



Getting freight right through Sydney: priority rail freight routes through metropolitan Sydney

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Abstract:

Resolving some of Australia's most challenging transport issues demands innovative research and fast track action to win everyone's support

Sydney's metropolitan network (1,400 km of track along 651 km of routes) is the largest (with almost 270m journeys in 1996/97) urban commuter network in Australia and is the nation's most strategic freight gateway. Its complexity and intensity imposes challenges for the owner and manager of the NSW rail network, the NSW Rail Access Corporation. Economic, commercial, environmental and social demands are pressing for more use of rail in Sydney, particularly for freight

Developing the strategy and solutions for "getting freight right through Sydney":

- applied new approaches to research in:
 - demand for passenger and freight services;
 - equitably managing diverse stakeholder interests;
 - operation of transport networks;
 - testing adjustments to infrastructure;
 - ways to resolve conflicts between users;
 - multi-faceted evaluation of priorities and staged investment programs;
- dynamically applied "fast-track" research to drive decision-making.

The integrated strategic research process used in this case shows how to most effectively:

- examine complex components while maintaining focus on the big picture;
- engage affected stakeholders and resolve competing demands on a multi-user transport network to optimise outcomes;
- maximise performance of existing networks through critical adjustments based on targeted research; and
- win support and commitment through research.

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Introduction

Resolving one of Australia's most challenging transport issues demanded innovative research and fast track action to win support.

Developing the strategy and solutions for 'getting freight right through Sydney' applied new approaches to research in:

- demand for passenger and freight services;
- equitably managing diverse stakeholder interests;
- operation of transport networks;
- testing adjustments to infrastructure;
- ways to resolve conflicts between users; and
- multi-faceted evaluation of priorities and staged investment programs.

This paper outlines how the Rail Access Corporation (RAC) applied 'fast-track' research to drive decision-making. Firstly, the paper shows that internal research is integral to RAC's success ('context for research'). The general role of research for the rail transport industry is outlined ('general research'). One of RAC's many research challenges, rail freight paths, is discussed and important research principles are highlighted.

Context for Research

Rail Access Corporation was established on 1 July 1996 under the NSW Transport Administration Amendments (Rail Corporatisation and Restructuring) Act 1996. A State Owned Corporation, Rail Access Corporation owns and manages the essential rail infrastructure in NSW and is responsible for providing open access to accredited rail operators under the NSW Rail Access Regime. The Corporation's principal functions are:

- to hold, manage and establish rail infrastructure facilities on behalf of the State; and
- to provide organisations with access as rail operators to the NSW rail network.

RAC aims to provide customer service that exceeds customers' expectations. RAC's customers include rail operators (and their client markets), governments (and the communities they serve), and suppliers of services. RAC strives for continual improvement by undertaking regular customer surveys to obtain feedback on RAC's service. RAC seeks to implement best practice rail network management processes that are based on sound commercial principles. Processes are benchmarked against domestic and international leaders. Clearly, RAC's collective capability stems from combining research and strategy to guide negotiations and facilitation of access and infrastructure and research. The pivotal role of RAC's research is illustrated below.



Figure 1. RAC's Role

Through such strategic research, RAC seeks to translate the pressures of demand and supply into robust solutions for all stakeholders.

General Research

Unsurprisingly, RAC's transport industry research shows that quality of service is critical, and the rail industry has often failed to provide the required degree of service, particularly in critical areas like reliability. Many customers have given up and sent their freight by road. Many will not come back to rail until service improvements are proven.

Governments have recognised that now is almost - but not quite - too late to redress the balance. We are witnessing an exciting program of reforms which will reinvigorate the rail industry and see rail regain its place as an essential part of the national transport industry. Past research has shown that better use of rail will deliver substantial economic, environmental and social gains.

RAC has introduced competition and competitive neutrality in rail transport between the public and private sectors, and is driving a market oriented commercial service culture into the rail network.

In its first year, RAC analysed its management systems, its fundamental business activities and its role in the transport chain. This strategic research showed RAC operates three separate, but interrelated businesses - coal operations, the urban network, and both interstate and intrastate services. The operators within the respective businesses share the same network, but have vastly different needs and service expectations. Not surprisingly there are many complex service delivery issues to be resolved by RAC in consultation with the different businesses. At present, only the coal operations provide a truly commercial return on assets.

RAC applies commercial decision making criteria and commercial rates of return on all proposals. This enables RAC to ensure that improvements to the operation and form of the network will meet customer needs and create a better, more competitive network. It also demands continuing public and corporate research to provide the basis for

management decisions RAC's strategic framework for asset development is illustrated below.

