Iconic Nation

REPORT

STANDARDS Australia 100

CELEBRATING 100 YEARS 1922-2022

ABOUT STANDARDS AUSTRALIA

Standards Australia is an independent, non-government, not for profit organisation.

We are the nation's peak non-government standards development organisation.

The work of Standards Australia and our staff, stakeholders, Members and contributors enhances the nation's economic efficiency, international competitiveness and contributes to a safe and sustainable environment for all Australians.

Standards Australia's vision is to be a global leader in trusted solutions that improve life – today and tomorrow.

www.standards.org.au

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Australian icons and the standards that protect them

Introduction

How do you create a national icon?

Standards affect us in thousands of ways. They surround us, protecting our everyday lives from the time we get up, to the time we go to bed.

Nearly everything we touch has a standard connected to it: the beds we sleep in, the food we eat, the cars we drive, the toys our children play with, the sport we compete in, and the countless ways we look after the health and safety of those around us.

They touch every Australian industry, from manufacturing and construction to energy and mining; from public safety, communications, and information technology to transport and logistics; and from water and waste services to consumer products, health, and agriculture.

Today, Australia has more than 9,000 standards that cover almost every aspect of our lives. Historically there are thousands more.

The first standards date back to the civilisations of Babylon and ancient Egypt, about 7,000 years ago. Used mainly as a benchmark for weights and measures, they provided a single reference point against which all other weights and measures in society could be standardised.

Today, standards are the cornerstone of Australian industry and society – improving the quality, comfort, and safety of everyday life.

This Iconic Nation Report marks the 100-year anniversary of Australian Standards, which began with the first standardised bolt on the Sydney Harbour Bridge in 1922.

This report looks at the critical role standards play in the creation and protection of some of Australia's most unique national icons, including our Melbourne trams, the Port Arthur heritage site in Hobart, lighting towers at the Sydney Cricket Ground and the city of Darwin, which had to be completely rebuilt after Cyclone Tracy levelled it on Christmas Eve 1974.

Standards are an invaluable resource. Globally there are well over half a million published standards from more than 1,000 recognised standards development organisations.[1]

While most standards are created by looking to the future, some others have inevitably come from largely unforeseen calamities of the past – including cyclones, floods and fires, and safety incidents like road and train accidents.

Lastly, as our society develops and expands, and as we look beyond physical icons to intangible assets – including climate policy, cyber security and sustainability – this report looks at what new standards will be required in the coming decade.

This report should be read by anyone who has an intellectual curiosity of, or professional interest in, understanding how Australians built the country we have today, and how it's predicted to develop in the future.

What is a Standard? Standards are documents that set out specifications, procedures and guidelines that aim to ensure products, services, and systems are safe, consistent, and reliable.

1 https://www.standards.org.au/about/our-history

Executive summary

Over the last 100 years, thousands of standards have been created to help build and protect Australia's most beloved national icons, and given us the confidence to travel, shop and build knowing we are safe from inconsistent or dangerous business practices. Currently there are up to 10,000 available standards across multiple sectors.

Australia's $1.8 trillion economy cannot operate without them today, and yet most Australians are largely unaware they exist.

Of these standards, the overwhelming bulk were designed by forward-planning teams of experts, thanks to advances in science and technology, and our continued focus on solving the challenges of tomorrow.

A minority, an estimated 10%, were developed by learning from largely unforeseen calamities, including natural disasters such as bushfires, floods and hurricanes, along with those from human error.

These include Cyclone Tracy that hit Darwin on Christmas Day 1974, the 1989 Newcastle earthquake and 2011 Brisbane floods, along with the 1970 West Gate Bridge collapse in Melbourne and the 1977 Granville Train disaster in Sydney.

The future, though, is changing at a frantic pace, as the digitisation of the global economy accelerates.

What this means is that over the next 10 years, up to 4,000 countless new standards will be needed to safeguard our way of life and the environment, protecting us from the growing threat of cyber-security and helping introduce the widescale take-up of alternative energy sources such as hydrogen and solar.

Standards now exist across 13 key industries including:

1. Agriculture, Forestry, Fishing & Food
2. Building & Construction
3. Communications, IT & E-Commerce Services
4. Consumer Products, Services & Safety
5. Education & Training Services
6. Electrotechnology & Energy
7. Health & Community Services
8. Manufacturing & Processing
9. Mining
10. Public Safety, Public Administration, Business & Management
11. Transport & Logistics
12. Water & Waste Services
13. Oil & Gas

Key facts

The past

Australia's first standard – introduced in 1922 for bolts on the Sydney Harbour Bridge.

First road safety standards – introduced in 1924 as vehicles permanently took over from the horse as the preferred form of transport.

Icons – Australia's national icons, from the Melbourne Cricket Ground, Sydney Opera House and the Australian War Memorial, to the Port Lincoln tuna pens in South Australia, Port Arthur in Tasmania, Central Park Tower in Perth and Suncorp Stadium in Brisbane, all have either conformed to safety standards in their construction or abide by other safety standards in their maintenance. Australia would not have these icons without our national safety standards.

World War II – one of the most important standards was for screw heads, which had previously been sent to troops in a variety of sizes, which made it harder for them to maintain guns, tanks, planes and ships on the frontline.

Workplace safety – the core of much of today's work health and safety legislation in Australia emerged from a single case at a building site in 1956.

Building safety – the 1970 WestGate Bridge collapse in Melbourne, which killed 35 workers, was the catalyst for landmark reforms in Victorian workplace health and safety standards.

Road safety – new vehicle safety standards progressively introduced from the 1970s lead to thousands of lives being saved in the last 50 years.

Cyclone Tracy – new standards introduced after Darwin was levelled by Cyclone Tracy on Christmas Day 1975 mean that Darwin buildings are now 85% stronger in withstanding future cyclones.

New workplace regulator – Safework Australia is created in 2009 to enforce national standards.

Construction – the National Construction Code was formed in 2011 to enforce existing safety construction standards.

The future

As the Australian economy continues its transformation into the digital age, the following five industries, or sectors, are likely to require up to 4,000 new standards over the next 10 years:

Cyber security – the digitisation of Australia's $1.8 trillion[2] economy is irreversible, and has only just begun.

As the digitisation of our economy accelerates, Australian governments, businesses, charities and consumers are increasingly likely to be the victim of cyber-attacks.

In the 2020–21 financial year, the Australian Cyber Security Centre (ACSC) received more than 67,500 cybercrime reports, an increase of almost 13 per cent from the previous financial year, or one every eight minutes.[3]

The cost to Australia was a staggering $33 billion.[4]

As a result, Standards Australia is partnering with the Internet of Things Alliance Australia (IoTAA), to develop a Smart Devices Cybersecurity Labelling Scheme (CLS).

This will support the development, adoption and implementation of international cyber security standards.

Natural disasters – The financial cost of natural disasters averaged $18.2 billion per year between 2006-2016, equivalent to 1.2% of average Gross Domestic Product (GDP).[5]

2 https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=AU
3 https://www.cyber.gov.au/acsc/view-all-content/reports-and-statistics/acsc-annual-cyber-threat-report-2020-21
4 https://www.cyber.gov.au/acsc/view-all-content/reports-and-statistics/acsc-annual-cyber-threat-report-2020-21
5 Australian Business Roundtable for Disaster Resilience & Safer Communities https://www.iag.com.au/natural-disaster-costs-reach-39-billion-year-2050

That figure is expected to climb to $39 billion a year by 2050.[6]

As a result, National Housing Resilience Guides are being examined to show homeowners how well equipped their homes are to withstand natural hazards such as bushfires, cyclones, storms, tides, and floods.

The environment – to help Australia's transition to net zero emissions by 2050, current initiatives to create new environmental standards include:

Reduction in plastic waste – Standards Australia will partner with the CSIRO and Data61 to produce an interactive circular economy and plastics standards mapping tool to be published jointly with the CSIRO. This could include national standards on reducing plastic waste and encouraging the take-up of recycled content through circular design and reuse.

Reuse standards – Standards Australia is working with key partners to develop harmonised information on current environmental innovations, global standards and opportunities in key sectors such as building, infrastructure and construction, transport, organics and textiles.

Hydrogen energy – Since signing the Paris Agreement in 2015, Australia has been on the path to emissions reduction, including a $1.4 billion investment[7] in hydrogen.

The Australian Government announced in March 2022 that it would spend more than $22 billion on low emissions technologies by 2030, including hydrogen.[8]

To support the widespread take-up of hydrogen energy, actions include:

Hydrogen safety information sheets – to explain how current energy standards apply to hydrogen, including the construction and operation of hydrogen refuelling stations.

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6 http://australianbusinessroundtable.com.au/assets/reports/media-release-nov-11.pdf

7 https://www.industry.gov.au/policies-and-initiatives/growing-australias-hydrogen-industry#:~:text=The%20Australian%20Government%20is%20investing,of%20our%20progress%20so%20far.

8 Minister for Industry, Energy and Emissions Reduction, 29 march 2022, https://www.minister.industry.gov.au/ministers/taylor/media-releases/2022-23-budget-backs-australian-industry-energy-security-and-net-zero-emissions

Dedicated hydrogen industry standards online portal – this will provide a 'one-stop-shop' standards portal for the hydrogen energy industry, providing an easily accessible and interactive platform for stakeholders to understand Australian hydrogen standards and their application.

Critical and Emerging Technologies – to ensure that Australia stays at the forefront of emerging digital technologies, new standards are required in the following areas:

5G Expert Advisory Group – Standards Australia is working with the Australian Government to establish a 5G Expert Advisory Group to provide guidance on future connectivity standards, with a focus on security.

Quantum Computing – a quantum computing position paper is being developed that will examine the opportunities for Australia to help set international standards.

Smart cities advisory group – a Smart Cities Advisory Group has been established to research and develop new national standards for urban living in the 21st century digital age.

Data and Digital landscape – a landmark data and digital landscape resource is being developed that will be presented to key government stakeholders including the NSW Smart Places Advisory Council and the federal and state government Data and Digital Ministers' meeting.

Conclusions

What this means is that for Australia to continue benefiting from quality standards that improve society, drive economic growth and create safer communities, we need a collaborative approach to anticipate future challenges.

For this to happen, the following benchmarks must be pursued:

Government engagement

Greater participation by government, especially departmental/agency policy, and subject matter experts, in the development of national standards.

Industry engagement

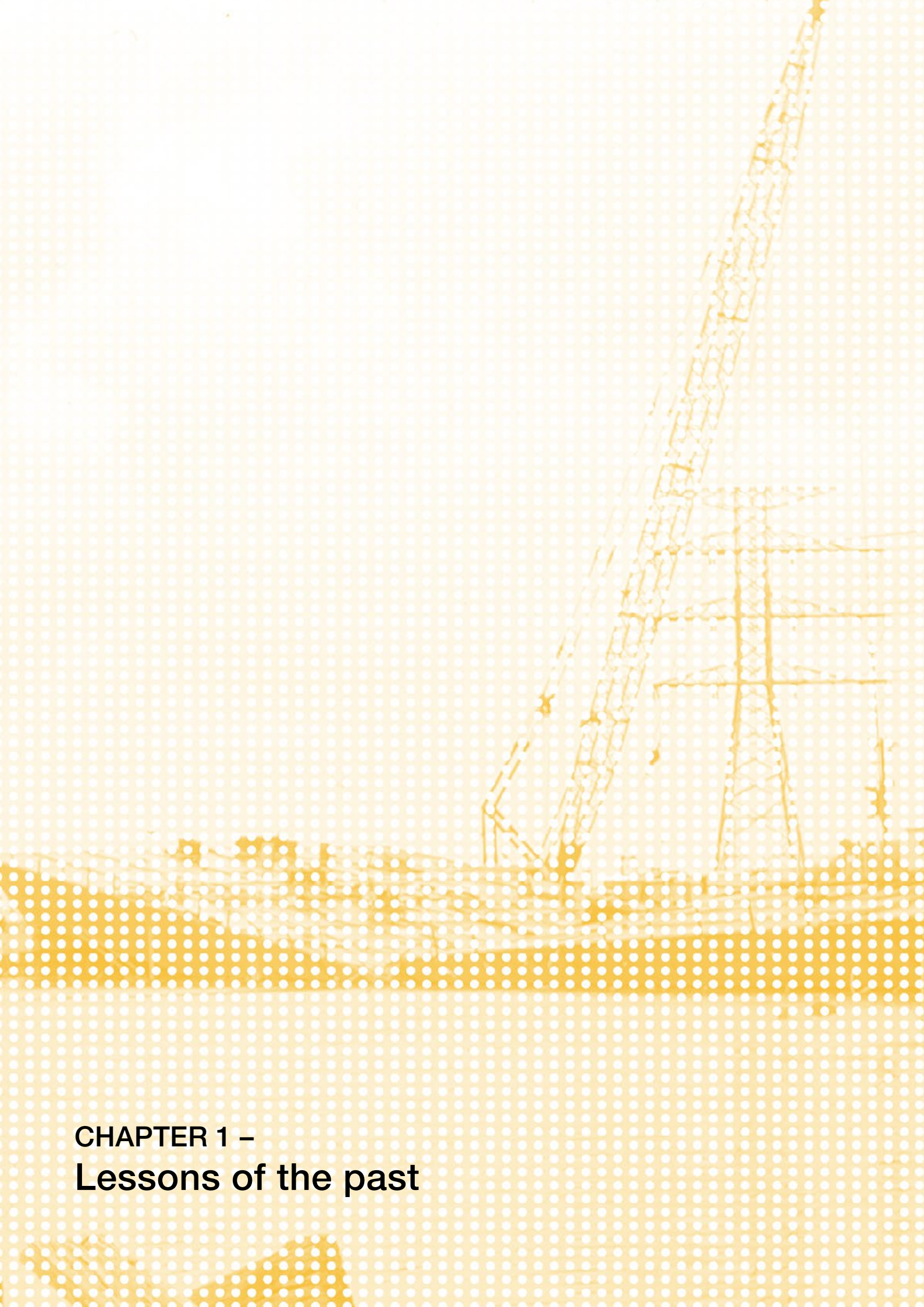
Greater awareness and engagement by industry. Australian industries should understand that dedicated standards are a long-term investment in their sector, helping to position their industry as a world leader in best practices and product quality, as well as promoting confidence with end users.

New laws

Increased willingness of governments to embed critical Australian standards within regulation and/or legislation where appropriate.

End user engagement

A heightened engagement and understanding by end users of the need to only engage industry suppliers that adhere to relevant Australian standards. There are numerous Australian standards that remain voluntary or self-regulated by industry. End users should therefore consistently and unequivocally insist on adherence to relevant Australian standards as part of any tender process, ensuring the standards form part of binding contracts.



CHAPTER 1 –
Lessons of the past

We are continually learning from the past.

History is marked by events that have contributed to significant improvements to the way we work, live and play.

Many of these improvements have been the result of methodical and planned goal setting by governments, industry and unions working together.

A small minority though have occurred as a result of unforeseen calamities.

