

State of Stone

Celebrating the Minister's Stonework Program



'Nature's colouring, native flora and fauna have been introduced by Monsieur Lucien Henry ... it is to him, to his genius, his enthusiasm for our country, to his belief in, and development of the natural intelligence of the youth of Australia, that we owe a rising school of national art'.

J.R. Tranthim-Fryer Mons, student at Sydney Technical College, 1892. From the article; Lucien Henry's new school of Australian decorative arts, published in the Australian Association for Advancement of Science, Hobart 1892.

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Authors Margaret Betteridge & Joy Singh
Managing Editor Kate Napier | Editor Roger Balch
Contributors Kate Napier, Bruce Pettman & Paul Thurloe





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Middle: 1892 carving of the allegorical figure Justice, Central
Local Court, Liverpool Street, Sydney, Photograph by Sebastian
Mrugalski, 2023.

Sides: Carving detail Sydney Hospital, Photograph by Michael
Nicholson, 2004.

Inside front cover, 1891 carving of a goanna over the entrance of
Building A, Ultimo TAFE, Sydney, Photograph by Sebastian Mrugal-
ski, 2023

*'Nawi' by Marrawarri
artist Joe Hurst, carved by
mason Nicky Diakovasilis
of Heritage Stoneworks.
Located in Steel Park
Marrickville, Cadigal
country. Photograph
supplied by Inner West
Council.*



Acknowledgement of Country

The NSW Government acknowledges the traditional owners of the lands on which the Minister's Stonework Program's work has been undertaken, and pays its respects to all Aboriginal people, and their Elders past, present and emerging. We acknowledge that the land was, is and always will be Aboriginal land.

In the preparation of this book, illustrating the past 30-plus years of stonework repair and conservation of the State's most significant public buildings, we are cognisant that these structures are colonial buildings. And that their construction and ongoing conservation asserts the legacy of colonial rule and all that has ensued for Aboriginal people. Furthermore, conservation has been undertaken without the due acknowledgement of, or engagement with, Aboriginal people.

Additionally, while the principles of good conservation include the need to make minimal interventions, the cumulative effect of the extraction of raw materials required for the work – in particular sandstone, sand, lime, metals and timber – has disturbed Country. In the past 30 years, most stone has been taken from already disturbed land, however consultation and collaboration with traditional landowners about the best path forward did not occur.

The Minister's Stonework Program is therefore committed to exploring the potential for policies and practices to redress this, with Aboriginal communities, cultural advisors and knowledge holders through appropriate, timely and respectful collaboration.



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Left: 1880s carving of child with Victorian lace collar, Photograph by Michael Nicholson, 2004.



Foreword

Paul Scully

NSW Minister for Planning and Public Spaces

It is often the case that through necessity come the ideas and initiatives that lead to great outcomes for the benefit of our communities. Such is the case of the foresight and creative push to establish the New South Wales Minister's Stonework Program.

From the early 1980s, condition assessments of the Macquarie Street and Bridge Street sandstone buildings – and the persuasive case put by the Department of Public Works (now NSW Public Works) master stonemason George Proudman, together with the bipartisan support of successive state governments over the past 30 years – have led to the development of an extraordinary ongoing program for the protection, repair and restoration of hundreds of State-owned heritage sandstone buildings and other structures.

This book reveals to all of us the beauty and robustness of our heritage sandstone buildings which are a great contributor to our cultural heritage tourism, our community identity, and our shared memories of place. It also illustrates the ravages of time; and the care and effort needed to overcome this and to invest and breathe new life into these buildings, structures and places so that they serve us still for a century or more to come. Their age and longevity make them sentinels of sustainability – every year of service highlights their value in reducing our carbon footprint.

I commend the work and achievements of the Minister's Stonework Program and congratulate the owner agencies who have contributed to the conservation of their assets. I acknowledge the many dedicated heritage architects, technical officers, stonemasons and skilled tradespeople involved in the Program's planning and delivery over the past 30 years. I look forward to seeing more.

Left: 1893 pediment carving located atop the central block of Sydney Hospital, fronting Macquarie Street. It includes a mix of endemic and symbolic flora. Evidence of salt attack can be seen on the upper stones and the lower joints. Protective leadwork and repointing with a permeable mortar have extended its life. Photograph by Michael Nicholson, 2004.



Preface

Abbie Galvin

NSW Government Architect

Since the passing of the NSW Heritage Act in 1977, state government agencies have been obliged to care for their heritage assets. As a key contributor to the physical care and conservation of government assets at that time, NSW Public Works commenced repairs to some of our more prominent and significant stone public buildings. In the leadup to the 1988 bicentenary of European settlement, the volume of works accelerated. Condition audits made it clear that a program of stone-conservation works was needed to catch up on repairs to the deterioration of sandstone buildings and structures at over 800 sites in the State's portfolio of assets.

In 1991, with the 2000 Sydney Olympic Games approaching, a program of stonework conservation was established. It was implemented by NSW Public Works heritage architects and its team of skilled stonemasons and artisans. In 1993, the responsibility for government assets was vested with owner agencies, so the then Centenary Stoneworks Program provided seed funding to support agencies in this specialised area of stonework-façade conservation.

Since its formation the Minister's Stonework Program has grown from an annual expenditure of \$4 million to about \$30 million, repairing approximately 300 assets. Schools, hospitals, courthouses, libraries, galleries, bridges, seawalls, forts, fountains and sculptures have all benefited from the team's design, management and technical expertise and its highly skilled stonemasonry, restoration and construction skills. There are still many more assets that need this centralised management and attention, sometimes the first attention to their most inaccessible elements since they were built.

In 2020, the Minister's Stonework Program fund was vested with my office. As Government Architect NSW, I am proud that this important initiative continues. The Program is managed and coordinated by NSW Public Works, with construction services delivered by the Heritage Stoneworks team from the Government Architects office at Department of Planning and Environment. Through these projects, future masons are being trained for traditional masonry skills while aided by modern technologies.

Now in its fourth decade, the Minister's Stonework Program has cared for both metropolitan and regional assets, enabling continuing service to communities state-wide.

This book is both a record and a celebration of the many achievements and accolades of the Program, the people who have driven and contributed to this important heritage initiative, and the outcomes it has delivered for NSW.

Left: 1866 carving of acanthus leaves by stonemason Walter McGill adorning the column capitals of Colonial Architect James Barnet's extension to the Australian Museum facing College Street, Sydney. Photograph by Michael Nicholson, 2004.



Dedication

Drew Varnum

Executive Director NSW Public Works,
Department of Regional NSW

Upon joining what was then the Department of Public Works and Services (Public Works), in 2000, I was fortunate to visit the Public Works' Heritage and Building Services stone yard (today called Heritage Stoneworks), as part of my orientation. I was fascinated then and since by the personalities, their craftsmanship, and the beauty of their work.

As Master Mason of the NSW Department of Public Works in the 1970s and 1980s George Proudman was a driving force and persuasive negotiator for the formal re-establishment of a skilled team of Public Works' masons, who were needed to deliver the important and critical heritage conservation of our stone buildings and structures.

Catalysing that 'just in time' initiative was the foresight of NSW Government Architect Ted Farmer who in the early 1970s recognised historic building repair as a critical, specialised, activity and advocated responsibility for it should be centralised within Public Works. Amongst many other heritage roles and advice the architects, engineers and specialist conservationists provide across the wide portfolio of projects that NSW Public Works delivers for state and local government, they continue to manage the Minister's Stonework Program, guiding strategic forward planning of essential façade and roof repairs with partnering agencies. They have administered the research, investigation, design and coordination of the Program since its inception, as well as community engagement, and advice to government. Setting priorities for the work needed and the managing of limited financial resources for work of this nature has enabled projects to roll on in a coordinated manner and also to develop the necessary trade skills for government and the wider industry.

I acknowledge the key role of the stonemasons as part of the Program and the need to encourage the continuous development of the skills of that craft to enable our built heritage to live on as useful, performing structures. As part of the Department of Regional NSW, NSW Public Works continues to have a strong regional focus with partnerships and collaborations across the state delivering conservation projects to regional and rural assets.

This book celebrates and documents the 30 plus years of the Program and the collaborative engagement and synergies that exist between our Public Works Heritage Architects, and the NSW Government Architect's Heritage Stoneworks team. I'm proud of our continuing association with the Program and I am honoured to dedicate this book *State of Stone* to the celebration and acknowledgment of those who have contributed over the years and those continuing this great initiative for the benefit of our public stone buildings, structures and monuments.

*Left: 1890s carving by
William Priestly MacIntosh
of an endemic fern frond,
Ultimo TAFE, Photograph by
Michael Nicholson, 2012.*



1 | Foundations

'When we build, let us think that we build forever. Let it not be for present delight nor for present use alone. Let it be such work as our descendants will thank us for; and let us think, as we lay stone on stone, that a time is to come when those stones will be held sacred because our hands have touched them.'

*John Ruskin,
The Seven Lamps of Architecture, 1849*

Foundations

Stone is foundational for the shape of our landscape, our unique biodiversity, our coastal and riverine lifestyles, our *genus loci* and connection to Country. It also shapes our architecture; the sheltering effect of a Victorian stone cornice mimics an overhanging rock ledge. Photograph by Sebastian Mrugalski, 2023.



Sydney Cove Port Jackson (1788) by William Bradley. The outcropping sandstone along the foreshores of Sydney Cove was useful when Governor Arthur Phillip began construction of the burgeoning penal settlement's colonial buildings and infrastructure. (The Mitchell Library at the State Library of NSW).

Locally quarried sandstone, particularly Yellow Block Sandstone, defines the architecture of many nineteenth and early twentieth-century public buildings across the state of New South Wales. Representing the strength and solidity of the government's presence, they enrich town centres and regional communities with a heritage steeped in European classical architecture.

These landmark buildings reflect both the civic values of the then colonial authorities and the calibre of government-appointed architects, engineers, stonemasons and tradesmen to oversee the design and construction of public works. This approach began with the appointment in 1816 of Francis Greenway as the first acting civil architect, and also assistant engineer to the Inspector of Public Works, Captain JM Gill. These appointments signalled the start of a long tradition of public building assets that continues to the present day.

In Safe Hands

The NSW Government now has custodianship of over 800 heritage assets built of sandstone. They include courthouses, hospitals, lighthouses, schools, colleges, government offices, landscape features, monuments, memorials and statues. Specialist care for these assets is the purpose of the Minister's Stonework Program, administered by NSW Public Works in partnership with Heritage Stoneworks, on behalf of the Government Architect.

The motherlode of this majestic legacy of public works is the sandstone of the Sydney Basin. The especially renowned layer of its stratigraphy known as Hawkesbury Sandstone is found in a large arc from Ulladulla on the south coast, west to the Great Dividing Range and north to Newcastle.



No stone was more highly prized than the honey-coloured Yellow Block Sandstone that defined the nineteenth-century buildings of the sandstone city itself, Sydney.

The prestigious civic architecture of the Department of Lands Building symbolises the government's role in the development of NSW. Shown here in the late 19th century, it showcases Sydney sandstone as a solid and durable construction material, particularly in the Italian Renaissance Revival style for which colonial architect James Barnet is remembered. (Bridge Street, Sydney. Photograph by Henry King, circa 1890s, Tyrrell Collection, Museum of Applied Arts and Sciences).



