

A BALANCED NETWORK OPERATIONS STRATEGY THE WESTERN AUSTRALIAN CASE

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ABSTRACT

Western Australia's roads authority manages its network in three distinct operating environments. This provides challenges, which require a sophisticated Operations Strategy that can respond efficiently to the demands of:

- A fast-growing city of 1.3 million people with all the transport problems typical of a thriving metropolis;
- An agricultural region with an aging road network that needs to carry medium traffic flows mixing heavy vehicles with light cars; and
- A larger remote region producing billions of dollars in mineral exports that is reliant on reliable, low cost, road freight.

To be successful, the strategy needs to respond effectively to the wide range of needs and demands of these three diverse operating environments. The roads authority, Main Roads Western Australia, has developed a strategy that utilises intelligent transport systems; is innovative and flexible in heavy vehicle management; uses best practice road safety and traffic management techniques, as well as information and education programs. It has developed this strategy in an environment of increasing community and stakeholder involvement; an ever-increasing need for "clever" improvements; and a recognition that the network operator has to meet the needs of all its users. In short it is a strategy that balances the economic, social and environmental needs with the circumstances presented in each of the three operational areas, and helps ensure a sustainable road network throughout Western Australia.

KEY WORDS: OPERATIONS STRATEGY/ ROAD NETWORK/ WESTERN AUSTRALIA

BACKGROUND

By international standards, Western Australia's road network is comparatively new. While in many parts of the world the history of road networks can be traced back thousands of years, in Western Australia (WA) the first formed roads were not built until European settlement in the 1820s. But it would be wrong to think that the formed roads had no pre-history. There is no doubt that the tracks and trails cut earlier by Aboriginal communities

would have helped determine the routes taken by some of the settlers' roads. And like elsewhere in the world, the original road network was developed for the horse and cart. It was only in the past 100 years that radical advances in transport technology have demanded networks that can carry millions of people and millions of tonnes of freight.

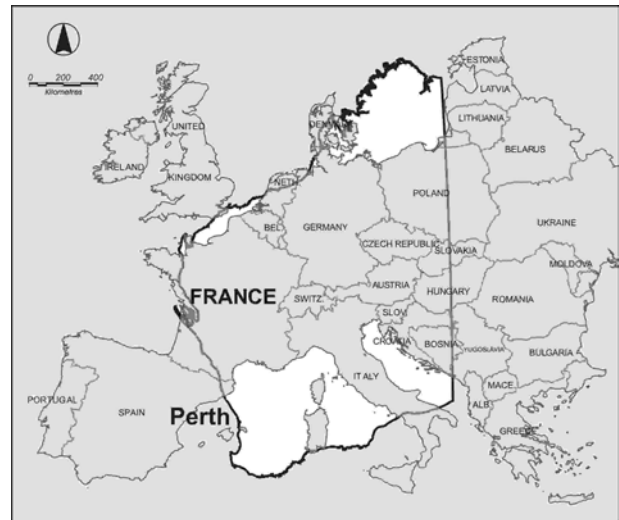
Today, the complexities of operating this continually evolving network are significant. Changing community values have added to the complexity and made it necessary to develop an operating strategy that can balance and reconcile the pressures of economic growth, social equity and the environment. It is clearly an on-going task to ensure such a strategy remains relevant and delivers a sustainable, secure and safe road network - one that meets the ongoing needs of all road users.

Measured in land area, WA is the largest of Australia's States. It covers one third of the continent and has 174,000km of roads - 48,000km of which are paved. The State spans an area that would envelope much of Europe. The State's road authority is Main Roads, which manages about 17,000km of the major roads. Most of the remainder are controlled by more than 140 local government authorities. The working relationship between them and Main Roads is close, which ensures an integrated approach to road network management.

WA's total population is close to 2 million and the per capita income is about US\$23,000 a year. For some years, the economy has been growing at an annual rate of 5% - a rate that looks like to continue. Most of the population (1.3 million) live in the Perth Metropolitan Area. Most other people live either in southwest coastal districts, or the Agricultural Area. Relatively few live in the State's Remote Area.