Whether it is the Hindenburg airship disaster of 1937, or the more recent Thredbo Village landslide of 1997, these events have improved the design and construction of buildings, vehicles, and structures, as well as improved the way we look at risk assessment and governance.

Industrial Revolution: the shift from efficiency to safety

After the rapid industrialisation of the early 19th century, the lack of national standards caused huge inefficiencies and dangerous workplaces.

The legacy of this remains today, with three different railway gauges operating across Australia's 30,000 kilometres of track.

So too, workplace explosions were responsible for more than 50,000 annual fatalities worldwide by the 1870s.[9]

In response, the American Society of Mechanical Engineers (ASME), one of the first voluntary standardising bodies, was established in 1880[10] and, by the end of the 19th century, industry standardisation was recognised as a national priority.

So, an industry that began with industrial roots quickly evolved to include consumer safety and a goal of improving our quality of life.

Challenges of the 20th century

Every decade in the 20th century had its own major safety challenges to overcome:

1920s

The roaring 20s were a period of economic prosperity, increasing urbanisation and rising migration. The movement of millions of people from continent to continent also led to the global spread of communicable diseases.

The Spanish flu infected almost a third of the world's population and led to the deaths of between 17 million and 50 million people, although some estimates put the fatality rate as high as 100 million.[11]

What followed was vaccine and antibiotic development, with systemic eradication and control of diseases becoming a global focus.[12]

From a lifestyle point of view, motor vehicles took over from the horse as our preferred mode of transport, and they were also a new way of dying by accident.

What followed were the first traffic safety laws in 1924, even though driver safety training lagged for another 20-30 years.

The same could be said for workplace safety. Relatively new industrial machines were seriously dangerous and basic safety practices simply didn't exist.

While mines, factories and other forms of urban employment became the norm, it would be many decades before Australia would significantly shift its thinking about acceptable hazards both on and off the job.

9 https://www.standards.org.au/about/our-history
10 https://www.standards.org.au/about/our-history
11 https://ourworldindata.org/spanish-flu-largest-influenza-pandemic-in-history
12 https://en.wikipedia.org/wiki/Timeline_of_global_health

In October 1922, the Australian Commonwealth Engineering Standards Association, was founded. It would later become known as Standards Australia, and would play a critical role in the design, development and maintenance of buildings and structures, workplace health & safety systems, energy management and more – here in Australia and on the international stage.

1930s and 40s

Car safety began to take a front seat in the 1930s and 40s. The first crash test was introduced by General Motors in 1934. Over the next decade, the biggest car manufacturers would introduce turning signals, seatbelts and airbags to their vehicles.[13]

By the start of World War II more than a quarter of Australian workers were employed in manufacturing, overtaking farming as the most popular sector for jobs.[14]

To support the war effort, the Standards Association of Australia, as it was then called, abandoned traditional standards development methods to accelerate the delivery of emergency war production.[15]

One of the most important new standards was for screw heads, which had previously been sent to the front line in a variety of sizes, which made the maintenance of guns, tanks, planes and ships on the frontline more complicated than it needed to be.

By the mid-1940s the Standards Association of Australia published 'War Emergency' Standards.

In 1947 international cooperation on standards was formalized through the International Organization for Standardization (ISO), with Australia a founding partner.[16]

Did you Know?

Because of its importance to the war effort, the Standards Association of Australia was declared by the Federal Government as a Protected Undertaking to exempt its staff from conscription.

1940s–early 1960s (post-WWII era)

After World War II, Australia entered an era of sustained expansion. Large-scale immigration, increasing availability of raw materials after wartime shortages, technical and scientific progress, and capital inflow all contributed to growth.[17]

Consistent standards were needed to ensure Australians were kept safe, and industries could grow confidently, knowing their suppliers used consistent quality methods.

A priority was to develop postwar Australia in the following ways:

- rural reconstruction
- conversion of munitions and armament factories to civilian uses
- encouragement of an Australian car manufacturing industry
- workforce training and employment opportunities
- secure electricity supplies
- fuel production and
- industrial technology[18]

Inevitably this required consistent standards across the country.

13 https://rac.com.au/car-motoring/info/future_history-of-car-safety
14 https://www.abs.gov.au/Ausstats/abs@.nsf/0/33bb7a8977192473ca2569de0027ced7
15 https://www.standards.org.au/centenary/history-and-future
16 ttps://www.standards.org.au/centenary/history-and-future
17 https://www.abs.gov.au/Ausstats/abs@.nsf/0/33bb7a8977192473ca2569de0027ced7
18 https://www.naa.gov.au/sites/default/files/2020-05/fs-244-industrial-development-in-australia-after-world-war-ii.pdf

The core of much of today's work health and safety legislation in Australia emerged from a single case at a building site in 1956.

A group of employees were hoisting buckets of hot bitumen to the roof of a five-story building when a bucket spilled hot bitumen onto one of the workers below.

The High Court decided that the employer had a duty "… to take reasonable care to avoid exposing the employee to unnecessary risk of injury".[19]

This is also when the first formal international cooperation on global health, peace and security emerged, with the creation of the United Nations and World Health Organization (WHO).[20]

1960s and 70s

Thirty-five workers were killed when a 112m span of the WestGate Bridge collapsed, in Australia's worst industrial accident.

The accident on 15 October 1970 was the catalyst for landmark reforms in Victorian workplace health and safety practices.

International collaboration grows

Throughout the 1970s, Australia had to 'metricate', transitioning from imperial forms of measurements to a full adoption of the metric system, and the implementation of a new generation of standards.[21]

In 1973 Australia became an inaugural member of Pacific Area Standards Congress (PASC) to promote standards development in the region, to ensure buildings, bridges and tunnels were safe.

The growing need for harmonization became evident on Christmas Eve 1974, when Darwin was levelled by a devastating cyclone. With wind gusts reaching 217km/hour and homes and buildings flattened, 71 people tragically lost their lives.

From tragedy emerged hope.

Cyclone Tracy resulted in the introduction of improved building standards that would apply across Australia.

Today, Darwin is stronger than ever, thanks to new standards that have been tested to reduce any future cyclone damage by up to 85 per cent.[22]

1980s – 2000s

Globally, the 1980s and 90s were characterized by a staggering rate of scientific, technological, and sociological change.

- Genetic and digital technology took off. The first 'designer babies' were conceived in a laboratory after being sex-selected, the first gestational surrogacy was performed, and Dolly the sheep was successfully cloned in the US.
- At the same time, the AIDS epidemic swept the globe, and improvements were made in maternal and child health, with a focus on HIV/

19 https://www.inspireeducation.net.au/blog/a-short-history-of-occupational-health-and-safety-with-videos/
20 https://en.wikipedia.org/wiki/Timeline_of_global_health
21 https://www.standards.org.au/centenary/history-and-future
22 Standards Australia

AIDS, tuberculosis, and malaria (the 'Big Three') in developing countries.[23]

- The Berlin Wall fell in 1989 and the Cold War ended with the collapse of the USSR in 1991, signifying an end to communist regimes in the region.
- The internet was launched to the world in the late 1980s and became a household necessity by the late 90s.

These trends encouraged increasing globalization of trade, which in turn required greater certainty about the standards of what was being produced in different parts of the world.

Meanwhile, workplace health and safety legislation continued to improve in Australia. In 1985 the National Occupational Health and Safety Commission (NOHSC) was formed.

Ideas from the Brundtland Report, released in 1987, were also introduced. For the first time, sustainable development and ethics were woven back into corporate governance and building a safe society.[24]

2000s and beyond

Climate change and global warming became common concerns in the 2000s, which have turned our focus in recent years to the need for new standards to protect the environment.

Australian states and territories also began the process of standardising workplace safety. Safework Australia was created in 2009. Some long-standing safety issues, including the banning of asbestos, was finally completed in this era.[25]

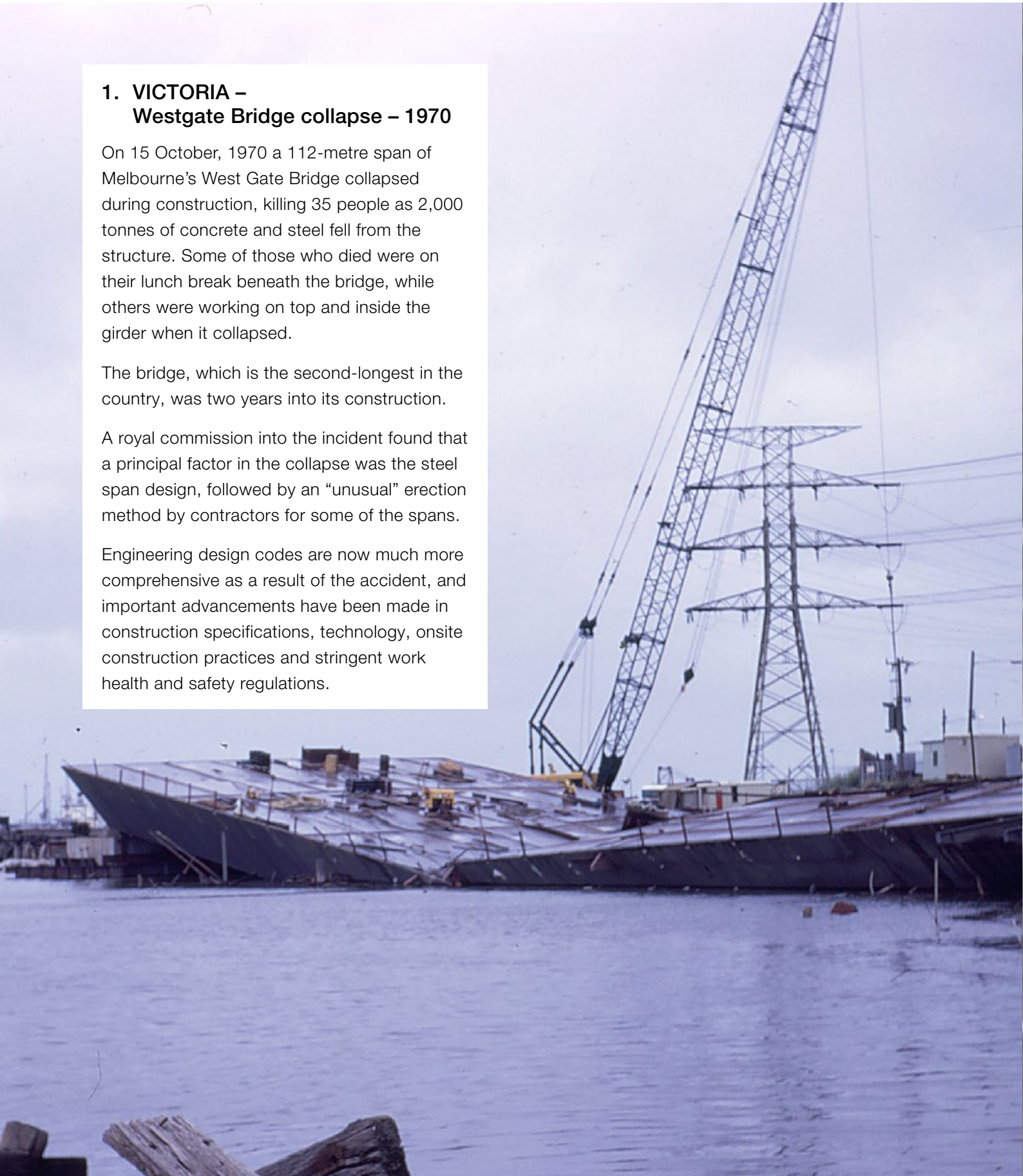
The National Construction Code was formed in 2011 to "provide the minimum necessary requirements for safety and health; amenity and accessibility, and sustainability in the design, construction, performance and livability of new buildings (and new building work in existing buildings) throughout Australia."[26]

By far the fastest technological growth in the last 20 years has been driven by the growth of the Internet and the subsequent rise of FinTech and HealthTech.

However, faster communication between people around the world has also triggered the emerging twin threats of data privacy and cyber security.

23 https://en.wikipedia.org/wiki/Timeline_of_global_health
24 https://www.inspireeducation.net.au/blog/a-short-history-of-occupational-health-and-safety-with-videos/
25 https://www.inspireeducation.net.au/blog/a-short-history-of-occupational-health-and-safety-with-videos/
26 https://ncc.abcb.gov.au/practitioners/history

9 major events that changed safety standards in the last 50+ years



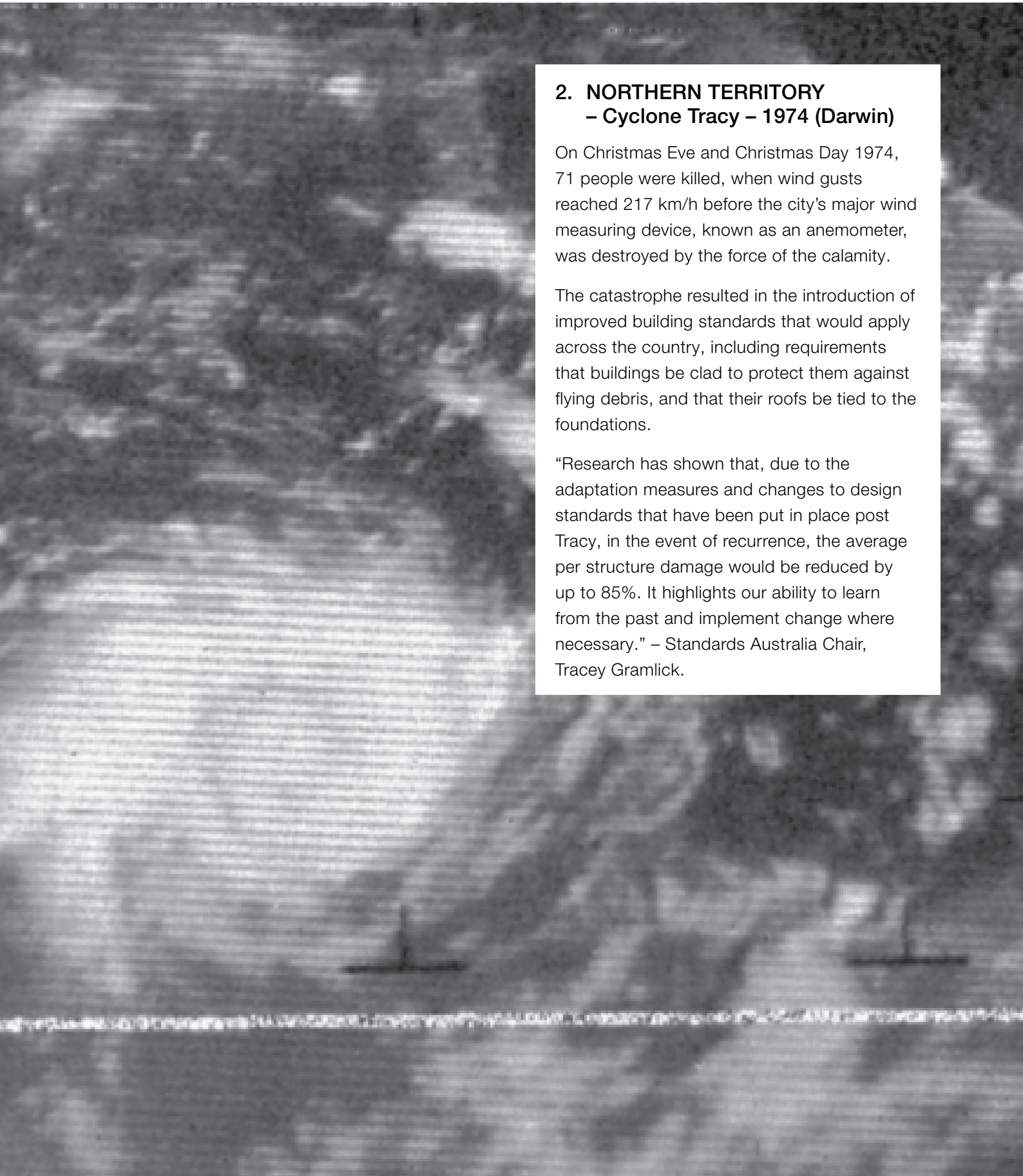
1. VICTORIA – Westgate Bridge collapse – 1970

On 15 October, 1970 a 112-metre span of Melbourne's West Gate Bridge collapsed during construction, killing 35 people as 2,000 tonnes of concrete and steel fell from the structure. Some of those who died were on their lunch break beneath the bridge, while others were working on top and inside the girder when it collapsed.

