. 164 pps.

Poister, Theodore H. 1997. *Performance Measurement in State Departments of Transportation: A Synthesis of Highway Practice.* Washington DC National Research Council Transportation Research Board, 1997.

--. 1997. "When Home is a prison." *The Economist,* Finance and Economics. June 14, 1997. p. 86.

--. 1990. "Public-Private Partnerships in Transportation, Executive Summary." *A Policy Development Conference, November 14-15, 1990, San Francisco, CA.* California Engineering Foundation. Sacramento, CA. 1990.

AUSTRALIA

Austroads. 1996. *National Performance Indicators 1996.*

Austroads. 1997. *Road Facts '96.*

Bureau of Transport and Communications Economics. *The Length of the Land: Australia's National Highway.*

Commonwealth Department of Transport and Regional Development. 1997. *Corporate Statement: May 1997.*

Department of Transport and Regional Development, Australia. 1997. *Competition in the Supply of Roadworks to Government.*

Douglas, Miranda. 1995. *Question I: Performance Management of Road Administrations.* XXth World Road Congress, Montreal, Canada.

Dunlop, Dr. R J, and J H van Barneveld. 1997. *Road Performance Indicators in Australia.* Presented at Transport Research Board, Washington D.C.

Kneeson, Doug and David Berry eds. 1997. *Australia at the Crossroads: Roads in the Community- A Summary.*

Roads and Traffic Authority of New South Wales. 1996. *Annual Report 1996.*

Sydney Operations. 1997. *Contract Maintenance on Sydney's State Roads.*

VicRoads. 1994. *The Hume: Building a National Highway Across Victoria.*

VicRoads. 1996. *Improved Business Performance Through Effective Use of Information Technology.*

VicRoads. *Linking Victoria: Victoria's Rural Arterial Road Networking Strategy.*

VicRoads, Minister for Roads and Ports. 1995. *Corporate Plan 1995 to 1998 and Strategic Business Plan 1995/1996.*

VicRoads. 1995. *Safety First: Victoria's Road Safety Strategy 1995-2000.*

VicRoads. 1997. *Traffic and Road Use Management: Program Strategies 1997-98.*

VicRoads. 1996. *VicRoads' Annual Report 1995-1996.*

Works Consultancy Services. 1995. *Momentum.* Wellington, NZ. September/October 1995.

NEW ZEALAND

Department of Transport and Regional Development, Australia. 1997. *Issues in Private Sector Involvement In New Infrastructure Provision: Update of April 1997.*

Dunlop, Dr. R.J., and J.H. van Barneveld. *Road Performance Indicators in Australasia.* Transport Research Board. Washington DC. 1997.

Knight, Fiona. 1995. *Question 1: Performance Management of the Roads Administration in New Zealand.* XXth World Congress, Montreal.

Land Transport Safety Authority. *Annual Report 1995-1996.*

Land Transport Safety Authority. 1996. *Statement of Intent 1996-1997.*

Land Transport Safety Authority. 1997. *Strategic Plan: 1997-2001.*

Ministry of Transport. *Corporate Plan 1996-1997.*

Ministry of Transport. 1996. *Government Transport Sector Overview 1996.*

Ministry of Transport. 1997. *Options for the Future: Land Transport Pricing Study: Discussion Document.*

Ministry of Transport. 1996. *Report of the Ministry of Transport For the Year Ended 30 June 1996.*

Ministry of Transport. 1995. *Transport Reform in New Zealand.*

Osborne, David and Peter Plastrik. 1997. *Banishing Bureaucracy: The Five Strategies for Reinventing Government.*

Toleman, Roger. 1997. *Transport Policy In a Market Economy: The New Zealand Experience.*

New Zealand. *Corporate Profile.*

Transfund New Zealand. 1997. *Competitive Pricing Procedures Manual volume 1: Physical Works and Professional Services.* Wellington, NZ. March 1997.

Transfund New Zealand. *Corporate Profile.*

Transfund New Zealand. 1997. *Briefing Notes: Transfund New Zealand Project Evaluation Methodology.*

Transfund New Zealand. 1996. *Statement of Intent 1996-1997.*

Transit New Zealand. 1996. *Annual Report 1995-1996.*

Transit New Zealand. *Corporate Profile.*

Transit New Zealand. *Statement of Intent 96-97.*

--. 1997. "Privatization Key to Transport Revamp." *Business Day.* April 24, 1997: 14-15.

SWEDEN

Gillerman, Brian F., and Greg Pates. 1994. *Bicycling and walking in the nineties and beyond:Applying Scandinavian experience to America's challenges.* Federal Highway Administration, US Department of Transportation. Washington DC. November, 1994. Publication # FHWA-PL-95-007 HPI-10/1-95 (5M) E.

Johnsson, Berth. 1995. *Question I: Performance Management of Road Administration, Sweden.* Swedish National Road Administration. XXth World Road Congress, Montreal, Canada p. 387-408.

KFB (Swedish Transport and Communications Research Board). 1996. *KFB: An introduction.* Stockholm, Sweden. 1996.

KFB. 1995. *KFB Projection.* Stockholm, Sweden. 1995.

SI Information Service. 1996. *General Facts on Sweden.* Sweden, http://www.sweden.nw.dc.us/sweden/Genfact.html

Swedish Road Federation. 1996. *The air we breathe.* Stockholm, Sweden. October, 1996.

Vägverket (Swedish National Road Administration). 1996. *Annual Report.* Borlänge, Sweden.

Vägverket (SNRA). 1996. *Environmental Report.* Borlänge, Sweden.

Vägverket (SNRA). 1997. *Facts on the Swedish National Road Administration, Roads, and Traffic.* Börlange, Sweden. 1997.

Vägverket (SNRA). 1996. *Road Traffic Safety Report.* Borlänge, Sweden.

Vägverket (SNRA). 1996. ---. Borlänge, Sweden.

Vägverket (SNRA), Stockholm Region. 1996. *The Stockholm Ring Road.* Stockholm, Sweden, 1996.

--. 1997?. *Competitive Tendering in Sweden.*

http:/www.smorgasbord.se/sweden.

http:/www.sweden.nw.dc.us/sweden/genfact.html

UNITED KINGDOM

Blair, Tony. 1996. "Investors should welcome labour." *The Economist: The World in 1997.* London, UK. 1996, p. 51.

Department of the Environment, Transport and the Regions, et al. 1997. *Developing an Integrated Transport policy: An Invitation to Contribute.* London, UK. August, 1997.

Greater Manchester Passenger Transport Authority (GMPTA) and Association of Greater Manchester Authorities (AGMA). 1997. *On Track for 2002: a vision for an integrated transport system for Greater Manchester.* Manchester, UK. 1997.

Hayward, Mike. 1997. *Presentation to Local Government Technical Advisers Group.* Government Office for the North West. September, 1997.

Highways Agency. 1997. *Business Plan 1997/98.* London, UK. 1997.

Highways Agency. 1997. *Condition of Contract for Term Contract.* London, UK. January, 1997.

Highways Agency. 1997. *Framework Document.* London, UK April 1994.

Highways Agency. 1997. *Implementation News: Final Staff Structures, Special Edition 7.* London, UK. May 1997.

Highways Agency. 1997. *Intergovernmental and Intermodal Relationship in Organisational Structure and Programme Delivery.* London, UK. September 1997.

Highways Agency. 1996. *The Organisastion and Staffing Needs of the Highways Agency: A Review.* London, UK. March 1996.

Highways Agency. 1995. *Network Performance Indicators* (slides). London, UK. August 1995.

Highways Agency. date? *Programmes, Resources, Priorities.* London, UK.

Highways Agency. 1997. *A Route Management Strategy.* London, UK. 1997.

Highways Agency , Private Finance Panel. 1997. *DBFO - Value in roads: A case study on the first eight DBFO road contracts and their development.* London, UK, 1997.

Kaletesky, Anatole. 1996. "Sterling's coming crisis". *The Economist: The World in 1997.* London, UK. 1996, p. 44-45.

King, Anthony. 1996. "Bland Blair, Bland Britain." *The Economist: The World in 1997.* London, UK. 1996, p. 43-44.