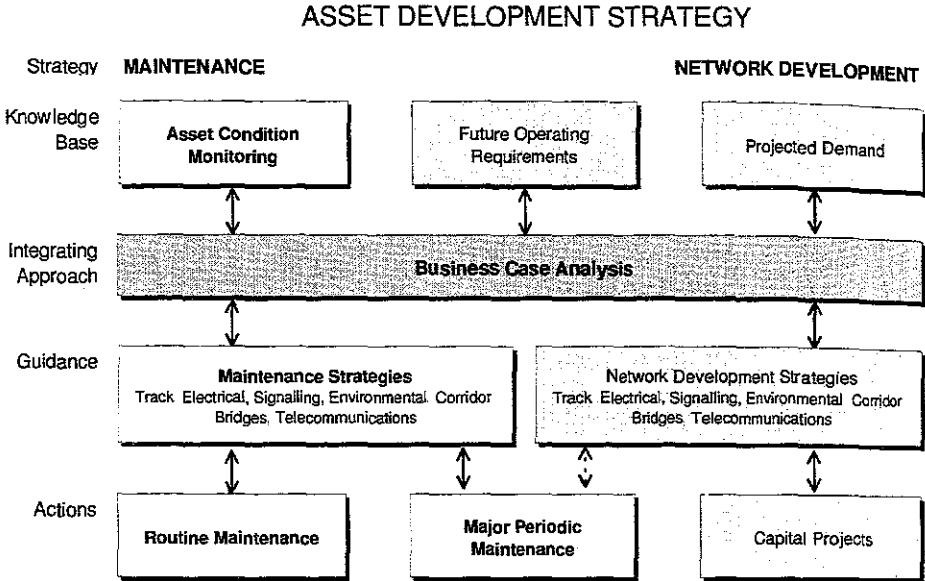


Figure 2. Strategic Framework, highlighting Network Development

Outside NSW, administrative barriers are being overcome (eg by creating the Australian Rail Track Corporation (ARTC) as a 'one stop shop' for national operators) to create a borderless network with continuous linkages between origins and destinations. Providing a seamless network for operators requires ongoing management of relationships between rail agencies, and sharing of research.

What has been lacking is adequate *funding* for the essential infrastructure needed to build a modern, national network - a network which will enable RAC, ARTC and others to provide the service levels our customers need to capture operating efficiencies (such as longer trains and heavier axle loads) and reliable train paths at key times. National Rail Corporation has shown that over the past 30 years, Federal investment in national rail infrastructure has averaged about \$50m annually, compared with more \$500m annually for national roads.

Previous research is starting to attract, at last, a more equitable share of national funding to rail. For example, investment by government entities in freight-oriented rail in Sydney includes:

- Federally funded One Nation program works from 1992-1995 (c \$45m) including dedicated bi-directional loops at Cowan and Glenfield-Ingleburn;
- Freight Corp improvements to the Enfield Yard, including re-railing;
- National Rail Corporation commitments to establish an intermodal freight facility at Chullora; and

- RAC's major upgrading (including concrete re-sleepering, track realignment and upgrading, overhead wiring replacement, bridge replacement, drainage, cutting and widening, junction renewals, crossover replacements) of the metropolitan goods line between Flemington Junction and Meeks Road Junction, for completion in 1999.

Metropolitan freight works currently being implemented by RAC include:

- construction of a crossing loop and upgrading lighting at Botany yard;
- (subject to confirmation of Commonwealth funding) construction of a grade separated junction at Flemington to reduce passenger and freight conflict; and
- extensive and diverse improvements across the network to improve infrastructure performance and better match freight operators' needs. Examples include re-railing, and improving communication and control systems.

RAC strongly supports the governments' Heads of Agreement signed in September 1997 providing for the investigation of all relevant matters affecting competitive neutrality between road, rail and sea. More research will be needed to promote and ensure competitive neutrality between road, rail and sea. RAC's research has shown that, the ratio of public capital expenditure on rail compared to road is consistently and significantly higher in NSW than the national average (see Appendix 2).

A Challenge for Research - Getting Freight Right

The problem

Sydney's metropolitan network (1,400 km of track along 651 km of routes) is the largest urban commuter network in Australia (with almost 270 million journeys in 1996/97) and is the nation's most strategic freight gateway. Its complexity and intensity imposes challenges for the owner and manager of the NSW rail network, the NSW Rail Access Corporation. Economic, commercial, environmental and social demands are pressing for more use of rail, particularly for freight.

