



NZ TRANSPORT AGENCY
WAKA KOTAHI



Auckland Motorways



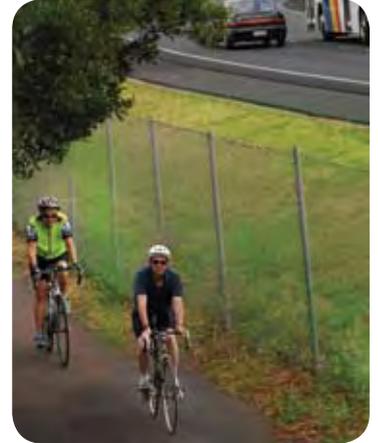
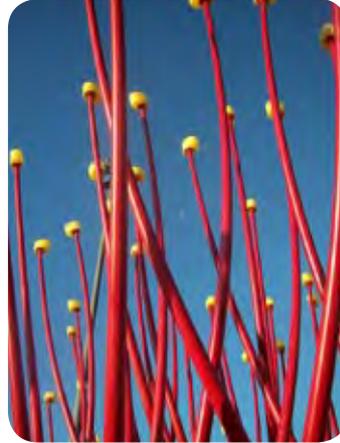
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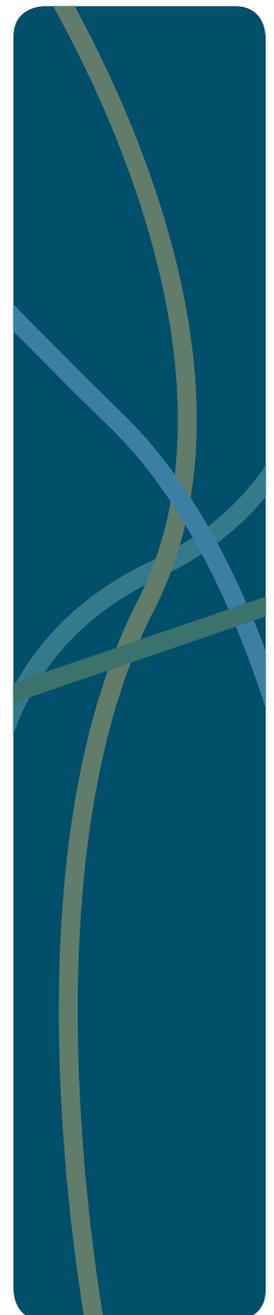
Auckland Office
Qantas House
191 Queen Street
PO Box 1459, Shortland Street
Auckland 1140
New Zealand

T 64 9 368 2000
F 64 9 368 2059
www.nzta.govt.nz

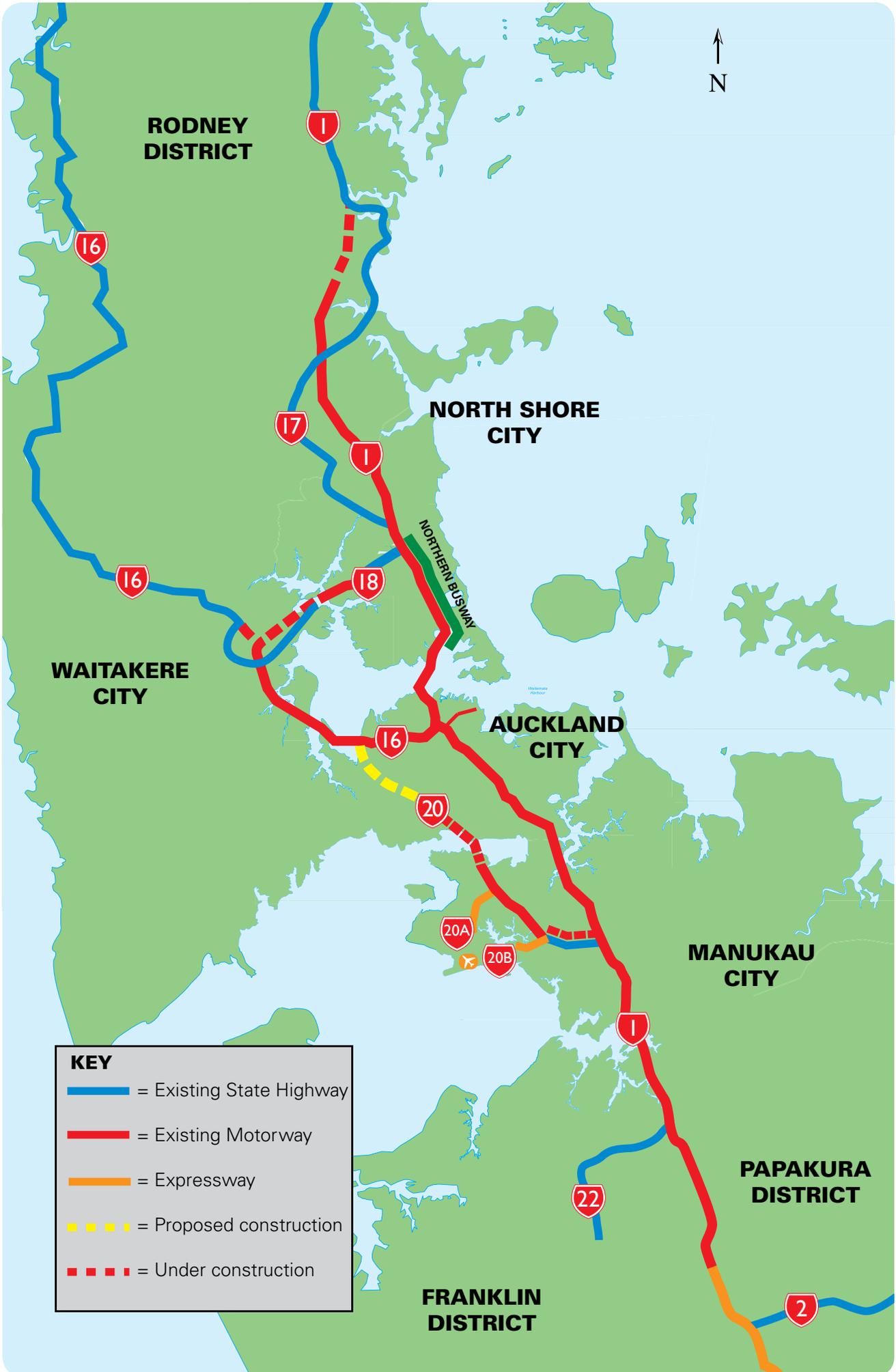
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Auckland Motorway and State Highway Network, 2008





Wayne McDonald, New Zealand Transport Agency, Auckland Regional Director

Introduction

The last edition of this book was published by the Ministry of Works in 1984. At that time the Southern Motorway ended north of the Bombay Hills and a new expressway had just opened at the end of the Northern Motorway; the Northwestern Motorway connected to the city at Nelson and Hobson Streets and the new Mangere Bridge had just opened on the Southwestern Motorway.

This book records the successful transport solutions applied, mainly by Transit New Zealand, over the past 25 years. This was a period that saw tremendous changes to the Auckland region's transport environment, enabling it to foster huge social and economic growth.

With the establishment of Transit New Zealand in 1989, our challenge was, and remains as we go forward as the New Zealand Transport Agency, to provide successful transport solutions for the growing Auckland region.

Today, a third of New Zealand's population is located here and is being added to at the rate of a city the size of Christchurch every 10 years.

Auckland's roads - motorways, state highways and local arterials - which are already operating close to capacity, have to cope with more and more vehicles every day.

We have managed the congestion resulting from this phenomenal growth by completing a number of major motorway projects. These include crucial motorway to motorway connections in the Central Motorway Junction and motorways giving access to the central business district and the Port. The motorways have been extended to the north and south while significant investment has been made to improve access to Auckland International Airport. Important advances have also been made on the strategic Western Ring Route, on target for completion in 2015.

However, long-term solutions to Auckland's transport issues lie not just with roading improvements but also through greater provision of public transport. We are working with the region's authorities to make this happen and recently completed the Northern Busway that runs alongside the Northern Motorway. We are also building bus priority measures into all our major roading projects.

Because we cannot simply continue building our way out of our traffic challenges, we have introduced Advanced Travel Management Systems (ATMS) to better manage traffic. This is being done through the use of smart technology involving CCTV cameras,

variable message signs, lane signal controls, ramp signalling and web based information systems to manage congestion.

That Transit has been successful is demonstrated by the fact that Auckland is now more than ever connected to its diverse communities. The region's four major motorways - Northern, Northwestern, Southern and Southwestern - are the transport spines that make it possible for its citizens to work and play with ease and safety.

Auckland's motorways and state highways total nearly 327 kilometres in length, just a fraction of a national network 10,300 kilometres long. However, it is this small segment of roads that carries nearly a quarter of all the country's state highway traffic.

This achievement has no small part been due to the many talented and dedicated people who have been part of the Transit organisation over its 19 years of existence. I wish you luck on your exciting journey with the NZ Transport Agency.

Wayne McDonald,
Auckland Regional Director



1 Northern Motorway

Origins

Development of the Northern Motorway (SH1) began with the opening of the Auckland Harbour Bridge in 1959 and has undergone substantial change since the 1980s. In 1975, the motorway extended from Wellington Street in the CBD to Tristram Avenue, a distance of 9.6 kilometres. Within 25 years it had extended to Orewa and its length had trebled to 31 km.

In 1983, the four-lane Northern Motorway ended at Sunset Road, and a two-lane expressway continued through to Albany Village, re-joining the existing highway that traversed the Albany Hill to Silverdale. Direct access to the East Coast Bays was formed with the construction of Greville Road.

Upgrading and widening

In 1994, Transit upgraded the two-lane expressway to a four-lane motorway to Greville Road and constructed a new interchange at Constellation Drive with on and off-ramps in both directions. To the west, the interchange connected to a new North Shore City Council road that improved access to the existing Upper Harbour Highway. This route, linking to Waitakere City, had been designated state highway in 1991.

The new interchange was also a much safer end point for the motorway at that time. The previous traffic signals at Sunset Road were at the top of a hill, giving motorists limited visibility. Further improvements came in 1999 when the motorway was widened to add bus shoulder lanes between Upper Harbour Highway and Greville Road.

Looking ahead

Motorists can expect further safety and access improvements with the completion of the upgrade to the Onewa Road Interchange in November 2008. The existing two-way bridge over the motorway has been replaced by two separate one-way bridges. One provides a general traffic lane for the southbound on-ramp; the other provides a traffic lane and a bus lane for the southbound on-ramp. These more gradually curved bridges improve safety. Separate lanes for north and southbound traffic heading onto SH1 from Onewa Road have been created by widening Onepoto Bridge.