The Argyle Cut between The Rocks and Millers Point in Sydney was initiated by convict labour in 1843 and completed in 1859. The sandstone removed from this deep cutting was considered an excellent building material. (The cut in Argyle Street (1853) by Frederick Charles Terry, National Library of Australia)



The bedrock was millions of years in the making, being formed about 250 million years ago by a freshwater delta, bringing grains of sand from as far away as Broken Hill. Earth movement and erosion shaped the deeply dissected sandstone valleys and gorges, exposing the sandstone escarpments and irregular cliffs familiar to us today.

As the British settlement in Sydney began to take shape from 1788, this sandstone was quarried to create the fine buildings and monuments which symbolised colonial authority and the ideals of the Georgian and Victorian social order imported from Britain. In the rich deposits around the foreshores of Pyrmont, no stone was more highly prized than the medium-grained honey-coloured Yellow Block that defined the mid to late nineteenth-century buildings of the sandstone city itself, Sydney.

The Need is Recognised

The imposing sandstone buildings eventually began to show signs of decay due to the combined effects of wind, water and air pollution over the decades following their construction.

As long ago as 1899, Government Architect Walter Liberty Vernon noted that 'the stone being compressed sand with some varieties being better than others, and of not knowing a single stone building in this colony 80 years of age [which] is in anything like good condition.'¹

Historically NSW Public Works was responsible for the design and construction of all state owned assets. Maintenance of the assets was however the responsibility of the agencies and thus was prone to ad-hoc repairs. In 1971 it was the view of the Government Architect Edward 'Ted' Farmer that the Government Architect's Branch (as it was then known) should be the guardian of historic buildings belonging to the State Government. This would ensure that interventions,

unsympathetic additions and makeshift repairs and maintenance could be minimised, and a consistent, durable approach to corrective maintenance established.

Farmer's views coincided with the growing realisation – as more and more structures began to show their age – of the State Government's burgeoning responsibility regarding public safety. In addition, short-sighted, invasive or intrusive ad hoc repairs were leading to further degradation.

By the late 1970s, Farmer's successors recognised that immediate action was necessary to maintain the value of heritage buildings as significant state assets to ensure their longevity. Not only was it imperative to allocate the funding to conserve them – but equally important to invest in programs that nurtured and upskilled the specialist craftsmanship and technical expertise required for their ongoing maintenance.

The *NSW Heritage Act 1977* was a precursor to establishing the Heritage Branch within the Government Architect's Office. This was the basis for replacing the piecemeal approach to asset repair with centralised and strategic management across the whole government heritage portfolio. As a result effective and efficient skills development and the prioritised planning and execution of appropriate conservation repairs flourished in the years ahead.

The Celebrations that Inspired a Program

A golden opportunity to showcase the State's portfolio of public buildings was provided by the Bicentenary of the founding of European settlement in NSW in 1988, closely followed by the Sydney 2000 Olympic Games. These events inspired a program of conservation works undertaken by the Department of Public Works to address the deficiencies and shortcomings of years of neglect and deferred maintenance. Colonial Architect Walter Liberty Vernon's prediction that the

¹ Minutes of Evidence from Government Architect, Walter Liberty Vernon presented to Parliamentary Standing Committee on Public Works on Thursday 19th January 1899.

More about

Chief Secretary's Building

Master Masons

The lofty grandeur of the Chief Secretary's Building was the epitome of NSW Government sandstone assets - a metaphor for the power and prestige of the position of Colonial Secretary known informally as the Chief Secretary from 1856, and formally changed under the *Ministers of the Crown Act (No.4 1959)*.

'...that pile of buildings which, like a veritable 'poem in stone' adorns the northern portion of Macquarie Street.'

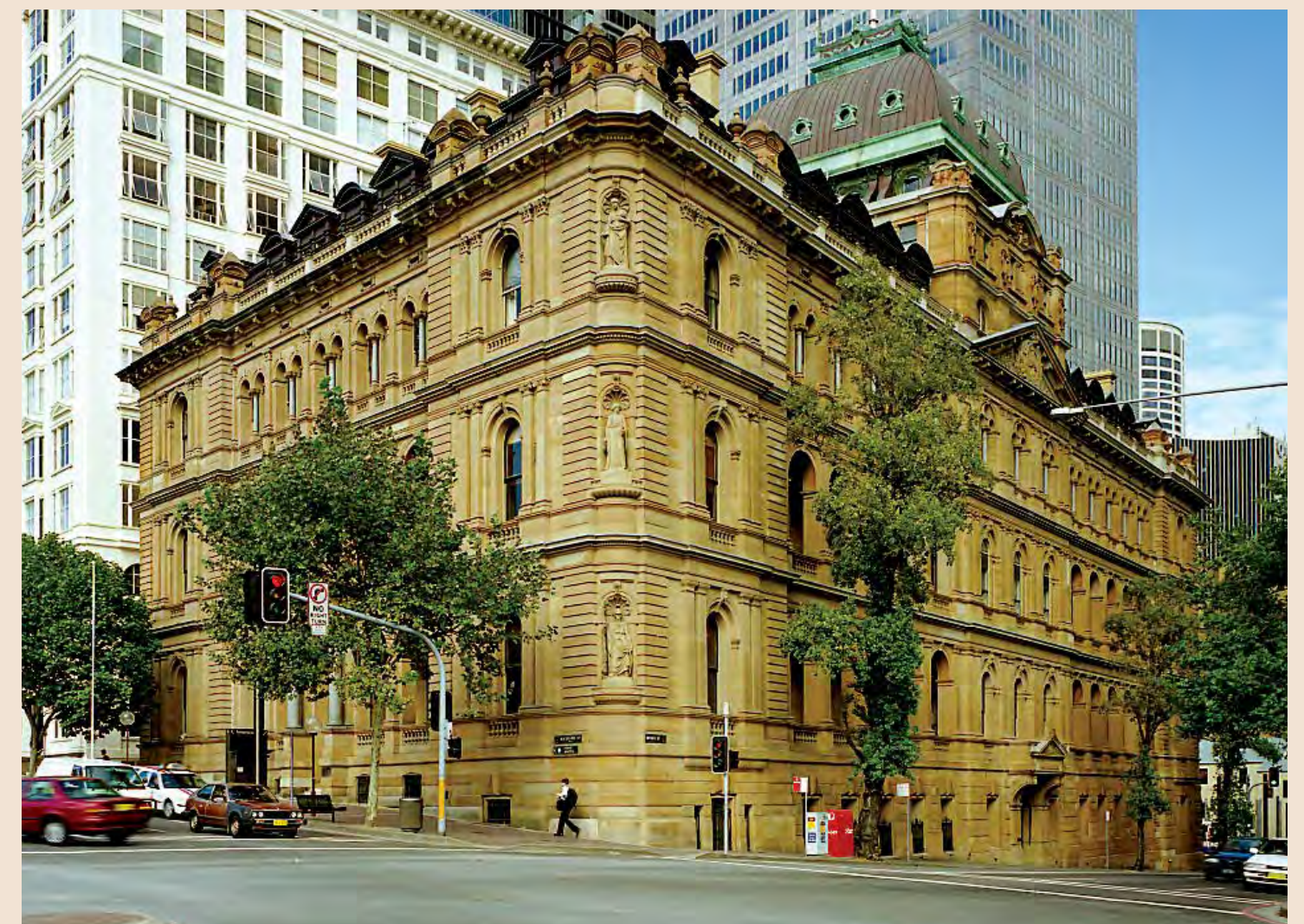
A Poem in Stone, Illustrated Sydney News February 1891.

100 years on from the construction of the Chief Secretary's Building, it was in need of repair.

It was the mid 1980s and there was an increased demand city wide for building restoration in the lead-up to the Bicentenary of the 1788 establishment of the British colony of NSW. At this time, working stone pieces for a project would occur on-site, with slabs being delivered, and masoned in an area adjacent to the building. This was an inefficient and disruptive process. In response the State Government established the Public Works Stoneyard at the former State Brickworks site in Homebush.

This dedicated workshop allowed for the stone to be masoned off site, with specialist saws and lifting gear making the process quicker, safer and less disruptive for the occupants of the buildings being restored.

The workshop was led by Master Mason George Proudman and stone was sourced from the Government's Kent Street development site. It is believed the Chief Secretary's Building was the first project of the Public Works Stone Program, later to become the Minister's Stone-work Program. The Stone Yard moved to its current location in Alexandria in the early 1990s when the Homebush site was redeveloped for the Sydney Olympics.



Right page above: Workers in front of the Chief Secretary's Building on the corner of Macquarie and Bridge streets in 1880, before construction of the second stage. Note that the corner niches are empty, awaiting their statues. (Mitchell Library, State Library of NSW).

Right page below: The Chief Secretary's Building in 2010. By 1896, the additional storey and dome had been added, and statues installed in the corner niches. The sandstone sculptures depict Mercy, Justice, and Wisdom. Photograph by Michael Nicholson, 2010.

The imposing sandstone buildings eventually began to show signs of decay due to the combined effects of wind, water and air pollution over the decades following their construction.

Georgian and Victorian era sandstone facades would require significant maintenance before a century passed, had been proven true.

The Centenary Stonework Program was therefore launched in 1991 as a Treasury funded 20 year program to undertake 'catch-up' maintenance. It aimed to be a strategic, dedicated initiative that would address both the immediate and long-term agency funding shortfalls and skills deficit. With an inter-agency agreement it would deliver conservation works that would maintain state owned heritage assets.

Following a review after 20 years, it was determined that the need to conserve public stone assets with specialised skills was an ongoing one. In 2011 the program name was changed to the Minister's Stonework Program and the funding strategy changed to a co-funding model with participating agencies supplementing the fund to make optimal use of scaffolding for whole facade repair. At this time, the Program was administered by the then Department of Public Works. Government departments and their ministers have changed over time and currently the program falls within the portfolio of the Minister for Planning and Public Spaces.

Now in its fourth decade – and with many awards and accolades to show for its innovation and technical expertise – the Minister's Stonework Program is at the forefront of sandstone heritage conservation and a world leader in its field.

Portico of the Darlinghurst Courthouse in Sydney's Taylor Square. Designed by Colonial Architect Mortimer Lewis – who is named in the plaque – and built between 1837 and 1844, it is the first purpose-designed courthouse built in NSW and still in use today. Fashioned in the Old Colonial Grecian style, it was completed in 1880 by Lewis's successor James Barnett. Photograph by Michael Nicholson, 2012.



Like a Beautiful Tree in Stone

Choragic Monument of Lysicrates

Monument of Antiquity

Sydney's Choragic Monument of Lysicrates is located in the Royal Botanic Gardens, near the Farm Cove seawall. The sandstone monument is a copy of the original, which is near the Acropolis in Athens and dates from 334 BCE.

The purpose of the original was to display the trophy endowed to Lysicrates, the patron (choragus) of musical and theatrical performances during the annual Festival of Dionysus. The story of the Greek original and its links with Sydney's replica is a fascinating and multifaceted journey that includes important historical figures, its typically classical form and exceptional craftsmanship. The Minister's Stonework Program was associated with conserving the Sydney monument, initially in the 1990s then between 2014 and 2017.

The original Choragic Monument of Lysicrates is of architectural importance and of significant interest to Greek scholars and students of architecture. It was the first ancient monument built in the Corinthian style, and is featured in architectural history books as one of its prime examples.