The bridge, which is the second-longest in the country, was two years into its construction.

A royal commission into the incident found that a principal factor in the collapse was the steel span design, followed by an "unusual" erection method by contractors for some of the spans.

Engineering design codes are now much more comprehensive as a result of the accident, and important advancements have been made in construction specifications, technology, onsite construction practices and stringent work health and safety regulations.



2. NORTHERN TERRITORY – Cyclone Tracy – 1974 (Darwin)

On Christmas Eve and Christmas Day 1974, 71 people were killed, when wind gusts reached 217 km/h before the city's major wind measuring device, known as an anemometer, was destroyed by the force of the calamity.

The catastrophe resulted in the introduction of improved building standards that would apply across the country, including requirements that buildings be clad to protect them against flying debris, and that their roofs be tied to the foundations.

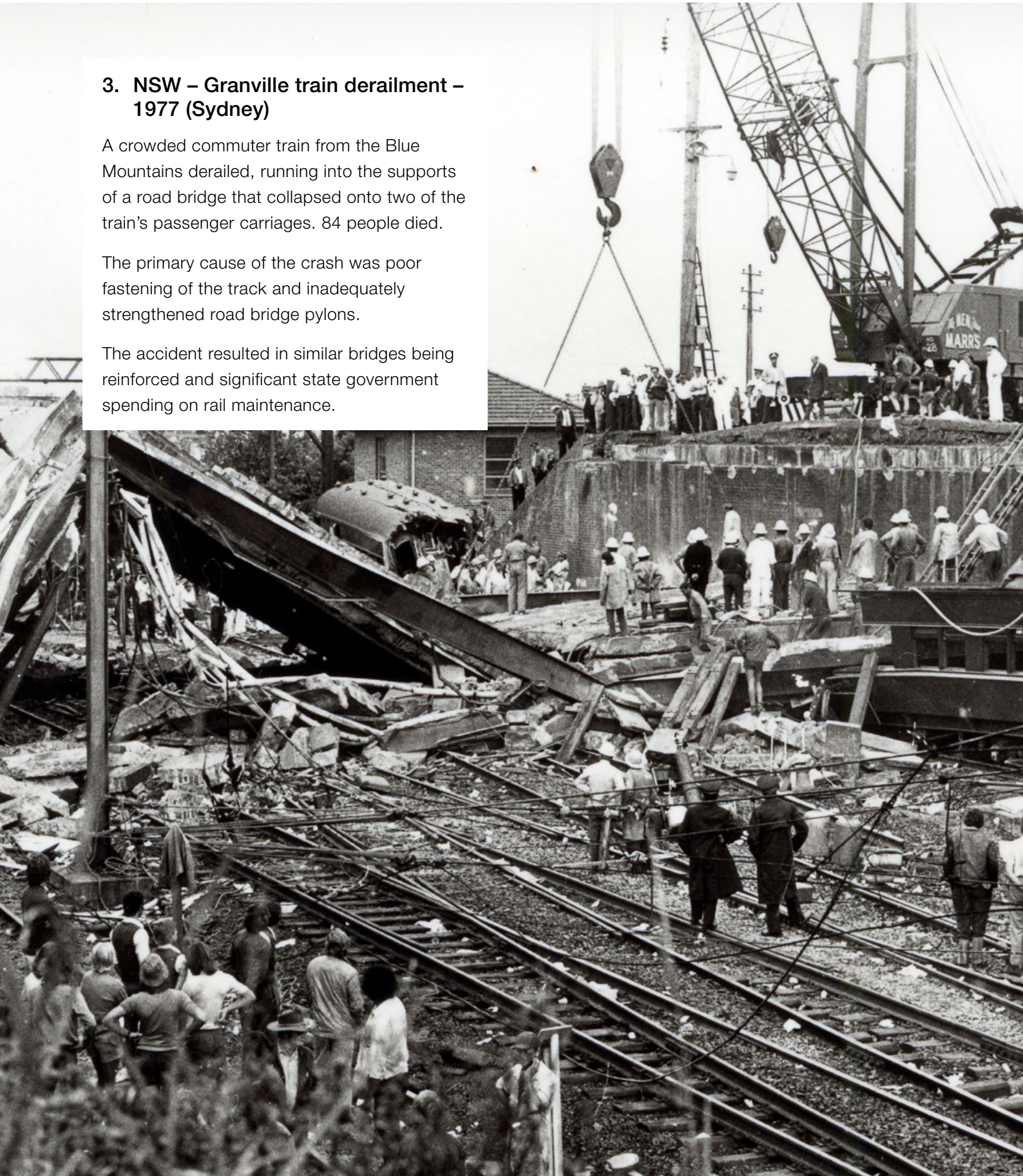
"Research has shown that, due to the adaptation measures and changes to design standards that have been put in place post Tracy, in the event of recurrence, the average per structure damage would be reduced by up to 85%. It highlights our ability to learn from the past and implement change where necessary." – Standards Australia Chair, Tracey Gramlick.

3. NSW – Granville train derailment – 1977 (Sydney)

A crowded commuter train from the Blue Mountains derailed, running into the supports of a road bridge that collapsed onto two of the train's passenger carriages. 84 people died.

The primary cause of the crash was poor fastening of the track and inadequately strengthened road bridge pylons.

The accident resulted in similar bridges being reinforced and significant state government spending on rail maintenance.

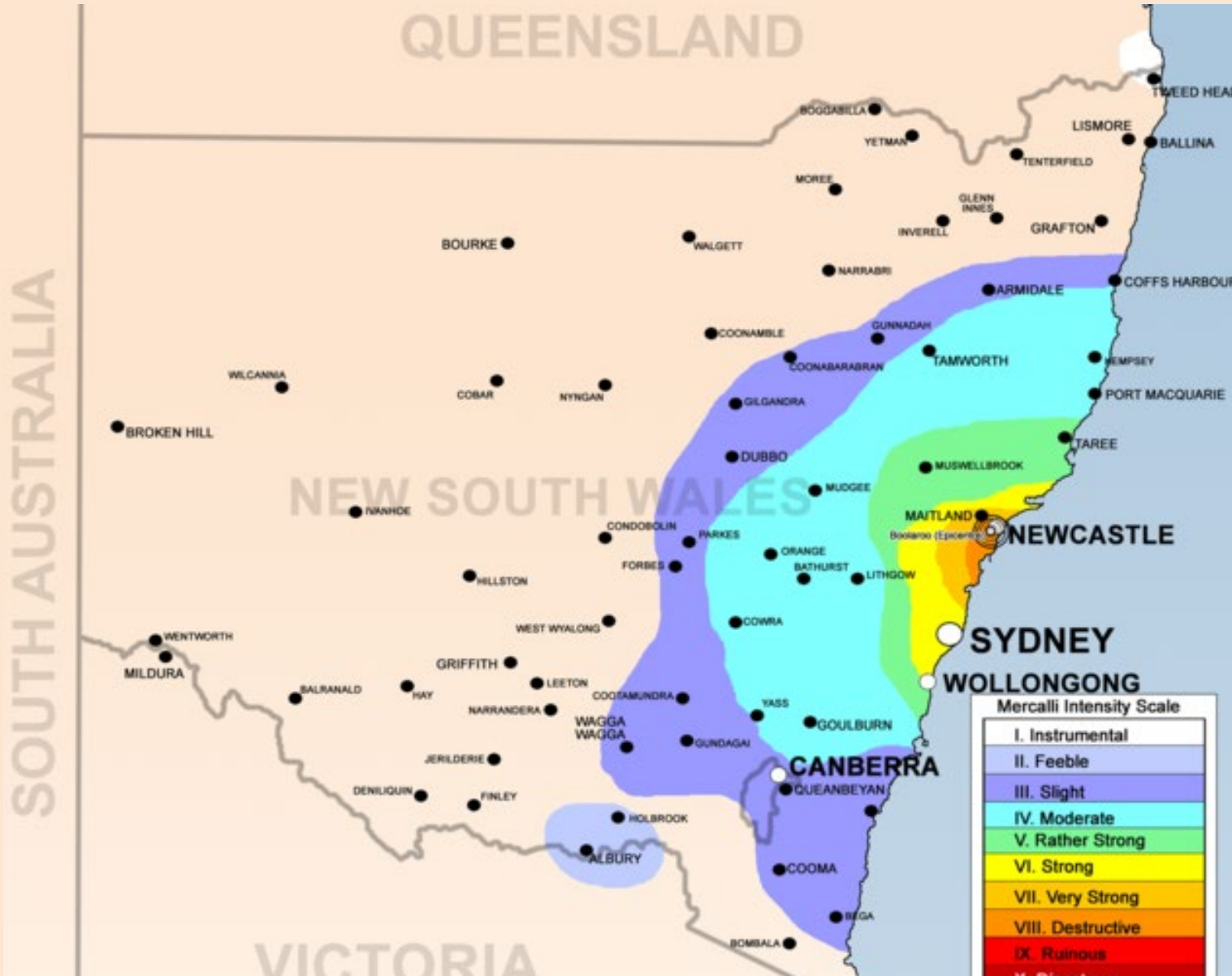


4. NSW – Newcastle earthquake – 1989

On Thursday, 28 December 1989, Newcastle was devastated by a 5.6 magnitude earthquake, which claimed 13 lives. Information was collected from around Newcastle and Lake Macquarie to better understand the local geology and susceptibility of the area to ground shaking.

This information has been used to better inform land-use planning and building standards in the area.

"At the time of the Newcastle earthquake there was no requirement in the Australian standards code for engineers to consider in design or construction the effects of an earthquake in Newcastle, or across the Hunter region." – Adrian O'Connell, Chief Executive Officer, Standards Australia.



5. NSW – Thredbo landslide – 1997

In July 1997, heavy rainfall triggered a landslide that destroyed the Bimbadeen and Carinya Lodges at the Thredbo Alpine Village in New South Wales. Inadequate retaining walls around houses were partly blamed for the catastrophe.

After the landslide, the NSW Fire Brigade expanded its urban search and rescue division. In 1998, three terraces with gabions and reinforced fill were constructed on the site and the Alpine Way were rebuilt with upslope retaining walls.

Engineers Australia and the Australian Geomechanics Society formed a Taskforce on the Review of Landslides and Hillside Construction Standards, recommending improvements in landslide hazard zoning for urban areas, roads and railways; slope management; site investigations, design, construction and maintenance; and landslide risk assessment.

The site along with a section of the Alpine Way is now monitored with 25 inclinometers, to detect any slope movement, and 12 piezometers, to keep track of water flow in the soil.

6. NSW – Glenbrook train accident – 1999

In December 1999, seven passengers were killed, and 51 passengers were taken to hospital with injuries when a CityRail electric interurban train collided with the rear wagon of the long-haul Perth-to-Sydney Indian Pacific.

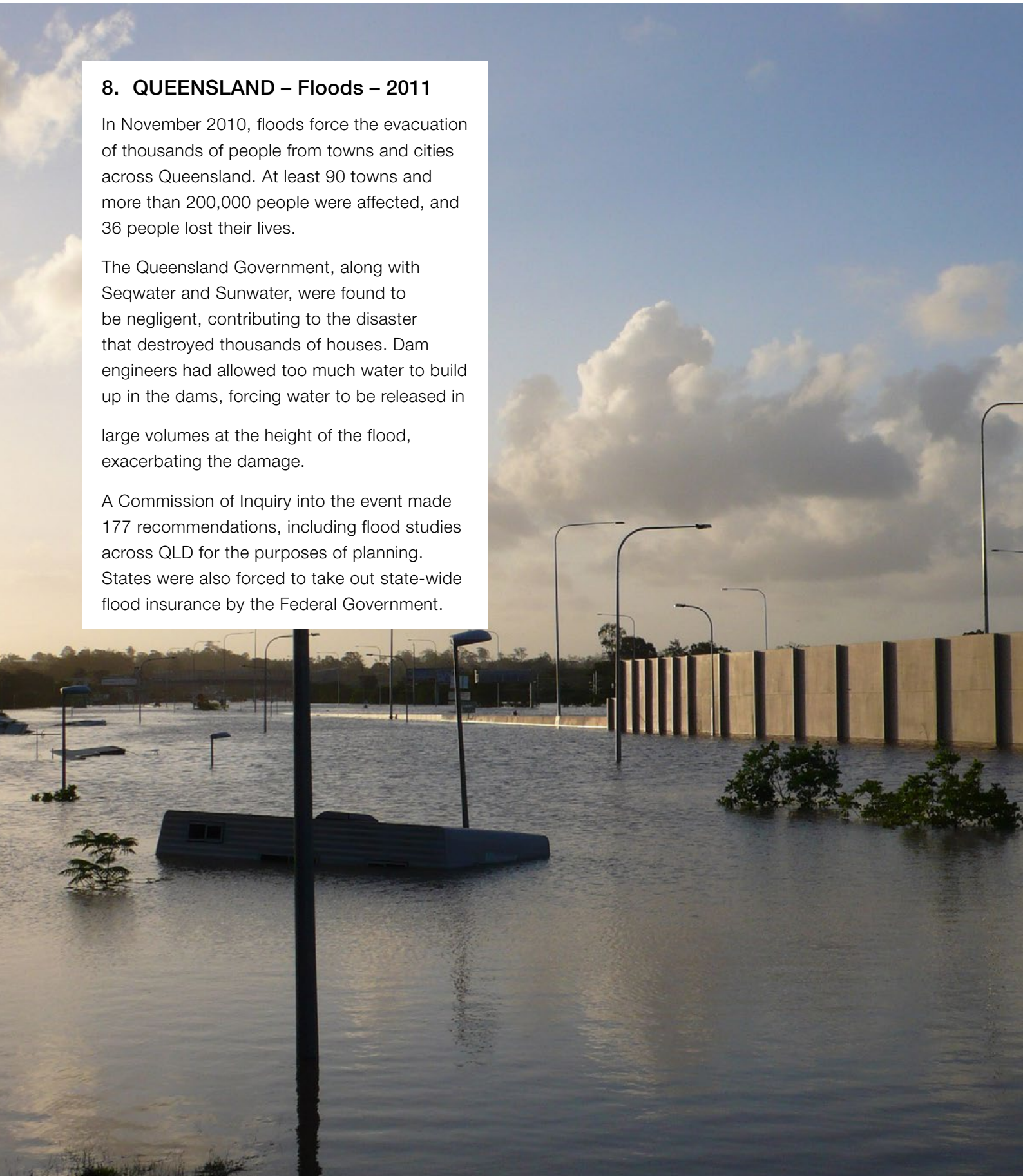
The accident was attributed to a power failure that caused two signals to remain ‘red’. The response by the driver of the inter-urban train and Sydney train control exposed severe failures in critical communication, monitoring and a failure of emergency procedures.

