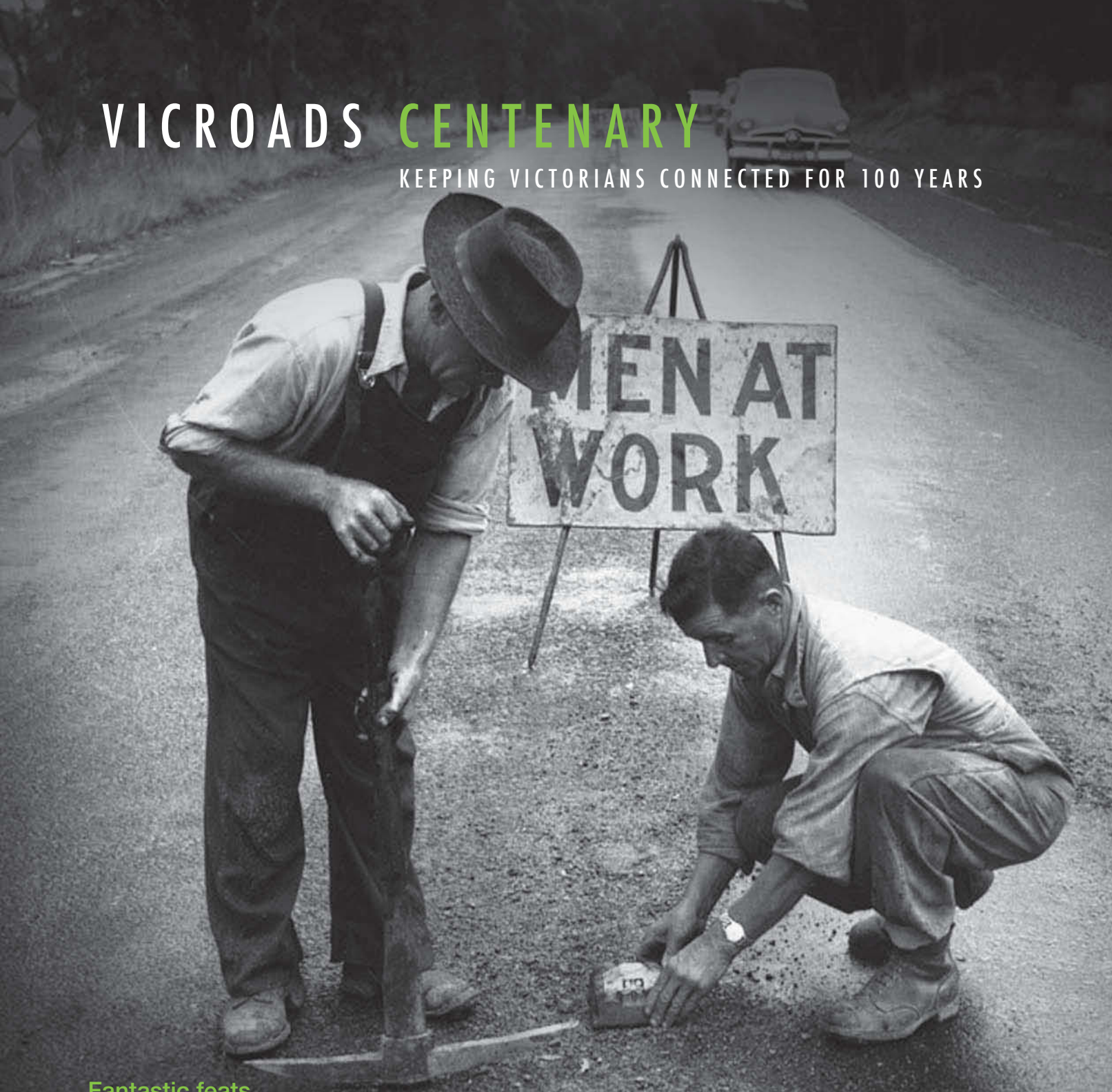
VICROADS CENTENARY

KEEPING VICTORIANS CONNECTED FOR 100 YEARS



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Happy 100th. Join the club.

Congratulations VicRoads on joining the 100 plus club. Together, we've shaped motoring for many generations in Victoria.

It all started back in 1907 when RACV sent a letter to the premier advocating the state should take control of Victoria's main roads and soon after that, the Country Roads Board was formed - the forerunner to VicRoads.

We provided road signs from 1909, issued drivers' licences from 1910 and we worked together to introduce hundreds of safety improvements over the years.

RACV began in 1903 with just 56 members and the idea of improving motoring in Victoria. And now, with more than two million members, our core values haven't changed.

Over the decades we've continued to respond to members' needs with the introduction of emergency roadside assistance, insurance, finance, home security, driver instruction and

innovations such as Emergency Home Assist. We have also established a range of resorts in Victoria and Queensland that give our members brilliant holidays at discount prices.

Our social responsibility programs reach far and wide - from teaching primary school children about road safety, through to lobbying government on behalf of motorists.

RACV is all about members, and last year alone, we returned more than $150 million in member savings through Years of Membership Benefits, Show Your Card & Save and member discounts at RACV resorts and shops.

So happy 100th and we all look forward to on-going improvements for Victorian motorists.

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congratulate **VicRoads**

on 100 years of service to the Victorian community.

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Over the past 100 years VicRoads has played a pivotal role in enhancing Victoria's liveability and opportunities for growth and prosperity. VicRoads has continued to support our economic well-being by shaping the development and use of Victoria's road system as an integral part of the overall transport system.

This is no small feat, demanding the management of over 22,000 kilometres of roads, 3,133 bridges, processing more than 22 million transactions a year for 3.7 million licensed drivers and 4.9 million registered vehicles, and continually striving to improve safety on our roads. All these functions are delivered by hard working and dedicated staff across a network of offices located state-wide.

I congratulate everyone who has contributed over the decades to the creation of a transport system where all its elements work together to deliver the best outcomes for the community.

Across 2013 it is important that we take the time to recognise these achievements and reflect on the many improvements and advances VicRoads has contributed. It is also an opportunity to look to the future and continue with our current commitment to ensuring Victoria's road network provides a safe and reliable service which drives jobs, productivity and economic activity.

Hon Terry Mulder MP
Minister for Roads and Public Transport

State Government Victoria

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CONGRATULATIONS VICROADS ON YOUR 100TH ANNIVERSARY OF CONNECTING VICTORIANS
FROM THE MANAGEMENT AND STAFF AT PORTER PLANT.

Corporate Communications
60 Denmark Street
Kew Victoria 3101
vicroads.vic.gov.au

This magazine is not just a history of VicRoads, the Country Roads Board, to the Motor Registration Branch and the other predecessor organisations; it is a history of Victoria through a century of growth, change and innovation.

The history of Victoria's roads dates back to 1801, when the Government of New South Wales built the state's first 'road' on Phillip Island. In 1896, steam powered cars, made in Armadale Victoria, travelled throughout Australia at an average speed of 14km/h. With the increasing popularity of cars, the Country Roads Board was formed in 1913 – Victoria's population at the time was 1,412,119. Since then, Victoria's population has increased to over 5.5 million people, with 4.17 million residing in Greater Melbourne. All of them are road users in some way, shape or form.

Connecting Victorians over the decades has been what VicRoads and its predecessors have done. We have built roads that connected isolated settlers, built bridges so people could get themselves and their goods across rivers, sealed surfaces to vastly improve travelling conditions, established rules and lifted vehicle standards to improve road safety, ensured people can register their vehicles and get their licence to drive – allowing them the freedom to commute and roam.

We have an excellent history of road safety, of reducing deaths and serious injuries on Victorian roads. In 1970, Victoria was the first place in the world to make it compulsory to wear seatbelts – the effect of this change on the road toll was a dramatic reduction.

While VicRoads is committed to looking forward and adapting to an ever-increasing demand, it is important to pause and reflect on where we have come from and what we have achieved in the past 100 years.

I hope you enjoy the publication.

Gary Liddle
Chief Executive Officer, VicRoads

VicRoads ABN 61 760 960 480
PSL 148

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ConnectEast delivered the $3.2bn EastLink tollway (including the untolled Ringwood Bypass and Dandenong Bypass) as a public-private partnership (PPP) with the Victorian Government.

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ConnectEast will continue to operate EastLink until 2043.

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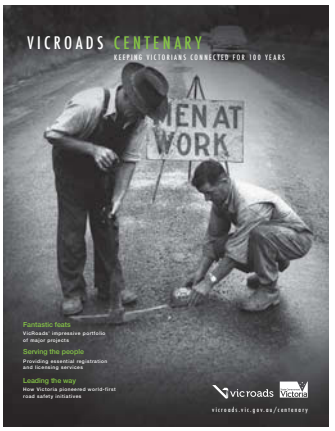
VICROADS CENTENARY

KEEPING VICTORIANS CONNECTED FOR 100 YEARS

1913–2013



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Asia-Pacific Headquarters
Level 15, Tower 2, Grafton Street,
Bondi Junction, NSW 2022, Australia

Tel: +61 2 8063-4800
Fax: +61 2 8580-5047

Publishers
Ross W. Jobson, Peter Antell

General Manager
Lloyd Millett, lloyd.millett@faircount.com.au

General Manager
Sales & Business Development
David Sanis, david.sanis@faircount.com.au

Sales Manager
Gary Mason, gary.mason@faircount.com.au

Advertising Account Executives
Peter Contos, Marty Douglas, Jon Lesjak, David Lock

Managing Editor
Darragh O Keeffe
darragh.okeeffe@faircount.com.au

Writers
David Anderson, Ted Barton, John Bethune, Graham Briggs, Emma Clarkson, Mark Dale, Kevin Fox, Wendy Harris, David Jellie, Max Lay, Gary Liddle, John Rebbechi, Hagen Rieck, D.D. Stejanovich, Doug Thompson, Paul Tierney, Robin Underwood, Peter Vulcan, Jim Webber, Merv Williams.

Art Director
Scott Ware, scott.ware@faircount.com.au

Production Coordinator
Lisa Omagari

Chief Information Officer
John Madden

Printing and Origination
BRB

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SHOPPING CENTRES

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PENINSULAR LINK PROJECT
M80 RING ROAD UPGRADE - LEIGHTON
MELBOURNE TENNIS CENTRE
SWAN HILL HARNESS RACING
VICTORIA UNIVERSITY SUNSHINE
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MELBOURNE OLYMPIC PARK
SOUTH MORANG RAIL EXTENSION
BRUNSWICK HEADS BYPASS
BONVILLE UPGRADE
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THE POOR, POOR COUNTRY

BY JOHN SHAW NEILSON

Oh 'twas a poor country, in Autumn it was bare, The only green was the cutting grass and the sheep found little there. Oh, the thin wheat and the brown oats were never two foot high, But down in the poor country no pauper was I.

My wealth it was the glow that lives forever in the young, 'Twas on the brown water, in the green leaves it hung. The blue cranes fed their young all day - how far in a tall tree! And the poor, poor country made no pauper of me.

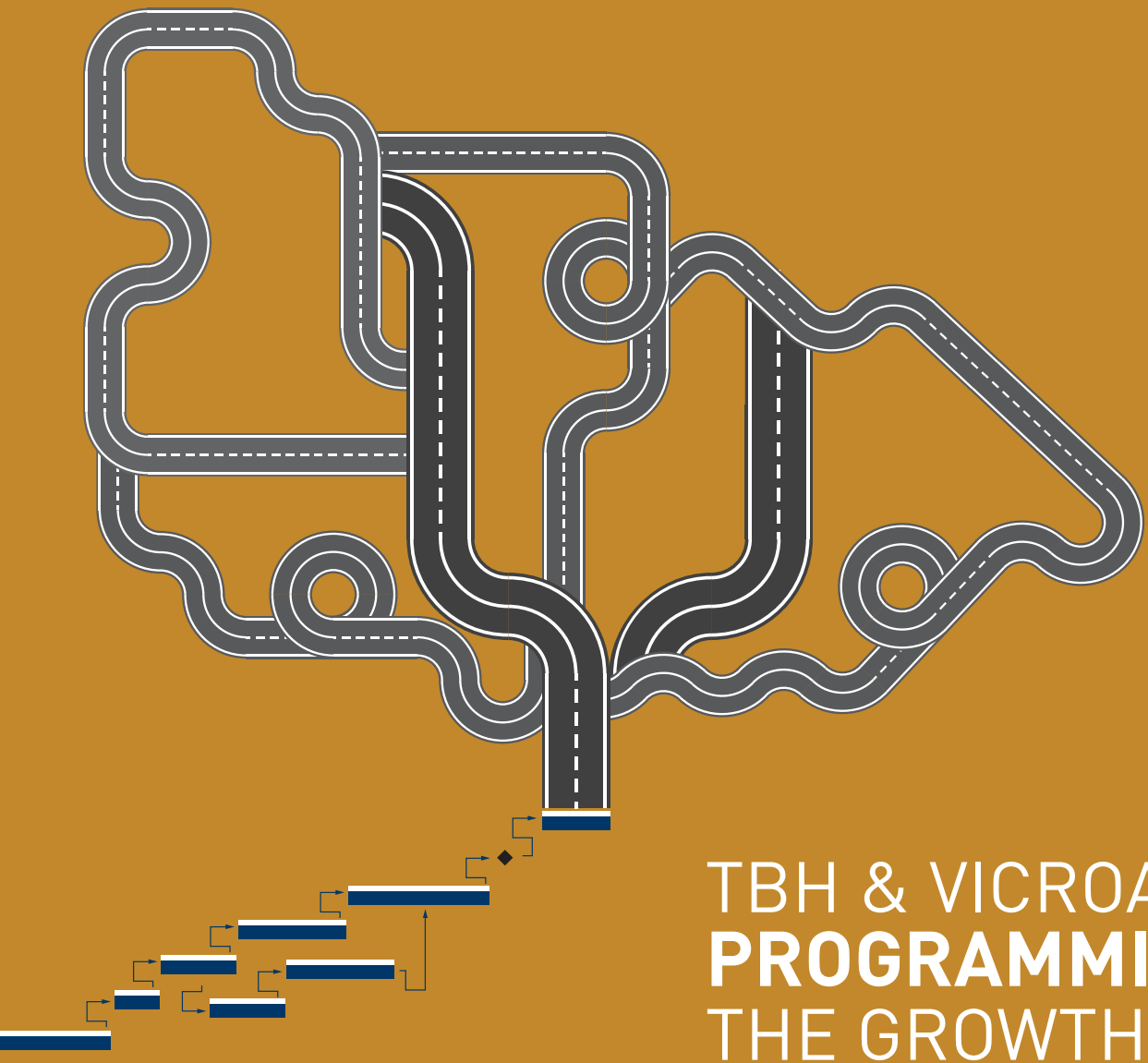
I waded out to the swan's nest - at night I heard them sing, I stood amazed at the Pelican, and crowned him for a king; I saw the black duck in the reeds, and the spoonbill on the sky, And in that poor country no pauper was I.

The mountain-ducks down in the dark made many a hollow sound, I saw in sleep the Bunyip creep from the waters underground. I found the plovers' island home, and they fought right valiantly, Poor was the country, but it made no pauper of me.

My riches all went into dreams that never yet came home, They touched upon the wild cherries and the slabs of honeycomb, They were not of the desolate brood that men can sell or buy, Down in that poor country no pauper was I.

The New Year came with heat and thirst and the little lakes were low, The blue cranes were my nearest friends and I mourned to see them go; I watched their wings so long until I only saw the sky, Down in that poor country no pauper was I.

John Shaw Neilson (1872-1942) is now considered one of Australia's most important poets. He worked at the Country Roads Board from 1928 to 1941. Read more about Neilson on page 32.



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FOOTPRINTS FROM THE PAST

MANY OF TODAY'S MAJOR ROADS FOLLOW ANCIENT INDIGENOUS ROUTES THAT WERE USED FOR TRAVEL AND THE MOVEMENT OF TRADE GOODS, WRITES WENDY HARRIS.

Aboriginal trade routes have been described as an ancient and pre-designated passage through the landscape. As the *First Australians* television documentary so succinctly described them, the trade routes were often mapped in song for the purpose of meeting at locations of great cultural and "mythical-historical importance, and ceremonially exchanging, renewing and reinforcing friendship rites with other Aboriginal tribal groups, clans or nations". Here, goods, objects or Dreaming songs considered valuable for their spiritual, religious, cultural and artistic worth were exchanged or passed from one group to another.

These Aboriginal tracks were not merely "meandering trails of aimless wanderers", wrote Henry Reynolds in *The Land, the Explorers and the Aborigines*. Rather, they "linked wells, springs and other water sources, led to fords and mountain passes, circumvented forests and other natural obstacles".

Bill Gammage, author of *The Biggest Estate on Earth*, wrote that records show early European travellers crossed rivers and creeks by large "fallen" trees. "In places the Murray and Goulburn River could be crossed using fallen trees deliberately felled by Aboriginal people undermining the roots. Long straight avenues of trees at regular intervals led to places such as initiation grounds," said Gammage.

The Princes Highway through Gippsland follows an ancient Aboriginal pathway.

Other commentary comes from Spooner, Firman and Yalmambirra in their work, *Origins of Travelling Stock Routes: Connections to Indigenous traditional pathways*. They wrote: "One perspective regarding the origin of Travelling Stock Routes (TSRs) is that many may have originated from previous Indigenous traditional pathways, which are known to have existed before European settlement. By examining available literature and maps, we found evidence which suggests that several TSRs, which follow the routes of early explorers, settlers or pastoralists, have developed from previous traditional pathways. Adoption of Indigenous pathways into the present-day stock route system has most likely occurred

Whereas Aboriginal people traversed waterways via felled trees, wheeled vehicles required bridges designed by engineers, such as this one on the Omeo Highway in 1914.

by 'passing on' of knowledge of pathways by Indigenous guides and trackers, observations of physical evidence of pathways by early Europeans, and their subsequent adoption, and shared development of some TSRs as a result of Indigenous people working in the pastoral industry."

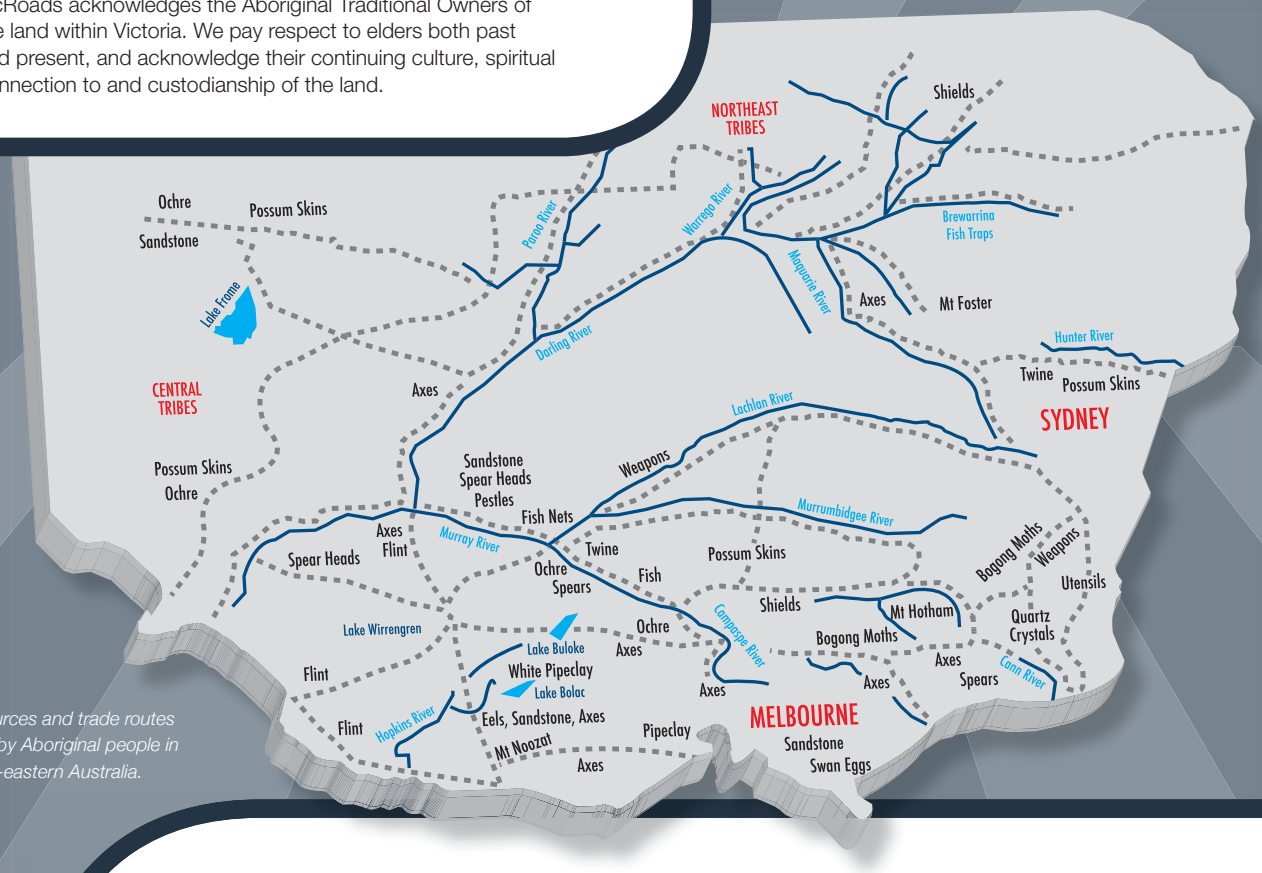
Aboriginal Victorians were rich in natural resources and access to food, clothing and shelter including permanent dwellings still in evidence adjacent to complex eel-farming infrastructure across the basalt plains in south western Victoria. The local Gunditjmara people of Budj Bim are today credited as engineers of aquaculture, builders of stone houses and warriors defending country (see *Gunditjmara People with Gib Wettenhall*, published in 2010).

Excess goods were traded and increased in value relative to scarcity and distance from origin.

Goods and objects from Victoria which were traded included greenstone and other stone artefacts such as axe heads, timber goods including spears made from mountain timbers, possum pelts and skin clothing items, ochres, crystals, and quartz.

ACKNOWLEDGMENT OF TRADITIONAL OWNERS

VicRoads acknowledges the Aboriginal Traditional Owners of the land within Victoria. We pay respect to elders both past and present, and acknowledge their continuing culture, spiritual connection to and custodianship of the land.



Resources and trade routes used by Aboriginal people in south-eastern Australia.

ANCIENT CONNECTIONS

Wurundjeri artist Mandy Nicholson Thomas painted this artwork in 2006 to illustrate ancient connections for Aboriginal Victorians – such as camp fires, trade connections and traditional travel, trade, and use of all land and waters – overlaid with vertical and horizontal representation of roads connecting all Victorians across the state today. The artwork is on display in public areas of all VicRoads offices and depots, together with a Statement of Commitment plaque to reflect to the public our commitment to genuine engagement with Aboriginal people living in Victoria.

According to *First Australians*: “The arrival of Europeans, who immediately began parcelling and fencing off tracts of land, severely disrupted these ancient routes.” Many of the travelling stock routes have become arterial roads; hence the wide reserves – 60 metres wide and more – on a large percentage of Victoria's roads.

In her book, *The Victorians: Making Their Mark*, Susan Priestley noted: “The Omeo Highway is said to follow one such route as it leads from the valley of the Mitta Mitta across the High Plains into the Tambo Valley. Similarly, the Western Highway between Horsham and Dimboola follows part of an ancient road, as does the Maroondah Highway north of Healesville. The Black Spur was originally called the Black’s Spur as miners heading out to the goldfields met a large party of Aborigines following the well-defined track into the Upper Yarra from the Goulburn."

Aboriginal place names and words remain in use across Victoria and beyond. Some of the Aboriginal names for freeways, highways, bridges and roadside rests include:

> Wurundjeri Way (Melbourne Docklands)
Wurundjeri Way is one of the roads that circuit Melbourne’s Docklands Stadium. A statue of creator spirit Bunjil the eagle sits at the Montague Street end of Wurundjeri Way. The Wurundjeri people’s land contains most of modern Melbourne. Their territory extends from north of the Great Dividing Range, east to Mount Baw Baw, south to Mordialloc Creek and west to Werribee River. Wurundjeri people who spoke the Woiwurrung language take their name from the word *wurun*, meaning Manna Gum (*Eucalyptus viminalis*), which is common along *Birrarung* (Yarra River), and *djeri*, a grub found in the tree. Wurundjeri people and their neighbouring traditional owner groups are known as the Kulin Nations and all observe Bunjil as their creator spirit.

> Tullamarine Freeway
Tullamarine (Tullamareena or Dullamarin) was a senior man of the Wurundjeri, a Koori people of the Melbourne area at the time of the British settlement in Victoria in 1835. It is believed he was present at the signing of John Batman's land deal in 1835. He was known to be a resistor to British occupation of Wurundjeri lands. Arrested in 1838 for sheep stealing from a property in Hawthorn, he escaped by burning down the thatched roof of the first Melbourne gaol and left with his friends Moonee Moonee and Jin Jin. Tullamareena was recaptured and sent for trial in Sydney by ship. His trial was terminated when it was established that he could not understand English. He was set free more than 700 kilometres from his home. While no records indicate further colonial contact, Aboriginal oral history tells us Tullamareena reached Melbourne on foot after more than a year of walking, having survived and negotiated his way through unknown Aboriginal lands and languages. He died shortly after reunion with his family and people. Tullamarine has a Melbourne suburb, international airport and freeway named after him.

> Mullum Mullum tunnel (Ringwood)
Named after Mullum Mullum Creek, *Mullum Mullum* is adapted from Woiwurrung language and is thought to mean “place of many big birds”. The tunnel carries vehicles towards the city, channelling traffic onto the Eastern Freeway. Mullum Mullum Creek runs beneath the Ringwood Bypass on and off ramps accessing


Mullum Mullum tunnel, EastLink.


William Cooper Bridge.

Eastlink, then runs parallel to the tunnel on its western side as it makes its way across the eastern suburbs until it eventually joins the Yarra (Birrarung) River near Sweeney Flats at Eltham.

> Maroondah Highway
Maroondah means "leaf" in the language of the local Woi Wurrung people. The Maroondah Highway extends from the leafy eastern suburbs of Melbourne to Mansfield in the Victorian high country.

> William Cooper Bridge
William Cooper was born in the 1860s in Joti-jota (Yorta Yorta) tribal territory. He worked hard for the rights of others. In the 1930s he organised a petition to the King seeking representation for Indigenous Australians and Torres Straight Islanders in Parliament. A national day of mourning for Indigenous Australians was, in part, organised by Cooper. He also led a delegation to protest the attacks on Jews in Germany in 1938. Cooper lived in Footscray in the mid to late 1930s. The Footscray railway station footbridge was named after him. Opening the bridge in May 2010, Planning Minister Justin Madden said of Cooper: “He played an important part in Australia’s Aboriginal history and it is fitting to pay tribute to his legacy in this way.”

> Taungurung Country Rest Area (Goulburn Valley Highway)
The "Scarred Tree" in the Taungurung Rest Area was not originally in this location but was moved there by VicRoads in cooperation with the Rumbalara Aboriginal Cooperative as part of the duplication of the Goulburn Valley Highway. Scarred trees have had bark removed by Aboriginal Australians to make canoes, shelters, shields and containers (coolamons). Eucalyptus species such as box and red gum were commonly used, and the scars remain in trees that are often over 200 years old.

Wendy Harris is a former Indigenous Employment Coordinator, VicRoads.

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SETTING THE SCENE

MAX LAY OUTLINES THE PEOPLE AND THE EVENTS THAT PRECEDED THE FOUNDING OF THE COUNTRY ROADS BOARD IN 1913.

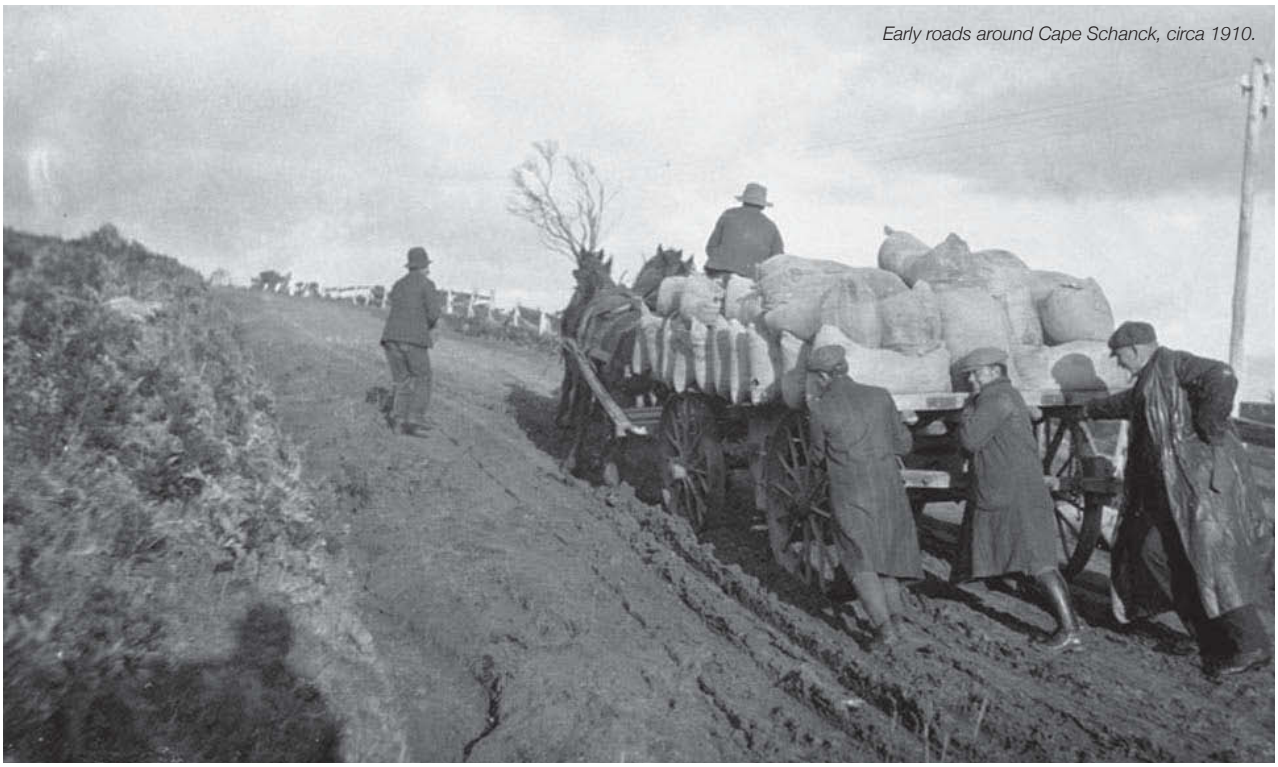
The settlement of Melbourne by Europeans began in 1835 and was formalised by the British Government in 1836. The colonialists partly used existing Aboriginal footpaths, but their cattle, sheep, carts and wagons required wider and flatter fords and bridges at watercourses. The colonial administration in Sydney provided limited funding for road and bridge building although some of the masonry bridges and macadam roads that were provided were built to world's best practice.

Victoria became a separate colony in 1851. Roads were a prime issue facing the new government. Gold was discovered almost immediately and the subsequent gold rushes created major demand for new roads. Progress was slow, as most workers had moved to the goldfields. Nevertheless, the new government's spending on roads and bridges was an order of magnitude greater than that of its colonial predecessor. During this stagnant period, the new legislative council appointed a select committee on roads and bridges under Henry "Money" Miller, a local investor.

IN ONE COLOURFUL PHRASE, THE COMMITTEE DESCRIBED THE COLONY'S ROADS AS A "SUCCESSION OF QUAGMIRES." IT RECOMMENDED THE FORMATION OF BOTH A CENTRAL ROADS BOARD AND DISTRICT ROADS BOARDS.

"A SUCCESSION OF QUAGMIRES"

Miller's parliamentary committee presented its report in late 1852. The committee had been criticised for slowness and a lack of intensity. Of the existing roads it noted that their location was often defective, reservations too narrow, alignment and construction



Early roads around Cape Schanck, circa 1910.

were poor, buildings often encroached into the reservation, and they were so close to a "state of nature" as to be impassable or ineffective.

In one colourful phrase, the committee described the colony's roads as a "succession of quagmires". It recommended the formation of both a Central Roads Board and District Roads Boards.

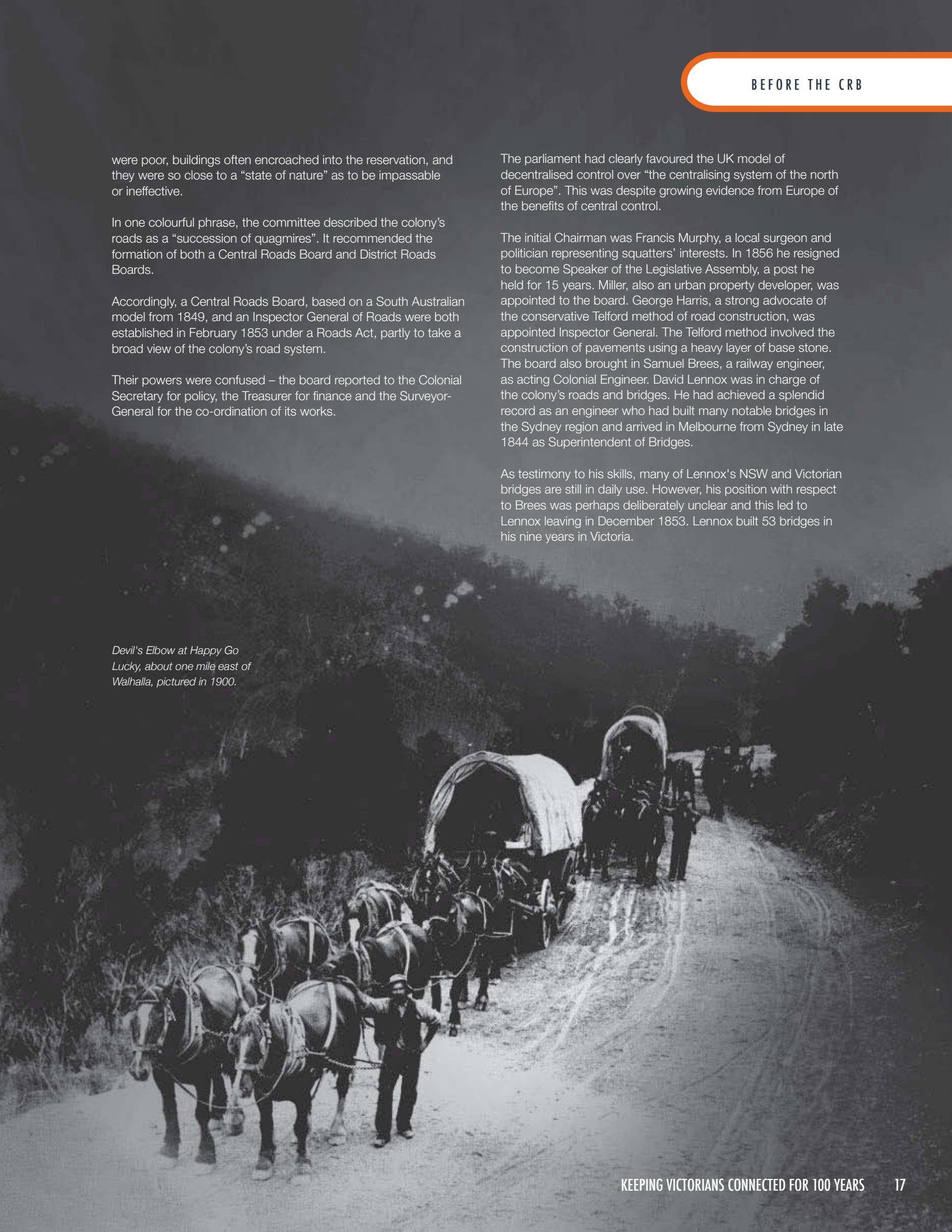
Accordingly, a Central Roads Board, based on a South Australian model from 1849, and an Inspector General of Roads were both established in February 1853 under a Roads Act, partly to take a broad view of the colony's road system.

Their powers were confused – the board reported to the Colonial Secretary for policy, the Treasurer for finance and the Surveyor-General for the co-ordination of its works.

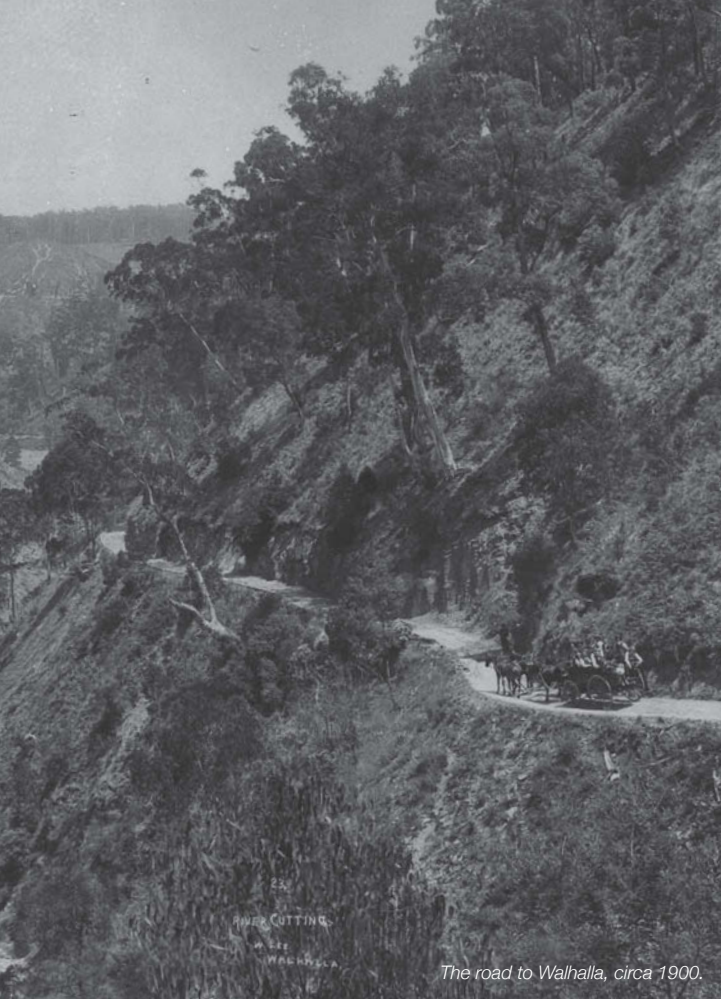
The parliament had clearly favoured the UK model of decentralised control over "the centralising system of the north of Europe". This was despite growing evidence from Europe of the benefits of central control.

The initial Chairman was Francis Murphy, a local surgeon and politician representing squatters' interests. In 1856 he resigned to become Speaker of the Legislative Assembly, a post he held for 15 years. Miller, also an urban property developer, was appointed to the board. George Harris, a strong advocate of the conservative Telford method of road construction, was appointed Inspector General. The Telford method involved the construction of pavements using a heavy layer of base stone. The board also brought in Samuel Brees, a railway engineer, as acting Colonial Engineer. David Lennox was in charge of the colony's roads and bridges. He had achieved a splendid record as an engineer who had built many notable bridges in the Sydney region and arrived in Melbourne from Sydney in late 1844 as Superintendent of Bridges.

As testimony to his skills, many of Lennox's NSW and Victorian bridges are still in daily use. However, his position with respect to Brees was perhaps deliberately unclear and this led to Lennox leaving in December 1853. Lennox built 53 bridges in his nine years in Victoria.



Devil's Elbow at Happy Go Lucky, about one mile east of Walhalla, pictured in 1900.



The road to Walhalla, circa 1900.

In 1854 the board was given power to levy tolls and build roads on private land. This last power was made necessary because land had been sold previously without road access.

Murphy's replacement as Chairman was Charles Pasley, a British army engineer who had become Colonial Engineer in 1854. When he became Chairman he was unique in being both the professional and political head of a government body. He left Australia in 1857 after the government fell and the short-lived new government replaced him with Charles Duffy, who served in various related roles until 1859.

DISTRICT BOARDS ESTABLISHED

The Roads Act of 1853 established road districts and gave the associated District Roads Boards the power to levy tolls and maintain roads, concentrating on roads of local significance. District Roads Boards were intended to work in conjunction with the Central Roads Board with its interest in highways. Each district was to nominate a person to sit on the Central Roads Board's advisory body. However, the model was too sophisticated for the embryonic government and was never achieved in law or in reality. A legal commentator later expressed surprise at the way the government had simultaneously set up two groups with conflicting interests.

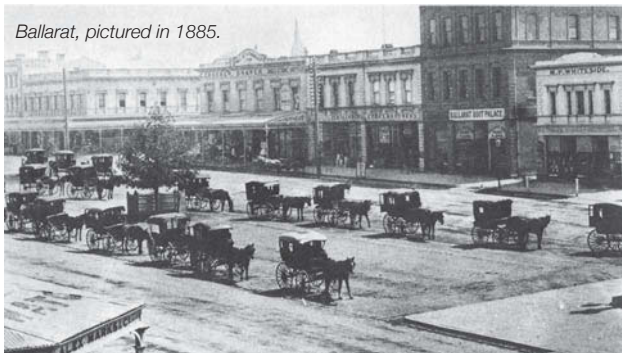
For these reasons, the District Roads Boards that did eventuate were too parochial and hard pressed to do even their specific tasks well. Their immediate concerns were with the almost impossible tasks of road and

bridge maintenance, and incremental improvement. What they had to do was burdensome enough. So District Roads Boards had little energy to devote to the planning and development of new infrastructure. In addition, the 1853 Act left the members of the District Roads Boards directly liable for many of their decisions, leading to timid decision-making. Nevertheless, the boards multiplied in an administrative vacuum between 1858 and 1874 and were the forerunners of many later local government entities.

ATTRACTION OF RAIL

This local and impoverished trend in road management was reinforced by the widespread introduction of steam rail in the 1850s. This technology provided better transport services than had previously been experienced and satisfied voters' demands for area-wide transport. Rail was alluring to the new settlement, and the railway companies were given strong controls over the land they needed. Consequently, simple road crossings were often rejected. Governments also gave low priority to funding roads running in parallel to a rail track.

In 1854 the *Melbourne Argus* newspaper argued that in all countries the ordinary road was being superseded by the railroad. A prize-winning Melbourne essay in 1856 echoed the widespread belief that there was no point spending money making arterial roads as they would soon be supplanted by railways. So why not start by building a railway?



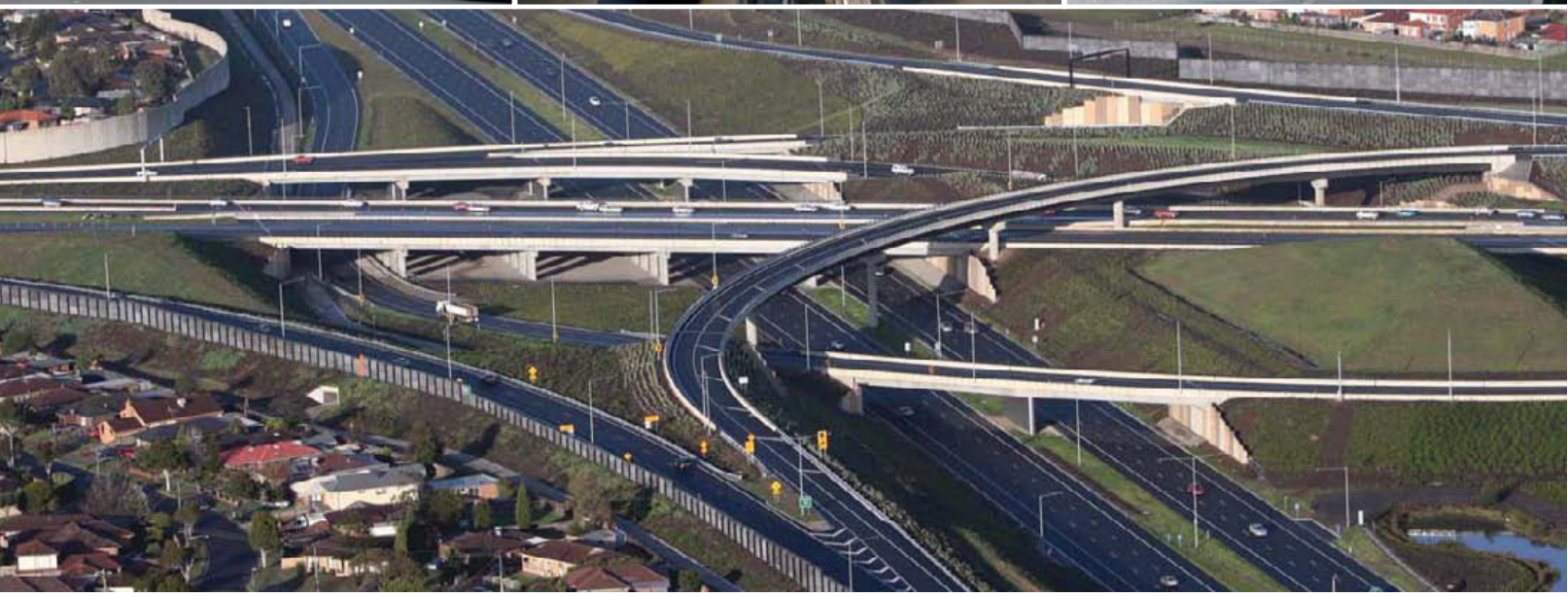
Ballarat, pictured in 1885.

In this climate, roads served only a local, parochial need and required no grand plans. Their management could be safely left to the locals, who were not always highly motivated. For example, the Dandenong District was proclaimed in 1857 but its members did not meet until 1862.

The Municipal Institutions Act of 1854 allowed new councils to be created by petition, provided they did not exceed nine square miles in area. The councils had the power to manage roads, levy tolls on the roads, and levy rates on land and houses.

Suburban local government was created the following year and, in distinction to the Central Roads Board, the councils and road

CONGRATULATIONS **VICROADS**



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districts soon had an impact by localising road development. Nevertheless, most councils were not formed until a new Act in 1870 made it easier for road districts to become shires. Thus the road districts had the dominant role from 1855 until after 1870. Even then, all the new councils took consistently parochial lines with respect to roads, as if as a matter of general policy.

FURTHER CHANGES

At a meeting in January 1857, Pasley and the District Roads Boards agreed that the district boards should be responsible for main as well as local roads. Ownership of a well-used tollgate was the main "spoil" to be distributed – otherwise, hard reality soon hit the newly chartered District Roads Boards.

The Central Roads Board was abolished later in 1857 – in the name of efficient administration. It was suggested that the board had devoted too much of its attention to Mt Alexander Road and the other roads to the goldfields and too little to the rural interests represented in parliament. Nevertheless, it had built 570 kilometres of road and 225 bridges during its short existence and its work was well regarded by administrators. At the same time as the abolition, Thomas Higinbotham, an Irish engineer, was appointed Inspector-General of Roads and Bridges. The office was not always well regarded. In 1862 a Parliamentary Standing Committee on Roads and Bridges reported that, in at least one matter, "the Inspector was outstandingly negligent and incapable".

The Central Roads Board's oversight and arterial road functions were absorbed into a Board of Land and Works, which also covered land, public works and railways. In 1858 J. Steavenson was appointed its Commissioner for Roads and Bridges, with the Inspector-General reporting to him. Initially, money was poured into the board. Main roads were the chief item of government expenditure until 1858, when rail took priority. By 1868 rail expenditure was 17 times larger than road expenditure. In 1870 the expenditure ratio was 36 times and for the next decade it was 12 times. Not surprisingly, in 1862 the Commissioner of Roads and Bridges became the Commissioner for Railways and Roads. By 1867, the position was Commissioner of Roads and Bridges and it was filled by J. Sullivan. It was an office position, whereas the Inspector-General was a field engineering one.

PAROCHIAL APPROACH CONTINUES

The Road District and Shires Act of 1863 replaced *the Roads Act of 1853*. It was intended to strengthen the role of the District Roads Boards, but proved counterproductive. It gave the boards more responsibility for roads, but no useful way to exercise that responsibility. Dissatisfaction was widespread. The 1863 Act was replaced in 1869 by a Shires Statute that abolished the roads districts, converting them into shires. Subsequently the *Consolidating Local Government Act of 1874* effectively transferred the roads responsibility of the Board of Land and Works to local government. This yet again reinforced a parochial approach to road management. For example, Sydney Road became the responsibility of the various local government bodies it passed through.

The Act did provide local government with some state funding, which peaked in 1891. In an attempt to satisfy everyone, a myriad of minor works were favoured over a few major ones and frequent repairs received priority over capital construction of low-maintenance facilities.

To fill the roads vacuum, in 1877-78 the Roads and Bridges Branch (or Office) was transferred from the Department of Railways and Roads to the Public Works Department. A significant downturn occurred in local road revenue, so the branch inherited a major administrative mess. In the aftermath, the branch struggled to even maintain the status quo and the pressure for corrective action grew. The department rarely funded more than 50 per cent of the cost of a project and supplied the rest to the local authorities. *The Public Works Act 1890* gave the department a wider roads focus but did not solve the underlying problems. Road-making rarely occurred, particularly after the economic depression in 1894.

ROAD-BUILDING PROGRESS WAS SLOW DUE PARTLY TO THE LARGE TASK CONFRONTING A SMALL POPULATION AND TO THE ALLOCATION OF MUCH OF THE GOVERNMENT'S REVENUE TO RAILWAY CONSTRUCTION AND OPERATION.