The frieze is carved in bas-relief, and represents the dramatic story of how Tyrrhenian pirates captured the god Dionysus. In anger, Dionysus filled their ship with vines and phantom beasts, and when the pirates leapt into the sea they were transformed into dolphins. The monument's six fluted columns terminate in Corinthian capitals and form a circular colonnade. The cornice is crowned with a series of Vitruvian scrolls and surmounted by a cupola finished in a thatch of carved laurel leaves, symbolising victory.

In 1658, a Capuchin monastery was built on the site of the original Choragic and it was adapted to become a library and reading room. Lord Byron lodged at the monastery from 1810 to 1811, and wrote poetry inside the monument's chamber.

In 1751, English architects James Stuart and Nicholas Rivett prepared drawings of the Choragic Monument while in Athens during their grand tour of Europe. These engravings were included in their publication called *The Antiquities of Athens*, a work that deeply influenced Greek Revival architecture.

We are fortunate to have an accurately proportioned copy of this monument in the Royal Botanic Gardens, carved in beautiful Yellow Block Sandstone from Sydney. There are approximately 30 replicas of the monument worldwide – but Sydney's is widely acknowledged to be the most accurate, differing only in minor details and just slightly smaller than the original.

Left: Sydney's very own Choragic Monument of Lysicrates, in the Royal Botanic Gardens, Photograph by Douglas Frost, 2017



The original monument of Lysicrates as it currently stands in the Athenian Plaka, to the east of the Acropolis in Athens. (Photograph, Prof. Hans Rupprecht Goette).

334 BCE: the original Choragic Monument of Lysicrates is constructed in Athens.

1762: Stuart and Rivett's drawings of the Choragic Monument are published.

1810-11: Lord Byron writes poetry inside the monument's chamber.

1868: a replica Choragic monument is carved by stonemason Walter McGill for NSW Chief Justice, James Martin's garden in Potts Point, Sydney.

1943: the replica is relocated to the Royal Botanic Gardens during World War II.

1997: the Minister's Stonework Program prepares a Conservation Management Plan and undertakes conservation works, including cornice replacement.

2014-17: funding from the Royal Botanic Gardens and Australia's Lysicrates Foundation enables further conservation by the Program, including recarving a panel of the frieze.

2015: the annual Australian Lysicrates Prize for playwrights is established.

2017: National Trust Award for Conservation



Top left: Carved more than 150 years ago, the Sydney monument's frieze has been adversely affected by the elements and especially salt-laden air. Photograph by Douglas Frost in 2015.

Bottom left: Heritage Architect Joy Singh assesses the condition of the stone with Stonemason Gary Rimmer before repairs are carried out. Photograph courtesy Royal Botanic Gardens, 2014.

Top right: Detail of the frieze from Stuart and Revett's 1762 *The Antiquities of Athens*, showing a satyr thrusting a torch in the face of a pirate.

Bottom right: Stonemason Paul Thurloe traces the design to help him accurately recarve the frieze. Photograph by Douglas Frost 2015.



Recarving the frieze stone in 2016. Photograph by Douglas Frost



The recarved frieze stone being lifted into place, 2017. Photograph by Douglas Frost

Sydney's Choragic

James Martin – three times Premier of NSW and the Chief Justice after whom Martin Place is named – commissioned the Sydney monument for the garden of his grand house in Potts Point, known as Clarens. He had a passion for all things classical, particularly literature and art, and it is believed that Sir John Young (a former Lord High Commissioner of the Ionian Islands) gave Martin a copy of Stuart and Revett's *The Antiquities of Athens*.

It's also thought that Lord Byron was Martin's favourite poet. The Sydney monument therefore illustrates nineteenth-century Europe's fascination with ancient Greece and the subsequent importing of those ideas and ideals to Australia, at that time, taking its cues from Europe. Carved from Pyrmont Yellow Block Sandstone in 1868 by Walter McGill, the monument demonstrates the stonemason's high-quality

carving and reproduction skills. During World War II, Martin's land was resumed to construct a graving dock between Potts Point and Garden Island, and the monument was relocated for its safety to the Royal Botanic Gardens in 1943, where it stands today.

Breaking New Ground with an Ancient Spade

During a stroll through the Botanic Gardens in 2014, private citizens Patricia and John Azarias noticed the Sydney Choragic Monument was losing carved details and in need of conservation. Inspired, they created the Lysicrates Foundation to raise funds from private donors, and the State Government's Minister's Stonework Program matched the funds dollar for dollar. This is the first, and only, public-private partnership that the Program has undertaken. Since 2015, the Lysicrates Foundation has held an annual playwriting award, known as The Lysicrates Prize Competition.

Its winners are democratically chosen by the audience and announced at a celebration gathering around the monument in the Sydney Royal Botanic Gardens.

The primary objective for conservation works carried out by the Minister's Stonework Program in 2017 and 2020 was to retain as much of the original sandstone as possible and to prolong the life and integrity of the monument. A major challenge was deciding on the level of stone replacement, given the exposure to harsh environmental conditions.

One of the three stones encompassing the frieze had lost all its recognisable detail. The choice was made to recarve the panel where the relief had significantly eroded and thus the meaning of the story was lost. As a structure fully exposed to the elements and constantly absorbing salt laden moisture it has heightened vulnerability.

Deterioration has been slowed by desalination cycles and repointing, however, in 2020 three scrolls required replacement and the pedestal required pinning of fine cracks. The pedestal's precarity prompted a 3D laser scan by NSW Public Works Survey team as part of archival recording of the work.



2 | Sandstone

'It is both easy to work and remarkably strong...but it is also a rock made of other rocks, in the midst of its own transformation back to sand.'

*Jarrold Hore,
David Scott Mitchell Fellow in 2020,
historian of environments, geologies &
photographies. Openbook summer 2021.*

Sandstone



Governor Macquarie's ambitious program of public works relied on the ready availability of local sandstone. To this end he established a government quarry on the northern side of Fort Phillip (Flagstaff, later Observatory Hill) and worked by convict labour. (Detail from Sydney Church and Regimental Mill from the Main Guard by Edward Close [circa 1817] showing stone quarrying. State Library of NSW)

Sandstone is a sedimentary rock found throughout the world, revered in its natural form and prized both as an artist's medium and a building material. The name refers to its composition of quartz-rich sand grains bonded by silica, iron oxide, clay and other constituents. Colour variations in sandstone depend on its mineral composition, detrital grains and bonding material; and vary from white, cream, grey and yellow through to red and to black. As an outcropping rock, Sydney Basin sandstone can range in colour from white, cream or grey and darkens on exposure and ageing. It is often banded with darker, stratified layers.

Before European colonisation, sandstone defined much of the landscape, creating ecosystems of rich diversity in plant and animal communities, and cultural practices. Natural forms of sandstone, shaped by wind and water over hundreds of thousands of years, were used by First Nations people for shelter, shade, cooling from the sun, strategic views and as galleries for story telling through visual art.

Knowledge Sites

In the Sydney-Hawkesbury area, elevated rock platforms were also utilised for gatherings, ceremonies and cultural knowledge exchange in the form of stylised carvings of animals, their tracks, people, tools, ancestral beings and other petroglyphs. Over 600 rock-carving sites have been doc-



Right: From 1854 there were 21 quarries operating on the Pyrmont peninsula which supplied fine grained Yellow Block Sandstone for major public buildings in the Sydney CBD for over half a century. For two generations, the Saunders family operated quarries nicknamed Paradise, Purgatory and Hell Hole. (Pyrmont Quarry, Sydney (circa 1880-95) by Alfred Tischbauer. State Library of NSW)

Below: The quarry face in Pyrmont's Carmichael Park. The sites of former quarries have bestowed spectacular rock faces upon the suburb's new cultural landscapes and local street names often allude to them.



umented in the region, containing more than 4000 individual figures – understood by art historians to be the largest known 'unified body of art'². The quartz in sandstone is sufficiently hard to sharpen and grind rock tools; grooves found in rock outcrops, often near to waterways, are evidence of this ancient practice.

The link between its geological landscape and built heritage is one of the colony's most defining features. Within weeks of the First Fleet landing in Sydney Cove, Governor Arthur Phillip reported a freestone 'which appears equal in goodness to that of Portland'³. Given the ready availability of building stone from shallow beds or natural rock faces, many early to mid-nineteenth century buildings were constructed either on the site of, or close to, sources of local sandstone. From the 1790s, quarrying shaped the harbour foreshore areas of the first settlement around Bennelong Point and Millers Point, giving The Rocks district its name.

Two decades later, Governor Lachlan Macquarie took steps to improve the quality of buildings by locating supplies of good sandstone, opening a government quarry on the western side of Sydney Cove, and supporting the training of convicts as stonemasons until the trade could be professionally organised.

² Issacs, J., *Australia's Living Heritage: Arts of the Dreaming*, New Holland Publishers, 1984

³ Portland stone is white-grey coloured limestone quarried on the Isle of Portland, Dorset, UK and used extensively throughout the British Isles, notably in public buildings. Arthur Phillip. *The Voyage of Governor Phillip to Botany Bay* (London 1789), p145 and Phillip to Under-Secretary Nepean, 15 May 1788. *Historical Records of New South Wales*, vol 1/2, p128

Quarrying shaped the harbour foreshore areas of the first settlement around Bennelong Point and Millers Point, giving The Rocks district its name.



Trade Union Banner of the Operative Stonemasons' Society, celebrating their 1855 victory in campaigning for an eight-hour workday, depicting the Art Gallery of NSW and its sandstone portico on which they worked. (Sydney Trades Hall)

A Stone-carver's Dream

It soon became obvious that sandstone was not uniform in quality, and some early extracted sandstone was more prone to erosion and decay. As Sydney expanded eastwards and westwards, the topography of its new suburbs was shaped by the quarrying of sandstone from the harbour foreshores and sandstone ridges. The inhospitable rocky land around Pyrmont and Ultimo, which had proven unsuitable for farming and difficult to build on, was found to contain a harder, more uniform and less friable sandstone which was better suited as a building material. This medium-grained golden stone – known as Yellow Block Sandstone – was quarried extensively and used in Sydney's most significant late-nineteenth century public buildings.

Yellow Block Sandstone is revered not just for its colour, uniform quality and compressive strength; it is also a stone-carver's dream. Colonial architects such as Mortimer Lewis and James Barnet seized the opportunities it afforded, adorning their buildings with the columns, friezes and ornamentation that distinguished classical architecture. This gave cities and towns in New South Wales the imperial gravitas, grandeur and respectability of the post-convict era.

In the hands of stone masons and carvers, Barnet's public buildings came to life with flowers, fruit, figures and faces – symbolic of the public responsibilities these institutions upheld. However, this new order of sophistication and civic pride also demanded respect for those whose skills and tools shaped its character.

Forced to work long hours outdoors with no protection from the weather, stonemasons joined a movement demanding better working conditions, opportunities for education and reasonable leisure time. Their demand for 'eight hours work, eight hours play, eight hours rest, for eight bob a day' prompted the union movement to agitate on their behalf. Half a century

later, the small gains they made would be shared with the wider workforce due to the passing of legislation in the early twentieth century that enshrined an eight-hour working day for all Australians.