A 2001 Special Commission of Inquiry into the incident made 95 individual recommendations for the improvement of rail transport safety in NSW.

7. VICTORIA – Kerang train crash – 2007

In June 2007, 11 people were killed when a semi-trailer ran into a passenger train at a level crossing on the Murray Valley Highway in Victoria. The truck driver was unable to clearly see the flashing red signal lights.

The investigation into the accident highlighted the need for an Australian standard into the side impact crash-worthiness of rail vehicles, and the design of curved highway approaches to level crossings.



8. QUEENSLAND – Floods – 2011

In November 2010, floods force the evacuation of thousands of people from towns and cities across Queensland. At least 90 towns and more than 200,000 people were affected, and 36 people lost their lives.

The Queensland Government, along with Seqwater and Sunwater, were found to be negligent, contributing to the disaster that destroyed thousands of houses. Dam engineers had allowed too much water to build up in the dams, forcing water to be released in

large volumes at the height of the flood, exacerbating the damage.

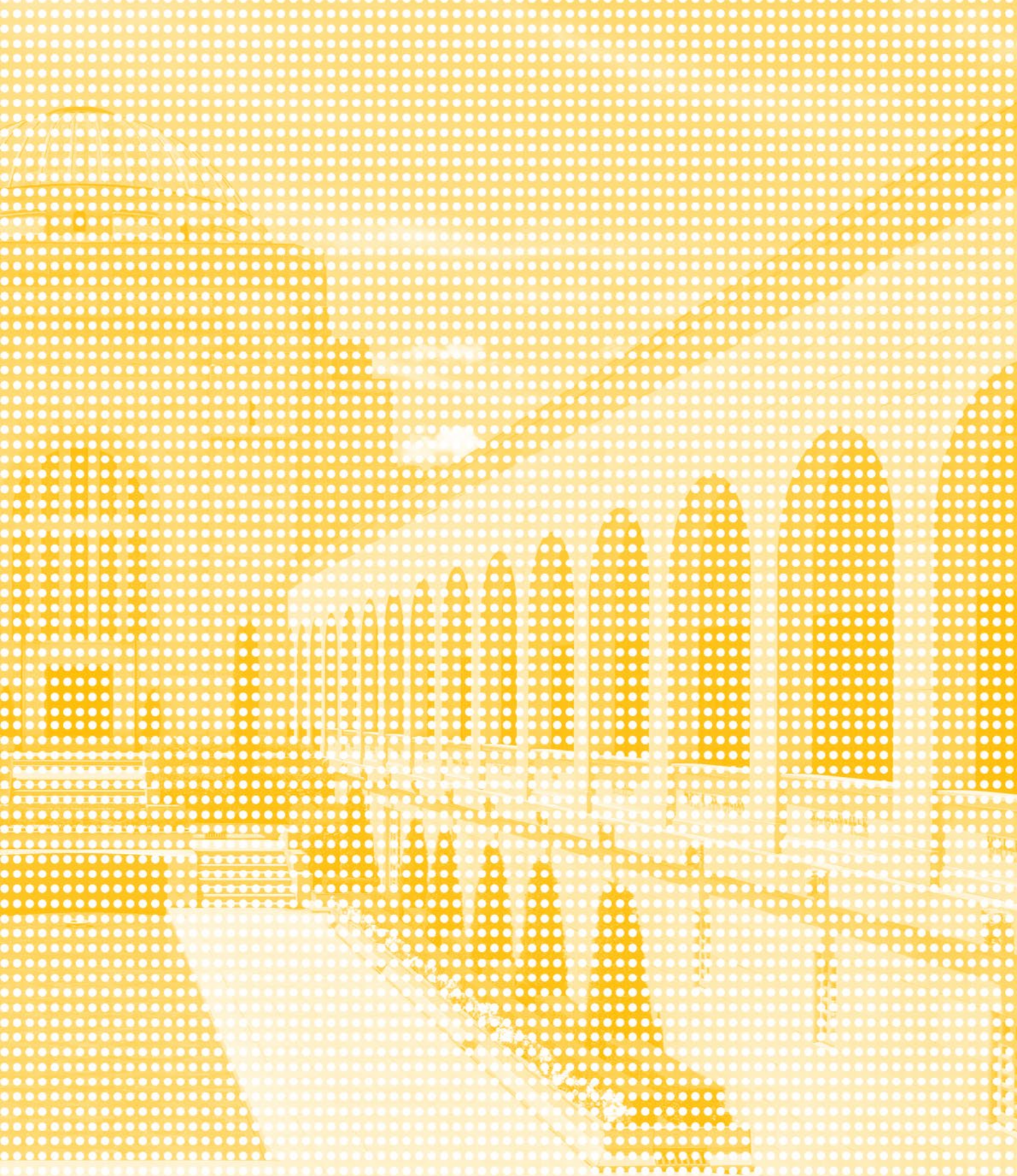
A Commission of Inquiry into the event made 177 recommendations, including flood studies across QLD for the purposes of planning. States were also forced to take out state-wide flood insurance by the Federal Government.

9. NSW – Quakers Hill nursing home fire – 2011

In November 2011, 14 elderly nursing home residents were killed by a fire that was deliberately lit by nurse Roger Dean, who was trying to cover up his theft of prescription drugs. Dean pleaded guilty to 11 counts of murder and was jailed for life.

Although the fire was deliberately lit, numerous lessons were learned from the disaster, including the need to improve fire safety in nursing homes.

As a result of the incident, new safety measures were introduced into aged care homes across NSW, including mandatory automatic fire sprinkler systems in all residential aged care facilities.



CHAPTER 2 –

Australian icons and standards that protect them

Each state in Australia has a number of highly recognisable ‘icons’ – both artificial and natural.

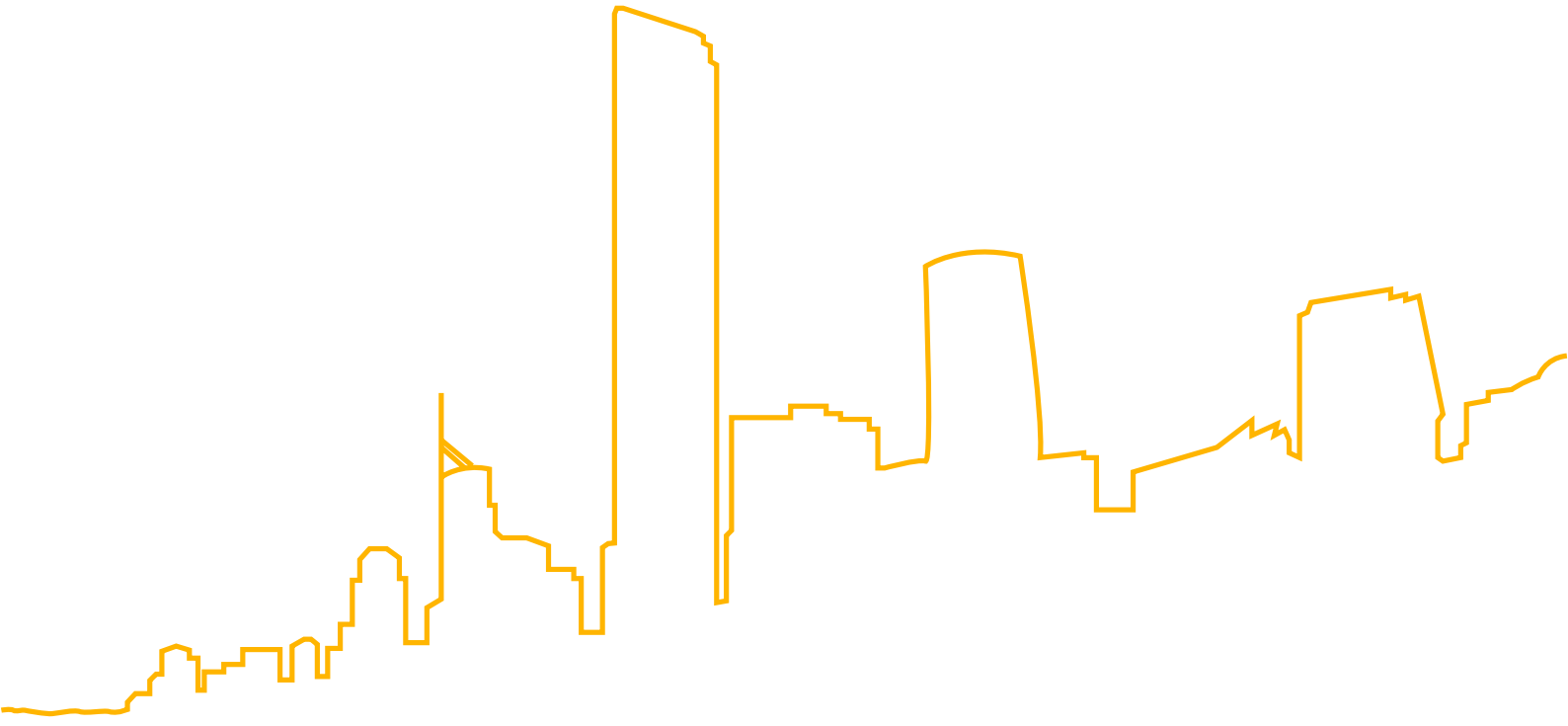
For example, most people remember their first trip to the Melbourne Cricket Ground, or to Old Parliament House in Canberra, the Sydney Opera House, or the Port Arthur Heritage site in Tasmania.

The first Australian standard was developed 100 years ago, mandating the types of bolts used in the construction of the Sydney Harbour Bridge from 1922.

Completed 90 years ago, the Sydney Harbour Bridge continues to stand proudly over the city it serves, providing a vital and safe link between the CBD and North Sydney, and serving as an internationally recognised landmark for all Australians.

Following are 24 Australian icons that have either been constructed, or continue to be protected, by Australian standards.

Without Australian standards they would not exist.



New South Wales

1. Sydney Harbour Bridge, NSW

Key Australian standards

1. Steel arches
2. Steel construction
3. Concrete construction

1932

Visitors: Around 150,000 vehicles a day. Over 4 million people have climbed the bridge using Bridge Climb since 1998.

Did you know? The first ever Australian Standard was with regard to the size of the bolts used in the construction of the Sydney Harbour Bridge.

2. Sydney Opera House, NSW

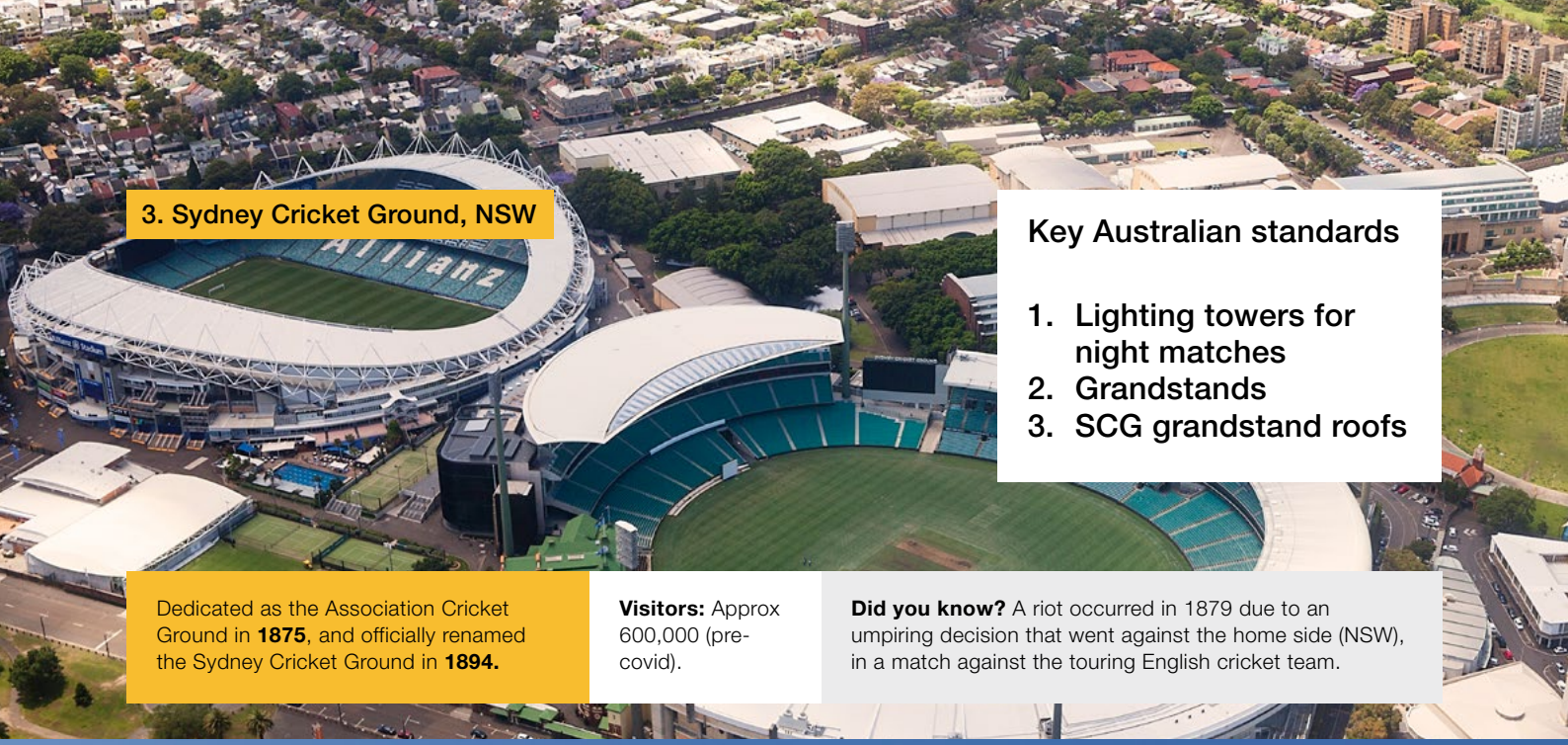
Key Australian standards

1. Opera House's famed tiles
2. Safety glass for its viewing platforms
3. Prestressed concrete for the building's unique sail
4. Reinforced concrete

1973

Visitors: 10.9 million p.a. average pre-covid.