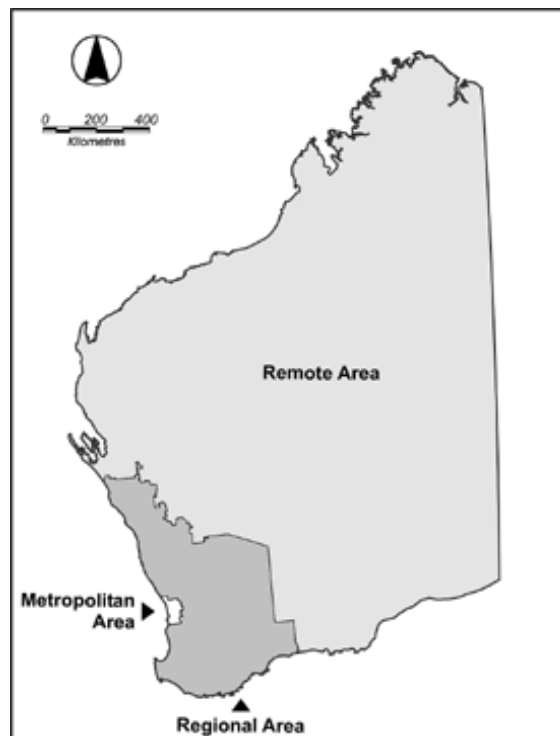
Mineral resources provide the backbone of the economy and provide export earnings of about US\$17 billion annually. Most of these resources, in the shape of liquefied natural gas, iron ore, gold, diamonds, bauxite and mineral sands, are found in the Remote Areas.

The sheer size of the WA landmass means the State covers a number of climatic zones. Temperate rain forest can be found in the south west, but travel north and you will pass through harsh deserts until you reach monsoonal, sub tropical savannah. Located in the southwest corner, Perth is the most remote of the world's major cities. Its nearest major capitals are Adelaide, 2200km to the east, and Jakarta, 3400km to the north.



There are basic road links across the Australian continent joining WA with the other states but the bulk of WA's freight enters or leaves the State by sea or rail. There are major ports in the north west of WA shipping huge quantities of iron ore overseas, ore that is railed from inland iron ore mines. Liquefied natural gas sourced from nearby offshore gas fields is also shipped overseas. The road network connects these ports and the crucial economic zone to the rest of the State. In the Regional Area a rail network is used to haul the bulk of the State's grain harvest to ports.

The number of vehicles and the amount of freight carried on the WA road network is substantial. Vehicles are now clocking 20,000 million vehicle kilometres annually. At the same time freight on the network has reached 19,000 million tonne kilometres annually and is expected to increase by at least 50% over the next decade. About 60% of the travel is along Metropolitan roads and by way of contrast, 70% of the freight is moved on Agricultural and Remote roads.



THE OPERATING CONTEXT

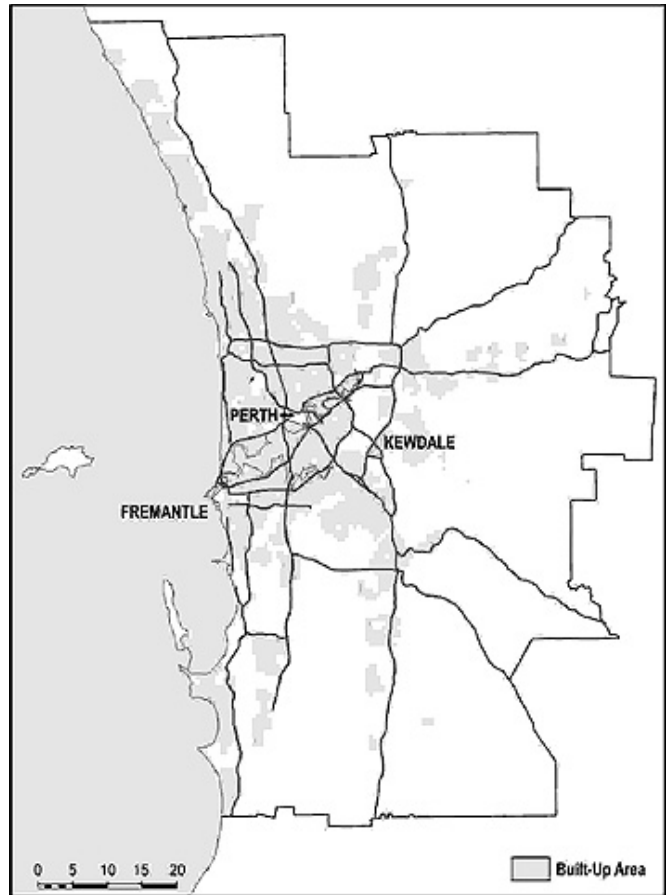
Main Roads faces a unique set of challenges in managing the operating needs of the road network. Geography, social attitudes, and economic demands all contribute to the special challenges that must be met.