The upgrade is part of Stage 2 of the Northern Busway (see Chapter 5).

An additional northbound lane between Northcote Interchange and Sunnynook Underpass was completed towards the end of 2008 to reduce congestion and improve safety.



Above: Northern Motorway and Akoranga footbridge

Left: Travelling southbound on the Northern Motorway approaching Onewa Road off-ramp

Far left: Looking north at Oteha Valley Road off-ramp



ALPURT and the Northern Gateway Toll Road

Increasing urbanisation and the rapidly expanding industrial area of Albany necessitated an extension of the Northern Motorway further north. A designation existed on the District Plans of both Takapuna City and Rodney District for a route from Albany to Silverdale, then swinging eastwards to behind Orewa Township and finishing at Hatfields Beach.

The location of the designation was challenged by various parties when the Rodney District Plan was reviewed in the late 1980s. A public consultation process showed a preference for a route further west of Orewa and finishing north of Johnstone's Hill, near Puhoi.

Following extensive studies, a new route was developed for the northern portion which met public expectations for a new connection better linking Auckland and Northland.

Applications for designations under the new Resource Management Act were submitted in early 1994 and confirmed by the Environment Court in early 1997. The expanded 27 kilometre, four-lane motorway was called the Albany to Puhoi Realignment, or ALPURT for short.

The new motorway improved transport infrastructure and motorist safety by taking traffic away from the original narrow, winding route, which was not designed to carry heavy traffic, particularly at Albany and Silverdale. It also contributed towards the economic and social well being of the Northland, Rodney and Auckland regions.

Construction contracts for the first two projects were awarded throughout 1997 and 1998 and on 20 December 1999, the first section between Greville Road in Albany and Silverdale in Rodney, ALPURT A, opened. The 13 kilometres of new motorway cut travel times and was more than 7 kilometres shorter than the existing route.

At the same time, a 4 kilometre, two-lane expressway called ALPURT B1 opened between Silverdale and Orewa and a new road, Grand Drive, gave a bypass of the commercial centre of Orewa. The opening was planned to celebrate the millennium and provide improved access for the America's Cup in early 2000. It remains the longest single section of motorway ever opened by Transit in Auckland.

The last section under construction, ALPURT B2, is known as the Northern Gateway Toll Road and will complete the project to Puhoi with a further 7.5 kilometre section of motorway. It is one of the most challenging roading projects ever undertaken in New Zealand, due to the very steep topography.

Above: Motorists heading off at Greville Road Interchange on to SH17 and local roads



ALPURT and the Northern Gateway Toll Road (continued)

Environmental sustainability

Transit faced a number of engineering challenges during construction, including difficult geological formations, steep terrain and the significant environmental importance of the area.

The emphasis on preserving the natural environment has been an integral part of the project from the beginning. In 1992, Transit undertook an extensive series of environmental impact studies and technical reports along the planned route as part of designation conditions. The route passed through an area of regenerating bush identified by the Department of Conservation as a recommended area for protection. The department wanted to ensure that the motorway would not sever an important ecological corridor. The Nukumea Viaduct was built to protect native aquatic fauna and natural wetlands. The eco-corridor will strengthen links between the established bush west of the motorway to Alice Eaves Bush and the important areas around Wenderholm.

Engineering excellence

The Johnstone's Hill Twin Tunnels are 15 metres apart, 380 metres long, 12 metres wide and 9 metres high. They are built to carry two lanes each, plus a shoulder and an emergency pathway. Initially, only one lane will be marked northbound and the second lane will come into operation when future works north of the project have been completed.

The Northern Gateway Alliance

The Northern Gateway Alliance is made up of seven partner organisations who are working together to complete the project. Alliancing is a popular and successful concept, often demonstrated overseas to deliver construction project on time and to budget.

Project innovation

Key features:

- Twin tunnels through Johnstone's Hill
- Waiwera Viaduct stands 30 metres tall and 520 metres long
- Eco-viaducts at Otanerua and Nukumea
- A 55 metre deep cut at China Hill

Above:

Waiwera Viaduct just before completion and Johnstone's Hill twin tunnels on the Northern Gateway Toll Road.



Auckland Harbour Bridge

An Auckland icon

The Auckland Harbour Bridge is an iconic New Zealand structure. For nearly 50 years it has straddled the Waitemata Harbour linking Auckland to the North Shore and beyond.

The 1.2 kilometre long structure is actually three bridges, the middle section (with the steep arches and flags) is the original four-lane 'truss' bridge. It took a team of 1000 men four years and a cost of £7,516,000 to build.

The bridge was financed through tolls with cars and taxis paying 2s/6d (25c), motorcycles 1s/3d (13c), buses 5s (50c) and 4s (40c) for commercial vehicles. It was opened with tremendous excitement and anticipation on 30 May 1959. Within one year, 4.9 million vehicles had already crossed the bridge.

Bridging the gap

By 1965 annual traffic had risen to 9.3 million and it became apparent that the bridge would not cope with the rapidly growing North Shore population. The decision was made to extend the bridge from four to eight lanes to increase capacity and ease congestion. Two new box girder 'clip-ons' were added to each side of the bridge. The new steel extensions were 'clipped' to the existing piers in 1969.

In 1985 inspections revealed cracking on the clip-on decks. A two-year programme of night work ensued and involved banning heavy vehicles on the clip-ons. Issues were also identified with the ongoing use of asphaltic concrete on the deck road surface. During the next round of annual resealing, Transit looked at alternative materials to improve the driving experience for motorists.

And still the numbers grew . . .

When the toll charges that had helped finance the bridge were abolished on 31 March 1984, traffic had reached 31 million vehicles per year and there has been a steady increase in demand ever since. By 2007 the annual average daily traffic count reached 166,000, which converts to over 60 million trips per year. This can increase to nearly 200,000 vehicles per day at particularly busy times.

*Above:
Auckland Harbour Bridge looking south to Westhaven*



Choosing the seal

BOLIDT, a Dutch firm had a product referred to as Z.OK which was chosen as it had strength but was still light enough not to add extra weight to the deck. It was also skid resistant and porous.

The open graded polyurethane surfacing provided much better corrosion protection to the steel deck plates.

Resurfacing using the new product first took place over the Christmas and New Year of 1995 and 1996. It now continues annually, always during the holidays to minimise the inconvenience to motorists. The only break in work was during the 1999 and 2000 holidays when the America's Cup took place.

Moving times

Safety and traffic flow was also improved in 1990, when a new moveable lane barrier machine was installed to safely manage peak traffic by changing the lane configuration on the bridge. See more about this innovation in Chapter 2.

In 1999 and 2000 an upgrade improved the seismic performance of the truss bridge and the clip-ons. The clip-ons were connected to the truss bridge piers to stop the three main bridge components hitting each other in the event of an earthquake. Strengthening was carried out on both the truss bridge and the clip-ons and was praised by international reviewers.

Trucks on the bridge

In 2007, trucks over 13 tonnes were restricted to the centre six lanes of the Auckland Harbour Bridge to minimise traffic disruption from maintenance and keep the bridge in good repair. The volume of traffic, particularly the number and weight of trucks crossing the bridge has increased in past years and is expected to continue.

Looking ahead

Another comprehensive strengthening programme for the clip-ons began in mid 2008. Preparations involve improving access, ventilation, lighting and power supply for the workers who, over two and a half years, will secure 760 tonnes of steel to the box girders.

Transit's ongoing maintenance to look after the bridge, including strengthening projects such as this, will ensure that the Auckland Harbour Bridge continues to perform as one of Auckland's vital transport links long into the future.

Above: Looking at the bridge from Westhaven



Beyond the bridge

In 2007, representatives from Transit New Zealand, Auckland Regional Transport Authority, Auckland Regional Council, Auckland City Council and North Shore City Council began a joint study to identify options for an additional link across the Waitemata Harbour. The new study expanded on findings of earlier studies completed in 1988, 1997, and 2003.

Phase one of the study, released in November 2007, delivered a short list of options. These were; a passenger transport

crossing between the North Shore and the western CBD, a crossing for vehicles and passenger transport between SH1 (at Esmonde Road) on the North Shore to the western CBD, and a tunnel underneath the harbour linking SH1 (at Esmonde Road) on the North Shore to the eastern CBD.

The shortlist was developed from an original list of some 159 options, taken from all major investigations that have been carried out since 1997, plus other options identified by the study partners and suggestions made by members of the public.

In May 2008, a single preferred option was announced for consideration. The recommended option comprises four tunnels – two for trains and two for motorists – to the east of the existing Auckland Harbour Bridge.

*Above left to right:
Stairway leading engineers from bridge arch to lower deck
Construction of the bridge in 1958
Right: Modern day lane layout heading over the bridge*





1 Southern Motorway

Origins

Since opening in 1953 with a single 3.2 kilometre section between Penrose and Mt Wellington, the Southern Motorway (SH1) has grown to become the gateway to Auckland and the Waikato. Over the next twelve years, the motorway was extended 23.4 kilometres in stages from Mt Wellington to Drury. It was also extended north toward the city. Newmarket Viaduct opened in September 1966 and the final 6.6 km to Symonds Street was completed.

An extension in 1978 pushed the motorway a further 8.8 km southward to St Stephens on the northern side of the Bombay Hills.

Enhancements throughout the nineties met the demands of a thriving central business district and the growth explosion in newly created Manukau City.

In 1993, the motorway was extended from Great South Road at St Stephens to Mill Road in Bombay. A new expressway (the Waikato Expressway) gave motorists a clear run from Bombay to the link with State Highway 2 and beyond to Hamilton.

The new expressway removed an accident black spot called the 'Collision Crossroads', where the highway ended at traffic signals and also reduced travel times across the Bombay Hills. Previously travel times of more than two hours were not uncommon during holiday periods.

To cope with rising numbers of commuters, the motorway was widened from four to six lanes between 1989 and 1996 creating extra capacity between the Mt Wellington and Hill Road (Manurewa) Interchanges.

The first motorway service centre at Bombay opened in 1994 and another service centre linked directly to the motorway opened in Papakura in 1999.

Above: Aerial shot of Southern Motorway and city links from the eighties

Below: Highbrook Drive off-ramp

Opposite: Mt Wellington and SEART





Supporting development

Today, the Southern Motorway remains the main artery into Auckland and further north, carrying more than 100,000 vehicles each day. An estimated eighty-five percent of all freight related to activities at the Ports of Auckland is delivered to, or comes from, the south.

