



HARBOUR-LINK



# THE SYDNEY MONORAIL



**vonRoll**  
Monorail



# DARLING HARBOUR - AN INNER CITY TRANSFORMATION

Darling Harbour is the greatest urban re-development ever undertaken in Australia and one of the most ambitious in the world today - 50 hectares of derelict industrial land transformed into a vital new entertainment, cultural and activity centre.

Over \$1.5 Billion worth of projects are destined for the site - \$2 of private development for every \$1 of public money invested.

Sydney is already served by an excellent metropolitan transport system which includes an underground train loop, the 'city circle', around which the central business district has been built. Darling Harbour will greatly expand this central business district while creating a magnificent array of new facilities.

## THE NEED FOR TRANSPORT INTEGRATION

To achieve its full potential, Darling Harbour must be integrated into the existing fabric and functions of the city. One of the most important means of achieving that integration is the TNT Harbour-Link Monorail system. It is the key to the Darling Harbour transport strategy and Darling Harbour's on-going success!

## EXPRESSIONS OF INTEREST

In early 1985, the Darling Harbour Authority received more than 20 Expressions of Interest from private enterprise for the development and operation of a 'People Mover' to link Darling Harbour and the city. Formal submissions from a selected shortlist were then invited. After more than 6 months of detailed consideration by a State Government sub-committee the TNT Proposal, using the proven light monorail technology of Von Roll of Switzerland, was chosen. The contract was awarded to TNT in October 1985. The formal contract, covering construction, operating and financial arrangements, was made public in March 1986.



The first monorail cars, in TNT colours.







# TNT HARBOUR-LINK

## MOVING WITH SYDNEY INTO THE 21ST CENTURY

There is no doubt that the TNT Harbour-Link monorail system is *the* answer to Sydney's problem of inner city transport, both now and well into the 21st century. Because of its ultra slim design, TNT Harbour-Link can boldly travel through the very heart of the city – *where the people are* – moving them quickly and quietly *above* our congested streets, to the magnificent Darling Harbour complex. No other transit system arouses as much excitement as does the monorail. Custom-designed by Von Roll for urban areas where space is at a premium, TNT Harbour-Link is the most effective and efficient solution to moving people, and what's more, it is absolutely *pollution free*. Rubber tyres and electric motors mean whisper quiet travel and no exhaust fumes!

Visionary in concept, TNT Harbour-Link is an innovation of which all Sydney can be justifiably proud. It enhances and contributes significantly to the delightful experience that is our modern city, and will do so for generations to come.



The monorail moves quickly and quietly, above the traffic – a view up Market Street.



# TNT HARBOUR-LINK

## THE FACTS

### THE OPERATOR

The TNT Group – Australia's most dynamic transport organization – is the developer/owner/operator of TNT Harbour-Link. As joint owner of Australia's leading domestic carrier, Ansett Airlines, TNT can claim with complete justification, that no other private enterprise group in Australia knows more about moving people – quickly and safely.

### THE TECHNOLOGY

Von Roll – Universally acknowledged as leaders in people mover construction, Von Roll has custom-designed and installed some nineteen monorail systems – the latest being at Seaworld, on Queensland's Gold Coast. Von Roll represents Swiss technology at its very best!

### THE FUNDING

TNT has funded the monorail in its entirety. This means that *all* construction and operating costs are being met by private enterprise. *TNT Harbour-Link doesn't cost the taxpayer a cent!* What's more, the State Government participates in a profit sharing arrangement, based on ridership revenues.

### THE LOCAL INDUSTRY INVOLVEMENT

TNT Harbour-Link monorail cars are manufactured by Von Roll in Switzerland. However, everything else – including the monorail assembly and fit-out of cars, control system, support columns, track, stations, and other infrastructure – proudly wears the 'Made in Australia' tag. Indeed, Local Industry accounts for more than 70% of the total project.

Another important by-product of TNT Harbour-Link, is the transfer of monorail technology.

In essence, this means that future monorail projects can be developed using a talent pool of experienced Australians. It has also provided a source of skilled, local operating and maintenance personnel.