The road network is vital for WA's continued economic growth - as well as for the mobility of its citizens and their social interaction. Roads have always had stakeholders but today, changing social values ensure many more stakeholders are recognised – and that they are able to influence decisions.

In Western Australia the network stakeholders - the community, industry and government - are each in their own way showing concern about the network's future. Stakeholders want to know about costs and benefits; want improved safety and equity; and require minimal environmental impacts. These requirements have resulted in Main Roads experiencing an increase in the level of regulatory requirements that it must meet in areas such as community consultation, design standards and environmental impact assessments.

The Metropolitan Area has developed along a coastal strip – and it is still growing. People like to live near the sea. The climate and life-style is very similar to Los Angeles and although today Perth is witnessing an upsurge in inner city living, the attraction of the beach suburbs is unlikely to diminish. For these and many other reasons reliance on the car as the main form of city transport, is likely to continue – even though the use of public transport is expected to grow in the city’s more densely populated corridors. As a result, increasing pressure on the existing road network is expected.

The growing levels of traffic will also put more pressure on the environment and subsequent congestion and pollution will add to the problem. Traffic noise is now becoming a major public concern and at the same time there is growing public opposition to more land being used for roads. This is particularly so in sensitive areas such as “wetlands” and in residential districts. The ‘Green’ movement in Western Australia now has a powerful voice.



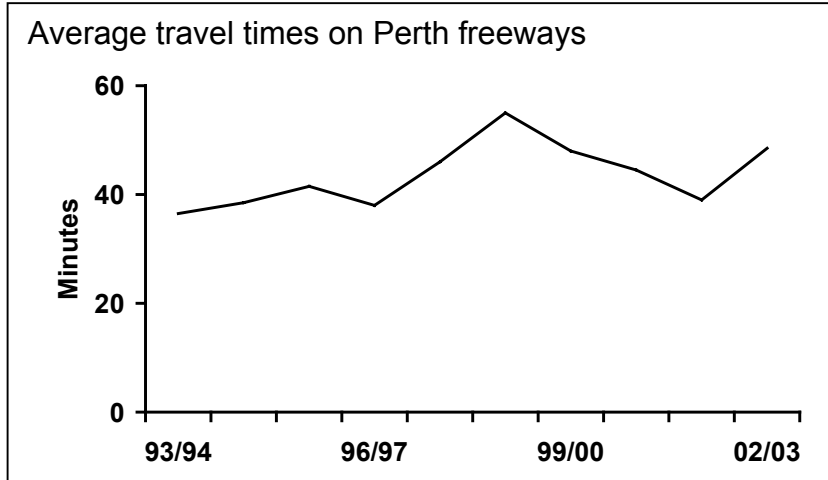
In Perth and in some of the larger towns, there is a substantial demand for road space to be allocated to cyclists, pedestrians and other vulnerable road users. These people need high quality, safe and accessible facilities. Because of the State’s aging population, there is also a growth market for the facilities. They demand safe, smooth, gently graded and well-lit paths not just for walking, but for riding “gophers” and “scooters”.

In the State’s Agricultural and Remote areas there is a need to improve interregional links and those with the Metropolitan Area. There is also a constant need to provide remote mines with quality access roads – otherwise they cannot operate. Other major issues are better access to remote aboriginal communities and tourist destinations. Living standards in many aboriginal communities are poor and good road access is crucial if the standards are to be raised. Because population densities are so low outside the State’s main urban areas, it is all but impossible to operate train and bus services. If people in remote areas need to travel they are obliged to take the expensive option of travelling either by car or plane - or more likely, both.