The increasing numbers of heavy vehicles prompted the building of a new link to the motorway from the southern suburbs of Onehunga, Penrose and Mt Wellington.

The Southeastern Highway connecting the Pakuranga regional motorway to Church Street opened in 1998. Heavy freight vehicles now enter the motorway via the Southeastern Highway and travel direct to the Ports of Auckland in Grafton. This was an alternative route that reduced demand on the Mt Wellington Highway on-ramp.

Together with the Mt Wellington Highway Interchange more than 90,000 vehicles enter and exit the Southern Motorway every day.

Further south in 2004, Manukau City Council started to build a business park at Highbrook in East Tamaki. Eventually, it is expected to employ up to 12,000 people.

To support the new development, Transit upgraded Princes Street Interchange and created a new interchange at Highbrook Drive, opened in April 2007. An additional lane in both directions has increased capacity and is helping to reduce congestion.

Just south of the Central Business District, is the 1960's built Green Lane East Interchange. Transit and Auckland City Council worked together in 2006/07 to upgrade the interchange. Two new slip lanes give motorists a free turn onto the on-ramp and improve safety. The two lanes at the top of the on-ramp then merge further down to join the motorway.

Looking ahead

The 23-metre high Newmarket Viaduct, a feat of engineering when it was built in the 1960s, is going to be replaced to ease congestion between the Central Motorway Junction (CMJ) and Green Lane East Interchange. An additional southbound lane will also be constructed between Gillies Avenue southbound off-ramp and Green Lane East Interchange. The new viaduct will also meet new seismic standards for bridges across the motorway network.

Growth in the south of the region and the opening of a new connection between the Southern Motorway and the Western Ring Route (SH20) at Manukau in 2010, is driving the need to increase capacity and improve interchanges south of Hill Road. Studies on future requirements are underway.



1 Central Motorway Junction

Original plan

The original scheme for Spaghetti Junction, as the Central Motorway Junction (CMJ) is commonly known, included two separate interchanges known as Grafton and Newton. Until 1971, the Southern Motorway ended at Wellesley Street, and the Northern Motorway was served by the Wellington and Cook Street ramps.

The concept was for the Northern Motorway to connect to a new motorway parallel to Dominion Road, and then on to the Southwestern Motorway at Mt Roskill, the project currently under construction. This was abandoned in the face of resident opposition. The ramps and bridges that were already built are the connections used today to Dominion Road and New North Road from the city.

There was an additional design for an Eastern Motorway from Wellesley Street heading north past the Port, then east along Tamaki Drive, south through Glen Innes and Mt Wellington before connecting to the Southern Motorway.

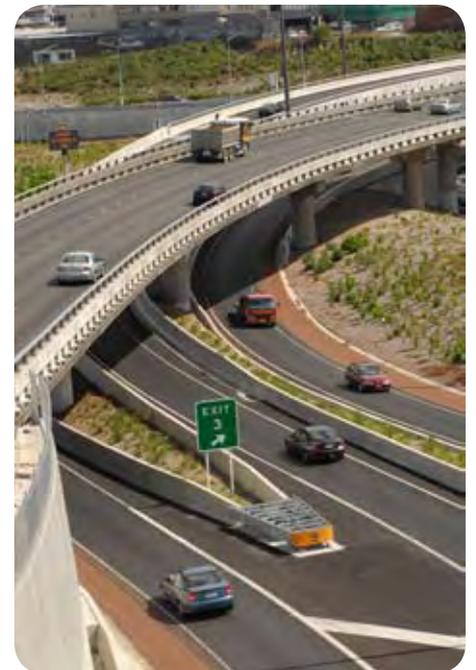
All of these concepts are shown in the 1973 edition of the Auckland Motorways Brochure.

The Northwestern Motorway ended at Waterview for many years, and the extension to the CBD was not opened until 1979. The connection between the Northern and Southern Motorways was made in 1978, when the Southern Motorway connections to the western part of the CBD were made.

With the old plans abandoned, new connections between the Northwestern Motorway and the Southern Motorway and Grafton Gully were proposed and opened in 1988 and 1989.

By the 1990s, planning was well underway for a suite of three projects - collectively known as the Central Motorway Improvements to improve capacity and connectivity through the heart of Auckland's motorway network. These were the Grafton Gully and CMJ Stage 1 (Grafton to Newmarket) and Stage 2 (Grafton to west and north) projects.

The Central Motorway improvements benefited all of Auckland. Besides giving the region the infrastructure it needed to move towards a more modern and sustainable future, completion of the project has made it easier for people, freight and public transport to move around the city.



Top: Signage to new links in CMJ
 Above: Winding links within Spaghetti Junction
 Opposite above: Pohutukawa urban design panels
 Opposite below: CMJ in the early eighties looking north



Grafton Gully

The groundbreaking Grafton Gully project was constructed between December 2001 and February 2004. The project improved access from the CMJ to the Port and across the city between the CBD, Auckland Hospital and the Domain.

A direct connection to Stanley Street was established to replace the old motorway end point at Grafton Road.

The dogleg intersection from Stanley Street into the Strand was replaced with a direct connection underneath the new railway bridge. A new link from Wellesley Street to Grafton Road bridges the motorway, providing a new

CBD connection to the motorways and locations east of Grafton Gully. New Southern Motorway (SH1) and Northwestern Motorway (SH16) ramps were also built.

New traffic signals at the intersection of Alten Road and Stanley Street provide better pedestrian access across the gully. Local and motorway traffic has also been separated so cyclists and pedestrians no longer have to compete with heavy vehicles traveling to and from the Port. Built as part of the project, the Grafton Road Bridge enables pedestrians to safely cross the gully on an extra wide footpath as traffic exits the motorway below.



Structural artworks

'Ropeworks' was created by local artist Caroline Robinson. The loose coil of fine metal strands pinned together and suspended under Wellesley Street Bridge is a metaphor for the streams that used to flow through the gully. Ropeworks is located close to where the first mechanised rope factory in New Zealand was set up in 1842.



More than roads

The achievements of the Grafton Gully Project in archeology, environmental management, design, traffic management, community relations and project delivery, set benchmarks used as a model for other projects. The project won a Public Archaeology Award and the International Road Federation Global Road Achievement Award for Environmental Mitigation.



Central Motorway Junction Stage 1

In October 2002, stage 1 of the CMJ project to add capacity to the Southern Motorway in the CBD was started. It was delivered 26 months later on 8 December 2004. This complex project was carried out around live traffic flowing through New Zealand's busiest section of motorway.

A new dedicated lane for motorists joining the Southern Motorway at Hobson Street continues as a fourth southbound lane to Gillies Avenue. Traffic using on-ramps at Symonds Street and Grafton Road join this new lane when entering the motorway.

Another northbound lane was added between Gillies Avenue and Khyber Pass to improve flow and capacity.

A new lane after Khyber Pass carries traffic to the Port, Wellesley Street and Symonds Street.

Bridges at Khyber Pass and Grafton Road were upgraded to tolerate increasing loads. One innovative feature was the 'hanging' of the extension to the

bridge carrying the Southern Motorway over the Northern and Northwestern connections with Grafton Gully. Two large structural pylons were created and are referred to as T Rex, after the dinosaur, given their prehistoric shape, which is reminiscent of a dinosaur's head.

Safety barriers, better motorway lighting and improved stormwater collection systems that prevent surface flooding have all made the CMJ safer and more enjoyable to use.

Like Grafton Gully, CMJ stage 1 incorporated urban design including native landscaping, specially designed Rangitoto motif safety barriers and original artwork including sculptures.



An eight metre long gecko sculpture with a colourful mosaic surface enhances a previously uninviting area under the Khyber Pass Bridge. According to Maori legend, the gecko provides guardianship and protects passage, particularly appropriate in a roading context.

Stage 2

Transit awarded the contract in October 2003 to seamlessly join Auckland's three major motorways and the Port for the first time since the junction was conceived some 40 years ago.

Stage 2 involved upgrading the existing SH1 junction and SH16 and linking the Northern and Northwestern motorways, Grafton Gully and the Port.

Above: Structural 'T Rex' pylons

Left: Grafton Gully at night

Opposite above and below:

CMJ links taking shape - August 2006

Northern link to the North Shore



Construction of the multi-million dollar project started in January 2004, comprising the four new links between SH1 and SH16, two new off-ramps to Nelson Street from the Southern and Northwestern Motorways, and new lane layouts to make the motorway safer and more intuitive to use.

One of these changes was to move the Nelson Street off-ramp heading into the city so motorists exit the motorway on the left rather than the right. A major new bridge was constructed on the alignment of an original structure which was removed as part of the 1970's redesign.

In February 2005, the project was extended to include an extra westbound lane on the Northwestern between Newton Road and Western Springs to add capacity and enable the new links to function at peak performance.

After three years of construction, the ribbon was cut on 15 December 2006 and the new links between the Northwest and the North and the Port and the North took motorists to their destinations via elevated and sweeping new sections of motorway.

CMJ stage 2 was one of the biggest and most complex upgrade projects to have ever taken place on Auckland motorways, constructed in a tight work site between residential houses and live traffic.

Considerable urban design included two kilometres of decorative retaining walls with motifs of karaka leaves and berries, kowhai and pohutakawa flowers and leaves. Environmental improvements included new stormwater treatment facilities, the introduction of 1300 cubic metres of topsoil and the addition of 143,000 plants.

Looking ahead

In the heart of the central business district lies one of Transit's most ambitious projects to date – the Victoria Park Tunnel. It will see three lanes of northbound traffic travelling in a 440 metre tunnel underneath one of Auckland's most popular green spaces, Victoria Park. Southbound traffic will travel on the existing four-lane viaduct.

Extra capacity created by the Victoria Park Tunnel will relieve congestion for traffic travelling through the CMJ to the Auckland Harbour Bridge.





16 Northwestern Motorway

In 1961, the Northwestern Motorway (SH16) ran 11.5 kilometres from Pt Chevalier to Hobsonville Road to serve Auckland's original airport at Whenuapai. In 1966 Auckland International Airport was opened and Whenuapai reverted to a military airport. This affected the use of SH16.

Ramps into the CBD to Nelson and Hobson Streets were completed between 1977 and 1979. Links to Grafton Gully and the Southern Motorway followed in 1988 and 1989.

These latter works significantly increased the functionality of the entire Northwestern Motorway. It wasn't until 2006 however, that the final piece of the jigsaw was in place with connections to the Northern Motorway (see section on the Central Motorway Junction).

Origins

Like the Central Motorway Junction and Southern Motorway, capacity on the Northwestern Motorway has been improved over the past 20 years to reflect the growing numbers of commuters. Established in 1989, Waitakere City, like Manukau, has grown rapidly and requires ongoing improvements to transport links for its residents and businesses commuting into the CBD and beyond.