### THE EMPLOYMENT

By providing a quick, efficient and scenic link from the city centre, TNT Harbour-Link ensures the on-going success of the magnificent Darling Harbour project, on a 365 day-a-year basis. The mammoth investment in Darling Harbour and the thousands of jobs which are generated by that investment, are therefore secure – thanks to TNT Harbour-Link.

During the construction of TNT Harbour-Link some 500 jobs have been generated, while some 30 to 40 permanent employees are needed to take care of operations, maintenance and security.

### THE EFFECT ON TRAFFIC

One particular advantage of TNT Harbour-Link is that it *does not compete for space* with cars, buses, or pedestrians, in Sydney's already congested streets. Support columns are located in parking lanes or on extended footpath areas. This means pedestrians continue to enjoy full use of existing footpaths, while cars and buses will continue to utilize existing roads for through traffic. Parking or set-down areas, for both public and private transport, are still available between those columns which are located in the parking lane.

The overall impact on street-level vehicular and pedestrian traffic flow within the city is minor.

Meanwhile, TNT Harbour-Link, with its elevated corridor, increases the overall capacity of the streets to move people. Passengers glide overhead – completely independent of, and totally unobstructed by the traffic below. With the ability to move in excess of 5,000 people an hour above our city streets, TNT Harbour-Link is a transport planner's dream, and a passenger's delight.







The monorail offers seating and decor in keeping with the highest standards.



TNT – A truly international transportation company.



The TNT Sydney Monorail – moving people as never before, above the congestion of the city streets.



# TNT HARBOUR-LINK

## THE FIGURES

### THE ENVIRONMENT

The combination of rubber tyres, electric drives and a continuously welded, steel running beam, means TNT Harbour-Link is *incredibly quiet*.

Meanwhile, the only visible sign of the TNT Harbour-Link system, apart from the monorails themselves, is the single running beam and the slender but incredibly strong "I" beam support columns, strategically situated, some 30 metres apart, along the route.

Additionally, selected 'inner city' support columns are suitably treated to further soften the shape. This unobtrusive support system ensures visual pollution is kept to a minimum.

Even more impressive is the fact that TNT Harbour-Link *does not cause any air pollution at all!* Its quiet, electric drives simply do not give off any emissions whatsoever, while all bearings and lubricated parts are fully sealed!

### THE TRACK

Von Roll have designed TNT Harbour-Link to run overhead, some 5.5 metres (18 feet) above the ground, just above awning level, on a 70cm (28 inches) wide by 80cm (31 inches) deep, single beam, which in turn, is supported on slender but incredibly strong, 25cm by 69cm (10 inches by 27 inches) "I" beam columns, spaced approximately every 30 metres (100 feet).

When we say  
"whisper-quiet",  
we mean it!

The running beam is field-welded together, to provide a continuous track which, along with rubber tyres, ensures minimal vibration and noise. *When we say "whisper-quiet," we mean it!*

The route, a loop configuration, is 3.6 kilometres (2.25 miles) in length.

### THE STATIONS

There will eventually be a total of eight stations around the loop, each one some 27 metres (88 feet) long. Access to each station includes ramps or elevators, (in addition to stairs or escalators) and the platform is level with the floor of the monorail. *This means access for the disabled in wheelchairs or people with strollers is unhindered – a first for Sydney transit systems!*

The city stations are integrated into host buildings so that stairs and escalators do not intrude onto the footpaths.

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### THE MONORAILS

Each monorail (consisting of seven individual cars) is approximately 32 metres long and there are six monorails in total.

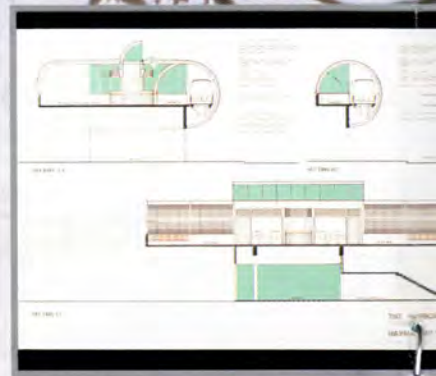
The TNT Harbour-Link system is designed to move some 5,000 passengers per hour on the complete circuit at rush hour. If required, additional monorails can be added to the system, so as to increase capacity even further!