Congestion.

In Perth most people prefer to travel by car and, despite the fact that Perth enjoys a high quality and rapidly improving transit system, congestion is growing.

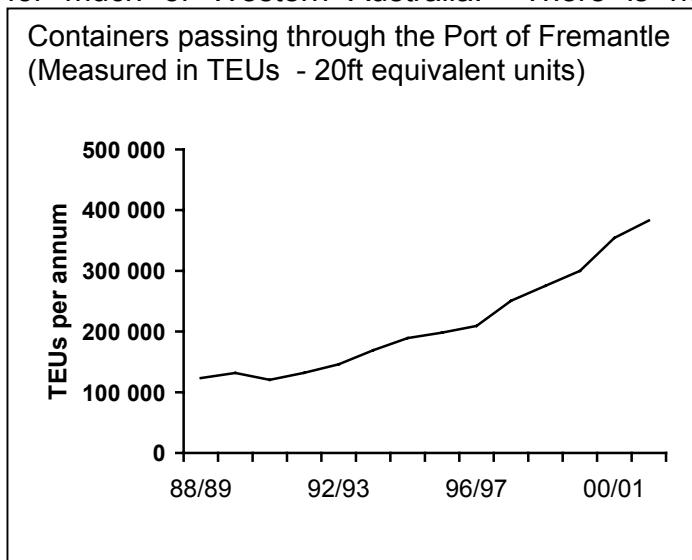
Through much of the 1990s, road construction in Perth's Metropolitan Area was intense. Roads were widened or new ones built – including a major freeway and tunnel system to carry east-west traffic away from the city centre. But despite all the efforts, congestion continues to be an issue. As shown in the chart average travel time on Perth's freeways is again rising after a period of falls.



The cost of Metropolitan road traffic delays is already considerable and is anticipated to rise in the future. The largest cost of congestion will be the delays for people travelling by car and public transport. But road congestion will also have its impact on the efficiency of freight transport.

Freight.

Road transport is well suited to moving freight over short distances. It also works well over long distances when the volume of freight to be carried is relatively small. This is the case for much of Western Australia. There is however constant pressure from trucking companies to cut costs by operating more "freight efficient vehicles" – which means opening the roads to heavier and longer trucks.



As is the case in most cities, trucks move much of Perth's intra-city freight. The high reliance on the metropolitan road network to move people as well as goods, is contributing to congestion, greenhouse emissions and other social costs. And like people the world over, most Perth residents do not like sharing the roads with heavy vehicles.

A key area of focus in Perth is the transport of containerised freight, a

rapidly growing task. Today the Port of Fremantle handles most of Western Australia's containerised cargo and there is considerable movement of containers between the port and Perth's principal industrial area, Kewdale. Container traffic through Fremantle has been growing at a rate of more than 10% pa for the past decade. This is expected to continue, a prospect that is causing much public concern.

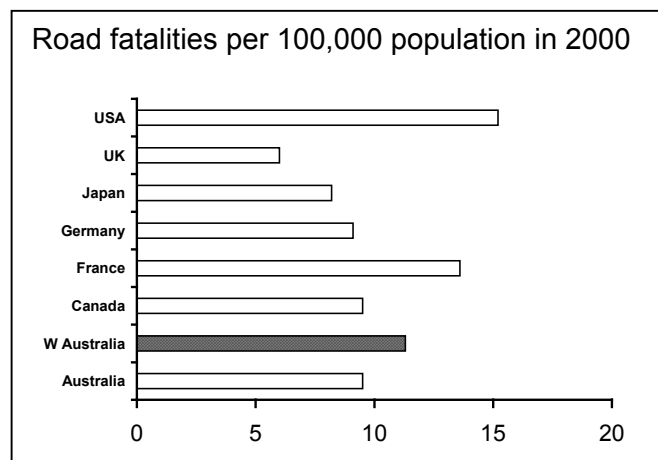
Even with the anticipated increased use of logistic services, such as "just-in-time" and e-commerce, there will be implications for the efficient movement of freight in the Metropolitan Area. Congestion will threaten economic competitiveness and pressure will be on the network operator to make routes favoured by trucks, as smooth flowing as possible.