In 1991, the motorway was widened from four to six lanes between the Te Atatu Road Interchange and Rosebank Road Interchange, including widening of the Whau River Bridge. Shortly after, in 1992, the motorway between Newton Road and the Great North Road

Interchange was also widened from four to six lanes.

At about the same time, the end of the motorway at Hobsonville Road was converted into a new intersection with traffic signals improving safety.

By 1993, it was time for the motorway to be widened to six lanes between the Rosebank Peninsula and the Great North Road Interchange.

Transit improved access for Avondale residents and the developing industrial area around Rosebank Road with a new split interchange in 1997. The Rosebank-Patiki Interchange included two sweeping on and off-ramps crossing the motorway. Two additional on and off-ramps completed the split interchange.





The existing pedestrian overbridge and bus stop on the seaward side of the motorway for citybound buses was removed and buses routed into the Rosebank Road industrial area and back on to the motorway.

The project was also one of the first to be built to strict new environmental standards under the Resource Management Act.

The new motorway ramps pass through the sensitive Motu Manawa (Pollen Island which was originally planned to be the second harbour for Auckland) marine reserve. This, coupled with the mostly industrial activity in the area, led Transit to create a system to capture and treat all stormwater from the road before being discharged.

Completion of the motorway allowed Transit to join two sections of cycleway built across the harbour from Great North Road and across to Te Atatu Road. The cycleway included several wooden boardwalks to minimise the impact on the marine reserve.

Looking ahead

Recent developments include widening bus shoulders between Te Atatu and Great North Road for quicker bus journeys during peak times.

Widening the motorway to six lanes is planned between Te Atatu Road and Royal Road Interchanges. From Great North Road to Te Atatu is also scheduled to be widened from six to eight lanes in the future.

A new three kilometre, two-lane section of motorway will extend the Northwestern Motorway from Hobsonville Road to a new roundabout at Brigham Creek Road

in Massey North. The SH16 Brigham Creek Extension will be constructed at the same time as the SH18 Hobsonville Deviation and will be completed in 2012.

A broader strategic study of the Northwestern Motorway is underway to identify further improvements that can be made to safety, efficiency and integration with other public transport modes. This will include identifying solutions to address the surface flooding that sometimes occurs between Great North Road and the Rosebank-Patiki Interchanges.

Above: SH16 Northwestern Motorway

Opposite above: Aerial view of Rosebank-Patiki Interchange

Opposite below: Making the most of the cycleway alongside SH16



18 Upper Harbour Motorway

Origins

In 1984, State Highway 18 was the Coatesville-Riverhead Road and formed part of the main Auckland to Whangarei highway. By July 1991 the state highway status had been transferred to Hobsonville Road and Upper Harbour Drive. Shortly after between 1992 and 1994, work to increase capacity and improve safety complemented the linking of Constellation Drive and Albany Highway.

Since the opening of the original Upper Harbour Bridge in 1975, a new motorway has been planned to provide a better link over the Waitemata Harbour between the growing North Shore and Waitakere cities and improve capacity.

Today, construction of the new motorway is well underway. It will extend from the intersection of Upper Harbour Drive and Paul Matthews Drive in the east, to the end of the Northwestern Motorway in the west. When fully completed, it will help ease congestion and provide an alternative route to Upper Harbour Drive and Hobsonville Road, passing through the developing residential areas of Greenhithe and Hobsonville.

The motorway is being built in three sections – Upper Harbour Bridge duplication, Greenhithe Deviation and Hobsonville Deviation. With the first two sections already completed, construction on the last section will start in late 2008. The entire Upper Harbour Motorway is scheduled to be completed in 2012 at an estimated cost of approximately \$400 million.

Upper Harbour Bridge

To create more capacity between Hobsonville and Greenhithe, a new 458 metre cantilevered bridge was constructed alongside the original 1975 bridge.

Construction began in February 2003 and was completed by December 2006. Twenty eight piles were driven deep into the Waitemata Harbour seabed to hold the deck. Three kilometres of drainage collects and filters all surface water and run-off from the bridge. Eight hundred and sixty metres of the existing highway was widened on the Hobsonville approach to the bridge.

The bridge was built using the ‘balanced cantilever’ approach, whereby piers were constructed using special formwork, the spans were constructed sequentially on either side to balance the loads on the pier. Segments were cast in place and then prestressed together in shorter lengths. When each pier/beam section reached the required length, the closing section was poured and the elements of the bridge were fully prestressed to form a continuous structure.

‘Mudcrete’ - a mixture of cement and soft marine mud was used to complete harbour bed foundations. Mudcrete was also used in widening the highway at the bridge’s western end, reducing the need to import and dispose of any excess materials.

Together, the two bridges provide three lanes towards Greenhithe and two towards Hobsonville. Cyclists and pedestrians share a separate 1.2 kilometre, three metre wide path across the bridge, which connects on both sides to local roads.

Above: Newly completed Greenhithe Deviation



SH18 Greenhithe Deviation

In 2003, construction began on the 5.5 kilometre Greenhithe Deviation, a four-lane motorway between Upper Harbour Bridge and Albany Highway.

Three new bridges form part of interchanges at Albany Highway, Tauhinu Road and Greenhithe Road. Together, the deviation and the bridge add capacity along the SH18 route, lessening congestion for the growing number of vehicles travelling through the area daily. The new links also reduce peak travel times in the expanding northwest region including the Albany and Greenhithe town centres in North Shore City and Hobsonville and Massey in Waitakere City.

At the official opening in 2007, Prime Minister Helen Clark, local iwi, Transit New Zealand, North Shore City Council and Waitakere City Council unveiled three bronze plaques at the eastern

end of the Upper Harbour Bridge to symbolise the new connections between the two cities.

Because the motorway was constructed through native bush, Transit carefully controlled erosion and sediment by limiting major earthworks to summer months. Native geckos and skinks were re-homed. Extensive restoration to the surrounding bush included the planting of 260,000 natives on earth slopes alongside the motorway.

Run-off from the motorway is filtered by four permanent stormwater treatment ponds, which also provide a habitat for local wildlife.

Timber noise walls reduce the effects of noise on surrounding neighbourhoods. Local flora and fauna were stenciled onto the 1,640 metres of wall to help protect them from graffiti and help the walls blend in with the natural environment.

Looking ahead - SH18 Hobsonville Deviation

Hobsonville Deviation is the last project of the Upper Harbour Motorway to be built. It will connect the new Upper Harbour Motorway (SH18) to the end of the Northwestern Motorway (SH16).

Approximately 6 kilometres of four-lane motorway will be built from Monterey Park immediately to the west of the Upper Harbour Bridge, to the Northwestern Motorway (SH16) at Massey North. A new flyover will connect SH16 and SH18 and allow SH16 to be extended 3 kilometres to Brigham Creek Road. New interchanges will be constructed at Buckley Avenue, Brigham Creek Road, Trig Road and Hobsonville Road and there is provision for bus shoulder lanes to be added to each side in the future. Major construction began in September 2008 and is expected to be completed by 2012.



Top left to right:

Urban design noise walls

New Upper Harbour Bridge next to original 1975 bridge

Left: Helen Clark and dignitaries unveiling plaque at opening of Greenhithe Deviation in 2007



20 Southwestern Motorway

Origins

In 1977, State Highway 20 ran between Neilson Street in Onehunga over the low level, narrow concrete bridge across the Manukau Harbour into Mangere Bridge Township.

The route continued through local streets to George Bolt Memorial Drive, then a two-lane rural road to the airport, before passing through Papatoetoe town centre to link to the Southern Motorway at the fast growing Manukau City Centre.

The most significant developments of the past 25 years have been the Papatoetoe Bypass, the replacement of Mangere Bridge, the continued construction of new motorway and the improved links to Auckland International Airport on what are now SH20A and SH20B.

The new Mangere Bridge was opened in 1983 and by 1984 the motorway

between Queenstown Road in Auckland City and Coronation Road in Manukau City was completed.

In 1987, the 4.1 kilometre Papatoetoe Bypass was constructed, linking new roads built by Manukau City, Wiri Station Road and Roscommon Road in the south to Massey Road in the north.

Motorists traveling to Manukau City Centre could now use the expressway instead of traveling through Papatoetoe Town Centre. Separating the traffic resulted in less congestion through the town centre and a quicker trip to the Southern Motorway at Manukau City.

Soon after, in 1989, the four-lane motorway was extended from Queenstown Road to Hillsborough Road in Auckland City.

Keeping traffic flowing through Manukau City was a decisive factor in expanding the Southwestern

Motorway. The Papatoetoe Bypass helped immensely, but links to Auckland International Airport also needed further improvements.

The solution was a new link to the airport on State Highway 20A (SH20A). Opened in 1992, the four-lane, 2.7 kilometre expressway enabled motorists to travel at 80 km/h between the intersection of George Bolt Memorial



Above: The site of SH1 - SH20 interchange at Manukau City before construction

Right: Keith Hay Park pedestrian bridge in Mt Roskill



Drive and Kirkbride Road and the airport.

Further expansion followed in 1997 between Massey Road and Coronation Drive when the Mangere Extension, 5.5 km of motorway linking the Mangere Bridge and Papatoetoe bypass sections and George Bolt Memorial Drive, were commissioned. This project completed the link from SH20, down SH20A to the airport.

However, the growth in air travel along with significant investment at the airport and the expanding commercial areas around it meant a second access road was needed.

The opening up of this new access to the airport involved the widening and extension of Puhinui Road and the construction of Pukaki Bridge by Manukau City Council and Auckland International Airport in 1996. These

improvements again changed travel patterns on SH20 and led Transit to construct the Puhinui Road Interchange that opened in August 2003, eliminating a notorious roundabout at the end of the Papatoetoe Bypass. Soon after in 2004 the second airport access route was taken over by Transit and renamed SH20B.