### THE TIMETABLE

Operating hours are currently 6.00am to midnight – 7 days a week.

### Now that's service for you!

Depending on flow conditions, the round trip takes approximately 12 minutes. Cruising speed is 33km/h. With all six monorails operating, the longest you'll have to wait is just 2 minutes. *Now, that's service for you!*



A cross section of Haymarket station, showing modern, tubular design.



TNT Harbour-Link – an integral part of the city-scape







So quiet and pollution-free — you can even dine next to a modern monorail.

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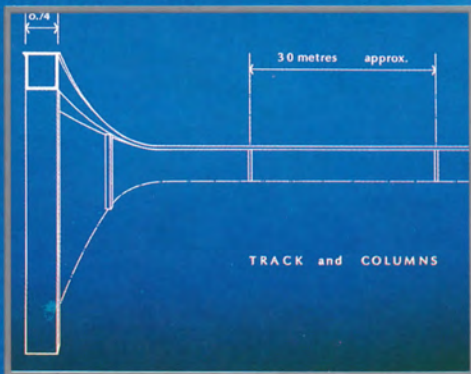
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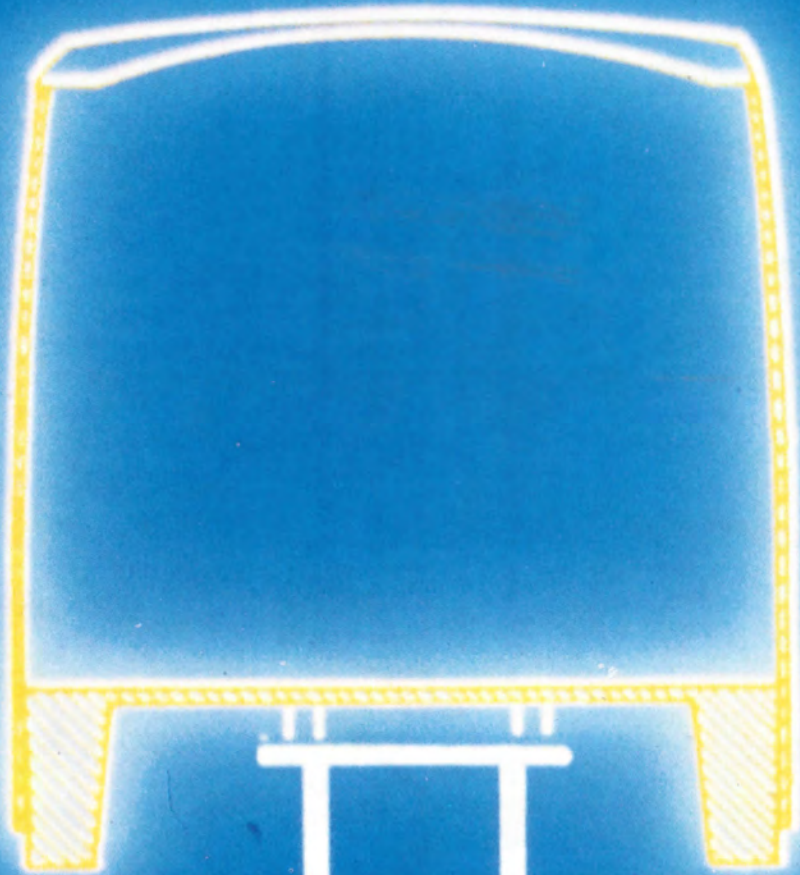




TNT Harbour-Link platforms and vehicle floor heights are at the same level. This means easy on- and off-loading, especially for the disabled.



TNT Harbour-Link runs on a very slim beam supported by slender columns spaced approximately every 30 metres.





# TNT HARBOUR-LINK

## SAFETY ASPECTS

### THE SAFETY ASPECTS

Equipment is, of course, provided to cope with the unlikely event of an emergency. But, how safe is TNT Harbour-Link?... in a word, very!