McCoubrey, William, et al. 1995. *Performance Management of Road Administrations: "We are committed to serving our customers."* XXth World Road Congress, Montreal, Canada. p. 409-428.

Reina, Peter. 1994. "After 99 months' work Channel Tunnel prepares for trains". *ENR*, Cover story: World Projects. May 2, 1994, p. 22-26.

SDG Research, for Highways Agency. *Road User Satisfaction Study: Report.* London, UK. May 1995.

Schriener, Judy. 1994. "Toll Roads: E-470 goes to higher court." *ENR*, November 7, 1994 p. 14.
Technical Advisers Group. 1997. *An Introduction to TAG.*

US Department of State Bureau of Public Affairs. 1995. *Background Notes: United Kingdom, November 1995.* Washington DC gopher://gopher.state.gov:70/00ftp

--. 1994. "Europe's dash for the future". *The Economist*, August 13, 1994 p. 13-14.

--. 1994. "European Union: Back to the drawing-board". *The Economist*, September 10, 1994 p. 21-23.

8.2 Bibliography

Sproles, Max. 1997. *Scan Tour Notes.* August 25-September 5 1997.
Pyers, Clyde E. 1997. *Scan Tour Notes.* August 25-September 5 1997.
Ofstead, Gene. 1997. *Scan Tour Notes.* August 25-September 5 1997.
Walton, C. Michael. 1997. *Scan Tour Notes.* August 25-September 5 1997.
--. 1997. *Scan tour Notes: Working Groups 1, 2 &3.* August 25-September 5 1997.

Austroads. 1997. *The Involvement of National Governments in the Funding and Provision of Roads: A Report on a Survey of Twelve National Governments.*
Twelve countries (including Australia, New Zealand, Sweden, the UK and the US) were surveyed by questionnaire regarding 1) the level of involvement of the national government in funding and providing roads, 2) the purpose of their involvement, 3) data on their road systems, 4) their methods of funding public roads, 5) the revenue from road use charges, and 6) private sector involvement in the provision of roads. The purpose of the survey is to provide the Austroads committee with input and a basis of comparison to other countries' practices. The report doesn't much venture into analysis but does provide a good comparative overview of national roads spending and procurement.

Berthier, Jean. 1997. "Organization of the Road Sector" *Routes/Roads.* No. 295, July 1997. P. 5-20.
Survey of trends in PIARC-member countries regarding funding, contract prioritization, user responsiveness and organization. In French and English.

Central Intelligence Agency (CIA, US). 1997. *World Fact Book* (online).
General information and statistics for all nations on the tour.

DRI/McGraw-Hill, for US Department of Transportation. 1994. *International Institutional Decision-Making Criteria & Procedures & Transportation Infrastructure Data - Phase I.* Lexington, MA. August 1994
International comparison of transportation financing and development strategy in the United Kingdom, Germany, Australia, Japan, Mexico, Canada, the European Union and Argentina. Covers context, objectives, revenue and funding sources, roles of the public and private sector, and land use issues in each government, and notes common trends.

The Economist Intelligence Unit. 1996. "E.I.U.: The World in figures: Countries." *The Economist: The World in 1997.* London, UK. 1996. p. 83-90.
Very brief economic profiles of each country, with current ('96) statistics and projections for 1997.

Gillerman, Brian F., and Greg Pates. 1994. *Bicycling & Walking in the nineties and beyond: Applying Scandinavian experience to America's challenges.* Prepared for the FHWA, Washington DC. November 1994. Publication No. FHWA-PL-95-007 HPI-10/1-95 (5M) E.

Overview of efforts in Denmark, Norway, Sweden and Finland to accommodate bicycle and foot traffic, especially in urban areas.

Federal Highway Administration (FHWA). 1997. *International Programs: Advancing US and Global Transportation.* Washington DC. 1997. Publication No. FHWA-PL-98-006 HPI-10/11-97(8M)EW.

Description of FHWA international programs relating to technology exchange, technical assistance and cooperative projects, the promotion of US road technologies and coordinating US and International Road activities.

Lockwood, Steve. 1997. *Institutional Change for 21st Century Transportation Infrastructure Services (Draft: 1/7/97).* Washington DC, Transportation Research Board, 1997.

Outline of 10 main points relating to the change in transportation institutions' internal organization and approach to infrastructure in light of changes in politics, economics and transportation needs.

Organisation for Economic Co-operation and Development (OECD), Scientific Expert Group IR7. 1997. *Performance Indicators for the Road Sector (Final Draft).* Paris, France. 1997.

Results of research by fourteen member countries, the World Bank, PIARC/WRA and AASHTO to develop a set of road sector performance indicators as part of a broadened scope of self-examination. Their stated objectives are to 1) survey member countries' assessment practices, 2) develop a parsimonious set of performance indicators, 3) suggest a refinement process of these objectives, and 4) provide a basis to track and compare countries' performance. The indicators are intended to be applied widely to evaluate the most important aspects of road planning and identify which measures will have the greatest desirable impact. The report emphasizes the interrelation of these indicators and includes a process for their refinement over time. It identifies forty primary and thirty-five secondary indicators covering the concerns of the government, administration and road-using public. The indicators are also intended to evaluate the achievement goals and objectives and develop new performance targets and courses of action, as well as assess the efficiency and effectiveness of the road administration. Includes charts and comparative road system descriptions by country.

Poister, Theodore H. 1997. *Performance measurement in State Departments of Transportation: A synthesis of Highway Practice.* Washington DC, National Research Council Transportation Research Board, 1997.

Discussion and survey of performance measures within the US in relation to construction, maintenance, safety, public transportation, rail, water, air, road and intermodal transport. Includes brief survey of programs in Oregon, Pennsylvania, Minnesota and Florida.

Talvitie, Annie P. *International Experiences in Restructuring the Road Sector (abstract).* Prepared for the Annual Meeting of the Transportation Research Board. January 1996.

Outlines five stages or plateaus that roadworks agencies seem to follow as they develop over time. They appear to be progressive, built on cumulative experience, and cannot be skipped. The stages are:

1) The establishment of a traditional construction and maintenance organization;
2) Identification of client and producer functions; expansion of regulatory framework; emergence of policy and environment concerns;
3) Separation of client and producer organizations; emphasis on efficiency; introduction of the Road Board;
4) Corporatization or privatization of the producer organization and establishment of an autonomous (client) road administration; installation of the Road Fund;
5) Corporatization of the (client) road administration or agency.

Individual countries' experiences are rarely referenced in the abstract.

US Department of State. 1997. Background Notes. gopher://gopher.state.gov

General statistics and information on all nations on the tour.

--. 1997. "When home is a prison." *The Economist*, Finance and Economics page, June 14, 1997. p. 86.

Andrew Oswald at Warwick University (UK) finds a positive correlation between national homeownership and unemployment rates and attributes this to selling costs and labor immobility. He suggests that encouraging a healthy rental sector may be preferable to subsidizing mortgages.

AUSTRALIA

Austroads. 1996. *National Performance Indicators 1996.*

This document publishes a list of performance indicators for the national highway system of Australia. The report covers the indicators first covered in 1995 and expands upon those eleven to cover eight more. The breakdown is as follows: road safety (8 indicators), environment (1), user transactions (2), travel time (4), road maintenance (2), road construction effectiveness (2). The report is very exhaustive and contains many charts and tables for easy comparison between time and/or different states within Australia. A description of all current and proposed performance indicators is included as well. The appendix contains descriptions and methodologies for all indicators.

Austroads. 1997. *Road Facts '96.*

This report is and overview of Australia's road system and its use. "Austroads is the Australian association of road transport and traffic authorities whose mission is to pursue the effective management and safe use of roads - as part of the Australian transport system and through development and promotion of uniform practices - and to provide professional advice and support to ministerial councils and national

bodies." This is a statistical look at the Australian roading system. Topics covered include: road use, road system, environment, road safety, vehicles and drivers, travel and fuel and finances. The last two sections include comparisons, first between states and then on an international level.

Austroads. *Work Plan 1996-97.*

The Work Plan for the upcoming fiscal year is described. A description of Austroads is included along with a listing of all of the various programs that will be performed.