Significance

The combination of stone and skill can be recognised in the natural, unifying, and the culturally diverse values embodied in the legacies of our sandstone heritage. They are tangible monuments to sensory perception and experience, to Country, to creativity and administrative foresight. They are simultaneously imbued with both uplifting and traumatising memory: recollections of ancestors in classical and enlightened Europe, or in bonded servitude to the Crown; recollections of ancestors on Country, of people removed from their homelands and kin, of the fabric of Country harvested as a resource for elsewhere.

Together, a sense of place results from the complexity of these interactions: the timescale of Earth's geological evolution; our corporeal response to the colour, texture, temperature and patina of the stone; the point in time meaning overlayed by the architects, masons, government agents and their political setting; and the unifying and divergent cultural reference points from which we all, then and now, interpret these buildings and this place, and what that means for our civic character and society.

For the Minister's Stonework Program, it means these buildings are valuable cultural and material assets. To endure, they require active tending, observation, reinterpretation and appreciation. The Program has played a leading role in the NSW Government's commitment to maintaining and conserving the State's sandstone heritage. It does this by investing in measures to sustain the active use of sandstone buildings; to conserve and repair their fabric to the highest standards of

More about

Chief Secretary's Building, Coat of Arms

Carved by Wran

English-born Thomas Vallance Wran (1832 – 1891) trained as a stonemason and studied the aesthetic sensibilities of architecture at the Royal Architecture Museum in London before emigrating to Sydney where he worked for three noted architects, Thomas Rowe, George Allen Mansfield and James Barnet. His style has been described as Ruskin-Romanesque and his work is remarkable for its lack of repetition and early use of Australian flora and fauna as carved sandstone ornament.

Carved by Wran in 1876, the impressive royal coat of arms above the Macquarie Street entrance to the former Colonial Secretary's Building embodies the imperial authority, power and control of its occupant. The two vibrant supporters, the rampant lion and unicorn are carved with such movement that they appear to be leaping from the sandstone substrate, rather than clinging to it.

Decades later, his great grandson, Neville Kenneth Wran would become the 35th premier of NSW and during his first term of office, he presided over the passing of the *Heritage Act (1977)*, the legislative instrument which protects, along with sites and buildings, the legacies of generations of stonemasons.



Above: Royal coat of arms on the Chief Secretary's Building. Photograph by Michael Nicholson 2005.

Bottom left: Rear view of the coat of arms. Photograph by Michael Nicholson 2005.

Bottom right: Thomas Wran's engraved signature. Photograph by Michael Nicholson 2005.



durability (given sandstone is a non-renewable resource); and to educate and train future generations of stonemasons, asset managers and the general public in the value and needs of these buildings.

An Irreplaceable Heritage

The first audit of sandstone heritage assets by NSW Public Works began in 1991. It identified over 800 sites. By 2023 more than 300 buildings and structures have been conserved, repaired or documented for attention by the Program. Understanding their significance, documenting their history and the changes to their built form is a cornerstone in delivering the objectives of the program.

Deferred maintenance heightens safety risks, threatening their longevity and significance. Strategic decision making is required to address the complexity of critical factors including the science of stone, the diminishing supply of suitable replacement sandstone, the continuation of heritage trades and skills, durable protective treatments and maintenance regimes, and also budgetary implications.

Sandstone, although revered for its beauty, is technically challenging when subject to mechanical and chemical erosion. The visible signs of rising and falling damp, disintegration of stone and discolouration are compounded by the ingress of water, failing mortar and salination. Often, adjoining building elements that have been poorly maintained or inappropriately added (including roofs, gutters, render, and brickwork) contribute to accelerated decay, requiring corrective maintenance (sometimes with major integrated engineering solutions). Working in partnership with government agencies to address, fund and rectify these deficiencies is a core business of the Minister's Stonework Program. Its focus is to keep these assets relevant and useful.

The economic value of the NSW Government's heritage sandstone portfolio is immeasurable because it is irreplaceable.



Left: Katoomba Courthouse at completion of facade, chimney and roof conservation, including seismic stabilisation, in 2021. Conservation of the former cell block at the rear is due to be completed in 2023. Photograph by Sebastian Mrugalski 2023.

The Minister's Stonework Program champions the continuation of the education and training in specialist architectural, engineering and stonemasonry skills, the scientific research informing best practice conservation and the future proofing of suitable stone resources.

The University of Sydney's Faculty of Design and Architecture prepared a report for the Program in 2016 called Valuing Sydney's Sandstone. It investigated the economic framework around NSW public-heritage stone buildings to examine the relationship between conservation of cultural assets and their economic benefits. Today the State of The Environment report links heritage protection with wellbeing outcomes at a local, state and even global level. Despite this, heritage assets remain vulnerable to demolition and deprioritisation in the trade-off between urban density demands and competing land use objectives.

Minister's Stone Stockpile

The prized Pyrmont Yellow Block Sandstone was used to construct Sydney Town Hall, the Queen Victoria Building, the Australian Museum, the Art Gallery of NSW, Sydney Hospital and Bathurst Courthouse, as well as humble schools and warehouses. The overburden was put to good use as fill in large sections of Sydney Harbour, ballasted roads and harbour sea walls. By the early twentieth century, supply of Pyrmont Yellow Block from active quarries was either exhausted or commercially unviable. New sources were opened for quarrying in the eastern suburbs in the 1920s, supplying stone for buildings such as the State Library, extensions to the Australian Museum, and the Art Gallery of NSW.

After World War II, new and cheaper construction methods and materials (such as steel, bonded asbestos, concrete and glass) changed architectural design. The demand for sandstone subsequently fell. By the 1980s, the eastern suburbs' supply of sandstone was either exhausted or built over.



Sandstone, although revered for its beauty, is technically challenging, when subject to mechanical and chemical erosion.

Previous page: St. Bernard's Church and Presbytery, Hartley Historic Site, following completion of conservation work in 2018 for National Parks and Wildlife. It's important to see the patina and age of an asset, whilst ensuring its protective elements are durable and functional. Photograph by Michael Nicholson 2019.

Right: The NSW State Library portico following conservation work in 2010, Photograph by Michael Nicholson 2010.

Although funding became available to conserve public stone buildings, sourcing restoration-quality replacement sandstone was a significant challenge. The diminishing supply of quality sandstone for repairs and replacement required scientific analysis and testing of the particular characteristics of Sydney sandstone to set minimum standards for stone selection on public projects. The Minister's Stonework Program's conservation practices and standards have benefited from collaborations with the University of Sydney, University of Technology Sydney, University of New South Wales, Commonwealth Scientific and Industrial Research Organisation (CSIRO), and Manly Hydraulics Laboratory.

The Hunt for New Supplies

Governor Phillip's initial classification of Sydney sandstone into three types was refined in the mid-nineteenth century by English clergyman Reverend William B Clarke. Clarke's observations on the stratigraphy of Sydney identified three distinct groups of geological variations which he named Narrabeen, Hawkesbury and Wianamatta, based on their layering and composition. Of these, the Hawkesbury sandstone was the purest and most consistent. More recently, the typology has been expanded to recognise six different varieties, based on colour and composition.

The Program has been innovative in sourcing new stone. In 1985, the NSW government delayed construction of a Maritime Services building in Kent Street for nearly two years to allow the quarrying of approximately 800 cubic metres of Yellow Block Sandstone. The stone was extracted using a Water Board trenching machine that facilitated quarrying in a built-up urban environment. This stone was used for the Bicentennial Stonework Program and 'The Bridge Street sandstones' including the grand Chief Secretary's Building, the Education Building and the Lands Department Building. By the early 1990s, the supply was exhausted. Although replacement stone

was sourced from Western Australia and Queensland, it was never a suitable match for Yellow Block Sandstone.

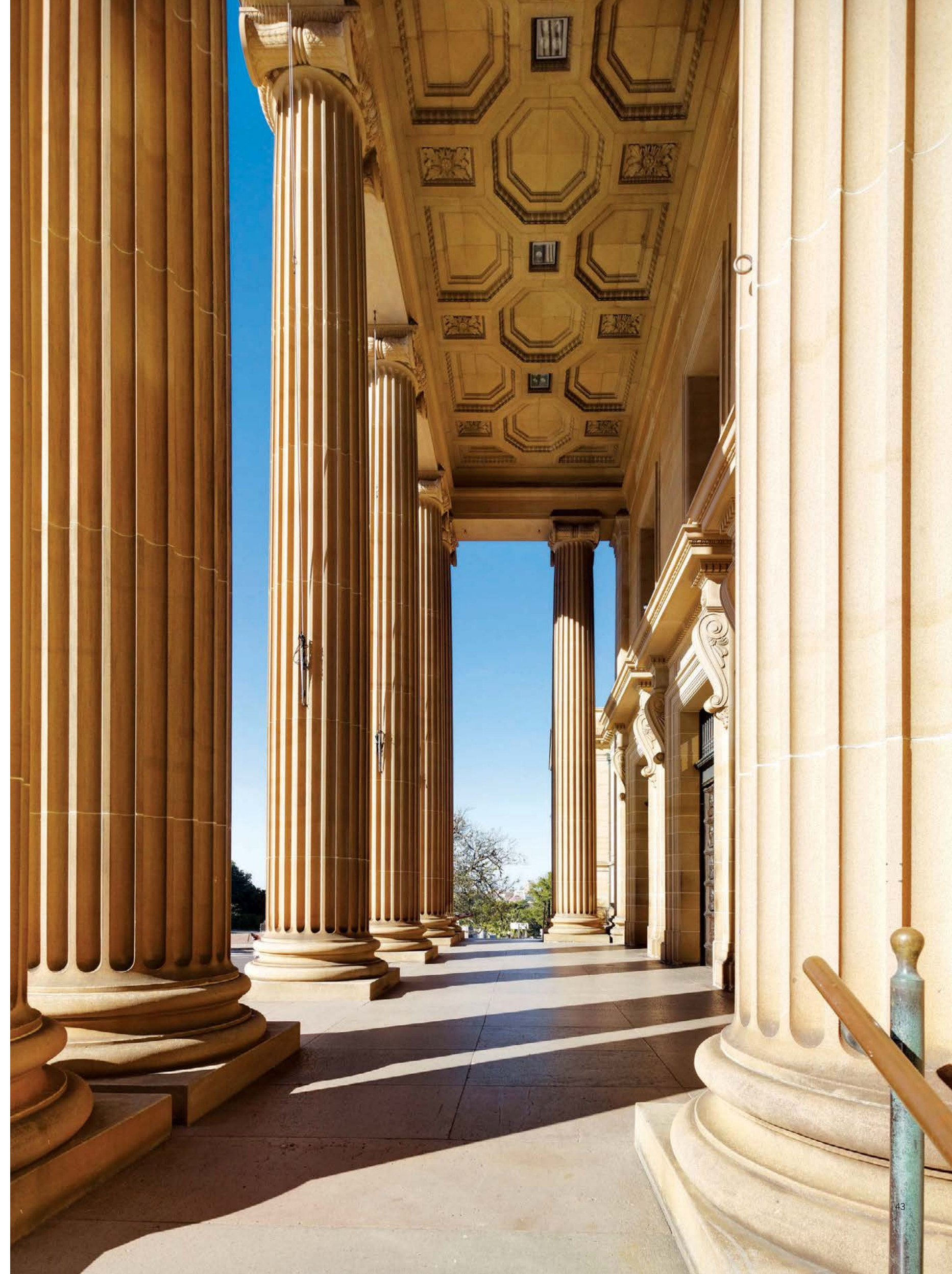
By the mid-1990s, extensive geotechnical investigations by Public Works saw a stone-harvesting opportunity on small-footprint sites designated for multilevel basement carparking. These were opening up in Pyrmont and the Sydney CBD. The use of excavator-mounted cutting wheels allowed for precision quarrying on a compact site. Restoration-quality Yellow Block Sandstone was the prize and its genus loci equivalent to the original sourced stone of much of the NSW government portfolio. This was the beginning of the Minister's Stone Stockpile.