Thus, for the 60 years before the establishment of the Country Roads Board there were various state-wide and district roads boards. Some of the latter morphed into municipal shire and councils. Road-building progress was slow due partly to the large task confronting a small population and to the allocation of much of the government's revenue to railway construction and operation. Road expenditure was typically about 3 per cent of rail expenditure and 5 per cent of public works expenditure. There were some successful toll roads but all were banned by the government in 1878.

Many roads became impassable in wet weather. The invention and rapid adoption of self-powered cars and trucks towards the end of the 19th century further exacerbated the situation. Nevertheless, in 1903, all roads were placed under the control of local government. This led to municipalities spending about 60 per cent of their revenue on roads – and almost all of that on maintenance of the inadequate existing road network. The situation worsened and from 1910 a series of official reports and reviews recommended the establishment of a strong and well-funded central road authority. Gippsland, in particular, was often inaccessible due to poor roads, so the strongest support for a new central road authority came from its local government. Despite opposition from some other municipalities, the State Government created the Country Roads Board in 1913.

Max Lay has authored numerous books on the history of roads. He was Executive Director of ARRB from 1975 to 1988 and Director of VicRoads from 1988 to 1995.

AN EVOLVING ORGANISATION

DAVID JELLIE CHARTS THE EVOLUTION OF THE VICTORIAN STATE ROAD AUTHORITY, FROM ITS FOUNDATION AS THE COUNTRY ROADS BOARD IN 1913 TO VICROADS TODAY.

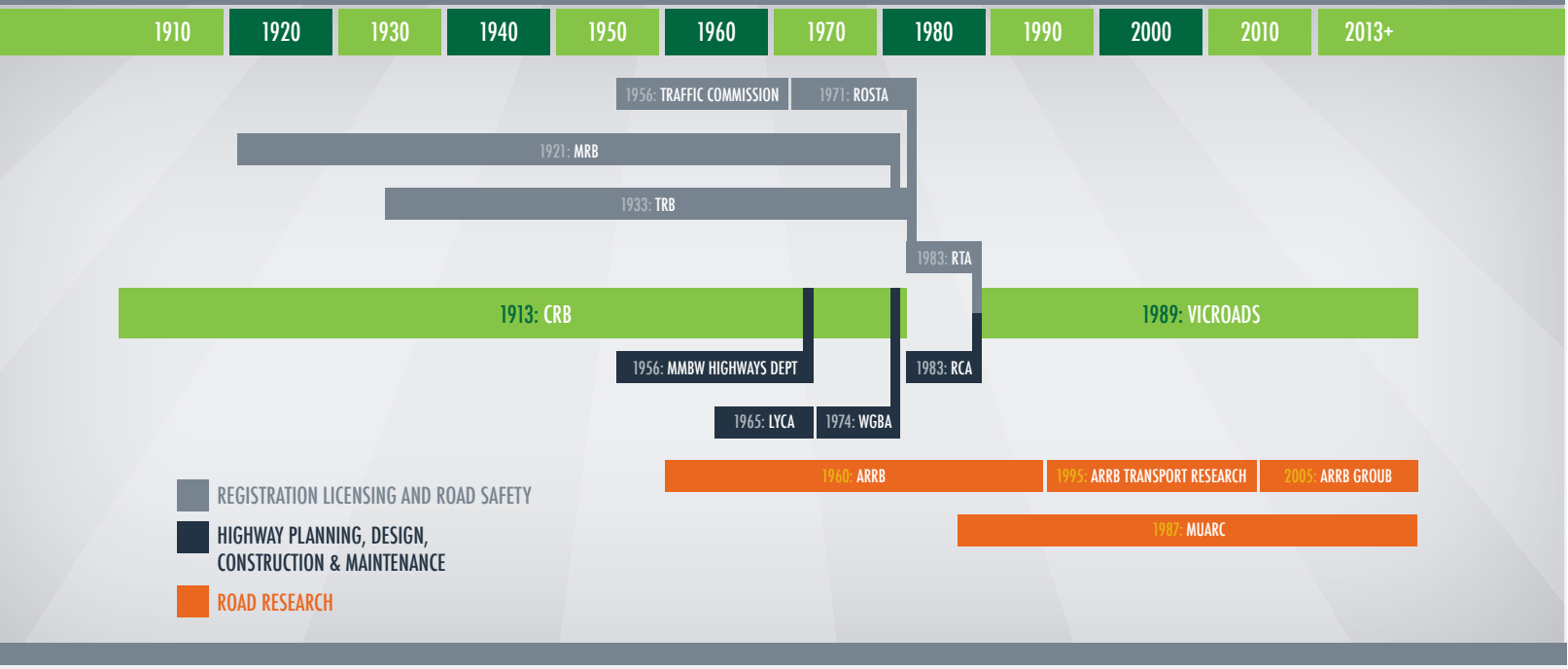
Today, VicRoads is an organisation that not only builds and maintains Victoria's road assets, but also manages the licensing of drivers, the registration of vehicles and the regulation of transport vehicles. It also coordinates Victoria's road safety strategy in partnership with Victoria Police, the Transport Accident Commission and the Department of Justice. All these responsibilities combine to provide the safest, most efficient and socially equitable environment for all road users.

Like the roads themselves, VicRoads has evolved from its beginnings in 1913 as the Country Roads Board (CRB), when it was responsible for managing the funding of main road construction and maintenance, which was undertaken by municipal councils, to today where it is responsible for the total management of all aspects of the roads and their use – including regulating the vehicles that use them and the drivers controlling the vehicles.

THE COUNTRY ROADS BOARD

The Country Roads Board's responsibilities were set out in the *Country Roads Act 1912*. The CRB was appointed on 26 March 1913 and held its first meeting on 31 March. Its first duty was to investigate road conditions throughout the state. This arduous task took two years to complete. Photographs of the CRB's car during these inspections – shown bogged to the axles – became CRB folklore. Other photographs show board members on horseback inspecting the roads, especially in winter when wheeled vehicles could not cope with the conditions (see across).

VICROADS AND ITS PREDECESSOR ORGANISATIONS



ROSTA - *Road Safety and Traffic Authority* *MRB* - *Motor Registration Board* *TRB* - *Transport Registration Board* *CRB* - *Country Roads Board*
MMBW - *Melbourne Metropolitan Board of Works* *RTA* - *Road Transport Authority* *RCA* - *Road Construction Authority* *ARRB* - *Australian Road Research Board*
MUARC - *Moash University Accident Reseach Centre* *LYCA* - *Lower Yarra Crossing Authority* *WGBA* - *West Gate Bridge Authority*

During these inspections the CRB also consulted municipal authorities to determine the state's declared road network. These comprised the main roads connecting the major settlements in the state, many of which provided for through traffic to distant destinations.

A number of other classes of road were added later: developmental roads (1918), state highways (1924), isolated settlers' roads (1925), tourist roads (1936), and forest roads and stock routes (1943). Although the most important of these were the state highways, the CRB played a key role in providing access to all parts of Victoria and contributed significantly to economic development by opening up inaccessible areas.

The CRB was independent and free of political interference, so was able to make its decisions in a logical, unprejudiced manner. The government borrowed £2 million to be spent over five years but this was hindered by the outbreak of the First World War. In its first year, the CRB approved contracts for permanent works amounting to £94,876, either directly or through the municipalities. The first contract was awarded in December 1913, a remarkable achievement considering the task facing the infant organisation. The map in the CRB's first annual report in 1914 shows the extent of its achievements. It details the gazetted main roads and those proposed for gazettal. It covers all of Victoria east of the Hume Highway to the New South Wales border and south-western Victoria to the South Australian border roughly south of the Hamilton Highway. It also includes the route to Bendigo – the Calder Highway named after the first Chairman, William Calder. The north-western part of the state was covered in the following year.

The first annual report also commented on matters such as the false economy of cheap construction, maintenance methods, setting of standards, construction techniques, equipment, instructions for surveying, foundations and drainage of roads, road materials, making use of materials at hand, road binders, compaction of pavements, road-making machinery, bridges and culverts, mile posts, signs, and conservation and aesthetics. It is not only a progress report to parliament but a pioneering engineering manual on the science of road making. These ideas helped to shape road making in Victoria and are still reflected in the approach taken by VicRoads today.

The first report also addresses the requirements of the communities the CRB visited. It shows the parlous state of existing roads and states: "These are the roads over which the settler must convey his produce to the market, that his wife must use to reach the township, and through which little children have to struggle to get to school. Is it any wonder that a deputation of settlers' wives waited on the board to plead for a metalled road to the township?" A poignant photograph (see top right) is included in the report showing the deputation of wives of settlers at Bullarong, South Gippsland, who urged that a metalled road be constructed to Foster. It shows eight women and five children dressed in their Sunday best standing on the stairway of what could be the local school. The board considered "that it is its duty to bring this aspect of the question under the notice of the government with a view to consideration of the settlers so situated."

The State Highways and Vehicles Act 1924 amended the *Country Roads Act* by providing for the declaration of state highways. It also charged the CRB with direct responsibility for building and maintaining roads on the declared-road network. This came about because in some remote areas there was insufficient expertise to maintain roads. In response to this expanded responsibility, the CRB appointed engineers to fill senior positions, including a Highways Engineer and District Engineers to represent the board in country areas and supervise construction and maintenance in their regions. These District Engineers organised patrol gangs who would regularly travel along their designated stretches of roads undertaking routine maintenance. This regional structure has survived to this day.

TOP: The wives of settlers at Bullarong, South Gippsland, called for a metalled road to be constructed to Foster. ABOVE: Winching the CRB car from the bog.

During World War II, the CRB played a major role in Australia's war effort. It managed construction of 1,300 kilometres of the Stuart Highway (known as the North-South Road) connecting Darwin and Alice Springs and built many airstrips along the way, including the one at Katherine.

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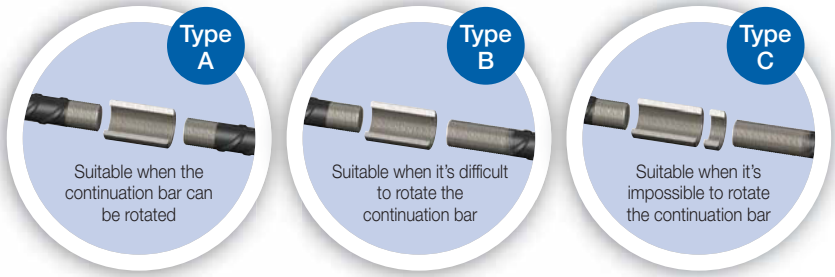

MBT Mechanically Bolted Couplers

Neither bar end preparation nor bar rotation is required. Ideal for remedial applications. Bolt heads shear off at a pre-determined torque to provide an instant visual check of correct installation.

Ancon BT and MBT Couplers, when designed and installed correctly, can meet the tensile and slip requirements of VicRoads Bridge Technical Note, BTN 2011/001, clause 5.3 Mechanical Splicing.

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Staff of the CRB, circa 1921.

It also built the runways at Fishermen's Bend, East Sale and Avalon for the Commonwealth Authorities. When the Allied Works Council was formed in 1942, the Chairman, Louis Loder, became the coordinator of the state instrumentalities in Victoria and in 1944 he was appointed Director General of Allied Works. In 1945 he became Director General of the Commonwealth Department of Works.

MOTOR REGISTRATION BRANCH

The first bicycle appeared in Australia in 1846 and there was a huge boom in cycling in the 1890s. Cycling was an affordable means of transport and the first bicycle paths were built in Melbourne at the turn of the 19th and 20th centuries. The first motorcycle in Australia appeared in Brisbane in 1893 and steam-driven motorcars arrived in the 1890s.

Melbourne's first car appeared in 1897. By 1910 there were 102 models on sale made by 50 different manufacturers. In 1910 there were 12,000 vehicles in Victoria and by 1915 there were 38,000, so when the CRB was formed, the era of the motor car had well and truly arrived. With this rapid adoption of vehicles it soon became clear that registration and licensing could generate significant revenue.

Arrangements were soon made to license drivers and register vehicles. The state's first *Motor Car Act 1909* was promulgated on 1 January 1910 and the first licence issued on 1 March 1910. By 1920, Victoria had 75,000 vehicles and the Motor Registration Branch (MRB) was formed in 1921 as an adjunct to the Police Department. Its main purpose was to identify vehicles, not collect revenue, but this soon changed and revenue collection became an important part of its operation.

CRB members consulting plans at East Tarwin Bridge, Mirboo South in 1913.

TRANSPORT REGULATION BOARD

In 1981 the MRB was transferred from the Office of the Chief Commissioner of Police to the Transport Regulation Board (TRB). The TRB had been established under the *Transport Regulation Act 1932* and began operation in February 1933. Its role was to introduce a system of licences and permits "applied to all commercial road motor vehicles, both passengers and goods". It had primary responsibility for licensing country commercial passenger vehicles, including stage, touring and light motor omnibuses, commercial goods vehicles, and vehicles of commercial travellers. It also regulated vehicle standards and conditions and passenger-vehicle routes and timetables. The responsibility for licensing country commercial passenger vehicles had previously been the responsibility of the Country Roads Board under the *Motor Omnibus Acts 1924 -1929*.

In 1952 the TRB became responsible for licensing all metropolitan passenger matters previously held by the Melbourne City Council and also urban transport in Ballarat, Bendigo and Geelong administered by their respective councils. So in 1981, when the MRB merged with the TRB, responsibility for licensing and registration of all vehicles – commercial and private – came under the aegis of a single entity, the TRB.

However, the TRB, in its newly constructed form, had only a brief life. In 1983 there was a significant restructuring of the transport sector in Victoria which inherited the creation of the Road

THE CRB WAS RESPONSIBLE FOR THE MANAGEMENT OF THE DECLARED ROADS WITHIN THE METROPOLITAN REGION AND ALSO UNDERTOOK DESIGN AND CONSTRUCTION OF ROADS AND BRIDGES FOR METROPOLITAN MUNICIPAL AUTHORITIES.

Construction Authority (RCA) to manage state road infrastructure and the Road Traffic Authority (RTA) to manage road users and vehicles. The responsibilities of the TRB were transferred to the RTA. Responsibility for urban bus services outside the metropolitan area was transferred to the newly formed State Transport Authority.

HIGHWAYS BRANCH

The Melbourne and Metropolitan Board of Works (MMBW) was established in 1891 to manage water supply, sewerage and sewage treatment. However, as Melbourne grew, the MMBW took on additional responsibilities including planning, foreshore management, management of parklands and, in 1956, the

construction and maintenance of metropolitan highways and bridges. As the major planning authority in Melbourne, the MMBW independently developed its own road projects such as the inner section of the South Eastern Freeway linking the city to Toorak Road (now the Monash Freeway) and the Eastern Freeway from Hoddle Street to Doncaster.

The CRB was responsible for the management of the declared roads within the metropolitan region and also undertook design and construction of roads and bridges for metropolitan municipal authorities. The construction of the Johnston Street Bridge over the Yarra River at Abbotsford and the Merri Creek Bridge in North Fitzroy are typical examples of this cooperation. However, the relationship between the MMBW and the CRB was strained and there was no better example of this than the construction of the Tullamarine Freeway. The MMBW designed and constructed the inner section of the freeway from Flemington Road to Strathmore while the CRB built the section from the Bell Street Interchange at Strathmore to Tullamarine Airport. Both sections were designed to different geometric standards, especially in relation to the width of the median separating the carriageways. The issue of what standards to adopt persisted until all road responsibilities were transferred to the CRB in 1974.

View of completed bridge over Yarra River at Johnston Street, 1957.

TRAFFIC COMMISSION

As a consequence of the rapid expansion of motor vehicles after World War II, it was soon recognized that death and injury on Victoria's roads was becoming a major public health issue. Organisations such as the National Safety Council tried to promote road safety but to little effect. At this time advances were being made in traffic engineering. Because of these developments the Traffic Commission was formed in 1956 to promote general road safety improvements by the orderly control of traffic on the roads. The Commission comprised three members – one of each from the CRB, the MMBW and the Police Department.

The Traffic Commission laid the foundation of much of Victoria's current road safety strategy including aspects such as: legislation for breathalysers and helmets for motor cyclists, compulsory roadworthiness tests on resale of vehicles, introduction of the probationary licence system, on-the-spot traffic infringement notices, blood alcohol limit of .05, education in school curricula, and the introduction of the points demerit system.

ROAD SAFETY AND TRAFFIC AUTHORITY

The Traffic Commission took over traffic-control functions that had previously been vested in local municipalities and played an important role in developing a standardised approach to traffic management across the state. However, it was abolished in 1971 and replaced by the Road Safety and Traffic Authority (RoSTA), a larger version of the Traffic Commission with expanded responsibilities and resources. RoSTA was initially accommodated in the CRB's head office in Kew but was forced to move to bigger accommodation in nearby Hawthorn.

RoSTA's expanded authority on road-safety issues resulted in the rapid implementation of initiatives now recognized as essential components of modern road safety. It built upon initiatives developed by the Traffic Commission and introduced others such as compulsory wearing of seat belts, increased drink-driving penalties, revised speed limits, compulsory blood-alcohol analysis of hospitalised road crash victims, introduction of mobile intensive-care ambulances, establishment of a priority-road network, introduction of tests for learner permits and the school crossing supervisor scheme. These initiatives remain the platform for all current and future road safety strategies.

LOWER YARRA CROSSING AUTHORITY

The Lower Yarra Crossing Authority (LYCA) was established in 1965 to finance and construct a crossing over the Yarra River at Fishermen's Bend. This state government statutory body succeeded a private company, the Lower Yarra Company Limited, which had had the same aim. In 1974, the LYCA changed its name to the West Gate Bridge Authority and in 1982 merged with the CRB.

AUSTRALIAN ROAD RESEARCH BOARD

Another organisation which is not strictly a predecessor of VicRoads but which plays a part in its history is the Australian Road Research Board (ARRB).

The ARRB was created in 1960 by the National Association of Australian State Road Authorities (NAASRA) to undertake research into all aspects of road management and to disseminate road-related information. The CRB had been a strong advocate for the establishment of a research institute such as the ARRB to assist and advise all Australian road authorities (the owners of the ARRB) on research results and to share the benefits of this information nationally. In fact, it was Caleb Roberts, the Chief Engineer of the CRB, who (amongst others) pressed for the creation of a national road research institution following a study tour of the US and Britain. ARRB was modelled on the US Highways Research Board.

Initially, the ARRB operated out of an annex of the office of the CRB but moved to its present site at Vermont South in 1972. Its scope of services covers all aspects of road management such as: materials, pavement and concrete technology; transport policy, operations and economics; asset management; bridge management; traffic engineering and road design; heavy-vehicle management; data collection and analysis; road safety; and dissemination of information via its annual conference and other forums.

The ARRB was renamed ARRB Transport Research in 1995 and became ARRB Group Limited in 2005.

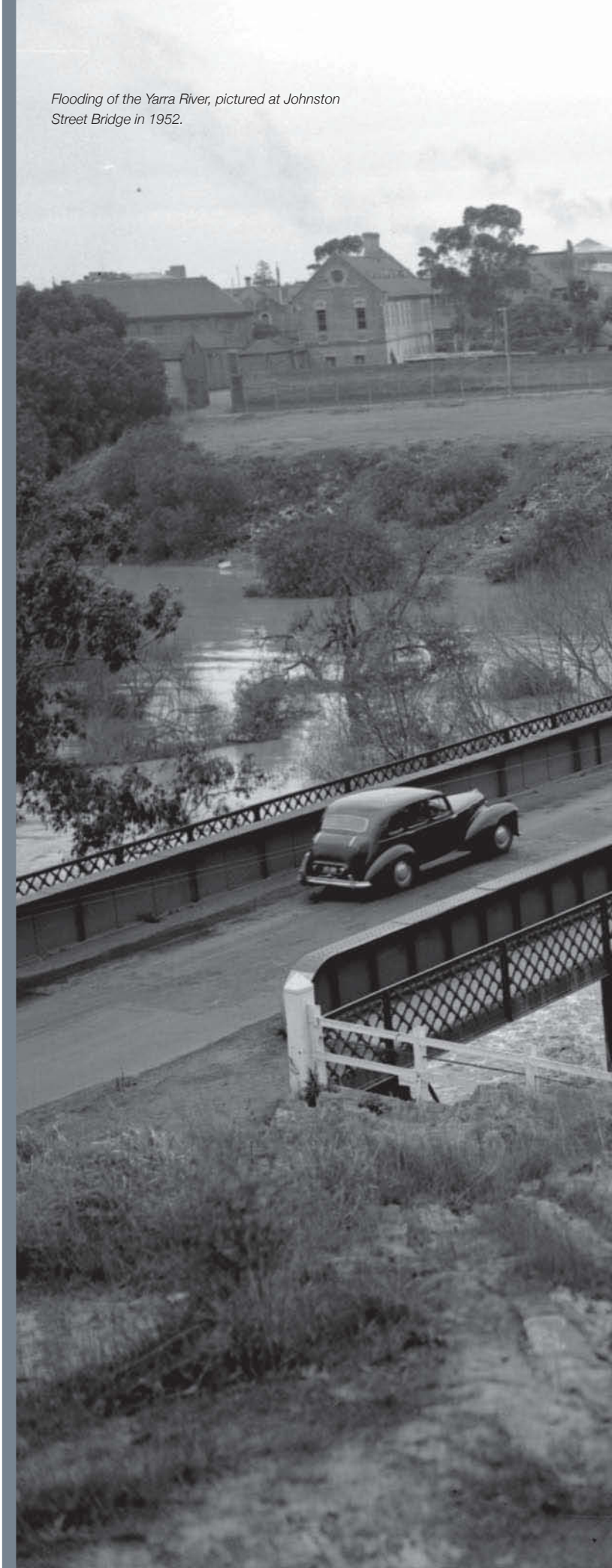
MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE

The Victorian Government and the bodies with road-safety responsibilities had for many decades given high priority to the implementation of strategies to provide safer road travel. In 1987 Monash University in conjunction with support and funding from RCA, RTA (later VicRoads), Victoria Police and the Transport Accident Commission formed the Monash University Accident Research Centre (MUARC). Its initial primary concern was the undertaking of research into road crashes, countermeasures and the effectiveness of the countermeasures. It continues to be an effective agent for the achievement of safer roads and has been able to expand its charter into other areas where accident reduction is required.

RCA AND RTA

The Cain Labor Government undertook a major restructuring of the transport sector in 1983. It created the Road Construction Authority (RCA), the Road Traffic Authority (RTA), the Metropolitan Transit Authority, and the State Transport Authority. This was the demise of the CRB. Some staff held a funeral in the grounds of Head Office with a headstone with the inscription: *In memory of the Country Roads Board. Born 1st January 1913. Died 30th June 1983. Although crabby in her last days, she brought forth an heir – the RCA.*

This pretty well described what happened. The RCA proceeded to plan, design, construct and maintain the declared-road network in much the same way as the CRB had. It maintained its close connection with Victoria's local municipalities as the CRB had, but it had to seek the RTA's agreement to purchase, design, construct, erect, install, maintain, and operate traffic signals and other traffic facilities for the purposes of traffic management and control. In order to carry out this responsibility, the RCA retained traffic engineers in its ranks to facilitate these negotiations with the RTA.



Flooding of the Yarra River, pictured at Johnston Street Bridge in 1952.

ALL THE EVOLUTIONARY CHANGES UNDERTAKEN TO ARRIVE AT VICROADS AS WE KNOW IT TODAY WERE DONE IN WHAT WAS CONSIDERED THE BEST INTERESTS OF VICTORIA.

The big change as far as road transport was concerned was to the role of the RTA. It took over both RoSTA and the TRB and so had responsibility for traffic management, road safety and registration and licensing. It is fair to say none of these responsibilities were diminished by these new arrangements.

VICROADS

However, in 1988, the then Chairman of the RCA, Ian Stoney, was also appointed Chairman of the RTA, ostensibly to manage the two authorities with a minimum of overlap and to ensure the best value for money of investments in road infrastructure. On 1 July 1989 the two authorities merged to form the Roads Corporation that operates under the name of VicRoads. The RCA and the RTA had existed for six years.

All the evolutionary changes undertaken to arrive at VicRoads as we know it today were done in what was considered the best interests of Victoria.

David Jellie worked at the CRB/RCA/VicRoads from 1961 to 1988.

PEOPLE FROM EARLIER TIMES

INTEGRAL TO THE HISTORY OF VICROADS ARE THE INDIVIDUALS WHO HELPED SHAPE THE ORGANISATION'S DEVELOPMENT AND GROWTH. HERE ARE SOME OF THEIR STORIES.

> D.V. DARWIN

A CHAIRMAN OF THE CRB FOR 13 YEARS, HIS OVERALL PERIOD OF SERVICE EXTENDED FOR MORE THAN 41 YEARS.

Donald Victor Darwin joined the CRB in October 1920 and became Engineer for Bridges in 1925, Assistant Chief Engineer in 1928 and Chief Engineer in 1941. He became Chairman in 1949.

Colleagues said he should be remembered for his ability to foresee developments in the engineering world. For example, shortly after World War II, the roads showed a lack of maintenance because of the focus on defence projects. Darwin realised the traffic load on the roads had increased immeasurably. Under his guidance, a report to government advised that suitable limits on wheel loads should be applied. This was accepted by government as a logical solution.

Others described Darwin as "an academic person" with a shy but humorous personality. He was seen as a clever man with great foresight.

Darwin retired as Chairman in June 1962 and died in March 1972.

> CALEB ROBERTS

THIS SENIOR ENGINEER CONTRIBUTED TO THE FORMATION OF A PERMANENT ROAD RESEARCH AGENCY.

Born in Balmain, New South Wales, in 1898, Caleb Roberts was the son of Tom Roberts, one of the nation's most notable and best-loved artists. He was educated at St Paul's school in London and the Royal Military Academy at Woolwich. He was a holder of the Military Cross, having enlisted in the Royal Engineers during World War I and been on active service in Palestine, France and Russia.

After the war he worked as an assistant engineer with the Ministry of Transport before joining the CRB as an assistant highways engineers in 1925. In 1928 he rose to the position of highways engineer and in 1939 he was appointed Chief Engineer.

In 1942 he was appointed Director of the Allied Intelligence Bureau serving under General Douglas McArthur, where he controlled a force of 2,000 men (commonly known as Z Force) undertaking sabotage, intelligence gathering and guerilla operations behind Japanese lines.

After the war he resumed his position as Chief Engineer with the CRB. Following a study tour to America and Britain in 1947, he recommended the formation of a permanent road research agency. This led to the establishment of the Australian Road Research Board in 1959. He was appointed to the board in 1956 and became Chairman in 1962. He retired in 1963 and died in 1965.

> KATE HANDLEY

THE FIRST WOMAN APPOINTED TO THE CRB GAVE 'OUTSTANDING SERVICE' FOR 50 YEARS.

In April 1913, Kathleen Handley was appointed to the position of typist and stenographer, becoming the first female appointment to the CRB.

Those who worked alongside Handley described her as friendly and hard working, a capable and cultured woman with a great sense of humour.

She supervised the female staff, and drafted the agenda and letters arising out of the board meeting. This was no small matter, even in those days. In 1932 the number of items on the agenda for three successive meetings, selected at random, was 226, 205 and 206.

Colleagues have commented on the level of responsibility Handley had, which was unusual for a woman in the public service at that time.

Handley retired in 1963 and died in 1977.

> ARTHUR CALLAWAY

THIS PERCEPTIVE AND VISIONARY ENGINEER BECAME THE FIRST CHIEF ENGINEER OF THE CRB.

The first Chief Engineer, Aurther Callaway, an Englishman and former Shire Engineer of Woorayl, was a dynamic character. He was a regular visitor to survey parties to see how location problems in difficult country were being solved. He is said to have driven his motor car as though it was a four-horse coach.

Callaway foresaw the need to stop making pavements in costly and hard-to-maintain tarmacadam and instead stage construction with gravel and sand pavements. He also investigated how corrugations in unsealed pavements could be minimised by blending clay with sands and loam with buckshot gravels or, as he termed it, "ferruginous grit".

It is said that Callaway would go to a job and look along it, apparently taking little notice. He would get back to the office and write to the contractor and tell him everything that was wrong. He had taken it all in.

One colleague described how, during the mid-1920s, Tom Pritchard was patrolman at Lightning Creek, north of Omeo. When his horse died he sent a telegram to Callaway: 'Horse died. What will I do?' Callaway replied: 'Bury him'!

> WILLIAM CALDER

THE FIRST CHAIRMAN OF THE CRB WAS POPULAR WITH STAFF AND WENT TO GREAT EFFORTS TO ENCOURAGE THE DEVELOPMENT OF YOUNG ENGINEERS.

William Calder started as a cadet in the New Zealand Government survey department in 1883. In 1888 he passed the authorised surveyor's examination and shortly after migrated to Victoria. He was appointed Assistant Town Surveyor for the City of Footscray, and in 1890 became Town Engineer.

Calder continued to advance his education, qualifying as a municipal engineer in 1890 and an engineer for water supply in 1892. In 1897 he was appointed City Engineer in Prahran and remained in this position until 1913.

In 1913 he became Chairman of the CRB and was an outstanding success. His influence was not restricted to Victoria; a major report he published on returning from a study trip to North America and Europe was most influential, with the recommendations in the report widely followed.

Calder was a hard-working Chairman who was well liked by his staff. He had a whimsical sense of humour and went to great efforts to encourage the professional development of young engineers.

He died in 1928 while still Chairman.

> JOHN SHAW NEILSON

ALTHOUGH POPULAR AMONG FELLOW STAFF AT THE CRB, FEW REALISED THEY HAD A CELEBRATED POET IN THEIR MIDST.

Born in Penola, South Australia, to Scottish parents, John Shaw Neilson moved with his family to Minimay, Victoria as a schoolboy. Neilson, called Jock by his family, was encouraged by his father, himself a poet, to study poetry.

In 1889 the family moved to Nhill in Victoria, where Neilson earned his livelihood as a farm labourer and road worker. His poetry was first published in 1890 and over the years gradually became recognised as outstanding.

Neilson's poetry was the most important thing in his life, but his long working hours and his deteriorating eyesight limited the time he could devote to his passion. Given the harshness of his life it is remarkable that his poetry exhibits the delicacy, subtlety and romance that have captured generations of his readers.

Dogged by poverty and weighed down by his labours, Neilson was happy when in 1928 the CRB, responding to urgent petitions from advocates who were concerned about his wellbeing, appointed him as an attendant. This job Neilson appears to have loved saw him through the Depression and to his retirement in 1941.

Neilson made many friends at the CRB and won the respect of fellow workers, most of whom had little idea of his literary celebrity. He died in 1942. One of his own verses can be seen as a fitting epitaph:

Good fellow of the song,
Be not too dismal; it is you and I
And a few others lift the world along.
'Speech to a Rhymer'.

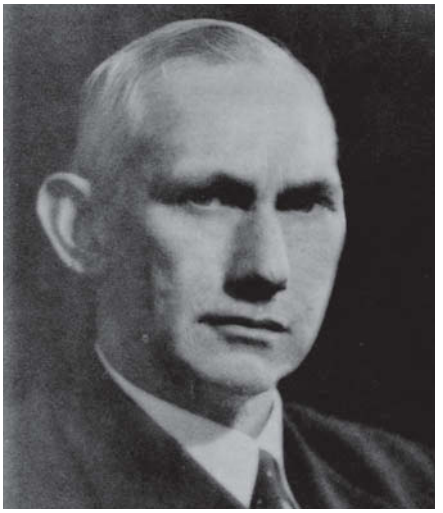
> F.M. CORRIGAN

THIS FORMER DEPUTY CHAIRMAN WAS RENOWNED FOR HIS CHARITY WORK AND LOVE OF SPORT.

Born in Melbourne, F.M. Corrigan was educated at Daylesford Convent and at the Daylesford School of Mines. During his engineering career he was engaged as Assistant Engineer and Shire Engineer of a number of shires throughout the state. He was a member of the Board of Examiners for Municipal Engineers for eight years. In 1944 he was appointed by Cabinet a member of the State Regional Boundaries Committee to recommend to the government the regional boundaries of Victoria.

As a sportsman, Corrigan had life membership of an impressive number of sporting bodies, which included the Metropolitan Golf Club, Melbourne Cricket Club, Gippsland Football League, Yarram Tennis Club and Yarram Football Club. He captained cricket, football, tennis and lacrosse teams in various towns throughout Victoria.

For his charitable work, he was appointed life governor of Yarram and District Hospital.



> LOUIS LODER

THIS ENGINEER LED THE CRB DURING MOST OF WORLD WAR II.

Born in Sale in 1896, Louis Loder was a distinguished, well-credentialed engineer and public servant. As a young man Loder studied at the University of Melbourne before war intervened. In 1916 he joined the AIF and sailed to England. Having trained as a pilot he was commissioned to the Australian Flying Corps.

After the war, and on completion of his studies, Loder joined the CRB in 1923. As a bridge builder, Loder helped design and supervise construction of many bridges across the state.

When promoted as a highway engineer, he oversaw the development of hundreds of miles of economical, bituminised roads suitable for heavy traffic, before being promoted again in 1928, to Chief Engineer. He was appointed Chairman in 1940.

Soon after World War II started and while Chairman of the CRB, Loder served as Coordinator of State Instrumentalities in Victoria for the Allied Works Council.

In 1944 Loder left the CRB to become Director General of Allied Works. He then became the first Director General of the Commonwealth Department of Works.

Loder was knighted in 1962. He died in 1975.

> ROLF FREDERICK JANSEN

THIS SECRETARY SERVED AS A COMMISSIONED OFFICER IN WORLD WAR II.

When the CRB invited applications for a clerical position early in 1915, Rolf Frederick Jansen got the job. Only five months later, he sailed for service with the AIF and was decorated for meritorious service. Discharged in 1919, he returned to the CRB and in 1920 was appointed Assistant Secretary. His promotion in 1929 to the position of Secretary marked the beginning of 20 years in that office.

Jansen recalled this humorous incident from his tenure as Secretary. In replying to a letter, the following expression was used: "The matter has been referred to the Blank Shire Council, as the road in question is under the control of that body." The letter was returned with the comment: "The Blank Shire Council is not a body; it is a corpse, and should be buried. There will be no mourners."

During World War II, Jansen joined the Volunteer Defence Corps and served as a commissioned officer. A great reader, he had a library of 1,500 books.

> GEORGE DEMPSTER

THIS ENGINEER FOR PLANS AND SURVEYS IS REMEMBERED AS A TRUE GENTLEMAN WHO WAS AHEAD OF HIS TIME.

A dedicated man, one of nature's gentlemen, a nice guy – these are just some of the descriptions former colleagues of George Dempster used to describe him.

Dempster, who was Engineer for Plans and Surveys, authored the handbook *Some Aspects of the Geometrical Designs of Roads*, which became a guiding book for most of the engineers at the CRB. He was responsible for promoting the traffic-engineering aspects of geometric design of roads that is now taken for granted. He was dedicated to obtaining good survey information to enable good and reliable design.

> JACK JARVIS

THE FIRST TRAFFIC OFFICER WAS A WELL-RESPECTED, HARD-WORKING MAN.

Jack Jarvis, the first Traffic Officer, came from the Mobile Traffic Section in the Police Department. He was well known in the log country; he spent a lot of his time in the ranges towards Warburton, Woods Point and Woori Yallock.

Jarvis is remembered as an incredible judge of timber. Colleagues recall he could assess a load of logs by sight. He was known by the local transport fraternity as "Father Jack". He was a person of outstanding integrity and was well liked by the magistrates of the time. Colleagues saw him as a hard-working, interesting character.

This article draws heavily on material in the publication, *Reminisces of Life in the Country Roads Board*, published by the VicRoads Retirees Association (now VicRoads Association) in 1995.

> TOM SCOTT

THE PHOTOGRAPHER WHO JOINED THE CRB IN 1950 AND TOOK MOST OF THE PHOTOGRAPHS FOUND IN ANNUAL REPORTS AND ON OFFICE WALLS.

When Tom Scott arrived as a photographer at the CRB from the *Age* newspaper in 1950, the organisation was quite casual about photographs. For example, the annual report had no covers; they were simply parliamentary documents. Scott persuaded then Chairman D.V. Darwin to change this and the 1951 annual report carried a picture on the cover.

Scott covered the first Royal Tour of Queen Elizabeth and photographed Princess Alexandria at the Melbourne Cricket Ground. He photographed the Queen and the Duke again on their second tour. His photograph of the Queen at Melbourne Town Hall was accredited by the state as the official portrait for the Queen.

Scott's major contribution was the thousands of photographic records he took (including aerial photographs) of road works being undertaken around the state.

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MAJOR PROJECTS

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FANTASTIC FEATS

FROM THE GREAT OCEAN ROAD TO THE HUME HIGHWAY, AND THE MALTBY BYPASS TO THE EASTERN FREEWAY, MANY OF THE MAJOR PROJECTS THAT FORM VICROADS' PORTFOLIO OF WORK OVER A CENTURY ARE IMPRESSIVE TECHNICAL FEATS. THESE PROJECTS DEMONSTRATE HOW STAFF OVERCAME KEY TECHNICAL CHALLENGES, OFTEN DEVELOPING NEW STANDARDS FOR DESIGN AND GAINING INTERNATIONAL RECOGNITION ALONG THE WAY.

WHAT FOLLOWS ARE THE STORIES OF SOME OF THOSE OUTSTANDING PROJECTS.

Erection of a "Bailey bridge" on the Great Ocean Road, Barrabool, 1954.

FOR THE GOOD OF COUNTRY

MORE THAN 2,300 SOLDIERS RETURNING FROM WORLD WAR I WERE AMONG THOSE WHO HELPED BUILD THE WORLD-FAMOUS GREAT OCEAN ROAD, WRITES DAVID JELLIE.

The need for a road around the south-western coastline of Victoria was investigated as early as 1864 but it was not until World War I that serious planning began for what is now known as the Great Ocean Road.

In late 1916, the Chairman of the State War Council, D. MacKinnon, pressed William Calder, Chairman of the Country Roads Board (CRB), to use the project to employ repatriated soldiers when the war was over. In September 1916, Calder advised MacKinnon that as considerable funds would be available for employment of returned soldiers, "lasting service to the state might be secured if some portion of these funds could be utilised in construction of roads in remote parts of the state …" and that the board would furnish a list of such roads if required. In December 1916, Calder suggested eight roads that could be constructed exclusively by returned soldiers – one of which was the South Coast Road (Western District).

Mr and Mrs J. R. Kemp on Mt. Defiance, 1928.

A year later, the scheme was made public when the *Argus* newspaper reported on a proposed "Memorial Road". The Mayor of Geelong was quoted as stating that after the holidays he intended to organise for the construction of an ocean road from Barwon Heads to Warrnambool. It would be built by returned soldiers as a memorial to those who had fallen. The idea received much press coverage and a poster was printed outlining the scheme.

By March 1918, the Great Ocean Road Trust had been formed with Major W.T.B. McCormack, member of the CRB, as its Honorary Engineer. Although McCormack made major engineering decisions, most of the day-to-day organisation and design fell to the board's Chief Engineer, A.E. Callaway, and other board engineers and surveyors.

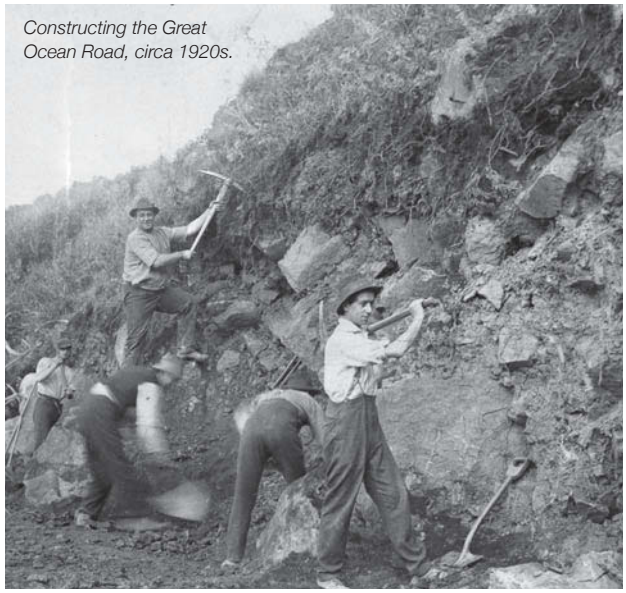
The trust was charged with raising the funds to build the road by public subscription. About 160 kilometres of road were to be constructed at an estimated cost of £150,000. The trust said that: "a donation of £100 makes 100 yards of road and carries with it a handsome certificate to that effect issued by the trust." It was explained that the cost was low because in many sections the necessary stone and materials were on the route, and the project was expected to take "at least three or four years to complete".

A formal appeal for funds was issued by the trust: "… no hesitation exists on our part in asking you to contribute to what we consider is the Finest Financial Appeal ever made. It is patriotic from beginning to end, and has numerous side issues that will, we feel sure, appeal to your sound judgement. It is for the good of our Country, and in contributing, you give to a scheme, which will be of great advantage to the giver. The scheme is yours. £150,000 is a large sum to raise, but we believe it can be done if you help."

Over 500 people attended the inaugural meeting of the Great Ocean Road Trust, held in Colac, and a total sum of £7,000 was donated in sums varying from £5 to £1,000.

The trust envisaged that the road would provide much assistance to government departments. Among other things, it would provide a road for military purposes, enable quick delivery of mail to seaside towns and those a few kilometres inland, would provide easy telephone communications (with damage to wires being quickly repaired), would be invaluable in case

NO HESITATION EXISTS ON OUR PART IN ASKING YOU TO CONTRIBUTE TO WHAT WE CONSIDER IS THE FINEST FINANCIAL APPEAL EVER MADE. IT IS PATRIOTIC FROM BEGINNING TO END, AND HAS NUMEROUS SIDE ISSUES THAT WILL, WE FEEL SURE, APPEAL TO YOUR SOUND JUDGEMENT.



Constructing the Great Ocean Road, circa 1920s.

of shipwrecks, and would be an easy way of taking supplies to Cape Otway Lighthouse. It also mentioned tourism, comparing it with the "Riviera (south of France); road from Ilfracombe (north coast of Devonshire); coast of Tasmania; San Francisco Road (going both north and south); Cape Town to Suburbs; and Bulli Pass (New South Wales). The linking of the seaside resorts along the road would "keep thousands of pounds in Victoria, instead of being spent in NSW, Tasmania and New Zealand. (New Zealand reckons that tourists from Australia alone, spend a million pounds annually)." The road would benefit the timber industry and open up land for farming – although "legislation would be made to prevent the Ocean Road being cut up with heavy loads of timber".

In its first publication, the trust said it would offer the work to the "physically fit returned soldiers suitable for that class of work. The CRB of Victoria have kindly agreed to supervise the whole of the work without any remuneration, and the specifications for the road will be up to the usual standard of the CRB, and they will engage the returned soldiers through the Repatriation Board."

At its first meeting in July 1918, the trust decided that the first section to be built would be between Lorne and Cape Patton (between Wye River and Apollo Bay) – a distance of 28 kilometres. On 5 August 1918, the government approved the CRB doing work on behalf of the trust with survey work to start as soon as possible. A surveyor was needed, as well as three chainmen and a cook. Warrant Officer Hassett was appointed surveyor by the CRB on the basis of his previous experience in road-location surveys. The party was to travel to Apollo Bay by boat, but this was changed at the last moment to a journey by train and coach. Their equipment, survey instruments and tools were sent by boat.

Hassett's report, written from Lorne on 28 January 1919, illustrated how difficult it was to work in this location: "I have experienced great difficulty in shifting camp from the Wye to the Cumberland principally on account of being unable to procure pack saddles… At present we have part of our equipment here and the remainder at the Wye, but have sufficient to carry on with."

In March 1919, he reported that “the weather has been very bad and have had great difficulty in trying to make the tents stand against the storms; the rivers rose to a great height and after being cut off from Lorne for three days, had to swim the rivers to get provisions.” By July, Hassett had pegged out 40 kilometres to Eastern View. The survey was finished on 18 September 1919 having started at Cape Patton 13 months and 58 kilometres prior.

Construction work could now start. The trust invited the Premier, Harry Sutherland Weightman Lawson to officiate at a commencement ceremony. The Premier travelled by train from Melbourne to Deans Marsh and then by Mountjoy’s coach to Lorne. He then transferred to a timber lorry and eventually made the final part of his journey on foot to the site selected for the ceremony. The whole journey had taken 10 and a half hours. Once there, he detonated an explosive charge. The *Geelong Advertiser* described his journey as providing “every opportunity of understanding what a boon this road would be to Melbourne and the Victorian people”.

At the end of January 1920, Hassett returned from his retirement in Gippsland only to find the work in poor shape. He reported this to Callaway, who was so dispirited he advised the closure of the camps and the works. Thus the first stage of the Great Ocean Road ended on a depressing note.

However, work soon resumed on a sectional basis. The first length between Lorne and Eastern View was opened in 1922 and with the final blasting at Mt Defiance (9 kilometres south-west of Lorne), the completed road was opened on 26 November 1932 by the Lt Governor, Sir William Irvine. Each traveller had to pay a toll but in October 1936, the Premier of Victoria, A.A. Dunstan, ceremoniously unlocked the tollgate at Shelley Beach, Eastern View and control of the road passed to the CRB. During the period of its construction up until 1932, it has been estimated that more than 2,300 former soldiers worked on the road. In the 1930s, workers were also employed under an unemployment relief (or sustenance) program.

It should be noted, however, that the road that was built in these early days bears little resemblance to the road we see today. It was a narrow, twisting unsealed track, difficult to negotiate in wet weather. Landslips were common and the road had to be closed at such times to clear debris and to ensure the safety of road users. From 1936 to 1946, a great deal of work was done by the CRB to improve the alignment and width of the road. In the 1950s, concrete bridges replaced all the timber bridges and the floodways. In 1970, the road was reconstructed and realigned between Glenaire and Laver’s Hill. The final sealing works took place between Apollo Bay and the Calder River (near Horden Vale) in 1984.

The geomorphology and terrain of the Great Ocean Road required high levels of road management and maintenance. For example, at Windy Point, about 3 kilometres south-west of Lorne, there was a major landslip in 1971. Small landslips had occurred earlier at this location but in 1971 it was estimated that the quantity of moving rock exceeded 200,000 tonnes. At Windy Point, the height of the natural surface is more than 200 metres whereas the road surface is about 20 metres above Bass Strait.

The rock comprises massive sandstone beds interspersed with clay beds, which dip steeply towards the sea. After heavy rainfall, the clay beds became slippery and the overlying rock slid into the sea. The road had to be closed for five months for remedial works.

A number of alternatives were considered including relocating that stretch of road inland, adding a further 21 kilometres to the distance to Apollo Bay. Another proposal was to massively irrigate the slope to encourage all the unstable material to fail.

Great Ocean Road, facing east from Mt.Defiance, 1972.

SINCE THE OPENING OF THE ROAD, TENS OF THOUSANDS OF AUSTRALIAN CITIZENS HAVE BEEN INVOLVED IN THE DESIGN, CONSTRUCTION AND MAINTENANCE EITHER AS EMPLOYEES OR CONTRACTORS OF THE COUNTRY ROADS BOARD, THE ROAD CONSTRUCTION AUTHORITY AND VICROADS.

This was to be followed by the construction of a new road further to seaward using rock fill from the slide. The third proposal, which was adopted, was to install cable anchors into the face of the slope drilled on a bearing directly counter to the direction of movement. Forty-three anchor cables were installed and tensioned to a force of 200 tonnes each before being permanently grouted. At the time, it was the largest landslide stabilised by cable anchoring in Australia.

Extremely heavy rain also fell in the Otway Ranges in April 1985. The downpour fed rivers and gullies which cross the Great Ocean Road in a 35-kilometre stretch east of Skene's Creek. The road was cut in four places due to erosion of the road and bridge approaches. There were also numerous landslips and trees and rock blocked the road. Culverts and bridges were jammed by debris but all survived unscathed. However, there were washouts at the approaches to some bridges. At Sugarloaf Creek, between Skene's Creek and Kennett River, a gap 15 metres was eroded at the bridge approach. Further east, at Orchard Creek, a culvert was blocked by flood-borne debris and the overflowing water eroded about 60 metres of roadway. Temporary repairs were implemented immediately and the road was re-opened within three days, although some sections were limited to one lane. However, permanent repairs continued until September 1985.

The Great Ocean Road has also been closed due to bushfires, the most notable of which was the Ash Wednesday fire that ravaged the area from Airey's Inlet to Lorne in 1983. It destroyed 41,000 hectares and more than 700 homes, and three people died.

Like any road project, the Great Ocean Road is undergoing continuous improvement, including realignment, widening, pavement strengthening, guardrail installation, passing turnouts, resealing, and improved drainage. Since the opening of the road, tens of thousands of Australian citizens have been involved in the design, construction and maintenance either as employees or contractors of the CRB, the Road Construction Authority and VicRoads. Their contribution has led to the Great Ocean Road becoming a major tourist attraction in Victoria and a lasting legacy to the people involved in its creation.

David Jellie worked at the CRB/RCA/VicRoads from 1961 to 1988.

MAJESTIC ICONS

THE WEST GATE BRIDGE AND FREEWAY PROJECTS WERE MAJOR TECHNICAL FEATS THAT GAINED INTERNATIONAL RECOGNITION, WRITES DAVID JELLIE AND KEVIN FOX.