Research commissioned by RAC has shown that:

- Rail carries one third of the 17.3 million tonnes of rail, road or sea-borne freight in the Sydney-Melbourne, Sydney-Brisbane, Melbourne-Brisbane and Sydney-Perth corridors.
- In the key corridors, rail has the highest market share in shipping containers and in general (dense) freight, which are generally less time sensitive than other freight.
- The total freight market is growing, and efficiency is improving.
- Rail has competitive (including price) advantages and some comparative disadvantages (time, reliability) in key market segments.
- Analysis of price and market data shows a strong relationship between price and market share, and that rail can continue to have a sustainable and competitive position in the freight market.

(Booz Allen & Hamilton (1997)).

Presently, the only train movements into and out of Sydney during the extended peaks are inter-urban commuter services. During these widening peaks, freight services are denied egress from Sydney through the operational intensive suburban network. Freight access is jammed inside and outside Sydney at the times of greatest demand. The constraints limit rail's share of freight markets, unduly complicate rail operations, and discourage new entrants to the rail market.

The need to amplify existing freight routes within the Sydney metropolitan area is overwhelming. Yet stakeholders could not overcome the supply problem if they acted individually - commercially or politically. Solutions need the collective support of many (if not all) stakeholders. Stakeholders have shown they need to be convinced (by solid market research and effective communication) that potential actions and solutions will make them better off individually, and not disadvantage them relatively.

On 10 September 1997, the Commonwealth, and mainland state governments entered an agreement aimed at reforming Australia's interstate rail network, to help deal with the myriad of issues of this kind. Among other things, Governments agreed to "develop a plan for the provision of a dedicated freight track(s) through Sydney and to settle on the means of achieving this by 14 November 1997". These tracks are to reduce passenger/freight conflict and improve the capacity of the metropolitan network for freight traffic.

Extensive research and experience had pointed to the problem for freight, the concurrent need for intensive passenger operations, and the potential cost of infrastructure solutions. However, research had not yet provided the solution to what had become an intractable problem.

RAC chose a dynamic approach in applying research to this national issue and complex problem. And there was limited time.

Creating the Framework for Research

RAC intended to engage stakeholders in a way which allowed them to make good judgements, preferably informed by a strategic perspective and enlightening research.

RAC's critical first step was to strategically review the problem, and refine the research brief to ensure it could produce realistic outcomes which could be supported by all stakeholders. RAC's approach to developing a solution is indicated below.

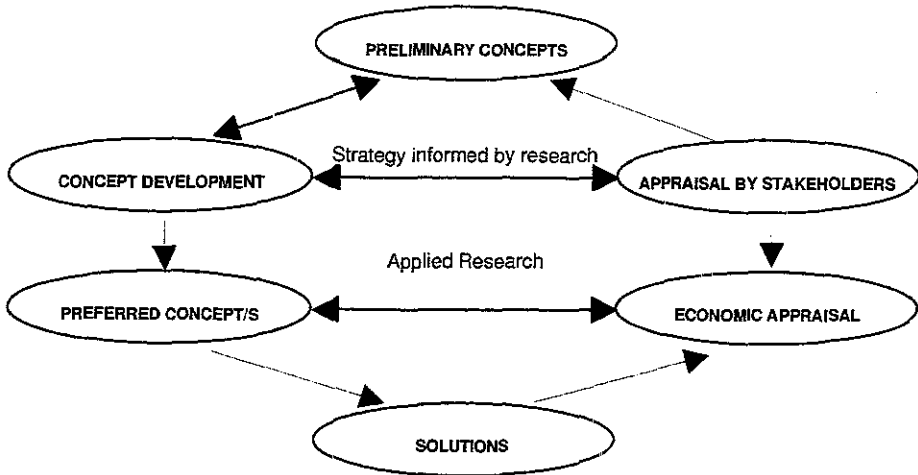


Figure 3. RAC's Approach

Preliminary Concepts to Bridge Gaps

RAC had to take the initiative by proposing preliminary concepts which would stimulate the reaction and involvement of key stakeholders. The concepts were developed by examining the gap between:

- current conditions - involving real understanding of the existing situation (including asset qualities, operation, capacity for change and cost of change) and future market conditions (including the raw freight markets, operators' market and ability to pay/elasticities); and
- our 'big picture' view of what's needed for the future.

Preliminary concepts were developed to 'bridge' the most critical, but 'bridgeable' gaps.