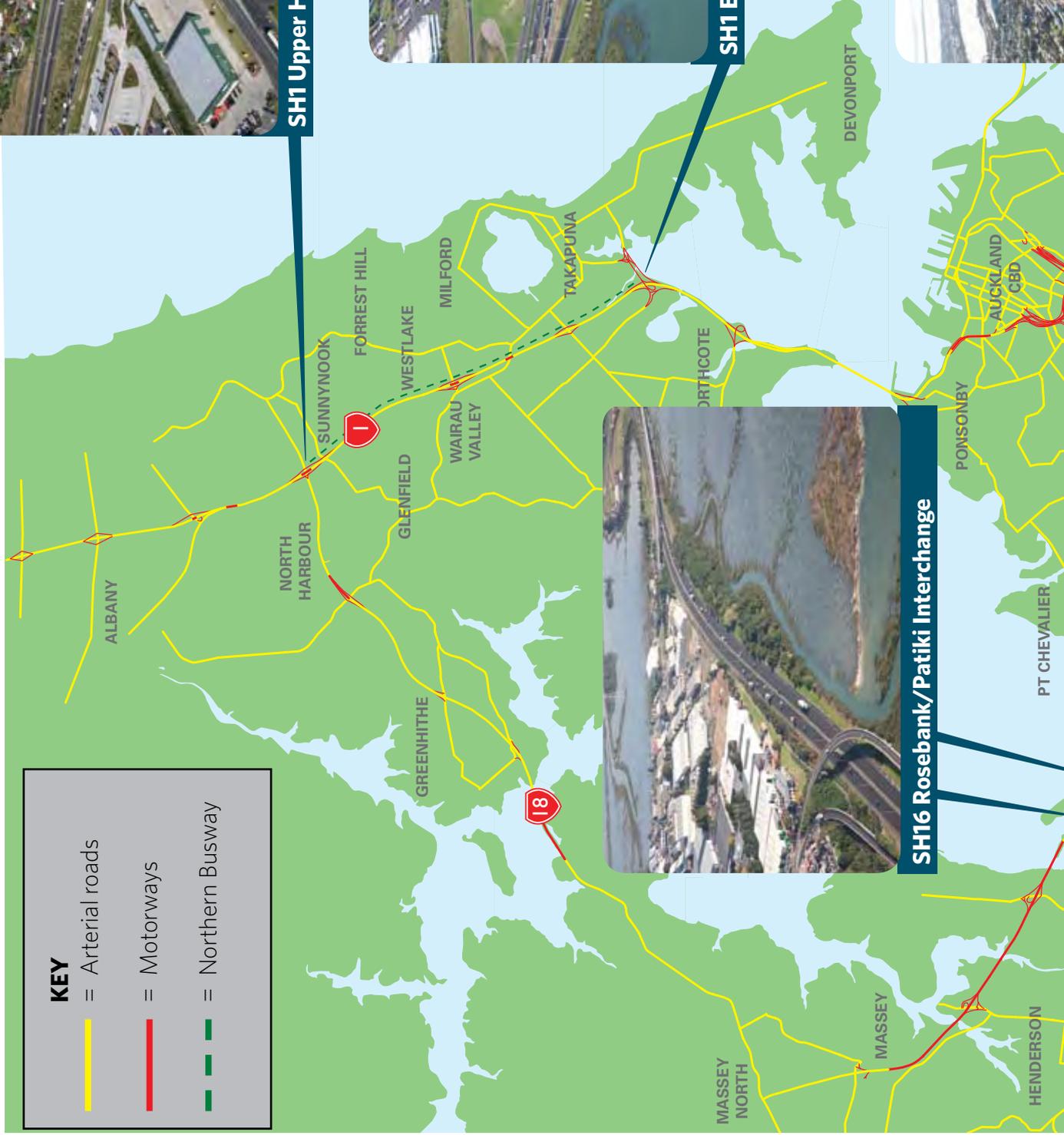


Above: Hayr Road bridge during construction to carry local traffic over Mt Roskill Extension, 2008
Left: Welding maintenance work on Mangere Bridge, February 2006

Auckland Motorway Network, 2008

KEY

-  = Arterial roads
-  = Motorways
-  = Northern Busway



SH1 Upper Harbour Highway Interchange

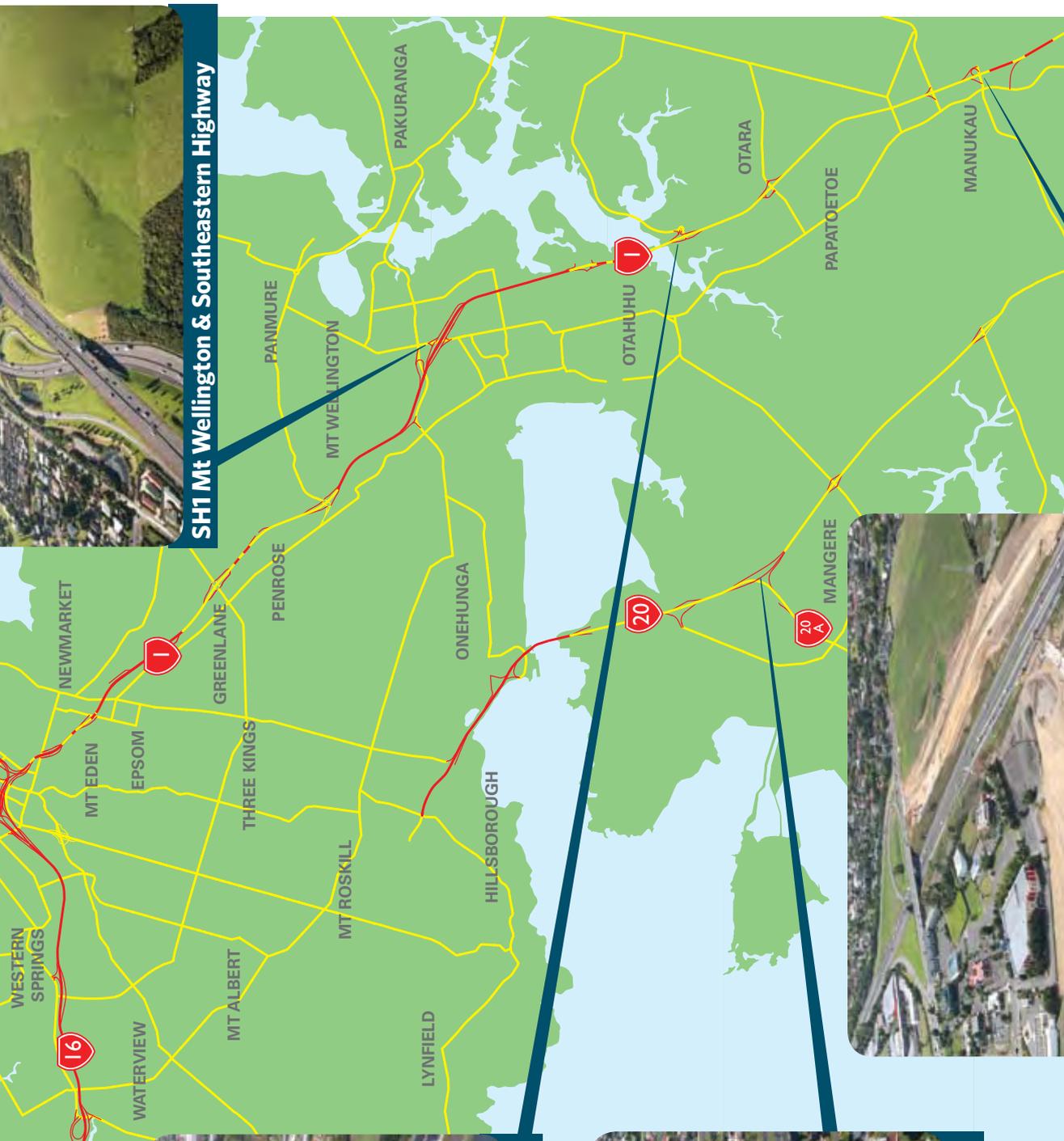


SH1 Esmonde Road Interchange



SH16 Rosebank/Patiki Interchange





SH1 Mt Wellington & Southeastern Highway



SH1 Highbrook Drive Interchange



SH20 & SH20A Junction at Mangere



SH1 Redoubt Road Interchange



SH20 Mt Roskill Extension

On the Auckland side of the Manukau Harbour, construction of the four-lane, 4 kilometre SH20 Mt Roskill Extension began in August 2005 and is well on the way to being completed in 2009. Running between Queenstown Road in Hillsborough and Richardson Road in Mt Roskill, it is designed to link to the SH20 Waterview Connection project in the future.

Two interchanges at Hillsborough Road and Dominion Road will separate local motorway traffic and help relieve congestion through Mt Roskill, particularly the industrial areas around May Road and Carr Road. Two new pedestrian/cyclist bridges have already been built across the motorway at Keith Hay Park and Ernie Pinches Street.

A dedicated cycleway running alongside the motorway is being developed in conjunction with Auckland City Council.

The project features two dedicated bus shoulder lanes as well as provision for a rail line in the future, connecting to Auckland Regional Transport Authority's proposed rail link to Auckland International Airport.

SH20 Manukau Harbour Crossing

Further north at Mangere Bridge, a new four-lane motorway bridge is being built over the Manukau Harbour between Onehunga and Mangere Bridge, parallel to the existing bridge. Together, they will provide eight traffic lanes and two bus shoulder lanes. As part of the upgrade, SH20 will be widened to six lanes and bus shoulder lanes added between Queenstown Road and Walmsley Road.

The new and existing bridges will add much needed capacity for motorists travelling across the Manukau Harbour. They have been designed to accommodate the 160,000 vehicles expected to use the crossing everyday by 2021.

Pedestrian and cyclist footbridges and a shared path will stretch along the Waterfront Reserve in Mangere Bridge. Provision is also being made for a rail link to run under both bridges to connect to the ARTA proposed rail link to Auckland International Airport.

Construction began in April 2008 and is on track for completion in 2011.

SH20 - 1 Manukau Extension

The SH20 to SH1 Manukau Extension, a new four-lane motorway, will connect the Southwestern Motorway at Puhinui Road Interchange to SH1 south of Manukau city centre. The 4.5 km motorway will replace Wiri Station Road as the main link from the city to the Southwestern Motorway, and is the southernmost link in the Western Ring Route.

Above: The new harbour crossing will be built to the east of the existing Mangere Bridge

Opposite above: Northwestern Motorway - where a new interchange will link to the Southwestern Motorway

Opposite below: Underneath view of Mangere Bridge



Construction started in November 2006 and is scheduled to be completed in 2010.

Manukau Extension will improve access to and from Auckland International Airport and provide relief for local roads. A new rail link into Manukau city centre, being constructed by Manukau City Council, will provide better rail links and support growth at Wiri and airport business zones.

The project involves redesigning the Redoubt Road Interchange to incorporate a sweeping flyover to carry traffic from the Southern Motorway.

The two motorways will connect via a new tunnel passing underneath the Southern Motorway to take motorists south from the Southwestern Motorway.

The Great South Road off-ramp will be realigned and 12 new bridges built to take local roads across the motorway.