The former Saunders' family Yellow Block quarry known as 'Paradise' in John Street, Pyrmont was to be part of the Jacksons Landing development for new waterfront housing. Building on their experience, Public Works' collaboration with the City of Sydney, developers and quarrymen extracted 4,000 cubic metres over an eight-month period from late 2000.

The Public Works' Minister was then able to on-sell Yellow Block to landmark heritage buildings including the Great Synagogue, St Mary's Cathedral, Sydney University, Sydney Town Hall and Sydney Trades Hall.

Ensuring that the ongoing need for fresh supplies of Yellow Block Sandstone could be met prompted the City of Sydney to develop a condition of development consent requiring the sourcing of Yellow Block Sandstone from excavations for restoration of Sydney heritage buildings.

By 2008, with Public Works input, a new City of Sydney condition of development consent was introduced which required developers undertaking excavation, to submit geotechnical testing results. If performance meets conservation standards, stone must be extracted in block sizes suitable for the Ministers Stonework Program conservation projects.





Construction of a Maritime Services building in Kent Street was delayed for nearly two years in 1985 to allow the quarrying of 800 cubic metres of Yellow Block Sandstone.

The Minister's Stone Stockpile currently holds approximately 3,500 gross cubic metres of sandstone for use on heritage public buildings.

While Yellow Block is justifiably the most well-known sandstone, its use for conservation around the state may not always be appropriate. In many regional areas, local quarries were utilised for civic structures to avoid the expense and logistical challenges of hauling sandstone blocks long distances.

The Minister's Stonework Program remit covers all of NSW, so there is a need to source and stockpile project-specific replacement materials. Significant resources are used to research, locate and procure suitable material around the state. For example, quarrying for a fine-grained sandstone that weathers to a pale brown (part of the Farley Formation) has occurred in Branxton to restore buildings in Singleton and Maitland. And in 2023, efforts were underway to reopen the historic Ravensfield quarry, which won first prize for its stone at the 1893 Chicago Exposition.

Previous pages: Harvesting of sandstone at Alfred Street Circular Quay. Developers undertaking excavation for basement car parking in Sydney are required by City of Sydney Council to harvest stone of suitable quality and size for use in conservation. When first quarried, Yellowblock sandstone is a pale creamy grey colour. Exposure to air causes the iron minerals to be drawn to the surface and oxidise, developing a golden colour. Photograph by NSW Public Works.

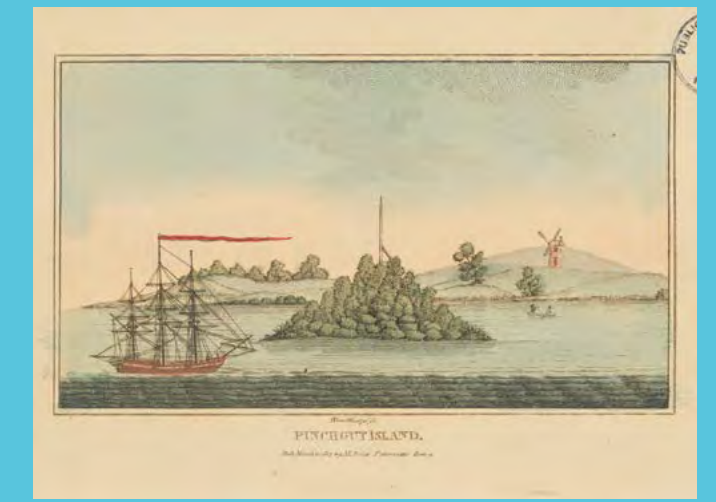
Left: The Minister's Stone Stockpile at Kurnell. White Wambeyan Marble used in many heritage foyers can be seen on the right of the photo, and Yellow Block Sandstone at the rear and left. Photograph by Douglas Frost, 2015.

Following pages: Stockpile, at Sandy Point, Sydney.





Fort Denison, Photograph by Michael Nicholson, 2010



Pinchgut Island. An 1803 plagiarised artwork by Vincent Woodthorpe. (National Library of Australia)

A ROCKY PAST

Construction of Fort Denison sparked an early heritage outrage in the colony. Before British colonisation, the island was a pyramid-shaped stone outcrop known to the Gadigal as *mat-te-wan-ye* (rocky place). It was beautifully described by the Reverend Dunmore Lang as ‘a natural ornament of the harbour ... like a sentinel keeping watch upon the harbour for thousands of years’. *Mat-te-wan-ye* was initially used by the British colonialists as a place of confinement and punishment for convicts, referred to colloquially as Pinchgut. After the unannounced arrival of two American warships in 1839, the island was developed as a defence fortification. Dunmore Lang described its levelling to build the fort as ‘the folly of man’.

Like a Stone Boat in the Harbour

Mat-te-wan-ye and Fort Denison

Treasure Island

Completed in 1857, Fort Denison is of national and international significance as an exceptionally fine and intact example of a nineteenth-century maritime fortification, in a superlative harbour setting. From a technical perspective its location within a tidal, salt-laden, aggressive marine environment makes it a treasure island of accelerated weathering patterns for the analytical minded conservationist. Its small island setting in the heart of Sydney Harbour provides a degree of remoteness and yet affords easy access from a CBD office. That access has enabled close study of degenerative and regenerative cycles. This has increased our understanding of the performance and durability requirements for sandstone replacement and repairs in harsh marine environments.

Working in partnership funding with NSW National Parks and Wildlife Service, catch-up conservation works were carried out by the Minister’s Stonework Program in several phases between the mid-1990s and 2019. The challenge was to slow the rate of deterioration and prolong the life of the stone and metalwork, within hostile environmental conditions, whilst also considering rising sea levels, and the ongoing use of the site as a museum, national park and hospitality venue. Conservation of Fort Denison has been professionally demanding, thought provoking and stimulating. Investigations into repointing, desalination, sacrificial renders and limewashing undertaken by the Minister’s Stonework Program’s material scientists, geologists, architects, stonemasons, engineers and conservators have

increased our knowledge of materials conservation. The Program’s work received a Highly Commended National Trust Award in 2011.

Since 2016, the Program has played a significant role in building and supporting private sector skills to supplement in house skills when workload demands are high. Fort Denison is a site that provides learning for the industry and it has benefited from partnerships with masons and conservators who are alumni of the Program.



Top left: The paintwork of the Martello tower dome being carefully conserved.

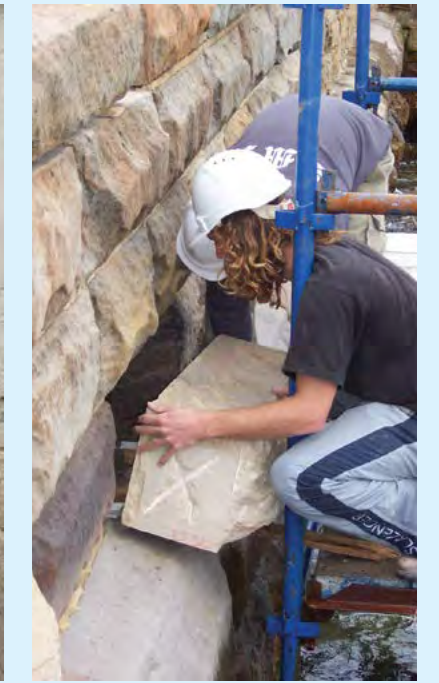
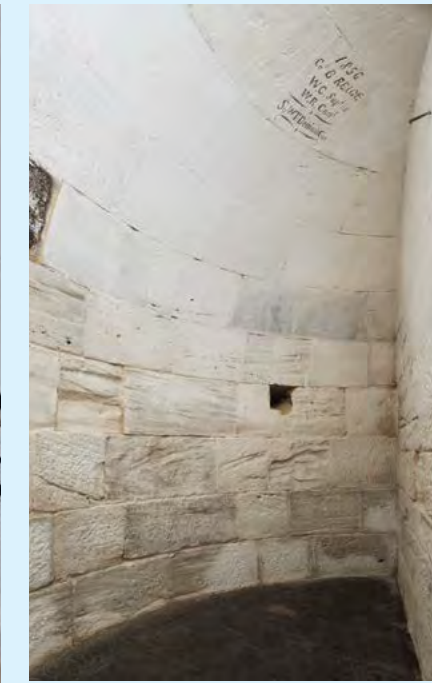
Bottom left: Discussing repair options. During king tides, the water levels peak under the barracks floor. Photograph NSW Public Works, 2019.

Above: The three cannon in the Martello tower were installed before construction of the domed roof. They were conserved as part of the metals conservation works. Photograph by Michael Nicholson, 2010.

Top right: The lower-level sandstone walls of the Martello tower have been re-lime washed. Photograph by Michael Nicholson, 2010.

Top far right: Carrying out seawall repairs at low tide. Photograph by NSW Public Works.

Below right: The completed seawall repairs. Photograph by Michael Nicholson, 2010.



Not All Stone Is Equal

The fort was constructed from 8,000 tonnes of quartz-rich sandstone quarried from the island itself and from nearby Kurraba Point on the harbour foreshore.

Major phases of stonework replacement have occurred since the 1940s, using a variety of sandstone types sourced from a wide range of quarries, including Pyrmont Yellow Block. Given the harsh environmental conditions, the stone has suffered from accelerated weathering. Analysis of replacement stone performance has increased our understanding of stone-type durability in marine environments: Yellow Block Sandstone which has lower quartz and higher clay content than the original stone is less durable in marine conditions.

Prior to the 2007 works, most replacement stone had failed. From 2007 onwards, a quartz-rich sandstone with extensive secondary

quartz overgrowth and a low clay content was sourced from the Wilton Quarry in Appin. This has proved a durable replacement stone for Fort Denison.

Learning From The Recent Past

An extensive review of previous studies, investigations and repairs since the 1940s clarified durability and stone deterioration rates. This helped guide the prioritisation of conservation works. The primary causes of stone and mortar deterioration are salt ingress, frequent wetting and drying cycles, and wind erosion. None of which can be prevented at this site.

The objective was to prolong the life of significant fabric by providing protection were possible and lowering the salt contamination. Conservation actions included desalination of stonework, treating corroded metalwork, removing cement pointing and repointing with

lime mortar. The Program takes a holistic approach to conservation: all parts of a building envelope or structure are critical to the conservation of the whole. To that end, the collapsing internal linings of the fort's chimneys were structurally stabilised, subsiding slipways and seawalls rebuilt, and significant paintwork conserved.

The nature of Fort Denison's massive sandstone construction, combined with its isolation and comparative inaccessibility, adds to its mystique and landmark status. It is significant for its long and continuing history in recording and predicting weather and tidal changes in Sydney Harbour; and its navigational beacons, fog warnings and the 1pm firing of a cannon – originally to help sailors set their ship's chronometers to Eastern Standard Time.