In the Regional and Remote Areas the demand is for safer and more productive freight vehicles. Eighty tonne road trains operate on 97% of the State's major roads and 200 tonne road trains operate on some remote roads. Main Roads has the constant challenge of providing roads and regulations that result in safer and more productive road freight transport.

Road Safety

Road safety has long been an issue of major public concern in WA and although numerous safety campaigns have helped keep the death toll relatively low by world standards, the community still gives high priority to curbing accidents

Within the Metropolitan Area, the number of crashes has fallen and toll figures have stabilised but in the remainder of the State, the accident rate has not fallen for ten years. One reason is that many roads in country areas are of low standard and much of the local road network is unsealed. The vastness of the Agricultural and Remote Areas means that fatigue is a major issue with up to 4 in 10 fatal crashes being attributed to fatigue. When these factors are combined with high speed on unsealed roads, disasters too often occur. Added to the problem is the constant risk of hitting an animal. Collisions with kangaroos are frequent, but generally only result in vehicle damage. But collisions with cows, horses and camels can be fatal.



The traffic volumes on the State's non-urban roads are generally too low to justify the construction of dual carriageways or other expensive treatments that deliver major safety benefits. Yet there are many instances where the traffic volumes are high enough for there to be problems with overtaking. This can lead to drivers getting frustrated and making dangerous overtaking moves. With no carriageway separation, overtaking in such

conditions also means that motorists are constantly facing oncoming traffic approaching at a combined speed of more than 200 km/h. One mistake and there is a catastrophe.



Agricultural and Regional Area Access

Over the past 20 years, Western Australia has witnessed enormous growth in mineral and petroleum production and there is every reason to believe the industries will continue to expand into the future. At the same time, new industries such as the South West Region's plantation timber will generate new growth for the State. Such developments will in turn drive freight growth, population increase and road use in the areas.

Providing access to Remote Areas of the State creates its own special challenges. Because the distances involved are usually long and the expected traffic volume low, the economic case for high cost roads is often poor. Yet there is a demand for good roads to serve the mining provinces, remote aboriginal communities and tourist destinations. But there is an added problem. Many of the remote areas are subject to tropical and monsoonal rains and keeping roads open all year round in such conditions can be a major challenge. The situation is not helped by local geography. Often the land is flat and drainage is a slow process. In the wet season, some roads can be closed for an extended period – creating a major burden for anyone living in the area or trying to run a local business.

THE OPERATING STRATEGY

As can be seen from the issues raised, both Main Roads and the local government authorities that manage the State's roads, now face major challenges as they work to optimise the future use of the road network. The Operating Strategy has a number of key focus areas.

Road Safety

The issue of road safety is managed and coordinated across a number of government agencies including Education, Police, Health and Main Roads. There is a community expectation that the safety of the road network will continue to improve and Main Roads, as the network operator, will constantly seek new ways to reduce the accident toll. Huge efforts have been made to better manage aggressive speed, and considerable investments have been made to prevent 'drinking and driving' and highlight danger areas through "Black Spot Programs". The programs provide constant reminders to drivers of the

need to maintain high personal awareness of safety issues and as such, these and newer safety programs will need to be aired constantly if safety is to improve.

There are numerous ways to improve the safety of the road network and Main Roads has adopted a pro-active approach to minimise risks. The current road improvement program is designed to minimise the potential for sections of road to become hazardous. Outside urban areas, Main Roads is building more roadside rest areas, removing roadside hazards like trees, and installing audible edgelines to alert drivers the moment they stray off track. At the same time, considerable effort is made to ensure roads have smooth and non-slip surfaces. Such measures help combat driver fatigue and frustration - and provide a safer road environment. Other initiatives include education campaigns to show motorists the safe way to share roads with heavy vehicles.