Looking Ahead

SH20 Waterview Connection

Connecting Mt Roskill Extension (SH20) to the Northwestern Motorway (SH16) at Waterview, the Waterview Connection proposes to use twin 3.2 kilometre tunnels underneath Mt Roskill and Mt Albert. The tunnels are part of a 4.5 kilometre, mostly underground route, to increase capacity and provide more reliable travel times. The new route will take traffic off local roads and create opportunities for improved bus transport.

The tunnels will run 20 to 30 metres underground, with no disturbance to houses and residents above. There will be two interchanges, one at the southern end at Maiero Street between Stoddard and Richardson Roads and one at Waterview by Great North Road and the Northwestern Motorway (SH16). It will be the last link in the Western Ring Route.





Keeping on moving

The development of smart technology systems such as CCTV monitoring and moveable lane barriers allows the NZ Transport Agency to manage congestion and keep traffic moving on the motorways during peak periods.

Moveable lane barrier

In the late eighties, accidents (serious injury and multiple fatality), led Transit to install a safety barrier to prevent head on collisions on the Auckland Harbour Bridge. However, as peak traffic demand required a tidal flow operation, a fixed barrier was not a practical option.

American and French firms were in the early stages of developing moveable barriers for construction sites, and an approach was made to an American

supplier to develop a system for the Auckland Harbour Bridge. In early 1990, a contract was entered into with Barrier Systems International and in November of that year, the moveable lane barrier (MLB) was installed.

The system incorporates tied concrete units that are lifted by a special vehicle. The 'string' is deposited off-set by 3.5 metres behind the machine - the width of one lane.

Using two machines (at different times) the barrier can go from a 4 x 4 lane configuration to a 5 x 3 lane configuration in either direction, maintaining the traffic capacity for peak flows. This was a world first and variants of the system are now used internationally.

Advanced Traffic Management System (ATMS)

In 1994 the seeds were sown to develop a traffic management system for Auckland that went beyond lane control signals for tidal flow and CCTV coverage for the Harbour Bridge and its approaches.

Following consultation, planning and the installation of an extended network of traffic data count stations, a contract was let in 1997 to a multi-national team to develop the concepts and standards for an extensible advanced traffic management system (ATMS).

In late 1998, a contract was let to Serco (UK) for the installation of a base ATMS consisting of CCTV coverage and variable message signs (VMS), with temporary wireless connections between the control room and the field equipment.

The barrier eliminated head-on crashes and has been a huge success. The whole system is being replaced at a cost of around \$10m in 2008/2009 after 18 years of almost faultless service. The new MLB will be lighter and able to be repositioned in half the time.





Ramp signals

Transit is currently installing 61 ramp signals - 31 at on-ramps to the Southern Motorway, 15 on the Northwestern Motorway and 15 on the Northern Motorway - to improve traffic flows and help reduce congestion.

The need for the system is underlined by the fact that the Auckland region is growing at an unprecedented rate.



Smart technology

A key skill of the ramp signal system is its ability to use measuring systems to detect, intervene and prevent traffic conditions from deteriorating, to keep traffic flowing.

The original project was extended to include coverage south to Newmarket Viaduct and west to St Lukes to assist in traffic management for the upcoming APEC meeting to be held in Auckland. The system was commissioned and used to coordinate traffic for the visiting Heads of State in September 1999.

A second contract was let to Phillips (Tyco) in 2000 to expand the system; connect to field equipment via fibre optic cables; replace and expand the lane control signal system and provide a comprehensive traffic management programme to drive the system from an enlarged control centre, later branded as ATTOMS.

To deliver Integrated Traffic Management (ITM) across the region's major arterial routes, the Traffic Management Unit (TMU) was established in 2003 as a joint venture between Transit and the four Auckland region city councils. The initiative was directed at providing a central location where over 600 signalised intersections could be managed.

As a result, the ATTOMS Traffic Management Centre provides a 24 hour, 365 days a year traffic management service for motorway and arterial road traffic. This provides control room operational services, incident response

assistance, on-road maintenance services, technical support and traveller information. Staff also maintain the website, coordinate temporary traffic activity and assist with travel demand management.

Opposite top and below: CCTV cameras on Auckland Harbour Bridge

Auckland Harbour Bridge moveable lane barrier stops a car from hitting oncoming traffic

Above top and below: Ramp signals leading onto the Northern Motorway

Moveable lane barrier machine in operation



Ready, steady, go

The NZ Transport Agency works in partnership with local authorities to plan special events and manage the more than 3000 lane closures that take place on Auckland's state highways every month.

The NZ Transport Agency works with event organisers to put together integrated traffic management plans for large events such as parades, festivals and sports games. Planning minimises the impact on the road network and lets motorists know about any changes or detours. Successful traffic management during special events relies on co-ordination with event organisers, local councils and police.

Event traffic management includes green light priority corridors to enable fast and safe transport for special vehicles, convoys and VIP visitors. Traffic light phases are adjusted to help move traffic around events and mobile electronic messaging signs are strategically placed during events.

Emergency advice

The NZ Transport Agency has a lead role in managing transport advice and resources in times of emergencies such as floods and earthquakes. This involves working closely with local authorities, government agencies and service providers to contribute to an overall emergency contingency plan which can then be implemented by the Civil Defence Emergency Management Group (CDEMG).

Accidents, breakdowns, debris, spillages and varied weather conditions all affect the motorways. Many incidents require an on-the-spot response and trained staff at ATTOMS in Northcote assist police and contractors to provide on-road support.

Above: Variable message signs keep motorists informed

Below: Traffic management for Auckland Marathon

Opposite above: Messages change frequently to keep motorists updated

Opposite below: ATTOMS control centre monitors traffic flow





Central intelligence

ATTOMS acts as a communications and operations hub, complete with a dedicated control room to monitor and respond quickly to incidents. The centre is located within one of the two motorway police units which facilitates a close working relationship with the police and enables staff to communicate directly with them as well as fire and ambulance services.

A number of tools are used to manage traffic around incidents including closed circuit television (CCTV) cameras, electronic messaging signs, lane control signals, traffic cones and traffic light monitoring. These help clear roads so that traffic flow returns to normal as quickly as possible. It enables emergency services and motorway police to put in detours and clear objects from the motorway. It also gives them access to parts of the motorway and arterial roads that might otherwise be restricted.

Lights, camera, action

Remotely controlled CCTV cameras able to pan, tilt and zoom, allow operators to monitor and respond quickly to incidents. With the aid of more than 110 CCTV cameras, a minimum of two operators at any given time provide around-the-clock monitoring of the region's major urban motorways and some critical arterial routes and junctions. Sixty cameras positioned on the motorways, two on the Sky Tower and the rest at arterial road intersections, send pictures to any one of the 25 monitors.

The CCTV motorway cameras enable traffic to be monitored all across Auckland from the south at Hill Road in Manurewa to the Lonely Track Bridge in Albany in the north. East-west coverage spans from Western Springs on-ramp to Lincoln Road. Using fibre-optic and radio technology as well as telephone lines, all CCTV cameras and traffic signals are operated through a centralised system. This enables operators to monitor queues and reduce or increase signal times depending on traffic flow in each area.





Improving safety

Safety is paramount

Innovative and sophisticated safety features and tools help to manage Auckland’s road network and ensure that motorists are kept as safe as possible when travelling on motorways and approach roads.

Median barriers

Median barriers are used throughout the region’s motorways and state highways and provide protection for motorists by separating lanes from oncoming traffic.

Stay in lane

Ceramic domes originally used to mark motorway lanes are being phased out and replaced with new high performance ‘audio-tactile’ line markings – raised, plastic lines. If motorists stray out of their lane and into the motorway shoulder, they will experience warning vibrations through their vehicle and steering wheel.

Long life and high performance markings help drivers see lanes in all types of weather and coloured reflectors also aid motorists travelling at night.

Slow vehicle lanes allow motorists to drive up steep hills without delaying others. These lanes are also commonly used by trucks and oversized vehicles with slower accelerations. Allowing slower vehicles to use a separate lane as they approach an exit enables other motorists to use the fast lanes and keep traffic flowing well. There are two slow vehicle lanes on the Northern Motorway and two on the Southern Motorway.

Taking care

As part of Transit’s, and now the NZ Transport Agency’s regular maintenance programme, safety features are provided wherever they are required. Safety fences, for example, are erected on two overbridges on the Southern Motorway to prevent debris and objects from falling onto the motorway underneath.





Lighting the way

Lighting throughout Auckland's motorways is continually updated with new technology and safety features. In areas where several roads intersect, high mast lighting is used to give better illumination. Lighting poles are positioned a set distance from the road in an effort to enhance the safety of motorists.

Concrete and fibre glass poles have been replaced by metal poles with a shear base. The base enables the pole to take the brunt of any impact and fall in a way that minimises damage to motorists and their vehicles.

Ongoing maintenance

The NZ Transport Agency provides essential upgrades and repairs to maintain the road surface on state highways, motorways and link roads. Resurfacing, repair and welding work is regularly completed on the Auckland Harbour Bridge, which is used by up to 200,000 vehicles a day.

Where needed, special surfacing

materials are used, such as on the Newmarket Viaduct. The special white chip seal is sourced from near Kaiwaka in Northland. Its reflective qualities reduce heat building up within the bridge structure.

Any lane closures required for maintenance work usually takes place late at night, or during summer holiday periods, to minimise disruption to the public.



Opposite above and below: Links onto the Southern and Northwestern Motorways

Variable message signs inform motorists of closures on the bridge for maintenance

Above: Median barriers and grass verges separate traffic

Right: Lighting on Auckland Harbour Bridge



Caring for the environment

Auckland’s 327 kilometres of state highways and motorways pass through widely differing environments. These include the dense urban setting of the Central Motorway Junction, coastal marine environments such as Shoal Bay and Mangere Harbour, and the relatively rural northern and southern extremities of the region.

The NZ Transport Agency is committed to using environmentally sustainable roading solutions and to improving the contribution that state highways make to local environments.

The following examples illustrate some of Transit’s past innovative approaches in Auckland to ensuring that state highway’s have a positive impact on local environments.

Auckland Harbour Bridge stormwater project

2008 saw special catchpits created below the bridge surface to capture and clean stormwater and any spilled liquids before they are discharged.

Graffiti

Graffiti is an increasing challenge as taggers liberally daub whatever structures they can reach. Transit has developed ways to tackle the problem, including treating areas subject to repeated attacks with protective coatings. Emphasis is placed on newly completed motorways, often an appealing blank canvas to taggers. A database of sites, dates and types of coatings is used to manage graffiti removal and identify patterns.