Concepts were developed for the establishment of priority rail freight corridors within metropolitan Sydney. Investigations focussed on establishing priority routes along the four major rail corridors leading to Sydney's existing priority freight network and linking freight terminals at Enfield, Chullora, Glebe Island and Port Botany. The corridors from the metropolitan edge into the core of the existing freight network are (in descending order of importance):

- south - Macarthur via Leightonfield to Sefton Park
- north - Hawkesbury River to Concord West/Flemington
- west - Emu Plains to Lidcombe/Flemington
- Illawarra - Waterfall to Sydenham

Investigations took account of:

- technical and market issues - including existing, proposed and forecast passenger and freight service demand, timetables, station stops and terminus operations, train

- stabling, train lengths, absolute and relative travel speeds and the resultant peak and off-peak capacity constraints and conflicts
- key stakeholders interests - including the business needs of the State Rail Authority (which operates metropolitan and intercity passenger services), freight operators (including National Rail) and Sydney Ports Corporation
- possible infrastructure improvements to address the identified constraints and conflicts to meet operators business needs.

Concept Development

Essentially the approach initially involved fast interactive participative research, indicated by the top 'triangle'. RAC quickly needed to give form to a complex problem, and to distil a manageable project that was not sidetracked by excessive detail, nor too simplistic. To ensure a high level of resolution, participants generally had a very sophisticated understanding of relevant issues or processes. RAC provided the vision and strategic direction. Affected stakeholders provided the required corridor specific detail.

In this scoping and defining phase, research methods were dynamic, verbal, graphic and highly interactive 'Open' techniques of brainstorming, workshopping, and role playing were used.

For example, this 'fast and informal' approach:

- identified the critical issue as service levels, defined principally in transit time reductions, improvement in on time reliability and improved service availability (expressed as 'improved options for timetabling of freight services to suit customer needs,' rather than constructing timetables around set curfews).
- unlocked rich information from rail operators about their commercial behaviour. With this insight, RAC could then undertake independent research on cost, efficiency and other parameters, and so better estimate net benefits of different scenarios.
- captured stakeholders' attention and stimulated shared commitment to rail reform.

Applied Research

The subsequent 'hard' research and analysis was stimulated by knowing we were 'on the right track' - doing nationally significant, innovative work of real value.

Crucial steps in getting it right were:

- RAC perceiving its central role as a coordinator and manager - creating a process and guiding direction which could quickly develop good concepts which would be supported by stakeholders, then apply demanding research and appraisal to identify, test and refine preferred concepts so they became the solution sought by all stakeholders.
- defining the goal with the right combination of focus and flexibility - for example - as 'making additional train *paths* (and not necessarily dedicated tracks) available to

increase capacity by investing in infrastructure improvements *and* finding better ways of using the existing infrastructure'. This avoided the research team having a pre-conceived solution that ignored demand management and asset management solutions. This also meant that RAC could act strongly to encourage stakeholders toward an agreed solution, without being associated with any particular solution. Such neutrality brings independence and legitimacy to the stakeholders' solution "Priority rail freight corridor" was another useful preliminary concept. Numerous infrastructure and economic studies showed that creation of dedicated new heavy rail infrastructure for general freight was often not economically viable. Extending existing dedicated freight networks to the edge of Sydney was financially and (in some locations) physically impossible...

- focussing on priorities - four major rail corridors lead to Sydney's existing priority freight network and the existing freight terminals at Enfield, Chullora, Glebe Island and Port Botany. The southern corridor was most important (carrying significantly the greatest freight) and the northern corridor also. Priorities were clear from RAC's knowledge base covering market and industry trends, as well as a continuously developing knowledge of the performance of its network, particularly those which accrue to rail freight customers. One research challenge was to identify, define, quantify and value the service levels sought by potential rail freight markets.
- involving the stakeholders in the process - through their shared commitment to the goals and the brief, direct consultation on their needs and options to satisfy them, and active participation in appraisals. Stakeholder participation made it possible to quickly focus on the right service issues, and assess economic appraisals and sensitivities
- interactive testing of potential solutions with stakeholders, so each could appreciate the needs of others and help resolve competing demands into fair solutions which could be advocated by all. The complexity of rail network issues means that "the devil is (often) in the details". This approach provided a necessary 'fast track' check of all details. Each stakeholder closely examined proposals from their own perspective, whilst developing an understanding of wider issues. This concurrently enhanced the capability and 'multiplied' the resources of RAC's research team.

Specific Project Findings and Outcomes

The freight plan has been driven by benefit cost analyses of the national network reflecting the commercial needs of freight industry and rail operators. Research took account of ;

- Existing , proposed and forecast passenger and freight service demand, timetables , station stops and terminus operations, train stabling, train lengths, absolute and relative travel speeds and the resultant peak and off peak capacity constraints and conflicts;
- the business needs of key stakeholders such as SRA (which operates metropolitan and intercity passenger services) and freight rail operators (including 'National Rail'); and

- possible infrastructure improvements to address the identified constraints and conflicts and meet operators business needs.