Bureau of Transport and Communications Economics. 1996. *Report 92: Traffic Congestion and Road User Charges in Australian Capital Cities.*

This ninety-nine page report analyzes the traffic patterns in the capital cities of Australia using various models.

Commonwealth Department of Transport and Regional Development. 1997. *Corporate Statement: May 1997.*

This department is responsible for overseeing the different branches of transportation. These various departments include land transport, maritime, aviation, corporate and regional development. Their purpose is to promote economic and social development by enhancing Australia's infrastructure performance. They have main critical success factors which are promoting integration of transport and regional development, promoting safe transport solutions, providing a framework for competition between and within transport modes and promoting accessibility, sustainability and environmental responsibility. Within each of those four sections various ways to track their progress are listed. The goals of each department (listed above) are also displayed in the "Program Outlines" pull-out.

Douglas, Miranda. 1995. *Question I: Performance Management of Road Administrations.* XXth World Road Congress, Montreal, Canada.

This article summarizes some of the strengths and weaknesses of the Australian road system. Australia is undergoing a structural reform process to make themselves more competitive in the global market. Road transport uses seventy-two percent of all roading resources that demonstrates the priority that roads are given. The major difficulty cited is the ability to maintain the lightly constructed system when demand is increasing over all of it. Austroads is developing a national performance model that will asses the efficiency of its road systems in comparison to key objectives set forth by stockholders. In the future, through the use of new technology and increased efficiency, Australia should become an increasing player in the world economy.

Dunlop, Dr. R J, and J H van Barneveld. 1997. *Road Performance Indicators in Australia.* Presented at Transport Research Board, Washington D.C.

This article looks at road performance indicators as used in Australia and attempts to translate them for New Zealand. Performance indicators are a way of ensuring a certain level of service in roads if they are well developed. The challenge, as seen in this paper, is to develop measures that can compare different controlling authorities. Once transit has become privatized, which is the eventual goal of New Zealand, then performance indicators become the main vehicle for ensuring the private sector is doing its intended job. This article looks at both the Australian and New Zealand systems of benchmarking and highlights the strengths and weaknesses of each. The conclusions include a list of good performance measures to be used by the road controlling authority and the fact that these measures should be used as it will bring a benefit to shareholders and help focus and shape managers' accountability.

Kneeson, Doug and David Berry eds. 1997. *Australia at the Crossroads: Roads in the Community- A Summary.*

This is a summary of two previous works contracted by Austroads. They were independent reviews and were titled *Roads in the Community- Are They Doing Their Job?* and *Roads Serving the Community- Towards Better Practice.* These were done by Australians outside the public realm to provide more independence in thought and observations. The report covers many bases including, "What People Are Saying" which looks at polls to find out what people say that they want and, "What People Are Doing" which looks at the way that they actually use the roads. Other chapters are included on managing roads, planning roads, and doing things efficiently. There is a lot of information in each chapter and being as broad based as it is, very informative.

Roads and Traffic Authority of New South Wales. 1996. *Annual Report 1996.*

This document covers the year that ended on June 30, 1996 and contains various information about the New South Wales Roads and Traffic Authority. The mission of this Authority is to "manage road related transport infrastructure and provide safe efficient access to the road network for the people of New South Wales." Subjects covered include: highlights of the past year, performance trends, the year ahead, road network infrastructure, road safety and traffic management, research and development and financial statements. The appendix contains a listing of major work projects as well as organizational information.

VicRoads, Minister for Roads and Ports. 1995. *Corporate Plan 1995 to 1998 and Strategic Business Plan 1995/1996.*

This document contains the key issues and directions for VicRoads through 1998. Among the key issues is a goal to increase private sector partnership. Included is a chart that shows private sector involvement through 1995 and their monetarial goals through 1998. They state that they will "continue to seek opportunities for private sector involvement in service delivery where there are benefits to the community." The Strategic Business Plan is included in the appendix.

VicRoads. 1994. *The Hume: Building a National Highway Across Victoria.*

This booklet, produced by VicRoads Corporate and Public Relations, highlights the building of the Hume, a National Highway connecting Australia's two largest cities, Melbourne and Sydney. It describes how vital the highway is in terms of freight, trucking and tourism. More freight passes on this road per day than any other Australian road. Advertisements for various construction companies who have built the Hume are included.

VicRoads. 1996. ***Improved Business Performance Through Effective Use of Information Technology.***

This manual shows the different forms of technology that are used and the various ways this technology is applied. It shows goal dates for achieving for various programs and how this new technology is improving efficiency and service delivery.

VicRoads. ***Linking Victoria: Victoria's Rural Arterial Road Networking Strategy.***

Linking Victoria is a strategy for managing Victoria's rural freeways, highways, main roads and tourist roads. This plan tries to provide a rural road system that is relevant to user needs and affordable. This system tries to balance economic, social, safety and environmental objectives to create a strategy that satisfies road users, industry and local communities. One of the key initiatives of this program was to develop a uniform sign system for all of the roads that will make users aware of the function and condition of the road. This report is broken down into six key issues and shows the strategy used to develop the plan.

VicRoads. 1995. ***Safety First: Victoria's Road Safety Strategy 1995-2000.***

Safety First is a plan to make road travel in Victoria safer. The primary aim is to reduce the incidence, severity and cost to the community of road crashes. The priority issues addressed are drink-driving, speeding, fatigue, restraint wearing, road design and quality, drivers in high-risk age groups, motorcycle, bicycle and pedestrian safety, heavy vehicle crashes, drugs and driving and occupant protection. The report looks at each of these items and presents data on the issue and an approach to combating the problem. The last section contains information on management and co-ordination between Victorian groups to show responsibility for each area.

VicRoads. 1997. ***Traffic and Road Use Management: Program Strategies 1997-98.***

This is one of the four core sections of VicRoads and is responsible for facilitating the operation of the arterial road network for all users. This report highlights the key programs and initiatives for the coming year. They include improving traffic flow, pro-active incident management, traffic information services, passenger transport priority, road freight efficiency and business efficiency. Each of those sections is broken down with specific projects and states its objective, priority actions, target outputs and benefits.

VicRoads. 1996. ***VicRoads' Annual Report 1995-1996.***

"The Roads Authority is a Victorian statutory Authority operating under the registered business name of 'VicRoads.'" VicRoads is Victoria's road and traffic agency responsible for managing the State's declared road system. There are four core activities within VicRoads: Road Safety, Registration and Licensing, Road System Management and Traffic and Road Use Management. This annual report breaks down each of those sections using charts and text to describe how each goal was achieved. There are also sections on business efficiency, corporate structure, and finances.

NEW ZEALAND

Department of Transport and Regional Development, Australia. 1997. ***Issues in Private Sector Involvement In New Infrastructure Provision: Update of April 1997.***

This paper is an update of an earlier version (March 1996) which uses the experience gained by Australia in the past year. The main focus is on private sector involvement in new infrastructure provisions. This paper examines both sides of the issue to show the advantages and disadvantages associated with each school of thinking.

It suggests looking at the larger scope of the highway system rather than as individual projects. The issue of assigning the risk of the project is also explored in the paper.

If the decision is between private sector involvement and no project at all, the potential drawbacks and issues to decide are covered in this paper. There is also a list of recommendations and individual state policies concerning private sector involvement that are located in the appendix.

Dunlop, Dr. R.J., and J.H. van Barneveld. 1997. ***Road Performance Indicators in Australasia.*** **Transport Research Board. Washington DC. 1997.**

Brief summary of experiences in the use of performance management in New Zealand and Australia.

Knight, Fiona. 1995. ***Question 1: Performance Management of the Roads Administration in New Zealand.*** **XXth World Congress, Montreal.**

This was written in 1995, when the road administration was slightly different due to the lack of Transfund NZ to carry out the funding process. This paper does however still have most of the major tenants to the administration of New Zealand's highway administration. A simple breakdown of the administrative aspects are given along with breakdowns of priorities. The goals and measurements of these goals are also generally explored along with future prospects of the system.

The emphasis is on New Zealand's strive for Total Quality Management with cost saving measures and greater efficiency, both economically and technically, throughout the system.