Did you know? The temperatures inside of the house have to stay at precisely 22.5 degrees Celsius in order to ensure that the instruments for the orchestra stay perfectly in tune.



3. Sydney Cricket Ground, NSW

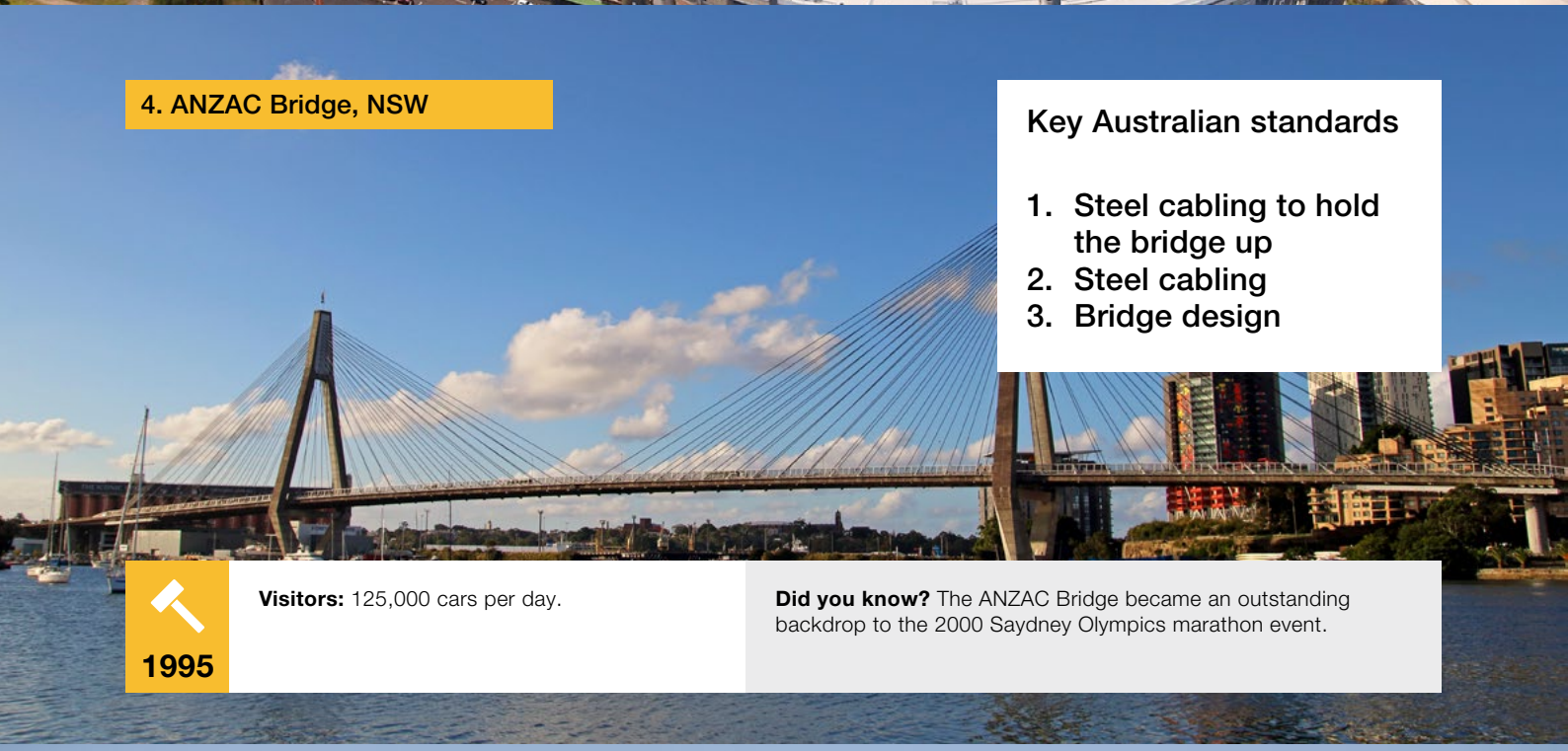
Key Australian standards

1. Lighting towers for night matches
2. Grandstands
3. SCG grandstand roofs

Dedicated as the Association Cricket Ground in **1875**, and officially renamed the Sydney Cricket Ground in **1894.**

Visitors: Approx 600,000 (pre-covid).

Did you know? A riot occurred in 1879 due to an umpiring decision that went against the home side (NSW), in a match against the touring English cricket team.



4. ANZAC Bridge, NSW

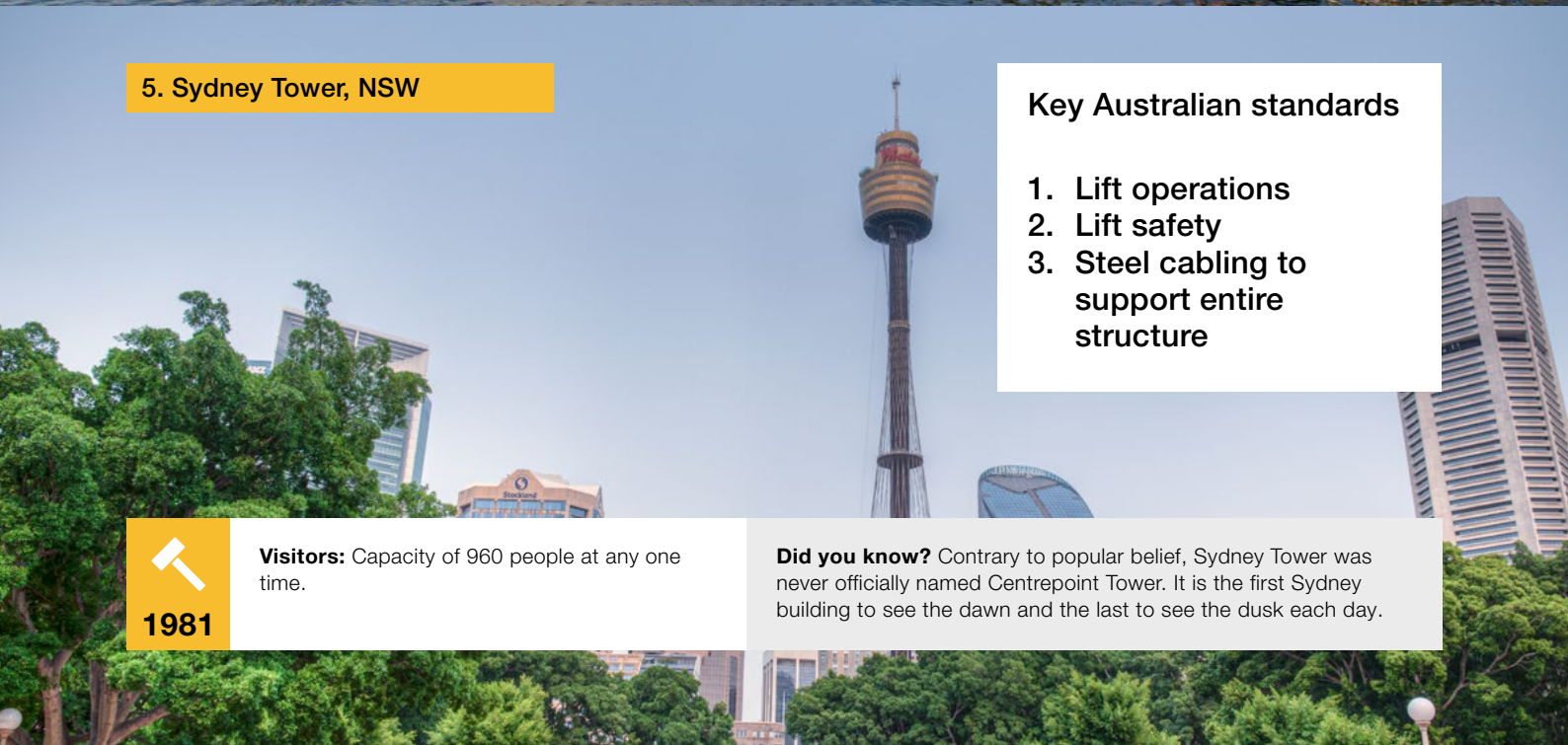
Key Australian standards

1. Steel cabling to hold the bridge up
2. Steel cabling
3. Bridge design

1995

Visitors: 125,000 cars per day.

Did you know? The ANZAC Bridge became an outstanding backdrop to the 2000 Saydney Olympics marathon event.



5. Sydney Tower, NSW

Key Australian standards

1. Lift operations
2. Lift safety
3. Steel cabling to support entire structure

1981

Visitors: Capacity of 960 people at any one time.

Did you know? Contrary to popular belief, Sydney Tower was never officially named Centrepoint Tower. It is the first Sydney building to see the dawn and the last to see the dusk each day.

Australian Capital Territory

6. Parliament Houses (old and new), ACT

Key Australian standards

1. Parliament house exterior
2. Parliament house interior
3. Safety glass

Old Parliament House – 9th May 1927; Parliament House 9th May 1988.

Visitors: Old Parliament House – around 380,000 – 80,000 schools children and teachers , Parliament House -760,000.

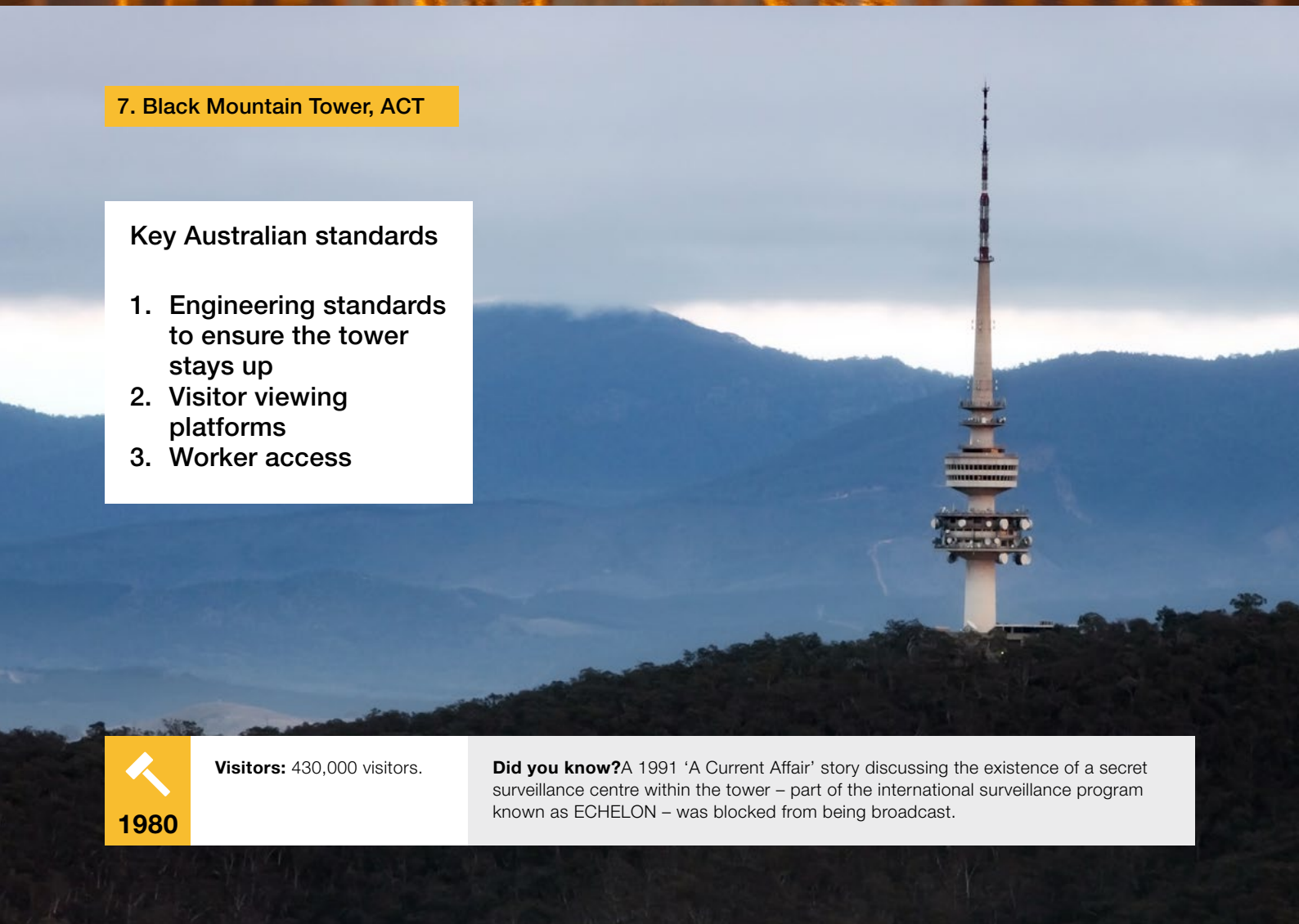
Did you know? New Parliament house was designed to standards to last 300 years.

All the central doors of Parliament House perfectly align with the central doors of Old Parliament House.

7. Black Mountain Tower, ACT

Key Australian standards

1. Engineering standards to ensure the tower stays up
2. Visitor viewing platforms
3. Worker access



1980

Visitors: 430,000 visitors.

Did you know?A 1991 ‘A Current Affair’ story discussing the existence of a secret surveillance centre within the tower – part of the international surveillance program known as ECHELON – was blocked from being broadcast.

8. Australian War Memorial, ACT

Key Australian standards

1. Maintaining the building's look
2. Protecting priceless wartime artifacts
3. Memorial extension

1932

Visitors: Over 1 million p.a. pre-covid

Did you know? There were only two entrants in the competition to design the Australian War Memorial – neither was chosen. The two entrants were asked to work together on a new design.