Initiatives such as the State's Black Spot Program will continue. For a section of road or intersection to be treated either the crash record must be high or the risk of crashes be high. "Road safety audits" are undertaken to identify the high-risk sites that do not meet the standard crash rate warrants. But the program is not without difficulties. The high cost of treating some Black Spots results in some proposed Black Spot projects having less 'benefits' than costs. Unless the 'benefits' in lives saved and injuries prevented are increased, or project costs are reduced, some projects may not be undertaken. Is the community saying the value of a human life when it comes to road safety is larger than that presently ascribed to it?

Traffic Management

A key tool in the battle with congestion is traffic management. Significant improvements are being achieved through Main Roads' state-of-the-art Traffic Operations Centre using ITS technology. Traffic on Perth's major Metropolitan roads is now monitored 24 hours a day, and control adjustments are made continually to ensure traffic moves smoothly. There is no doubt that ITS technology can deliver even greater benefits in improving safety and reducing congestion and Main Roads is continuing to seek new opportunities to harness the benefits of ITS.

There are signs that it is becoming more acceptable to use road pricing to manage traffic demand in congested areas. In fact many key stakeholders in Western Australia now accept the concept in principle. For many years it has been the case that freight vehicles have paid additional



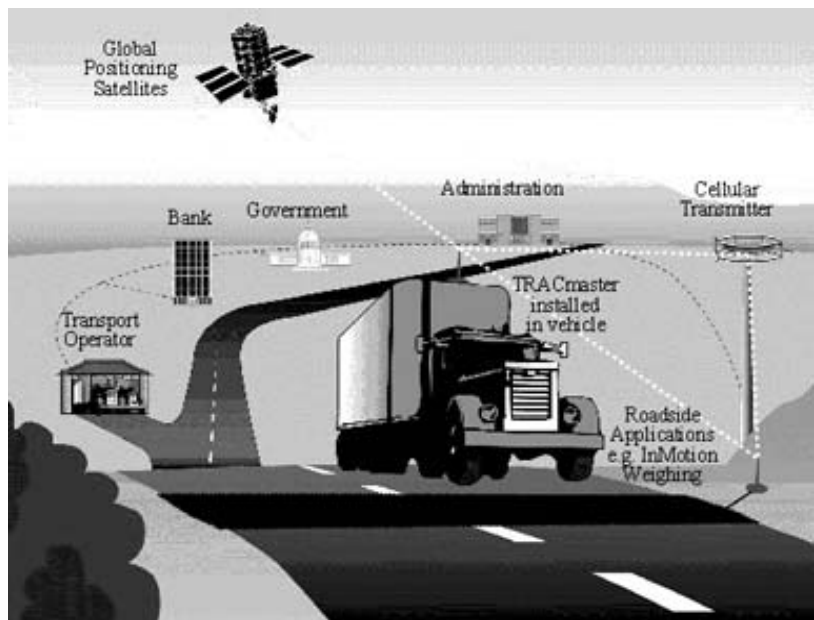
charges when carrying extra heavy loads. Main Roads is now investigating how road pricing could be used to generate funds for better roads for heavy vehicles. Such a

concept would need to show clear benefits for both the network operator and the road freight transport industry.

For the foreseeable future roads outside the Metropolitan Area will continue to be predominantly operated using tools as static signs, road markings, rest areas, street lighting and road rules, rather than with ITS technology such as used by the Traffic Operations Centre. But there will be some changes. Outside urban areas there will be a greater emphasis on such features as overtaking lanes. These have proved to be very popular with road users and far more cost effective than the provision of multi-lane roads.

Freight Transport

Recently the State Government has adopted a plan to improve freight transport in Perth. The plan has six elements of which three fall into the province of the network operator: putting more freight on rail; making better use of the roads; and improving existing roads. These and the recommendations of the Road Train Summit of 2001 form the basis of the freight transport part of the strategy.



Operators of the bigger heavy vehicles are now subject to a form of ‘Operator Licensing’ known as heavy vehicle accreditation. Should this deliver the benefits expected, the State

Government may decide to enhance and extend its operation. Compliance and enforcement practices will embrace “Chain of Responsibility” principles to ensure all participants in the freight industry accept their responsibilities.