Basic capital works will ease access through critical locations and give immediate off-peak improvements for freight. Ultimately, new bypasses along the vital southern and northern access corridors will join to provide a completely independent and effectively dedicated southern route and a high capacity shared northern route that can be accessed throughout the day. Clearer paths will also be created for freight operators in the western corridor.

By unlocking strategic gateways, the whole of the existing network can be used more productively, and so more efficiently. Research has optimised net benefits and minimised conflicts in:

- technical and market performance - including existing, proposed and forecast passenger and freight service demand, timetables, station stops and terminus operations, train stabling, trains lengths, absolute and relative travel speeds and the resultant peak and off-peak capacity constraints and conflicts
- business needs of passenger and freight operators (such as National Rail) and key stakeholders like Sydney Ports Corporation

Freight operators' capabilities will greatly improve through:

- more flexibility for operators to provide customer focussed services,
- peak period services, eg for higher-value time-sensitive freight
- less operating risk - with fewer delays and disruptions from less interaction with the passenger network

The now-proposed works strategy is generally:

- to upgrade the existing access corridors to the existing dedicated freight network, freight terminals and ports in Sydney (rather than create new corridors); and
- within these access corridors, to prioritise and stage investments.

Three stages of investment are envisaged for the most vital access into and through Sydney from the south (Melbourne) and the north (Brisbane):

- Stage 1 - To maximise immediate benefits, delivering significant all-day train pathing benefits and permit some relaxation of the peak curfew for specific high priority freight services. Includes passing loops, bi-directional freight track, freight refuges and grade separation at Flemington. Indicative cost \$145m (+/- 30%).
- Stage 2 - To enable further relaxing of the curfew. Includes further bi-directional freight track, track remodelling, bypasses and quadruplication. Indicative cost \$193m (+/- 30%).
- Stage 3 - To provide a clear northern, southern and 'through' route, even during peak commuter periods. Includes selective additional track, track duplications and grade separation. Indicative extra cost \$112m (+/- 30%).

Appendix 1 shows the location of the investment

The eventual cost of a clear north-south route is \$450m. For the western corridor, investment of \$3m (stage 2) and \$65m (Stage 3) would provide corresponding improvement for this less critical corridor

The research findings are included in RAC's submission for part of the capital funds committed by the Commonwealth government.

Conclusions

The integrated strategic research process used in this case shows how research is essential to effectively:

- examine complex components while maintaining focus on the big picture;
- engage affected stakeholders and resolve competing demands on a multi-user transport network to optimise outcomes;
- maximise performance of existing networks through critical adjustments based on targeted research; and
- win support and commitment for reform involving multiple stakeholders.

References

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Acknowledgments

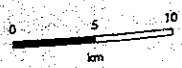
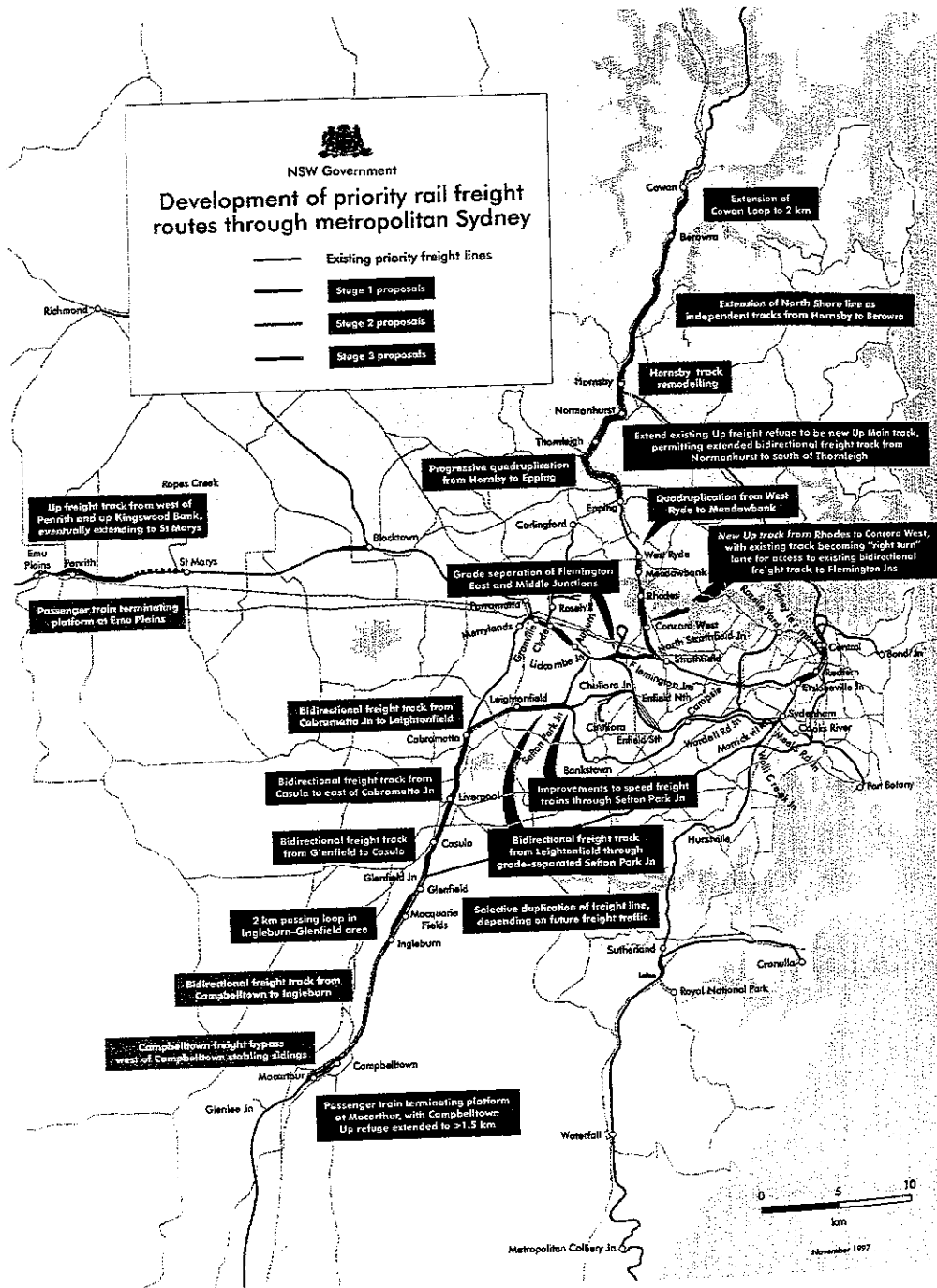
This paper draws from the work of the NSW Rail Access Corporation, including work for the Corporation by consultants Booz Allen & Hamilton and GHD.