Graffiti is removed as quickly as possible, with the majority cleaned off the same night as it occurs. Painting over graffiti and applying protective coatings has stopped structural damage from water blasting and there is no chemical contaminant run off.

Vulnerable sites have been hidden with clever planting - an additional benefit of the extensive planting programme.

Planting

Used in all new projects, planting reduces maintenance costs and softens the built up environment. It provides natural screens, encourages bio diversity, reduces run off and makes the motorway more attractive.

Over the years, many hundreds of thousands of indigenous plants and

Above: Native planting on SH1 and Akoranga footbridge

Right: Planting provides brilliant swatches of colour

*Opposite: Artwork at Grafton Gully
Timber noise walls with scenic stencilling*



shrubs have been introduced to Auckland's motorway network. Notable examples include Orchid Corner on SH1 at Bombay Hills and the SH20 extension to Auckland Airport.

More recently, around 60,000 plants were introduced at SH1 Esmonde Road Interchange. This included the vegetation of new slopes, stream planting, low coastal ground cover and wetland planting.

Transit focused on reintroducing indigenous species that have historically thrived in particular areas. Pohutukawa, an iconic New Zealand tree chosen for its strong association with the Shore, was planted around busway stations. As well as being a hardy native, it is large enough to soften structures and provide swathes of brilliant colour in summer.

Creature comforts

Construction of the busway saw the creation of new habitats for endangered New Zealand Dotterels. Predator control was introduced, new nesting sites created and existing breeding sites enhanced.

Back in 1996, Transit had one of its first major experiences of building near delicate marine environments with the creation of the SH16 Rosebank Road and Patiki Road cycleways.

Since then, everything from eels to frogs, geckos and fish have been carefully considered during the design and construction phases of motorway projects.

Treading carefully on the land

The Northern Gateway Toll Road team used various innovative environmental management techniques. These included GPS technology to minimise bush clearance and the eco friendly design and construction of bridges. Native geckos were also relocated and new wetlands incorporated into the design of the larger stormwater treatment ponds.



Case study: Grafton Gully

Environmental management

Completed in 2004, the SH16 Grafton Gully project showed what can be achieved by employing world-class environmental and social management techniques and working closely with regional partners. Key features included:

Sustainable waste management

To minimise and dispose of waste, Transit built the city's largest sedimentation tank. During construction the tank captured and treated site run off. Afterwards, it was connected to Auckland City's stormwater pipe, construction of which was brought forward to minimise disruption and reduce costs.

Noise-control

Noise can be an issue for people living near construction sites. Mindful of this, Transit scheduled noisy work to be done during the day in residential areas and at night in commercial neighbourhoods. Special 'silencer shells' were acoustically sealed to contain the noise of up to three people working with jackhammers.

Art in collaboration with local communities

Grafton Gully's rich industrial heritage is commemorated by artworks that provide interest and enhance the area. These include a 13-metre stainless steel Tewhatewha, a modern version of a treasured Maori artefact. This was the result of a partnership between Transit, the project delivery team, Ngati Whatua o Orakei and Auckland City Council.





More than motorways - public transport, cycling and walking

Commuter choice

The NZ Transport Agency helps increase commuter choice by providing opportunities for an integrated multi modal land transport system. In Auckland, Transit, now the new agency, works more closely than ever before with its regional partners to provide sustainable infrastructure for transport choices.

In the mid nineties, Transit started what would eventually become a cycle path running alongside the length of the Northwestern Motorway between Newton Road and Te Atatu Road.

More than 10 years ago, bus priority shoulder lanes were introduced on SH16

Waterview to Lincoln Road, SH1 towards St Marys Bay, SH1 Southern Motorway at Mt Wellington, SH20 to the airport and a pedestrian walkway underneath SH20 Mangere Bridge.

Looking ahead

All of the projects that make up the Western Ring Route (see Chapter 6 for more details) incorporate walking and cycling. For example, a new cycleway is planned to connect the SH20 Mt Roskill motorway project to the SH20 Manukau Harbour Crossing. The cycleway will in turn connect into Auckland City Council's existing and planned cycle routes.

Specially designed footbridges at Keith Hay Park and Ernie Pinches Street create crossing points for cyclists and pedestrians, particularly useful for the six schools in the area, and joining up local communities.

Above: Shared cycle and pedestrian path over SH18 Upper Harbour Bridge

*Below left: Urban design walls along the busway
Below right: Keith Hay Park pedestrian and cycle bridge*

Opposite page above: Akoranga bus station and Northern Motorway

Right: Cyclists riding beside SH16 Northwestern Motorway

Far right: Busway in operation



Case study:

Northern Busway

Transit's flagship public transport project, the Northern Busway, is a leading component in transforming public transport in Auckland. It is the first purpose-built road for buses and provides a reliable, high-speed link between the North Shore and the Britomart transport hub. The 6.24km of two-way busway extends from Albany in the north to the Auckland Harbour Bridge and incorporates five commuter stations along its length.

Origins

The concept of a busway was first conceived in the 1970's. Bus lanes running on the motorway shoulders were introduced in the 1980's so buses could bypass congestion.

Long term, a dedicated two-way busway running alongside the motorway with purpose built stations was deemed the best solution. The Northern Busway as it would become known, follows overseas trends of successful bus transport systems operating in Canada, the United States, Brazil, Colombia and Australia. The US and Canadian busway teams provided input during the concept stages of Auckland's busway.



The Northern Busway is a good example of collaboration among the four partner organisations who worked in later years to bring the project to fruition – Transit New Zealand, Auckland Regional Transport Authority, North Shore City Council and Auckland City Council.

Roaring success

In March 2008, a month after the Prime Minister opened the busway, 115,060 passengers travelled on the Northern Express – the first month the service exceeded 100,000 passengers.

The North Shore City Council and Auckland Regional Transport Authority funded bus stations at Albany,

Constellation, Sunnynook, Smales Farm and Akoranga, provide platforms, shelter and real time passenger information. State of the art technology delivers audio help and information and 24 hour security surveillance.

Passenger facilities include integrated tickets, cycle lockers, covered walkways, footpaths, bridges and lifts as well as drop off zones for commuters.

Besides parking facilities at the Albany and Constellation bus stations, there are pick up and drop off (kiss and ride) facilities at all stations to encourage motorists to leave their cars at home.





The future of Auckland's motorways

Western Ring Route

The Western Ring Route is the proposed 48 kilometre strategic motorway passing through North Shore, Waitakere, Auckland and Manukau cities to take traffic away from the CBD and the Harbour Bridge.

The proposed route will create more motorist choice, enabling them to travel from one area of the Auckland region to another safely and efficiently. It will create more capacity on the region's state highways by allowing Waitakere and North Shore traffic to travel directly to Auckland International Airport.

Government funding of \$2 billion has kick started several projects on the route. The SH20 Manukau Harbour

Go west

The route uses a combination of existing motorways which will be upgraded and new motorways that will be built to link SH20, SH16 and SH18.

Made up of 10 individual motorway projects, the Western Ring Route includes completing the Southwestern corridor (SH20), connecting to the Southern and Northwestern motorways, upgrading the Northwestern Motorway (SH16), and completing the Upper Harbour Motorway (SH18) to connect the Northwestern Motorway at Massey North to SH1 at Constellation Drive on the North Shore.

Crossing and SH20 Mt Roskill Extension will, within three years, deliver much needed capacity for motorists and freight in South Auckland. Another ring route project, the SH20 Waterview Connection project is planned to incorporate twin tunnels to minimise disturbance to the residential areas the route passes through.

Looking to the future

Representatives from key Auckland authorities including the NZ Transport Agency, are already working together to identify the best option for a third crossing of the Waitemata Harbour. The integrated planning of the proposed crossing will see new transport links created and better travel options for motorists on both sides of the harbour. These will provide for cars and public transport, as well as cyclists and pedestrians.

See the Auckland Harbour Bridge section of Chapter One.





*Joseph Flanagan,
New Zealand Transport Agency, Auckland
Network Operations Manager*

Keeping Auckland connected

The NZ Transport Agency's job is to ensure that Auckland's motorways and state highways are in the best condition and ready to meet the increasing demands placed upon them. These include

- Traffic volumes over 200,000 vehicles per day in some areas
- An expected road area increase of 21 percent over the next 10 years
- New technology that will continue to change the way in which we operate the motorways
- Auckland's motorway network has the highest expenditure of any of NZ Transport Agency's networks.

Motorway alliance model

Because of the complexities of the Auckland motorway network and the fact that customer service is NZ Transport Agency's number one priority, an alliance method has been adopted to maintain the motorways. The network's importance to the regional and national economies, coupled with the programme of changes over the next 10 years, are the main drivers of this revolutionary new approach. While the alliance maintains and improves the physical condition of the motorways within the available budget, success will be ultimately be determined by improvements to the levels of service offered to road users. A key element is the 'whole of network' approach in planning and setting priorities. This will include traffic management using the NZ Transport Agency's Traffic Management Centre.

World class transport system

The alliance arrangement provides greater potential for improved service and value for money. This combination of new capital projects to connect the motorway network, and the innovative use of new technologies to manage growing traffic by maximising the capacity of the existing network, will deliver a world-class transport system to a world-class city well into the future.

**Joseph Flanagan,
Auckland Network Operations
Manager**

Acknowledgements

The NZ Transport Agency would like to thank Terry Brown, former Transit New Zealand Northern Regional Manager for his contribution to this brochure.