The mighty West Gate Bridge is an icon of Melbourne, curving for 2.5 kilometres across the lower reaches of the Yarra River to provide the major access between Melbourne and its western suburbs and beyond. Before its construction a vehicle ferry connected Fishermans Bend to Williamstown but all road traffic had to use Footscray Road or Dynon Road to connect to the Princes Highway West.

With the growth of traffic after World War II, pressure developed for the construction of a major crossing of the Yarra to relieve traffic congestion in the inner western suburbs and to support industrial and residential development.

The State Government supported the concept of a new bridge but did not have the funds to finance it. In 1965 a private enterprise group called the Lower Yarra Crossing Authority was formed to finance, construct and operate a toll bridge that would be handed over to the government after the franchise period. Enabling legislation was developed for this arrangement in much the same way as today's public-private partnerships operate for large infrastructure works such as CityLink.

THE WEST GATE BRIDGE CONSTRUCTION ATTRACTED WORLD ATTENTION IN THE ENGINEERING PROFESSION. NOT ONLY WAS THE SCALE OF THE PROJECT A MAJOR FACTOR, BUT THE COMPLEXITY OF THE GEOMETRY WAS A SIGNIFICANT TECHNICAL CHALLENGE.

Designs were prepared and contracts let but work ground to a halt on 15 October 1970 when a section of the bridge on the western side of the river collapsed, killing 35 workers. This remains the worst industrial accident in Australia's history.

After a Royal Commission, a new consortium was formed to redesign the bridge and supervise its construction. The West Gate Bridge finally opened on 15 November 1978. Victorian drivers had not paid road tolls for the best part of a century and many chose to avoid charges by continuing to use Footscray Road and Dynon Road. As a result, the projected use of the West Gate Bridge was not reached until the Cain Government removed bridge tolls in 1985.

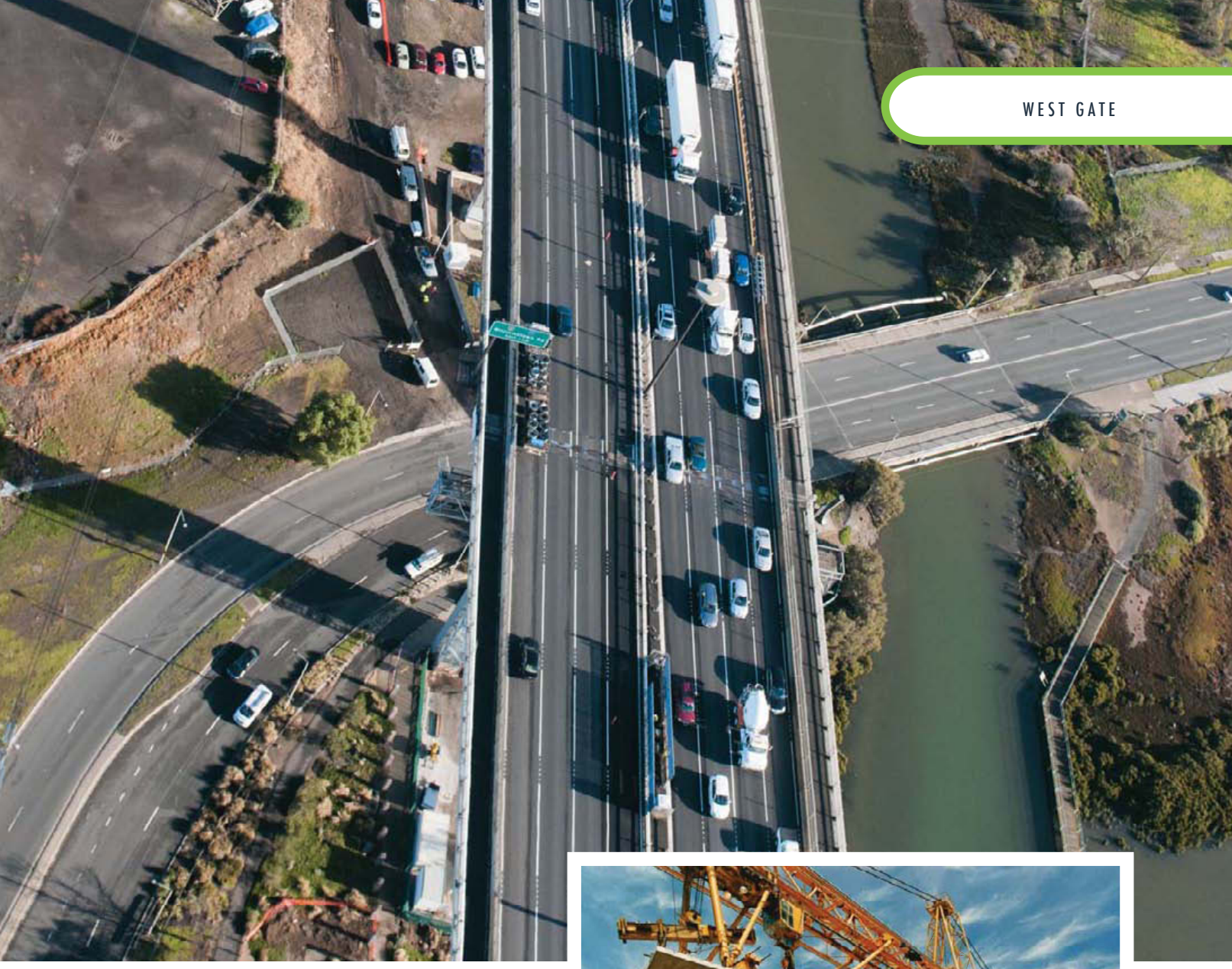
While construction of the West Gate Bridge was proceeding, the Country Roads Board (CRB) was designing and constructing the freeways connecting at each end. At that time the Lower Yarra Freeway (later renamed the West Gate Freeway) on the western side of the bridge extended from Williamstown Road and continued to the Princes Freeway at Altona.

On the city side of the bridge, the freeway extended initially as far as Graham Street, Port Melbourne, with the intention of extending it further east to Sturt Street, South Melbourne. This alignment anticipated a tunnel under St Kilda Road and the Domain, well into the future, which finally came about almost 20 years later with the opening of the CityLink tollway.

Implementation of the West Gate Freeway South Melbourne section in the 1980s followed intensive investigations by the CRB to identify a design solution for freeway construction in the built-up urban environment. It needed to cross major arterial and minor roads, two suburban railway lines, a railway container-handling yard and tramlines in Clarendon Street and Kings Way. Because of this complex urban layout, much of the freeway had to be constructed on twin bridges 1.85 kilometres long to minimise disruption to activities and businesses below. Today these twin bridges remain the longest in Victoria, apart from West Gate Bridge itself.

In considering the bridge design options, steel construction was not practical due to the high cost, and with the project located in an environment susceptible to corrosion, maintenance would have been a significant ongoing problem. In 1977 two senior CRB engineers, Keith Opie and Bruce Addis, were sent to Europe to investigate construction methods for the elevated freeway. Match-cast segmental balanced cantilever construction, commonly used in Europe, was favoured. This allowed the bridges to be constructed from overhead with minimum disruption to traffic, and with less reliance on support from the ground. This was important because the ground conditions over most of the length of the elevated freeway were extremely poor.

French firm Europe Etudes Gecti provided consulting services for the design of the two overhead launching gantries required to erect the match cast concrete segments, for other specialist equipment, and to check the CRB's bridge design during construction loading.



ABOVE: West Gate Bridge today. RIGHT: Constructing the West Gate Freeway, 1987.

Image courtesy of Christian Pearson - Misheye.

In late 1983 major construction for the 3.6 kilometres between Graham Street and Sturt Street began following the award of a contract to Citra Constructions Limited and its French parent company, Spie Batignolles. Large capacity piles to support the bridges were installed by separate contracts in advance of these works.

Match cast balanced cantilever construction adopted for the $175 million West Gate Freeway project was a major application of the technology by world standards. In addition to other advantages, it helped provide visually pleasing but unobtrusive structures compatible with the urban environment.

All services on the bridges, including drainage pipes, were concealed to provide smooth, uncluttered lines in the urban landscape. The West Gate Freeway construction attracted world attention in the engineering profession. Not only was the scale of the project a major factor but the complex geometry was a significant technical challenge.

In the final layout, spans varied from 24 to 55 metres. The bridges varied in width – mainly because of entry and exit ramps and weaving lanes on structure – and were on constantly shifting vertical and horizontal alignments. This meant that of the 2,070 concrete segments cast for the project, no two were the same.

The north bridge opened to traffic in November 1987 and the south bridge carrying westbound freeway lanes opened in September 1988 – six months ahead of schedule.

The West Gate Bridge.

Beyond what was planned as far back as 1955 and achieved in the 1980s, the West Gate Freeway story has, more recently, had some new chapters written.

With the completion of the privately-funded CityLink tollway in 2000, and with the growth of Melbourne's traffic over time, in 2007 the Victorian Government committed $1.4 billion to improve traffic flow and safety along the M1 corridor. Major works on this busy cross-town freeway route included sections of the Monash Freeway in the south-eastern suburbs, and on the West Gate Freeway and West Gate Bridge. For the West Gate section of the M1, the work was divided into two projects.

Because of the risks and complexities of the widening of West Gate Freeway and West Gate Bridge, VicRoads chose to deliver both projects using an alliance contract model whereby VicRoads entered into a contractual partnership with designers and constructors to design and build each project.

Between 2007 and 2010 major improvements to the freeway and connections were completed including widening and constructing additional lanes, a new elevated structure for the Kings Way westbound ramp to the West Gate Freeway, a new eastbound ramp from Bolte Bridge to the freeway, and reconfiguring the Montague Street interchange. As part of the overall M1 Upgrade an Electronic Freeway Management System was installed on the West Gate Bridge and the freeway. The system, which now operates along the 75-kilometre M1 Freeway corridor between Werribee and Narre Warren, includes driver information and lane use management signs and ramp metering signals. The systems are dynamically linked to VicRoads Traffic Management Centre in Kew.

In 2011 strengthening works costing almost $400 million were completed on West Gate Bridge to provide for five lanes each way. This work was undertaken while traffic continued to use the bridge and included the installation of more than 500 props under the deck cantilevers to support the new outer lanes. In addition, 38 kilometres of carbon fibre laminate was applied for the strengthening, together with the addition of 1,600 tonnes of new steel plate fabricated into 80,000 pieces. About 400,000 new bolts were also installed.

The West Gate Bridge construction attracted world attention in the engineering profession. Not only was the scale of the project a major factor, but the complexity of the geometry was a significant technical challenge.

This work was completed using an alliance contract involving VicRoads, John Holland Constructions, Sinclair Knight Merz and the UK-based design consultants, Flint and Neill. The West Gate Bridge now safely carries 160,000 vehicles each day compared to 40,000 vehicles per day when it first opened in 1978.

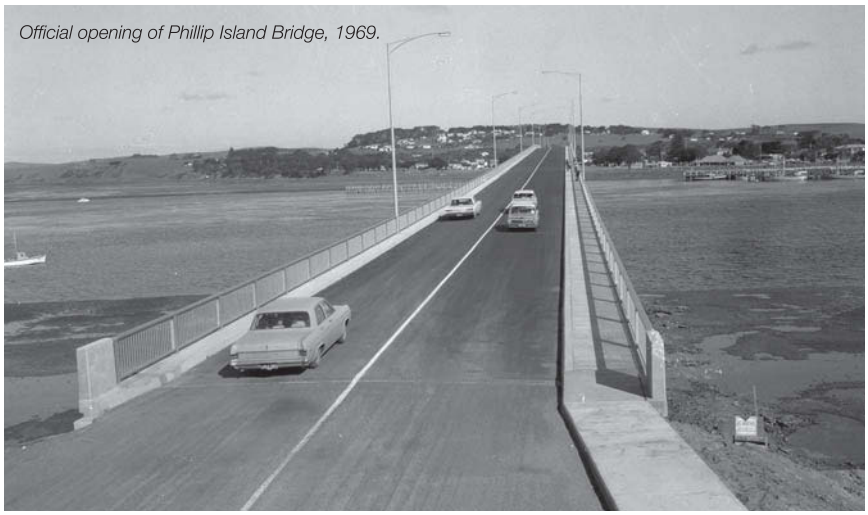
These latest improvements together with the massive planning and construction task completed by the CRB and implemented by VicRoads are part of the West Gate story. Together they have provided safer and more efficient transport links to support industry, jobs and growth for people, living, working and doing business in Melbourne.

David Jellie was Project Manager for the West Gate Freeway. Kevin Fox worked in the Media Unit and later the Major Projects Division at VicRoads from 1986 to 2012.

A SPECIAL CONNECTION

SINCE IT OPENED IN 1969, PHILLIP ISLAND BRIDGE HAS GIVEN THE ISLAND INHABITANTS A KEY LINK TO THE MAINLAND. BY D.D. STEJANOVICH AND KEVIN FOX.

Phillip Island occupies a special place in Victorian hearts for its natural wonders, coastal attractions and role in Australia's motor sport heritage.



Official opening of Phillip Island Bridge, 1969.

"The island" was a remote outpost of European settlement and later farming, until the opening of the first bridge built by the Country Roads Board (CRB) in 1940. That bridge was replaced by the current wider concrete structure in November 1969.

With direct road access, Phillip Island gradually established its reputation as a seaside holiday playground, a surfing spot and destination for special events. Home to world-renowned nature reserves providing havens for fairy penguins, koalas and seals at the Seal Rocks colony, the island is visited by many thousands of tourists from around the world each year. Daily they make the 90-minute trip from Melbourne via the South Gippsland Highway and the Bass Highway to the Phillip Island Road and over the bridge.

Phillip Island is part of Australia's motoring history as home to the Australian Grand Prix, first held on a road circuit in 1928 and continuing for eight consecutive years. A purpose-built permanent racing circuit opened in 1956, which in 1989 became home to the Australian Motorcycle Grand Prix. Superbikes and V8 racing regularly feature at the track.

These major events can draw up to 100,000 people to the island, inevitably exerting a massive impact on local infrastructure. This makes the Phillip Island Bridge a particularly important asset, as it is the only road link with the mainland.

In 1929, access was via a two-car punt plying between San Remo and Newhaven near the site of today's bridge. A larger six-car punt was operating there by 1938, and a 36-car passenger ferry connected Stony Point and Cowes.

Works on the first bridge to the mainland started in 1938. The Phillip Island Suspension Bridge opened on 29 November 1940. This narrow, single-span, cable suspension bridge was 536 metres long, with a 5.5 metre wide pavement and six pedestrian refuges along the way.

WHEN THE MINISTER FOR PUBLIC WORKS, MV PORTER CUT THE RIBBON TO OPEN THE BRIDGE ON 21 NOVEMBER 1969, IT CREATED NEW OPPORTUNITIES FOR PEOPLE LIVING ON THE ISLAND AND FOR VISITING FAMILIES WITH BEACHES, CAMPING AND HOLIDAY SPOTS NOW WITHIN EVEN EASIER REACH.

In the book *Reminiscences of Life in the Country Roads Board* mention is made of the influx of funds into the CRB in the late 1920s and the setting up of what was called the Bridge Section, headed up by M.G. Dempster, who was renowned as an innovative bridge designer. The book comments that: "The first bridge – the timber suspension structure linking San Remo and Newhaven – was largely composed of second-hand materials, including cables from the cable-tram system which was being replaced" (in Melbourne). The main cables had previously been used on the North Shore Bridge in Sydney.

The central section of this bridge spanned a channel of deep tidal water of some 167 metres, and required costly foundations.

With a load limit of six tonnes, it became increasingly inconvenient as demand for access to and from the island grew. Large milk tankers could not cross at all, and buses had to unload before crossing.

The current concrete bridge, built at a cost of $3.25 million, opened in November 1969. It provided significantly more capacity, being 640 metres long with a road pavement width of 8.5 metres, allowing for two-way traffic, with a separate pathway for pedestrians. John Holland and Company Pty Ltd was the CRB's contractor.

Building the bridge provided considerable engineering challenges, which were summarised in a special CRB report, which stated: "The main problems of the site were deep water and the very strong tidal current, which has been measured at seven knots and is reputed to reach 10 knots at times. Soundings and underwater inspection indicated scouring and deepening of the main channel on the ocean side of the suspension bridge."

The location chosen was further into Westernport, where turbulence and depth of water were reduced and the seabed was more stable.

The foundations were spread footings, cylinders or piles depending upon ground conditions, which at the site generally consisted of basaltic clay covering decompressed basalts with hard jointed basalts at the lower levels. Piles were capped at or below seabed level to minimise scouring problems.

Special arrangements were made to counter the corrosive effects of salt water. The 18 piers were reinforced portal frames with sloping column legs and were constructed inside sheet pile coffer dams positioned by a steel frame.

The superstructure of 19 spans, each having five longitudinal beams, is 640 metres long. Sixteen approach spans, each 30 metres long, consisted of five pre-tensioned T-beams with the deck formed by infill concrete placed between the beams. Navigational clearance at high tide is 12 metres. The bridge is 8 metres wide between kerns with 1.5 metres on the ocean side.

When the Minister for Public Works, M.V. Porter, cut the ribbon to open the bridge on 21 November 1969, it created new opportunities for people living on the island and for visiting families. Beaches, camping and holiday spots were now within easier reach.

In recent times VicRoads has completed major works to protect the bridge against corrosion in the harsh coastal environs. Stronger concrete and steel barriers now provide greater protection for pedestrians and safer conditions for tourist coaches and trucks passing over the bridge each day. Today, VicRoads' ongoing maintenance ensures the bridge and connecting roads will continue to serve for generations to come, securing the legacy of past CRB bridge builders.

New, better road connections are also being built with the Bass Highway duplication nearing completion and a new direct road link from the highway to Phillip Island Road due to open in 2013. This will make it even easier and safer for visitors, tourists and motor sport enthusiasts to follow their island passion, made possible by the bridge connecting Phillip Island to the world.

Kevin Fox worked in the Media Unit and later the Major Projects Division at VicRoads from 1986 to 2012.

Original Phillip Island Bridge, before its demolition.

PASSING WERRIBEE

THE SUCCESS OF THE MALTBY BYPASS PROJECT WAS DUE IN PART TO ITS CAREFUL CONSIDERATION OF SOCIAL, ENVIRONMENTAL AND ECONOMIC FACTORS, WRITES ROBIN UNDERWOOD.

In the early 1950s, Victoria's roads were still recovering from the effects of reduced road works during the war years, and were displaying the effects of increasing numbers of vehicles, particularly commercial vehicles. The Country Roads Board (CRB) was embarking on a large program of reconstruction and upgrading of the road system throughout the state. In 1955 the CRB began a program of providing dual carriageways on the Princes Highway West from Brooklyn to Norlane.

This section was a two-lane, two-way rural state highway passing through the township of Werribee. Werribee had a population of about 4,000 in 1950, increasing to 6,000 in 1961 and 12,000 in 1971. Since then its population growth has continued, reaching 38,000 in 2011.

Available information on hourly traffic volumes throughout the year, on state-wide trends in population, and on vehicle use (in terms of persons per registered vehicle), together with an analysis of weekend and holiday-period traffic volumes on the Princes Highway West, combined to present a strong case for a bypass at Werribee.

THE PROJECT INVOLVED APPROPRIATE CONSIDERATION OF THE RELEVANT ENGINEERING, SOCIAL, ENVIRONMENTAL AND ECONOMIC FACTORS, INCLUDING AN APPROPRIATE LEVEL OF COMMUNITY PARTICIPATION.

Three basic options for a bypass were identified: a southern bypass, a northern bypass, and a route along Synott Street. The last alternative was quickly discarded because it would result in heavy traffic using a residential street, whereas the northern route was discarded because it would result in increased travel distance for through traffic, greater effect on properties on the north side of the township, more difficult connections to the existing highway at each end, and additional railway crossings. The adopted southern bypass extended from about the 17 Mile Post to about the 23 Mile Post on the Princes Highway West – a distance of about 10 kilometres.

During the examination of the bypass options, some local traders became concerned about the possible effect of a bypass on their businesses. A survey of the amount of traffic stopping in the township, and of the business generated, was carried out. It involved stopping traffic on the approaches to Werribee, using police control, and handing out prepaid postcards that asked questions about origin and destination, stopping in the township and details of business done. This was the first time that such a survey had been carried out in Victoria. The results of the survey showed that the large majority of the traffic did not stop in Werribee, and that the business resulting from those who did stop was a very small proportion of the total trade – and less than the normal annual growth.

Once it was decided to adopt a southern route, careful consideration was given to minimising effects on the township. It was decided to provide grade separated interchanges at each end of the bypass, instead of one centrally located interchange, so through traffic desiring to enter the township during its journey could do so without travel distance penalties. It was also decided that services centres would not be permitted on the bypass itself, and that signing would be erected at each of the two interchanges to indicate the services available within Werribee.

In addition to the interchanges at each end of the bypass, overpass bridges were provided at Snydes Road – Hoppers Lane, at Duncans Road and at Farm Road to retain local connections. Duplicate bridges over the Werribee River were also involved.

One significant design aspect related to the location of ramp entrances and exits. Werribee-bound traffic leaving the freeway at the eastern interchange was required to leave from the west-bound median lane (the fast lane), and similarly, Geelong-bound traffic entering the freeway at the western interchange was required to enter the west-bound median lane (again the fast lane). It was argued that road-safety considerations required that these movements should be made from the slow (outside) lane. However, this would have involved extra structures and extra costs, and it was decided to adopt the cheaper alternative because the ramp movement involved was relatively light. There is now much evidence to support all entrance and exit movements being from the slow lanes, and this is now common practice. Some years later, both interchanges were modified to this safer arrangement.

Basil Abery, Divisional Engineer, Geelong Division and Les Elms, Assistant Divisional Engineer, had overall responsibility for the construction of the Werribee Bypass. Under their direction, Ron Angus was the supervising engineer for the road construction works. The Bridge Division, headed by Ian O'Donnell, Bridge Engineer, was responsible for the bridge works, and Dave Nicholson was designated by him to supervise the various bridge works. Abery took a close interest, and was also actively involved in the bridge works.

At the end of 1958, on his return from studies at Yale University, Neil Guerin was appointed to the position of Traffic and Location Engineer. Under Guerin's direction, Traffic and Location Division staff were responsible for preparation of detailed proposals for signing and line marking on the bypass, and for drafting by-laws for the control of access and various classes of traffic, including pedestrians, bicycles, animals and agricultural machinery.

When the opening the bypass was imminent, the government decided to name it the Maltby Bypass Road after the Minister for Public Works, Sir Thomas Maltby.

At the time of the initial investigations for the bypass there were no legislative requirements for the environmental assessment of proposals. However, clearly the project involved consideration of the engineering, social, environmental and economic factors, including community participation. This was largely due to the knowledge and experience of Harry George, Traffic and Location Engineer, who led the investigations that resulted in adoption of the southern bypass. Completion in June 1961 of the construction of the Maltby Bypass as the first full freeway-standard road in Victoria was very significant. Since then, the entire route from Melbourne to Geelong has been further improved and upgraded and is now a high standard facility.

Robin Underwood worked from 1953 to 1957 as an engineer assistant on the Maltby Bypass.

ABOVE AND LEFT: The Maltby Bypass is officially opened, 1961.

FIT FOR A PRINCE

THE STRETCHES OF ROAD FORMING THE PRINCES HIGHWAY WERE AMONG THE FIRST TO BE IDENTIFIED BY THE CRB IN 1913 AS MAIN ROADS ELIGIBLE TO BE IMPROVED, WRITES DAVID JELLIE.

At almost 1,000 kilometres, the Princes Highway is the longest in Victoria. It forms a small part of National Route 1, the world's longest national highway. National Route 1 circumnavigates the continent connecting all the mainland capital cities. It is about 14,500 kilometres long, exceeding in length the Trans-Siberian Highway (11,000 kilometres) and the Trans-Canada Highway (8,000 kilometres).

The part of National Route 1 known as the Princes Highway traverses three states. It starts in Sydney, following the south-eastern seaboard and crosses Victoria from east to west, entering South Australia near Mt Gambier. It then turns north to Adelaide and terminates at Port Augusta, where it connects to the Eyre Highway.

The designation of the Princes Highway was made in 1920 to celebrate the visit to Australia of the Prince of Wales (later to become King Edward VIII and, after his abdication, the Duke of Windsor). The eighth annual report of the Country Roads Board (CRB) reported: "On the occasion of the visit of His Royal Highness The Prince of Wales, in 1920, and at the instance of the National Roads Association, the main Gippsland road in this State from Melbourne easterly to the border of New South Wales was, with the consent of His Royal Highness, named the Prince's Highway.

"During the year, the name of the Prince's Highway has also been given to the Great Western route from Melbourne through Geelong, Warrnambool, and Portland, to the South Australian Border near Mount Gambier, the idea being to eventually connect all the capital cities of the Commonwealth by a great coastal route…

Workers conduct repairs at the junction of Princes Highway west and Geelong Anglesea Road, 1952.

Spreading pre-mix seal on the Princes Highway, 1929.

"It is hoped that within two years the whole length of the Highway in this state, from the western to the eastern borders, will be fit for regular traffic."

The stretches of roads forming the Princes Highway were among the first to be identified by the CRB in 1913 as main roads eligible to be improved with funds provided under the *Country Roads Act*. The criteria used by the CRB to designate main roads included whether they carried, or were likely to carry, extensive traffic between centres of population or from rural districts to the railway systems, or whether their construction would lead to increased settlement or production.

All the stretches of what was to become the Princes Highway obviously met at least one of these criteria. The route is Victoria's only connection to the southern NSW seaboard and along its eastern length it travels through the rainforests of East Gippsland to the main town of Orbost, now a centre of agriculture, timber and recreational industries. Orbost is also an important hub for the more remote communities along the Cann River Valley and the Bonang Highway. No doubt the third criterion would have influenced the CRB in declaring the road between Orbost and the NSW border a main road.

The first annual report provides an insight into the CRB's deliberations. During its initial tour of Gippsland's shires in 1913 to study road conditions, the board encountered a herd of 500 pigs at Hospital Creek, between Bairnsdale and Orbost. The herd had been driven 110 kilometres from the Cann River Valley and still had another 65 kilometres to travel to reach the railhead at Bairnsdale. They noted that the Orbost Shire (in which the Cann River Valley is situated) was being deprived of income because its potential for agricultural development was rendered uneconomic by the lack of an effective road system. They also noted that the railway between Bairnsdale and Orbost was under construction.

THE DEVELOPMENT OF THE HIGHWAY THAT WE SEE TODAY WAS DRIVEN BY SOCIAL AND ECONOMIC NEEDS. THE SECTION TO GEELONG WAS THE FIRST ALONG ITS LENGTH TO BE DUPLICATED.

Further west, the Princes Highway connects Gippsland's major rural communities such as Bairnsdale, Sale, Traralgon, Morwell and Warragul. The route skirts the Gippsland Lakes and bisects the prime dairy country of West Gippsland. However, the board wasn't to know at the time they made their deliberations of the importance of the Latrobe Valley to Victoria's economy. It wasn't until 1921 that the State Electricity Commission of Victoria (SECV) was created to generate and distribute electricity and to open up the brown coal deposits of the region for this purpose.

PRINCES HIGHWAY

Princes Highway east; Pakenham Bypass, which opened in 2007.

In Western Victoria, the Princes Highway connects Melbourne to the Victoria's second largest city, Geelong. Geelong was a major centre for the export of products such as wool and wheat from Western Victoria and later, manufactured goods. Geelong was to become a major industrial and manufacturing centre and its port dealt with one third of all the shipping entering Port Phillip Bay.
From Geelong to the South Australian border, the Princes Highway passes through the rich agricultural centres of Colac, Camperdown, Terang, Warrnambool and Portland.

The development of the highway we see today was driven by social and economic needs. The section to Geelong was the first along its length to be duplicated.
The Maltby Bypass around Werribee was the first stretch of road built in Victoria to freeway standards. The stretch between Melbourne and Geelong is the most heavily trafficked rural road in Victoria. The expansion of power generation after World War II resulted in the expansion of existing

Anglesea Road open to traffic.

towns such as Morwell and Moe, and the creation of new towns such as Yallourn and Churchill along the highway. Many power stations were built during this time, requiring special consideration by the CRB in strengthening the pavements and bridges along the Princes Highway to carry the huge loads of generating equipment being transported from Melbourne to the Latrobe Valley. This equipment was mostly imported from Europe and landed at Port Melbourne before being moved to site.

It wasn't until 1966 that the sections of highway that cross Mt Drummer (near Genoa) and from Genoa to the NSW border were sealed, enabling motorists to drive from Melbourne to Sydney entirely on sealed surfaces. Recent upgrades include the $380 million Geelong Ring Road - Princes Freeway (west), which opened in 2009, and the $242 million Pakenham Bypass - Princes Freeway (east), which opened in 2007.

Currently underway is the $175 million duplication of the highway (east) between Traralgon and Sale, and the $220 million duplication of the highway west between Waurn Ponds and Winchelsea, and planned through to Colac.

David Jellie lived within a couple of kilometres of the Princes Highway West near Colac and attended primary and secondary schools located on the highway.

BRIDGE OVER TROUBLED WATERS

GIVEN THE SNOWY RIVER'S PROPENSITY TO FLOOD VAST AREAS, BRIDGING IT WAS NO MEAN FEAT, AS NUMEROUS EARLIER ATTEMPTS HAD SHOWN, WRITES DAVID JELLIE.

The Snowy River rises on the slopes of Mount Kosciuszko and flows south along the eastern slopes of the Snowy Mountains, through the Snowy Mountains National Park, Alpine National Park and the Snowy River National Park to the rich flood plains at Orbost before entering Bass Strait at Marlo. The river is relatively short at a little over 350 kilometres long but its source is the highest of any major river in Australia at an elevation of 2,200 metres.

The bridge over the Snowy River at Orbost plays a vital role for access along the Princes Highway from East Gippsland and southern NSW, especially for commercial traffic. The only other bridge over the Snowy River is McKillops Bridge (opened in 1938) on the Gelantipy-Delegate road, which is unsuitable for large vehicles.

The first bridge across the river at Orbost was built late in the 19th century. It was an elegant timber bridge with a suspended central span of about 30 metres. However, by the end of World War I its condition had deteriorated due to flooding. In 1922 a new bridge was built across the river as a joint venture between Victorian Railways and the Country Roads Board (CRB). In 1934 the two central spans were swept away by floods and the bridge was replaced by a welded steel truss bridge. It too suffered badly from flood damage. In 1952 extensive repairs were undertaken on its foundations at the western end.

In the 1960s, the CRB began investigating a new crossing of the Snowy River at Orbost. The existing bridge required constant maintenance and was estimated to only last a further 10 years.

In the initiating report for a new crossing of the Snowy River and its floodplains, the Divisional Engineer at Bairnsdale noted that when roused it was the biggest river in the state and as a result, “bridges across it have had a fairly turbulent time". He decided, for design purposes, that a peak discharge of 300,000 cusecs (or 8,495 cubic metres per second) with a recurrence interval of about 100 years was necessary. After further investigation and calculation, his recommendations were adopted for the final design.

During the flood of February 1971, the river was a mile wide and a maximum discharge of 7,790 cubic metres of water per second was measured. The river protection works along the Snowy River flats were not up to the task of resisting such a flood and all properties downstream of Bete Bolong were inundated.

BECAUSE OF THE RAPID FLOW OF THE RIVER, THE DESIGN PROVIDES TWO METRES CLEARANCE ABOVE THE 1971 FLOOD LEVEL TO THE UNDERSIDE OF THE SUPERSTRUCTURE. THIS ALLOWS LARGE TREES WASHED DOWN IN SEVERE FLOODS TO PASS UNDER THE BRIDGE WITHOUT SNAGGING.

The approach embankment on the Orbost side was washed away and a temporary Bailey bridge was erected across the gap to re-open the Princes Highway to traffic as soon as possible.

A new alignment, 2 kilometres long, was selected downstream of the existing railway bridges across the flats at the narrowest point of the flood plain. This required a major diversion of the Princes Highway at the Newmerella end and the new road bypassed Orbost to rejoin the existing alignment east of the town.

The crossing required two bridges across the floodplain and one across the river. The embankments connecting the bridges generally matched the length of the embankments between the railway viaducts. Starting at the western end, the bridge across Ashby’s Gulch is 600 metres long. The second bridge across Watt’s Gulch is 215 metres long and the bridge across the river is 380 metres long. The two embankments connecting the bridges are 320 and 520 metres long. The waterway provided by this arrangement is about 15 per cent more than the maximum-recorded flood of 1971. Because of the rapid flow of the river, the design provides two metres clearance above the 1971 flood level to the underside of the superstructure. This clearance allows large trees washed down in severe floods to pass under the bridge without snagging.

The river bridge comprises five 30-metre spans and two 27-metre spans over the permanent river channel and eight 21.5-metre spans over the lagoon adjacent to the river.

For the two bridges across the gulches, there are 38 spans of 21.5 metres.

At the time of design, a conventional bridge for this type of project would have comprised prestressed concrete 'I' beams with a composite concrete deck. However, a new 'U' shaped beam profile was developed as the smooth surface of the outside of the beam reduced the risk of snagging by debris when compared to conventional 'I' beams, and the shape provided superior lateral stiffness to resist the impact forces of large trees and logs brought down the river during floods.

The geology of the site presented challenges. Each pier on the river bridge is supported on two 1.5 metre reinforced concrete cylinders sealed three metres into the bedrock. The maximum length of cylinders was 21 metres. The very hard metamorphosed sandstone under the river bridge constantly broke the 1.5 tonne rock chisels used to break the rock and mining and blasting had to be performed to excavate some cylinders and seal them before casting concrete.

The foundations for the gulch bridges were also problematic. Here the foundations comprised highly compressible silts overlying dense gravels at a depth of 30 metres. These bridges are supported on welded steel 'H' piles driven through the silt and into the gravels. However, in driving the piles through the compressible upper layers negative friction forces were generated which increased the loads on the piles. Test piles were driven with instrumentation to measure the extent of the friction forces. The design was then amended to include bitumen coating of the upper lengths of the pile to reduce the friction against the compressible silts.

Because of these silts, the embankments between the bridges (and elsewhere) were constructed and overloaded to a height of two metres to allow as long a time as possible for consolidation of silt across the floodplain. This period was about two years. Despite these measures, settlement continues, albeit at a slower rate, and remedial works have been required at the abutments of the gulch bridges.

A contract was awarded to Pearson Bridge Pty Ltd of NSW to construct the bridges and work began early in 1974. The contractor sub contracted the foundation works of the Snowy River Bridge to Frankipile Pty Ltd and of the Gulch Bridges to Oakley and Waldron Pty Ltd. Construction was completed in two and a half years, about six months ahead of schedule. The total cost of the bridges was $6 million, which equates to about $50 million today.

David Jellie was Project Engineer for the construction of the bridges on the Snowy River Crossing.

Snowy River Bridge, 1985.

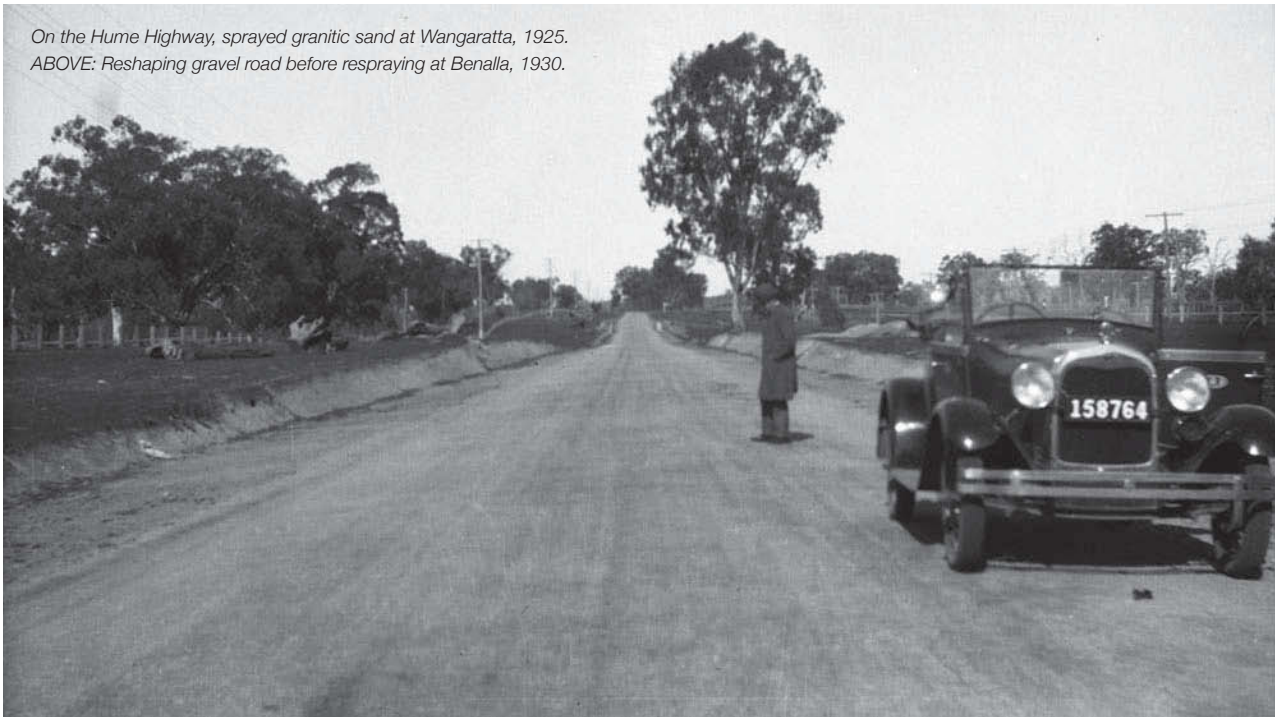
SINGING THE PRAISES OF HIGHWAY 31

THE LEGACY OF REBUILDING THE HUME HIGHWAY HAS BEEN THE DEVELOPMENT OF NEW STANDARDS FOR ROAD AND BRIDGE DESIGN, PLANNING AND ENGINEERING, WRITES KEVIN FOX.

When Johnny Chester penned the 1969 country rock ballad *Highway 31* telling of his lovelorn travels north from Melbourne along the Hume Highway, it was very different trip compared to today's four-lane freeway.

Forty years ago the old two-lane highway managed by the Country Roads Board (CRB) ran for more than 150 miles in Victoria, with trucks rumbling through towns large and small, including Wallan, Euroa, Benalla and Wangaratta, before crossing the Murray at Albury-Wodonga, and then on to Sydney.

While the song tells of hitching "a lift to Seymour" and "grabbing a cup of coffee in a Glenrowan café", this would not be as easy today, given all towns on the Victorian stretch of Highway 31 have been bypassed with the quicker, more direct freeway extending for 290 kilometres from Melbourne's northern outskirts to the border.



On the Hume Highway, sprayed granitic sand at Wangaratta, 1925.
ABOVE: Reshaping gravel road before respraying at Benalla, 1930.

Truck traffic on the old Hume Highway at Craigieburn, 1950.

Trucks and interstate travellers can now complete the trip on the Victorian side in just over three hours, with landscaped rest areas, truck stops, and commercial service centres catering for thirsty, tired and hungry travellers without needing to exit the freeway.

Still, there is plenty of romance and history to be found about our early settlers, bushrangers and road builders, by exiting the freeway and following the road less travelled on sections of the old Highway 31, which still pass through the many towns along the way.

The Wangaratta Bypass opened in 1994, marking the end of more than three decades of work by the CRB, the Road Construction Authority and VicRoads to convert the old highway to a safer, modern freeway. However, the story of the Hume and the efforts of our road authorities to make it what it is today can be traced back more than 150 years.

In 1913 William Calder and his board members traversed what was a 187-mile road of inconsistent quality, which until then had been mostly developed and maintained by the shires along its route. As far back as 1852 the Colonial Government is believed to have funded some works through a Central Roads Board, but funding was inconsistent and sporadic.

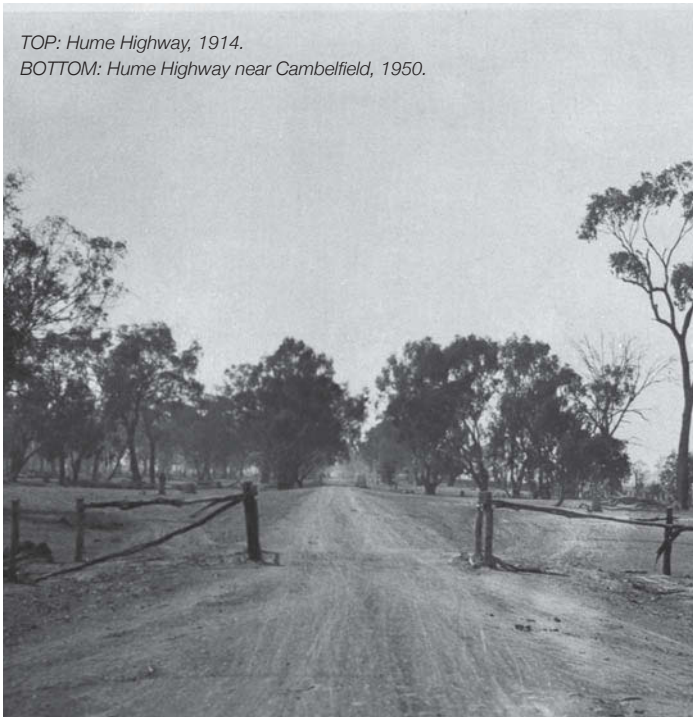
Calder reported the road to be: "…in a very bad state, portions of it where it has not been metalled being impassable in wet weather for vehicular traffic; and for the greater part it is quite unfit for a main national highway connecting the two largest cities in the Commonwealth."

THE FIRST FULLY DIVIDED SECTION OF HIGHWAY 31 WAS COMPLETED AT CRAIGIEBURN IN 1961, WITH IMPROVEMENTS PROGRESSING THROUGH TO BEVERIDGE, WALLAN, BROADFORD AND TALLAROOK.

Sydney Road was declared a main road in 1914 and in 1924 became a state highway with financial responsibility for the North Eastern Highway fully assumed by the CRB.

Sections of the original route through Coburg and Fawkner still carry the Sydney Road name, but it wasn't until 1928 that Victoria and New South Wales agreed that the main highway linking our two largest capital cities be named in honour of Hamilton Hume, whose early explorations opened up much of the country now traversed by the freeway. Over the next two decades through to the war years, much work was done to achieve a dustless paved surface.

In the 1960s and 1970s, the two-lane road was progressively widened to provide four lanes in some places, or at least intermittent passing lanes.



TOP: Hume Highway, 1914.
BOTTOM: Hume Highway near Cambelfield, 1950.

This provided some relief for drivers caught up behind the steady stream of interstate trucks, and for families taking the road north for holidays with caravans in tow.

The first fully divided section of Highway 31 was completed at Craigieburn in 1961, with improvements progressing through to Beveridge, Wallan, Broadford and Tallarook. It wasn't until 1974 that the impetus came to rebuild the Hume as a four-lane divided freeway between Melbourne and Sydney, with the introduction of federal government funding under the National Highways Program.

Over the next 20 years major progress was made. More than $700 million (in 1994 dollar terms) was invested, as old two-lane highway sections were duplicated and reconstructed to freeway standard, new freeway alignments were planned, and major bypasses of towns were constructed including at Seymour (1982), Benalla (1987) Glenrowan (1988) and Euroa (1992). That investment would equate to about $1.2 billion today.

Drivers now enjoy safer and easier travel on Highway 31. The regional towns along the way are better connected and more pleasant places to live, work and visit, with thousands of cars and trucks no longer rumbling through main streets.

In 1976 more than 20 people died in road accidents on the old Hume Highway compared with five road deaths in 2011, a massive reduction given that traffic has more than doubled in this time.

For VicRoads today, the legacy of rebuilding the Hume as a modern, high-quality freeway between Melbourne and Wodonga has been the development of new standards for road and bridge design, planning, engineering, survey, environmental management and community engagement.

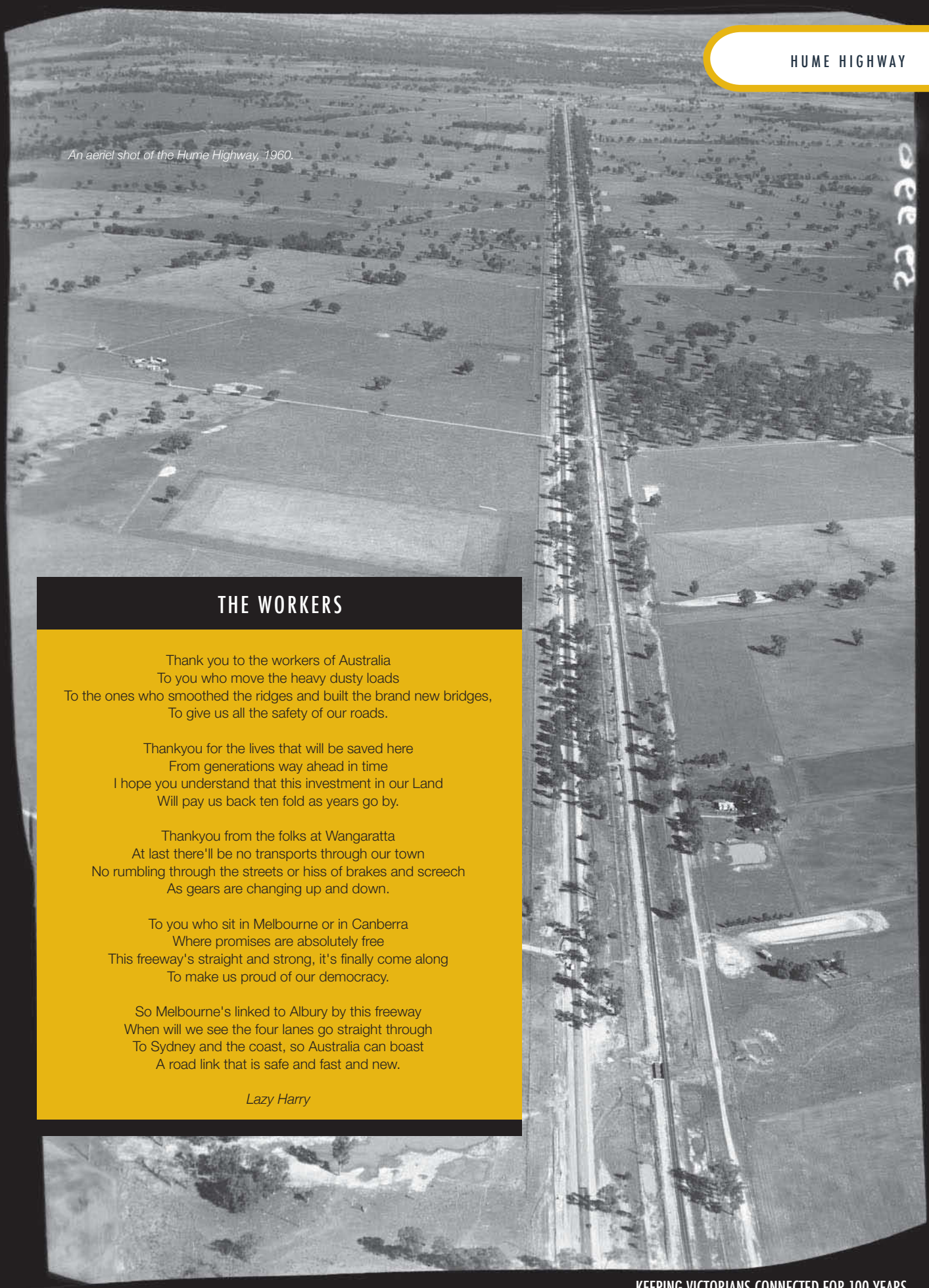
Many of VicRoads current staff, including engineers, designers and planners, learned their trade on Hume Freeway projects, together with industry partners who played key roles then, and are still working with VicRoads today. These include Leighton's, Cut & Fill and Thiess Contractors.

Some 25 years after Johnny Chester sang of his trip up Highway 31, the safer freeway route was completed at Wangaratta.

And as the ribbon was cut on that sunny day in April 1994 and the first traffic drove through in front of the assembled politicians and VIPs, another famed country singer, Lazy Harry, entertained the throng with his new ballad praising an achievement that was more than 150 years in the making:

"Thank you to the workers of Australia, To you who move the heavy dusty loads, To the ones who smoothed the ridges and built the brand new bridges, To give us all the safety of our roads."

Kevin Fox worked in the Media Unit and later the Major Projects Division at VicRoads from 1986 to 2012.



An aeriel shot of the Hume Highway, 1960.

THE WORKERS

Thank you to the workers of Australia
To you who move the heavy dusty loads
To the ones who smoothed the ridges and built the brand new bridges,
To give us all the safety of our roads.

Thankyou for the lives that will be saved here
From generations way ahead in time
I hope you understand that this investment in our Land
Will pay us back ten fold as years go by.

Thankyou from the folks at Wangaratta
At last there'll be no transports through our town
No rumbling through the streets or hiss of brakes and screech
As gears are changing up and down.

To you who sit in Melbourne or in Canberra
Where promises are absolutely free
This freeway's straight and strong, it's finally come along
To make us proud of our democracy.