NSW Government

Development of priority rail freight routes through metropolitan Sydney

- Existing priority freight lines
- Stage 1 proposals
- Stage 2 proposals
- Stage 3 proposals



November 1997

Appendix 2 - Trends in Government Expenditure on Rail

Introduction

Commonwealth and NSW Government spending over the past 10-15 years has been examined by RAC concerning:

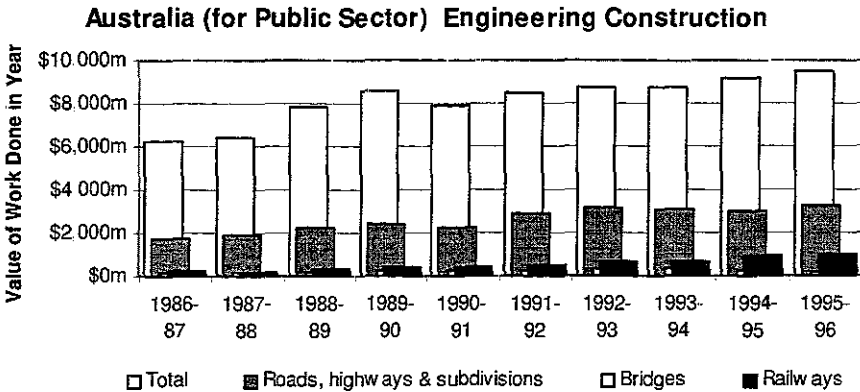
- each government's outlays on rail compared to roads, and
- outlays in the rail sector on capital and operations.

Data is sourced from ABS 5512.0. Because of changes in public accounting, 1980s information on government outlays may be inconsistent with later information.

National and State Spending on Infrastructure

Spending on Infrastructure

The value of engineering construction done for the whole public sector (all governments) in Australia is shown below.



1. Figure A2-1 Australian Public Sector Engineering Construction

Spending on roads, highways and subdivisions far outstrips spending on rail. However road/highway/subdivision expenditure has leveled over the past four years, whereas rail expenditure continues to increase. Rail expenditure is also growing as a proportion of total engineering construction for the public sector.

Roads spending has grown (in NSW to over \$1500m) then declined (in NSW to about \$1,000m) in the same period.