Networks of roads will be designated for use by large trucks. As it would be too costly to have all roads and bridges built to carry the biggest trucks, Main Roads will continue to identify and improve “freight routes” – including “high and wide load routes”.

There will be a continual challenge for Main Roads to meet the increasing demands of the freight transport industry without alienating other road users. ITS will play an important part in controlling the truck traffic. Vehicle tracking technology based on the Austroads Intelligent Access Project (See illustration) will be pursued and performance-based regulation of heavy vehicles will be introduced to further improve the safety and

productivity of freight vehicles and simpler access for restricted access freight vehicles will be made available.

Public Transport, Cycling and Vulnerable Road Users

The sustainable future of cities is now a major issue worldwide and Perth's sustainability is to be closely examined. The State Government has launched a major project to investigate the city's future shape and it could result in efforts to ensure that much of Perth's anticipated population growth is accommodated within existing metropolitan boundaries. If this proves to be the case, travel modes



other than the car will be more viable. Public transport and inter-modal improvements are already a State Government priority but with a control on sprawl, this is likely to increase still further. It is hoped that some of the growth in private car commuter travel can be stemmed by the construction of a new passenger rail link between Perth and Mandurah, a fast-expanding town to the south.

It has been shown that by promoting cycling and increasing the number of cycle lanes, more people will cycle - thus keeping down demand for road space. Cycling has grown rapidly in popularity since the mid 1990s – despite a downturn earlier after it became compulsory to wear cycle helmets.

Community Engagement and Customer Service

It is part of the Operating Strategy to ensure that Main Roads continues to build better relationships with key stakeholders. This is being done through the active use of Advisory Groups to deliver better services to the community. Advisory Groups, such as those in the *Pedestrian, Disability Awareness and Heavy Vehicle* areas now work closely with Main Roads. The plan now is to work to improve the community consultation process to ensure consultation is inclusive, transparent and accountable. Main Roads will also strive to encourage responsible driving by all road users. One example of this is the agency's *Heavy Vehicle Road Safety Community Awareness Campaign*.

Main Roads will also continue to communicate with road users through a multitude of ways including the Internet, free telephone services, radio, newspapers, road maps, motoring organisations, television, magazines, leaflets, Local Government and regional offices.

Regional and Remote Area Access

Main Roads has an obligation to maintain road access throughout the State. This means that when there is flooding, road closures are kept to a minimum and changing road conditions well publicised. The notion of 'Community Service Obligations' is well accepted in the provision of water and electricity and the provision of viable road networks should be viewed in the same way.

The issue of access to remote aboriginal communities is now receiving greater attention and so too is tourist access to Western Australia's remote northern coast. Wherever possible, tourist signage indicating potential hazards, tourist sites, varying road conditions and information bays will be provided. At the same time various media outlets will be used to advise tourists of current hazards and conditions.

CONCLUSIONS

Operating a road network in Western Australia means facing extremes. At one end of the scale is the challenge of managing traffic operations in a city where roads can attract 160,000 vehicle movements a day. At the other extreme are remote roads used by a few vehicles each day. Some are desert roads. Others wind through forests. Still more must cope with tropical monsoons. The network operator manages this with tools ranging from sophisticated ITS packages to little more than rudimentary signage.

Main Roads Western Australia faces many issues: road safety, road freight, congestion, traffic management, vulnerable road users and many more. Congestion is a problem in the Metropolitan Area and road safety is a statewide issue. Although heavy freight vehicles are readily accepted in the Remote Area, there are access issues elsewhere. The Operations Strategy sets out to address these issues.

The Western Australian strategy endeavours to make the most of many tools, but in the future will make even greater use of:

- ITS, public transport, cycling and pricing on congested urban roads;
- Traditional traffic management on all roads;
- Road safety initiatives such as the Black Spot Program;
- Performance based regulation of heavy vehicles;
- Community involvement, customer service and extensive communication.

The role of the road authority is changing. The traditional task was to construct and maintain roads. This has moved to more of a stewardship role as manager of the road network. This role of road network manager in turn is providing a renewed emphasis on that of network operator.