Land Transport Safety Authority. ***Annual Report 1995-1996.***

The Land Transport Safety Authority is responsible for promoting safety in land transport at a reasonable cost and for managing the land transport register. This report contains a Director's Report that contains the many elements of their responsibility followed by output classes and their respective performance indicators. The financial statements are the final segment of the report and contains a rather detailed account of their revenues and expenditures.

Land Transport Safety Authority. 1996. ***Statement of Intent 1996-1997.***

This basically outlines what the Land Transport Safety Authority hopes to accomplish in the coming year. After some brief introductions, the main thrust is located in the "Output Based Information" section. The output classes are described in the previous section. This information shows which measures are being used to calculate the efficiency of the Authority. Output classes fall under the following categories: policy advice, work program for policy projects and reviews, safety information and promotion, work program road safety training services, grants management, safety audit, and land transport licensing. Each category has specific measures on which they are evaluated.

Land Transport Safety Authority. 1997. *Case Study: Strategically Oriented Management and Planning*. OECD-PUMA. Wellington, NZ. July 1997.

Examines the effectiveness of strategically-oriented management and planning as a general mechanism for improving performance in New Zealand's state sector.

Land Transport Safety Authority. 1997. *Strategic Plan: 1997-2001.*

The Land Transport Safety Authority was created on August 20, 1993 with a primary focus to improve safety in land transport. This report outlines the vision, mission, statutory basis, goals and strategies, and outputs (Performance Indicators). It also looks at itself from a corporate point of view to show such items as marketing strategy, human resource strategy, and the source and use of all funds. The annex contains a list of all targets for the year 2001 for such items such as deaths, injuries, alcohol related deaths, speed, occupant restraint and cycle helmets worn. The targets are listed along with actual numbers to check their progress.

Ministry of Transport. *Corporate Plan 1996-1997.*

This document contains the Ministry of Transport Consultation Charter. This is the list of principles that the Ministry uses when developing policies. It contains members to consult and who should participate to ensure the policy is fair and the public has been made aware of the situation. The rest of the document contains general information about the structure of the Ministry of Transport, its vision, performance criteria, and various contacts.

Ministry of Transport. *Corporate Plan 1997/98.*

An updated version of the previous Corporate Plan with current output measures and statements from the top level executives.

Ministry of Transport. *Report of the Ministry of Transport for the Year Ended 30 June 1996.*

The Ministry of Transport, having been reduced to a staff of approximately 30 people, has acted mainly in an advisory manner. Its functions have been to oversee the Crown entities and to create policy reports on various topics. This document contains mostly financial statements and some various output measures to ensure they are meeting their objective of a "safe, sustainable transit at a reasonable cost."

Ministry of Transport. 1997. *Options for the Future: Land Transport Pricing Study. Discussion Document.*

This paper provides a review of the work performed on the topic of pricing the road system. It includes an outline of work done to date, reviews areas of concern raised for future work and provides a range of options for future pricing and regulatory framework for New Zealand's roading system.

Ministry of Transport. 1995. *Transport Reform in New Zealand.*

This sixteen page document analyzes the reformation of the transport sector and provides information on the model that was used to underscore this change. It outlines the key principles used and how each of the environments (commercial, operating, safety) are related to the reform.

Osborne, David and Peter Plastrik. 1997. *Banishing Bureaucracy: The Five Strategies for Reinventing Government. pp.75-93.*

The pages listed above are from a chapter of the book that describes the history behind the reforms in New Zealand. It highlights the move towards a core strategy and selling off of the many assets that were held by the national government. Basically by allowing the government to focus more clearly on its core issues it allowed the country to be rescued from the brink of bankruptcy back to a first-rate world economy.

Rutledge, John C. 197? Case Study: PWD to Private Company. Opus International Consultants Ltd.

Outlines the corporatization of commercial activities in what was a traditional public works department, the New Zealand Ministry of Works and Development (MWD). Also briefly discusses what has happened to the policy and regulatory parts of the old department and makes some suggestions to other organizations that may be considering a similar change.

Toleman, Roger. 1997. *Transport Policy In a Market Economy: The New Zealand Experience.*

This is a very good article concerning the deregulation of the transportation sector in New Zealand. It is not a history of this process but rather meant to look at the overall process. It demonstrates the strategic planning involved and how these long-term goals are linked together. It starts with the goal of the transport system, "safe , sustainable transport at a reasonable cost", and fits that goal with seven operational goals to determine a strategic vision. It analyzes commercial sustainability, safety at a reasonable cost, environmental sustainability at a reasonable cost and social sustainability to show the definition of each and its outcome. The conclusion points out that even as dynamic as the system has become, it should become even more so in the next decade.

Transfund New Zealand. 1997. *Briefing Notes: Transfund New Zealand Project Evaluation Methodology.*

The project evaluation methodology is discussed in this eight page document. Topics include: the need for evaluating projects, economic concepts, use of economics in roading, cost-benefit analysis, discounting, effects of the do-minimum approach and selection criteria.

Transfund New Zealand. 1997. *Competitive Pricing Procedures Manual. Volume 1: Physical Works and Professional Services.*

This manual describes the steps taken for analyzing bids for tender. It lays out the procedure that decides the approach that will be taken to award the projects. This is based on the size and scope of the project. Different methods are used to analyze different contracts. Flowcharts and examples are included in the appendix.

Transfund New Zealand. *Corporate Profile.*

Transfund New Zealand is a Crown Entity established in 1995 and is charged with allocating road-user funds from the National Road Account to achieve a safe and efficient roading system. This pamphlet lays out the general structure of Transfund NZ and highlights some of its major responsibilities.

Transfund New Zealand. 1997. *Competitive Pricing Procedures Manual volume 1: Physical Works and Professional Services.* Wellington, NZ. March 1997.

Transfund New Zealand. 1996. *Statement of Intent 1996-1997.*

The mission statement for Transfund New Zealand states that they will "purchase a safer and more efficient roading system for New Zealand." This document lays out the goals of Transfund NZ for the coming year. It states objectives clearly and gives the nature and scope of activities that Transfund NZ performs. The bulk of the report is in the form of projected performance that gives seven output classes ranging from improvement and replacement of local roads to audit services and lists its target for the year. This gives Transfund something to aim for and is also a measure of the level of service it is providing.

Transit New Zealand. *Annual Report 1995-1996.*

This is the main report done by Transit New Zealand to outline what they have accomplished in the past year and what they hope to do in the near future. It includes reports by the Chairman, General Manager, the different divisions (State Highway Management, Corporate Services, Review and Audit, etc.) and the different regions throughout New Zealand.

The bulk of the report is in the "Statement of Objectives and Service Performance" section in which each output class, such as local roading, is analyzed with a series of measures to demonstrate how that section performed in the last year in relation to other years. Each is compared to its target numbers as well to see if it is reaching the goals of improved efficiency and service throughout the system.

A separate section entitled "Roading Statistics: For the Year Ending 30 June 1996" is also included which gives detailed information about physical statistics, projects completed, and expediters for the roads of New Zealand.

Transit New Zealand. *Corporate Profile.*

Transit New Zealand is a Crown Entity established in 1989 and is responsible for 10,400 km of state highway and provide a link for the other 85,000 km of local roads. This pamphlet outlines some of the major initiatives of Transit NZ and promote greater awareness of its activities. The major areas covered are development of a national state highway system, new state highway projects, strategic planning, public consultation, and total quality management.

Transit New Zealand. *Statement of Intent 96-97.*

This publication includes financial statements for the past three years. The Statement of Intent is required under the 1989 Public Finance Act. It also includes information on the following items:

- Objectives,
- Nature and scope of activities,
- The performance targets and other measures by which the performance of the organization may be judged in relation to its objectives,
- A statement of accounting policies,
- A statement of output objectives.

--. 1997. "Privatization Key to Transport Revamp." *Business Day*. April 24, 1997: 14-15.

This article looks at South Africa's transit system and looks how privatization, similar to New Zealand's model, could revitalize its system. Some government officials have traveled to New Zealand to see its transportation system first-hand. New Zealand's situation was similar to the current situation in South Africa. The belief is that by using the a system similar to New Zealand, their transportation would become more efficient, at a lower price, with more economic benefits. If they are able to achieve a transportation system in this manner, it will boost their economy and make them more competitive in the global economy.