The Swiss-designed TNT Harbour-Link monorail employs sound, well-proven engineering technology, which, in turn, ensures reliability that is second-to-none.

With some nineteen monorail systems to their credit, Von Roll really know how to build in safety!

The all-metal car bodies are of a non-flammable, lightweight construction and are, at the same time, extremely strong.

In the unlikely event of breakdown, a monorail can be moved to the next station, using stand-by power, or by using another monorail to push it.

TNT Harbour-Link monorails are computer-controlled, and have well proven, automatic fail-safe controls and blocking systems to prevent any possibility of collision.

### OTHER STANDARD SAFETY FEATURES INCLUDE:

- ☐ an intercom inside each car which enables passengers to speak with central control;
- ☐ closed circuit television surveillance at stations, with continuous monitoring from central control;
- ☐ a track structure designed to withstand collision by road vehicles, plus a system of sensors which, in the event of track misalignment, immediately brings the monorails to a halt;
- ☐ up-thrust and side-thrust wheels which prevent any possibility of derailment;
- ☐ TNT security staff and system controllers who monitor the monorail system around-the-clock.

### THE TRACK

The track – or running beam – is a light, torsionally stiff steel structure. The track is borne by steel support columns, spaced approximately every 30 metres. The elements of the steel structure are factory pre-fabricated. Field assembly is therefore simplified. The resultant time savings mean minimal disruption to traffic and pedestrians during the construction phase.

### THE STATIONS

The station platform is at the same level as the floor of the monorail, thereby permitting unobstructed quick-boarding and off-loading – especially for the disabled, or people with strollers.

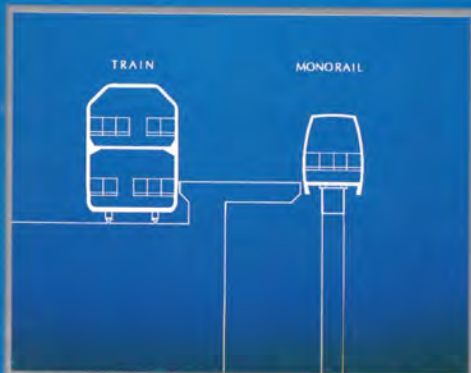
### THE POWER SUPPLY

The power rails are attached at the side of the track. They consist of three aluminium/stainless steel collector lines, mounted on insulators. An insulating cover, along the entire track length, protects against accidental contact. A fourth rail forms part of the monorail control system.

### THE ROLLING STOCK

The rolling stock consists of compact monorail vehicles. The main electrical control equipment is accommodated in the front car, while a single-axle drive bogie is located between each of the seven cars.

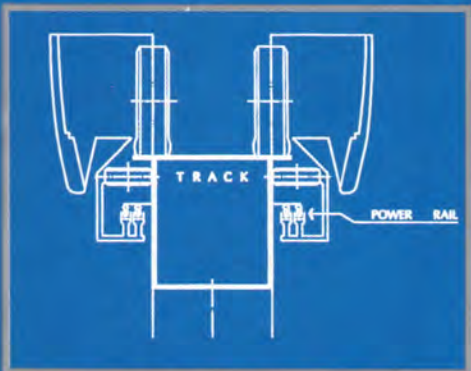
The bogies are provided with air-bag suspension and rubber-tyred drive and guide wheels to give TNT Harbour-Link excellent riding, braking and adhesion properties. The vehicles are powered by six, independent D.C. motors mounted on the bogies. Two independent brake systems acting on each drive axle assure maximum safety and reliability.



The Sydney Monorail is a 'light' transportation system – the monorails are smaller than a commuter train, for example. Capacity is generated by the frequency of service – a monorail every two minutes.



Travelling in Safety – TNT Harbour-Link uses the latest in electronic surveillance which, along with security patrols, provides for passenger safety.



Up-thrust and side-thrust wheels prevent any possibility of derailment.



# TNT HARBOUR-LINK

## THE ROUTE

TNT Harbour-Link, as its name implies, links the Darling Harbour complex with the city centre, encouraging Sydney-siders and visitors alike to enjoy a fast, convenient and scenic ride to the various attractions that Darling Harbour has to offer.