Victoria

9. Melbourne Cricket Ground, VIC

Key Australian standards

1. Lighting towers for night matches
2. Great southern stand rebuild
3. MCG roof

1853

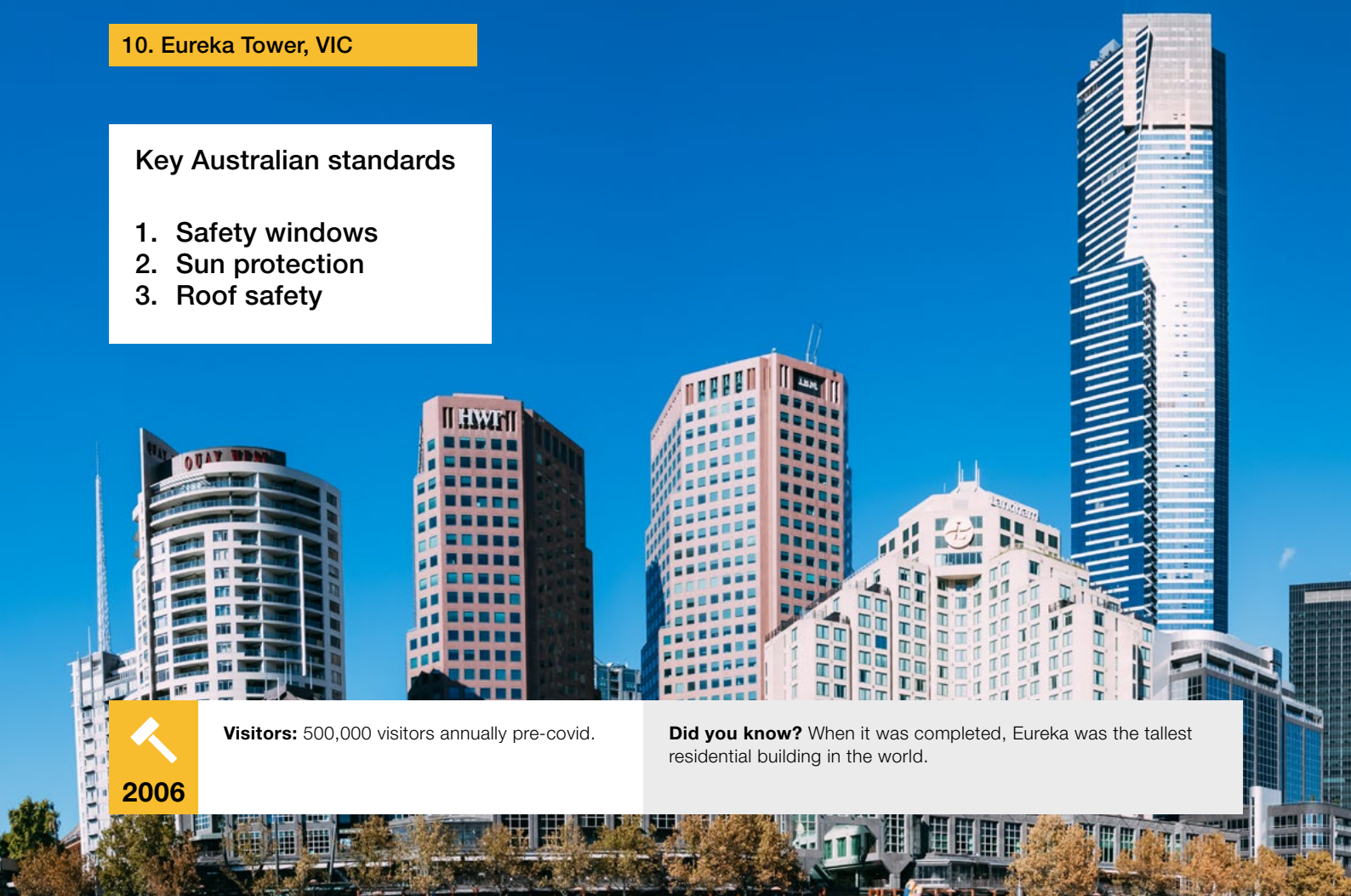
Visitors: 737, 500 pre-covid p.a.

Did you know? The MCG is one of the oldest sporting facilities in the world. It has been constantly upgraded and rebuilt through the years, relying on evolving national safety standards. The largest ever crowd at the MCG was 130,000 – it was to hear American Preacher, Billy Graham in 1959.

10. Eureka Tower, VIC

Key Australian standards

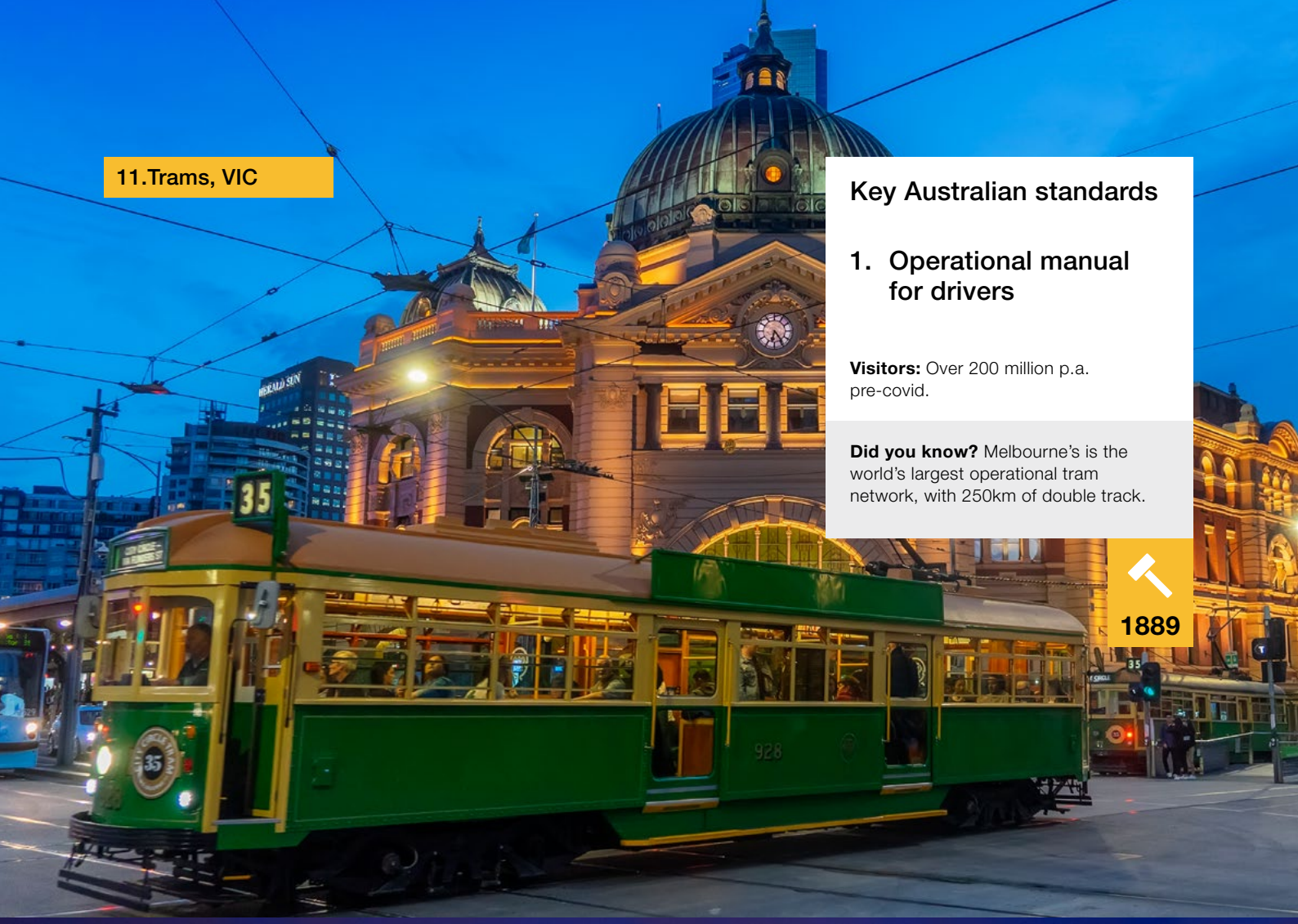
1. Safety windows
2. Sun protection
3. Roof safety



2006

Visitors: 500,000 visitors annually pre-covid.

Did you know? When it was completed, Eureka was the tallest residential building in the world.



11.Trams, VIC

Key Australian standards

1. Operational manual for drivers

Visitors: Over 200 million p.a. pre-covid.

Did you know? Melbourne's is the world's largest operational tram network, with 250km of double track.

1889

12. Federation Square, VIC

Key Australian standards

1. Building internal structure
2. Safety glass for visitors
3. Visual standards

2002

Visitors: 2.7 million pre-covid.

Did you know? The main square is paved in 470,000 ochre-coloured sandstone blocks from Western Australia and invokes images of the outback.

Queensland

13. Story bridge, QLD

Key Australian standards

1. Bridge maintenance
2. Bridge design
3. Traffic management

1940

Visitors: 100,000 vehicles per day.

Did you know? The Story Bridge is the longest cantilever bridge in Australia.

14. Q1 Tower, QLD

Key Australian standards

1. Lift quality
2. Tower roof
3. Safety glass

26.10
2005

Visitors: Unclear.

Did you know? Q1 has one of the fastest elevators in the world, taking you from the ground to Level 77 in 42.7 seconds.

15. Kuranda Scenic Rail, QLD

Key Australian standards

1. Keeping the rail line secure
2. Ensuring replacement timber sleepers are safe
3. Ensuring the rail route is secure

15.06
1891

Visitors: 3,000 visitors a day.

Did you know? The Kuranda Scenic Rail station became a medical centre for wounded troops in WWII and soon became a relaxation treatment spot for soldiers on leave.

16. Suncorp Stadium, QLD

Key Australian standards

1. Lighting for night games
2. Ensuring the roof is safe
3. Safe lifts for visitors

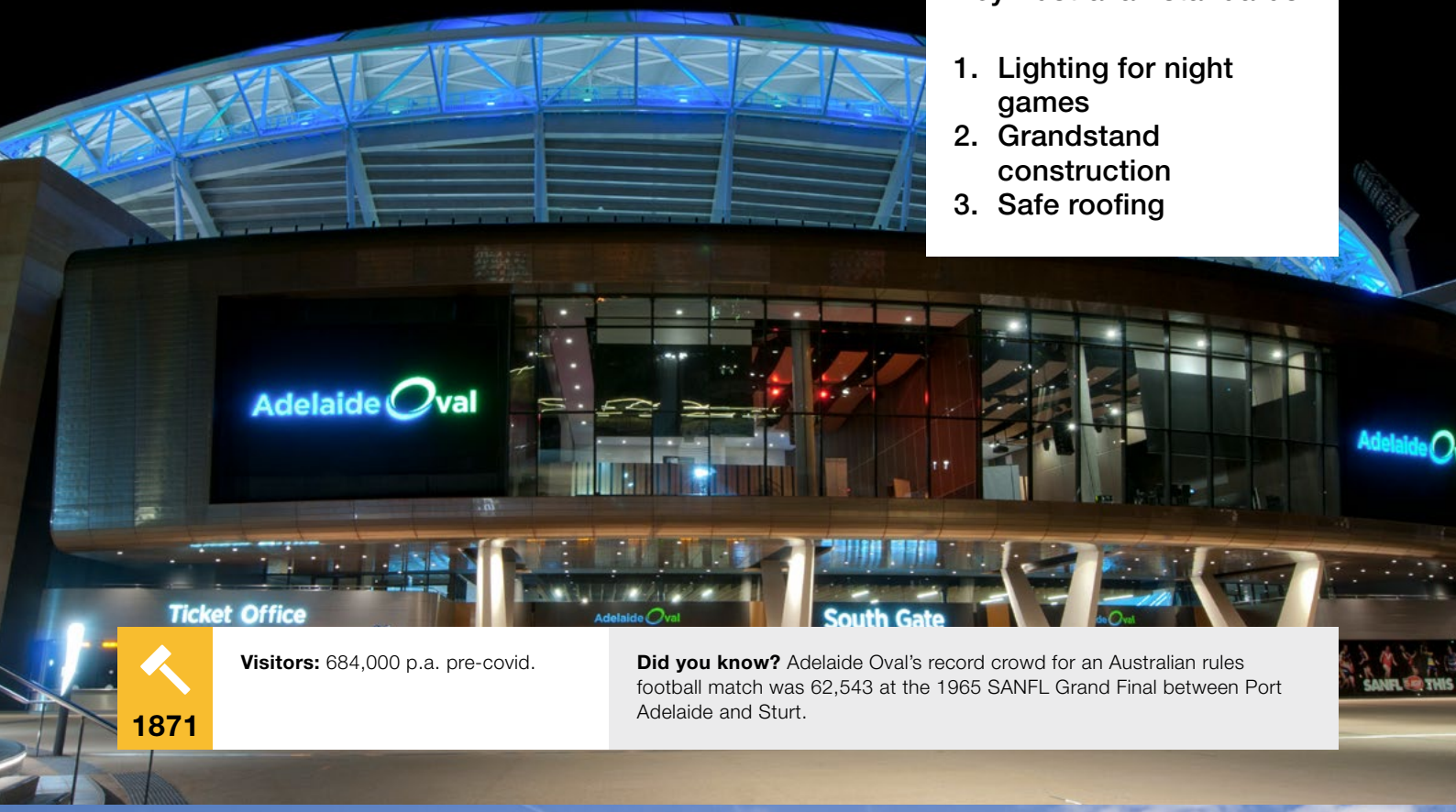
1914

Visitors: 973,000 p.a. pre-covid.

Did you know? Suncorp Stadium sits on the original site of the North Brisbane Burial Grounds which operated until 1875.

South Australia

17. Adelaide Oval, SA



Key Australian standards

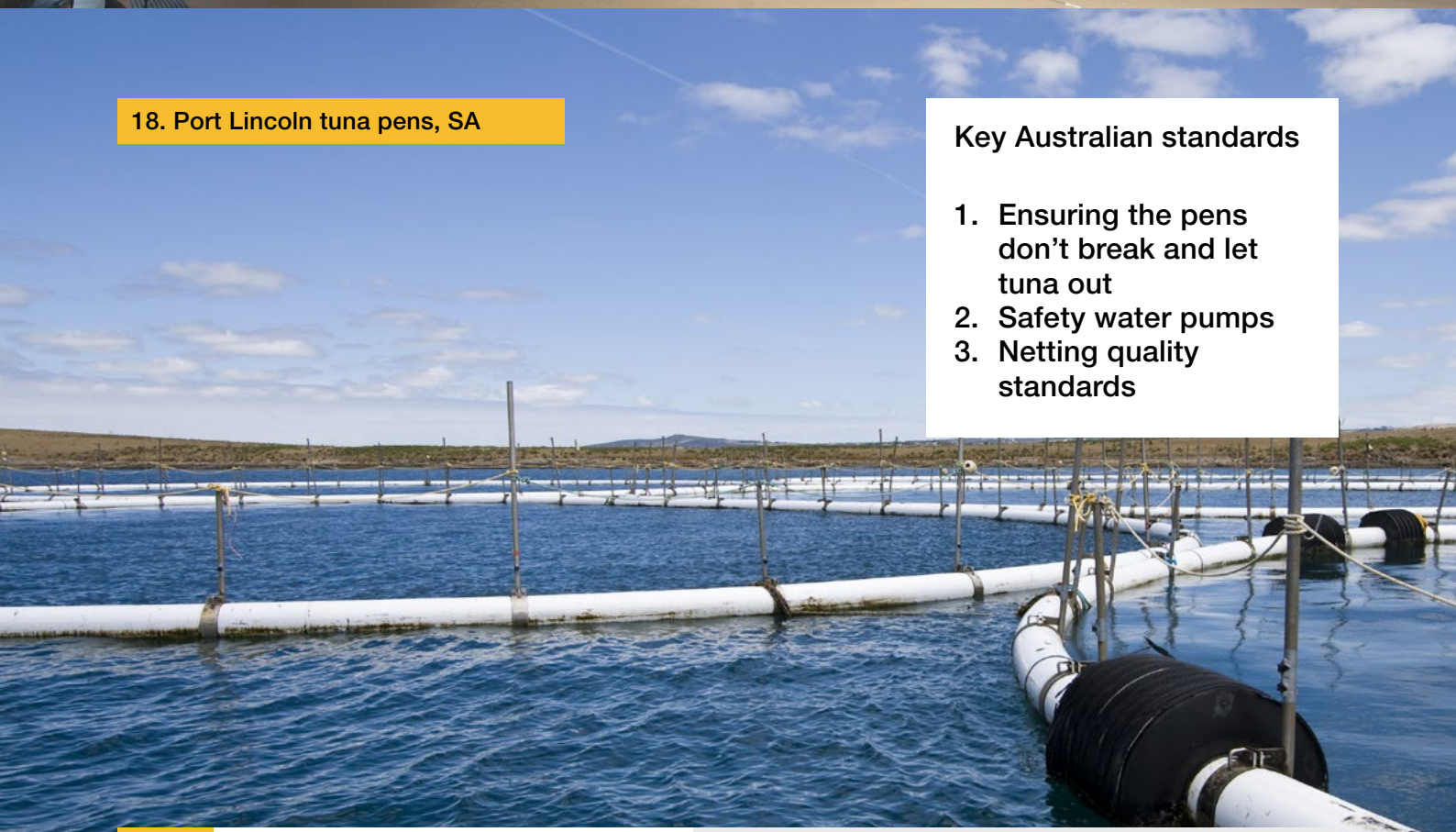
1. Lighting for night games
2. Grandstand construction
3. Safe roofing

1871

Visitors: 684,000 p.a. pre-covid.