SWEDEN

Gillerman, Brian F., and Greg Pates. 1994. *Bicycling and walking in the nineties and beyond: Applying Scandinavian experience to America's challenges.* Federal Highway Administration, US Department for Transportation. Washington DC. November, 1994. Publication # FHWA-PL-95-007 HPI-10/1-95 (5M) E.

A survey of urban- and transit- design techniques for bicycle and pedestrian accommodation as practiced in Denmark, Norway , Sweden and Finland. Topics include accident experience, traffic calming, and the degree of local autonomy in implementation. Includes recommendations for techniques applicable in the US.

Johnsson, Berth. 1995. *Question I: Performance management of Road Administration, Sweden.* Swedish National Road Administration. XXth World Road Congress, Montreal, Canada p. 387-408.

Overview of the Swedish national and private road system, its development and recent reorganization. The national road administration (Vägverket) began in 1967 as a technical planning, construction and maintenance organization, and came to include planning and services, increasingly considering the roads as a whole system including commercial and community values. Private consultants and contractors were always available and competition was well-managed, but gradual decline, attributed to a politically dominated board and old system of traditional planned management, prompted review in 1986. In 1988 the Director General of Vägverket published *Väginsären*, a document of directives/vision regarding management by objectives (based on principles in Anders Kälström's *Assignment: control effect* and cybernetics), which recommended:

- separating the purchasing and selling roles within the administration
- improved performance evaluation of contractors
- better goal-oriented accounting
- placing road users at the center of activities and involving them in the planning and evaluation processes

Vägverket was given collective responsibility for road safety (not enforcement) and environmental protection in 1992. Vägverket's construction division became an independent company on January 1, 1996. All production must be procured in competition. The report describes the new model for performance control (goals for efficiency, safety, environment, regional balance, accountable management, socio-economic priorities, road capital and productivity) and also notes the need to quickly identify, analyze and remedy undesirable incentives and for continued development of public administration regularly presented to taxpayers.

KFB. 1995. *KFB:An introduction.* Stockholm, Sweden. 1996.

Booklet describing the scope of activities of the KFB (Communications Research Board). General areas include communications technology, telematics, legal issues relating to the transportation and communications sector, public transit logistics, road and vehicle design, motivations for safe driving and alternative fuels. The KFB commissions almost all of its research from universities, private and public researchers.

KFB. 1995. *KFB Projection.* Stockholm, Sweden. 1995. 42 pps.

States long-term goals of the KFB. Transportation-related projects include individual and collective passenger transport, logistics studies in freight transport, traffic safety and technology, road infrastructure technology, electric and hybrid vehicles and biobased fuels.

SI Information Service. 1996. *General Facts on Sweden.* Sweden, http://www.sweden.nw.dc.us/sweden/Genfact.html

General information on Swedish geography, people, resources, government structure, economy, foreign policy, labor market, education and social welfare systems. Most statistics current to 1996.

Swedish Road Federation. 1996. *The air we breathe.* Stockholm, Sweden. October 1996.

Statistics relating to emissions and air quality in Sweden and other parts of Europe.

Vägverket (Swedish National Road Administration). 1996. *Annual Report.* Borlänge, Sweden.

Annual report of the activities, progress and budget of Vägverket (Swedish National Road Administration). Includes progress against parliament-mandated directives: efficiency, accessibility (improving the bearing capacity of roads and bridges, and reducing winter closures), traffic safety, environmental quality and regional balance. Covers sectoral responsibilities, including public safety campaigns and research (all policing is local), research and coordination of public transport services, improvement of service for the disabled, research and development (including public motivation) and road informatics. Also covers Vägverket's role as a public authority in planning, making transfer payments to private companies for road works, licensing of drivers and vehicles and fostering international cooperation in transportation. Actual operations have operated as three independent companies (ferry operation, construction and maintenance, consulting services) within Vägverket since Jan. 1, 1996 (in 1996 16% of invoicing was to external clients). Includes summary table of quantified progress against goals, list of individual improvement projects, accounts summary and many statistics relating to long-term transportation statistics.

Vägverket (SNRA). 1996. *Environmental Report.* Borlänge, Sweden.

Summary of progress toward national goals of the long-term conservation of resources and an agreeable environment. Targeted measures include 1) ground water protection, 2) treatment of road surface water, 3) noise reduction, 4) improved road system design, 5) communication and training. Includes discussion of Vägverket's participation in the MaTs project, which aims for a sustainable overall transport system.

Vägverket (SNRA). 1997. *Facts on the Swedish National Road Administration, Roads and Traffic.* Borlänge, Sweden. 1997.

Introduction to the scope of activities of the SNRA. Includes statistics.

Vägverket (SNRA). 1996. *Road Traffic Safety Report.* Borlänge, Sweden.

Summary of Vägverket's goals and progress in road safety, including motorists, cyclists and pedestrians. Includes discussion of programs to reduce speeding and drunk driving, increase use of safety belts and helmets, improvements in auto safety features, the road environment and driving tests, and research. The long-term goal is to eliminate road injuries and fatalities ("Vision Zero"). Includes statistics and risk data.

Vägverket (SNRA). 1996. ---. Borlänge, Sweden.

Collection of organizational charts and descriptions of job responsibilities.

Vägverket (SNRA), Stockholm Region. 1996. *The Stockholm Ring Road.* Stockholm, Sweden. 1996.
Describes ring road to be completed in Stockholm, much of which will be through tunnels. Emphasis on design and fitting of roadways into the urban landscape. Noteworthy design innovations. Excellent Stockholm map.

-- 1997. *Competitive Tendering in Sweden.* 5 pps.
Brief discussion of change to new tendering and procurement procedures in Swedish public transit. Case studies of Stockholm and Göteborg metro areas. Some statistics. Good overview of new system, attention to intermodal relationships and good explanation of tendering system.

http:/www.smorgasbord.se/sweden.
Good discussion of Swedish geography, history, economy, traditions, common phrases, business culture, cursing etc. Includes maps.

UNITED KINGDOM

Blair, Tony. 1996. "Investors should welcome labour." *The Economist: The World in 1997.* London, UK. 1996, p. 51.
Outlines the business philosophy of Britain's new government.

Department of the Environment, Transport and the Regions, et al. 1997 *Developing an Integrated Transport Policy: An Invitation to Contribute.* London, UK. August, 1997. 16 pps.
Solicitation of input in forming a national policy for transportation systems integration (modes, passenger/freight, public transit). Outline of government objectives in this policy.

Greater Manchester Passenger Transport Authority (GMPTA) and Association of Greater Manchester Authorities (GMA). 1997. *On Track for 2002: a vision for an integrated transport system for Greater Manchester.* Manchester, UK. 1997.
Describes the Authority's vision for integrated transport in the region.
see also: GMPTA's *Runway 2 Facts*; *Metrolink 2000,* and the Trafford Park *Annual Report* 1996-1997.
Haywayd, Mike. 1997. *Presentation to Local Government Technical Advisers Group.* (slides and outline) Government Office for the North West. September 1997.
Slides used in presentation and 3-page discussion of plan to franchise passenger rail services in the northwest region. Includes statistics relating to the region's transit patterns

Highways Agency. 1997. *Business Plan 1997/98.* London, UK. 1997.
Provides a summary of the Agency's activities and projects for the year. Targets are set by the Secretary of State in the areas of serving the public, serving the road user, protecting the environment, and serving the taxpayer. Covers some general strategy and specific points on environmental reporting requirements, organization, budget, the R&D program, and lists individual projects for the year.

Highways Agency. 1997. *Conditions of Contract for Term Contract.* London, UK. January, 1997. 66 pp.
Outlines 71 clauses for specification of conditions for term contracts on roadworks.

Highways Agency. 1997. *Framework Document.* London, UK April 1994.
Sets out the structure of the Highways Agency, which took over the construction and maintenance on the trunk roads network from the Department of Transport, to take effect in April 1994. The aim of the agency as set by the Secretary of State is "to secure the delivery of an efficient, reliable, safe and environmentally acceptable trunk road network". There will be increased focus on maintaining the network as a whole system, resulting in better quality and faster delivery of services. The agency will be judged on its ability to deliver high quality services to both road users and those affected by the network, in an agreement in accordance with the 1991 Citizens' Charter. Includes specific objectives and performance indicators.