So Melbourne's linked to Albury by this freeway
When will we see the four lanes go straight through
To Sydney and the coast, so Australia can boast
A road link that is safe and fast and new.

Lazy Harry

A MAJOR MILESTONE

THE CONSTRUCTION OF MELBOURNE'S ORIGINAL RING ROAD WAS A LANDMARK IN VICTORIA'S TRANSPORT HISTORY, WRITES KEVIN FOX.

Melbourne's M80 Ring Road, which extends for 38 kilometres from the Princes Freeway at Laverton North to the Greensborough Highway at Greensborough, has its origins in the 1969 Melbourne Transportation Plan, when the F3 and F5 freeway reservations were identified.

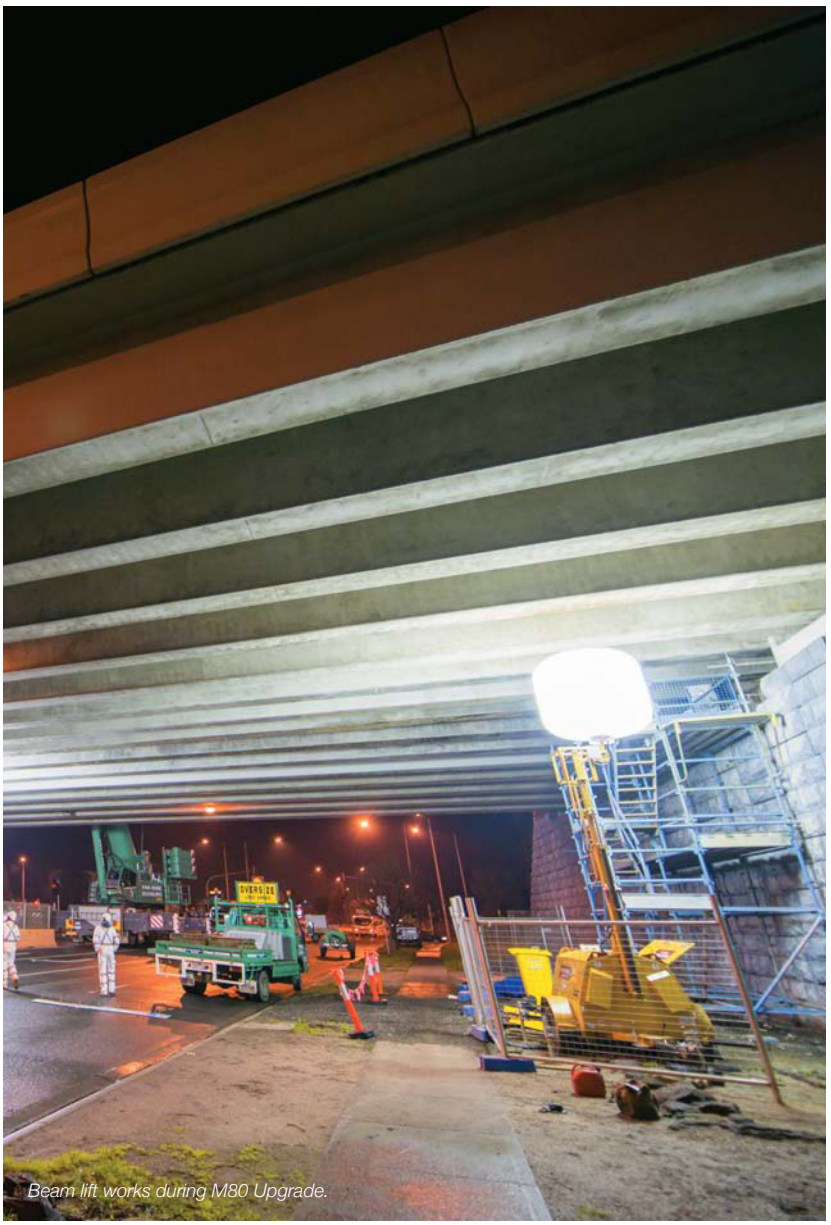
While dotted green lines first appeared on the Melways soon after, it was more than 20 years before elements of that early plan were put to action along this greenfield corridor, as sections of the Western Ring Road and the Metropolitan Ring Road were progressively built over a decade from 1989.

The orbital route through Melbourne's western and northern suburbs, now designated as the M80 Ring Road, links five key radial highways: the Princes Freeway (west), Western Freeway, Calder Freeway, Tullamarine Freeway and the Hume Freeway at Craigieburn. Connection of these key roads of national importance was the major driver for the Federal Government's funding of the Ring Road in the 1990s to link up national highway routes. Beyond Fawkner the Ring Road was primarily funded by the State Government continuing through to the Greensborough Bypass and servicing residential areas in Melbourne's north-eastern suburbs.

When VicRoads built the Ring Road it opened up much of Melbourne's west and north for large-scale development with transport, warehousing and manufacturing drawn to the vast expanse of adjacent land now easily accessed by the new road connections.

Its success was such that it drew masses of traffic, including many thousands of trucks off other arterial roads. As a result of the growth of industry spurred on by the Ring Road, it now carries more than 140,000 vehicles each day, including 22,000 trucks. This is well beyond the traffic volumes first predicted when the Ring Road was announced.

New flyover ramp for Tullamarine, city bound traffic heading to M80 Ring Road.



Beam lift works during M80 Upgrade.

During the 1990s the freeway construction was staged and scoped in line with available federal funding, and the route was generally constructed with two lanes each way. Major bridges and the Jacana tunnel were initially constructed with three lanes each way, but land was reserved and the design largely developed to allow for freeway widening in years to come as traffic grew in line with industrial and residential development, and as funding became available.

A victim of its own success, the M80 Ring Road, originally built at a cost of around $650 million (in 1996 dollar terms) was predicted to achieve savings in travel times, transport and accident costs of around $400 million per year by 2011. It more than achieved these aims and is now undergoing a $2.25 billion makeover to support growth, with extra lanes, widening, access ramp improvements and the installation of a dynamically linked electronic freeway management system.

Like the Hume Highway, the original Ring Road was a key project driving VicRoads innovation. It became a breeding ground for a generation of engineers and project staff to develop their skills and knowledge. A new generation of young engineers, in some cases led by the previous generation who built the original Ring Road, are now at work on the M80 upgrade.

At the cutting edge of road engineering in the 1990s were significant features of the project like the Jacana tunnel. Carrying three lanes each way under busy Pascoe Vale Road, it had to be built below four rail lines carrying metropolitan and interstate rail services. To minimise impacts on trains and road traffic, the tunnel was created by excavating and progressively jacking 16 precast concrete cells beneath the road and rail lines. Each cell weighed up to 1,600 tonnes.

Twin bridges at East Keilor, nearly 50 metres high and spanning the Maribyrnong River valley for 600 metres, were also constructed using an innovative incremental launch system. A series of 27-metre long precast concrete bridge sections were cast on site and progressively pushed out across the valley from one side to the other.

VicRoads and its partner companies involved in building the Ring Road at the time were widely recognised by industry. Sections of the project, including the Maribyrnong River Bridges, won many accolades, including Engineering Excellence Awards from the Institute of Engineers.

Western Ring Road, Mahoney's Road to Melrose Drive,1994.

The Maribyrnong River Bridge was given even greater significance when on the initiative of Premier Jeff Kennett it was named the E.J. Whitten Bridge to honour Victorian football legend Ted Whitten, who played in Footscray's only premiership and was a hero of the western suburbs.

While the section of the Ring Road including the bridge had been open for some months prior, the formal naming ceremony planned in conjunction with Ted Whitten's family poignantly took place on the morning after he died from prostate cancer in August 1995. An iconic image of Ted's right-foot punt kick features in a plaque telling his story, located on the bike path near the bridge.

Construction of Melbourne's original Ring Road set new standards for design and engineering and marked a milestone in Victoria's transport history, and for VicRoads as the state road authority. But the story is not just about cars, trucks, asphalt and concrete. More than 1 million trees and shrubs were planted as part of the project and extensive new bike paths were built, extended and linked in conjunction with the works.

One major modification to the original line on the 1969 Transport Plan map is a marker to changing times, and VicRoads' efforts to ensure the new freeway looked to more than just Melbourne's traffic needs.

The final route between Sunshine West and Laverton deviated from the originally proposed orbital link for about 6 kilometres to ensure the suburb of Ardeer was not divided, saving more than 30 homes and preserving the significant Derrimut Grasslands in Melbourne's west for future generations.

Kevin Fox worked in the Media Unit and later the Major Projects Division at VicRoads from 1986 to 2012.

A NEW STANDARD

THE EASTERN FREEWAY SET NEW STANDARDS IN URBAN DESIGN AND ENVIRONMENTAL OUTCOMES FOR ROAD PROJECTS, WRITES KEVIN FOX.

On a sunny Sunday morning in December 1997, Victorian Premier Jeff Kennett waved the Australian flag to signal through 15,000 walkers and riders along the Eastern Freeway at Doncaster, marking the opening of the 7-kilometre freeway extension to Springvale Road at Nunawading.

It also signalled the end of the last major stage of VicRoads' direct involvement in the Eastern Freeway construction since the Melbourne and Metropolitan Board of Works (MMBW) started work on the sometimes controversial project in the early 1970s.

Planning for a new arterial road from inner Melbourne to the emerging eastern suburbs began in the 1950s. It culminated in 1969 when the F19 freeway route was confirmed in the Metropolitan Transport Committee's report, which also proposed more than 640 kilometres of new freeways, together with a number of new rail lines, and the Melbourne underground rail loop.

With the rise of environmental concerns and community activism in the early 1970s, following the release of a transport plan, many of the originally proposed freeway routes including an inner eastern ring road fell out of favour and were dropped. The MMBW pushed on with plans for the Eastern Freeway, and in late 1971 some 10 acres of land were cleared through Yarra Bend Park for preliminary works amid considerable outrage in the press and the wider community.

In 1974 the State Government transferred the MMBW's responsibilities for Melbourne's arterial roads and bridges to the Country Roads Board (CRB). More than 200 staff transferred across to the CRB together with their projects under active construction, including the Eastern Freeway between Clifton Hill and Bulleen.

Works pushed on with sections of the freeway progressively opening to the Chandler Highway in Kew, to Burke Road, North Balwyn, and finally to Bulleen in December 1977, where eastbound traffic continued along Thompsons Road.

Eastern Freeway, Burke Road Bridge, 1974.

Aerial shot of the Eastern Freeway, Hoddle Street to Bulleen Road, 1978.

Over the next few years, freeway works continued to Doncaster Road at North Balwyn with this next stage opening in mid 1982. Following the election of the Labor Government led by John Cain, Victoria's transport agencies were restructured with the new Road Construction Authority (RCA) created under the *Transport Act 1983*, assuming responsibilities of the CRB.

While the original F19 road reservation had been long established between Doncaster and Ringwood, debate continued in the community and in Government circles about the merits of freeway construction through the Koonung Creek and Mullum Mullum Creek valleys. It would be another 15 years before the next 7-kilometre section of the Eastern Freeway continued beyond Doncaster Road.

In 1985 the Ministry of Transport and five eastern suburban councils formulated the Eastern Corridor Road Action Plan to determine future transport needs through the area, and to prepare recommendations for future road development. Transport Minister Tom Roper announced an Environment Effects Statement (EES) to investigate a possible bypass of Ringwood and an arterial road extension from the Eastern Freeway at Doncaster to Ringwood. The EES supported building the arterial road to Ringwood, which the State Government initially approved. However, following a further review, in February 1992 the government determined that the Eastern Arterial extension would not be built.

In its place a $256 million package of rail and road improvements was proposed, including separating the Maroondah Highway and Springvale Road intersections, accelerating construction of the Ringwood Bypass, and constructing a third rail track on the Ringwood rail line, with associated works to allow for double-decker trains.

Later that year the Kennett Government was elected on the promise to build the 7-kilometre freeway extension to Springvale Road at Nunawading, at a cost of $250 million.

In late 1994 VicRoads awarded the first three contacts for bridgeworks to carry major roads over the freeway including at Elgar Road/Tram Road, Middleborough Road, Blackburn and Springvale Roads. About 12 months later, contracts for the freeway construction were awarded.

In conjunction with these works, the Eastern Freeway between Bulleen Road and Doncaster Road was widened to carry three lanes each way. In restarting works to extend the Eastern Freeway, Victoria's road authority drew on the lessons from earlier times and from the 1987 EES to create new environmental standards for road construction. Innovative urban design and open space improvements were incorporated into the project, in line with community expectations.

While much of the early road reservation was open paddocks used for agistment, or in some cases weed-infested land with degraded creek environs, the freeway project provided new opportunities for cleaning up these areas and to develop linear parklands and trails in conjunction with road work.

On the $250 million project, more than $12 million was spent on landscaping and planting, with three wetlands areas created from storm-water runoff, providing new habitat for aquatic animals and waterfowl. Two million indigenous trees and shrubs were planted and 7 kilometres of bike paths and walking trails created. $28 million was also invested on measures to minimise noise impacts on adjacent residential communities, including innovative clear acrylic curved noise walls on one section.

The final stage of the Eastern Freeway, opened in December 1997, immediately achieved positive transport outcomes. Traffic on the adjacent Doncaster Road halved from about 60,000 vehicles per day. At the time it was credited with saving drivers more than $100,000 daily in travel time and transport costs, and considerable reductions in congestion and accidents were achieved on the nearby arterial road network.

The project also created a legacy for community facilities, urban design and environmental outcomes for road projects. These can be seen today in more recent urban freeway projects delivered by VicRoads such as the Deer Park Bypass in Melbourne's west, and on the privately owned tollways such as EastLink, which continues the M3 route beyond Springvale Road via a tunnel under a section of the Mullum Mullum Valley to Ringwood, and south to Frankston.

Although the Eastern Freeway has had many starts and stops over the years, since construction started at Hoddle Street in 1974, it has helped connect communities to support liveability in Melbourne's eastern suburbs.

AT THE TIME IT WAS CREDITED WITH SAVING DRIVERS MORE THAN $100,000 DAILY IN TRAVEL TIME AND TRANSPORT COSTS, AND CONSIDERABLE REDUCTIONS IN CONGESTION AND ACCIDENTS WERE ACHIEVED ON THE NEARBY ARTERIAL ROAD NETWORK.

Along the way, the works and projects have served as a learning ground for thousands of planners, designers and engineers from the original MMBW and CRB, to the RCA in 1983, and later for VicRoads project teams.

Works on the final major stage of the Eastern Freeway construction between Doncaster and Nunawading were led by VicRoads' current Chief Executive Officer, Gary Liddle, who served as Project Manager between 1993 and 1997.

"It was a great project to be involved with, leading the way for the integration of freeways into the urban landform," Liddle said. "When engineers, architects and landscape architects were given the opportunity on the Eastern Freeway project, a new standard for urban freeways was created."

Kevin Fox worked in the Media Unit and later the Major Projects Division at VicRoads from 1986 to 2012.

AN IMPORTANT LINK

MERV WILLIAMS RECALLS THE BUILDING OF THE MULGRAVE/ MONASH FREEWAY.

Mulgrave Freeway near Brady Road,Dandenong, 1974.

The Melbourne Transportation Study (MTS), carried out from the mid to late 1960s, proposed a network of major roads in freeway form. The rapidly developing urban area south and east of Melbourne, roughly centred on Dandenong, was to be served by:

- **Eumemmerring Bypass**, a north-south route east of Dandenong from Mulgrave Bypass to South Gippsland Highway
- **Scoresby Bypass**, a north-south route west of Dandenong and roughly that now constructed as EastLink Toll road
- **Mulgrave Bypass** - roughly parallel to Princes Highway East (PHE) and about 3 kilometres north of it.

These routes, along with many others now mostly abandoned, were largely located in undeveloped corridors, protected from development, and acquired as funds permitted.

The Country Roads Board (CRB), originally created to provide and maintain all-weather roads connecting provincial towns and rural areas to Melbourne and other ports, was decentralised with divisional offices in eight regional centres and two in urban Melbourne. Dandenong Division, the largest in expenditure, was centrally located initially, then later moved to Nunawading. Dandenong was responsible for major urban highway duplications on Hume Highway, Princes Highway East, Nepean Highway and Maroondah Highway. When the Commonwealth Government provided a new international airport at Tullamarine, the Melbourne and Metropolitan Board of Works (MMBW) provided the freeway to serve it from Royal Park to Strathmore along Moonee Ponds Creek. Dandenong built two sections from Essendon Airport to Tullamarine, and Strathmore Bypass from Essendon to join the MMBW route.

To relieve an increasingly congested PHE it was decided to build Eumemmerring Bypass from PHE at Doveton (next to the General Motors Holden plant) and Mulgrave Bypass towards Melbourne. Planning started under Dandenong Division control. Such major urban and some rural works were distorting the role of regional divisions so a Major Projects Division was formed under Alan Pryor as Major Projects Engineer, to plan and construct nominated major roads. The first projects assigned to this group were:

- **Hume Freeway** – Wallan to Broadford Section under Geoff Hunt as Project Engineer;
- **Hume Freeway** – Bell Street to Craigieburn under Bill Thomas as Project Engineer;
- **Mulgrave Freeway,** with myself as Project Engineer.

An increasing volume of major works was overtaxing the capacity of bridge and road design groups at the CRB's head office so consultants were engaged for Mulgrave Freeway. Wilbur Smith and Associates, a US-based consultant with Melbourne staff assisting in the MTS, was engaged to design the roads and bridges for Eumemmerring and Mulgrave from PHE at Doveton to west of Stud Road. Rankine and Hill, an Australian consultant, was engaged for Mulgrave from west of Stud Road to Springvale Road.

Monash Freeway today – near Stud Road.

Further sections between Springvale Road and Warrigal Road, Chadstone were designed in-house at a later date. All designs were for outer lanes of an ultimate six lanes on Eumemmerring and eight lanes on Mulgrave.

A project office using demountable units was built alongside the route near PHE at Doveton. It housed engineering, surveying, testing and administrative staff supervising the contract let to Mecho Constructions, a road contracting subsidiary of E.A. Watts Ltd, a well known building company. Suitably experienced personnel under the leadership of Ted Goddard supervised the contractor's work, which included all roads and bridges and ancillary works.

On completion in 1971 this section was opened to traffic between PHE and Stud Road by the then Governor of Victoria, Sir Rohan Delacombe.

A larger demountable project office and laboratory was provided within the freeway interchange with Ferntree Gully Road at Mulgrave with access from that road, and served for the balance of the route.

Mecho Constructions was again the successful tenderer for the Rankine and Hill-designed second section – thus avoiding the potential for contract disputes at the junction of the two projects. The second section was completed and opened to traffic in 1974.

Next cab off the rank was Springvale Road to Forster Road, again with Mecho Constructions, from 1974 to 1976. From mid-1975 onwards, Don Durant was the Project Engineer.

Completion from Forster Road under Huntingdale Road to Warrigal Road continued until 1979 in a more piecemeal fashion, with separate contracts for several north-south road overpasses,

MECHO CONSTRUCTIONS WAS AGAIN THE SUCCESSFUL TENDERER FOR THE RANKINE AND HILL-DESIGNED SECOND SECTION – THUS AVOIDING THE POTENTIAL FOR CONTRACT DISPUTES AT THE JUNCTION OF THE TWO PROJECTS.

a tunnel taking Scotchman's Creek under the freeway, service tunnels for major water mains, and other road works. Supervisory personnel for bridgeworks were seconded from the bridge sub-branch. Laboratory and surveying staff were recruited from relevant Head Office areas. Road supervision and administrative were mainly transferred from the Strathmore Bypass section of the Tullamarine Freeway. The project was also widely used as a training role for more recent graduate engineers.

In the later years of construction Melbourne experienced significant anti-freeway protests, leading to a decision by the Hamer Government that construction would not proceed west of Warrigal Road. It was to be some years before connection of the outer section to the former MMBW South-Eastern Freeway at Toorak Road to complete the now renamed Monash Freeway. Don Durant supervised this extension under the overall control of Reg Paterson, initially as Regional Manager Metropolitan, later as Chief Works Engineer.

Merv Williams was the Project Engineer for the Mulgrave Freeway and later, the Major Projects Engineer.

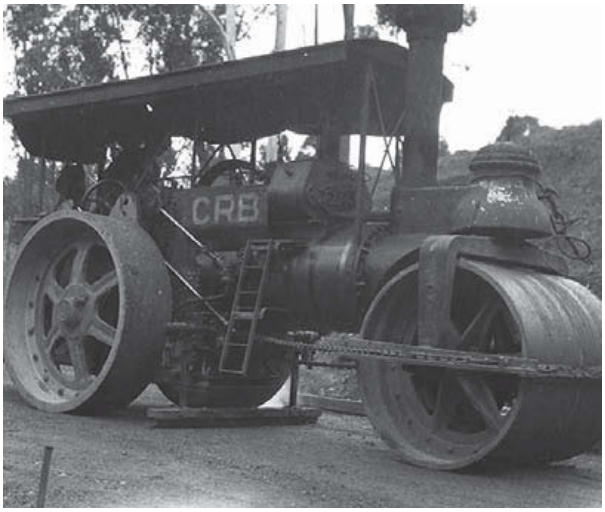
AS GOOD AS GOLD

SINCE THE 1850S, MAJOR IMPROVEMENTS HAVE BEEN MADE TO TRANSFORM WHAT WAS ONCE A BUSH TRACK TO THE GOLDFIELDS INTO TODAY'S CALDER FREEWAY, ONE OF THE LONGEST HIGHWAYS IN THE STATE, WRITES KEVIN FOX.

Stretching for more than 500 kilometres from the Tullamarine Freeway junction near Essendon Airport to the Murray River at Mildura, the Calder Highway through central and north western Victoria is one of the longest highways in the state.

Over more than 150 years, Route 79 developed from an early bush track to the goldfields to a safe modern freeway to Bendigo, with the state highway continuing beyond Bendigo to link wheat towns through the Mallee region.

In the 1850s fortune seekers from around the world came to the Port Phillip district in search of gold. They spent days trekking northwest from Melbourne, camping along the way and leading to the establishment of now familiar towns including Diggers Rest and Kyneton. The original route to the Mt Alexander (now Castlemaine) and Bendigo goldfields was well traversed by diggers and their families, with rest stops springing up to service the weary and footsore, including one established by Caroline Chisolm near Gap Hill.



Accident at Golden Square, Calder Highway, 1949.
TOP: Spreading limestone at Mildura, Calder Highway, 1932.

Bridge over Loddon River at Bridgewater, Calder Highway.

IN ADVANCE OF CONSTRUCTION, ENVIRONMENT EFFECTS STATEMENTS WERE PREPARED TO DETERMINE THE BEST ROUTE, GIVING CONSIDERATION TO POTENTIAL IMPACTS ON LANDOWNERS, NATIVE VEGETATION, FAUNA AND SITES OF SIGNIFICANT ABORIGINAL AND EUROPEAN HERITAGE.

Roads to the goldfields were in such poor condition that cartage costs for a dray to take supplies to Bendigo were reputedly £150. In January 1854 the first Cobb and Co service was launched from the Criterion Hotel at Collins Street in Melbourne with the journey split into 10-mile stages to change horses, and with the fare set at £8.

While completion of a rail line to Bendigo in 1862 saw demand for roads decline, the route became well established as the gold was exhausted and land opened up for farming and grazing.

In 1914 the first annual report of the Country Roads Board (CRB) identified that portions of the main road between Melbourne and Castlemaine were in fair order, while elsewhere maintenance had been neglected to the point where "...the surface coating of metal has entirely disappeared".

Beyond Castlemaine, the road to Bendigo was in such a condition to justify immediate steps for its construction, with contracts for works in progress. In his report to the Minister for Public Works, CRB Chairman William Calder stated: "Portions of this road appear to have been well constructed many years ago, but have been allowed to get into a state of disrepair, while other sections would appear never to have been constructed."

It was not until 1925 that the road was declared a state highway and named the North Western Highway, with the CRB assuming full responsibility for its construction and maintenance. Just three years later the CRB's founding Chairman died, and in recognition of his service, the highway to Bendigo and beyond was renamed in his honour.

Widening the Calder Highway, 1953.

Over the ensuing years, progress to improve Victoria's road network including the Calder Highway was impacted by the Great War, the Depression, and later World War II, when men, materials and funding was diverted to serve more pressing causes.

Post war initiatives to open up areas for soldier settlement in the Mallee, and towns such as Merbein near Mildura, helped drive improvements to rural highways in remote areas. In the year of Queen Elizabeth's visit in 1954, when she toured much of the state by road, a new 14.6-mile deviation of the Calder Freeway was completed between Ouyen and Nowingi.

That same year during works to upgrade the highway at Big Hill, CRB workers discovered stonework from an original tollgate dating back to the goldfields days.

In the early 1970s, as Melbourne grew and car use increased, the first steps were taken at Niddrie to transform the two lane highway into a safer, fully divided four lane road.

The 1975 *Melway Street Directory* shows 175 blue-edged map pages with suburbia extending along the first freeway sections as far as East Keilor. From there a single thick black line continued on the maps to Sydenham, indicating the single carriageway road traversing vast empty paddocks. There was little or no residential development as far as the Calder Motor Raceway. Today's Melway runs to 697 pages. A dual green line now marks the highway passing through established suburbs at Keilor Park and Taylors Lakes, and continuing beyond Calder Park Thunderdome to Diggers Rest, Sunbury and Gisborne. These towns were once just rest stops on the track to the goldfields.

In April 2009, the 120-kilometre Calder Highway route from Melbourne to Bendigo was finally completed when the last section opened near Harcourt.

Over 20 years, more than $750 million in state and federal funding had been invested in highway duplication works, new freeway alignments, and bypasses of towns including Diggers Rest, Gisborne, Woodend, Kyneton and Malmsbury.

During that time many RCA and VicRoads staff followed the works in project teams up the Calder Highway to become valued members of local communities along Route 79. Near Macedon a bridge taking the old Calder Highway over the freeway is named in honour of Alex Evans, VicRoads long standing project manager who died of illness during the works to build the safer highway, now used by almost 15,000 vehicles each day. Evans and hundreds of other VicRoads staff spent many years, not just building the road but working with communities to plan and identify route options.

In advance of construction, Environment Effects Statements were prepared to determine the best route, giving consideration to potential impacts on landowners, native vegetation, fauna and sites of significant Aboriginal and European heritage. Archeological surveys along the way helped identify and protect indigenous sites and to preserve artefacts including scar trees and stone tools.

Between Kyneton and Ravenswood 47 wildlife crossings were constructed including underpasses, culverts, and overhead cables. Koala fences to prevent road kill in the vicinity of known wildlife corridors were also installed.

To make the new Calder Highway as safe a possible, ice detection stations and warning systems were also installed to alert drivers of black ice when travelling through the Black Forrest area in winter.

In rebuilding the Calder Highway, innovative engineering solutions were developed by VicRoads and its contractors for many complex technical challenges, continuing Victoria's road and bridge building heritage dating back more than 150 years. Today it can be seen in our modern day freeway overpasses, rail bridges and river crossings.

Near Sunbury, adjacent to the freeway at Kororoit Creek, a bluestone arch bridge built in 1861 by early engineers and stonemasons still stands strong – a testament to the efforts and skills of those who built the road to the goldfields, which today bears Calder's name.

Kevin Fox worked in the Media Unit and later the Major Projects Division at VicRoads from 1986 to 2012.

TO MAKE THE NEW CALDER HIGHWAY AS SAFE A POSSIBLE, ICE DETECTION STATIONS AND WARNING SYSTEMS WERE ALSO INSTALLED TO ALERT DRIVERS OF BLACK ICE WHEN TRAVELLING THROUGH THE BLACK FORREST AREA IN WINTER.

Calder Highway, 2009.

First test of Horrocks Roxborough's 900 gallon tar sprayer.

BLACK MAGIC

THE ADOPTION AND CONTINUOUS DEVELOPMENT OF SPRAYED SEALING ENABLED THE CRB, RCA AND VICROADS TO PROVIDE A SAFE AND RELIABLE ROAD NETWORK.

Bitumen, or 'the black stuff' that seals our roads, is a material used widely in Victoria over many decades. A sprayed bituminous seal, or a sprayed seal as it is often called, is a simple and effective way of sealing a road. One of its most significant functions is to provide a waterproof surface on which cars can safely drive.

A sprayed seal is formed by an application of binder, which is mostly made up of bitumen, immediately followed by a layer of aggregate or loose stones that is rolled into the binder. The result is a watertight and, thanks to the aggregate, skid resistant surface.

Sprayed bituminous sealing was adopted in Victoria in the 1910s as a method for surfacing roads as it offered a low cost, efficient and practical method of building and extending Victoria's road network. The Country Roads Board (CRB) purchased its first sprayer in 1916 and by 1926 the annual report listed nine bituminous sprayers in its plant fleet. The adoption of this method of surfacing enabled the Victorian road authorities to provide a safe, all weather and low maintenance road system.

However, the successful construction and maintenance of this road network would not have been possible without the initiative and commitment of the people who worked for the CRB, and later the Road Construction Authority and VicRoads. Their foresight enabled sprayed seal technology to be adopted but also improved to produce consistently high quality surface treatments that were renowned worldwide.

Bitumen sprayer on Nepean Highway, 1951.

THE BLACK STUFF

Over the years a number of different types of sprayed seal surfaces involving multiple applications of binder and aggregate have been developed to adapt to different conditions across the state, and to maximise safety for road users.

A sprayed seal can be used either as an initial surface on a compacted gravel pavement, or to reseal an existing surface, such as an older sprayed seal or in some cases asphalt. It is important to note that a sprayed seal is exactly that – a seal. It has no structural properties and relies on the composition and structure of the road that it seals.

A sprayed seal has many benefits. As well as being low cost and flexible, a sprayed seal provides a durable, safe and dust free surface. The gaps between the aggregate provide superior drainage and safety during wet weather and help to prevent vehicles from aquaplaning. This type of surfacing minimises the rate of pavement wear and keeps maintenance costs as low as possible. In addition, a sprayed seal protects the underlying road or granular pavement base from the damaging effects of traffic and moisture.

BLAZING A TRAIL

Two early pioneers of sprayed surfacing in Victoria were Henry (Harry) Gray, the “Father of Bituminous Surfacing”, and Stuart Deany. Gray was the CRB's first Asphalt Engineer, holding the position from 1935 to 1955. He was a major player in the development of sprayed bituminous surfacing in Victoria. His pioneering approach built a culture of innovation and fostered an environment in which improvements in work practices and equipment development were encouraged and supported. Deany was Asphalt Engineer from 1967 to 1973 and continued Gray’s commitment to the development of field practices and made a major contribution to road surfacing in Victoria. Both Gray and Deany were renowned nationally and internationally for their expertise in this area.

INDIVIDUALS WITH THE DESIRE TO EXPERIMENT AND INNOVATE WERE SUPPORTED BY THE CRB, AND LATER VICROADS, AND ENCOURAGED TO DEVELOP IDEAS THAT SOLVED PROBLEMS IDENTIFIED IN THE FIELD.

In the 1930s, F.M. Hanson, an engineer from New Zealand, made a major contribution to sprayed sealing practice by publishing a rational design method which had a wide impact on the technology. The procedure was used to improve the methodology used by the CRB. By 1960 the CRB aimed to build the most consistently successful surface treatments in the world.

NECESSITY MEETS INNOVATION

Much of the early equipment used in the sealing process was developed by the CRB and either purpose-built or adapted in the mechanical workshop in South Melbourne. In the early days of adoption in Victoria, sprayed sealing was still in an experimental stage. Necessity combined with a commitment to innovation resulted in a practical approach to plant development.

Victoria's spray gangs travelled all over the state.

LIVING BLACK MAGIC: THE SPRAY GANGS

Teamwork is essential for the sprayed sealing process. Each member of the spray team, road gang or crew has an important role to play. The work of the spray gang is like a choreographed dance – each step in the process is highly refined and carried out with competence and efficiency. Each element of the process relies on the successful completion of the one before. A strong team atmosphere within the gangs is a highly valued aspect of the work culture as a result.

Victoria's spray gangs travelled all over the state creating Victoria's road network, living in camps for many months. Living conditions were not always luxurious. Early spray gangs slept in two-man tents, with only basic facilities for toilets and showers. Meals also varied, with the camp cook having a large bearing on the quality of the food.

Camp life was unique. The atmosphere in the camps often depended on the personality of each overseer. Some ran a tight ship with strict discipline, while others encouraged a more convivial atmosphere. Later the camps evolved from tents to portable huts, then caravans. Today, spray gangs - or as they are now known, sealing crews - stay in motels.

Life on the road had its appeal, but being away from home and family was also a challenge. While some were suited to the life, others lasted just one season – or sometimes not even that. Working long days in extreme heat and being away from home for long periods were tough, but camp life was also a place where friendships were formed.

This involved designing and manufacturing machines to refine and improve the sprayed sealing process and to fit specific needs. Specially constructed items of plant such as the rotary road broom, aggregate belt spreader, box spreader and aggregate loader are outcomes of this development work.

Described as a genius when it came to invention and adaption, Robert (Bob) Banks-Smith was responsible for some of the plant innovations of this period, such as the aggregate loader and the development of the belt spreader based on a design by the Buckeye Company, USA. Equipment continued to be developed with the same commitment to innovation and progress, with changes enabling improvements in safety, efficiency and mobility.

A PRACTICAL APPROACH

The CRB had a culture of innovation, with a hands-on approach to problem solving. It was an organisation that was prepared to experiment by trying new methods, with some of the best ideas for improvement coming from people in the field.

THE SPRAYED SEAL SURFACES ON THOUSANDS OF ROADS AROUND THE STATE, AND INCREASINGLY, AROUND AUSTRALIA, ARE A SILENT BUT PERTINENT TESTIMONY TO THE PIONEERS OF THIS TECHNOLOGY.

Individuals with the desire to experiment and innovate were supported by the CRB, and later VicRoads, and encouraged to develop ideas that solved problems identified on the ground. Regular trials of equipment and monitoring of processes resulted in modifications and continuous improvement to equipment, materials and supply processes. Continued innovation was supported through overseas study tours, practical field research and partnerships with bodies such as the Australian Road Research Board.

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Improvements in mechanical equipment and advances in technology have refined the process of sprayed sealing. Cost efficiencies, and the speed at which roads can be sealed, continue to increase.

EFFICIENCIES AND SAFETY

From the early days of the workshop in South Melbourne, equipment has adapted to meet changing needs and refine the process. Machines that previously required several operators can now be controlled by just one. Accordingly, the number of people in a spray gang has reduced from around 35 to fewer than 20 today. Increased mobility of plant also means that crews can now travel further and faster, enabling more roads to be sealed and existing seals to be maintained.

INDIVIDUALS WITH THE DESIRE TO EXPERIMENT AND INNOVATE WERE SUPPORTED BY THE CRB, AND LATER VICROADS, AND ENCOURAGED TO DEVELOP IDEAS THAT SOLVED PROBLEMS IDENTIFIED ON THE GROUND.

Safety has always been a key consideration in the sprayed sealing process; it is an unavoidable concern when dealing with traffic and hot materials containing volatiles. Conscious of this importance, the CRB continually instituted safety procedures, even eventually doing away with the shorts and singlets once worn by spray gangs.

Over the years innovations relating to safety resulted in changes to equipment, materials and procedures to ensure the safety of workers and the wider community. Ongoing improvements in the area of safety, including interactive training courses and annual checks on equipment, help maintain the stringent safety standards required in the industry today.

A CHANGING ORGANISATION

In 1983 the CRB became the Road Construction Authority (RCA). In 1989, the RCA merged with the Road Traffic Authority to create the Roads Corporation – better known by its trading name, VicRoads.

The establishment of SprayLine in 1997 was a result of a change in focus for VicRoads. Sprayed sealing, along with other aspects of the organisation, became a commercial venture. Named for its two main activities - spraying and line marking – SprayLine is now a semi-autonomous body that undertakes contract-based work for VicRoads, as well as for other clients. The organisation has also expanded into the interstate market, undertaking work in New South Wales and South Australia.

Line marking today.

The existence of SprayLine and its connection to VicRoads ensures that sprayed sealing capabilities are retained, while the commercial environment in which SprayLine operates means pricing remains competitive. This in turn ensures that sprayed surfacing remains a viable road treatment.

SIGNIFICANCE OF SEALED ROADS

Bituminous surfacing played an important role in the economic development of the state, providing a low cost means of putting an all weather surface on a significant number of roads. It also provided smoother, safer roads for vehicles to travel on.

From school children on buses, to district nurses travelling to see patients and trucks collecting produce from farms, sprayed seal has contributed to a safer and better standard of living for many.

The concept of sprayed bituminous surfacing, and the continual refinement of the process, has changed the face of Victoria. The sprayed seal surfaces on thousands of roads around the state, and around Australia, are a silent but pertinent testimony to the pioneers of this technology. These roads are the physical embodiment of the dedication, commitment and passion of those who have worked to bring safer and more durable roads to all.

Edited from transcripts of interviews conducted by Way Back When historians Sarah Rood and Katherine Sheedy (www.waybackwhen.com.au). To listen to the original oral histories visit www.vicroads.vic.gov.au.

A ROLE IN THE RESERVES

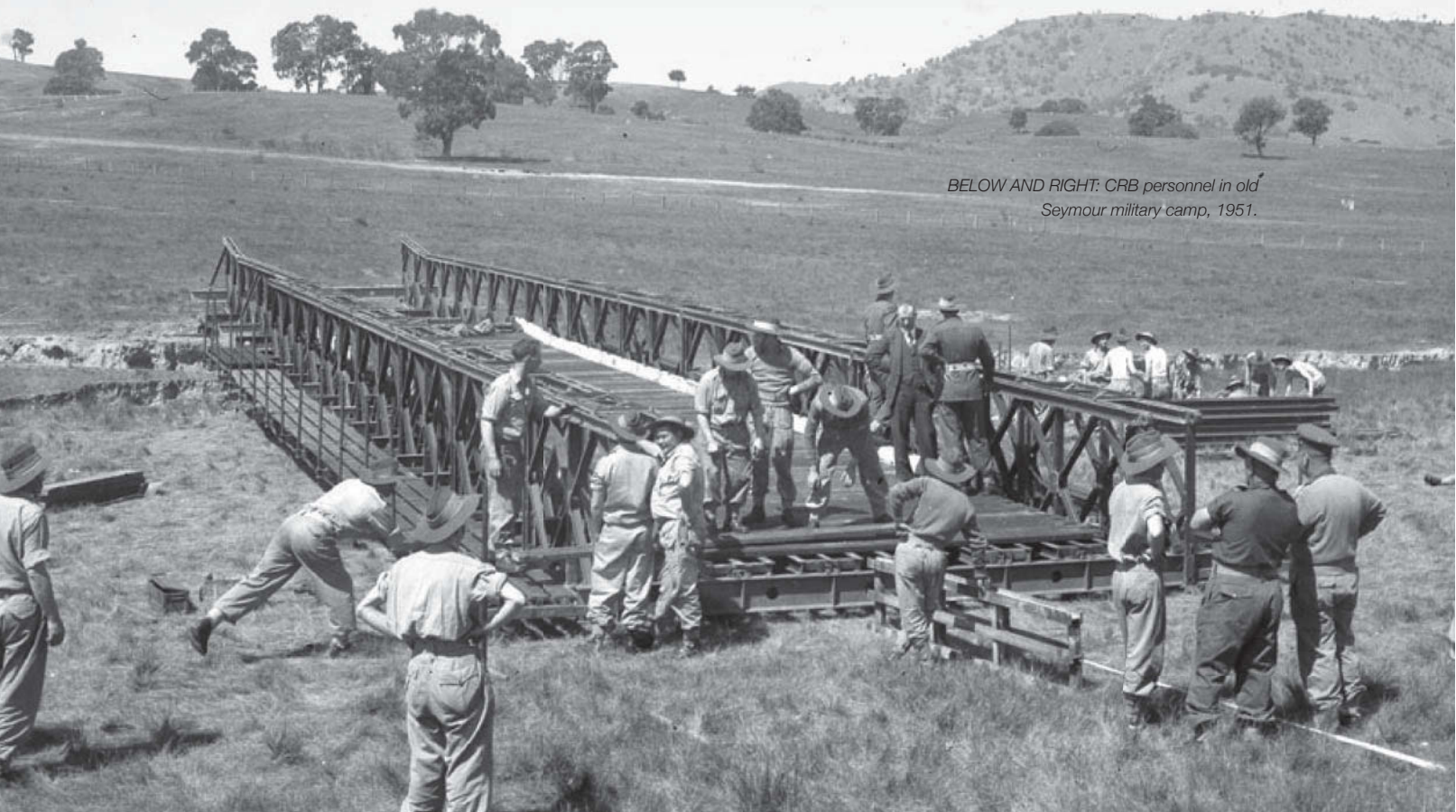
CIVILIAN ENGINEERS AND CONSTRUCTION WORKERS PROVIDED SUPPORT TO THE ARMY IN A NUMBER OF KEY POSTINGS, WRITES JOHN REBBECHI AND GEOFF HUNT.

The Country Roads Board, in 1950, together with other Victorian Government instrumentalities undertook to sponsor Royal Australian Engineers (RAE) Supplementary Reserve (SR) units of the Citizen Military Forces (CMF), now the Australian Army Reserve. These sponsoring authorities carried out civilian works akin to military engineering tasks such as road and bridge construction, water supply and electric power generation and reticulation.

SR units would provide the means of turning the civilian qualifications and skills of personnel of these authorities to military advantage as a basis for rapid expansion of army engineers in time of defence emergency or war. Essentially SR members would undertake a fortnight's annual camp where they would receive basic military training and adapt their civilian technical skills to military engineering tasks and be available for early tactical development in their technical roles. Outside annual camp sponsoring authorities would assist with unit administration.

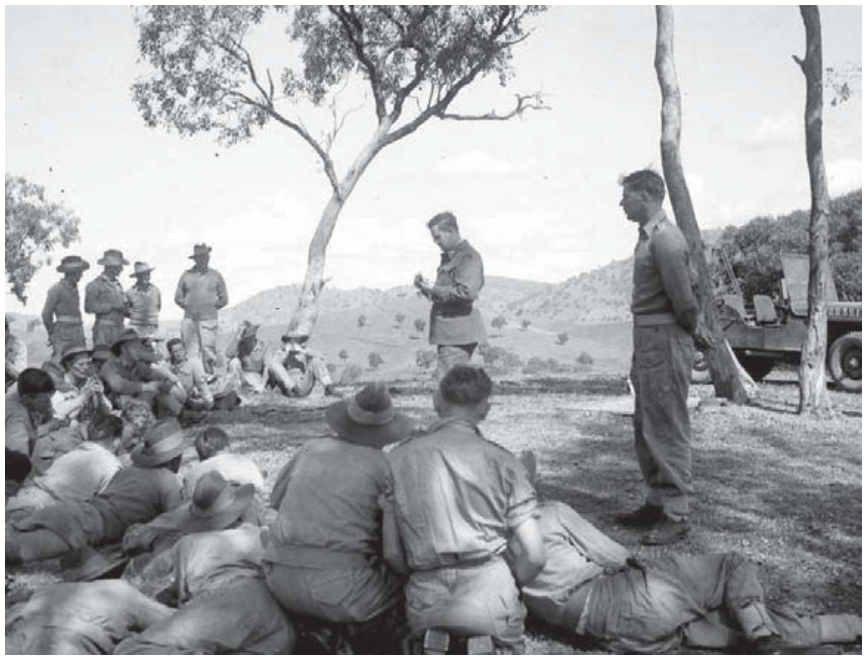
The SR system resulted from initiatives taken following the end of World War II, principally by the Council of the Institution of Engineers, Australia, of which Major General Clive S. Steele DSO MC, who had been Engineer-in-Chief of the Australian Military Forces during the war, was a member. Their concern was to overcome any time-lag in the provision of engineer support in the early stages of any conflict.

The first SR unit raised was the 22nd Construction Regiment comprising a headquarters sponsored by the CRB, and sub-units (squadrons) sponsored by the CRB, the State Rivers and Water Supply Commission and the Melbourne and Metropolitan Board of Works.



BELOW AND RIGHT: CRB personnel in old Seymour military camp, 1951.

The regiments first Commanding Officer was Lieutenant Colonel I.J. O'Donnell OBE, then the CRB's Bridge Engineer (and later Chairman from 1963 to 1971), who had commanded the army's 8th Division engineers in Malaya during the war and who had investigated the SR system of the British army on a visit to the UK in 1948. His was the task of raising the unit and of recruiting sufficient officers, non-commission officers (NCOs) and other ranks to constitute a viable unit.



As well as the ready co-operation of the sponsoring authorities he received much personal support from the army's Chief of Engineer, Southern Command, Lieutenant Colonel A.T.J. Bell (later Brigadier Bell OBE, Engineer-in-Chief of the Army). The initial intake of recruits included a significant number of ex-service members of the sponsoring authorities with RAE experience who generally retained their wartime officer and NCO rank and who, together with regular army assistance, gave the unit its early impetus.

Within the CRB, initial recruitment was conducted in its Bairnsdale, Ballarat, Bendigo, Geelong, Horsham, Metropolitan and Traralgon Divisions as well as in head office and the South Melbourne Syndal Depot – and later the Syndal Depot.

Training at annual camps covered military subjects and the application of civilian skills to military engineering tasks, sometimes in the form of a project. Military engineering training at annual camps and other training courses included bridging, watermanship, water supply, demolitions and minewarfare activities. In 1964, 1974, 1978, 1983 and 1988 annual camps were conducted at the School of Military Engineer in Sydney. Additionally, special training courses were conducted at other times of the year for officer and NCO development.

In 1963, 92 members of the regiment including many CRB personnel, were deployed for two weeks to Wewak, Territory of Papua New Guinea, to relieve elements of 21st Construction Squadron, a regular army engineer unit stationed there. This contingent constructed two timber bridges on the local road system and installed reinforced concrete culverts on a road development project. Unit plant operations participated in this project also. This deployment provided a classic peace-time example of the SR concept in action with the application of specialised skills in a realistic setting.

From 1967 to 1971, small groups of CMF officers, generally of the rank of major, visited South Vietnam for two-week periods to observe an Australian force deployed operationally, particularly units of their own corps. Four CRB officers of the regiment participated in these visits which afforded them a unique opportunity to witness active military engineering tactically and technically.

In practising the military application of its particular skills, the regiment over the years has undertaken bridging and road construction and improvement tasks. These have included erection and/or dismantling of Bailey bridging required for temporary civil use by the CRB and municipalities to enable replacement or improvement of permanent structures to be carried out free of traffic. Some of the more significant road projects carried out were construction of roadworks in Puckapunyal, in 1962, construction of a 3.6 kilometre military vehicle test track at Monegeeta in 1979, construction of access roads as part of military exercises at Shoalwater Bay, Queensland in 1980 and 1981, construction of forest access roads in East Gippsland in 1982, and further roadworks at Puckapunyal in 1986. Many other minor projects were undertaken for military and community facilities.

The SR system within the RAE provided a valuable professional link between military engineering and civilian engineering functions. It fostered the personal development of officers and NCOs in terms of leadership, man-management and general organisational skills to the strong mutual benefit of the army and the sponsoring authorities. It also generated a sense of camaraderie among members extending back to the workplace, and long-standing friendships.

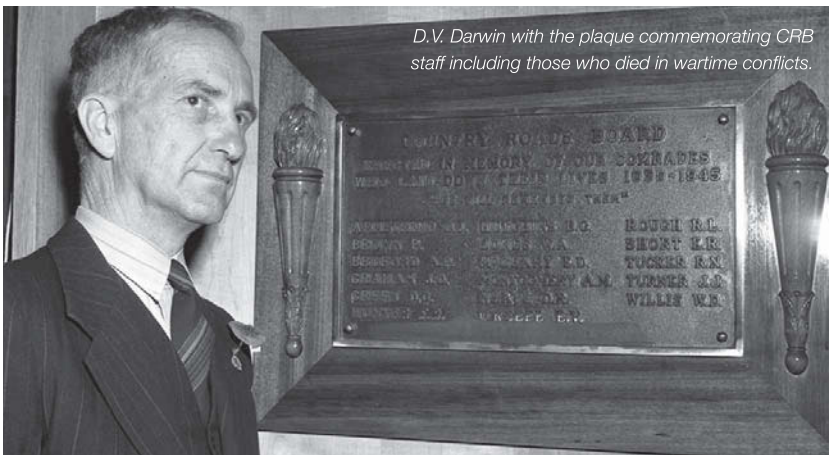
During the 1990s re-organisation of the various sponsoring authorities took place with much of their direct works capacity being passed to private enterprise, so limiting the source of SR recruitment. SR units became "normal conditions" units with recruitment being undertaken on the open market. The original concept of sponsorship was no longer applicable.

John Rebbechi served with the unit from 1974 to 1987, retiring with the rank of Captain. Geoff Hunt was the Lt. Colonel and Commanding Officer of the regiment.

BUILDING WARTIME ROADS

VICTORIA'S ROAD AUTHORITY HAS A LONG ESTABLISHED MILITARY HERITAGE WITH STAFF AND OFFICERS ACTIVE IN BOTH WORLD WARS, AND IN OTHER CAMPAIGNS SINCE, INCLUDING VIETNAM, SOLOMON ISLANDS AND EAST TIMOR. BY KEVIN FOX.

Two bronze plaques commemorating the service of Country Roads Board (CRB) staff including those who died in wartime conflicts have pride of place at VicRoads Head Office foyer in Denmark Street, Kew. Many staff members are known to have died in the Great War.