Did you know? Adelaide Oval's record crowd for an Australian rules football match was 62,543 at the 1965 SANFL Grand Final between Port Adelaide and Sturt.

18. Port Lincoln tuna pens, SA



Key Australian standards

1. Ensuring the pens don't break and let tuna out
2. Safety water pumps
3. Netting quality standards

1991

Visitors: Approx 10,000 visitors to Oceanic Victor 'Tuna Swim' tourist attraction pre-covid (currently closed for construction).

Did you know? Port Lincoln fisherman Dinko Lukin invented the 'pontoon tow' method of tranpsorting captured tuna. His son, Dean, won weightlifting gold at the 1984 Los Angeles Olympics.

Western Australia

19. Perth Airport, WA

Key Australian standards

1. Fire safety
2. Safe visitor access
3. Visual standards

Opened for international travel and named 'Perth Airport' in **1953.**

Visitors: Approx 15 million pre-covid.

Did you know? In WWII Perth International Airport was known as RAAF Station Guildford and housed RAAF No. 85 Squadron.

20. Optus Stadium, WA

Key Australian standards

1. Lighting towers for night games
2. Safe roofing
3. Safe grandstands

21.01
2018

Visitors: 1 million p.a. average.

Did you know? The lightweight fabric roof covers 85% of seats and at night presents a spectacular glowing halo effect.

21. Central Park Tower, WA

Key Australian standards

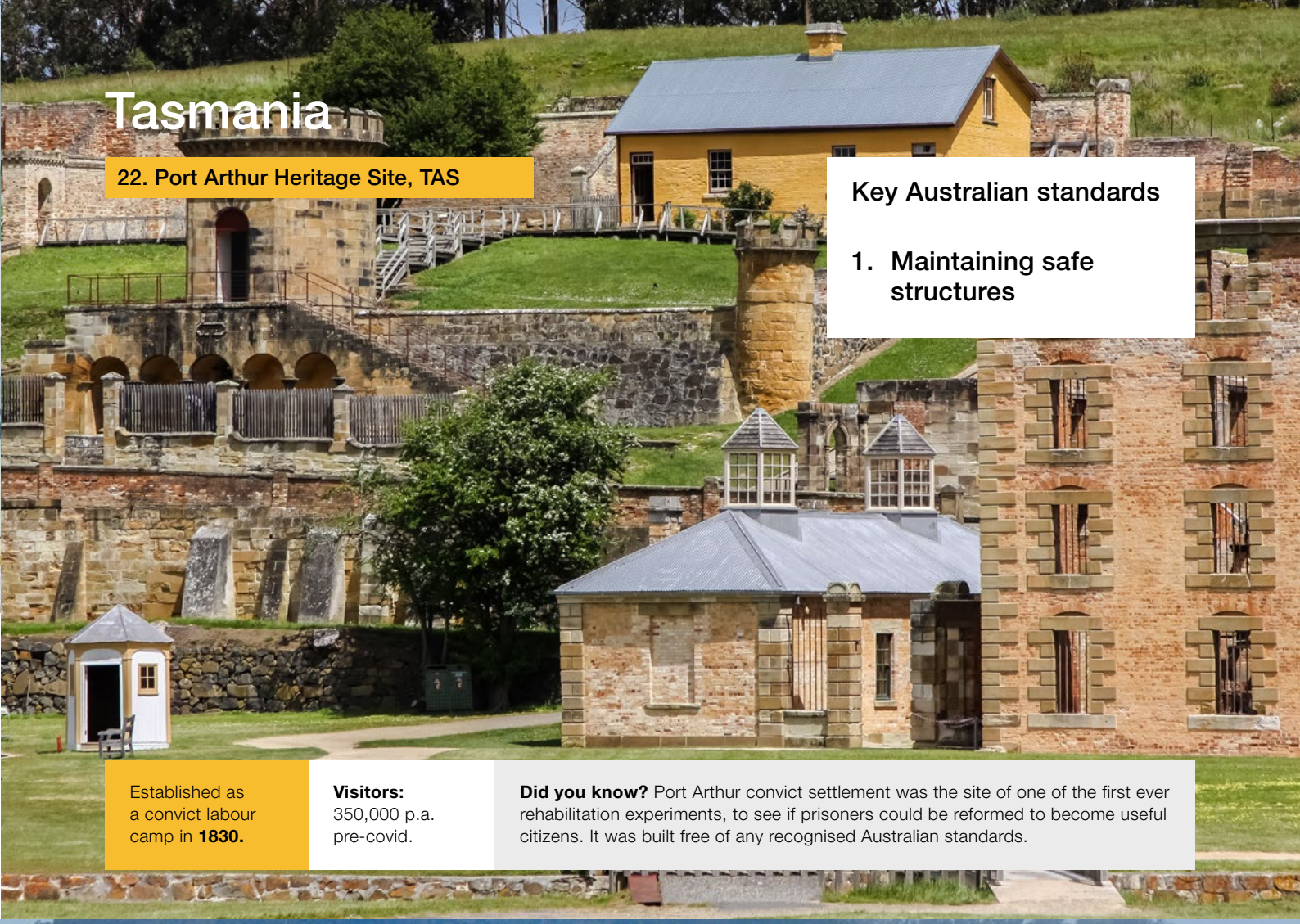
1. Safe lifts
2. Safe construction
3. Glass windows

01.05
1992

Did you know? Since 2001, the tower has played host to an annual climb race up 53 flights of stairs to the roof. In 2008 the event raised $103,719 for MS Australia.

Tasmania

22. Port Arthur Heritage Site, TAS



Key Australian standards

1. Maintaining safe structures

Established as a convict labour camp in **1830.**

Visitors: 350,000 p.a. pre-covid.

Did you know? Port Arthur convict settlement was the site of one of the first ever rehabilitation experiments, to see if prisoners could be reformed to become useful citizens. It was built free of any recognised Australian standards.

23. MONA, TAS

Key Australian standards

1. Fire safety
2. Safe building construction
3. Safety glass for visitors and workers

21.01
2011

Visitors: 347,000 p.a. pre-covid.

Did you know? MONA's infamous 'poo machine' instilation was used in the national campaign to educate people on testing for bowel cancer.

Northern Territory

24. Darwin City, NT

Key Australian standards

1. Cyclone considerations
2. Building strong metal structures
3. Building strong timber houses

Traditional owners – Larrakia (Saltwater) People – European settlement in **1869.**

Visitors: 1.3 million domestic visitors to the year ending September 2021 (latest available).

Did you know? 243 people lost their lives when the first Japanese bombs dropped on Darwin, 19th February 1942.

CHAPTER 3 –

The challenges of the future: the next 100 years

The future will bring new challenges we haven't considered yet, but if the last century is any indication, Australia will continue to do great things and make a positive difference in people's lives.

Two decades ago, the concept of the gig economy and the emergence of companies like Uber and Airtasker were not even on the drawing board.

A decade ago, no mainstream media outlet was taking commercial space travel seriously.

Five years ago, the idea that by 2022 Australia would ship hydrogen power to the world was barely a theory.

Within this context, Australia needs to anticipate future trends and needs, to ensure everyone can rely on upcoming services and goods, even if those products have not yet been invented. However, Australia does not exist within a vacuum. We live in a global community that is in constant flux.

Driving this heightened rate of change is the growing expectation of immediacy by end users. Whether it is in health and entertainment, food production and agriculture, or construction and defence, consumers increasingly want change introduced seamlessly.

This challenge has been exacerbated by an unprecedented number of domestic and global natural disasters. Here in Australia, bushfires, floods, drought, along with periods of unpredictable ecological abundance highlight the immense challenges presented by our changing climate.

Standards Australia's approach to our changing world is to focus on some of the most pressing areas of rapid transformation that would benefit from the research, development, and application of new dedicated standards.

This means diversifying from the construction of buildings and bridges to create standards for the environment, cyber-security, new energy fuels like hydrogen and the digitisation of our economy with Internet of Things (IoT).

Australia is also in the early stages of an energy revolution, with advances in electricity generation technology increasingly becoming more economically viable.

However, even as innovations in energy systems emerge, the ability to safely and securely provide reliable 24/7 power to every Australian home, business, hospital, school and everything in between remains a complex challenge.

3.1 Five key areas of focus over the next decade

3.1.1 Cyber security

THE CHALLENGE

The digitisation of Australia's $1.8 trillion economy is irreversible, and has only just begun.

By 2025, there will be 75 billion smart device connected to the internet globally.

Up to 60% of these devices will be unsecure with the cost estimated to be $29 billion per year, or 1.9% of Australia's GDP.

Within this context, online threats to our way of life are real. Cyber-security and the rapidly changing landscape within the Internet of Things (IoT) represents one of the greatest security challenges of the modern age.

Australia will need to develop uniform standards to better protect government, industry, and end-users as they navigate the IoT.

At the heart of this challenge is providing confidence and trust to users within the digital/cyber landscape.

Standards Australia will work in partnership with relevant stakeholders to develop the first Australian cyber security labelling scheme to bring us in line with international benchmarks.

Actions and progress:

- Standards Australia is partnering with the Internet of Things Alliance Australia (IoTAA) to develop a Smart Devices Cybersecurity Labelling Scheme (CLS) that uplifts safety for Australian consumers and businesses.
- A CLS will incentivise manufacturers to address security vulnerability levels aligned to international standards to instil product confidence in their end users.

The scheme will also promote security for consumers and at the same time increase the marketability and value of Australian products and services. This will be an Australian first and position Australia as a world leader in enhancing security within the IoT.

The CLS also represents a benchmark model of collaboration between industry and government in addressing new and emerging challenges.

3.1.2 Natural disasters

THE CHALLENGE

The financial cost of natural disasters averaged $18.2 billion per year between 2006-2016, equivalent to 1.2% of average Gross Domestic Product (GDP).

That figure is expected to climb to $39 billion a year by 2050.

Actions and progress:

- Consolidated National Housing Resilience Guide – Standards Australia is exploring the development of the first Australian single source guide that will consolidate all existing worlds-best-practice research and standards for upgrading existing homes to increase resilience against critical bushfire, cyclone, storm, tide, and flood events.

It is anticipated that a National Housing Resilience Guide will highlight best-practice beyond minimum standards. It will also include a cost benefit analysis to empower the building industry, local councils, homeowners, and the wider community with reliable information on how to upgrade their home and the costs associated. This will include an analysis of the housing insurance landscape and relevant options available to homeowners.

The first stage in the development of this guide will be engagement with stakeholders and government to secure the necessary resources to undertake detailed project research and planning.

3.1.3 The environment

THE CHALLENGE

The global economy consumes 100 billion tonnes of primary materials each year – of which only 8.6% is recycled. We are consuming more resources than the Earth can provide. At current rates, we would need 1.7 planets to produce global output and absorb the waste that is produced.

Actions and progress:

- Reduction in plastic waste – Standards Australia will partner with the CSIRO and Data61 to produce an interactive circular economy and plastics standards mapping tool to be published jointly with the CSIRO.

The tool will provide a basis for identification of future opportunities to accelerate the transition to a circular economy. This has the potential to include national standards on reducing plastic waste and encourage take-up of recycled content through circular design and reuse.

- Circular Economy Advisory Group (CEAG) – Standards Australia has formed a Circular Economy Advisory Group (CEAG) comprised of leaders in the circular economy, including the Department of Agriculture, Water and Environment (DAWE), Australian Council of Recycling (ACOR), Australian Packaging Covenant Organisation (APCO), Planet Ark and CSIRO.

The CEAG will help Standards Australia identify areas of priority in accelerating Australia's circular economy which may include:

- building
- infrastructure and construction
- transport
- organics and
- textiles.

Reuse standards and circular economy guidance – Standards Australia is working with key partners to develop harmonised information to accelerate the circular economy global standards and opportunities in key priority sectors.

3.1.4. Hydrogen energy industry

THE CHALLENGE

Since signing the Paris Agreement in 2015, Australia has been on a path to emissions reduction and the development of new-technology energy generation.

The Australian Government announced in March 2022 that it would spend more than $22 billion on low emissions technologies by 2030, including hydrogen.

Actions and progress:

- Hydrogen safety information sheets – Standards Australia is trialling the development of information guides on how current standards in the energy space apply to the development of key hydrogen systems, for example the construction and operation of hydrogen refuelling stations.

  The information guides are near completion and once finished, Standards Australia will seek to work with the Department of Industry, Science, Energy and Resources (DISER) to identify appropriate case studies that highlight how current standards align with regulations and legislations associated with the development of certain hydrogen systems.

- Dedicated hydrogen industry standards online portal – Following the successful development of hydrogen industry information guides, Standards Australia will seek to create a dedicated online platform to host all hydrogen standards and related material along with relevant legislation and regulatory information.

This will provide a 'one-stop-shop' standards portal for the hydrogen energy industry, providing an easily accessible and interactive platform for stakeholders to understand Australian hydrogen standards and their application.

3.1.5 Critical and Emerging Technologies

THE CHALLENGE

Harnessing the potential of Critical and Emerging Technologies (CET) is essential to Australia's competitiveness and economic growth. As technological change continues to accelerate, CET standards development is becoming more complex.

The growing demand for immediacy by consumers is driving an unparalleled 'speed-to-market' and coordination challenge.

Advances in communications (5G/6G), artificial intelligence, smart cities, IoT, quantum computing and digital twin are areas of rapid growth.

Actions and progress:

Standards Australia is committed to increasing engagement and influence with government and industry on issues arising from CET. This will require identifying, prioritising, and addressing risks and opportunities to develop fit-for-purpose Australian standards for CET in the national interest.