Highways Agency. 1997. *Implementation News: Final Staff Structures, Special Edition 7.* London, UK. May 1997.
Newsletter informing employees about the progress of the restructuring process. Complete list of staff by department, openings, organization charts etc.

Highways Agency. 1997. *Intergovernmental and Intermodal Relationships in Organisational Structure and Programme Delivery.* London, UK. September, 1997.
Outlines the origins and development of the Highways Agency as a Next Steps agency, the roles of government offices in relation to the Highways Agency and the program of initiatives from the new Labour government.

Highways Agency. 1996. *The Organisation and Staffing Needs of the Highways Agency: A Review.* London, UK. March 1996.
Study and proposal for restructuring of staff and services in the Highways Agency in response to reduced funding and the Ministerial review of the Road Programme. Recommendations include keeping all offices open, restricting layoffs to higher-level staff, and increasing customer focus.

Highways Agency. 1996. *Model Agency Agreement (Volume 1)* and *Tendering Instructions (Volume 2).* London, UK 1996.
Model agreement for use on new commissions for trunk roads agencies, as a replacement for the model used by the Department of Transport and Highways Agency. The model is to be used by the new management agencies that were operationally phased in beginning

April 1997. Volume 1 contains the model agency agreement and brief; volume 2 contains an explanatory note for tenders, the works package guidance and works package tables.

Highways Agency. 1995. *Network Performance Indicatiors.* (slides). London, UK. August 1995
Describes indicators relating to the performance of the trunk roads, and their meaning to the public.

Highways Agency. *Programmes, Resources, Priorities.* London, UK.
Slides from a presentation by Gwyn Drake on the role of Programme Development.

Highways Agency (UK), Private Finance Panel. 1997. *DBFO - Value in Roads: A case study on the first eight DBFO road contracts and their development.* London, UK, 1997.
Case study of the first eight DBFO (Design, Build, Finance and Operate) projects in Britain since the Department of Transport's 1992 invitations for private companies to tender for road contracts. The arrangement has been successful; where projects previously ran 28% over budget, the DBFO projects have been shown to beat public sector comparisons by an average of 15%. Previously major roadworks were contracted out piecemeal (with private companies functioning like subcontractors) and paid by measured progress against specific goals. A DBFO company is paid 80% of the construction price when the project is opened to public use and the other 20% on completion, after which is paid to operate the roadwork through tolls for the remainder of its 30-year contract. Payment of tolls (which currently come from a general fund rather than directly from motorists) is based on 1) usage/demand, 2) availability of service (land closure charges are assessed for the time a land is closed, except when required by police or utilities), and 3) performance in terms of safety and operability. The 30-year life of the contract encourages the DBFO company to consider its obligations as a whole, and permits it more flexibility in funding arrangements. Includes construction and financing schedules.

Kaletesky, Anatole. 1996. "Sterling's coming crisis". *The Economist: The World in 1997.* London, UK. 1996, p. 44-45.
Predicts that the pound may become overvalued, with the usual repercussions. Outlines how this might be avoided.

King, Anthony. 1996. "Bland Blair, Bland Britain." *The Economist: The World in 1997.* London, UK. 1996, p. 43-44.
Profile of Tony Blair, described as "the first genuinely post-imperial prime minister." Covers his strengths as challenges as leader of the new left.

McCoubrey, William, et. al. 1995. *Performance Management of Road Administrations: "We are committed to serving our customers."* XXth World Road Congress, Montreal, Canada. p. 409-428.
Overview of British government, roads and roads administration systems, with attention to recent reforms. noes changes in public needs: in the last forty years individual transit has tripled and freight transit doubled, with 90% of both by road. The car now accounts for 79% of personal mileage. Changes in the Road Administration and its objectives include:

- greater accountability to elected members of parliament and local councils for policy and expenditure of public funds
- transfer of activities to the private sector where appropriate and greater use of market testing
- transfer of construction and financial risk to the private sector through increased use of design-build contracts
- easing the "burden of regulation" where appropriate.

It includes response to the Citizens' Charter (1991), a national document to improve public sector service and accountability, with specific goals pertaining to the environment, public safety, local government structures, performance measures, the procurement of road services, payment management, "competing for quality", project evaluation, improving service quality and managing public liability. Describes the emergence of Next Steps Agencies (including the Highways Agency) in restructuring bureaucratic control in a more responsive manner. Includes figures on the extent of major roadways by region, expenditure on roads by region, and an appendix of suggested indicative performance measures/indicators.

Reina, Peter. 1994. "After 99 months' work Channel Tunnel prepares for trains". *ENR*, (cover story) New York, NY. May 2, 1994, p. 22-26.
The channel Tunnel, scheduled to open may 6, (1994?), is showing the way for large scale private infrastructure. It will carry not only high speed trains, but also cars, busses and trucks on large wagons. The projects was constructed without public funds, but with $13.5 billion in risk capital from investors and loans from 220 banks. The project was constructed by a Design-Build-Finance-Operate firm constituting a group of five French and five British contractors, and five banks, and will be operated by Eurotunnel for 55 years. Problems included premature entry into a contract, conflict of interest among the contractors and gross underestimation of the transportation system's costs. This environment proved ripe for litigation, and eventually Eurotunnel pulled out of the disputes procedure and paid a $150 million settlement to avoid further legal costs and delays, and restore cooperation. Although they consider it a successful project, emerging wiser and more marketable, each of the ten contractors lost $15 million on the project.

SDG Research. 1995. *Road User Satisfaction Study: Report.* Prepared for Highways Agency. London, UK. May 1995. (Also December 1996.)
Results of annual survey of road users regarding satisfaction with various aspects of the trunk toads, motorways, and the Highways Agency generally. Includes discussion of sign legibility, awareness of the agency, safety, needs of vulnerable road users, the information line and response to vehicle breakdown.

Schriener, Judy. 1994. "Toll Roads: E-470 goes to higher court." *ENR*, November 7, 1994 p. 14.
The Colorado Supreme Court has agreed to review a lower court ruling against the E-470 Public Highway Authority, which had forbidden it to remarket $650 million in bonds. The higher court agreed to hear arguments that the E-470 authority is an "enterprise," which would exempt it from going to voters before issuing new debt. Currently the authority keeps rolling over the $722 million in Arapahoe

County revenue bonds from 1986. The delay has cost $225 million so far. E-470 is a planned ring road around Denver providing greater access to the new airport. on the one completed 5.5-mile segment traffic has increased 30% each year.

Technical Advisers Group. 1997. *An Introduction to TAG.*
Brief introduction to the nature and scope of TAG functions.

US Department of State Bureau of Public Affairs. 1995. *Background Notes: United Kingdom, November 1995.* Washington DC gopher://gopher.state.gov:70/00ftp
Brief overview of British demographics, economy, government structure, trade and investment, relations with the US and recent politics.

--. 1994. "European Union: Back to the drawing-board". *The Economist*, September 10, 1994 p. 21-23.
In anticipation of the 1996 review of the 1991 Mastricht treaty, an examination of several means of structuring the EU, and a distinction of five different groups of nations with distinct motives and preferences for each form.

--. 1994. "Europe's dash for the future". *The Economist*, August 13, 1994 p. 13-14.
Warns against European protection of national industries, particularly telecommunications, transport, technology and energy. Believes that government innovation in emerging industries can be destructive, since the standard in which it will appear is unpredictable. Believes eventual job losses in artificially protected industries are inevitable, and intervention only makes the process more painful and distorted, while damaging the innovation and competitiveness of other industries and the country itself.

--. 1997. "New Labour, New Zealand: Britain's "green" budget combines commendable prudence with shallow populism." *The Economist,* November 29, 1997. p. 20.
Mixed review of chancellor of the exchequer Gordon Brown's recent policies, modeled after those in New Zealand.

--. 1997. "Gordon Brown's progress." *The Economist*, November 29, 1997 p 57-58.
Criticism that Brown's policies do not yet measure up to his vision; particular issue with a credit to pensioners for winter heating.