Robust and blunt in character, yet vulnerable to time and tide, Fort Denison survives because it is captivating and defiant. It forms an

iconic trinity with the Opera House and the Sydney Harbour Bridge that keeps its conservation servants returning to minister ongoing care, ensuring it will endure as a much-loved feature of renowned Sydney Harbour.



3 | Skills

'The tools used for working a stone are basically the same as those used for thousands of years...'

*George Proudman,
Master Mason, Public Works*

Skills



Darlinghurst Courthouse designed by Mortimer Lewis receives additional wings designed by James Barnet shown here in construction on January 1st 1885. Image shows a timber gantry crane for lifting stones. (State Archives and Records Authority of NSW).

Stonemasonry thrived in New South Wales from the mid-nineteenth century, when gold was discovered, until World War I broke out in 1914. Masons migrated from Great Britain and Europe in their hundreds to work rough-hewn Yellow Block Sandstone from the quarries at Pymont, Annandale and the eastern suburbs. They brought with them impressive traditional skills and displayed them majestically. Their legacy is evident in the proliferation of iconic sandstone architecture across NSW from that time.

Shifting Community Values

Rapid urban development from the late 1960s to the early 1970s resulted in an accelerated loss of built heritage enabled by a lack of legislative protection. This triggered a wave of community advocacy and activism to protect significant heritage and environmental places. In addition, preparations for celebrations of the bicentenary of Captain Cook's voyage to Australia in 1770 saw a growing interest in Australian settler history and cultural heritage. The welcome introduction of the *NSW Heritage Act 1977* was the result of shifting community values to protect culturally significant places. It, therefore, became incumbent upon the government to allocate funds for catch-up maintenance of significant public buildings.

A meeting at Burra in South Australia adopted the 1979 Australia ICOMOS Guidelines for the Conservation of Places of Cultural Significance, widely known as the Burra Charter. It provided a much-needed set of principles for heritage

conservation practice. It specifically elevated the cultural value of significant fabric, alongside form. Before 1979, there were no Australia-wide guidelines for the care of culturally significant items and stone replacement was undertaken without due consideration for alternative options.

The adoption of the Burra Charter was a turning point in the practice of heritage conservation, which was transformed from a tradesperson-led approach to a multidisciplinary one led by a professional heritage adviser. Much of the 1980s was spent understanding how to apply the Burra Charter in practice and clarifying what would be an acceptable level of intervention.

The navigation of materials science and technological innovations now became essential to the conservation industry. Previously, without a centralised government agency to coordinate stone repair or investigate the effects of new techniques and products, untested products and technologies developed for modern buildings had tragically damaged heritage fabric rather than conserved it. For example, coatings applied to stone facades trapped moisture and hastened deterioration; masonry repointing was done with non-breathable cementitious or mastic-based materials that permanently damaged the stone; and non-reversible destructive sample coring was undertaken in the name of progress.

NSW Public Works architects and technical officers became the link between the philosophy, the legislation and the practice of stone facade conservation. They worked closely with stonemasons, scientists and allied heritage trades to develop best-practice scopes of work and specifications. Importantly, they provided guidance across government and supported agency asset managers in this specialist area of expertise.

Right: Stone mason's tools, Sydney Hospital. Photograph by Douglas Frost, 2018.





Left: Expert stone carver Luke McDermott refines the details of replacement carvings for The Muse at Ultimo TAFE. Photograph by Sebastian Mrugalski, 2023.

Right: Pointing up replacement stone at Leichhardt Public School. Photograph by Michael Nicholson, 2014.



Skills Crisis

By the 1960s and 70s, the traditional stone masonry trade was in decline in the face of steel, glass, concrete, brick and stone-veneer cladding construction. Less demand for traditional stonework meant an extensive loss of expertise and experience, with masons leaving the profession never to return. Young recruits were drawn to new trades and burgeoning industries. Investment in plant, equipment, materials and training spiralled downwards. Heritage buildings were demolished rather than repaired to make way for new buildings. Over time, quarries were abandoned as the stone was no longer in demand. Land values soared to meet the need for housing and gentrification of the inner suburbs. The most accessible quarries with the highest-quality stone made way for alternative, more profitable land use.

The lack of suitable stone and expertise resulted in some poor heritage outcomes. This is evident in the 1980's installation of faux-stone mouldings to replace deteriorated facade elements. Seen on the north kiosk of Sydney Hospital fronting Macquarie Street, they are a potent reminder of how precious each stone in a facade is; and the importance of skilled conservation practitioners and regular maintenance programs in extending the service life of significant buildings.

Scientific Rigour

Public Works architects, technical officers and construction supervisors pivoted to stonework conservation. Materials scientists from the CSIRO and universities became interested in analysing the deterioration mechanisms of Sydney sandstone – as well as rising damp, stone selection, mortar composition and chemical preservatives. Rigorous sandstone testing then began in the 1990s. Initially, a visual assessment of a potential stone source is made, examining

colour, grain size, bench depth and uniformity, i.e. being free from large shale deposits, cracks, inclusions, heels, banding and fine, dispersed dark minerals known as tea leaves etc.

If a potential stone deposit shows promise, it is subjected to a series of geotechnical engineering tests to determine water absorption, compressive strength and resistance to salt attack etc. These tests all investigate the structural performance and durability of the stone. Petrographic analysis looks at the mineral composition of a stone to determine its suitability as well.

Given the large investment and disruption required to extract a non-renewable resource, transport and store it, then measure, saw, work and install it in heritage buildings, it is critical that the material must be fit for purpose. Should replacement of the stone be deemed necessary, these tests ensure the highest quality specification for durability is achieved.

Concepts of stone conservation versus stone replacement need to be considered within the Burra Charter framework, which prioritises fabric retention. In the words of the Charter, 'It requires a cautious approach of changing as much as necessary but as little as possible.' Architects from the Heritage Section of the Government Architects Branch (GAB) worked closely with then Master Mason George Proudman, Clerk of Works Peter Leslie and others; along with heritage tradespeople such as roofers, scaffolders, painters and carpenters to develop conservation techniques that were aligned with the principles of the Burra Charter. It was important to assess the building envelope and its setting holistically as a composite system in a dynamic environment.

Often a blocked or failing box gutter was a major contributor to a building's deterioration. Maintaining a skilled group of heritage roofers, plumbers and carpenters was essential to

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More about

George Proudman Fellowship

Continuing Craftsmanship

The George Proudman Fellowship was established by NSW Public Works in honour of the late Master Mason George Proudman, for his leadership in advocating for a permanent government stonemasonry team thereby securing the necessary skills for ongoing repair.

The George Proudman Fellowship was created to offer additional, international stone-conservation learning opportunities for mid-career stonemasons with proven skills, leadership potential and an interest in the many aspects of heritage stone conservation. It was named in honour of the legacy of George Proudman, who passed away in 2000 and who was instrumental in revitalising the craft of traditional stonemasonry in NSW. His legacy can be summarised as promoting and preserving heritage buildings through the maintenance of stonework, utilising heritage expertise and skills training on the job. The George Proudman Fellowship is sponsored by the stone industry and the NSW Government. It supports, via a competitive application process, the biennial granting of a travelling fellowship to a mid-career stonemason.

Each Fellow identifies an industry and/or personal skill gap which the traveling scholarship would help to bridge, and for new skills to return to NSW to develop our practices and knowledge.

Stonemason Paul Thurloe was the first recipient of the Fellowship, in 2001, and used it to fund a seven-week work and study tour in Europe to further his understanding of the craft. Paul has been the Stone Masonry Manager at Heritage Stoneworks for a number of years, which indicates the benefits of the Fellowship in identifying leadership capability and capacity.

Other recipients include Daniel Feeney, Brad Rimmer, Nicky Diakovasilis and Phillip Parsons. Nicky's proposal focused on the cultural significance of stone to First Nations people; and the impact of its extraction, shaping and use in building and maintaining significant colonial buildings. Refocusing the program on ways to engage with First Nations knowledge keepers on our approach to maintenance moving forward:

In my practice, I seek to negotiate meaning in places through interpretation of historic, ecological and material layers and processes. Here I have identified a knowledge gap in stonemasonry, I seek to know how local material, ecological, and spiritual pathways are impacted by stone quarrying – specific to the heritage sector. For this I was awarded the George Proudman Fellowship, Nicky Diakovasilis, the 2021 Fellow.

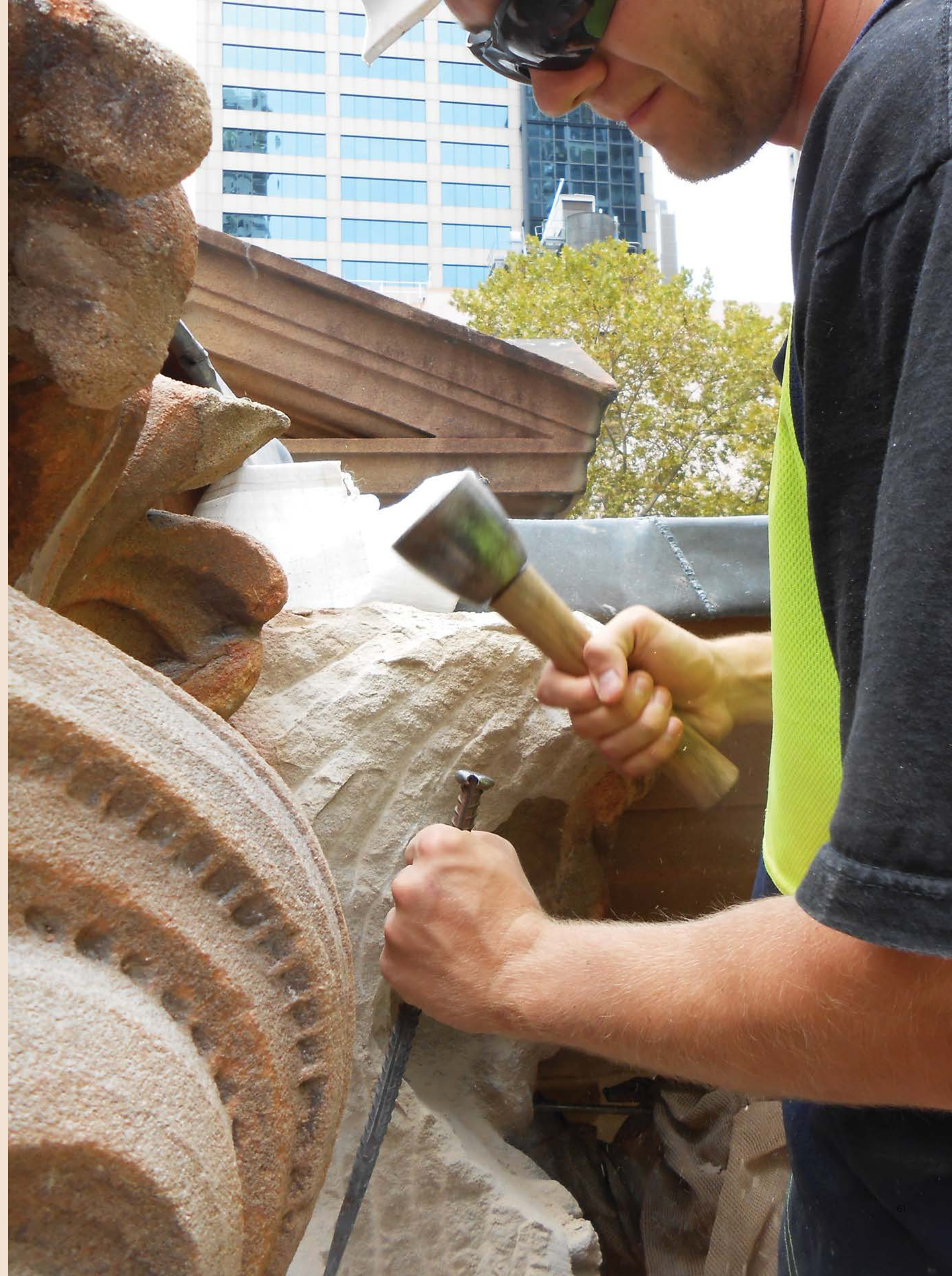


George Proudman, Master Mason, Order of the Medal of Australia, 2000.