D.V. Darwin with the plaque commemorating CRB staff including those who died in wartime conflicts.

In the CRB's 1954 annual report, Chairman D.V. Darwin thought it "… desirable to place on record the names of those officers and employees of the Board who served in the Forces." Almost 600 staff members are recorded as having enlisted, with at least 15 known to have lost their lives. Having fought with the AIF during World War I and been awarded the Military Medal, it was appropriate that Darwin served as Chief Engineer during the years when conflict touched Australia's northern doorstep.

Under the watch of Darwin, and CRB Chairman Louis Loder, our state road authority played a most significant role in the defence of the nation. At the direction of the Allied Works Council, CRB engineers and works teams were commandeered to build critical transport infrastructure well beyond Victoria's borders to service and supply our soldiers and airmen. Most notable was the establishment of a CRB Divisional Office in Tennant Creek, headed by Divisional Engineer Charlie Jones with his team of technical staff engaged in vital road and aerodrome construction in the Northern Territory.

More than 500 men worked in the harshest of conditions on projects of significance including surveying, strengthening and surfacing Australia's "north-south road" - the Stuart Highway, running 1,013 kilometres from Alice Springs to Larrimah. The dirt track through Australia's central spine was originally built to service the Overland Telegraph, but in the war years it was reconstructed to transport soldiers and supplies. The road joined two rail heads and carried heavy wartime convoy traffic on the way to Darwin for Australia's northern defence.

Among those who went were Tom Russell and Keith Moody, who joined the CRB as junior engineering assistants at age 17. It was an auspicious start for these young men sent to the NT in 1943 but their early experience held them in good stead for the years to come. Russell progressed to become the CRB's Chief Engineer in 1971 and later Chairman of the CRB and the RCA until his retirement in 1986. Moody was later appointed Chief Engineer.

"WE WORKED SIX DAYS A WEEK FROM DAWN TO DARK BECAUSE THE WAR WAS ON AND WE HAD TO DO OUR BIT," RUSSELL SAID.

Works included surveying and levelling the road between Alice Springs and Tennant Creek. "We worked six days a week from dawn to dark because the war was on and we had to do our bit," Russell said. Though the conditions were harsh for the young engineer from Geelong on his first trip out of Victoria, he knew the work was important. "You could tell it by the hundreds of trucks going up the road to Darwin every day, loaded with military personnel, air force personnel, nurses and supplies," he said. The original track was rough and dusty and trucks lasted only a short time; they just rattled to bits. "We realised it was important to have a sealed road."

In addition to roadworks, the CRB team carried out resheeting and surfacing of the Gorrie Aerodrome, where Russell found himself in charge after the senior engineer, Alan Jacka, came down with Dengue fever. While working at Gorrie Aerodrome, Moody applied to join the Air Force when he turned 18, "…but they knocked me back because of the work I was engaged in."

On return to Victoria in early 1944, and working at the CRB Laboratory, he applied again. “D.V. Darwin, the Chief Engineer, came out to the lab and told me the manpower authorities had considered my application and knocked it back. We want you to go back to the NT.”

Moody was again sent north, working until August 1944 on construction of the Tindal Airbase near Katherine, and on aerodrome projects at Fenton and Long.

Beyond manpower, the massive task of road and aerodrome works required highly mechanised equipment to be provided and maintained in remote areas. Extensive workshops were established which according to contemporary reports employed a considerable proportion of the CRB's staff. With some pride the 1944 CRB annual report notes that works to upgrade the Stuart Highway in the Northern Territory were “…successfully carried through in close accordance with time, schedule and estimated cost”.

In total £1,252,000 was expended on the project. Defence works completed by the CRB in the NT and Victoria to the final year of the war were valued at £4,672,910. Evidence of the 1940s wartime roadwork camps is still sometimes turned up today up by travellers in remote areas, finding old drums, bits of steel, and relics off to the roadside. Importantly the engineers who built the highway and upgraded it during and after the war are remembered with a plaque 30 kilometres north of Alice Springs at the Tropic of Capricorn marker.

MORE THAN 500 MEN WORKED IN THE HARSHEST OF CONDITIONS ON PROJECTS OF SIGNIFICANCE INCLUDING SURVEYING, STRENGTHENING AND SURFACING AUSTRALIA’S “NORTH-SOUTH ROAD” - THE STUART HIGHWAY, FOR 1,013 KILOMETRES FROM ALICE SPRINGS TO LARRIMAH.

While the CRBs efforts continued in the NT during the war, at home road building in Victoria was curtailed due to the diversion of men and machinery. The supply of bitumen was severely restricted and controlled under National Security Regulations. In 1944 there was almost no new construction works undertaken on Victoria’s state highways. The exception was for “…the replacement and restoration of bridges and culverts necessary for the safe passage of military traffic”. Available resources were focused on paving and surfacing roads to vital factories, stores and, according to the annual report, at an important but unnamed ordinance depot, no doubt giving consideration to wartime security restrictions.

In Victoria a key focus of the CRB’s defence works included building or extending runways and aprons at aerodromes including at East Sale, Bairnsdale, Point Cook, Laverton, Essendon and Fishermans Bend. Some major works were also completed

Tom Russell and Keith Moody on track to Neutral Junction Stn, June 1943.

on the Ocean Road between Sheoak Creek and Wye River under a priority order issued by the Commonwealth to allow for uninterrupted carting of timber vital for supply as part of the war effort.

Looking to the future it was observed that the mechanisation of road building implemented during the war years would provide valuable experience for post war reconstruction of Victoria’s roads, replacing the older manual methods. In readiness for the end of conflict and the return of servicemen to life at home, the CRB’s Deputy Works Coordinator prepared a priority list for consideration by the Minister for Public Works, which planned for the equivalent of two years normal work. This included restoration of roads on which maintenance had been deferred, and the re-erection and restoration of many important bridge structures.

Following the conclusion of hostilities, the CRB set about the task of managing this program of road works as funds allowed. In addition, the CRB together with the Soldier Settlement Commission and Councils helped to plan, manage and fund roads giving access to new soldier settlement housing estates in rural Victoria.

Kevin Fox worked in the Media Unit and later the Major Projects Division at VicRoads from 1986 to 2012.

A RUNAWAY SUCCESS

DURING WORLD WAR II, THE COUNTRY ROADS BOARD BUILT SEVERAL AIRFIELDS IN VICTORIA AND THE NORTHERN TERRITORY, SUCH AS AT KATHERINE, FISHERMEN'S BEND AND EAST SALE. HERE, ROBIN UNDERWOOD RECALLS HIS TIME WORKING ON THE CONSTRUCTION OF THE AVALON AIRFIELD.

Up until 1953 the government aircraft factories, located at Fishermans Bend, had used a runway beside their factory for test purposes. However, the introduction of newer and larger aircraft, such as the Canberra jet bomber, required a much longer runway, located away from urban development, for safe testing operations. After some investigation, land at Avalon, near Lara, was selected and purchased by the Commonwealth as the site for a future airfield.

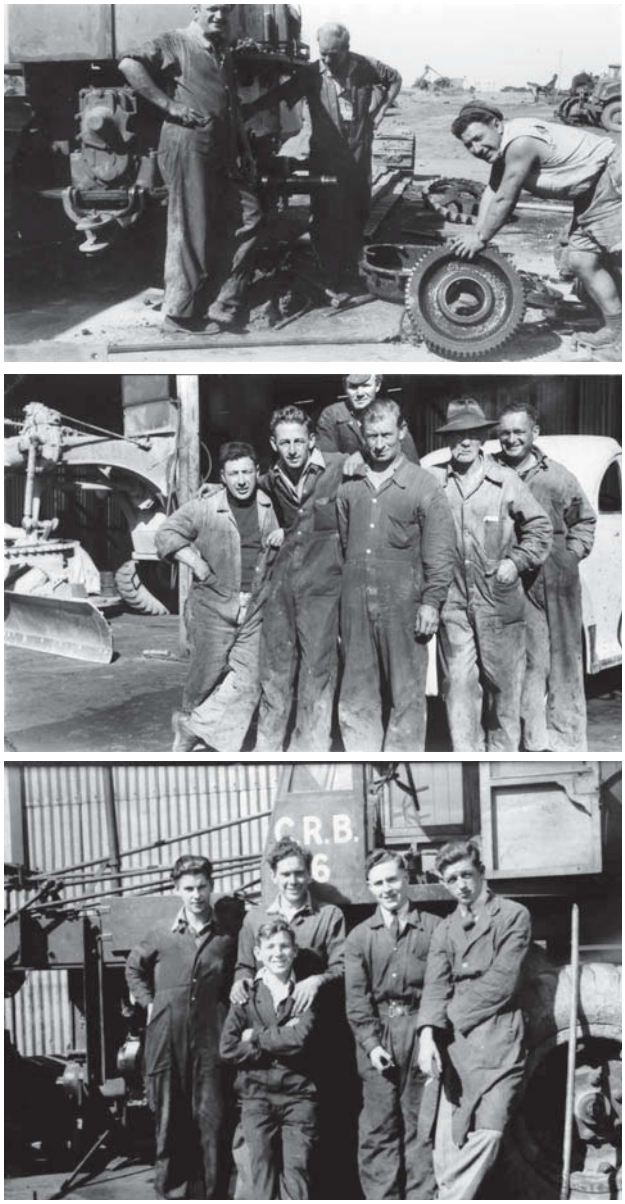
On the Avalon airfield project the Country Roads Board (CRB) was a contractor to the Commonwealth Department of Works, and was responsible for the construction of the main runway, taxiways, access roads, drainage and building foundations. The main runway was 3,000 metres long and 46 metres wide. It was constructed with granitic sand, obtained from pits at the nearby You Yangs, with a surfacing layer of fine crushed rock and a bituminous surface seal. The total pavement thickness was about 1 metre.

The person with overall responsibility for the CRB's work was Basil Abery, the CRB's Geelong Divisional Engineer. The Supervising Engineer responsible for the construction works on site was Greg Clydesdale, who later became Shire Engineer to the Shire of Cranbourne. The Superintending Overseer for the construction works was Jack Parkinson, who was assisted by overseers Bill Bray, Joe Dean and Lindsay Muller.

THE WORKERS

The CRB workforce totalled about 160 men. Its supervisory staff and most plant operators were drawn from its various regional divisions around Victoria. There was a fleet of owner-driver truck operators who were paid on a per cubic yard basis to cart granitic sand and crushed rock. Many, if not most of the labourers were recent European migrants. We all camped on the site. There was a central mess where camp meals, generally of a high quality, were served three times a day.

Some of the European migrants understandably had personal problems, having arrived in Australia relatively recently, separated from their families, some with language problems and others having qualifications and experience that were not utilised. Living close together in tents with little to do at night often resulted in drinking, gambling, betting and some arguments and occasional



CRB staff working on the airfield at Avalon.

Avalon was one of several airfields built by the CRB.

fights. The winter nights were cold, and use of heaters was prohibited in the camp because of the danger of fire.
The large majority of the migrants on the project seemed to welcome the opportunity for a new life in Australia, and were conscientious workers who fitted in well.

The main construction equipment on the job comprised dozers, scrapers, tractors and rippers, graders, excavators including back hoes, concrete mixers and trucks, as well as bituminous surfacing equipment. Some of the plant operators were very skilled with their machines. Here, although my responsibility was engineering surveying, I quickly became familiar with construction procedures and techniques. The scale of the operation, and the size and range of equipment, was far greater than anything I had seen before. The CRB had regular maintenance programs for its fleet, and the benefits of this soon became apparent. In contrast, the owner-driver truck operators were individually responsible for maintenance of their trucks. It was interesting to observe the different maintenance standards they adopted. In general, those who carried out daily maintenance checks and regular preventative maintenance over a period of time had a far greater output and no doubt a more profitable operation.

HIGH STANDARDS

The Superintending Overseer, Jack Parkinson, was an experienced man who had been involved in many large CRB road construction projects. He always insisted on the highest safety standards for all operations; that all plant and equipment be used only for its intended purpose; that it be effectively and efficiently operated; and that it be properly maintained. He also required that all unfinished work be left in a condition that it would be self-draining in the event of unexpected rain. In this respect, on wet days when normal work could not proceed, he required that the works be inspected and that any drainage deficiencies be immediately corrected to avoid unnecessary water damage.

FOR DAYS BEFORE THE FIRST FLIGHT, NEWS REPORTERS CONGREGATED ON THE SIDE OF THE PRINCES HIGHWAY DIRECTLY UNDER THE FLIGHT PATH.

The initial use for the Avalon airfield was to test Canberra jet bombers. I remember the expectation leading up to the first flight of a Canberra jet from the airfield. Several times the plane taxied out of the hangar and onto the taxiway and airstrip, but each time after checking the engines it returned to the hangar, presumably for some adjustments or modifications. Finally, one day it took off, circled around and returned safely. From then on flights seemed routine. For days before the first flight, news reporters congregated on the side of the Princes Highway directly under the flight path. Incidentally, the first plane to land at Avalon was, if my memory is correct, a small single seater plane that had gotten into trouble during a severe windstorm. It landed some weeks before the arrival of the first Canberra bomber, and before construction of the runway had been finally completed.

Avalon airfield was initially used for the assembly and testing of the Canberra jet bomber. In 1959, Qantas established a training base there. In 1988, the airfield was first used for the servicing and maintenance of Boeing 747s. In 1997, the Australian Government decided that the airfield was no longer required for its purposes and it was leased to Linfox. It is now used for the biennial Australian International Airshow and is the second busiest of four airports serving Melbourne.

Robin Underwood worked as a Chainman on the Avalon Airfield. By the end of his career he was the Managing Director of the RTA.

A LASTING PARTNERSHIP

OVER THE LAST CENTURY THE VICTORIAN TRANSPORT ASSOCIATION HAS WORKED WITH VICROADS ON KEY ISSUES, WRITES PHILIP LOVEL.

For well over 100 years, the Victorian Transport Association, together with its predecessors the Victorian Road Transport Association and the Victorian Master Carriers Association, has been working together with VicRoads to deliver a safer road transport industry and a safer Victorian community.

The road transport industry is an important user of the Victorian road network. It relies on effective road investment and management to underpin industry productivity, safety and sustainability.

The road freight task in Australia has grown strongly over the past 20 years, from 23.9 billion tonne kilometres in 1988-89 to 57.3 billion tonne kilometres in 2008-09, according to the Bureau of Infrastructure, Transport and Regional Economics. Victoria's share of this task is over 20 per cent, meaning that road transport vehicles undertake approximately 12 billion tonne kilometres of freight movements on the Victorian road network each year.

Over the last century, the VTA has worked with VicRoads and its predecessors on a wide range of issues. Among them has been safety on our roads; increased heavy vehicle weights and size; registration of equipment and specialised vehicles; and addressing infrastructure issues such as road wear and bridge design. Together we have also worked with the transport industry on vehicle innovation and design; roadworthy vehicles; network control and management; and vehicle safety such as wearing seat belts, mass limits, load restraint and fatigue management.

Road transport productivity would have been far less effective without active collaboration between the road transport industry and VicRoads over many years. The introduction of new, larger and safer heavy vehicle combinations – six axle articulated trucks in the 1970s and B-doubles in the 1990s – contributed significantly to the growth in road freight productivity. These two vehicle combinations presently account for over 70 per cent of all road freight movements.

The VTA has always supported VicRoads and its predecessors by providing industry input. Our members have been represented on the many industry committees that operated under the VicRoads banner and continue to do that today.

The road transport industry needs an active and forward thinking authority to support the many unique industry operational requirements. With over 700,000 commercial vehicles operating on Victorian roads every day, we need a stable and powerful authority to direct and control the industry. We have that in VicRoads.

The VTA board, executives and members salute VicRoads and its predecessors for 100 years of fantastic work and innovation.

Philip Lovel, AM is Executive Director of the Victorian Transport Association (VTA).

BLAZING A TRAIL

FROM THE PLANNING AND DESIGN OF ROADS TO THE DEVELOPMENT OF SIGNS AND TRAFFIC SIGNALS, THE INNOVATION AND LEADERSHIP OF VICROADS' STAFF AND ENGINEERS HAS LED TO MANY TECHNICAL ACHIEVEMENTS OVER THE DECADES.

> ON THE SURFACE

DAVID ANDERSON DISCUSSES THE INTRODUCTION OF A PAVEMENT MANAGEMENT SYSTEM IN VICTORIA.

During the 1980s, one of VicRoads' predecessors, the Road Construction Authority (RCA), became involved in the introduction of new technology to assist in developing maintenance budgets and programs for maintaining acceptable road conditions.

It followed the troublesome performance of new pavements on some of the Hume Highway projects during the late 1970s. Although they had been successfully remedied, the government needed to demonstrate its road manager had the best knowledge in pavement design, construction and maintenance.

In 1979, the Premier agreed that David Anderson should be sent to study for a year under pavement expert Professor Carl Monismith of the University of California at Berkeley. A subsequent report in November 1980 discussed pavement management systems (PMS) being developed, mainly in the United States, and concluded that a PMS for Victoria would have a number of economic benefits.

However, it was not until 1986 that the decision was made by the newly established RCA to develop a PMS, driven by several factors which included a new Chief Executive, improved computer literacy, and a road network that had a significant proportion of pavements 20 or 30-years-old.

Among the objectives for the PMS, adopted by the RCA board, were: the ability to predict future pavement conditions and user costs for a given budget; assess the effect of different management strategies and past investment levels; and, identify how to provide road users with optimum road conditions for a given budget.

One of the major lessons learned in the US was the importance of gaining ownership of, and commitment to, the PMS by senior decision makers. Consequently, the RCA Chief Executive appointed the Director Operations to take responsibility for developing the system. In turn he formed a steering committee consisting of four of the five directors who reported to the Chief Executive, representatives of local government engineers, and a senior Pavement Research Manager from the Australian Road Research Board.

The responsibility for detailed development was given to the Central Highlands Region of the RCA. The group was led by Anderson, who by that time had been appointed as Regional Manager, as well as Andrew Wall, Colin Kosky and Garth Stevens. The core of the computer software was obtained free of charge from the Department of Transport in Arizona, which was one of the first jurisdictions to develop and use PMS in the world. It also generously provided expert advice.

Pavement testing in progress.

A key module of the system required a set of predictions to be included about future pavement condition. For example, if a section of pavement was currently in a given condition, what was the probability of it being in the same, worse, or better condition in 12 months time? This was further refined according to the treatment applied in those 12 months.

Initial values were derived using a “Delphi” questionnaire technique, the participants in which were expert pavement managers. This approach helped to strengthen the PMS’s ultimate credibility within the RCA and local government.

The PMS was first used for maintenance investment decisions in about 1988. Its main impact was in the distribution of the overall maintenance budget between regions and local districts in the state.

Later, a newer PMS known as HDM (highway design model) replaced the original Arizona model. HDM had been developed by the World Bank and was more compatible with contemporary information technology.

David Anderson was responsible for implementing the PMS in the RCA. He later became Chief Executive Officer of VicRoads.

> A LONG-TERM VISION

THE FORWARD PLANNING AND STRATEGIC STUDIES CONDUCTED BY VICROADS’ OVER DECADES FORM THE BASIS OF TODAY’S ARTERIAL NETWORK, WRITES JIM WEBBER.

In the 1950's there was a considerable planning focus in Country Roads Board (CRB) regional offices on the widening of existing urban and rural arterial roads to allow for future metropolitan expansion and traffic growth. In 1956 the government decided to vest the responsibility for the planning, design, construction and maintenance of metropolitan highways and bridges with the Melbourne Metropolitan Board of Works (MMBW).

Due to the increased economic activity and subsequent traffic growth, the CRB realised that the existing arterial roads, in both urban and rural areas, would need to be supplemented by high capacity freeways. The category of bypass roads was introduced in 1959. During the 1960s planning for these future bypass roads was undertaken in regional offices and, from 1960, in head office.

CRB annual reports in the 1960s list many bypass road projects where functional layouts and preliminary layouts had been prepared, in some cases for imminent construction (the Malty Bypass of Werribee was completed in 1961) but in most cases they were used to determine boundaries for road reservations in statutory planning schemes. This long term planning work was critically important in the relatively easy implementation of many future freeway projects.

In 1972 the CRB had the foresight to appoint an economist, sociologist and a town planner to work in a multidisciplinary team to pioneer a more widely based approach to freeway planning to give greater consideration to economic, environmental and social values. It was the first state road authority to do so. In 1974 the CRB undertook its first multidisciplinary open planning study for a freeway when the Ringwood Roads Impact Study was commissioned.

In July 1974, 18 years after it gained its urban road role, the MMBW's road-related functions were transferred to the CRB. The CRB's inter-disciplinary group became the Environmental Studies section in 1975. On major planning investigations, the in-house expertise was supplemented by consultants with expertise in air quality, traffic noise, flora, fauna, landscaping, Aboriginal archaeology and historic buildings. The CRB had considerable internal expertise in traffic noise, chairing a National Association of Australian Road Authorities (NAASRA) noise working group. Later, VicRoads was to provide the brief for some world-class noise barriers on Wood Marsh's Eastern Freeway extension in 1995 and Taylor Cullity Lethlean's Craigieburn Bypass in 2005.

In 1982, the newly elected State Government transferred most of the CRB's road planning function into the Ministry of Transport.

After the ministry's role in road planning virtually ceased in 1987, several major planning investigations were undertaken by the Road Construction Authority (RCA), and later as VicRoads, with multi-disciplinary teams in the 1980s and 1990s.

The RCA prepared a comprehensive National Roads Strategy for Victoria (NATROV) in 1987, supporting the declaration of additional national roads in urban and rural areas.

Over a 40-year period the CRB/RCA/VicRoads initiated many route location and strategic planning studies that form the basis of today's arterial road networks in urban and rural Victoria. Many pioneered principles and standards in road planning. Without this forward planning, many of today's freeways and divided arterial would not have been built.

Jim Webber held several senior management positions in planning in the CRB and RCA, and became Assistant Director General in the Ministry of Transport. With thanks to Bill Saggers, Trevor Phillips and Robin Saunders for their input.

> GRAND DESIGNS

INNOVATIONS AND NEW TECHNOLOGIES HAVE LED TO IMPROVEMENTS IN THE DESIGN OF ROADS AND BRIDGES, WRITES DAVID JELLIE.

When the Country Roads Board (CRB) commenced its duties in 1913 it did not carry out design of roads and bridges itself. Rather, it assigned projects to the various municipalities. To ensure consistency, the first annual report of the CRB set out standards and design requirements to be adopted by shire engineers for the works to be undertaken on the gazetted main roads. It also set out instructions for engineers for initial surveying and design requirements, and a benchmark for the aesthetics and environmental aspects of road design.

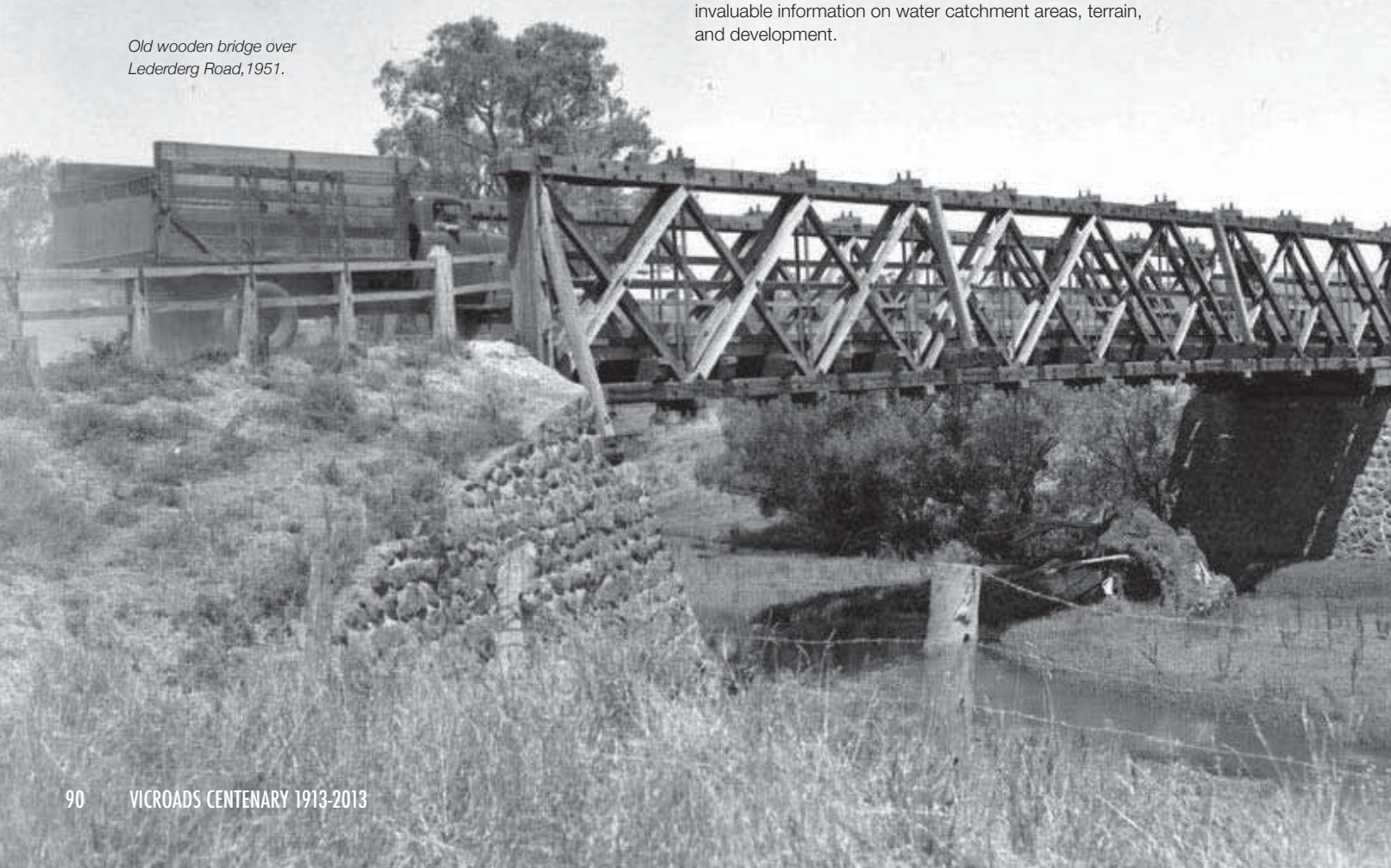
In 1916 the CRB produced standard drawings for reinforced concrete beam bridges for spans varying from 15 to 40 feet and for widths varying from 16 to 20 feet between kerbs. This standardised the design of the majority of the bridges on the gazetted main roads. In 1926 standards were set out for concrete pavements and a two-mile stretch was constructed in Geelong the following year.

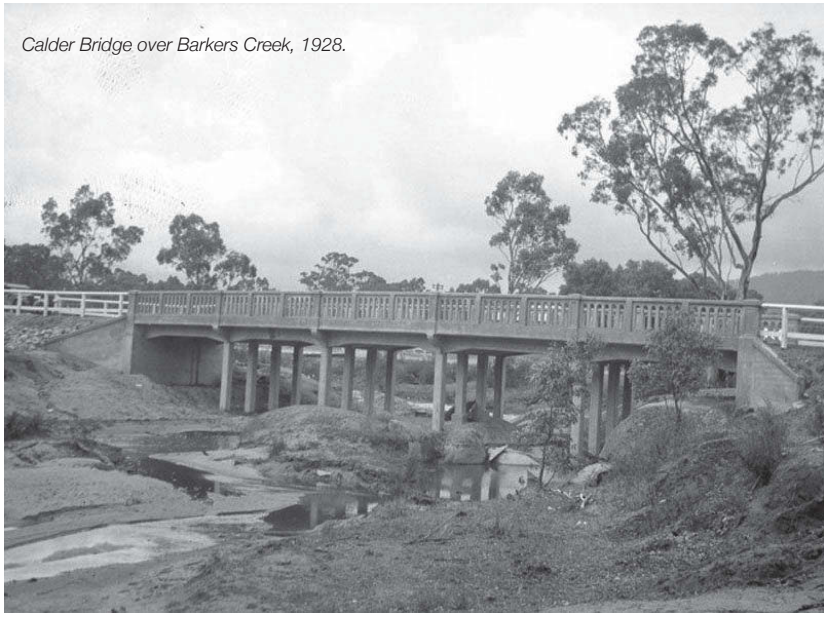
By 1924 the CRB was undertaking its own road and bridge design. As it developed its design capabilities it also undertook most of the bridge design functions for Victorian municipalities. The Barwon River Bridge was the first major bridge undertaken by the CRB.

Although the CRB had adopted the practice of building concrete and steel bridges as much as funds permitted, there remained a substantial number of timber bridges on the network, especially on the development roads. In 1932, it introduced a new standard for timber bridges that overcame many of the earlier deficiencies. Three years later it responded to the increase in traffic speed by introducing the concept of a design speed into road design.

It was the introduction of computerised methods in the early 1960s that really revolutionised design. Manual design processes often meant that the time taken for planning and design exceeded construction time but the introduction of computerised techniques soon changed this. Aerial photography had developed during World War II and this became a great aid to road planners and designers. Topographical maps covering all of Victoria were developed by the Department of Lands and Survey and provided invaluable information on water catchment areas, terrain, and development.

Old wooden bridge over Lederderg Road,1951.





Calder Bridge over Barkers Creek, 1928.

THE MOST SIGNIFICANT DEVELOPMENT IN THE ROAD DESIGN FIELD OVER RECENT YEARS HAS BEEN THE ADOPTION OF A NEW SUITE OF NATIONAL ROAD DESIGN GUIDELINES AS THE PRIMARY DESIGN REFERENCE IN 2010 FOR ALL STATE ROAD AUTHORITIES.

In 1961, with the introduction of a mainframe computer into its new headquarters in Kew, the CRB developed an array of programs to assist road and bridge design tasks. Early programs included road design, horizontal and vertical bridge geometry, analysis of stresses in rectangular columns, survey coordinates, statistical analysis of data and bridge pier analysis.

Today, computer-aided design (CAD) software has been developed for most design and drafting functions including planning, surveying, road design, structural design and detailing, and landscaping. The increased computer power now available has enabled designers to use more sophisticated traffic analysis tools (such as micro simulation) to more accurately model complex traffic scenarios involving multiple intersections.

The most significant development in the road design field over recent years has been the adoption of a new suite of national road design guidelines as the primary design reference in 2010 for all state road authorities. VicRoads' guidelines were formally retired at this time.

We continue to see the ongoing evolution of traditional materials used for bridge building such as concrete and steel. With the influence of new technology these materials continue to become stronger and more versatile. However, even more exciting is the increased availability of new materials such as carbon fibre reinforced polymer (CFRP), which is being used to strengthen and repair existing bridges and is being incorporated into various components in new bridges.

David Jellie was a bridge design engineer in the CRB between 1961 and 1973.

> ENGINEERING A BETTER FUTURE

ROBIN UNDERWOOD RECOLLECTS ON THE INDIVIDUALS AND EVENTS THAT PLAYED A ROLE IN THE DEVELOPMENT OF TRAFFIC ENGINEERING UP TO AND DURING THE 1950S.

As early as 1913 traffic counts were used in Victoria as one of the factors in selecting main roads. Systematic manual traffic counting began in 1928 and by 1933 state-wide traffic counts were taken on one weekday in March. The first traffic signal was installed by Melbourne City Council (MCC) at the intersection of Collins and Swanston Streets in 1928. The marking of traffic lines began in Victoria in about 1930, and the first recorded use of broken centrelines to economise in the use of paint was in 1941.

Shortly after World War II, significant papers all emphasising the need to collect, analyse and understand traffic data and characteristics appeared. These included papers by D.V. Darwin on road planning in 1946 and 1950, and by Harry George in 1946 reporting the results of a comprehensive road transportation survey carried out in Victoria in 1944 and 1945.

Traffic engineering had its early beginnings in Australia in the second half of the 1940s. The word 'traffic' first appeared in an engineering title in 1947, when the Country Roads Board (CRB) appointed Harry George to the position of Traffic and Location Engineer. George and Earle Johnston, who was appointed Traffic Services Engineer, Department of Main Roads (DMR), New South Wales in 1954, were both widely credited with leading the development of traffic engineering in Australia.

George remained as Traffic and Location Engineer until late 1958. During his tenure, many traffic engineering practices were developed and increasingly applied in the day-to-day operations of the CRB. Among these were:

- traffic studies, including traffic counting (using both manual classification and automatic traffic counters), turning movement studies, travel time and delay, origin and destination, road capacity, railway level crossing delay, truck loading and trip length studies
- economic analyses, taking into account vehicle operating costs under varying conditions of traffic volumes and composition, distance and grade
- traffic studies and preliminary geometric layout design for intersections, grade separations and other traffic facilities
- road location studies, including realignments of existing roads
- examination of statutory planning schemes prepared by planning authorities
- line marking and signing.

In 1954, the Melbourne City Council created a Traffic Engineering Branch within the City Engineer's Department and John Bayley was appointed Traffic Engineer. In the same year, he was awarded an International Road Federation Fellowship to study at the Yale University Bureau of Highway Traffic in the United States during the 1954-55 academic year. On his return he made a significant contribution to traffic engineering in Melbourne.

Moonee Ponds junction, Essendon, 1952.

IN VICTORIA, THE TRAFFIC COMMISSION WAS ESTABLISHED IN 1956 WITH RESPONSIBILITY FOR VARIOUS ASPECTS OF TRAFFIC CONTROL, REGULATION AND ROAD SAFETY.

In 1955, the Conference of State Road Authorities (now Austroads) established a Traffic Engineering Standing Technical Committee, which has since met annually to consider traffic engineering matters of interest to the state road authorities.

In 1956, the division became involved in marking the line for the Olympic Games marathon. The line was in a green wear resistant paint and extended from the Melbourne Cricket Ground along Punt Road and the Princes Highway East to just west of Springvale Road. Painting was done by a small line marking machine with the crew working through one night from about 10pm to 6am.

In Victoria, the Traffic Commission was established in 1956 with responsibility for various aspects of traffic control, regulation and road safety. Jack Thorpe was appointed Chairman of the commission. He played a significant role in preparation of the Victorian Road Traffic Regulations, setting up the State Accident Record System, the Metropolitan Route Numbering System and the Clearway System. In 1960, Joe Delaney was appointed Chief Engineer of the commission.

By the end of the 1950s traffic engineering had become well recognised in its own right, and formed a firm base for further developments and rapid growth in the years to come.

Robin Underwood held senior management positions in traffic engineering, road design and planning before becoming the Managing Director of the RCA.

"Clock dial" traffic signal and BELOW: Traffic lights today.

> A SAFE CROSSING

TRAFFIC SIGNALS HAVE EVOLVED FROM MANUAL DEVICES TO HIGHLY SOPHISTICATED ELECTRONIC CONTROLLERS, WRITES TED BARTON.

The first use of traffic signal control at intersections in the Melbourne central business area, and probably the first in Victoria, was by the Melbourne City Council who installed two sets of signals in Swanston Street in 1929.

According to John Bayley, a device was installed as a trial at the intersection of Swanston Street and Flinders Street in the early part of 1928. The device, which was manually operated by police, did not meet the requirements of the council's then Traffic and Building Regulations Committee and was removed from the intersection. Later that year, according to Bayley, "a system of illuminated signals (mechanically controlled) was installed at the corner of Collins Street and Swanston Street, which can be operated either manually or mechanically". This is surely the first reference to traffic signal coordination in this state and the forerunner of SCRAM (Signal Coordination in Regional Areas of Melbourne) a project that implemented SCATS (Sydney Coordinated Adaptive Traffic System).

Traffic signals at intersections did not always look like those in use today. In the City of Geelong, the traffic signal heads were quite unusual, consisting of a vertical rectangular display containing a number of horizontal red and green neon tubes which were illuminated in red during the stop period and in green during the go period. This arrangement included a countdown procedure, which gave drivers a guide as to how much green or red time was available.

Another common display was the "clock dial". This was a large circular display with a pointer, which rotated at a set speed. The display facing traffic was divided into red, amber and green sectors, and the circumferential length of the display represented the proportions of green and red time separated by a short amber sector in each cycle of the signal.

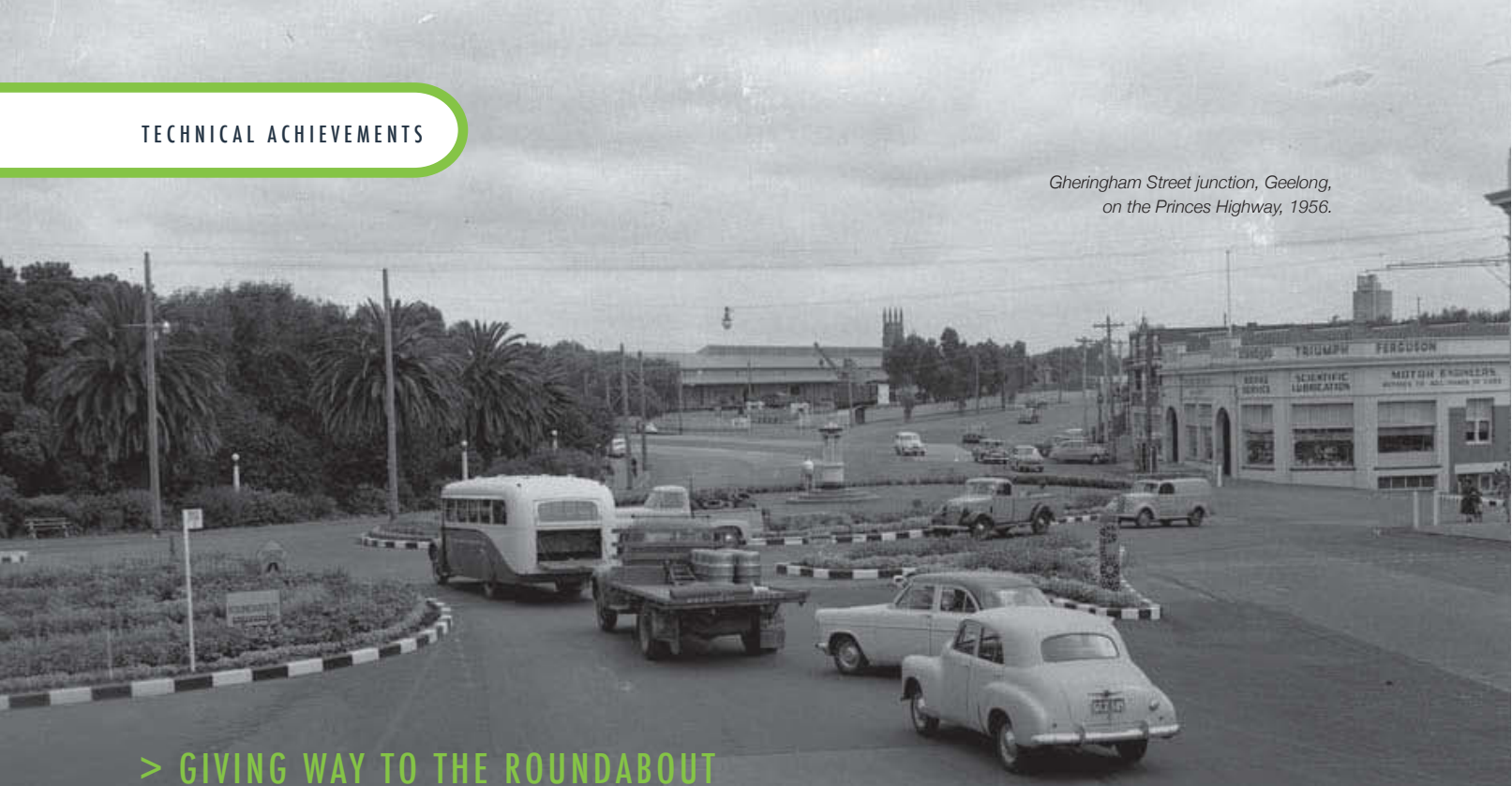
By the 1960s, these early types of traffic signal gave way to electro-mechanical type signal controllers and the standard array of red, amber and green aspects set in a vertical array that we see today. These were still mostly fixed time cycling but pneumatic (road) tube vehicle detectors were being developed along with more complex electrical devices within the controller that allowed some flexibility in phase length and cycle time.

In 1969, the *Country Roads Act* was amended to allow the CRB, after consultation with the then Traffic Commission, to purchase, construct, install and maintain traffic signals on roads that it was constructing or carrying out works of permanent improvement, and also on any road approaching a road that the CRB had constructed or carried out works of permanent improvement.

Traffic signal design work was carried out in the Traffic Engineering Division of the CRB and this work was further boosted when the highways responsibilities of the Melbourne Metropolitan Board of Works (MMBW) was transferred to the CRB in 1974. During the 1970s, traffic signal technology was steadily developing with experimental work focussed on finding the most efficient method of signal phasing for diamond interchange geometry such as at Millers Road and Williamstown Road on the West Gate Freeway.

From the late 1970s and through the 1980s, the CRB sponsored important research into improved methods of analysis of signalised intersection timing and performance by the Australian Road Research Board. This work introduced a more advanced approach to the calculation of signal phase and cycle times, and the estimation of vehicle delay and queue length under different modes of traffic signal operation.

Ted Barton was Principal Traffic Engineer at VicRoads from 1976 to 1993.



Gheringham Street junction, Geelong, on the Princes Highway, 1956.

> GIVING WAY TO THE ROUNDABOUT

ONCE THE MERITS OF ROUNDABOUTS HAD BEEN ACCEPTED, THEIR UPTAKE IN MELBOURNE FROM 1974 WAS EXPONENTIAL, WRITES TED BARTON.

In the late 1960's Victoria, indeed much of Australia, was debating the merits of "priority roads", a system whereby traffic on major roads has priority over side road traffic by virtue of placing Stop or Give Way signs on the side road approaches. This would displace the "Give Way to the Right" rule which had been in operation since 1964 and treated all roads as equal in respect to traffic movement priority at intersections. This system had resulted in serious delays to traffic on major roads, including busses and trams, and significantly increased vehicle crashes throughout the road system. There was some reluctance to abandon the Give Way to the Right rule on the grounds that it was a well-established rule of driving. Ultimately the balance of argument tended to favour the change.

Debate then shifted to which method of priority roads should be applied. The Country Roads Board (CRB) favoured the North American practice of placing Stop or Give Way signs on the side road approaches at intersections, based on the principle that it is the drivers who do not have right of way who should be controlled by the regulatory signs. Neil Sache and I recommended this approach in our report on the matter. Subsequently, the then Premier of Victoria, Rupert Hamer, visited the UK and was impressed with their system, which was broadly that proposed by the CRB. The Victorian Government immediately directed that we should introduce priority roads in this fashion. The program was completed by Easter 1975 and then extended to the remainder of the state over the next couple of years.

One of the remaining concerns was how to deal with the intersection of two priority roads, especially in urban areas and particularly in the Melbourne metropolitan area. In the inner suburbs most of these would need costly traffic signals to be installed.

In order to avoid this, I proposed the much wider use of roundabouts on arterial roads as they could cater for the required traffic flows and would reduce vehicle collisions.

In 1971-72 there were just 17 intersections in Melbourne with a roundabout. These operated on a "merge/weaving" arrangement where vehicles entering the roundabout were not required necessarily to give way. This required larger diameter roundabouts with consequential higher vehicle speeds, increased accidents and low capacity. However, about that time the UK was experimenting with a new concept of "Give Way / Gap Acceptance", where entering vehicles were required to give right-of-way to vehicles already in the roundabout and seek safe entry gaps in the traffic stream coming around the roundabout, from the right. The concept favored smaller roundabouts and more effective speed control on entry traffic (by bending the entry roadway).

Meanwhile, having recently arrived in Melbourne, Emerson Richardson joined the Traffic Engineering Division and I immediately involved him in our Traffic Design Section, along with Trevor Miller developing our roundabout design principles and promoting opportunities to use roundabouts. This resulted in the preparation and publication, within the CRB and councils, of CRB Technical Bulletin No 30, *Guidelines for the Design and Installation of Roundabouts*, dated 13 July 1979. This publication became widely used as roundabouts, based on these design principals, proved very successful and their use gained in popularity.

It is of interest to note that the 1984 *Melway Street Directory* showed a total of around 423 roundabouts in the area. This included both arterial and local roads and represents an almost 2,500 per cent increase over the 10 years 1974 to 1984.

Ted Barton was Principal Traffic Engineer at VicRoads from 1976 to 1993.

> SIGN OF THE TIMES

TED BARTON OUTLINES THE HISTORY OF TRAFFIC SIGNING AND ROAD MARKING.

In the early days of the CRB, traffic signing and road marking was fairly rudimentary and practices developed more or less on a case-by-case basis to meet the problems encountered. Practices tended to be influenced more by experiences in the United States rather than Britain, which may be explained by the strong attachment that developed between Australia and the US in the post World War II period and because most, if not all, of our early traffic engineers did post graduate training in the US. The first Australian *Manual of Uniform Traffic Control Devices* was published in 1935 as Australian Standard AS CA14 (now AS 1742). It adopted the American form of signs rather than the form used in the Britain; for example, yellow diamond shaped warning signs as in US rather than red triangular shapes used in Britain.

Practices within the CRB were consolidated in the first publication of the board's *Road Furniture Manual* in 1972. This manual promoted a systematic approach to direction signing to supplement the "finger boards" that had been routinely placed at key intersections on highways and main roads throughout the state.

In the 1970s and 1980s, a small, specialised team lead by engineer David Freeman dealt with traffic signing, road marking and delineation matters. They developed a high degree of expertise, which was largely responsible for the strong influence Victoria had on the development of uniform standards and practices throughout Australia.

A system of route numbering for national highways was developed through the National Association of Australia State Road Authorities (NAASRA) and the display of these numbers within a shield was introduced in direction signing on these routes in Victoria. For example, Princes Highway is National Route No 1 and the Hume Highway is National Route 31. A system of state and metropolitan route numbering was subsequently also initiated in the 1980s using a different style of shield to differentiate these routes from national routes.

These numbering systems are still in use today although the system was further enhanced in 1996 by the addition of an alphabetic designation. This system is based on the British system and comprises M, A, B and C designations to reflect both the quality and function of each road.

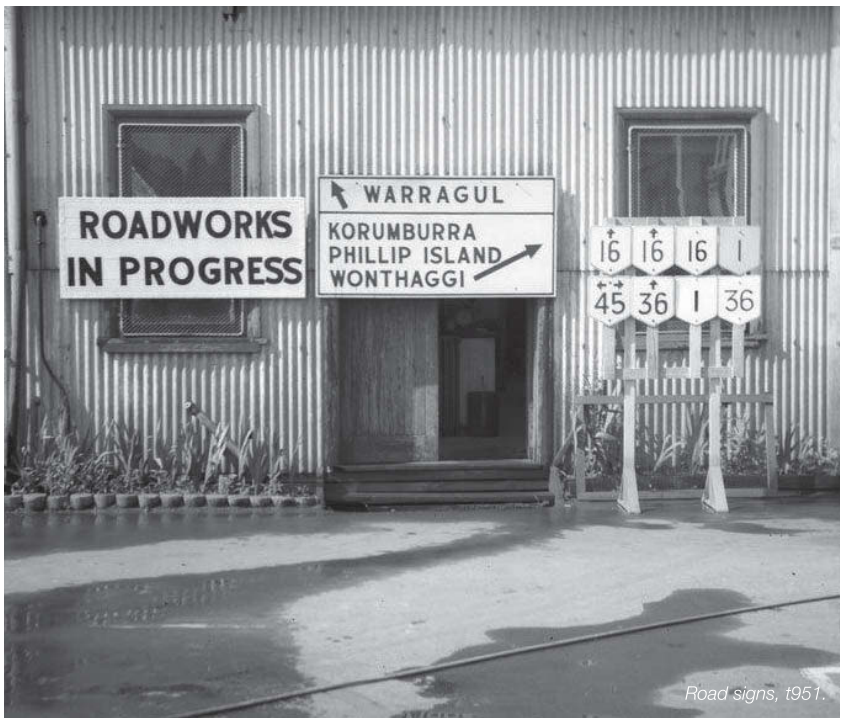
General direction signing must be systematically and logically designed to provide the motorists who are in unfamiliar territory with the information they require to navigate safely. This required the establishment of destination name selection maps for both the rural area and the major metropolitan areas. These maps, which are included in the *VicRoads Traffic Engineering Manual* volume 2, show the key destinations designated for traffic signing along each arterial route.

Elsewhere, road marking and roadside delineation has been an important road safety measure from the beginning of the CRB, as sealed roads wide enough to carry two lanes of traffic were built, they were marked with a centreline. The pavement of some roads with narrower seal widths was widened over hills so that double lines could be marked to prohibit overtaking under the prevailing traffic regulations.

Road marking equipment was designed and constructed by the CRB's mechanical sub-branch. Road marking teams were highly efficient and productive units mostly centred in Melbourne, at the Syndal Depot, with a number of smaller machines and crews centred in the major regional divisions.

A major innovation was brought about by the Metcon/Statcon intersection control programs that necessitated the marking of Stop and Give Way lines across the minor approaches of all arterial intersections. Sophisticated machines were designed and constructed to automate the painting of these lines in one pass along the major road, which made the initial installation and subsequent maintenance very economical.

Ted Barton was Principal Traffic Engineer at VicRoads from 1976 to 1993.



Road signs, t951.