UNITED STATES

Graff, Joe S. 1997? *Maintenance Contracting in Texas.* Prepared by the Construction and Maintenance Division, TxDOT. 7 pp.
Outlines the evolution of the state's current policy of outsourcing highway maintenance functions, as prompted by budget requirements and legislated mandates.

Jeter, Jon. 1997. "A Winning Combination in Indianapolis: competitive bidding for city services creates public-private success story." *Washington Post,* September 21, 1997.
Account of Indianapolis Mayor Henry Birk's successful restructuring of municipal service contracting. The changes began as a call for privatization, but under pressure from AFSCME unions were permitted to submit bids on an equal basis. The union employees performed well, and have not lost a single union job, although many have been transferred between departments. Most inefficiencies had apparently been the result of bloated middle management and politically-motivated contract awards rather than the work force itself.

Lockwood, Steve and Parsons Brinkerhoff. 1997. *AASHTO Department Survey of Organization, Management and Program Delivery Initiatives* (Draft Report). AASHTO Institutional Change Survey. November 1997.
Overview of international context and trends in organizational change in road authorities, and report of responses to AASHTO questionnaire survey of major trends in management, organization and program development in member departments since ISTEA.

Lockwood, Steve. 1995. "Public-Private Partnerships in US Highway Finance: ISTEA and Beyond" *Performance Indicators for the Road Sector (Final Draft).* Paris, France. 164 pp.
(Summary article under the same title in Transportation Quarterly. V. 49, No 1 Winter 1995 p. 5-26. Landsdowne, VA)
Survey of public-private partnership arrangements employed by the states under the more flexible ISTEA guidelines.

New Mexico State Highway & Transportation Department. *Corridor 44 Project, Executive Summary.* 3 pps.
Brief description of a highway expansion project (two lanes to four) that will be financed, designed, managed and warranted by private enterprise. It is expected that the innovative financing system will permit the project to be completed in 1/6 the time for $77 million less.

Richardson, Nancy J. 1997. *Managed Competition: The Iowa Experience.* AASHTO Presentation by the Iowa Department of Transportation. November, 1997.
Executive summary of a report on two pilot projects in managed competition under Iowa DOT. The two projects involved contracts for paint striping and sign manufacture.

--. 1990 "Public-Private Partnerships in Transportation, Executive Summary." *A Policy Development Conference, November 14-15, 1990, San Francisco, CA.* California Engineering Foundation. Sacramento, CA. 1990.

9.0 APPENDICES

9.1 Panelist Biographic Information

NOTE: Biographic Information is based on status at the time of the scanning tour.

Francis B. "Frank" Francois, Panel Co-Chairman, is the Executive Director of the American Association of State Highway and Transportation Officials (AASHTO). He also serves as an Ex Officio member of the Executive Committee of the Transportation Research Board and on the boards of several other national and international transportation organizations. Prior to joining AASHTO, Mr. Francois was a member of the County Council of Prince George's County, Maryland. He has served as President of the National Association of Counties and President of the National Association of Regional Councils. Mr. Francois has been active in the development and implementation of public policy at the local, state and federal levels for over three decades.

David S. Gendell, Panel Co-Chairman, is a Regional Administrator for the Federal Highway Administration (FHWA). Based in Baltimore, Maryland, he is responsible for providing leadership, in cooperation with the states and local governments for the $2 billion annual Federal-aid program for the states of Delaware, Maryland, Pennsylvania, Virginia, West Virginia and the District of Columbia. Mr. Gendell's 35 year career with FHWA has included assignments in planning, policy and engineering. He is a registered professional engineer and has served on several Transportation Research Board and AASHTO committees. Mr. Gendell is a recipient of the U.S. Secretary of Transportation's silver medal for superior achievement and the President's award for meritorious executives.

Dwight M. Bower is the Director of the Idaho Transportation Department in Boise, Idaho. He is responsible for the activities of over 1,800 employees and an annual budget of approximately $290 million. Prior to his appointment, Mr. Bower was the Deputy Director of the Colorado Department of Transportation. He was the Co-Chairman of the National Quality initiative and a member of the Executive Committee of the Transportation Research Board (TRB). Mr. Bower is currently the President of the Western Association of State Highway and Transportation Officials and is on the American Association of State Highway and Transportation Officials (AASHTO) Board of Directors. He is also on the Information Technology Resource Management Council, Vice Chairman of the Strategic Forum Steering Committee, and serves on the TRB Subcommittee on Planning and Policy Review.

Larry R. Goode is the State Highway Administrator (Chief Administrative Officer for the Division of Highways) for the North Carolina Department of Transportation. He joined the North Carolina Department of Transportation in July, 1972. The majority of his career has been in the planning, programming and policy areas of the department. Dr. Goode is a registered professional engineer and active in the following professional U.S. organizations: the National Society of Engineers, the Institute of Transportation Engineers, the American Road and Transport Builders Association, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. In addition, he currently serves as the President of the Professional Engineers of North Carolina.

Peter C. Markle is the Division Administrator for the U.S. Federal Highway Administration's (FHWA) Massachusetts Division, headquartered in Boston, Massachusetts. He has been with the FHWA for 21 years and has served in positions in California, New York, Texas, Georgia, Connecticut, Region 4 in the Southeast United States, and FHWA Headquarters in Washington, D.C. He presently oversees the Federal interest in the $10 Billion Central Artery/Tunnel Project in Boston, Massachusetts. Previously he was involved in developing the innovative contracting procedures for the rapid reconstruction of the highways damaged by the 1994 Northridge earthquake in Southern California. Mr. Markle is a registered professional engineer. Prior to joining the FHWA, he was a pilot in the U.S. Air Force.

Gene McCormick is a Senior Vice President with Parsons Brinckerhoff (PB), an international engineering consultant firm providing a full array of transportation services including planning, design, construction, financing and operations. Mr. McCormick is responsible for strategic planning and marketing with PB and located in Washington, D.C. His previous experience includes serving as the Deputy Federal Highway Administrator and Illinois Deputy Secretary of Transportation. He is a registered professional engineer and an active member of the American Society of Civil Engineers, National Society of Professional Engineers, American Consulting Engineers Council, American Road and Transportation Builders Association, International Bridge Tunnel and Turnpike Association and the International Road Federation.

Gene Ofstead is an Assistant Commissioner in the Minnesota Department of Transportation (Mn/DOT). His responsibilities include strategic management, investment management, development of performance measures and performance targets, alternative transportation finance, research and development of advanced transportation systems, administration of the department's overall research program, motor carrier safety, and grant programs for airports, transit, and railways. He has

served 39 years at Mn/DOT in a variety of capacities including directing the centralized engineering functions, and managing the department's legislative program.

Clyde E. Pyers is the Director of the Office of Highway Policy Assessment, Maryland State Highway Administration. He has worked within the Maryland Department of Transportation for 25 years and has previously served as the Chief Transportation Planner and has directed the Office of Transportation Planning. He is Secretary-Treasurer of the American Association of State Highway & Transportation Officials and a member of the Reauthorization Steering Committee. He has been an active member of the Transportation Research Board for many years. Mr. Pyers holds degrees in civil engineering and city planning and is a member of the American Society of Civil Engineers, the American Public Works Association, and the Women's Transportation Seminar.

Darrel Rensink is the Director of the Iowa Department of Transportation (DOT). He is responsible for the internal operation of the Department including the administration of programs for all transportation modes. He assists a 7-member policy making Commission in preparation of long-range transportation improvement programs. Formerly the city manager of Sioux Center, Iowa, for 14 years, he joined the DOT as Deputy Director in 1987 and was appointed Director in May 1988. Mr. Rensink was a member of the Iowa Transportation Commission and served on the Iowa Development Commission Board. During 1993-1996, Mr. Rensink was a member of the Transportation Research Board's (TRB) Executive Committee. He also served on the TRB Subcommittee on Planning and Policy Review. Mr. Rensink currently serves as President of the American Association of State Highway and Transportation Officials (AASHTO).