George Proudman Fellows (left to right) Paul Thurloe, Philip Parsons, Brad Rimmer, Nicky Diakovasilis at the Mint for the announcement of the 2023 Fellow. Absent Daniel Feely. Photograph by Sebastian Mrugalski, 2023.

Right: 2023 George Proudman Fellow, Phillip Parsons at work on the King Street Court complex coat of arms, 2013.





Expert stone carver Luke McDermott carving a section of the dated ribbon to be 'indented' into the original coat of arms carved by Walter McGill in 1879 and positioned above the Forbes Street entrance to the former Darlinghurst Gaol (now the National Art School, formerly East Sydney Technical College).
The damaged unicorn's head can be seen in the foreground. Its face has been rebuilt with plasticine.
If you look closely, the red crosses mark the location of depth measurements used to set out the new carving.
The replacement head carved by Luke is complete and positioned in the coat of arms behind. The replacement stone was harvested from Alfred Street Circular Quay and is anticipated to oxidise to match the original stone. The photos on the next two pages show the restored coat of arms being installed.
Photograph by Sebastian Mrugalski, 2023.



Installation of Coat of Arms, National Art School, Forbes Street, Darlinghurst

Photographs by Sebastian Mrugalski, 2023.



Left: NSW Public Works Principal Heritage Architect Kate Napier and Heritage Stoneworks' Senior Stonemason Craig Miller work through the night. They assess condition and scope repairs at close range from a crane box. Lichen and carbon build-up on exposed stones makes hairline cracks difficult to see at night, however lightrail track installation has prevented day time work. Stone is tapped to detect unsound stone, which is a safety risk in high level cornices overhanging publicly accessible areas. Photograph by Michael Nicholson, 2018.

continued from page 59

delivery of the Minister's Stonework Program, as was a scaffold team to enable sensitive and safe access on busy operational sites, for repairs to cornices, bay windows and gables, that are anything but straightforward.

Future Generations

Despite the *NSW Heritage Act 1977* triggering an increase in government and private sector funding for conservation of stonework, the loss of traditional stonemasonry skills and a lack of quality replacement stone still impeded progress. To remedy this, skilled masons capable of reproducing high-quality intricate carvings were urgently recruited from overseas in an echo of earlier times. And stone-cutting machines that had laid dormant for decades were resurrected – a gang saw for stone slabbing was even retrieved from the Old Sydney Town open-air museum and put back into action.

Safeguarding and teaching the traditional skills of stonemasonry is an important part of the Minister's Stonework Program. Since the foundation of the Public Works Stoneyard in 1987, some 40 stonemasons have completed apprenticeship training. Many have moved into private sector masonry organisations thereby enhancing the State's overall skills capacity and capabilities.

Stonemasons can now be retained, knowing there is a reliable supply of quality work. With this platform, their expertise is handed on, ensuring a continuity of heritage trades training, for government assets and to seed the industry. Apprentices can be employed, knowing there is enough work to finish their training, and have an ongoing career. Money has been invested in new plant and machinery to make the industry safer and more efficient. Stone can now be harvested from city building sites and stockpiled because there is a forecast corrective maintenance requirement and financial commitment.



Charles Dickens statue prior to conservation works in 2011. The marble statue, located in Centennial Park, is one of only two known life-size representations of Charles Dickens in the world. The other is a bronze statue in Philadelphia, USA. The statue was placed in storage in 1972 for protection following vandalism. Photograph by Michael Nicholson, 2011.



Installation of the statue in Dickens Drive, Centennial Park by stonemasons Luke Wijtes, Ben Gardener, Gary Rimmer and Reuben Varfi. Photograph by Michael Nicholson, 2011.



Stonemason Reuben Varfi applies the finishing touches to the statue. A block of carving quality marble was sourced from Carrara, Italy to recarve the head, pen and part of the scroll. The legs were structurally stabilised with pins, the marble was cleaned and the letters were re-leaded using traditional techniques. Photograph by Michael Nicholson, 2011.



The statue was unveiled by Marie Bashir, Governor of New South Wales, in 2011, coinciding with Charles Dickens' 199th birthday celebrations. Photograph by Michael Nicholson, 2011.



Left: Working under Covid restrictions, masons, heritage architects and project managers meet on-site to plan repairs. Photograph by Michael Nicholson, 2021.

Below: The project team review progress on the College Street facade of the Australian Museum in 2020. From left to right: Site Controller Craig Bonnici, Manager of the Minister's Stonework Program Kate Napier, Conservation Lead Martine Craswell, and Project Manager Ahmed Gomaa. Photograph by NSW Public Works.

Underpinning the successful delivery of the Program's goals is its symbiotic relationship between the architects and heritage advisers in NSW Public Works, and the mason and project delivery staff at Heritage Stoneworks.

The Program's team performs a key role in providing heritage stone training for the industry, in particular the establishment of exhibits, demonstrations, and presentations of the stonemasonry course at Miller TAFE. Tours, exhibits and presentations are held throughout the year and around the state for government agency asset managers, project managers, local government officers, site supervisors, allied trades and private consultants.

Underpinning the successful delivery of the Program's goals is its symbiotic relationship between the architects and heritage advisers in NSW Public Works, and the masons and project delivery staff at Heritage Stoneworks.

The heritage architects and advisors of the Minister's Stonework Program contribute advocacy and appreciation for the work, the scoping and financial administration of projects, assurance of the underlying principles and philosophy of sound, well-researched architectural conservation practice, the documentation of the works and quality inspections through construction. The stonemasons bring exceptional masonry skills alongside tangible knowledge and experience of stone, its performance, and construction practicalities and – through this dialogue – the solutions to many challenging heritage problems arrive. This best-practice delivery model founded on mutual respect, co-operation and collaboration, is evident in the numerous awards that the Program teams have accumulated over the past 30 or so years.

The financial stability afforded to the stone conservation industry by the rolling annual program funding has enabled forward prioritisation and planning of State government asset-maintenance works. Benefits include responsiveness to safety concerns, technological upgrades to improve efficiency, an apprenticeship program and industry leadership in work health and safety, continual improvements in technical specification, and quality assurance in construction delivery. *continued page 77*



More about

Women in Construction

Masons, Architects, Leaders

The Minister's Stonework Program has historically provided excellent opportunities for women in construction, whether beginning their career, refining their skills, or taking on leadership roles. Women have held key roles in the delivery of the Program since its inception.

Anne Higham was the first Stonework Program Coordinator in 1991 followed by: Sue Brennan, Julie Paton, Joy Singh, Vivian Sioutas, and Kate Napier as managers of the Program. The current manager of the Minister's Stonework Program is Martine Craswell, she began in 2022.

Vivian Sioutas was the first woman Minister's Stonework Program Leader at Heritage Services (now Heritage Stoneworks). Dianne Kingsford-Smith was the first woman stone mason working in NSW Government, she was followed by Katie Hicks and Rebecca Green.

Other women architects working in the Program: Lucy Bourke Smith, Catherine Macarthur, Anita Krivkas, Milena Crawford and Amy Chew have made a significant contribution.

Dianne Kingsford-Smith instigated establishment of the stonemasonry course at NSW TAFE.

In 2003 Rebecca Green, second year stonemasonry student at TAFE, won the National Woman in Construction Award for Outstanding Student.

Katie Hicks became the first woman in NSW to complete the TAFE Stonemasonry Course and win a TAFE Achievement Award for second place in her graduating year. Also receiving the Pride of Workmanship Award from the Rotary Club of Liverpool West.



Joy Singh, former Stonework Program Co-ordinator



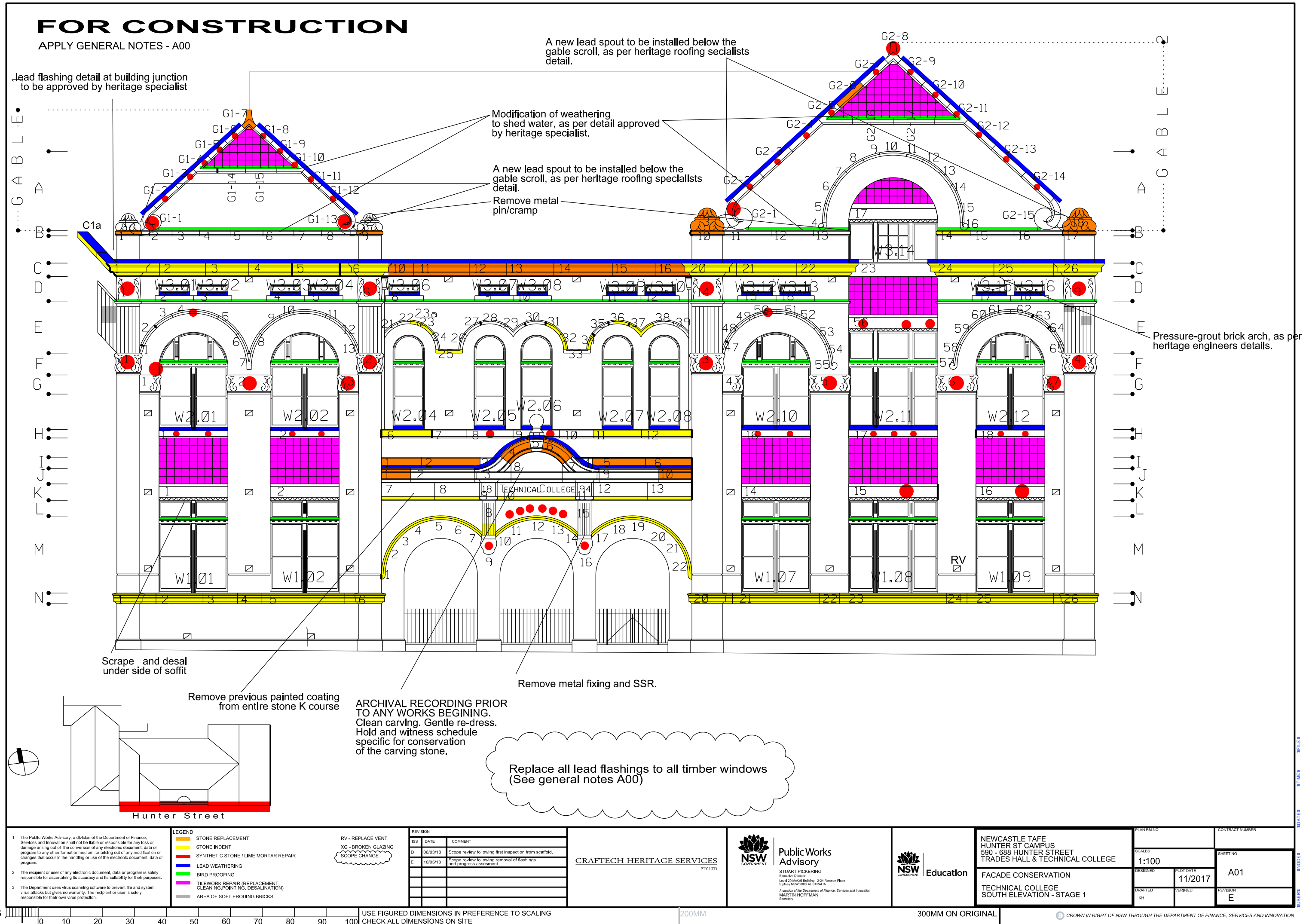
Dianne Kingsford-Smith, first woman stone mason in NSW Government.