- Smart cities advisory group – Standards Australia has established a Smart Cities Advisory Group to research and develop a national position and strategic approach to standardisation in fields related to smart cities.

- Digital landscape briefing paper – Standards Australia is developing a landmark data and digital landscape briefing paper to be presented to relevant government stakeholders including the NSW Smart Places Advisory Council and a future meeting of the federal and state government Data and Digital Ministers' meeting.
- 5G Expert Advisory Group – Standards Australia is working with the Australian Government to establish a 5G Expert Advisory Group to provide guidance on future connectivity standards, with a focus on security.
- Quantum Computing – Standards Australia is working with experts to research and develop a quantum computing position paper that will examine the opportunities for Australia to position itself as a global leader in the sector through engagement in international standard setting.

3.2 Call to action – a collaborative approach is critical

In 2022, Standards Australia are the stewards of a valuable legacy – a long history of important work that has improved the lives of all Australians.

We must build on this legacy by holding to the core principles of why standards in Australia are necessary. Standards improve society. Standards foster a growing economy. Standards help keep our communities safe.

As this report has shown, the history of standards in Australia and around the world has shown that the overwhelming number of standards are the result of forward-thinking individuals and groups anticipating future needs.

Standards Australia's mission is to be at the forefront of proactively addressing the challenges of a changing world by researching, developing and helping to implement standards that embed the highest levels of safety and confidence within government, industry and end users.

For this to happen, the following benchmarks must be pursued:

1. Government engagement – greater participation by government, especially departmental/ agency policy and subject matter experts, in the cooperative development of Australian standards;
2. Industry engagement – greater awareness and engagement by industry in the development of relevant Australian standards. Australian industries should understand that dedicated standards are a long term investment in their sector, helping to position their industry as a world leader in best practices and product quality, as well as promoting confidence with end users.
3. New laws – increased willingness of governments to embed critical Australian standards within regulation and/or legislation where appropriate.
4. End user engagement – a heightened engagement and understanding by end users of the need to only engage industry suppliers that adhere to relevant Australian standards. There are numerous Australian standards that remain voluntary or self-regulated by industry. End users should therefore consistently and unequivocally insist on adherence to relevant Australian standards as part of any tender process, ensuring the standards form part of binding contracts.

Appendix A: Industries that use Australian Standards

This year marks the 100-year anniversary of Standards Australia operating in this country. Over that time, we have pioneered world first innovations in safety standards that have served to keep Australians safe, and many of which have been adopted by nations around the globe.

We've worked with a wide variety of industries and all levels of government across the country to develop important safety standards to help create a safe Australia.

Standards Australia also conducts world's-best-practice research to identify emerging technology and developing industries in Australia and around the globe. Our mandate is to anticipate potential safety risks and develop safety standards to help address each challenge.

Top 10 industries that rely on standards

1	Manufacturing and Processing
2	Electrotechnology and Energy
3	Building and Construction
4	Public Safety; Public Administration; Business and Management
5	Communications; Information Technology and e-Commerce Services
6	Mining
7	Consumer Products and Services and Safety
8	Transport and Logistics
9	Water and Waste Services
10	Health and Community Services

Appendix B: List of key Australian standards used in building and protection our national icons

Icon	Key Australian standards
1. Sydney Harbour Bridge	1. STEEL ARCHES – AS CA8-1933 Australian standard rules for the design and construction of metallic arc welding (hand or machine) in steel buildings together with Australian standard specification for Electrodes for metallic arc welding (known as The SAA Code for Metallic Arc Welding 2. STEEL CONSTRUCTION – AS CA1-1933 Australian standard rules for the design, fabrication and erection of structural steel in building. Known as the SAA code for structural steel in building 3. CONCRETE CONSTRUCTION – AS CA2-1934 Australian standard rules for the design, fabrication and erection of concrete in building. Known as the SAA Code for Concrete in Building
2. Sydney Opera House	1. PRESTRESSED CONCRETE (FOR OPERA HOUSE SAILS) – AS CA35-1963 The use of prestressed concrete in structures (known as the SAA code for prestressed concrete) 2. REINFORCED CONCRETE – AS CA2-1958 Australian standard rules for the use of normal reinforced concrete in buildings 3. INTERNAL STRUCTURES – AS B70-1958 Cast iron surface plates and granite surface plates for inspection and marking purposes THE FOLLOWING WERE BROUGHT IN AFTER THE OPERA HOUSE WAS CONSTRUCTED BUT THE BUILDING HAS TO CONFORM TO THEM NOW. 4. SAFETY GLASS – ISO 12543-3:1998 Glass in building – Laminated glass and laminated safety glass – Part 3: Laminated glass 5. OPERA HOUSE'S FAMED TILES – ISO 10545-3:1995 Ceramic tiles – Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density
3. Sydney Cricket Ground	1. LIGHTING TOWERS – AS 2560.2.3-2007 Sports lighting, Part 2.3: Specific applications – Lighting for football (all codes) 2. GRANDSTANDS – AS CA2-1963 Australian standard rules for the use of normal reinforced concrete in buildings. Known as the SAA code for concrete in buildings 3. GRANDSTAND ROOFS – AS 1562-1980 Design and installation of metal roofing
4. ANZAC Bridge	1. STEEL CABLING TO HOLD THE BRIDGE UP – ISO 19203:2018 Hot-dip galvanized and zinc-aluminium coated high tensile steel wire for bridge cables – Specifications. 2. STEEL CABLING – AS 3569-1989 Steel wire ropes 3. BRIDGE DESIGN – AS 5100.4:2017 Bridge design, Part 4: Bearings and deck joints
5. Sydney Tower	1. LIFT OPERATIONS – AS CA3.10-1966 Rules for the design, installation, testing and operation of lifts,escalators and moving walks (known as the SAA Lift Code) Tests 2. LIFT SAFETY – AS B184-1968 Steel wire ropes for lifts 3. STEEL CABLING TO SUPPORT ENTIRE STRUCTURE – AS 1979-1993 Electric cables – Lifts – Flexible travelling

Icon	Key Australian standards
6. Parliament Houses (old and new)	1. PARLIAMENT HOUSE EXTERIOR – AS 1480-1982 The use of reinforced concrete in structures (known as the SAA Concrete Structures Code). 2. PARLIAMENT HOUSE INTERIOR – AS 2796.P1-1985 Timber – Seasoned hardwood – Milled products – Wall chart – Summary of surface finishes for seasoned hardwood milled products (in accordance with AS 2796). 3. SAFETY GLASS – AS 1288:2021 Glass in buildings – Selection and installation
7. Black Mountain Tower	1. ENSURING THE TOWER STAYS UP – MP 28.C4-1975 Commentary on AS 1480, SAA Concrete Structures Code – Quality of concrete. 2. VISITOR VIEWING PLATFORMS – AS CA10-1938 Australian standard rules for the design, construction and erection of platforms, gangways, stairs and ladders (Known as the SAA Code for Platforms, Gangways, Stairs and Ladders). 3. WORKER ACCESS – ISO 3881:1977 Building construction – Modular co-ordination – Stairs and stair openings – Co-ordinating dimensions
8. Australian War Memorial	1. MAINTAINING THE BUILDING'S LOOK – AS 2700S-1985 (Y53) Colour standards for general purposes – Sandstone 2. PROTECTING PRICELESS WARTIME ARTIFACTS – AS 4666-2012 Amd 1:2018 Insulating glass units. 3. MEMORIAL EXTENSION – AS 3700:2018 Masonry Structures
9. Melbourne Cricket Ground	1. LIGHTING TOWERS FOR NIGHT MATCHES – AS 2560.2.3-2007 Sports lighting, Part 2.3: Specific applications – Lighting for football (all codes). 2. GREAT SOUTHERN STAND REBUILD – AS CA2-1963 Australian standard rules for the use of normal reinforced concrete in buildings. Known as the SAA code for concrete in buildings. 3. MCG ROOF – AS/NZS 1562.2:1999 REC:2020 Design and installation of sheet roof and wall cladding – Corrugated fibre-reinforced cement
10. Eureka Tower	1. SAFETY WINDOWS – ISO 1288-4:2016 Glass in building – Determination of the bending strength of glass – Part 4: Testing of channel shaped glass. 2. SUN PROTECTION – ISO 877-2:2009 Plastics – Methods of exposure to solar radiation – Part 2: Direct weathering and exposure behind window glass. 3. ROOF SAFETY – AS/NZS 1562.2:1999 REC:2020 Design and installation of sheet roof and wall cladding – Corrugated fibre-reinforced cement
11. Trams	1. OPERATIONAL MANUAL FOR DRIVERS – AS 1742.12-2000 Manual of uniform traffic control devices – Bus, transit, tram and truck lanes
12. Federation Square	1. BUILDING INTERNAL STRUCTURE – AS 1250-1981 The use of steel in structures (known as the SAA Steel Structures Code) (incorporating Amdt 1). 2. SAFETY GLASS FOR VISITORS – AS 1288:2021 Glass in buildings – Selection and installation 3. VISUAL STANDARDS – AS/NZS 2311:2017 Amd 1:2019 Guide to the painting of buildings

Icon	Key Australian standards
13. Story bridge	1. BRIDGE MAINTENANCE – AS 5100.8:2017 Bridge design, Part 8: Rehabilitation and strengthening of existing bridges. 2. BRIDGE DESIGN – AS 5100.6-2004 AMDT 2 Bridge design – Steel and composite construction. 3. TRAFFIC MANAGEMENT – AS 1348.1-1986 Road and traffic engineering – Glossary of terms – Road design and construction
14. Q1 Tower	1. LIFT QUALITY – AS CA3.10-1966 Rules for the design, installation, testing and operation of lifts,escalators and moving walks (known as the SAA Lift Code) Tests 2. 2. TOWER ROOF – AS/NZS 1562.2:1999 REC:2020 Design and installation of sheet roof and wall cladding – Corrugated fibre-reinforced cement. 3. SAFETY GLASS – ISO 1288-4:2016 Glass in building – Determination of the bending strength of glass – Part 4: Testing of channel shaped glass
15. Kuranda Scenic Rail	1. KEEPING THE RAIL LINE SECURE – ISO 22074-8:2022 Railway infrastructure – Rail fastening systems – Part 8: Test method for vertical stiffness. 2. ENSURING REPLACEMENT TIMBER SLEEPERS ARE SAFE – AS 3818.2-1998 Timber – Heavy structural products – Visually graded – Railway track timbers. 3. ENSURING THE RAIL ROUTE IS SECURE – AS 2758.7-1996 Aggregates and rock for engineering purposes – Railway ballast
16. Suncorp Stadium	1. LIGHTING FOR NIGHT GAMES – AS 2560.2.3-2007 Sports lighting, Part 2.3: Specific applications – Lighting for football (all codes). 2. ENSURING THE ROOF IS SAFE – AS/NZS 1562.2:1999 REC:2020 Design and installation of sheet roof and wall cladding – Corrugated fibre-reinforced cement. 3. SAFE LIFTS FOR VISITORS – AS ISO 18738-2005 Lifts (elevators) – Measurement of lift ride quality.
17. Adelaide Oval	1. LIGHTING FOR NIGHT GAMES – AS 2560.2.3-2007 Sports lighting, Part 2.3: Specific applications – Lighting for football (all codes). 2. GRANDSTAND CONSTRUCTION – AS 3600 SUPP 3-1991 Concrete structures – Extracts from AS 3600 Concrete structures – Concrete construction requirements (Supplement to AS 3600-1988). 3. SAFE ROOFING – AS 1562-1980 Design and installation of metal roofing
18. Port Lincoln tuna pens	1. ENSURING THE PENS DON'T BREAK AND LET TUNA OUT – ISO 1806:1973 Fishing nets – Determination of mesh breaking load of netting. 2. SAFETY WATER PUMPS – ISO 13457:2008 Agricultural irrigation equipment – Water-driven chemical injector pumps. 3. NETTING QUALITY STANDARDS – ISO 1107:1974 Fishing nets – Netting – Basic terms and definitions
19. Perth Airport	1. FIRE SAFETY – ISO/TR 24679-2:2017 Fire safety engineering – Performance of structure in fire – Part 2: Example of an airport terminal. 2. SAFE VISITOR ACCESS – AS 1735.5.2:2019 Lifts, escalators and moving walks, Part 5.2: Safety of escalators and moving walks — Rules for the improvement of safety of existing escalators and moving walks (EN 115-2:2017, MOD) 3. VISUAL STANDARDS – AS/NZS 2311:2017 Amd 1:2019 Guide to the painting of buildings

Icon	Key Australian standards
20. Optus Stadium	1. LIGHTING TOWERS FOR NIGHT GAMESAS 2560.2.3-2007 Sports lighting, Part 2.3: Specific applications – Lighting for football (all codes). 2. SAFE ROOFING – AS/NZS 1562.2:1999 REC:2020 Design and installation of sheet roof and wall cladding – Corrugated fibre-reinforced cement. 3. BUILDING SAFE GRANDSTANDS – AS 1554.1-1991 Structural steel welding (known as the SAA Structural Steel Welding Code) – Welding of steel structures
21. Central Park Tower	1. SAFE LIFTS – AS CA3.10-1966 Rules for the design, installation, testing and operation of lifts,escalators and moving walks (known as the SAA Lift Code) Tests. 2. SAFE CONSTRUCTION – AS 3600 SUPP 3-1991 Concrete structures – Extracts from AS 3600 Concrete structures – Concrete construction requirements (Supplement to AS 3600-1988). 3. GLASS WINDOWS – ISO 1288-4:2016 Glass in building – Determination of the bending strength of glass – Part 4: Testing of channel shaped glass
22. Port Arthur Heritage Site	1. BUILDING SAFE STRUCTURES – AS/NZS 1562.2:1999 REC:2020 Design and installation of sheet roof and wall cladding – Corrugated fibre-reinforced cement
23. MONA	1. FIRE SAFETY – ISO/TS 22269:2005 Reaction to fire tests – Fire growth – Full-scale test for stairs and stair coverings. 2. SAFE BUILDING CONSTRUCTION – MP 28.C22-1978 Commentary on AS 1480, SAA Concrete Structures Code – Rectangular slabs supported on four sides. 3. SAFETY GLASS FOR VISITORS AND WORKERS – ISO 12543-2:2011 Glass in building – Laminated glass and laminated safety glass – Part 2: Laminated safety glass
24. Darwin City	1. CYCLONE CONSIDERATIONS – AS1170.2 – 1975 Wind loads. 2. BUILDING STRONG METAL STRUCTURES – AS 1250 – 1975 Steel structures code 3. BUILDING STRONG TIMBER HOUSES – AS 1720 – 1975 Timber structures code.

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14	Westgate_Bridge Collapsed Span	https://en.wikipedia.org/wiki/West_Gate_Bridge
15	Cyclone_Tracy_25_December_1974_ESSA-8	https://en.wikipedia.org/wiki/Cyclone_Tracy
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21	Flooding of a caravan park and motorway at Ipswich suburb of Gailes	https://en.wikipedia.org/wiki/2010%E2%80%932011_Queensland_floods