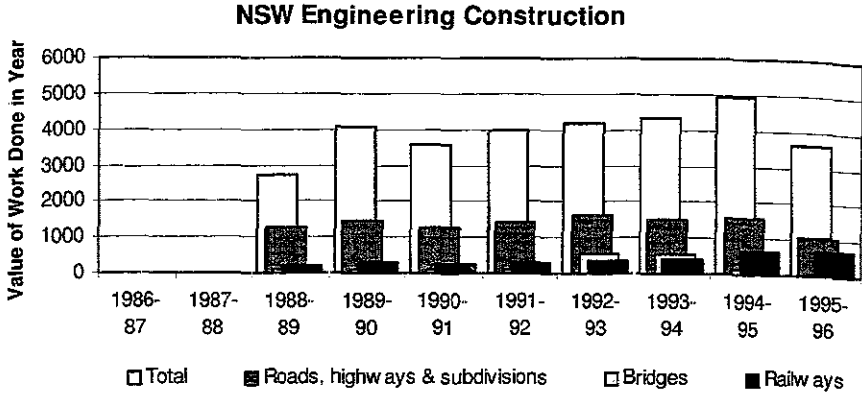


Figure A2-2 NSW Engineering Construction

Because most bridge expenditure is road related (e.g. Glebe Island Bridge) the 1992-93 peak spending on road-related infrastructure was really higher than shown. In NSW rail expenditure is rapidly approaching road expenditure.

The ratio of road to rail spending is substantially higher in NSW than for the rest of Australia, and represents most of the national growth in public sector rail expenditure.

Spending on Rail

Railway engineering work done has grown since 1987-99 (e.g. in NSW from around \$200m in 1988-89 to over \$600m in 1994-95). Expenditure in NSW on rail (mostly for the public sector) is the major share of work for the public sector in Australia, as shown below).

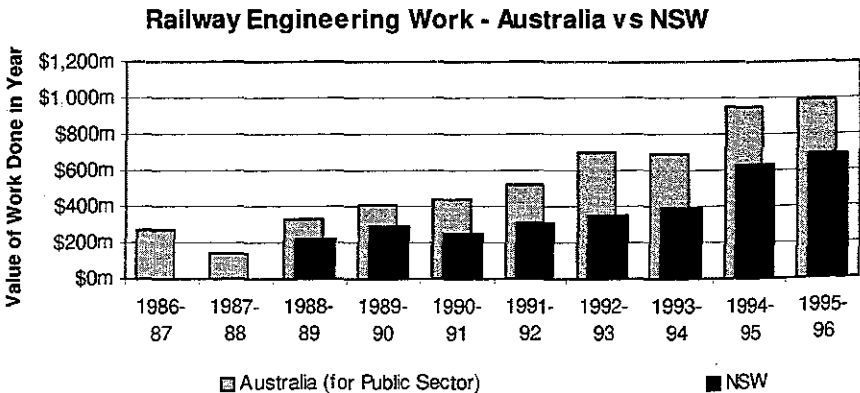


Figure A2-3 Railway Engineering Work - Australia vs NSW

Spending on Roads

Engineering work done for the public sector in Australia on roads, highways and subdivisions has generally grown since 1987-99 to plateau at just over \$3billion nationally since 1992-93. Work done in NSW (including private sector subdivisions) has recently declined partly due to urban consolidation reducing demand for subdivisions.

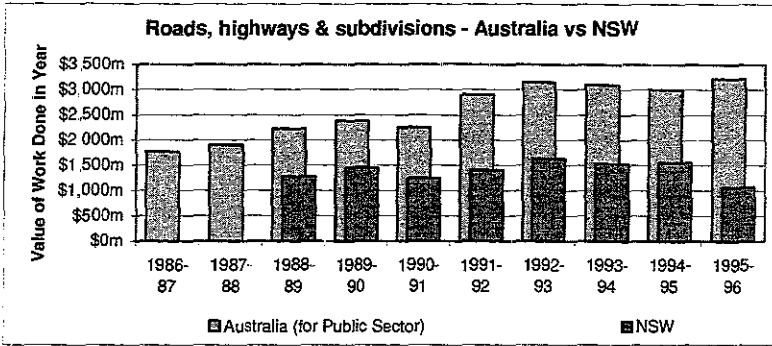


Figure A2-4 Roads, Highways & Subdivisions - Australia v NSW

Ratios of Road to Rail Spending

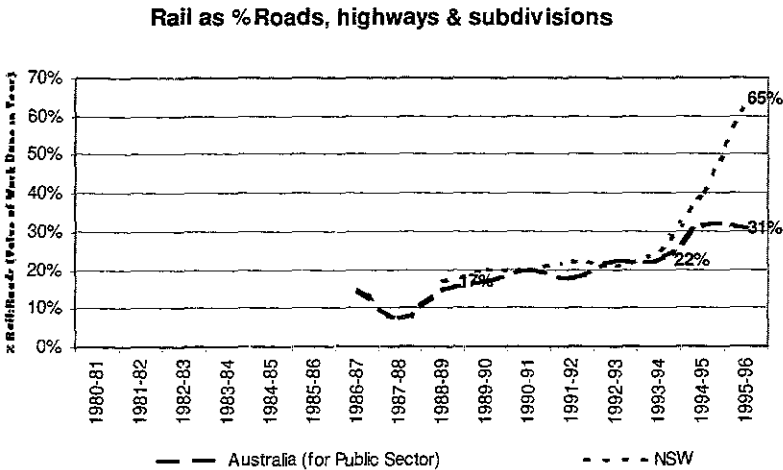


Figure A2-5 Roads, Highways & Subdivisions - Rail as % of Roads etc.