Conversely, the millions of visitors drawn to Darling Harbour each year have ready access to the retail heart of the city.

In addition, the TNT Harbour-Link loop provides a convenient link between the city centre and the inner suburbs of Pyrmont and Ultimo.

To examine the TNT Harbour-Link route, let us start at Darling Harbour – at one of the route's most exciting sites – the Harbourside Festival Marketplace, on the western side of Pyrmont Bridge.

**1. HARBOURSIDE** – serving the Harbourside Festival Marketplace development, with its dynamic mix of specialty shops, cafes, bars and restaurants; the National Maritime Museum; the northern Darling Harbour car park; and the suburb of Pyrmont.

**2. CONVENTION CENTRE** – skirting the western edge of Darling Harbour, the route heads for Convention Centre Station, which serves the enormous 3,500 seat Convention Centre; the suburb of Ultimo; plus the Government Printing Office and the TAB Head Office.

**3. HAYMARKET** – this next station is situated adjacent to the Entertainment Centre car park. It also serves the Powerhouse Museum; Sydney Technical College; "Paddy's Market"; the NSW Institute of Technology; hustling, bustling Chinatown; and the Haymarket.

**4. DARLING WALK** – the last station before leaving Darling Harbour is located near the Darling Walk development – a tomorrow's world of entertainment and technology; and also serves the magnificent Chinese Gardens, near the corner of Liverpool and Harbour Streets; the major landscaped park areas of Darling Harbour; and Trades Hall.

**5. WORLD SQUARE** – TNT Harbour-Link then travels up Liverpool Street and over George Street to World Square Station which serves this exciting new development (with its shops, international hotel, and office complex) on the site of the old Anthony Hordern building; the movie theatre district; and provides a direct link with George Street buses.

**6. TOWN HALL** – the route then runs along Pitt Street to Town Hall Station, where an underground arcade provides quick, convenient access to the SRA's Town Hall railway station.

**7. CITY CENTRE** – continuing along Pitt Street, TNT Harbour-Link arrives at City Centre station, located near the Market-Pitt Streets intersection – the retail heart of the city. This station also serves the Central Business District; the city's secondary movie district; and the Queen Victoria Building.

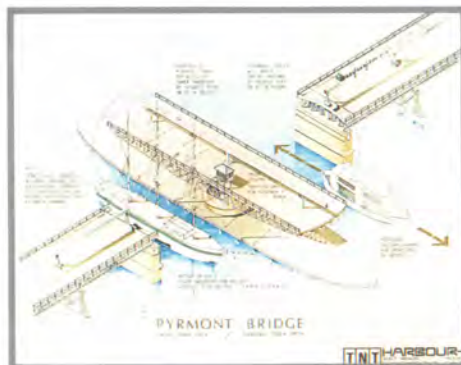
**8. CASINO** – moving down Market Street, TNT Harbour-Link then stops at the Casino Station, serving both the International Hotel/Casino development and the Aquarium.

This station is also in close proximity to Kent Street car parks and the eastern promenade of Darling Harbour.

A spectacular ride across the water over Pyrmont Bridge completes the round trip.



TNT Harbour-Link – an exciting addition to Sydney's transport system.



TNT Harbour-Link runs high above Darling Harbour, allowing boats up to 50 feet high to pass under the running beam unimpeded. On those few occasions when tall-masted ships wish to enter inner Darling Harbour, the monorail service will halt temporarily while the beam opens with the Pyrmont Bridge swing span – an exciting event in itself.



The monorail track is supported by "I" beam columns which are treated to make them as attractive as possible, whilst still maintaining a high degree of safety. There are some 120 such columns along the 3.6km route.





CONVENTION  
CENTRE

HARBOURSIDE

MAINTENANCE  
FACILITY

HAYMARKET

CASINO

DARLING  
WALK

WORLD  
SQUARE

TOWN HALL

CITY  
CENTRE





**HARBOUR-LINK**



Another imaginative project from:

**TNT – THE WORLDWIDE TRANSPORTATION GROUP**



*– People moving people.*

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