Motorway and Urban Highway statistics

Northern Motorway (SH1)

Area	Length (km)			Lanes	Opened
	Motorway Expressway	Urban Highway	Under construction		
Waiwera - Orewa (1)			7.1	4	
Orewa (ALPURT) - Greville Road	18.0			4	1999
Greville Road - Upper Harbour Highway	1.8			4	1994
Greville Road - Sunset Road	4.5			2	1984
Sunset Road - Tristram Avenue	2.5			2	1979
Tristram Avenue - Northcote Road	1.9			6	1969
Northcote Road - Onewa Road	3.1			6	1959
Onewa Road - Fanshawe Street	4.3			4 - 8	1959
Fanshawe Street - Wellington Street (Victoria Park Viaduct)	1.0			4	1962
SUBTOTAL (running distance)	35.3		7.1		
Average Annual Daily Traffic	1989	1993	1997	2002	2007
Auckland Harbour Bridge	114,000	125,100	144,408	155,256	165,747

Northern Busway (SH1)

Area	Length (km)			Lanes	Opened
	Motorway Expressway	Urban Highway	Under construction		
Constellation Station - Akoranga Station		6.9		2	2008
SUBTOTAL		6.9			
Monthly patronage on Northern Express	Aug 07	Oct 07	Dec 07	Feb 08	Apr 08
	56,000	53,000	40,000	81,000	115,000

Southern Motorway (SH1)

Area	Length (km)			Lanes	Opened
	Motorway Expressway	Urban Highway	Under construction		
Cook Street - Symonds Street	1.0			4	1978
Symonds Street - Khyber Pass Road	0.6			6	1966
Khyber Pass Road - St Marks Road	1.8			6	1966
St Marks Road - Market Road	0.8			6	1965
Market Road - Green Lane East	1.3			6	1965
Green Lane East - Ellerslie Panmure Hway	2.1			6	1963
Ellerslie-Panmure Hway - Mt Wellington Hway	3.2			6	1953
Mt Wellington Highway - Redoubt Road	9.4			4	1955
Redoubt Road - Takanini	5.4			4	1963
Takanini - Runciman	8.6			4	1965
Runciman - St Stephens	8.8			4	1978
St Stephens - Bombay	1.4			4	1993
Bombay - SH1/SH2 Interchange (2)	5.4			4	1993

SUBTOTAL **49.8**

Average Annual Daily Traffic	1989	1993	1997	2002	2007
Gillies Avenue to Khyber Pass Road	149,100	168,500	195,625	197,858	202,087
Manurewa to Redoubt Road	54,900	62,400	72,769	88,295	96,241
North of SH2 (Bombay)	18,600	20,850	23,942	31,701	35,868

Motorway and Urban Highway statistics (continued)

Northwestern Motorway (SH16)

Area	Length (km)			Lanes	Opened
	Motorway Expressway	Urban Highway	Under construction		
Newton Road – Western Springs	2.4			4	1979
Western Springs – Motions Road	1.0			4	1983
Motions Road – Great North Road	2.4			4	1981
Great North Road – Lincoln Bridge	7.8			4	1955
Lincoln Bridge – Lincoln Park Avenue	1.0			4	1957
Lincoln Park Avenue – Hobsonville Road	2.7			4	1961
Hobsonville Road – Brigham Creek Road (3)			3.0	2	
SUBTOTAL	17.3		3.0		
Average Annual Daily Traffic	1989	1993	1997	2002	2007
Newton Road to Western Springs	69,800	87,000	108,600	115,667	122,747
Great North Road to Rosebank Road	55,700	63,300	84,121	86,430	91,582
Royal Road to Hobsonville Road	21,000	24,800	34,314	38,063	40,541

Southwestern Motorway (SH20 including SH20A and SH20B)

Area	Length (km)			Lanes	Opened
	Motorway Expressway	Urban Highway	Under construction		
Maio Street – Hillsborough Road (5)			3.5	4	
Hillsborough Road – Queenstown Road	0.9			4	1989
Queenstown Road – Neilson Street	1.1			4	1984
Neilson Street – Old Mangere Bridge	0.8			4	1977
New Mangere Bridge – Coronation Road	2.5			4	1983
Coronation Road – Massey Road	5.5			4	1997
Puhinui Road – Massey Road	4.1			4	1987
SH1/SH20 junction – Puhinui Road (4)			4.3	4	
SH20A – Airport (2)	3.9			4	1992
SH20B – Airport		2.39		4	2004
SUBTOTAL	18.8	2.39	7.8		
Average Annual Daily Traffic	1989	1993	1997	2002	2007
Mangere Bridge	51,000	54,100	69,884	82,423	88,938

Upper Harbour Motorway (SH18)

Area	Length (km)			Lanes	Opened
	Motorway Expressway	Urban Highway	Under construction		
SH1 - William Pickering Drive		1.9		2	1994
William Pickering Drive - Buckley Avenue	6.0			4-5	2007
Buckley Avenue - SH16/SH18 junction (6)			5.1	4	
Hobsonville Road - William Pickering Drive		12.0		2	1991
SUBTOTAL	6.0	13.9	5.1		
Average Annual Daily Traffic	1989	1993	1997	2002	2007
Upper Harbour Bridge	13,100	15,200	19,272	24,021	23,945

Central Motorway Junction

Area	Length (km)			Lanes	Opened
	Motorway Expressway	Urban Highway	Under construction		
Wellesley Street off-ramp (two way initially)	1.3			2	1969
Symonds Street southbound on-ramp	0.2			1	1971
Hobson Street southbound on-ramp	1.5			1	1973
Lower Grafton Road southbound on-ramp	1.0			2	1975
Nelson Street northbound off-ramp	1.6			1	1977
Lower Grafton Road southbound off-ramp	0.8			1	1978
Northern Motorway (Wellington Street - Hobson St) - Southern Motorway	1.0			4	1978
Hobson St two-way access to Northwestern Motorway	1.0			4	1979
Southern Motorway - Northwestern Motorway	0.7			2	1988
Grafton Gully - Northwestern Motorway	1.5			2	1989
Grafton Gully - Northern Motorway (from Wellesley St)	0.8			1	2006
Northern Motorway - Grafton Gully (to Alten Road)	0.6			1	2006
Northern Motorway - Northwestern Motorway	1.3			1	2006
Northwestern Motorway - Northern Motorway	0.5			1	2006
Nelson Street northbound off-ramp reconfiguration	0.5			2	2005
SUBTOTAL	N/A				

Total Auckland Motorway Length (km)

	Motorway Expressway	Urban Highway	Under construction
SH1 Motorway	72.7		7.1
SH1 Waikato Expressway	6.5		
SH16	17.9	1.5	3.0
SH18 Motorway	6.0	13.9	5.1
SH20 Motorway	12.9		7.8
SH20A Expressway	3.9		
SH20B		2.4	

Note: In addition to the centreline lengths detailed above, there are 65 km of interchange ramps.

- (1) Toll road to open early 2009
- (2) Includes sections to expressway standards
- (3) To be opened in 2012 as part of SH16 Brigham Creek Extension
- (4) SH20-1 Manukau Extension to be opened in 2010
- (5) To be opened in 2009 as part of SH20 Mt Roskill Extension
- (6) To be replaced by SH18 Hobsonville Deviation in 2012

Motorway structures

Section	Motorway	From	To	Bridge		Underpass		Total number of structures	Length (m)
				No.	Length (m)	No.	Length (m)		
1	Northern Motorway (including SH1A)	Orewa	Tank Farm Lagoon	37	1776.9	10	831.4	47	2608.3
2	Northern Busway	Constellation Station	Akoranga Station	1	330	2	60	3	390
3	Harbour Bridge and approaches	Onewa Road Interchange	Shelly Beach Road off-ramp	2	1701.9	2	174.5	4	1876.4
4	CMJ (2)	SH1 Victoria Park Viaduct SH16 Grafton Bridge	SH1 Newmarket Viaduct SH16 Newton Road	39	6299.9	5	406.6	44	6706.5
5	Northwestern Motorway	Quay Street Bond Street	Bond Street Royal Road	12	1539.1	12	599.04	24	2138.1
6	Southwestern Motorway (including SH20A)	Wiri Station Road	Queenstown Road	8	1012.2	7	317.9	15	1330.1
7	Southern Motorway (3)	Market Road	SH2 Bridge Underpass	27	1587	26	939.8	53	2526.8
8	SH18 (4)	Albany Highway	Buckley Avenue	2	537.2	2	160	4	697.2
TOTAL				128	14784.2	66	3489.2	194	17,883.40

(1) Centreline lengths only

(2) Including 18 new bridges (total length 2612m) in CMJ

(3) Including one new overbridge at Highbrook Drive (60m)

(4) Including new structures as part of Greenhithe Deviation: Tauhinu Road Underpass (51.38m), Greenhithe Road Underpass (43.53m) and Albany Highway Overpass (37.43m)

Motorway structures (continued)

Motorway structures under construction

Section	Motorway	From	To	Bridge		Underpass		Total number of structures	Length (m)	Road length (km)
				No.	Length (m)	No.	Length (m)			
1	SH1 Northern Gateway Toll Road	Albany	Puhoi	6	1168.7			6	1168.7	7.1
2	SH18 Hobsonville Deviation	Hobsonville Road	Upper Harbour Bridge	2	161.5	3	190.3	5	351.8	8
3	SH20 Mt Roskill Extension	Queenstown Road	Richardson Road			4	266	4	266	3.5
4	SH20 - 1 Manukau Extension	SH20 Puhinui Road Interchange	SH1 Manukau City Centre	5	342	6	765	11	1107	4.5
5	SH20 Manukau Harbour Crossing	Queenstown Road	Walmsley Road	4	808		4	808	4.7	
6	SH16 Brigham Creek Extension	Hobsonville Road	Brigham Creek Road	1	32			1	32	3.1
TOTAL				18	2512.2	13	1221.3	31	3733.5	30.9

Section 1

Structure	Length (m)	Type
Southern Interchange	68	Bridge
Nukumea Eco Viaduct	180	Bridge
Otanerua Eco Viaduct	256	Bridge
Waiwera Viaduct	537	Bridge
Hillcrest Bridge	116	Bridge
Waiwera Bridge	11.7	Bridge

Section 2

Structure	Length (m)	Type
Hobsonville Road Bridge	54.6	Underpass
Trig Road Bridge	81	Underpass
Brigham Creek Road Interchange Bridge	54.7	Bridge
Buckley Avenue Bridge	54.7	Underpass
SH16-SH18 Flyover	106.8	Bridge

Section 3

Structure	Length (m)	Type
May Road Bridge	61	Underpass
Dominion Road Bridge	40	Underpass
Hayr Road Bridge	130	Underpass
Hay Park Bridge	173	Footbridge
Ernie Pinches Bridge	85	Footbridge
Hillsborough Road Bridge	35	Underpass

Section 4

Structure	Length (m)	Type
SH1 bridge over SH20	75	Bridge
Redoubt Road Flyover	243	Underpass
SH20 over Nesdale Avenue	61	Bridge
Nesdale Avenue Bridge	30	Bridge
SH20 bridge over NIMTR	105	Bridge
SH20 bridge over Puhinui Stream	71	Bridge
Great South Road Bridge	56	Underpass
Wiri Station Road Bridge	82	Underpass
Barrowcliffe Place Bridge	60	Underpass
Lambie Drive Bridge	62	Underpass
Plunket Avenue Bridge	62	Underpass

Section 5

Structure	Length (m)	Type
Beechcroft Avenue	84	Footbridge
Hastie Avenue	47	Footbridge
Tararata Creek Bridge	34	Bridge
Duplicate Mangere Bridge	643	Bridge

Section 6

Structure	Length (m)	Type
Totara Creek Bridge	32	Bridge