Robert E. Skinner, Jr. is the Executive Director of the Transportation Research Board (TRB), a unit of the non-profit National Academies of Sciences and Engineering, dedicated to coordination and dissemination of transportation research. TRB maintains 430 technical committees dedicated to promoting innovation in transportation; publishes over 150 transportation reports, proceedings, and other documents each year; holds an annual meeting attended by more than 8,000 participants; administers contract research programs on behalf of the states and the federal government; and conducts studies on national transportation policy issues. Mr. Skinner joined TRB as a Senior Program Officer in 1983; was named Director, Studies and Information Services Division in 1986; and became Executive Director in 1994. Prior to joining the TRB, he was Vice President of Alan M. Voorhees and Associates, McLean, Virginia, a transportation consulting firm specializing in services to local, state, and federal transportation agencies. He earned a Bachelor of Science degree in civil engineering from the University of Virginia, and a master's degree in civil engineering/transportation systems from the Massachusetts Institute of Technology. He is a registered professional engineer.

Max R. Sproles is Vice President and Director of corporate development for the international transportation and design firm Frederic R. Harris, Inc. Based in Washington, D.C., Mr. Sproles is responsible for coordination of the company's international programs and federal government agency liaison. He was recently elected to a one-year term as Chairman of the American Road and Transportation Builder's Association (ARTBA) and is a Fellow with both the American Society of Civil Engineers and the Institute of Transportation Engineers. Mr. Sproles is a registered professional engineer with over 35 years experience in the planning, engineering and administration of major transportation systems projects worldwide. Early in his career he spent seven years with the U.S. Federal Highway Administration and five years with the North Carolina Highway Department.

C. Michael Walton is Professor of Civil Engineering and holds the Ernest H. Cockrell Centennial Chair in Engineering at The University of Texas at Austin. In addition, he has a joint academic appointment in the Lyndon B. Johnson School of Public Affairs. For approximately 30 years he as been actively involved in defining and evaluating transportation policy through his research, publications and national service to government and industry. Dr. Walton is a registered professional engineer and a member of the National Academy of Engineering, the Transportation Research Board, the American Society of Civil Engineers, the Institute for Operations Research and Management Sciences, the Urban Land Institute, the Society of American Military Engineers, the Society of Automotive Engineers, and the Institute of Transportation Engineers. In addition, he is a Fellow of the American Society of Civil Engineers and a founding member of the Intelligent Transportation Society of America.

Germaine (Gerry) G. Williams manages the strategic planning process for the Federal Highway Administration. She is responsible for facilitating the development of the Agency's Strategic Plan and for coordinating the development of the three annual Program Performance Plans which document what the three major agency Programs will do to accomplish the goals and objectives of the Strategic Plan. She is also responsible for the agency performance measurement system. Prior to her current assignment, Mrs. Williams worked in the area of highway finance and aviation policy as well as in human resource management. She has a Masters degree in Public Administration from George Washington University and is a member of the American Society for Public Administration and the Government Finance Officers Association.

9.2 Transportation Organization and Management Questionnaire

AMPLIFYING QUESTIONS

1.0 Governmental organization, interrelationships and responsibilities and role of the private sector in the delivery, operation and maintenance of highway transportation facilities

- 1.1 Define the division of responsibilities among public jurisdictions and the role of the private sector.
- 1.2 Levels of government, organizational structure, and respective roles (including interrelationships with other modes and the degree to which policy and implementation are centralize vs decentralized, national vs local).
  - 1.2.1 Challenges faced in defining (redefining) respective roles among formal-informal, public-private, public-public
  - 1.2.2 Primary mechanism used to transcend local vs national perspective
  - 1.2.3 Oversight structure(s) for regional and federal levels (intermodal or by mode)
- 1.3 Program delivery at each level
  - 1.3.1 How is coordination achieved (e.g., public-public, public-private, academic)?
  - 1.3.2 Shifts in past five years? Next five years? And if so, what caused shift?
  - 1.3.3 It appears that, in some cases, the real benefits of competitiveness may not be realized until the competitive culture has time to "shake out" and mature. In other services the benefits of competitiveness are achieved early. Have you seen any patterns in this regard?
  - 1.3.4 What is the basic project delivery mechanism? Changes past five years? Next five years? How does it differ for public vs private delivery?
  - 1.3.5 Does the basic project delivery mechanism vary between modes?
  - 1.3.6 Have you evaluated the effectiveness of the various delivery systems?
  - 1.3.7 Do you have a quality management system? Do you perform quality assessments of your total transport programs?
- 1.4 Assignment of responsibility
  - 1.4.1 Legislative, administrative or other mandate
  - 1.4.2 Changes in past five years? Next five years?
  - 1.4.3 Variation at different levels of government
  - 1.4.4 Allocation of benefits and risks
  - 1.4.5 Variation of roles at different project stages? over time?
  - 1.4.6 Variation among modes?
  - 1.4.7 Competition among public and private for same project?
  - 1.4.8 Delivery of transportation facilities includes toll facilities and traffic control centers?
  - 1.4.9 Successful mechanisms
- 1.5 Financing by activity, e.g., construction, maintenance, etc. including toll roads
  - 1.5.1 Have methods changed for financing facilities and services? Past five years? Next five years?
  - 1.5.2 What methods are used to finance transportation at the different levels of government?
  - 1.5.3 Are financing methods different for different modes? If so, what are they?
  - 1.5.4 Type of procurement mechanism for engineering services (cost vs qualification based)? Future changes to nurture public/private partnerships?
- 1.6 Intermodal and multimodal relationships (primary focus on highway program and highway transportation relationships with other modes)
  - 1.6.1 Structure and relationship at each level
  - 1.6.2 Level at which planning occurs and modal decisions are made and by whom
  - 1.6.3 How are intermodal policies established and issues resolved?
  - 1.6.4 How are intermodal approaches to planning, programming and financing changing the level and quality of transportation services being provided?
- 1.7 Extent to which traditional responsibilities and activities are outsourced
  - 1.7.1 How successful have these practices been?
  - 1.7.2 Lessons learned
  - 1.7.3 How are fees/budgets determined?
  - 1.7.4 Are audits performed?
  - 1.7.5 Have the real costs to end users been calculated?
- 1.8 Public input and customer involvement
  - 1.8.1 How is it solicited?
  - 1.8.2 Lessons learned

1.8.3 Are there any road user associations in your country? What are their objectives? How do they operate?
1.8.4 What formal or informal consultation processes do you undertake with road users?
1.8.5 Are there any transportation related professional associations that play a role in the transportation sector either in setting policy or formulating standards?

1.9 How is the training and recruitment of transportation professionals changing in your country?

1.10 Who is responsibility for basic long-term transportation research? Is there adequate funding? What are the areas of focus?

2.0 The use of performance measures and performance target to allocate resources and enhance the delivery of programs and products.

2.1 Definition
2.1.1 How are they used and for how long?
2.1.2 To what purpose (e.g., priority setting)?
2.1.3 How are they developed?
2.1.4 How are they measured and by whom?
2.1.5 Are they required and if so by whom (e.g., external authority)?
2.1.6 Have there been changes over time? If so, can you provide examples?
2.1.7 What have been your experiences such as success with customer satisfaction, enhanced creditability?
2.1.8 What has been your experience with data collection, quality, value, etc.

2.2 Have trends resulted in creating new targets?

2.3 Customer satisfaction
2.3.1 Measured for both public and private services?
2.3.2 If so, are measures the same?
2.3.3 Is "customer satisfaction" creating a change (organizationally or in the way business is done) in any aspect of work activity?
2.3.4 Products and services dropped or added based on customer market research
2.3.5 The focus on customer outcomes implies more collaboration and interdependence needed among providers. However, competition can work against that collaboration. What have you seen evolving in the product areas that have had the longest experience in competitive delivery?

2.4 What are the reporting procedures, frequency, format and distribution of report documents?

3.0 Innovative approaches for developing and implementing highway transportation products and services

3.1 Describe innovative practices performed which led to a step change and lessons learned

3.2 What non-traditional methods or procedures have led to breakthrough in increased productivity and efficiency.

3.3 Have you experimented with the concept of a "virtual" transportation organization? If so, could you describe the concept used and your experience?

4.0 Other related topics

These **Digests** are issued in order to increase awareness of research results emanating from projects in the CRP. Persons wanting to pursue the project subject matter in greater depth should contact the Cooperative Research Programs Staff, Transportation Research Board, 2101 Constitution Ave., NW, Washington, DC 20418.

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