> MIGHTY MATERIALS

THE INPUT OF THE MATERIAL RESEARCH DIVISION HELPED VICROADS DEVELOP A STRONG INTERNATIONAL REPUTATION AS A LEADER AND INNOVATOR, WRITES JOHN BETHUNE.

Since the first laboratory was established in conjunction with the engineering school at the University of Melbourne in 1923, the staff of VicRoads Material Research Division (MRD) has made an important contribution to improving road infrastructure design and construction. In so doing, they have built a strong international reputation as a unit providing valuable expertise in a wide range of areas.

Following its earlier incarnations, which after the University of Melbourne laboratory included a central CRB laboratory at Drummond St Carlton, the unit moved to a specially designed and constructed building at the Kew head office.

This building had laboratories and test equipment for all aspects of research and testing including pavements, geotechnical and chemistry and environment. The basement had workshop facilities and a specially designed floor to enable load and other testing of full-sized bridge components and scale models.

Each divisional or regional office and major project had it's own laboratory consisting of three to five technical officers reporting to the regional or project manger, with technical oversight from the central laboratory. In 1984 the Materials Research Group and Asphalt Division was combined under a Group Manager Materials & Asphalt.

Following a change in operating policy by the government during the 1990s, from carrying out most aspects of designing, constructing and maintaining roads to managing the process, the MRD staff of around 220 was considerably reduced and the central laboratory was moved to the regional office at Nunawading.

Over the years there have been some stand out developments from the people and projects of the MRD.

For example, following the brittle fracture of the high tensile steel beams on the Kings Street Bridge, Roy Gilmour was brought in as a metallurgist. He and members of the Concrete and Metallurgy

Section developed ultrasonic testing of welding procedures and specifications to ensure similar problems did not occur in future. Gilmour later spent considerable time with the National Association of Test Authority in assessing laboratories both in Australia and overseas. Reinforcing steel and elastomeric bearing pads for bridge bearings were also tested.

Likewise, in the 1970s it was realised that thin asphalt overlays on some major roads were subject to fatigue cracking after a short period of service although they complied with the then asphalt overlay design procedure. David Anderson, as the then Pavements Engineer, was sent overseas to complete a Masters Degree at Berkley University under Professor Karl Monosmth. The research showed that although the overlays met the then current design deflection requirements, the radius of curvature of the pavement under wheel loads was too large. A French deflectograph, which had been recently purchased, allowed this to be measured under the action of a moving legal wheel. As part of his degree, Anderson developed a design procedure, which took both pavement deflection and curvature into account and overcame the fatigue problems. This asphalt overlay design procedure later became the basis of the Austroads national design procedure.

Field and plant inspection in the 1970s and 1980s was another key development. Kelvin York and John Foote headed a team of Clerk of Works who attended asphalt and wet mix plants to monitor quality procedures and carry out testing to ensure that these materials met VicRoads and municipal specification requirements

University students viewing samples of rock and earth at CRB laboratory, 1951.

before they left the plant. Similarly, samples were taken from the recently refined bitumen tanks in oil refineries and the bitumen was not allowed to be dispatched until testing confirmed they met specification.

Other staff of the MRD played significant roles in similarly important developments. These included new alignment investigations and seismic surveys, investigations into groundwater and slope stability, the development of a penetromer vehicle and calibration procedures for assessing foundations.

John Bethune had a long career in materials research and paving systems and was Manager Materials and Asphalt between 1984 and 1988. He later became Manager Major Works.

LEADING THE WAY

PETER VULCAN OUTLINES THE RANGE OF MEASURES AND INITIATIVES, SOME OF THEM WORLD FIRST, THAT HAVE SUCCESSFULLY LOWERED THE ROAD TOLL IN VICTORIA.

Road deaths in Victoria progressively increased from 760 in 1960 to a peak of 1,061, as the number of registered vehicles and the population increased. Then, as shown in figure 1, the number decreased in several large steps, joined by periods of moderate progress, down to 287 in 2011. This is a drop in deaths per 10,000 registered vehicles from 8.1 in 1970 to 0.7 in 2011, or from 30.8 deaths per 100,000 population in 1970 to 5.1 in 2011. The number of injuries followed a similar pattern, although the percentage reductions were not as large.

Some of the initiatives which contributed to these large reductions are summarised here. They are presented under the categories of safer roads, safer vehicles and safer road users, which are the components of the modern safe system approach that now also recognises safe speed as a separate component. There was no comprehensive road safety strategy published until Safety First 1995-2000, followed by Arrive Alive 2002-2007. Rather, the approach was to identify road trauma countermeasures that had been shown to be effective elsewhere, or had such potential and to present the case for their implementation to government and other stakeholders. Wherever possible evaluations were done on the effectiveness of these measures and feedback provided to the stakeholders.

Before discussing each of these categories it should be mentioned that the Victorian Parliamentary Road Safety Committee has played an important role in investigating and recommending a wide range of specific road safety initiatives, many of which required legislation. It has operated since 1968 under several different names and has generally consisted of members of both houses and from the government, the opposition and other parties. This has facilitated a bipartisan approach to many road safety initiatives.

Road improvements have provided road safety benefits.

Children participating in Bike-Ed at school were required to wear an approved helmet.

SAFER ROADS

During the past 60 years or so there has been a continuous program of road improvement and the introduction of improved standards for road construction and for maintenance. Such improvements have provided road safety benefits over the whole of their effective life.

Higher standard roads and improved traffic control devices have been shown to be effective in reducing crashes. Examples of designs and treatments used with proven road safety benefits include:

- limited access freeways with high standard geometric design
- provision of divided carriageways on rural highways and major urban arterial roads
- staggered T junctions, particularly on rural roads
- skid resistant pavements
- improved street lighting in urban areas
- improved road delineation
- sealed shoulders with tactile edgelines.

The State Intersection Control Program, which, together with the T junction rule, predetermined who should give way at all intersections, began in the mid 1970s. It also led to the installation of more than 1,000 traffic signals over a 15-year period, improved channelisation and the installation of many hundreds of roundabouts. These treatments reduced crashes at intersections significantly. The subsequent provision of fully controlled right-turn phases further reduced such crashes.

There was also a continuing program to reduce the severity of crashes through removal of roadside hazards, provision of guard rails and fencing, as well as frangible poles for roadside furniture.

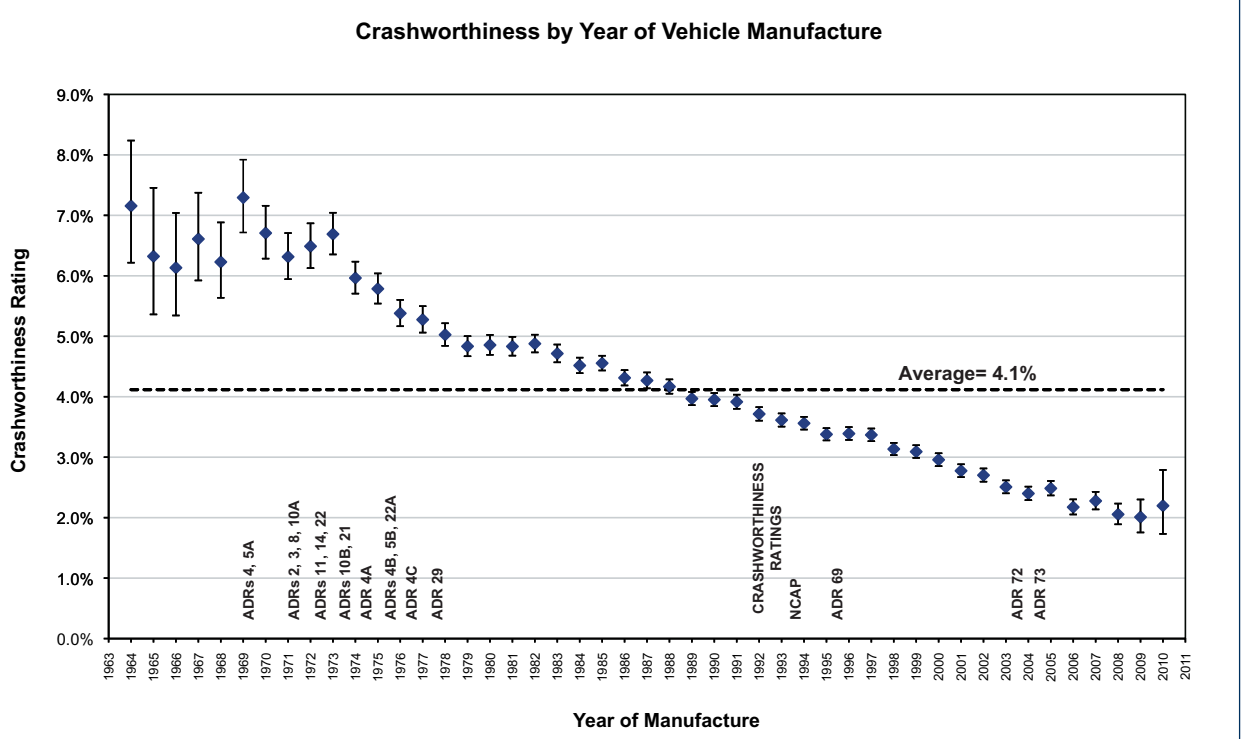
In 1979 an accident black-spot program was commenced with modest funding, using relatively low cost treatments that showed high benefit/cost ratios. During the early 1990s this was expanded by the provision of $85 million by the Transport Accident Commission (TAC). Mass action treatments along sections of roads with above average crash rates were also implemented. As a result of the savings in road trauma and consequent compensation payments the TAC decided to continue to invest a further $240 million in accident black-spot programs, over four years beginning in 2000.

SAFER VEHICLES

In the early 1960s there were regulations regarding vehicle lighting, brakes, wheels, modifications and so on, to ensure a minimum level of safety for vehicles registered in Victoria. By 1963 locally manufactured seat belts meeting a new Australian Standard became readily available and some owners began fitting them. In October 1964, lap belt anchorages for the driver and left front passenger became compulsory in new cars registered in Victoria.

In 1965, a new Australian Standard required lap/sash belts for all outboard seating positions, together with a certification mark scheme to ensure quality control and compliance with this new standard. In 1967, all Australian car manufacturers began fitting lap/sash belts for the outboard front seats.

After that safety standards for new vehicles were formulated on a national basis, through endorsement by the Australian Transport Advisory Council. Most of these, except those relating to seat belts were based on international standards, generally with proven effectiveness. Certification of compliance was also done on a national basis, with all states being represented on the Australian Motor Vehicle Certification Board.



An illustration of the improvement in occupant protection since 1970, provided in figure 2, shows the average crashworthiness rating of cars by model year. This was compiled by the Monash University Accident Research Centre (MUARC) using the severity outcome of 654,934 drivers injured in real world crashes from 1987 to 2010. It corrects for factors such as driver age and sex, speed zone and number of vehicles involved. Crashworthiness has been defined as the probability of a driver being killed or severely injured if involved in a tow away crash. The dates at which the Australian Design Rules for Motor Vehicle Safety relating to occupant protection came into effect, as well as the introduction of the Australian New Car Assessment Program, are shown. The progressive improvement in crashworthiness also illustrates the increased crash protection provided by manufacturers, beyond that required by the Australian Design Rules. It can be seen that a pre-1974 model car has a crashworthiness rating about three times worse than a post 2005 car.

Unfortunately there is not yet a reliable method of assessing the crash-avoidance performance of cars, but it is known that there have been significant improvements through the provision of systems such as anti-skid brakes and electronic stability control.

SAFER ROAD USERS

In contrast to safer roads and safer vehicles, measures involving legislation to improve road user behaviour require ongoing enforcement to maintain their full effectiveness.

• Seat Belt Wearing

In September 1969, the Parliamentary Road Safety Committee recommended that all occupants of motor vehicles should be required to wear seat belts within a maximum period of two years (immediately for learner and probationary drivers). A publicity campaign to promote the benefits of seat belts was also recommended. During the second half of 1970, it became clear that Victoria was heading for a record high road toll. The Royal Australian College of Surgeons had been publicly supporting compulsory seat belt wearing for some time, as had some academics from Melbourne University.

They were joined by the RACV and the *Sun* newspaper. The legislation for compulsory wearing, where fitted, was implemented in December 1970. It was the first in any motorised country.

Seat belt usage rates were about 25 per cent before the law and they jumped to about 50 per cent immediately afterwards. By the end of the first year they had increased to 75 per cent, but further increases required sustained education and enforcement. Vehicle occupant fatalities for 1971 were 18 per cent below the number expected, with a similar reduction for injuries.

Although seat belts were required to be fitted in rear seats of new cars from January 1971, their usage rate was low. By 1980 it was only 19 per cent, compared with 85 per cent in front seats. A combined publicity and enforcement campaign a year later resulted in an increase in rear seat belt usage to 66 per cent.

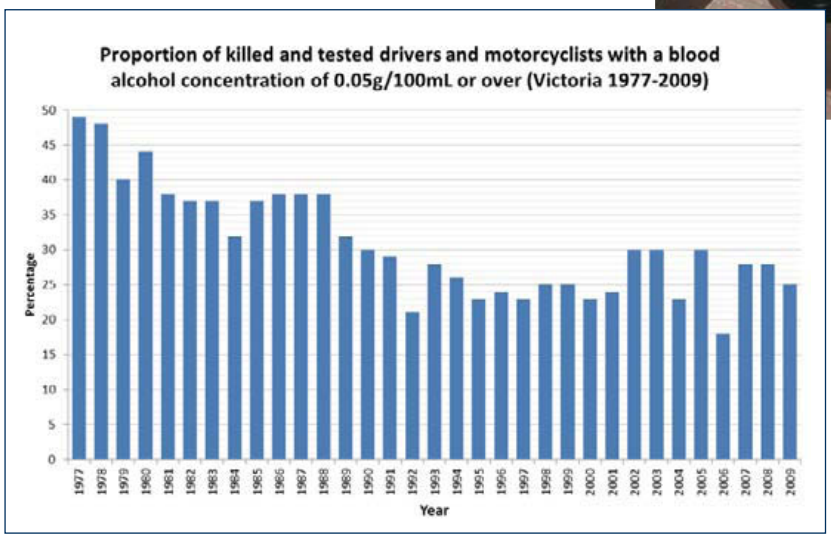
• **Drink Driving**

During the 1960s, the Police Surgeon drew attention to the presence of alcohol in many of the serious crashes he attended. His vocal campaign for action, together with the recommendations of a Royal Commission led to the adoption of legislation in 1966 specifying 0.05g/100ml (0.05 per cent) as the maximum legal blood alcohol concentration (BAC). This law, together with the use of the breathalyser, facilitated the detection and conviction of drink drivers, although it was not until the mid-1970s that sufficient police resources were provided to have a significant effect.

A major breakthrough in the reduction of drink driving was the random breath testing legislation, introduced with a "sunset clause" in 1976 and confirmed in 1978, an Australian first. This enabled police to stop and test a driver at a properly designated breath test (RBT) station, without the need to suspect that the driver was affected by alcohol, as previously required.

A useful measure of the extent of alcohol involvement in fatal crashes is the proportion of drivers and motorcyclists killed (and tested) with an illegal BAC. In the period up to 1978 it was about 50 per cent. As shown in figure 3 below, with the increase in random breath testing operations commencing at the end of 1978 and supported by publicity, that percentage dropped progressively to below 38 per cent by 1981 and remained at or below that level until 1988.

The new GLS includes 120 hours of supervised driving experience as a learner, over 12 months.



In December 1989 a state-wide multi-million dollar publicity campaign "If you drink then drive – you're a bloody idiot" was launched by the TAC and, with other publicity campaigns to support the RBT operations, was undertaken at a level of several million dollars during 1990 to 1992.

Fatal crashes in Melbourne during high alcohol hours (mainly at night) dropped by 19 to 24 per cent over these three years and serious casualty crashes in rural areas during high alcohol hours dropped by 13 to 15 per cent.

The increase in monetary penalties and doubling in the period of mandatory licence cancellation for exceeding various levels of BAC, introduced in December 1978, may also have contributed to this reduction. The number of fatalities dropped from an average of about 912 during the period 1971 to 1978 to an average of around 690 during the period 1980 to 1988. However, there were undoubtedly other factors that contributed to this overall reduction.

As a result of an increase in road deaths during 1989, RBT was given new emphasis. Commencing in September the use of the four existing "booze buses" was increased initially in the Metropolitan area and progressively throughout the state as 13 new purpose-built highly visible booze buses were provided by the TAC. This resulted in the number of RBT tests increasing from around 0.5 million in 1989 to over 0.9 million in 1990 and 1.2 million by 1992.

As shown in figure 3 above, the proportion of drivers and motorcyclists killed (and tested) with an illegal BAC dropped progressively from 38 per cent in 1988 to 21 per cent in 1992, but then climbed to an average of 25 per cent in subsequent years.

Total fatalities dropped by a massive 49 per cent from 776 in 1989 to 396 in 1992 and then averaged 400 until 1999. The reduction in serious injuries from the expected trend was 46 per cent. Other countermeasures associated with these reductions included:

- new speed cameras supported by publicity
- bicycle wearing law
- lowering the 110km/h freeway speed limit
- improvements to the road system
- various other measures.

Wearing an approved helmet became compulsory for all cyclists in July 1990.

The downturn in the economy and reduced alcohol sales probably also contributed. The coincidence of all these factors during the same three year period made it difficult to determine accurately the extent to which each of them contributed to the total drop, but modelling by the MUARC estimated that more than half was associated with the drink driving and speed enforcement programs, supported by publicity campaigns.

• Speed Enforcement
In January 1972 the 50mph prima facie speed limit was replaced by a 70mph absolute limit. In January 1974, this absolute speed limit was reduced to 60mph and then metricated to 100km/h in July 1974. Significant reductions in both fatalities and injuries occurred in 1974, but the numbers returned to earlier levels in the following years.

New slant radar speed cameras were progressively introduced commencing with four in December 1989 and increasing to 54 by January 1991. The program included an intensive state wide mass media publicity campaign "Don't fool yourself – speed kills" to increase the perception of the level of speed camera operations and their legitimacy. This multi-million dollar publicity campaign was launched in April 1990 and continued during 1991 and 1992.

An analysis by MUARC found reductions in serious casualty crashes during "low alcohol hours" (mainly daytime) of 20 per cent on 60km/h roads. There were also significant reductions in crash severity on Melbourne arterial roads.

There was considerable variation in the hours of camera operations and the levels of supporting publicity during the two-year evaluation period from December 1989 and the reductions were not found during the whole period.

In January 2001 a default 50km/h speed limit in built-up areas was introduced. This was associated with a 12 per cent reduction in casualty crashes. For pedestrians reductions of 25 per cent in fatal crashes and 40 per cent in serious injury crashes were associated with the program.

In December 2001, a further package of initiatives was introduced. They included a progressive increase in camera operating hours from 4,200 to 6,000 per month, new cameras and other speed detection equipment, as well as a progressive reduction of the speed detection threshold (from 10km/h down to "a few") supported by the "Wipe off 5" publicity campaign. Recently there have been 40km/h speed zones introduced along sections of strip shopping centres.

• Bicycle Helmets
Children participating in Bike-Ed at school were required to wear an approved helmet. In some cases these were provided on loan during the course, while other schools facilitated bulk purchase of helmets. Some schools required that any student riding to school must wear a helmet.

After nearly 10 years of promoting the benefits of bicycle helmets and several government subsidy schemes (generally $10 per helmet) the wearing of an approved helmet became compulsory for all cyclists in July 1990. The helmet wearing rate was estimated at about 36 per cent before the law and rose to 73 per cent within a year. The law was associated with a significant reduction in head injuries among cyclists admitted to hospital.

• Red Light Cameras
Red light cameras, which had been shown to be effective in reducing crashes at intersections in Europe, were introduced in 1983. In order to increase deterrence, 12 cameras were initially rotated between some 50 intersections where camera boxes were installed by the Road Safety and Traffic Authority (RoSTA) and later the Road Traffic Authority (RTA). Warning signs were placed on all approaches to these intersections, although the camera operated on only one approach. A limitation on the number of offences which could be processed (and hours of operation) was the requirement for Police to visit the owner of the vehicle and ascertain the identity of the driver at the time of the offence. Amendment to the legislation required the owner to nominate the driver in response to a Traffic Infringement Notice served by mail. This paved the way for handling the large number of Traffic Infringement Notices resulting from the speed camera program introduced in 1989.

Fixed digital speed and red light cameras were placed at 71 signalised intersections, commencing in 2005. Warning signs were placed on all approaches to these intersections. There was a 26 per cent reduction in casualty crashes at these locations.

• Motorcyclists
In January 1961, compulsory wearing of helmets by motorcyclists was introduced, which was a world first. It resulted in virtually 100 per cent wearing rate and about 50 per cent reduction in motorcyclist fatalities during the following two years.

A MAJOR BREAKTHROUGH IN THE REDUCTION OF DRINK DRIVING WAS THE RANDOM BREATH TESTING LEGISLATION, INTRODUCED WITH A "SUNSET CLAUSE" IN 1976 AND CONFIRMED IN 1978, AN AUSTRALIAN FIRST.

In January 1979, learner and first year probationary motorcyclists were restricted to motorcycles with engine capacity less than 260cc. This resulted in a 30 per cent reduction in casualty crash rates among this group.

In June 1983, the motorcyclist learner permit test was upgraded to include a written test in riding knowledge and road craft. A basic riding skills test was also progressively introduced in those areas, where off-road training facilities were available.

• Drug Driving
In another world first, random roadside testing to detect drivers under the influence of illicit drugs was introduced in December 2004. In the period 2002 to 2004, the target drugs (THC, methamphetamines, MDA) were detected in about 18 per cent of drivers killed. Although there was a small increase in this percentage during the first three years, it had dropped to 15 per cent by 2009. The effect on fatalities has not yet been fully evaluated.

• Graduated Licensing
A new Graduated Licensing System commenced in July 2008. It includes 120 hours supervised driving experience as a learner (12 months) then a new driving test, four years on a probationary licence with per passenger restrictions and no mobile phone during the first year and zero BAC for four years. Preliminary evaluation shows a significant reduction in casualty crash involvement during the first 21 months as probationary drivers. Further evaluations are continuing.


A new Graduated Licensing System began in 2008.

FUTURE PROGRESS

The current road safety strategy, Arrive Alive 2008-2017, aims to reduce deaths and injuries by a further 30 per cent. This should be possible provided the initiatives proposed are implemented effectively. Further reductions beyond 2017 will be possible if the strategy which has been successful to date is continued, namely to identify, implement and evaluate proven or promising countermeasures.

The emerging crash avoidance technologies in new vehicles show considerable potential and there will be continuing opportunities to improve the safety of the road system.

ACKNOWLEDGEMENT

The information presented here has been based on the published work of my former colleagues at RoSTA, RTA, VicRoads and MUARC. Their contributions are gratefully acknowledged.

Peter Vulcan, AM was Founding Director of the Monash University Accident Research Centre until his retirement in 1998, prior to which he was Chief General Manager (Road Safety & Traffic) in the Road Traffic Authority and Chairman of the Road Safety and Traffic Authority.

A CLASS ACT

EDUCATION IS A CRUCIAL ELEMENT IN HOW VICROADS WORKS WITH THE COMMUNITY TO PROMOTE ROAD SAFETY, WRITES EMMA CLARKSON.

For more than three decades, road safety education has played an important part in the lives of countless Victorians. Many of us grew up listening to Hector the Cat's road safety song when it was shown as a public service announcement on TV. Some of us did Bike Ed when we were at school, or have fond memories of walking to school with our parents for the first time. The messages and methods may have changed over time, but the importance of road safety education remains.

Road safety education in early childhood and school helps to lay the foundations for safe road use throughout life. Its focus is on developing knowledge, skills and behaviours that increase the safety of children and adolescents - whether it's supporting young children by holding hands while crossing the road, educating primary school children on how to cycle and use buses safely, or providing adolescents with pre-licence education.

TOP: Linda Ivett and John Dilena of VicRoads with Hector the Cat.
ABOVE: A Bike Ed resource centre from the early 1980s.

VicRoads introduced the Bike Ed program in 1980 and it remains an important part of the curriculum for many Victorian schools today. Further, VicRoads staff trained teachers and parents to teach Bike Ed until 1996, when this training was outsourced to an external provider.

In 1985, road safety education was formally established within the Victorian education system. From 1984 to 1995, VicRoads employed teachers seconded from schools to deliver professional development to fellow educators. In 1989, the Transport Accident Commission (TAC) began funding VicRoads for the employment of 26 full-time staff and during this period around 80 per cent of schools were delivering high quality road safety education.

VicRoads introduced the Starting Out Safely program in 1989. The program, which provides road safety information to parents and carers of children under six years of age, is delivered through kindergartens, early childhood centres, maternal and child health, and family day care. The program's character, ThingleToodle, has big hands for holding; big ears for listening; big eyes for looking and big feet for stopping at the kerb. ThingleToodle appears in TV commercials funded by the TAC, and visits funded kindergarten programs throughout Victoria. Over 10,000 Victorian kindergarten children participated in a ThingleToodle education session last year.

In July 2011, after an extensive review, VicRoads engaged an early childhood sector organisation, Kindergarten Parents Victoria, to deliver Starting Out Safely. The program is benefitting from the increased exposure from Kindergarten Parents Victoria's position as a lead player within the early childhood sector.

Since 1990, VicRoads has operated Safe Routes to School in primary schools throughout Victoria. This is a community-based program combining engineering treatments, education, encouragement and enforcement to reduce road crashes involving school children. This program was associated with a 17.9 per cent reduction in casualty crashes involving primary school aged pedestrians and cyclists travelling during school time.

More recently, VicRoads Regional Road Safety Coordinators were funded to support the delivery of road safety education throughout Victoria. At different times, their roles included influencing school decision-makers to support the teaching of road safety education in primary schools, promoting Starting Out Safely to early childhood services, delivering ThingleToodle education sessions to early childhood services and promoting Keys Please sessions. In 2004, VicRoads and its road safety partners reviewed the delivery of road safety education in Victoria and developed a new strategic

approach to delivering essential or “core” road safety education. This approach coincided with the introduction of the new Victorian curriculum framework, the Victorian Essential Learning Standards.

In 2009, VicRoads and its Victorian and national partners were involved in the development of the Principles for School Road Safety Education, which demonstrates the effectiveness of quality road safety education.

Road safety education is moving into a new era with VicRoads working closely with other jurisdictions to achieve national outcomes for road safety education. In 2011, VicRoads, on behalf of the Road Safety Education Group Australasia (RSERGA), successfully advocated for road safety education to be included in the new National Quality Framework for Early Childhood Education and Care. This means all Australian early childhood service types may be assessed as to how road safety education is incorporated into the children’s program. RSERGA is aiming to achieve a similar outcome for schools by advocating for road safety education to be included the new Australian Curriculum.

Victoria is recognised by other jurisdictions as a leader in road safety education. The success of Victoria’s approach is largely due to the collaboration of the Victorian Road Safety Education Reference Group, which first came together in 1994. The Reference Group, chaired by VicRoads, comprises the Department of Education and Early Childhood Development, Transport Accident Commission, Royal Automobile Club of Victoria Department of Justice, Department of Transport, Public Transport Victoria and Victoria Police. By working together and developing strategic Action Plans, the agencies use their resources effectively and provide consistency and continuity for Victorian educators, children and students. This cross agency approach is unique to Victoria.

MORE RECENTLY, VICROADS HAS PUBLISHED TWO NEW ROAD SAFETY EDUCATION STORYBOOKS AND RELATED APPS TO PROMOTE WALKING SAFELY TO SCHOOL AND THE IMPORTANCE OF CHILD RESTRAINTS AND BOOSTER SEATS.

Over the 30 years that VicRoads has been involved in road safety education, teaching and learning has been revolutionised by technology. Technology is an integral part of young people’s

ThingleToodle is the character from the Starting Out Safely program.

lives and digital literacy is now a mainstream capability that complements 21st century numeracy and literacy in most countries. VicRoads has embraced digital learning and the opportunities it presents for engaging children and young people by developing digital resources. For example, VicRoads, in conjunction with the TAC, was ahead of its time when it developed Motorvation in 1992, a pre-licence education program aimed at preparing young people for driving and travelling safely. The program included teacher support and classroom materials, live bands, presentations by AFL footballers and touch screen computers that VicRoads loaned to schools (until Motorvation 2 was released on CD-ROM in 2007).

More recently, VicRoads has published two new road safety education storybooks and related apps to promote walking safely to school and the importance of child restraints and booster seats. The interactive mobile and tablet apps bring to life the engaging storybooks, written by Danny Katz and illustrated by Mitch Vane.

Over the next decade, VicRoads is committed to working with its state and national colleagues in advocating for all children to benefit from road safety education, contributing to improved road safety outcomes for the next generation of Victoria's road users.

Emma Clarkson is Senior Project Manager, Road Safety Education, Policy and Programs at VicRoads.

NO FRONTIERS

SINCE THE MID 1980S VICROADS STAFF HAVE LENT THEIR EXPERTISE TO MORE THAN 80 INTERNATIONAL ROAD SAFETY AND INFRASTRUCTURE PROJECTS, WRITES DAVID JELLIE.

Prior to the 1980s, VicRoads had little involvement in international projects. The Country Roads Board had undertaken training programs in 1978 for African and Asian engineers for the Australian International Development Assistance Bureau, though these were conducted in Victoria.

Then in 1974 Dr David Currie was invited to Pakistan by the Snowy Mountains Engineering Corporation (SMEC) to provide advice on pavement design and construction for upgrading the Indus Highway. SMEC was preparing a tender for the project, which was being financed under the Colombo Plan.

In 1978 Bruce Phillips was seconded to SMEC as a project engineer on the northern section of the Indus Highway project. This part of the highway extended to the Khyber Pass. The project was plagued with delays. The Kingdom of Saudi Arabia was a major financier of the project but it withdrew its support after the incarceration and execution of Prime Minister Zulfikar Ali Bhutto. However, Phillips stayed on for two years training Pakistani engineers and assisting them in developing manuals for road and bridge construction and maintenance. At about this time, Bob Adams was working on another SMEC road project in West Kalimantan in Indonesia.

Rob Ekers, VicRoads (fifth from left), with members of the consultants and contractors teams in South-East Sulawesi, Indonesia in April, 2012.

In 1985 the Victorian Government created a company called the Overseas Projects Corporation of Victoria Ltd (OPCV). This was the brainchild of the Deputy Premier, Robert Fordham. For many years, the Victorian Department of Agriculture had been providing expert advice and services to countries – mainly in Africa, Asia and the Middle East. The department had expertise in dry land agriculture and its services were keenly sought by developing countries to improve their performance and output.

Fordham thought that if one of Victoria's government departments could export its expertise, then other government agencies might be able to do the same.

EXPORTING EXPERTISE

OPCV became the international consulting arm of the Victorian Government by which Victorian public sector expertise could be exported through projects sponsored by bilateral agencies such as AIDAB (later AusAID), multi-lateral agencies such as the Asian Development Bank and the World Bank, government-to-government contracts and private sector projects. As a company, OPCV carried all marketing and project management costs, and accepted contractual risk. It paid an annual dividend from profits to the Victorian Government and invested the balance into its projects.

Ian Stoney was appointed Chairman and Managing Director of the Road Construction Authority (RCA) in 1987. He was also appointed Director of the Australian Road Research Board (ARRB) and the National Association of Australian State Road Authorities (NAASRA). Stoney was active in strengthening the RCA's external relationships in Australia and overseas. He became active in the Road Engineering Association of Asia and Australasia (REAAA) whose role was to promote the science and practice of road engineering in the Asia Pacific region. In June 1988 he established the Australian chapter of REAAA. This was the first national chapter to be established in REAAA and other countries soon followed suit – using the Australian chapter as a model. Stoney was also a keen supporter of the Permanent International Association of Roads (PIARC), also known as the World Congress of Roads. VicRoads remains very active in these organisations today.

Stoney supported OPCV's mission and wanted to raise the international profile of the RCA – especially in the Asia Pacific region. He believed that international projects would enhance the experience and skills of participating RCA staff and provide them with opportunities to work in other cultures. In 1988, he arranged for me to be seconded to OPCV to promote the RCA's services in international projects. I had recently completed my role as the Project Manager of the West Gate Freeway and had just commenced the project management of the Metropolitan Ring Road.

FIRST MAJOR PROJECT

At the time of my appointment, OPCV was negotiating a contract with the Public Works Department (PWD) in Fiji as part of the Fiji Road Upgrade Project, which was financed by the World Bank. Peter Lowe, the then Acting Director of Technical Resources, assisted OPCV in successfully negotiating this contract. This was the first major project undertaken by the RCA. Lead by Geoff Hose, seven RCA engineers, a soils scientist and an accountant provided

Road Safety Engineer Ibu Jany Agustin (far right) at a road safety audit site inspection in West Kalimantan, Indonesia, with Team Leader for the IndII Activity, Gerard Neilson, VicRoads (second from right) in September, 2010.

VICROADS HAS PARTICIPATED IN OVER 80 PROJECTS FOR INTERNATIONAL CLIENTS INVOLVING MORE THAN 150 MEMBERS OF STAFF. THIS INVOLVEMENT HAS DEVELOPED VALUABLE LINKAGES WITH OTHER ROAD AUTHORITIES AND PROVIDES OPPORTUNITIES TO WORK WITH LOCAL AND INTERNATIONAL PARTNERS.

services and support to the PWD in implementing major road works in Fiji. This project set the foundation for a long relationship with the PWD. Three further projects funded by the World Bank and the Asian Development Bank were procured and the RCA and VicRoads had a continuous involvement in Fiji over the next decade. More than 30 staff members were involved over that time.

Other successes soon followed in which RCA/VicRoads personnel (and recently retired officers) were involved. Programs included a bridge management project in Indonesia, registration and licensing projects in Bangladesh and Nepal, a pavement management system in the Philippines, traffic signal management in Trinidad and Tobago, a pilot pavement management system in Hong Kong, two projects in Bhutan relating to road maintenance, resurfacing of the Rama IX Bridge in Bangkok, strengthening of the PWD in Samoa, a skid resistance survey for TRANSIT New Zealand, and bridge design in Samoa.

Di Campbell teaching children in Kerala, India about road safety.

OPCV, in partnership with Phillips Traffic Systems Ltd, was also successful in procuring projects for SCATS traffic control systems in which RCA/VicRoads provided intersection design, installation and commissioning of computers, technical expertise, and training. These included systems in Singapore, Kuala Lumpur and Dublin.

VIC ROADS UNIT ESTABLISHED

In early 1996 VicRoads decided to establish its own international delivery arm to prosecute overseas projects. Peter Robinson was appointed Manager - External Projects. Although much of VicRoads' involvement in overseas projects continued to be carried out through OPCV, nonetheless it partnered with other organisations to broaden its involvement. During this period, VicRoads assisted the government of Kyrgyzstan through the United Nations in developing and implementing a road taxation system. It also joined with the ARRB and Rust PPK Ltd to develop a road safety strategy in Heilongjiang Province in China. Building on its reputation for delivery of area traffic control systems, VicRoads advised the Transport Department in Hong Kong on strategic planning and traffic management in the New Town area of Shatin.

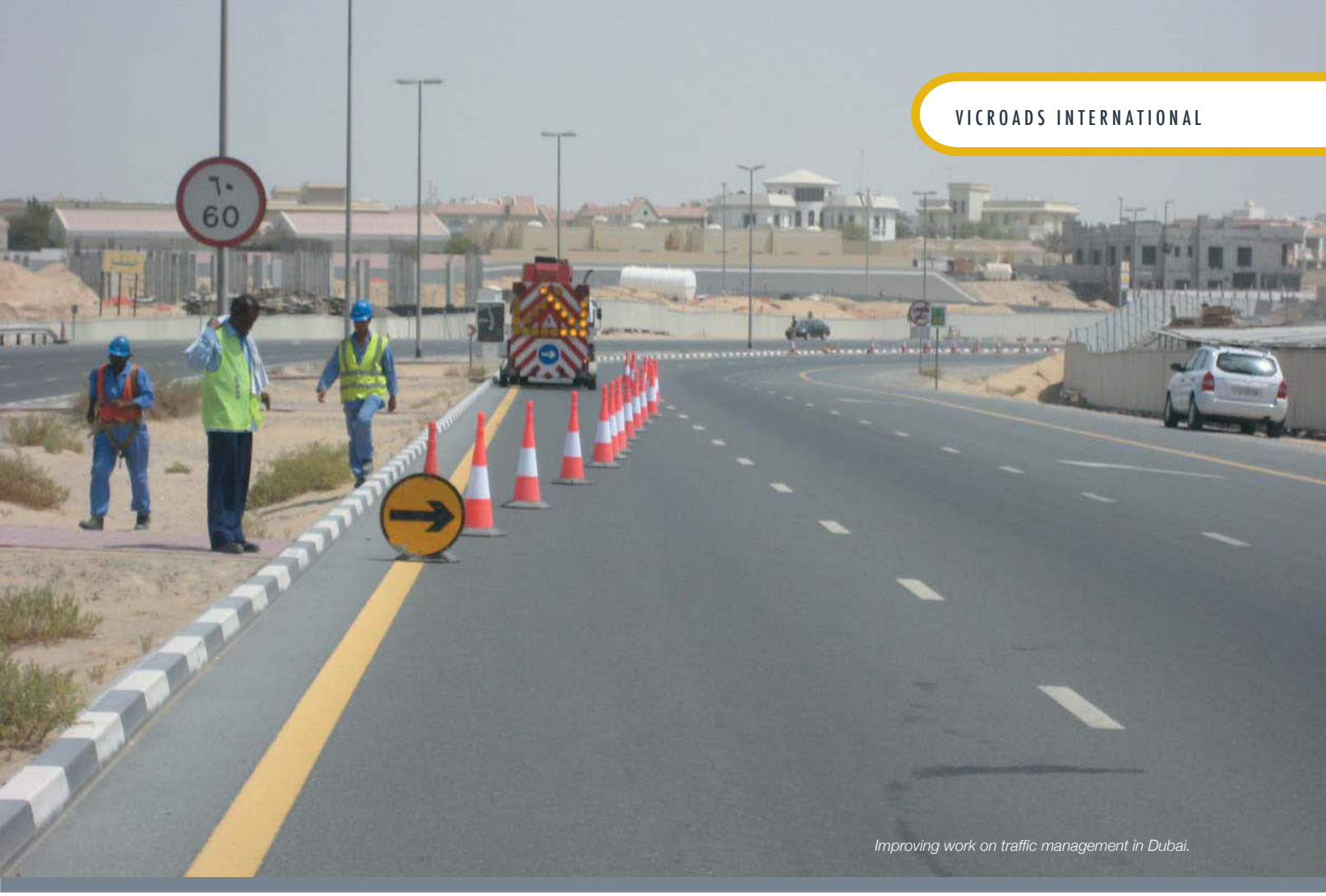
With OPCV, VicRoads was awarded a contract by the Asian Development Bank in 1997 to prepare national road design standards for the People's Republic of China under the leadership of Harry Mok. Implementation of this project was hampered by the lack of full-time commitment by the nominated Chinese engineers. They were distracted by their other work responsibilities. Consequently OPCV decided to bring them to Melbourne so they could work in VicRoads' office and dedicate themselves to the task. This strategy worked well and the final product was highly praised by the Asian Development Bank. In the meantime, VicRoads' involvement in Fiji continued. It won further work in computer aided drafting and design training (CADD) and became involved in another OPCV project for the establishment of the Land Transport Authority, including a new registration and licensing system for Fiji. VicRoads also continued with extensions to their SCATS projects in Dublin, Singapore, Kuala Lumpur, and other smaller applications, as the systems expanded.

NAME COINED

Following Peter Robinson's retirement in later in 1996, John Coles took over the section with the new title of Manager – International Projects. It was around this time that the trading name of VicRoads International was coined. Road safety advice was provided to the Hong Kong Special Administrative Region and the government of Laos and Thailand. The first project in India was procured, involving institutional strengthening of the PWD in Orissa. During Coles' management a focus was placed on leveraging off visits to VicRoads by international delegations to help establish ongoing relationships and to build a brand. VicRoads started bidding for projects in its own name and in 1998 it was awarded the World Bank-funded Andhra Pradesh Institutional Strengthening Project. Since then, VicRoads has enjoyed an almost continuous engagement with projects in various Indian states – mainly in institutional reform/strengthening and road safety management.

Coles retired in late 1999 and, following a caretaking role by Peter Benson, an external appointment was made to lead VicRoads International. Greg Kemp had a long career in international development projects including extensive experience as a team leader in road projects located in India. He joined forces with OPCV, PPK Ltd and Parsons Brinckerhoff Philippines Inc to tender for a major Asian Development Bank-funded road safety project in the Philippines to develop a crash database, based on VicRoads' own system. The tender was successful and VicRoads managed this project for many years including a number of contract extensions. Kemp also retained the focus on projects in India as well as winning a road safety project in Samoa in conjunction with OPCV. Kemp left VicRoads in 2002 and Andrew Houghton led VicRoads International until 2004. Houghton consolidated VicRoads' brand in India, winning two major contracts in Kerala and Mizoram. A road safety project in Eritrea was also implemented in partnership with SMEC. Manoli Lukas succeeded Houghton for about six months before SMEC appointed him Regional Director in India.

In 2004, OPCV was sold to Sinclair Knight Merz (SKM) but it still operated in the new organisation as an international consulting arm. Peter Williams managed these activities and, in 2005, he was appointed Manager – VicRoads International. Following an organisational restructure in 2007, he became Director Commercial



Improving work on traffic management in Dubai.

and Business Services, retaining responsibility for international activities until October 2012. Two former OPCV staff managed international projects during this time – Bob Cross from 2008 to 2010 and Meg Holmberg from early 2011.

CHANGE IN FOCUS

During this time the focus of VicRoads International's business changed to put a greater emphasis on key sectors such as road safety and institutional capacity building. In other words, VicRoads responded to niche opportunities that coincided with its available skills. A number of contracts were won from the World Bank to undertake reviews of road safety management arrangements in countries including Armenia, Bosnia, Serbia, Montenegro and the Ukraine. An asset management project was conducted in Egypt and a number of significant projects related to driver training and testing, road safety and heavy vehicle management were implemented in Dubai. Significant institutional strengthening and capacity building projects were delivered in Laos, Cambodia and Madhya Pradesh in India during this period.

In Vietnam VicRoads delivered two major road safety projects for the World Bank - one focused on road user education and awareness and the second on designing and implementing a computerised national road traffic accident system. VicRoads has also played a major role in improving road safety outcomes in Indonesia through its involvement in the AusAID-funded Indonesia Infrastructure Initiative program where it has delivered a number of projects related to road safety audit, crash reduction and blackspot improvement.

VicRoads is currently delivering institutional strengthening projects in Mongolia and Karnataka in India. VicRoads continues a strong engagement in India. Over the last decade it has implemented projects in Andhra Pradesh, Madhya Pradesh, Mizoram, Karnataka, Maharashtra, Kerala, Rajasthan, and Uttar Pradesh and has hosted delegations from every Public Works Department in India.

Overall, VicRoads has participated in over 80 projects for international clients involving more than 150 members of staff. This involvement has developed valuable linkages with other road authorities and provides opportunities to work with local and international partners to promote VicRoads' expertise across a range of disciplines – as well as providing professional development of staff. Since commencing its international engagement, VicRoads' role has evolved from one of partnering with other organisations to full management of tendering and implementing overseas projects.

David Jellie was seconded from VicRoads in 1988 to the Overseas Projects Corporation where he worked as General Manager until his retirement in 2001. He continues to write many of the tenders for overseas projects for VicRoads International.

DRIVING VICTORIA

SINCE IT WAS ESTABLISHED WITH A STAFF OF TWO MEN IN 1910, THE REGISTRATION AND LICENSING UNIT OF VICROADS HAS EVOLVED AND GROWN. BY D.D. STOJANOVICH AND GRAHAM BRIGGS.

After the sale of the first petrol engine car in Australia in 1897, life changed rapidly for a growing number of people as a new means of transport across vast distances was now possible. However, effective administration of the wonderful new road network and its growing number of users soon became essential.

The Motor Car Act 1909 came into effect on 1 January, 1910 and it declared: "Every motor car shall be registered by the Chief Commissioner who shall keep a register and shall assign a separate identifying number to every car so registered and shall enter in the register every such number..."

The first Victorian driver's licence was issued on 1 March 1910, and by June 1911 there were 2,722 motor cars and 2,122 motorcycles registered in Victoria.
The increase in motor vehicles continued unabated, leading to the establishment of the Motor Registration Branch (MRB) in 1921, as an adjunct to the Police Department.

In its earliest days the MRB's total staff comprised two men – C. Furey and A. O'Dee – and their office was one room in the Royal Court Building in Russell Street.

In 1924 the MRB moved to the Russell Street Police Headquarters. By 1928 the MRB had become a busy and financially significant organisation, which was responsible for 369,750 diverse transactions that yielded revenue of £1,014,208.

Initially, the responsibility was placed on owners to display their registration number on their vehicle. With no common standard for number display, owners took liberties in their design and presentation. Some elected to paint their registration number directly onto the body of their vehicle, while others took the opportunity to design their own number plates and fit these onto their vehicles.

BY 1928 THE MRB HAD BECOME A BUSY AND FINANCIALLY SIGNIFICANT ORGANISATION, WHICH WAS RESPONSIBLE FOR 369,750 DIVERSE TRANSACTIONS THAT YIELDED REVENUE OF £1,014,208.

An early factory producing enamelled licence plates.

Recognising that a common approach to registration number display was required, official number plates were designed and enforced under legislation in 1932. Handmade from heavy gauge metal, with embossed or raised numbers, and coated with black and white vitreous enamel, these original number plates acted as a practical and functional tool.

The first sequence to be allocated under the new regime was from number 2 to 285,000. This sequence lasted until May 1939 when a new issue became necessary - an alphanumeric range from AA.000 to ZZ.999. This sequence lasted until 1953 by which time a total of 576,000 numbers had been assigned.

The next batch, from GAA.000 to GZZ.999, was allocated in just six years. The following two batches, HAA.000 to HZZ.999 and JAA.000 to JZZ.999, lasted for even shorter periods – five years and four years respectively. By 1968 the number of cars on the register was approximately 1,200,000 and MRB revenues had reached $83,700,000.

Many more sequences were added, many with slogans also embossed into the metal, such as 'Vic Garden State' or 'Victoria' or 'Vic Nuclear Free' or 'Australia 1788-1988'.

By 1979 there were 1,800,000 motor vehicles registered in Victoria, which represented an increase of 500 per cent since 1950. The MRB's revenues had increased to a staggering $411,731,400.

In 1981 the MRB, which at this stage had a staff of 897, was transferred from the Police Department to the offices of the Transport Regulation Board (TRB).

On 1 July 1983 as part of a wide ranging of reorganisation of the state administration by the new Labor Government, the TRB was replaced by a new organisation called the Road Transport Authority (RTA), which included both the TRB and the Road Safety and Traffic Authority (RoSTA). In 1989 the RTA and the Road Construction Authority were merged to form the Roads Corporation, trading as VicRoads.

THE CHANGING FACE OF VICTORIAN LICENCE PLATES

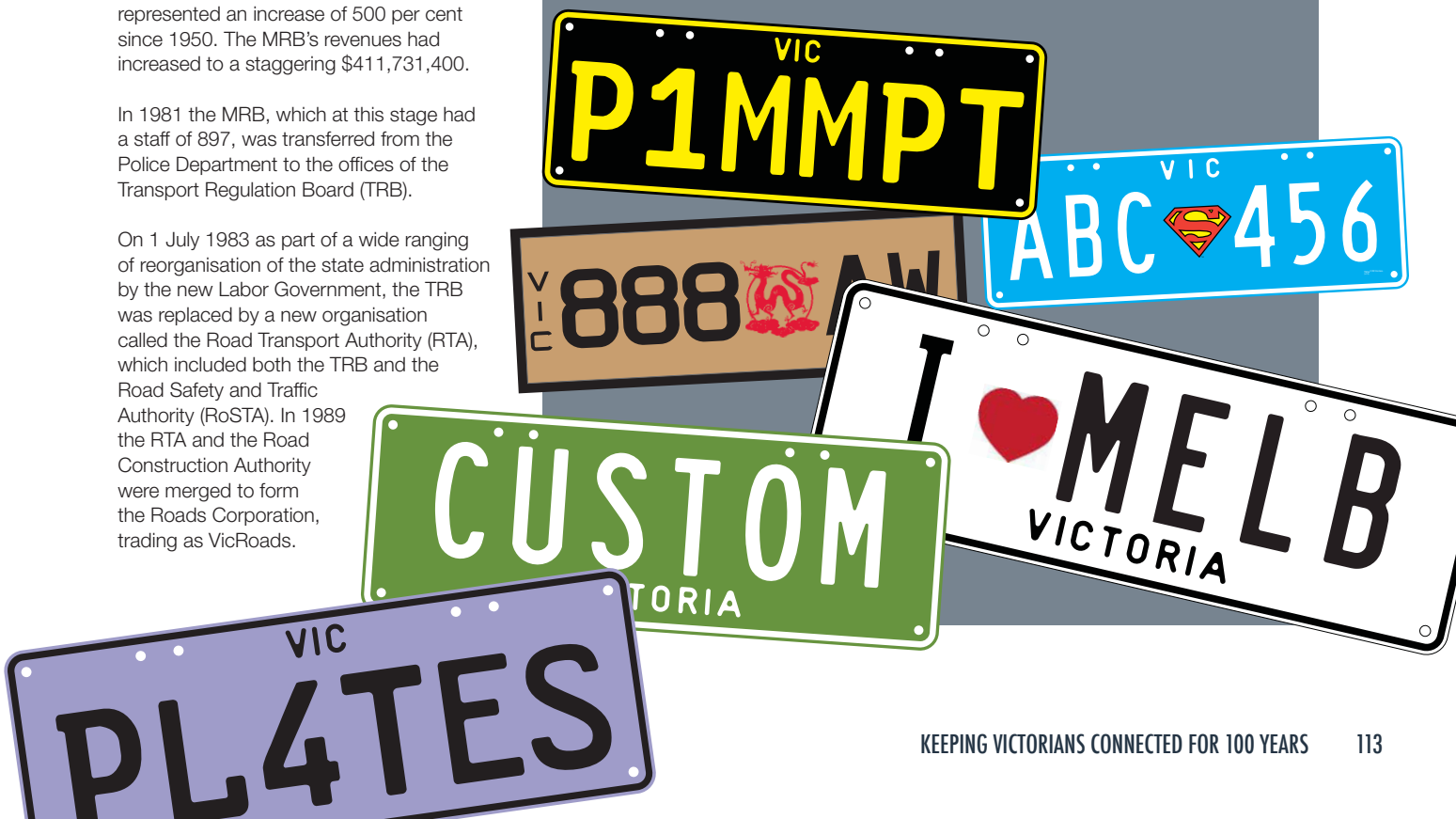
Since 1939, standard Victorian state plates have been black and white (1939 to 1977), green and white (1977 to 1994), and blue and white (1994 to present). Those with a taste for something more exotic have jumped at the opportunity to splash a 'granny smith green', 'flamingo pink' or 'chilli red' coloured plate on their car. Sporting buffs have also proudly been showing their allegiances towards favourite teams on their cars since 1993, with the availability of footy plates.