National public sector expenditure on rail as a % of roads/highways/subdivisions has grown at about the same rate as expenditure in NSW – from 17% in 1988-89 to over 22% in 1993-94. From 1994-96, the ratio of rail to road outlays has increased (assisted

by leveling of national public sector road spending and real decline in NSW road spending).

NSW Government Outlays on Rail versus Road

In NSW, the ratio of NSW government outlays on rail to road outlays peaked in 1993-94, when expenditure on rail reached \$1,500million. A large part of this growth was multi-modal transport, such as the railway interchange program.

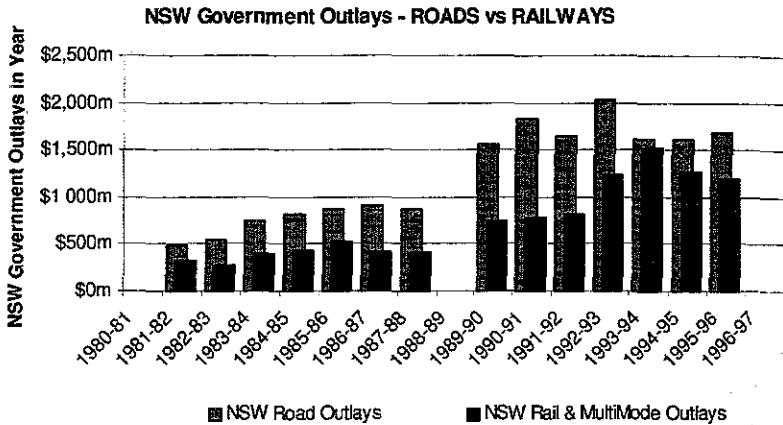


Figure A2-6 NSW Government Outlays - Roads v Railways

The graphs below show the emphasis on capital outlays for rail, compared to current outlays for roads.

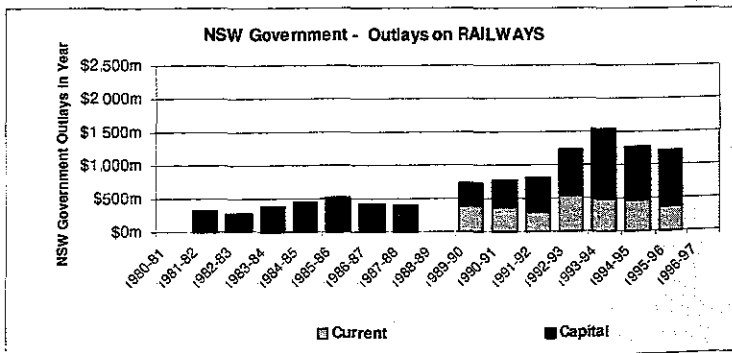


Figure A2-7 NSW Government Outlays on Railways

Early current outlays on rail were not identified in the NSW accounts.

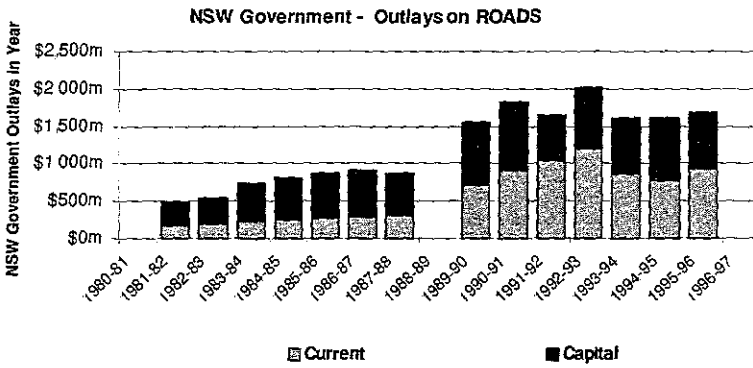


Figure A2-8 NSW Government Outlays on Roads

Recent capital expenditure on rail exceeds capital expenditure on roads. The differences between total outlays for road and rail are primarily due to differences in current outlays.