Personalised number plates were introduced in 1972 and hundreds of thousands have since been sold. Indeed they have been so popular that in October 1984, the Heritage Plate Auction was held and raised over $1 million for road safety. Plate number 1 was sold for $165,000.

There is now a category for special interest plates which includes Aboriginal Australia plates, Ham Radio plates, Harness Racing plates, Melbourne City of Enterprize plates, Mountain Cattlemens' Association plates, National Servicemen's Association plates, Penny the Little Penguin plates, Service Clubs plates, Thoroughbred Country plates, Victorian Maronite Community plates and Victorian Regional plates.

European car owners were invited to complete the look of their European cars in 2005, as VicRoads Custom Plates added Euro plates to its suite of products. The plates were specifically designed to fit the larger plate recesses of these cars.

2007 saw the introduction of Signature plates, and the response from motorists exceeded the most optimistic expectations. Victorians jumped at their first opportunity to display just their two initials, or their initials combined with one or two numbers. These signature plates marked VicRoads Custom Plates first foray into "prestige plates" with combinations offered in silver and gold.



SERVING THE PEOPLE

ASIDE FROM ITS ROAD BUILDING DUTIES, VICROADS' HANDLING OF REGISTRATION AND LICENSING OVER THE DECADES HAS CONTRIBUTED TO A SAFER AND MORE EFFICIENT ROAD NETWORK, WRITES KEVIN FOX.

When the motor car first appeared on Victoria's roads just over 100 years ago the need to regulate driving, and to help fund much needed road improvements for growing traffic in our cities and towns soon become apparent to the State Government and councils.

Melbourne's first recorded fatal traffic accident was reported in 1905 and involved a collision between a car and a cyclist, but it would be another five years before our first traffic laws were enacted and moves were made to register cars and to license drivers.

In 1910 the Automobile Club of Victoria (now the RACV) was appointed as agents to register vehicles and collect driver licence fees on behalf of the government.

IN 1910 THE AUTOMOBILE CLUB OF VICTORIA (NOW THE RACV) WAS APPOINTED AS AGENTS TO REGISTER VEHICLES AND COLLECT DRIVER LICENCE FEES ON BEHALF OF THE GOVERNMENT.

Over the next century the task to ensure that drivers were sufficiently skilled and knowledgeable of road rules and that their vehicles were safe to drive on our roads grew substantially, as did the challenge for government to provide and improve services and access to meet changing community needs and expectations.

Today more than 12 million car trips are completed each day on Melbourne's roads alone. Just as car use, road rules and vehicle technology has evolved over time, so too did the responsibilities and structure of government agencies managing our roads and their safe use.

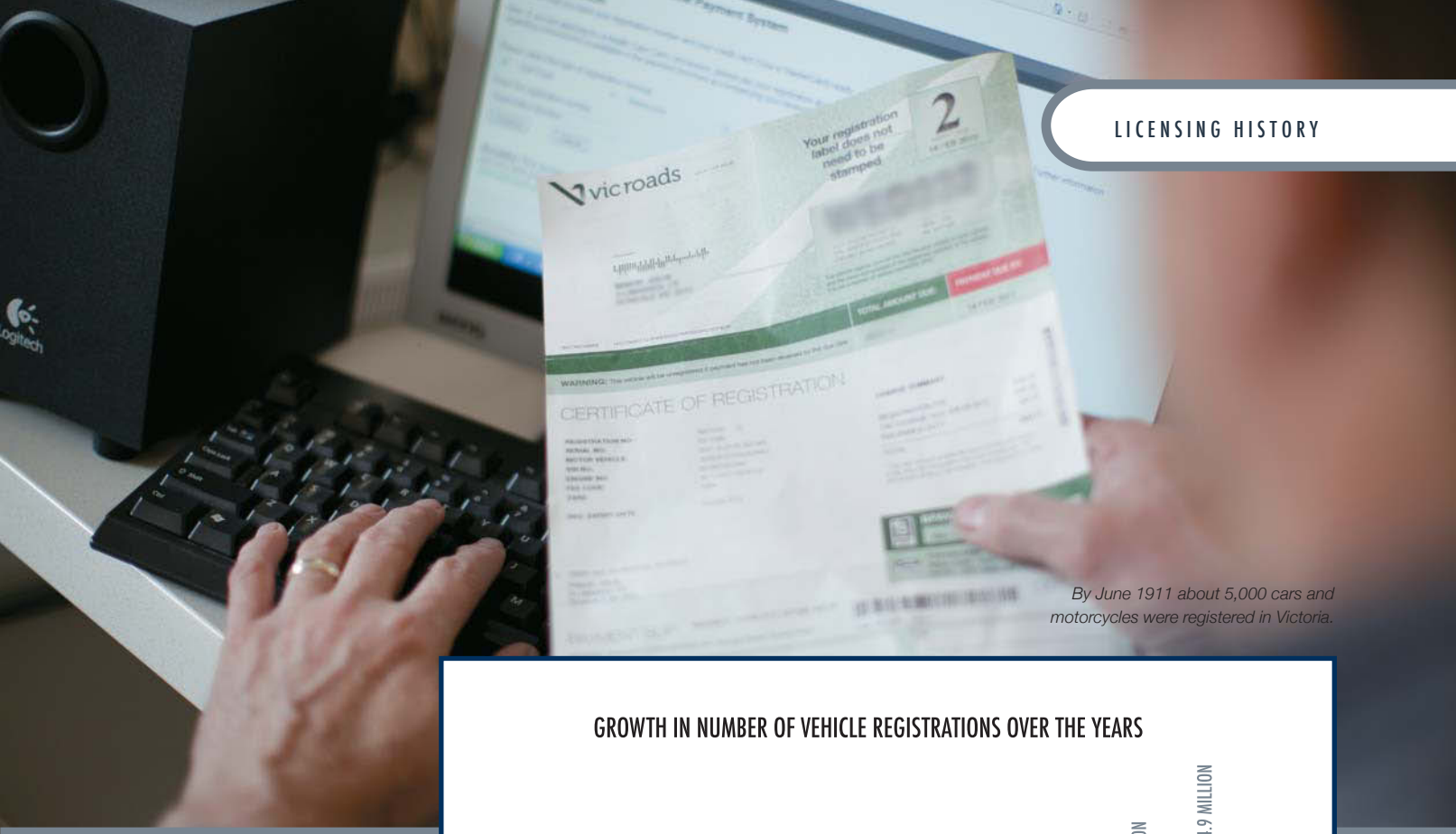
VicRoads is Victoria's road authority charged with this responsibility, building on the legacy of the organisations before it.

By June 1911 about 5,000 cars and motorcycles were registered in Victoria. Motor registration fees were set at £1. More than 100 years on, we now have 3.7 million licensed drivers and nearly 5 million registered vehicles on our roads including cars, motorcycles, trucks and other commercial vehicles.

Victoria has 3.7 million licensed drivers.

VicRoads registration and licensing services are delivered from 41 customer service offices and agencies across the state, from call centres in Ballarat and Melbourne, and increasingly through online channels with the growth of the web. Emerging technology such as mobile applications for transactions are on the horizon, as VicRoads strives for new and better ways to serve its customers and improve business efficiency.

More that 21 million transactions are completed annually including registration and licence renewals, vehicle transfers, and most importantly, 150,000 driving tests.



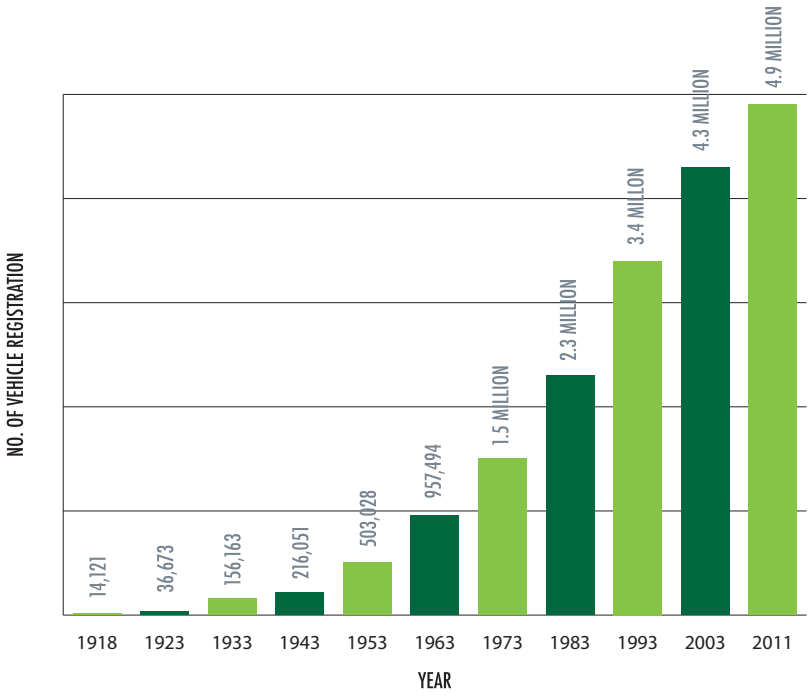
By June 1911 about 5,000 cars and motorcycles were registered in Victoria.

HOW WE GOT HERE

The story of how we got here and where we are going is an important part of Victoria's transport history, and future of VicRoads as it works to help shape our development and economic prosperity and to support liveability of our communities.

While many of Victoria's early roads and bridges were financed from loans and rates, it was not until the 1913 when the *Country Roads Act* was proclaimed that registration fees from motor cars and traction engines were set aside in a special fund for road maintenance works.

GROWTH IN NUMBER OF VEHICLE REGISTRATIONS OVER THE YEARS



Over the next decade car ownership and use grew to the point where direct responsibility for registering vehicles was handed to the Police with the creation of the Motor Registration Branch (MRB) in 1921. As traffic grew so did the road toll with 65 deaths reported in 1922.

While the MRB collected registration fees, the task of testing drivers on road law and skills fell largely to officers in district police stations.

In addition to the MRB a separate authority the Transport Regulation Board (TRB) was established in 1931. It was responsible for licensing and enforcement of trucks, buses, taxis and commercial transport vehicles, including aircraft for a short time in the 1950s. In 1983 100,000 motorboats were registered with the TRB.

Over the decades from the 1930s through until the late 1980s many agencies shared responsibility for regulating drivers, registering vehicles, building and maintaining our arterial road and managing traffic the traffic they carried.

KEY DEVELOPMENTS IN REGISTRATION AND LICENSING

1900

1905 Melbourne's first fatal crash between a car and motorcycle.

1909 Automobile Club of Victoria collects registration fees.

Car registration is £1.

1910

1913 Registration fees allocated to fund road maintenance.

1914 Motor registration revenue: £26,010.

1920

1921 Motor Registration Branch established in the Police Department.

1924 Motor registration revenue: £217,361.

In 1989 the Road Traffic Authority and the Road Construction Authority (formerly the Country Roads Board) merged to form VicRoads, bringing many related functions under the one roof for the first time, and clearing the way for integration and streamlining of services to the community.

In the years prior to the establishment of VicRoads, many initiatives now commonplace for drivers and car owners came about.

The 1932 Motor Car Act required cars to be fitted with windscreen wipers, horns and rear view mirrors and that year number plates were first issued by the MRB to help identify vehicles (see story page 112).

It wasn't until 1936 that a standardised traffic code was adopted for Melbourne including the "Keep Left" rule. Strangely it took until 1944 before jurisdiction for the traffic code extended across the whole of Victoria.

The post war years saw car ownership and traffic continue to grow, spurred on in 1948 with the creation of Australia's own car the Holden 48/215 (FX), and with the expansion of Melbourne's suburbs through the baby boom era.

But as the number of registered car owners and licensed drivers grew so too did our road toll. New laws in 1952 required drivers to make hand signals for turns, and for cars to be fitted with headlight dippers and red tail lights for the first time. By 1954 there were 567,000 registered vehicles on Victoria's roads and our road toll had reached nearly 600.

Significant changes to registration and licensing requirements were introduced in 1964. Probationary Licences were implemented and roadworthy certificates were first required for the private sale of second hand vehicles. In 1966 the "Give Way to the Right" intersection priority rule was introduced and the .05 blood alcohol limit for drivers was mandated.

1970

1970 Demerit Points introduced.

Road safety and Traffic Authority (RoSTA) established.

1971 Compulsory seat belts.

1972 Open road speed limit reduced to 50 miles per hour.

1974 Learner permits introduced.

1977 Green and white Victorian number plates with garden state slogan.

1979 21 Police/MRB offices testing drivers and registering vehicles.

1980

1981 MRB functions transferred from Police to TRB.

1983 Road Traffic Authority (RTA) created and assumes driver licensing, registration and road regulation responsibilities.

1984 Computerised licence records system adopted.

Plastic photo ID licences introduced.

1989 VicRoads created.

$1 billion collected in registration, licensing and TAC insurance fees.

1930

1932 Transport Regulation Board established

Windscreen wipers, rear view mirrors and horns required for cars.

First number plates issued.

"Keep Left" rule introduced.

1932 Motor registration revenue: £1,199,674.

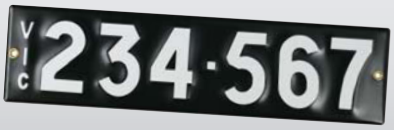
Licence fees: £9,783.

1950

1952 Hand signals introduced for turns.

Cars required to be fitted with red tail lights and headlight dippers.

1956 Traffic Commission established.



1960

1964 Probationary licences introduced.

Roadworthy certificates first required.

1966 New TRB office opens in Lygon Street Carlton with staff moving from the Exhibition Buildings.

1969 P Plates required.

Australian Design Rules implemented.

A few years later P Plates were introduced and the Australian Design Rules applied for all new cars registered in Victoria. As our road laws and vehicle standards evolved, there were increased responsibilities for agencies including the Police, MRB and the TRB who shared the oversight of drivers and vehicles.

Despite these actions to improve driver and vehicle safety our road toll continued to climb, peaking at 1061 in 1970. This led to a media outrage and public campaigns for new safety initiatives, tougher road rules, greater enforcement and more stringent driver licensing requirements.

Demerit points were adopted in 1970 and compulsory seatbelt wearing was introduced in 1971. That year marked a watershed as for the first time our road toll began to trend down despite rising vehicle ownership and car use. By 1979 Victoria had 1.8 million registered vehicles. That year driver testing and vehicle registration and checking was undertaken through a network of 21 Police and MRB offices across Victoria.

In 1981 motor registration and driver licensing functions were transferred from the Police and MRB to the TRB. Further rationalisation continued in 1983 when the Road Traffic Authority (RTA) was created, assuming broad responsibility for road regulation, driver licensing and road safety management.

The formation of the RTA led to a new era of service initiatives and technology in Victoria with many business process improvements implemented which we now take for granted. In 1983 the RTA processed 736,000 driver licence renewals and 114,000 driving test were undertaken. The next year computerised driver licence records were first adopted, replacing manual documentation systems dating back many decades.

With these changes came improved security and accuracy of driver records and easier access to services for customers. Importantly new technology better supported police enforcement and the detection of traffic infringements.

1990

1991 10 year licences introduced.

11 metro and 21 rural VicRoads R&L offices.

1992 World-first computer based road law knowledge and touch screen hazard perception testing trials.

New Car Assessment Program launched.

1995 SafeDrive program launched for older drivers.

1996 VicRoads website launched.

Touch screen information kiosks operate from new Burwood East R&L office.

1998 New Sunhine R&L office opens.

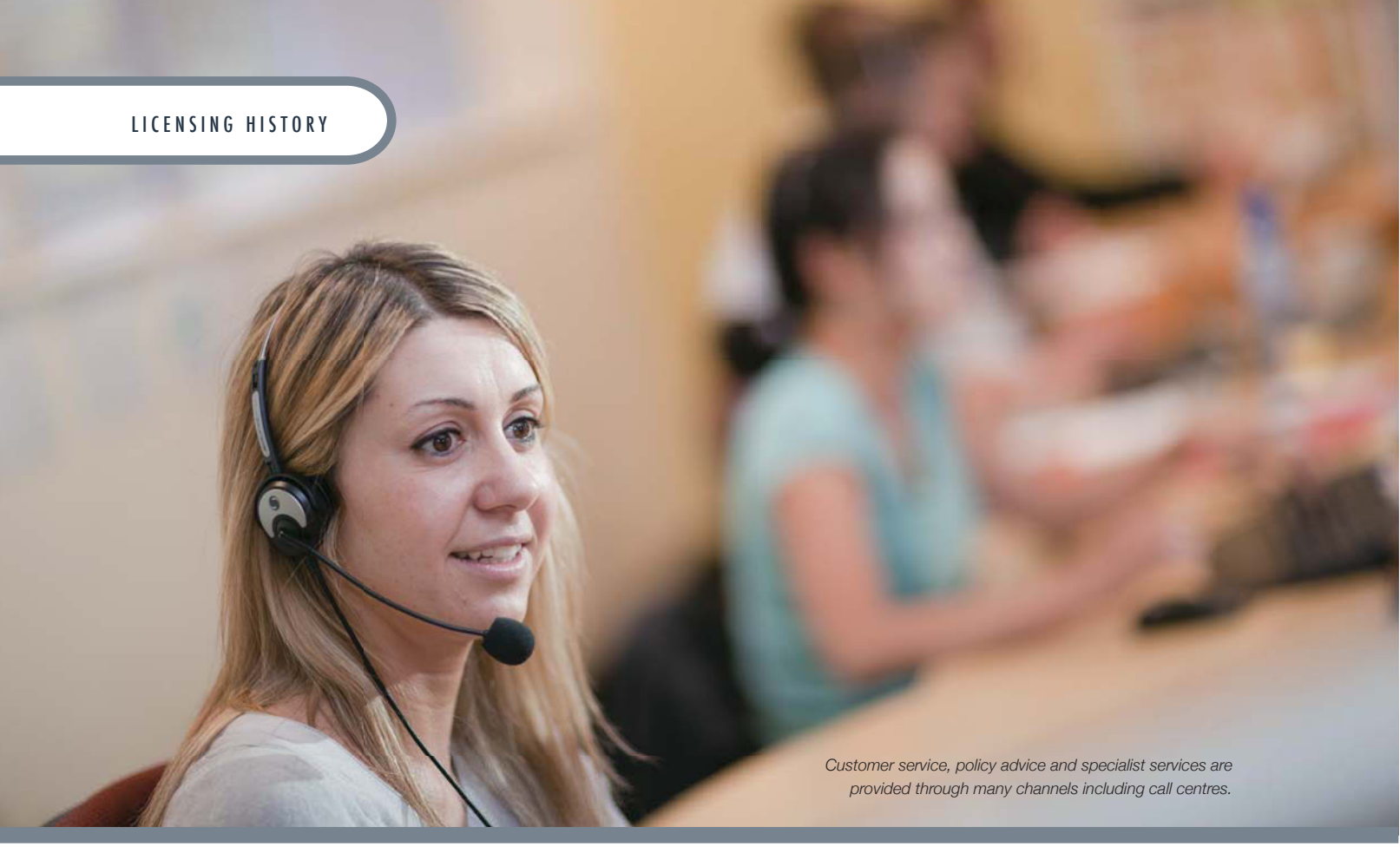
2000+

2008 Graduated Licensing System started.

2012 21 million registration and licensing transactions.

Vehicle registration revenue: $994 million.

Driver Licence revenue: $68 million.



Customer service, policy advice and specialist services are provided through many channels including call centres.

Plastic driver licence cards were also introduced with photo ID and the Vehicle Securities Register was established to help drivers avoid the pitfall of buying second hand cars still under finance or otherwise encumbered.

In 1977 our first number plate slogan: 'Victoria - the Garden State' was adopted and green and white number plates replaced black number plates used since 1932.

The last major structural change in the administration of Victoria's roads and traffic came about in 1989 when VicRoads was established. Management was consolidated at the old CRB/RCA head office in Denmark Street, Kew.

Over the next decade former RTA registration and licensing offices and RCA regional roads management offices were rationalised, relocated or established at new locations to better serve customers in regional Victoria and across Melbourne, as our city grew and new suburbs were created.

TODAY

In a changing environment VicRoads strives to support Victoria's liveability and economic prosperity by planning, developing and managing the arterial road network and its use. The first touch point with VicRoads for many people is when they learn to drive, obtain a licence, or buy their first car.

In partnership with the Police, TAC and other stakeholders, VicRoads works to achieve positive road safety outcomes by providing accessible, timely and cost effective vehicle registration and driver licensing services.

IN 1977 OUR FIRST NUMBER PLATE SLOGAN: 'VICTORIA - THE GARDEN STATE' WAS ADOPTED AND GREEN AND WHITE NUMBER PLATES REPLACED BLACK NUMBER PLATES USED SINCE 1932.

By ensuring new drivers are sufficiently skilled and that their vehicles remain safe, roadworthy VicRoads significantly contributes to the government's road safety strategy to reduce the road toll.

In 2012 a new record low was achieved. While 279 people still died on our roads, this figure in nearly 800 down on 1970 when 1061 families experienced road tragedy with the death on a loved one.

LICENSED DRIVERS	
1975	1.9 MILLION
1984	2.47 MILLION
1990	2.7 MILLON
2003	3.4 MILLION
2011	3.7 MILLION

Great strides have been made to ensure all drivers and especially young drivers are skilled and safe once they get on the roads. Towards this aim VicRoads launched the Graduated Driver Licensing System (GLS) in 2008. Leaners are introduced to driving progressively through a structured transition as their experience and maturity builds before they sit their driving test at a VicRoads office.

The GLS helps new drivers to be safer and better equipped for the road by:

- preparing learners for solo driving through extended learning
- testing learners to ensure they can drive safely in everyday traffic
- protecting probationary drivers by keeping them out of higher risk situations
- motivating probationary drivers to drive more safely and within the law.

Novice drivers move through the learner permit and the P1 and P2 probationary licence stages (Red and Green P Plates) to earn their full driver licence without being exposed to high risk driving situations before they are ready. They must:

- serve a minimum 12-month period on their learner permit
- complete 120 hours of logged supervised driving experience before their test
- face a more challenging on-road driving test
- graduate through a two-stage probationary licence system with restrictions for peer passenger numbers and vehicles.

PUTTING CUSTOMERS FIRST

As a large, complex customer-focussed business servicing a broad range of customers and stakeholders VicRoads maintains vast data records and personal information which must be secured and times provided to agencies such as Police to help them carry out their functions.

Customer service, policy advice and specialist services are provided through many channels including the office network and call centres.

Great efforts are being made to help customers interact with VicRoads and complete routine business functions when and where they want, to maximise convenience. Increasingly transactions such as registration and licensing payments, driving test bookings or even ordering replacement number plates can completed 24/7 online and from mobile platforms through the VicRoads website.

VicRoads also delivers licensing services on behalf of Transport Safety Victoria and the Victorian Taxi Directorate. In 2012 more than $3.4 billion in revenue was collected on behalf of the Victorian Government including licence fees and TAC insurance charges. Much of this revenue is directed to road programs safety works, education campaigns and related initiatives to benefit the wider community.

In managing Victoria's arterial road system to help keep people and businesses connected, VicRoads has a diverse range of functions and interacts with many different customers and stakeholders. One of its key priorities is to understand and meet the changing needs of customers including migrant communities and others from culturally diverse backgrounds who may not be proficient in the English.

With the ageing population and the need to balance mobility for older or impaired drivers with road safety outcomes, medical review and driver retesting is a growing part of VicRoads' business.

Great efforts are being made to help customers interact with VicRoads.

Initiatives such as conditional licences have been introduced to help drivers stay on the road subject to outcome of medical assessments.

RECENT DEVELOPMENTS

On VicRoads recent achievements and future directions in registration and licensing services VicRoads Chief Executive Gary Liddle said: "There has been a continued focus on improving capability and making our processes more efficient." The strategic directions aim: "…to make customers their focus of our business, contributing to an integrated transport system and creating a culture of innovation."

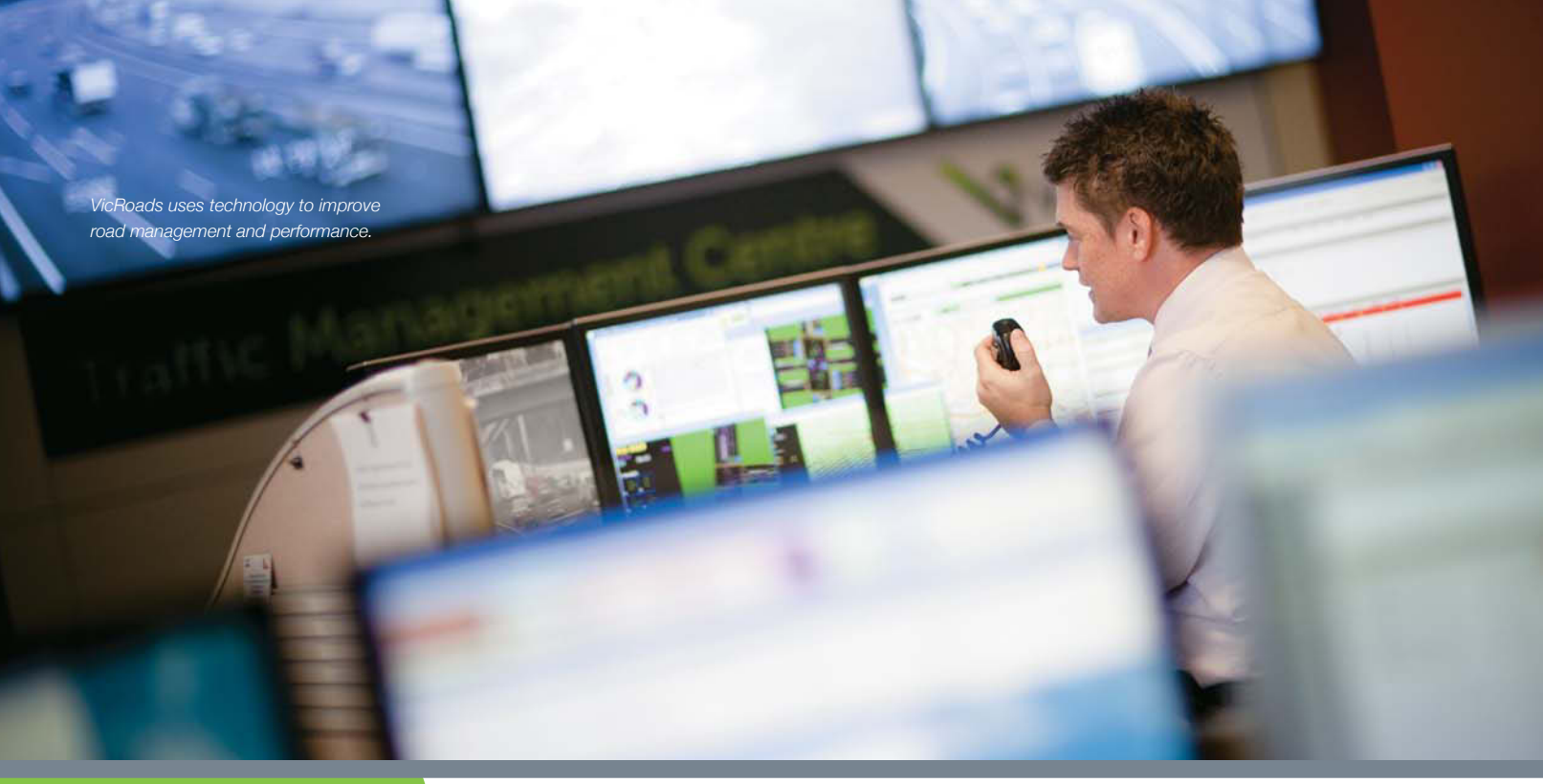
For over 100 years now Victoria through its agencies including VicRoads has been at the forefront of innovation in planning and managing the roads and their safe use. On many fronts VicRoads has led with initiatives on road and vehicle safety, traffic management and driver education, with this expertise being sought out not just in Australia, but internationally.

New technology is being applied now and more so in the future so customers can transact with VicRoads and obtain the information they need effectively and conveniently when and where they want it.

To this end VicRoads is developing a new registration and licensing system, RandL, to further improve efficiency, flexibility and responsiveness to business and government needs. It will be even more customer-centric, will reduce the potential for fraud and other illegal activities, and will strengthen the integrity and security of vehicle registration and driver records.

Already a new Computerised Licence Test System has been implemented as part of the RandL program. It is now live across VicRoads customer service centre network and is transforming the registration and licensing processes for the benefit of its customers and the Victorian community.

Kevin Fox worked in the Media Unit and later the Major Projects Division at VicRoads from 1986 to 2012.



VicRoads uses technology to improve road management and performance.

SMARTER OPERATIONS

A RANGE OF TECHNOLOGIES AND INNOVATIONS ARE LEADING TO SAFER AND MORE EFFICIENT ROAD AND TRAFFIC MANAGEMENT AT VICROADS, WRITES D.D. STOJANOVICH.

A key lesson from the devastating floods and bushfires that affected Victoria in the past few years has been the importance of providing timely and accurate information to the general public.

In light of this, VicRoads late last year developed a new website to provide real time information about road conditions during emergencies such as floods, fires and major traffic incidents. Using a map interface, the system provides information for the public and emergency services about where roads are closed, why they are closed and whether detours are available.

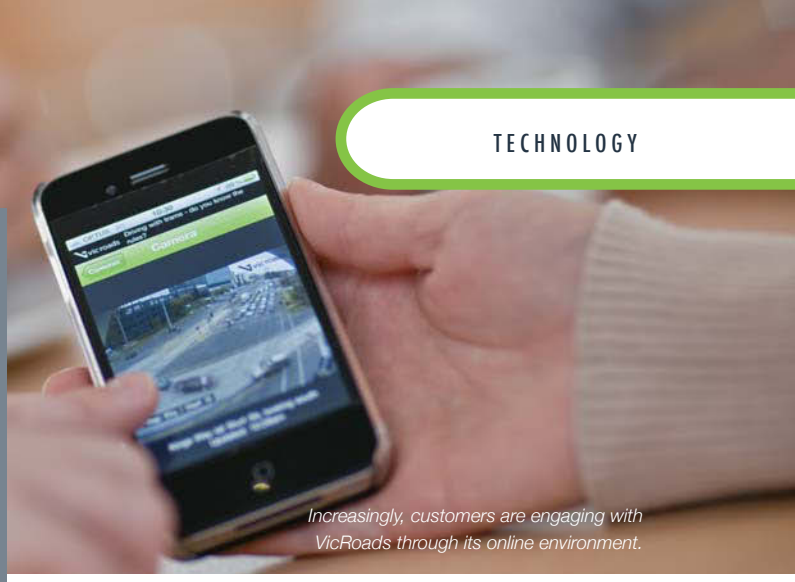
Accessible on desktops and mobiles, the Road Closures and Traffic Alerts (RC&TA) website pioneers the use of geographic information system (GIS) technology, which means updates can be made live on the site in less than a minute.

Launched in December 2011 the site has proven sufficiently robust to withstand the barrage of web traffic typically experienced during significant crises. In the four and a half months after launch, the site had already hosted over half a million visits, 38 per cent of which were from mobile devices. In the two weeks following the major rain event on 26 February 2012 in Victoria, there were more than 300,000 visits to the website, where more than 400 roads were published as being closed or restricted (see also, page 126).

The pioneering website has been recognised nationally and internationally. VicRoads won a Special Achievement in GIS Award at the recent ESRI International User Conference in San Diego. It was the only Australian recipient from 170 award winners worldwide. The new website also subsequently won the National ITS Excellence Award at the ITS Australia national awards in late November.

Next year the website will display even more information. According to Dean Zabrieszach, Director Road Operations at VicRoads, the site will be renamed as VicTraffic and will provide information about major road works, events, traffic conditions and live traffic images as well as the existing information.

The website is, however, just one example of how VicRoads is at the forefront of using intelligent transport systems (ITS), which is described as technology that improves the safety, access and environmental performance of the road system in its entirety.



Increasingly, customers are engaging with VicRoads through its online environment.

HELPING CUSTOMERS TO THE MAXI

By Paul Tierney

There is no doubt that the internet has revolutionised the communications world. While most of us take its origins and benefits for granted, it was only around the mid-1990s that the term "internet" was officially defined.

At the same time as the world was grappling with the growth of the internet phenomenon, it seemed bold for the Victorian Government to announce that all government services were to be available online by the year 2000.

As a result of this mandate, VicRoads, along with Multimedia Victoria, the Department of Justice, and several local government agencies, teamed up to deliver the maxi service.

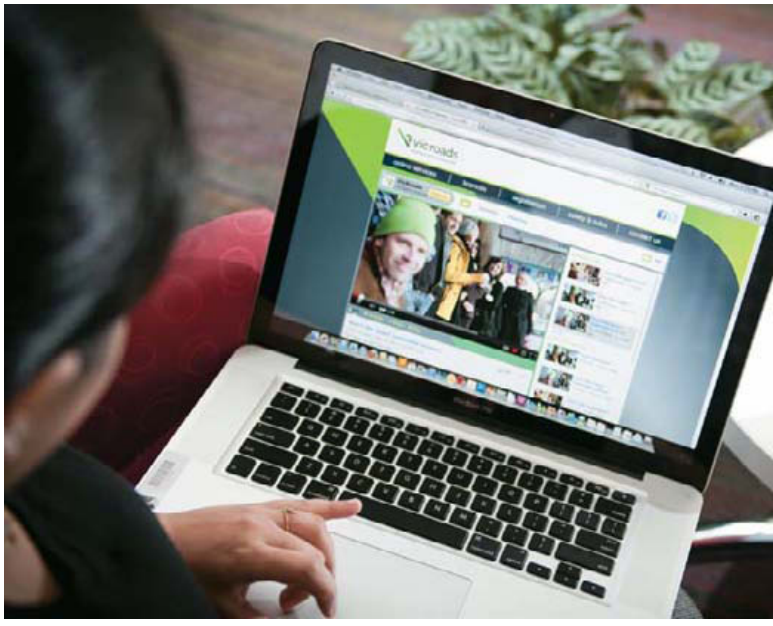
Maxi allowed VicRoads customers to make common transactions 24 hours a day, seven days a week, either online via a website, through one of 20 payment kiosks at shopping centres across the state, or via telephone using an interactive voice response (IVR) system. The IVR system allowed customers to use a touch-tone telephone to enter account and credit card information to complete payments.

Such common transactions made by VicRoads customers included paying registration fees, changing address, booking a learner permit or licence test, ordering a driving history report, or checking vehicle details before purchase. The potential benefit for customers was great. Primarily, maxi gave customers a secure and flexible online payment and booking system that eliminated the need for them to travel to customer service centres, where they would then wait in queues to complete their transactions. This was a service that was particularly beneficial to rural and remote customers who already had to travel long distances.

The benefits for VicRoads were substantial too. Creating an online customer service centre had the potential to shift people from the actual customer service centres and reduce the waiting times for those who needed to attend offices in person. In doing so, the average cost to VicRoads per transaction could also be reduced. It sounds so simple.

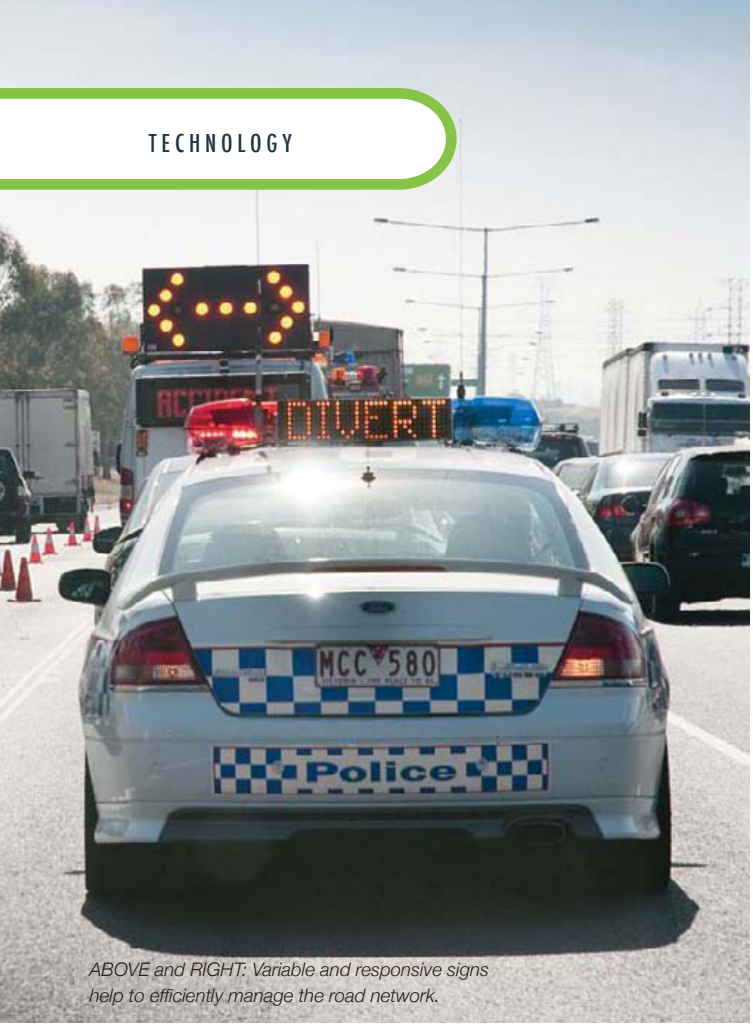
However, John Ford, Manager of Online Service Delivery at the time of introduction, said that implementing these online services at VicRoads had its problems. Victoria was at the cutting edge, being the first of the Australian Government jurisdictions to implement such technology, but it was doing so at a time when the internet and online services were relatively new to the community. This meant that VicRoads and the other responsible agencies were unable to draw upon the experiences of other organisations.

This coupled with the fact that VicRoads' systems were 20 years old with no web capability, and that there was huge pressure to ensure the online security and privacy of customers, an incredible challenge lay ahead for Ford and his team. But the challenge was faced and ultimately met. The introduction of online services, saw one-third of payments being made online, reducing pressure on customer service centres and giving back valuable time and convenience to customers.



IN THE TWO WEEKS FOLLOWING THE MAJOR RAIN EVENT ON 26 FEBRUARY 2012 IN VICTORIA, THERE WERE MORE THAN 300,000 VISITS TO THE WEBSITE, WHERE MORE THAN 400 ROADS WERE PUBLISHED AS BEING CLOSED OR RESTRICTED.

For example, automatic incident detection is a way of maintaining an ever-watchful eye across the network using CCTV monitoring. There are some 400 CCTV cameras located at strategic points on the Victorian freeway and arterial network, which are continuously monitored by the Traffic Management Centre in Kew. There are further cameras on the City Link, East Link and Peninsula Link networks. This network provides information that is vital for real time traffic management, including a capability for coordinating system responses to emergency situations.



ABOVE and RIGHT: Variable and responsive signs help to efficiently manage the road network.

VARIABLE AND RESPONSIVE SIGNS

Road networks have to operate under a wide variety of conditions that vary according to time of day and year, and respond to a number of key factors such as weather, maintenance works and emergencies.

As such, variable message signs have been a welcome innovation. These display different messages that can be altered at any time by the Traffic Management Centre. There are currently approximately 100 such signs in Victoria.

Similarly, variable speed limits provide a management approach that is flexible and immediately responsive. In some instances the signs can operate automatically, with the system's controls responding to levels of traffic flow. Some systems can also take into account local weather conditions, while others respond to the demands of school zones or shopping centre precincts to control traffic flows at crucial times. The signs, which can also be operated from a central control centre, are being used on the Western Ring Road, the Westgate Freeway and the M1 project.

Other signs now in use advise motorists of dangerous weather conditions as they occur, as these important messages can be triggered remotely and even automatically. For example, there are several ice detection and warning systems in Victoria in locations such as Ballarat, Daylesford, Harrietville and along the Calder Freeway. There are high wind warning signs on the Westgate Bridge, as well as bridge deck heating when required.

In some rural locations where there have been significant numbers of crashes in the past, vehicle activated signs are now often used. These signs become operational when they detect a vehicle moving at a speed that is above a set threshold. Many of these are solar powered and radar activated.

Similarly, extra low voltage traffic signals are also being implemented which result in considerable energy savings.

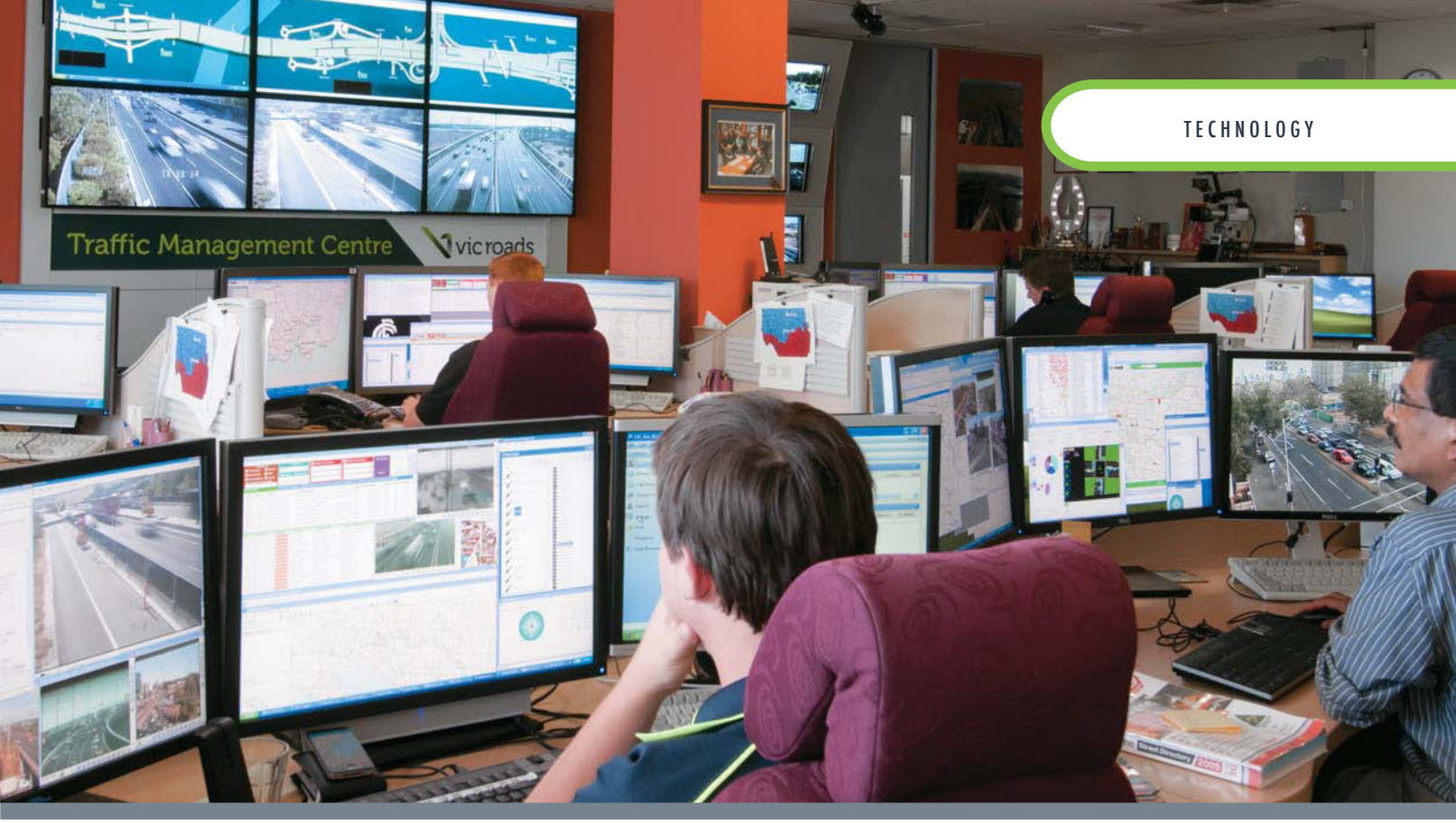
OTHER INNOVATIONS

Ramp metering is another traffic management technique being used to enhance safety and traffic management. It facilitates the safe and orderly entrance of incoming traffic into the freeway traffic stream. Overseas studies, as well as local experience, show that among the key benefits is smoother traffic flows. There are over 100 such installations around the Melbourne metropolitan region.

Elsewhere, active advance railway crossings are being introduced to some 200 sites in rural Victoria. These purpose-built control devices, which are linked to the rail system, feature warning indicators that are visible on approach to the crossing and are activated prior to the level crossing control becoming active. Some crossings also have rumble strips on approach, and some signs can be monitored remotely by VicRoads.

One of the most significant interventions in managing the road system is emergency vehicle pre-emption. This is where signals from emergency vehicles can trigger traffic light changes to save the emergency vehicle crucial time, as well as providing it with safer passage. Emergency vehicles have been fitted with transmitters with a range of some 500 metres. The system is supported by, and integrated into the emergency services systems.

Technologies are also being used by VicRoads to improve safety for pedestrians using the road network. For example, intelligent pedestrian crossings use microwave signalling to detect pedestrian traffic, and use the information gathered to extend or reduce crossing times. They also forewarn of impending traffic light status changes in order to enhance pedestrian confidence and safety.



ONE OF THE MOST SIGNIFICANT INTERVENTIONS IS EMERGENCY VEHICLE PRE-EMPTION, WHERE SIGNALS FROM EMERGENCY VEHICLES CAN TRIGGER TRAFFIC LIGHT CHANGES TO SAVE THE EMERGENCY VEHICLE CRUCIAL TIME, AS WELL AS PROVIDING IT WITH SAFER PASSAGE.

Meanwhile, other devices are being used to provide crucial information to drivers. For example, internally lit road studs make it easier for the motorist to accurately see the road in times of compromised visibility, such as during poor weather conditions, and in instances of increased danger, such as such as hazardous curves, pedestrian crossings and lane changes.

Similarly, the Drive Time Traveler Information System assesses point-to-point travel time under the prevailing conditions and advises motorists at various points in the system via large electronic signs along motorways. Commercial arrangements are in place with some third parties to utilise a variety of data collected from the road system by VicRoads. This may soon be supplemented by CCTV information.

Finally, measurement and identification of all road users - and particularly heavy vehicles, which present acute challenges to road network management and safety - can provide enhanced data so as to better manage the road system. New technologies to progress this are being evaluated on an ongoing basis.

ABOVE AND TOP: Some 400 CCTV cameras located at strategic points on the network are continuously monitored by the Traffic Management Centre in Kew.

These include radar-based products and pictograms (diagrams and other images), which can quickly convey crucial information to system users in a readily understood graphic format.

Indeed, the pipeline of other future innovation will be transformational, with more comprehensive data collection, analysis and utilisation available. This will allow road and traffic management techniques, road safety measures and freight monitoring to be greatly refined and improved, leading to better outcomes for motorists and road users.

A LAND OF FLOOD AND FIRE

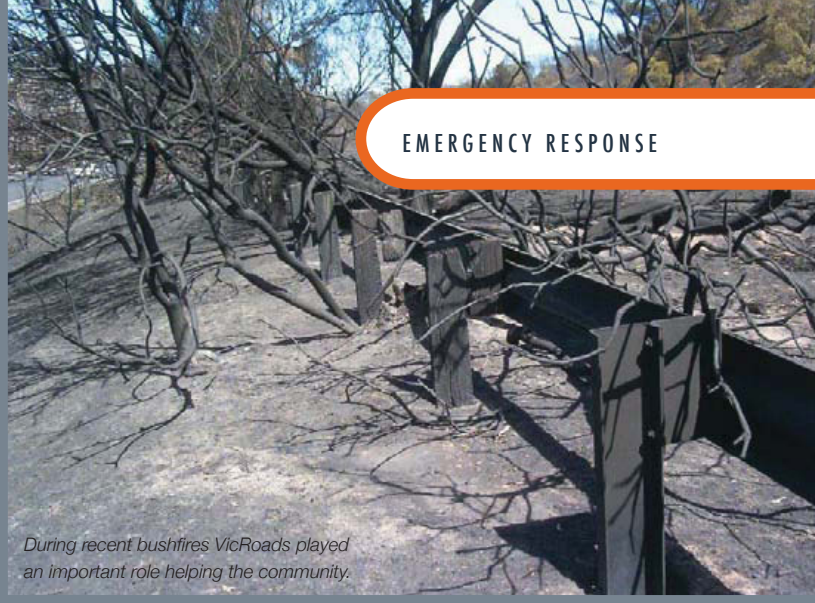
DURING THE BUSHFIRES AND FLOODS THAT AFFECTED VICTORIA BETWEEN 2009 AND 2011, THE TEAMWORK, DEDICATION AND INNOVATION OF VICROADS STAFF WAS ON DISPLAY, WRITES HAGEN RIECK.

Dorothea Mackeller's ode *My Country* typifies how Australians tend to reflect on our experiences with nature and her forces. That line about droughts and flooding rains rings true when we cast our minds back to the devastating natural disasters that swept through Victoria between 2009 and 2011.

While the floods and bushfires in Victoria during these times brought much loss and suffering, they also saw an abundance of examples of that Australian quality of "helping out our mates".

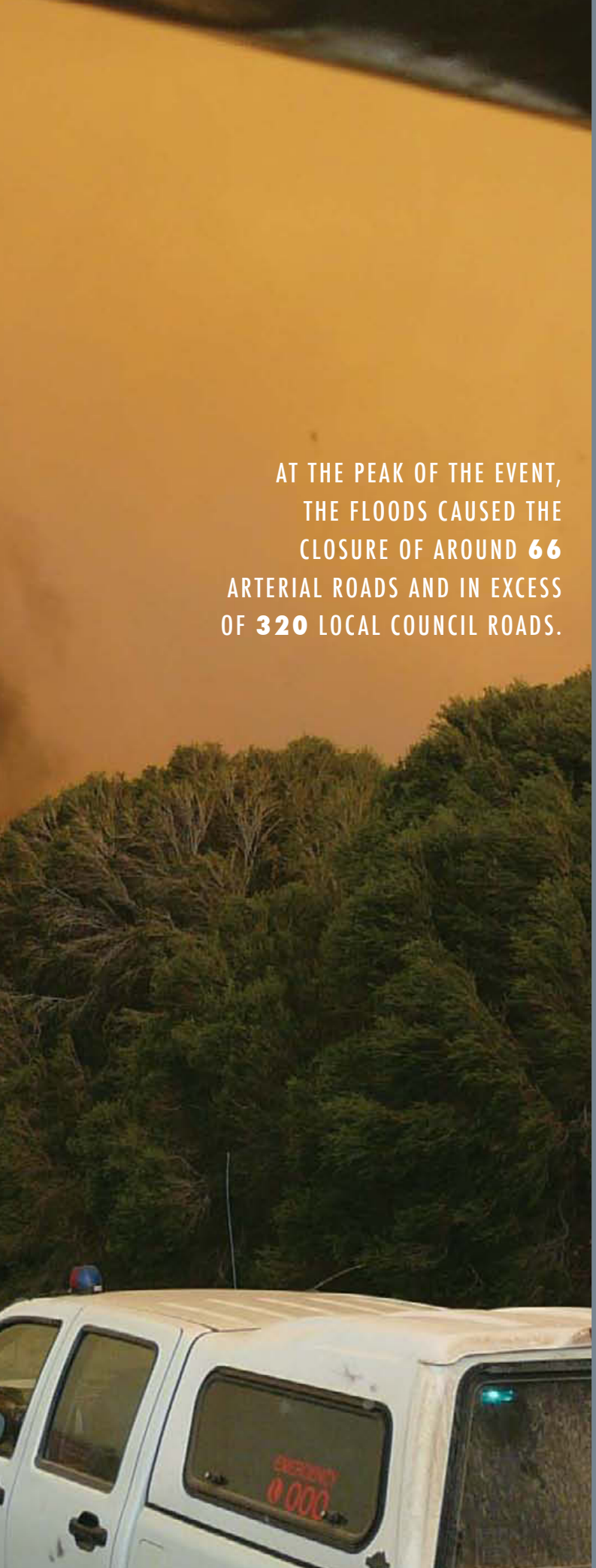
During these times VicRoads played an important part. While most us saw it as just doing our jobs, it was not as simple as that. Take for example the unprecedented rainfall spanning 2010-11, which caused significant damage to the major and local road networks (mostly in our regional areas), presenting exceptionally challenging working conditions and requiring different technical solutions.

While it needed a whole of VicRoads' approach to get through this devastating period, it was largely our regional areas that found themselves at the coalface day after day.



During recent bushfires VicRoads played an important role helping the community.

AT THE PEAK OF THE EVENT, THE FLOODS CAUSED THE CLOSURE OF AROUND **66** ARTERIAL ROADS AND IN EXCESS OF **320** LOCAL COUNCIL ROADS.



The tireless dedication and commitment of VicRoads staff to making sure they connected communities with their families, their lives and their jobs as quickly as possible was invaluable.

Although the following examples highlight some of the experiences in the Northern Region, they are not far removed from what all regions experienced.

There are many examples of VicRoads regional staff working feverishly in managing public safety and travel flow as well as assessing damage, repairing assets and communicating road closures during these emergencies. The following is a nod to everyone involved during those times.

BUILDING A BRIDGE

Working for VicRoads, particularly in the regions, means that every now and again you'll likely be confronted with significant challenges; the January 2010 floods were just that.

When the floods hit, the teams at Northern and Western Regions and their SprayLine Road Services work groups swung into action. The challenge was to ensure that the road conditions were safe and that the locals were not isolated any longer than necessary.

While the rains had stopped, the impacts on our regional road network lingered, and in some locations, remained for many months.

The initial focus for the regions was safety. That meant coordinating people and resources, having surveillance and even Transport Safety Services (TSS) staff working around the clock, closing roads, setting up detours and even managing to begin the massive task of inspecting the network.

Next was beginning the huge job of fixing and opening roads as quickly as possible to provide important access for local communities. That required real teamwork. A great example of this was the teams at Northern and Western Regions and their SprayLine Road Services work groups assembling a "Bailey bridge" near Kerang.

This type of bridge is commonly used by VicRoads in emergency situations where we need to quickly restore access to communities.

Tract Consultants

Award winning Landscape Architects, Urban Designers & Town Planners.

Tract Consultants congratulate VicRoads on its 100th anniversary.

Tract enjoys a long standing relationship with VicRoads having been involved on several award-winning VicRoads design projects including the Eastern Freeway and the Princes Highway, Geelong.

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e *melbourne@tract.net.au*
www.tract.net.au

The teams at Northern and Western Regions and SprayLine Road Services assembled a "Bailey bridge" near Kerang.

In just over a day this temporary bridge was assembled and erected over the Murray Valley Highway to provide emergency services and local residents with important access to Kerang.

Coupled with these types of activities was the collective efforts in working with communities and importantly keeping them informed, with communications playing a vital part in the recovery phase.

While the bridge was only in place for roughly two weeks, it proved vital to the local community.

SWAMPED

The Bridgewater-Maldon Road is located in a natural basin called Bells Swamp, which is approximately 15 kilometres north of Maldon, in Central Victoria.

The road is an important link between the Calder Highway and forms a strategic freight route from northern Victoria to the ports of Geelong and Portland. It carries a high proportion of commercial vehicles, with a focus on agricultural and general freight. It is also a school bus route, a major access that links the popular tourist towns of Dunolly and Eddington with Maldon and Castlemaine.

In January 2011 a 1-kilometre stretch of the road was severely affected by the flooding. In essence the swamp filled to its highest level since European settlement and covered the road for months.

Local councils, communities, businesses and the freight industry were very concerned about the closure and the long term impact that the 20 kilometre-plus detours were having.
Local and state government politicians and community members sought urgent action to have the road re-opened, particularly to meet the expected heavy transport from the grain harvest season at the end of November 2011.

A saturated road surface, which was like quicksand in most places, water lapping at the edge of the seal, significant environmental constraints plus an unwelcome additional 40 mm of rain in October 2011 added to the challenge to reopen the road.

VicRoads made a commitment to have the road reopened by mid November 2011. A flurry of activities quickly followed, including the development and consideration of all possible options.

To deliver on the commitment required strong relationships and discussions with VicRoads' major stakeholders, including Department of Sustainability and Environment (DSE), Parks Victoria, Council and the local Catchment Management Authority. These relationships allowed the teams to carry out all the required planning to build a new road quickly including environmental, flora and fauna studies and the all important pavement testing.

Funded by the Australian and Victorian Governments through the Natural Disaster Relief and Recovery Arrangements, works with totalling more than $750,000 were able to get started in late October 2011 and the road was officially opened to traffic on the 16 November 2011 – just in time for the all important grain harvest season.

The end result was that VicRoads was able to achieve a tailored solution for the Bridgewater-Maldon Road through Bells Swamp in quick time.

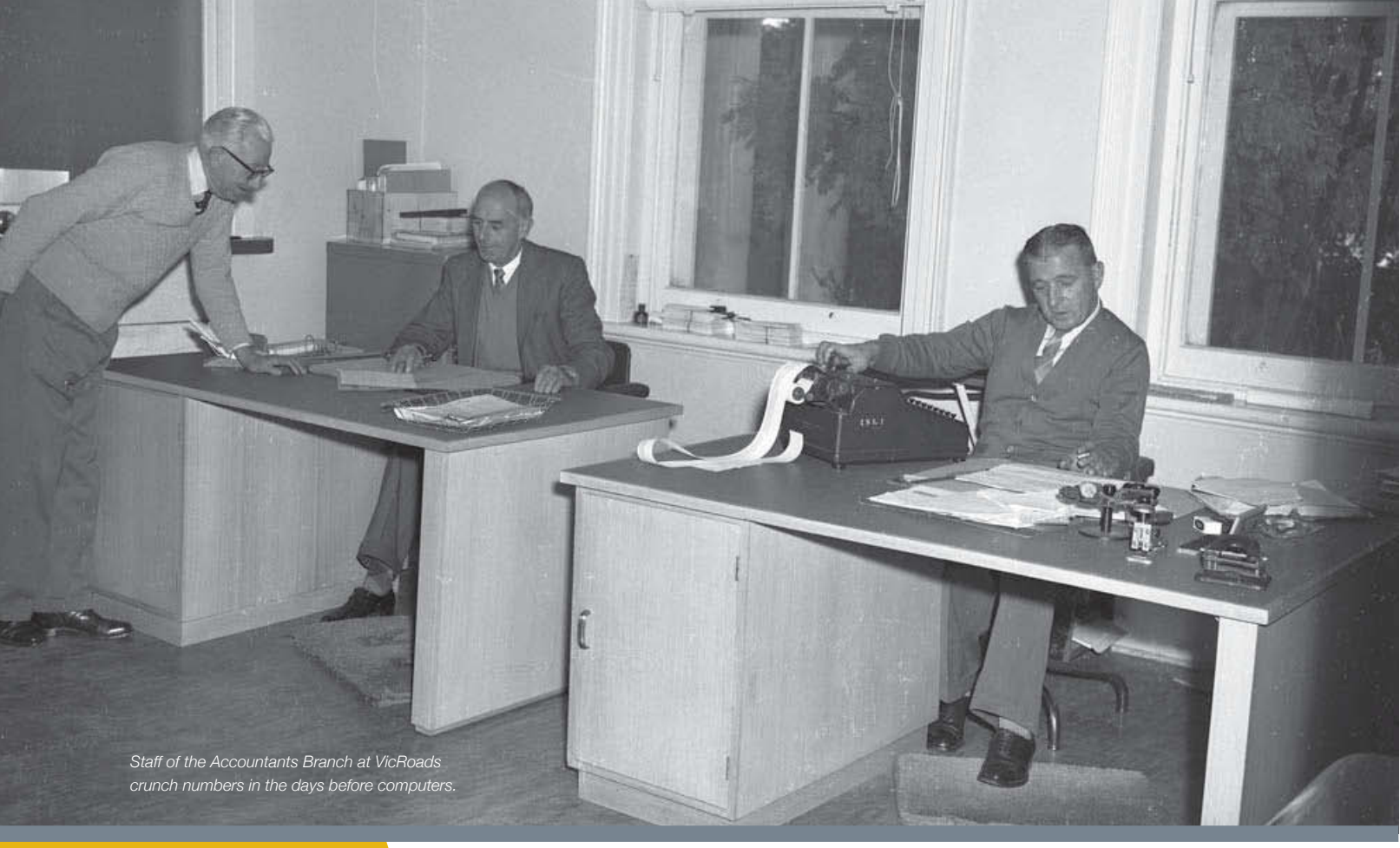
THE NUMBERS INVOLVED

It's worth putting these efforts into some context, in terms of what was happening during this time in other parts of the state. Here are some statistics to get an idea of the impact these floods had on services and infrastructure:

- Over 400,000 views of the Flood Traffic Alert page
- At the peak of the event, the floods caused the closure of around 66 arterial roads and in excess of 320 local council roads
- In the first week of the flood event, the VicRoads Traffic Management Centre took over 18,500 calls from the public, with 3,299 the maximum daily peak. This was approximately a 50 per cent increase for weekly calls received during the 2009 Black Saturday fires.

It was a long, wet road to recovery for all the regions and there were plenty of examples of "getting on with the job", far too many to cover here. The key to all of them, however, was the underlying commitment of the VicRoads family to ensure it re-connected communities as quickly as possible.

Hagen Rieck is Communications Officer, Northern Region, VicRoads.



Staff of the Accountants Branch at VicRoads crunch numbers in the days before computers.

MAKING IT COUNT

THE ACCOUNTING AND FINANCE DIVISION OF VICROADS HAS EVOLVED OVER 100 YEARS TO ACCOMMODATE ORGANISATIONAL CHANGES AS THEY OCCURRED AND TO INCORPORATE NEW TECHNOLOGIES, WRITES DOUG THOMPSON AND MARK DALE.

In 1963 the Country Roads Board (CRB) publication *Fifty Years of Progress* stated: "The accountant is responsible for the recording of the CRB's receipts and expenditure, for co-ordinating records with state treasury and municipalities, for the operation of the board's costing system, and for the control of and accounting for stores."

That role has evolved over the years, reflecting changes in financial reporting requirements, technology and the structuring of the organisation into business areas operating along commercial lines. As the organisation grew, so too did the role of the Accountants Branch, which progressively needed to evolve and expand its skills. In the years 1913 to 1924, the majority of works carried out on the state's main roads was undertaken by councils (in excess of 90 per cent) and therefore the role of the branch was, in the main, limited to the reimbursement and recording of expenditure.

Expenditure incurred by councils on main roads was funded by capital loan funds provided by the State Government. In the very early years, transactions (both expenditure and loan details), were recorded meticulously using quill and ink in ledgers, many of which still exist in the CRB archives, well preserved in leather-bound books.

This position changed rapidly after 1924 when legislation was passed providing for the declaration of state highways, which were to be the direct responsibility of the CRB. This required the branch to account for capital and maintenance works being carried out by the organisation's direct employees. Over time, systems for costing road and bridge works, quarries, bituminous surfacing, precast yards, and plant and equipment were needed, and these were developed and implemented. In addition, these activities required payrolls to be prepared and costed.

By 1963 the functions of the Accountants Branch were diverse and were provided not just in the head office environment but across the State, with the Controller of Stores at the Central Depot Syndal, divisional accountants located at each of the board's eight divisional offices, and with cost clerks located on-site at projects and operational locations.

Whilst the board's ledgers at head office had been mechanised for many years, in 1963 most other accounting, stores and costing records were still manually maintained. It is interesting to note that even in 1963, adding machines were only recent additions to the tools available. Many of the tasks were still carried out by comptometrists and or by clerks doing the arithmetic calculations long-hand.

IN 1970 THE ACCOUNTANTS BRANCH OBTAINED ITS FIRST CALCULATOR, A CASIO MACHINE COSTING SOME $450 – AN EXPENSIVE ITEM IN THOSE DAYS.

As technologies changed so too did the equipment used by the Accountants Branch.

Since 1963 the rate of change has accelerated, with many developments being driven by the merge of functions from other organisations, such as the roads function of the Board of Works in 1974, the West Gate Bridge Authority in 1982, the Road Safety and Traffic Authority (ROSTA) in 1983, and the merger of the Road Construction Authority (RCA) and the Road Traffic Authority (RTA) in 1989. Furthermore, the move to ensure accountability, transparency and to operate along more commercial lines has encouraged significant changes to be adopted by the Accountants Branch.

For example, in 1969 the Costing Section was fortunate to obtain the use of a Friedan machine to carry out calculations. On the other hand, cost clerks, who were mostly located in the field, were not officially provided with adding machines or calculators until well into the 1970s.

In 1970 the Accountants Branch obtained its first calculator, a Casio machine costing some $450 – an expensive item in those days. Following the CRB assuming the management of the West Gate Bridge in 1982, the branch purchased its first Compaq computer, which enabled the WGB loans to be computerised. This meant the task of calculating monthly interest payments was reduced from many days each month to a respectable 45 minutes each month.

Elsewhere, while we are all now used to our salaries being paid directly into our bank account, historically this was not the case and the CRB, like most companies, paid its employees in cash. This was achieved by requesting a security company to deliver the necessary bulk cash to head office or regional offices, at which point CRB officers would place the required cash into each pay packet for distribution. Distribution involved hand delivery to each individual, either in the office or at a depot or job site – a very time-consuming task.

One of the first sets of accounting records to be computerised involved the earnings and tax records of each employee. Although these records had been maintained by mechanised ledgers since the early 1960s, at the end of the financial year each employee's fortnightly earnings and tax record had to be totalled, balanced and reconciled manually. Only after all records were totalled and reconciled to control ledgers could each employee's group certificate be prepared. This was a very labour-intensive task that had to be completed within a tight timeframe set by the Australian Taxation Office. The computerised version maintained a record of the progressive earnings of each individual, which enabled the automatic production of timely and accurate group certificates. This resulted in the closure of the Tax and Records Section, a trend continued in later years as technology changed.

In the late 1960s and 1970s, the application and allocation of road funds processing had moved from manual systems to computerised ones, initially using punched cards on the CRB's engineering computers – the IBM 1620 being the first used for running financial applications. Before 1972, the allocation of funds to municipalities was carried out by the Allocations Section, located in the Secretaries Branch. In 1972, a decision was made to move this group to the Accountants Branch. This move was very significant in the overall management and financial reporting of the funds and funding sources. The general approach was the precursor to the Finance Branch facilitating the budget process.

From the late 1960s to the early 1980s, CRB accounting and financial reporting was driven by the fact the CRB was an outer-budget, semi-government instrument with earmarked sources of revenue from the state and federal governments.

CRB accounting systems were not driven by commercial accounting principles and double-entry accounting requirements, debtors and creditors control, asset-recognition and road-infrastructure valuation, but rather by fund accounting requirements and expenditure reporting of road grants by road classification, state and federal.

This was about to change. In 1983 the State Government brought the CRB from the outer-budget sector to the inner budget sector to give it greater control of the organisation and the dollars made available to it. The CRB then became the Road Construction Authority (RCA) and was required to move to a more commercialised accounting approach with the Chief Accountant's Branch, and the rest of the organisation, going through many restructures in the 1980s to accommodate this and the merger with the RTA in 1989. Ledger machinists, accounts and cost clerks would be retrained to computerised systems, a program which was well accepted and implemented.

In 1987-88 the RCA was required to report to government the level of debtors' and creditors' balances as at 30 June and, as a result, it was decided to introduce accrual accounting on a full-time basis. This was achieved by implementing a PC-based financial system, CBA (Corporate Business Application) in regions, projects and other business units. The computerised financial system operated in head office was

One of the first sets of accounting records to be computerised involved the earnings and tax records of each employee.

upgraded to report both cash and accrual figures which, in part, were achieved from data extracted from the CBA systems.

Unfortunately, the approach encountered audit problems at the end of the first year. Audit was reluctant to sign off on the integrity of the reports as they were the product of two "unlinked systems". As a result of this it was decided to introduce a corporate CBA system, which consolidated all subsidiary CBA systems, with all accounting information being entered only once.

In 1989, the RCA and Road Traffic Authority (RTA) merged. The numbers in the branch immediately doubled from about 80 to 160. About 40 of the RTA members belonged to a Revenue Section responsible for functions associated with collection and control of more than $1 billion annually in registration, licensing and TAC fees. As financial functions and payroll functions were consolidated, the numbers gradually reduced over the next couple of years. Many of the functions of the Revenue Section such as bulk processing of dealers' registrations and transfers were contracted out and the section was left with about 10 staff handling post collection problems such as dishonoured cheques and tracing payments that were not allocated correctly.

The next big change occurred with the introduction of the Program and Resource Management System (PARMS) accounting system in 1994. The PARMS system was introduced to replace the many systems in use following the merge of the RCA and RTA. Both organisations had their own software packages and there was an obvious need to have one common system covering all functions. This meant all accounting was incorporated in the one system with many control and
reporting benefits.

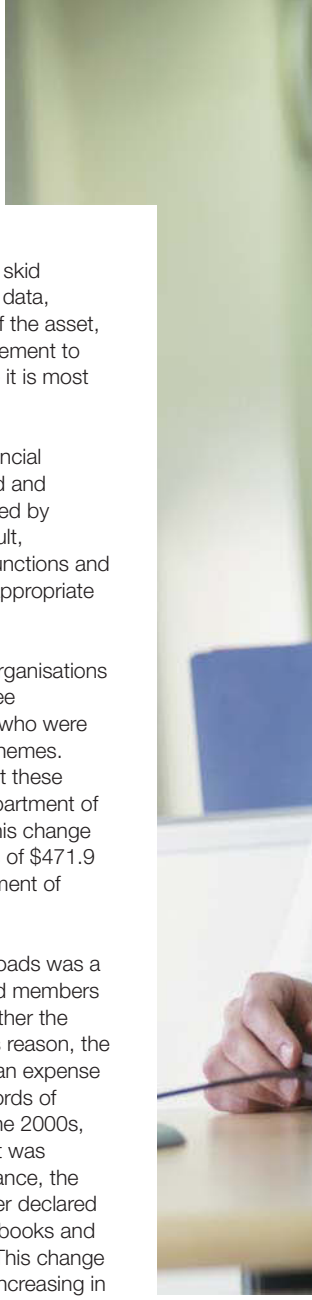
A fully integrated accounting system provided significant productivity improvements, such as reduced reconciliation issues, a reduction in data input duplication and volumes, and improved reporting. In addition, the system enabled all payments

A FULLY INTEGRATED ACCOUNTING SYSTEM PROVIDED SOME VERY SIGNIFICANT PRODUCTIVITY IMPROVEMENTS, SUCH AS REDUCED RECONCILIATION ISSUES, A REDUCTION IN DATA INPUT DUPLICATION AND VOLUMES, AND IMPROVED REPORTING.

to be centralised and made by electronic funds transfer and/or outsourcing cheque production to VicRoads' bankers.
To this end, PARMS was very successful. For example, in the case of payroll systems, it replaced 28 different payroll packages or local versions.

The change in program delivery from being carried out by direct labour to largely being outsourced to contractors had a dramatic impact on the structure of accounting services throughout the organisation. Gone were the roles of cost clerks, storemen, ledger machinists, and comptometrists.

The recognition of the road network as a capital asset in the VicRoads books had been a contentious issue for many years.



Whilst there were many supporters for these assets to be included in the books, the task was not easy and the organisation had some difficulties in attaining acceptance by Audit. In 1996, after many attempts to find an acceptable methodology that would provide a basis on which a value of the road network could be determined, VicRoads was able to produce an annual report which included the road network at a specified value without its accounts being "qualified" by the Auditor General. The value of these assets recognised in VicRoads' books at that time totalled $9.2 million.

The valuation of the network was not considered the most important issue, but rather, as the basis of determining the valuation, which was condition based. In other words, the road network was monitored bi-annually to determine the condition of the pavement and surface.

IN 2004 THE VICTORIAN GOVERNMENT IMPLEMENTED A FINANCIAL MANAGEMENT COMPLIANCE FRAMEWORK TO ENSURE SOUND AND BEST PRACTICE FINANCIAL MANAGEMENT WAS BEING ADOPTED BY GOVERNMENT DEPARTMENTS AND PUBLIC ENTITIES.

This was achieved by measuring the rutting, cracking, skid resistance, and formation of each road kilometre. This data, while providing the basis to determine residual value of the asset, more importantly provided a significant tool for management to direct limited maintenance funds to those areas where it is most warranted.

In 2004 the Victorian Government implemented a Financial Management Compliance Framework to ensure sound and best- practice financial management was being adopted by government departments and public entities. As a result, VicRoads undertook a detailed review of its financial functions and significant work was completed to ensure that it had appropriate policies and systems in place.

Since the late 1980s, VicRoads and its predecessor organisations recognised in their financial records unfunded employee superannuation liabilities relating to retired employees who were members of Victorian Government superannuation schemes. In 2004, the Victorian Minister for Finance decided that these liabilities should be recognised in the books of the Department of Treasury and Finance rather than VicRoads' books. This change in policy resulted in unfunded superannuation liabilities of $471.9 million being transferred from VicRoads to the Department of Treasury and Finance.

For a number of years the accounting for land under roads was a contentious issue due to a number of practitioners and members of the valuation profession having concerns as to whether the value of such land could be reliably measured. For this reason, the value of land under declared roads was written off as an expense rather than recognised as an asset in the financial records of VicRoads and its predecessor organisations. During the 2000s, VicRoads pursued this matter and in 2008, agreement was reached between the Department of Treasury and Finance, the Victorian Auditor General and VicRoads that land under declared roads should be recognised as an asset in VicRoads' books and agreement was reached on a basis of measurement. This change in accounting treatment resulted in VicRoads' assets increasing in value by $14.7 billion at that time.

The mix of funding provided for roads has changed significantly over the years. In the early years, the CRB retained registration and licence fees and also received government grants in the form of "loan funds". Over time, the registration and licensing fees have been transferred to the State's Consolidated Fund and VicRoads now receives an output appropriation to partially fund its operations. During 1986-87, legislation was passed to transfer responsibility for outstanding "loans" from the CRB to a central government department. The value of loans previously recorded in the CRB accounts was converted to "contributed capital" as equity held by the Victorian Government.

Although the relative sharing of responsibility for road funding has varied over time, the Commonwealth Government has almost always provided some form of direct road funding to the states under a variety of different programs. Initially, Commonwealth funding was intended for improvements and not permitted for maintenance of roads. However, following concerns raised by the states, these restrictions were subsequently relaxed and today the Commonwealth provides a specific allocation towards the maintenance of roads on the "national network".

The impact of technology continues to change how VicRoads' accountants work.

In 1993 the government established a Better Roads Victoria Trust Account which provided for a levy (3 cents per litre) on petrol and diesel fuel sales to be held in trust and used to fund construction and maintenance of roads. Although the levy was abolished in 1997, the Victorian Government has continued to make equivalent payments into the trust account. An increase in registration fees from 1 July 2002 was also hypothecated to the trust account, increasing the funds available for roads. In addition, from 1 July 2005, all revenue raised from traffic cameras and on-the-spot speeding fines has also been paid into the trust account and used to fund road-related activities.

Since 2004-05, the Victorian Transport Accident Commission has provided funding to VicRoads to undertake a variety of improvement projects targeting enhanced safety benefits. There is no doubt the accounting role within VicRoads will continue to evolve to accommodate the changed environment and the advance of technology. The impact of smart phones, tablets, card facilities, apps and the like are already changing the way accountants operate. VicRoads has always been at the forefront of adopting new technology and no doubt this will continue.

Doug Thompson worked in the finance area for more than 50 years and retired in 2004 as Director of Finance. Mark Dale is Chief Financial Officer at VicRoads.

CONTRIBUTING TO A GREENER FUTURE

ENVIRONMENTAL SUSTAINABILITY AT VICROADS HAS EVOLVED AND NOW INCLUDES TRAFFIC NOISE, AIR POLLUTION AND WATER MANAGEMENT. BY MEGAN WADDELL.

The environmental impacts of roads can be significant. Inappropriate road design can divide natural ecosystems and impact on cultural heritage. Non-renewable resources and fuels used in road construction increase greenhouse gas emissions, contributing to the effects of climate change. Furthermore, the operation of a road means that vehicles emit a range of pollutants including greenhouse gases, adding to congestion as well as traffic noise.

These impacts provide significant opportunity for VicRoads to contribute to a more environmentally sustainable future. 'Making the road system more environmentally sustainable' is one of the four objectives of the 2012-2014 VicRoads' Strategic Directions. To drive this objective, VicRoads has implemented the 2010-2015 Sustainability and Climate Change Strategy, which ensures that VicRoads tackles the impacts of climate change, reduces greenhouse gas emissions and minimises its own impact on the environment.

Over time, environmental issues have evolved and will continue to emerge. Although protecting the natural environment and cultural heritage is still fundamental to VicRoads' operations, the environmental response has expanded to include broader sustainability issues. These include traffic noise, air pollution from transport vehicles, integrated water management and global environmental issues including climate change mitigation and climate change adaptation.

A PROACTIVE RESPONSE

As such, the way in which the Environmental Sustainability unit within VicRoads operates has also changed. It has grown and has moved from a traditionally reactive approach to the development of systems that embed environmental sustainability across the entire organisation. This approach was intended to ensure that each area within VicRoads is aware and responsible for its own environmental impacts.

The more recent change has seen the Environmental Sustainability unit become part of the Strategy and Planning Division to reflect not only VicRoads' commitment to the environment, but also the need to embed sustainability principles in all aspects of VicRoads operations including the planning, provision, management and use of the transport system.

Anthonys Cutting welcome to country sign.

DIRECTION AND INNOVATION

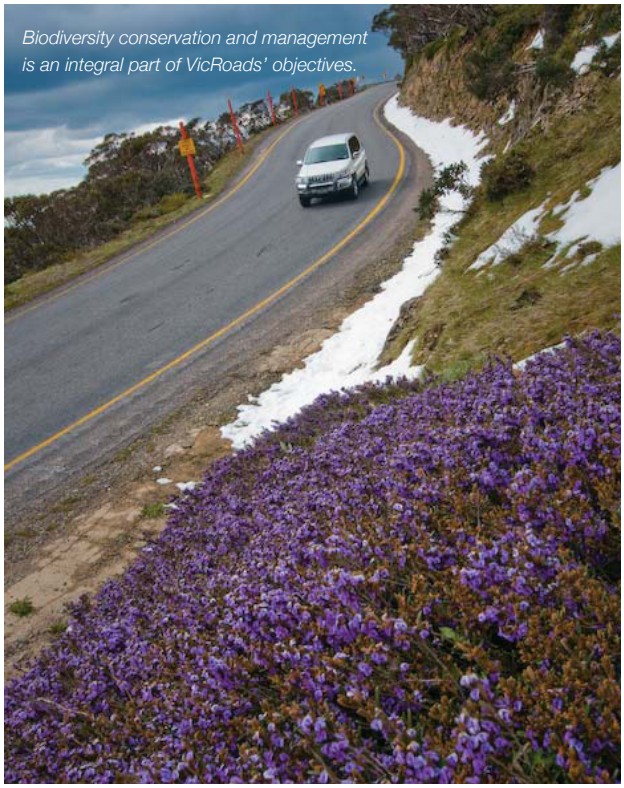
Over the years, the Environmental Sustainability unit has developed many guidelines that provide advice to road design and construction projects. Furthermore, tools have been created that provide incentives and direction for innovative behaviour change. Among these initiatives are:

- **INVEST**

INVEST is a sustainability rating tool created by the Environmental Sustainability unit. It is the first and only sustainability rating tool for road projects in Australia. To drive innovation and leadership within the road industry, the tool has been designed to rate road projects out of five stars.

INVEST star ratings are achieved through assessing a wide range of sustainability aspects related to a road. It aims to enhance road planners' and engineers' understanding of sustainability while also promoting innovation and leadership. It is expected that the tool will deliver large-scale results and lead to significant environmental and social benefits.

A greater emphasis is being placed on effective management of water resources.



Biodiversity conservation and management is an integral part of VicRoads' objectives.

Last year, the INVEST tool was shortlisted as a finalist in the Banksia Awards, which are regarded as the most prestigious environmental awards in Australia. INVEST was short listed in the Built Environment Award – Harmonious Manmade Landscape category, which "recognised leadership and innovation by integrating sustainable principles and practices in designing, building and retrofitting today, the homes, suburbs, businesses and infrastructure of the future".

• Carbon Gauge

Carbon Gauge was created as a user-friendly tool that estimates the whole-of-life greenhouse gas emissions associated with a road project. It is now available across Australia and New Zealand. With increasing use of this tool, it is expected that greenhouse gas emission benchmarks and targets will be established for VicRoads road projects. This will enable VicRoads to assess and reduce its emissions and contribution to climate change impacts.

• Centre for Excellence for Environmental Sustainability

The Centre for Excellence for Environmental Sustainability has been created in 2012 to develop the skills and understanding of environmental sustainability within VicRoads. It comprises training modules that span a variety of aspects of environmental sustainability.

These are tailored to address specific environmental obligations and responsibilities associated with the road network. They are delivered through a variety of means, from classroom-based attendance, to online training and self-paced learning.

• Cultural heritage education
The Environmental Sustainability unit continues to develop a number of initiatives that aim to enhance the community's understanding of cultural heritage. This education is important as cultural heritage contributes to society's sense of identity and connection to its history. In 2012, the Environmental Sustainability unit developed Cultural Heritage Interpretation Guidelines, which aim to assist in the design of interpretive signs installed on Victorian roadsides and rest areas. These interpretive signs will contain information on the area's Indigenous and non-Indigenous cultural heritage.

Also during 2012, VicRoads installed its first Welcome to Country sign as part of the Western Highway – Anthony's Cutting Realignment project. Undertaken in consultation with the Wurundjeri Tribe Land Compensation and Cultural Heritage Council, these signs promote Victoria's Indigenous heritage and feature a welcome message from the local traditional owners.

• Biodiversity Values
Biodiversity conservation and management is an integral part of VicRoads' objectives. VicRoads recognises the importance of protecting and where possible, enhancing biodiversity.

THE CENTRE FOR EXCELLENCE FOR ENVIRONMENTAL SUSTAINABILITY HAS BEEN CREATED IN 2012 TO DEVELOP THE SKILLS AND UNDERSTANDING OF ENVIRONMENTAL SUSTAINABILITY WITHIN VICROADS. IT COMPRISES TRAINING MODULES THAT SPAN A VARIETY OF ASPECTS OF ENVIRONMENTAL SUSTAINABILITY.

When VicRoads is considering the clearance of native vegetation during its activities, a hierarchical approach must be considered. Firstly, adverse impacts must be avoided, especially through vegetation clearance. If VicRoads can't avoid impacts, impacts are minimised through careful planning and road design. To direct staff and contractors to activities that minimise biodiversity impacts, a number of guidelines have been produced, including the recent Fauna Sensitive Road Design Guidelines.

If clearing must occur, native vegetation offsets are secured. The clearing must be offset through the Net Gain process.

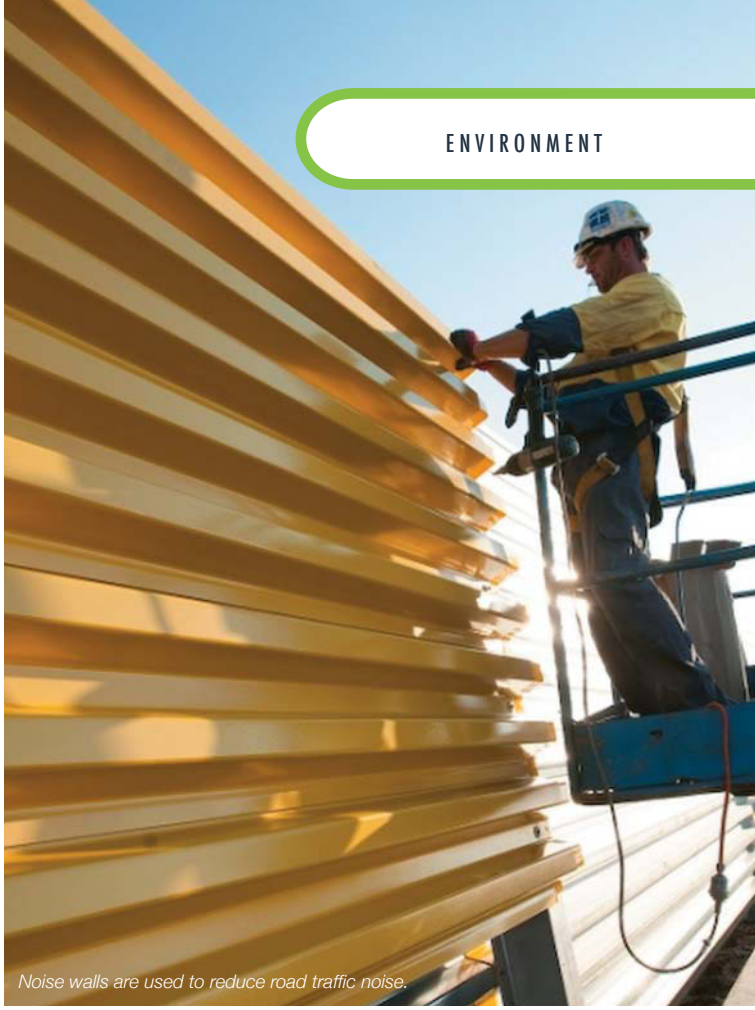
These offsets are areas of remnant vegetation or re-vegetated land that is protected via a covenant.

• Integrated Water Management
In recent times, a greater emphasis is being placed on effective management of water resources. This is in response to current and emerging issues including drought effects of climate change and population growth.

Through the Integrated Water Management Guidelines created by the Environmental Sustainability unit, VicRoads takes a holistic approach to water management in the construction, operation and maintenance of roads. An integrated approach will help ensure that the water cycle is considered as a whole, in keeping with the fundamental principles of Water Sensitive Road Design in addition to urban and regional water management.

• Traffic Noise
Road traffic noise can be a major nuisance, particularly in residential areas. VicRoads is working to reduce overall traffic noise levels and limit noise impacts from new or upgraded roads. The Environmental Sustainability unit administers the Traffic Noise Reduction Policy on behalf of VicRoads. The Policy details acceptable noise limits. If these limits are exceeded, the Environmental Sustainability unit provides advice on noise reduction measures. These could include noise walls and low noise road surfaces.

Megan Waddell is an Environmental Scientist at VicRoads.


Noise walls are used to reduce road traffic noise.

TODAY AND THE FUTURE

DURING THE NEXT 20 YEARS VICROADS WILL LIKELY WITNESS AS MUCH CHANGE AS IT HAS IN THE WHOLE OF THE LAST CENTURY, SAYS GARY LIDDLE.

As this magazine demonstrates, VicRoads is an ever-changing organisation. Much as the Country Roads Board of 1913 bears little resemblance to the VicRoads of today, so too will the VicRoads of the future continue to grow and change.

A century seems like a long time; or so I thought until I realised that I have been at VicRoads for 42 of those 100 years. You can imagine over that time myself and the many other long standing employees have seen a lot of change – not only in the way we do things, but what we actually do.

It wasn't until the early 1980s that VicRoads took over licensing; I sat for my licence test at the Brunswick West Police Station. I still remember I was so terrified by the reversing test that my foot was shaking on the clutch and I stalled the car twice; I wouldn't have got my licence doing that these days.

Today, VicRoads registration and licensing processes more than 22 million registration and licensing transactions each year through a network of more than 40 customer service centres, two major call centres and the VicRoads website and mail; a pretty big change in just 30 years.

Along with our service provision, the amount of arterial road has increased to over 22,000 kilometres. In the 1970s, a mate and I drove to Rutherglen to the wine festival and the Hume Highway still had not been duplicated – it was literally bumper to bumper traffic all the way from Melbourne to Rutherglen. That is really what it was like across the state. Now, 40 years later I can drive from Albury to Trafalgar without going through a set of traffic lights. In that time we have been able to construct a world-class road network, seamlessly connecting the entire state.

While these changes have been significant and crucial for the development of the state, looking forward it is clear that VicRoads faces many more changes as new technologies emerge and the community changes and grows.

Gary Liddle, the Chief Executive of VicRoads. LEFT: The amount of arterial road has increased to over 22,000 kilometres.

WHAT I HAVE LEARNT FROM LEADERS

Over my career I have learned from many other leaders, each with their unique leadership styles: some good and some bad. However, all have helped shape the way I lead today.

Need for empathy
Compassion and understanding are extremely important in leadership. I recall in my late 20s I was struggling with a project I was working on. Luckily, two of my managers recognised I needed help. They both reached out to me to help me work through the situation. The care and understanding they offered was invaluable to me overcome my struggle. It also achieved the best outcome for the organisation by getting the best out of me.

Support people in their careers
Leadership means being able to foresee the potential in others. Many past leaders of this organisation offered me opportunities to advance my career. The virtue in these opportunities was that even though I may not have had all the skills required at the time, they saw that providing challenges and experiences helps to develop employees.

Respect all (and make sure to show it)
I recall one leader who did not show respect for staff and, as a result, staff felt a lack of trust in him and did not raise issues with him.

Be aware of the politics of a situation
I am not talking about the capital P type of politics. I have found that the best way to resolve problems and be innovative in all situations is to take a step back and consider the varying objectives and viewpoints of each party involved. To make an organisation work, you have to be able to understand where the best compromise can result from conflicting opinions.

This will present new challenges as we strive to meet the needs of an increased population, adapt to evolving technologies, respond to environmental concerns and road safety considerations, and effectively utilise the existing road space.

Things like the amount of space currently standardised between the road edge and abutting trees, a policy that has greatly reduced road trauma in our state, will need to be reviewed because, environmentally, the increase in traffic and infrastructure requires more trees. We need to look for new ways of ensuring safety is not compromised by utilising space more efficiently, and look at new technology and planning.

The same is true with the relationship between different transport modes. Until recently, rail and road have operated quite seamlessly. However, over the past decade both public transport patronage and road use have grown, resulting in issues where the two cross over - level crossings. While this problem is being addressed currently with a program of rail grade separations, there will be many other examples ahead that will require us to think more holistically to manage the resources we have.

The same will apply to our customer service provision for registration and licensing, developing new, more efficient and more far reaching ways to serve an increasing population.

While the way we build roads is unlikely to change over the next 20 years (given it is currently not so different from the Romans) vehicle technologies, commuter behaviours and safety standards will. With that in mind I asked experts from around the business what they believe the next two decades may hold:

> A VIEW OF THE FUTURE OF ROAD PLANNING

In the past, VicRoads built and maintained the major road network using predominantly in-house resources. Today, VicRoads manages a marketplace of resources to deliver best value outputs and operations.

Over the next few decades, it is clear that:

- Roads will remain an adaptable piece of transport infrastructure used for private travel, freight movement, public transport and other purposes.

- Private sector involvement in the provision and funding of infrastructure will become more important. Alternative means of accessing this involvement and funding need to be developed and assessed.

- Road users will increasingly seek information about roads and travel conditions from private sector suppliers who can fund its capture from pervasive technologies by selling it to the public and industry.

REBUILDING THE NATION

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> A VIEW OF THE FUTURE OF CUSTOMER SERVICES

VicRoads registration and licensing customer services are under increasing demand from a growing, ageing, more culturally and linguistically diverse population; multiple and complex policy and regulation changes; and, customer expectations of greater choice, accessibility and convenience, often through modern media – such as mobile devices.

At a time when there are ever more innovative ways to deliver services, the public sector needs to be more creative and collaborative, and less risk averse, not just to survive but to be valued by customers. VicRoads will adapt to address the big challenges that are now common to most public sector service providers through a Service Delivery Strategy made up of three components:

• Self Service Strategy: In the future there will be substantial numbers of customers using more accessible, quick and convenient self service channels.

• Partnership Strategy: Where it is not possible to self-serve, customers will have a greater choice of service provider. VicRoads will share its workload with strategic partners to increase capacity and flexibility to meet rising and fluctuating demand. Greater collaboration with the private sector will increase market competition and open the way for more innovation.

• Property Strategy: By managing demand in this way it will be possible to adopt a more efficient property footprint, with fewer offices in areas of greater activity. The cumulative effect is a more flexible, resilient and sustainable delivery model.

> A VIEW OF THE FUTURE OF ROAD USE

The management of traffic on Victoria's roads is becoming increasingly important as the competing demands placed on the network continue to grow. Use of technology to enable us to manage the roads smarter and more efficiently is vital to providing safe and reliable travel for road users.

The introduction of managed motorways technology – including ramp metering, incident detection and lane use management – onto major Melbourne freeways has already shown tangible benefits in terms of traffic flow and incident management. As the world-wide movement towards cooperative intelligent transport systems makes its way to Australia, we will see cars that can communicate with each other, cars that communicate to infrastructure and, in time, a host of new technologies that today we are only just conceiving.

As you can see in the next 20 years VicRoads will likely witness as much change as in the whole of last century. It will be both exciting and challenging, bringing with it a range of benefits and obstacles. I know that each of these will be met head on by VicRoads and its staff, much like they have for the past 100 years, with ingenuity, with expertise and with pride.

Gary Liddle is the Chief Executive of VicRoads.

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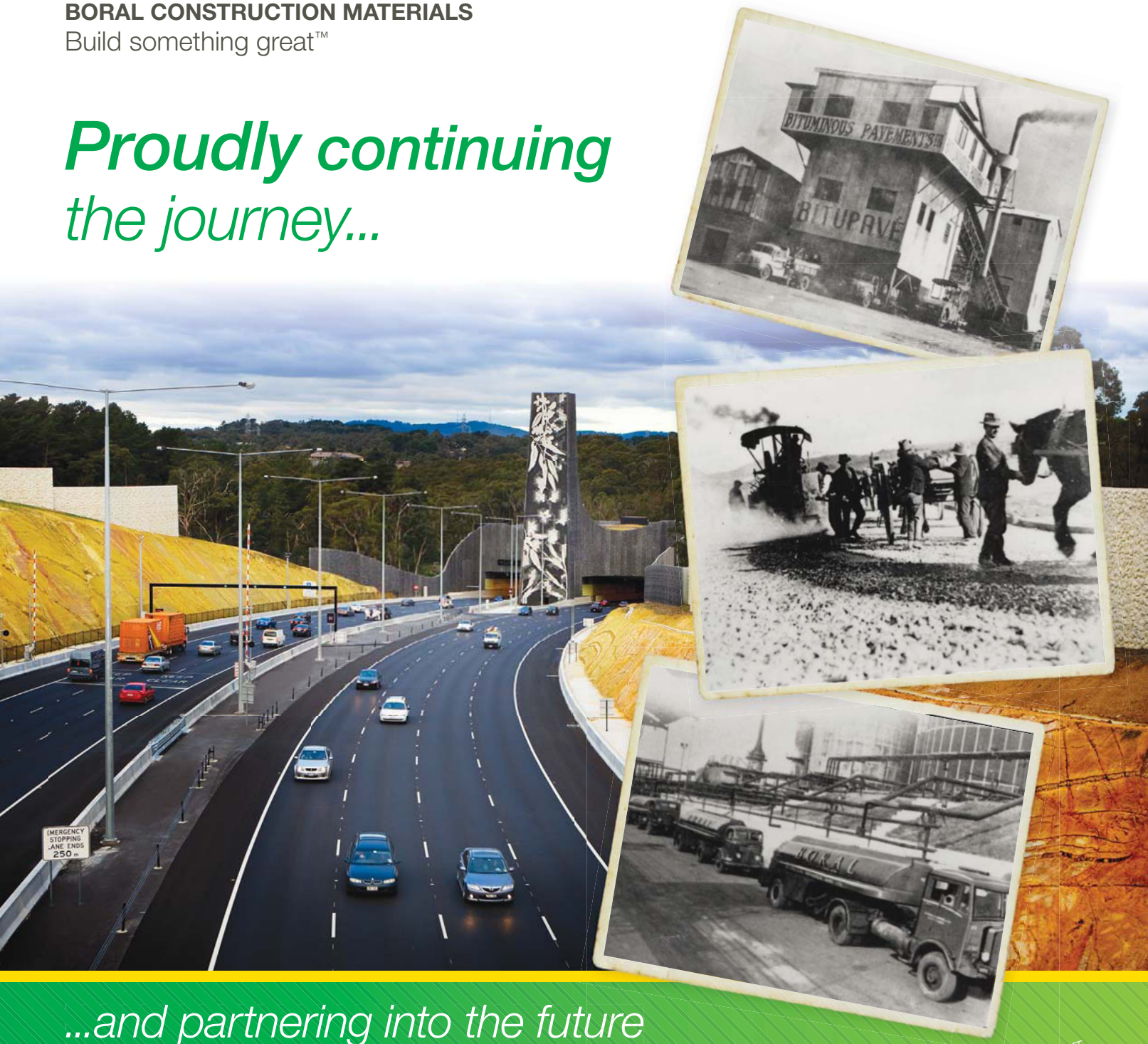

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