Undertaking a high level inspection, Heritage Architect Anita Krivkas on the left, and on the right Vivian Sioutas, heritage architect, first woman leader at Heritage Services, and former Stonework Program Co-ordinator.

Right: Stonemason Katie Hicks. Photograph by Anson Smart for the 2008 Sydney Magazine article 'Traders of the Lost Arts' by Geraldine O'Brien.





An example of a typical drawing created and referenced by Minister's Stonework Program heritage specialists, architects and masons for building and site conservation works.

This Newcastle TAFE elevation drawing captures the works proposed, which becomes an 'as built' recording once work is complete.

Stone-cutting machines that had laid dormant for decades were resurrected – a saw was even retrieved from the Old Sydney Town open-air museum and put back into action.

continued from page 70

In the early 1990s, with the Homebush site being redeveloped for the 2000 Olympic Games, the stoneyard was moved to Alexandria, and Master Mason Alf Pires took the reins, generously sharing his knowledge and expertise until his retirement in 2009. The work and legacy of George, Alf and the Minister's Stonework Program has created the conditions for skills to flourish. Investment in the latest generation of stone-cutting equipment has been innovative in creating safety solutions for managing the dangers of respirable silica dust, while maintaining a strong focus on traditional stone-working techniques. The stoneyard employs over 50 staff and is the benchmark for quality stonework and training in the industry.

Left: The profile saw cuts stone with laser-like precision while water cools the blade to stop it melting. These stones are destined for capping Hyde Park's boundary walls. Photograph by Douglas Frost, 2015.



A Reflection On Our Changing Values

Macquarie Wall, Royal Botanic Gardens

The Macquarie Wall can be found in Sydney's Royal Botanic Gardens, on the eastern side between the Middle and Lower gardens. It is the sole remnant of the sandstone walls built to Governor Macquarie's specifications around the Governor's Demesne (now the Domain) between 1812 and 1816 to protect the Governor's privacy and the enclosed farms and gardens.

The wall demonstrates the practice of building from local and abundant stone outcrops in the early days of the colony. Originally providing shelter for the propagation of vulnerable plant species in the Middle Gardens, it is significant for its association with botanical specimens collected by distinguished early nineteenth-century explorers, botanists, and Aboriginal guides.

Visitors to the Royal Botanic Gardens entering through the Macquarie Wall might not perceive the subtle differences in the sandstone structure of the wall, attributing them solely to natural ageing. But the shape, texture, and patina of the wall is a story about intervention in the aging process, the changing practice of conservation, reflecting shifts in social attitudes over time itself. Constructed in 1816, parts of the remnant wall appear to have been demolished, other sections have been rebuilt with replacement machine-finished stone, and some have been stabilised yet retain the leans and bows caused by movement and weathering in the wall.

The Macquarie Wall is of exceptional significance as a rare example of the form, materials, and character of a Macquarie-era convict-built



Mid 1970s demolition of the Macquarie era boundary wall, Hospital Road, just prior to the protection afforded by the NSW Heritage Act 1977.

A WALL DIVIDED

1816: the Macquarie era walls demarcating the Governor's Domain are constructed.

Early 1970s: most sections of the Domain walls are demolished. The remaining sections, known as the 'Macquarie Wall' in the Sydney Royal Botanic Gardens, are some of the earliest surviving structures of European settlement in Australia.

1975: The Macquarie Wall was 'restored' according to conservation thinking at the time. The east section was untouched as it was covered in thick vegetation.

Late 1980s: community values had shifted from a desire to restore the original form to valuing the patina and significance of the original materials.

1990s: the original convict-worked wall was stabilised without replacing any original stone or lime mortar.

2023: further stabilisation has been scoped to the eastern most sections of the wall.

A section of the Macquarie Wall that demonstrates diverse responses to conservation, reflecting changing approaches overtime. Photograph by Sebastian Mrugalski, 2023.



Top left: A section of the Macquarie Wall in the Botanic Gardens that was reconstructed in 1975. Photograph by Sebastian Mrugalski, 2023.

Bottom left: Heritage Architect Vivian Sioutas assesses salt deposits in the stone as part of continuing conservation planning in 2023. Photograph by Sebastian Mrugalski, 2023.

Above: Built to keep out 'undesirables' the only remaining portion of wall that dates from the Macquarie era lies between the Lion Gate Lodge and the Botanic Gardens restaurant. Photograph by Sebastian Mrugalski, 2023.

structure. It also shows evidence of the development of the current approach to sandstone conservation, methodology, and repair methods in Australia.

Each intervention marks a context that reflects our changing social character and values – in the practice of heritage conservation, understanding the values of a place is critical in developing a conservation approach.

When writing in the 1950s about the theory of restoration, art historian Cesare Brandi said that, 'the relative, partial and transient character of any restoration, even the most skilful, is always marked by the cultural climate in which it is carried out.' (Historical and Philosophical Issues in the Conservation of Cultural Heritage, The Getty Conservation Institute, NS Price, MK Talley jnr, AM Vaccaro, Los Angeles 1996 p207).

By the mid-1970s, the Macquarie-era stone boundary walls of the Domain and Botanic Gardens had largely been demolished to accommodate changing land use, public access and boundary adjustments, but the remnant Macquarie Wall within the gardens was saved. This is probably because of its central location in the gardens, and its utility and beauty creating a point of interest and an optimal microclimate for vulnerable species. But by the 1970s, due to lack of maintenance, parts had collapsed or were at risk, demonstrating the lack of value placed on it by the community.

However, society's values were thankfully shifting and in 1975 the Sydney Garden Club community group raised funds to repair the Macquarie Wall. This mainly involved replacing large areas of the original convict-hewn stone with freshly quarried banded sandstone set in cement-based pointing. This period pre-dates any guiding

principles for the care of culturally significant items (i.e. the Heritage Act 1977, and the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance, 1979). The approach to stonework conservation in Australia during this time almost exclusively involved reconstruction, the form of the wall being considered of more value than the original material.

Then in 1990, fifteen years later when another cycle of major repairs was carried out, the approach to repairs was markedly different. As much of the original fabric as possible was conserved rather than replaced. Structurally unsound walls were retained and stabilised, their leans and bows kept intact by means of underpinning, grout injection (approximately three tonnes of it) and introduced ties.

In 2022 the Program architects have focussed on scoping works to protect and extend the functional life of the eastern, most materially

original section of the wall. The bare necessities include replacement of lead weathering with improved drip detail, removal of hard pointing and replacement with soft line mortar, and replacement of failed, non-original, stone indents and copings installed in 1989.



A Palace of Justice

Bathurst Courthouse

Impressive

The Bathurst Courthouse complex was completed in 1880 to great fanfare. On the official opening day, a half-day holiday was observed complete with an afternoon banquet and an evening ball which was attended by parliamentarians and other dignitaries including Sir Henry Parkes. The Courthouse, including its former Post and Telegraph Office wings, is Bathurst's most prominent public building, proclaimed 'a Palace of Justice' by the Sydney Morning Herald on its opening. One of the State's finest Victorian-era buildings, it symbolises the growing confidence of regional centres at that time.

Its scale, quality and grandeur reflect Bathurst's late-nineteenth-century prosperity, founded on Crown land grants and gold discoveries as well as pastoral farming and other industries. The building is also an outstanding example of Colonial Architect James Barnet's work, being the biggest Victorian-era regional courthouse in NSW and its majestic copper dome soaring to a height of over 30 metres.

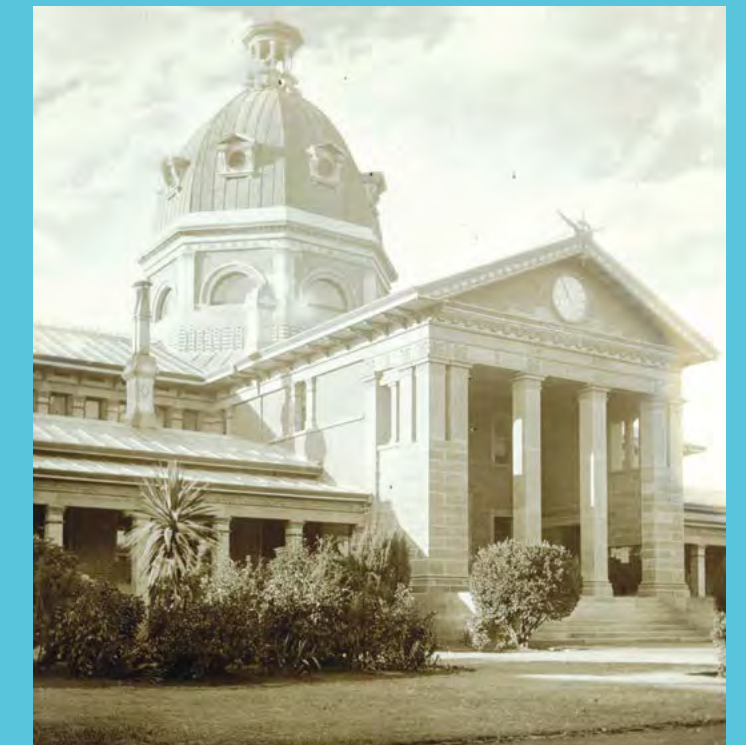
However, by 2019 its facades and roof were in dire need of repair: cracked chimneys, deteriorated high level stone and rotten timbers were all a major cause of concern. Facade and roof conservation works were actioned between 2020 and 2022. This was the culmination of much research and planning and involved multidisciplinary heritage trades – stonemasons, lead workers, roofers and carpenters; architects; engineers and technical-heritage specialists.

Ornate

Bathurst Courthouse has a wealth of decorative elements, and a distinctive feature of the conservation project was restoring a diverse mixture of materials. These included the copper dome and bell tower; cast-iron ridge cresting; bronze lettering; glazing; stonework, brickwork and timberwork; renders and mortars; complex colour schemes and the historic clock.

The objective was to undertake catch-up maintenance to best-practice standards and provide quality long-term repairs. The conservation approach aimed to retain as much of the original fabric as possible, replacing 'like for like' and recording the interventions. Before repairs began, studies and analysis were carried out by a multidisciplinary team. They included a condition assessment, tender documentation, mortar-and-render lab analysis, with samples and trials for repointing, cleaning, paint colours and reconstructing missing details.

Left: Bathurst Courthouse at completion of conservation work. Photograph by Michael Nicholson, 2021.



Bathurst Courthouse roof before the bell lantern was installed in 1900. (John Henry Harvey, photographer, circa 1895; State Library of NSW)

JUDICIOUS REPAIRS

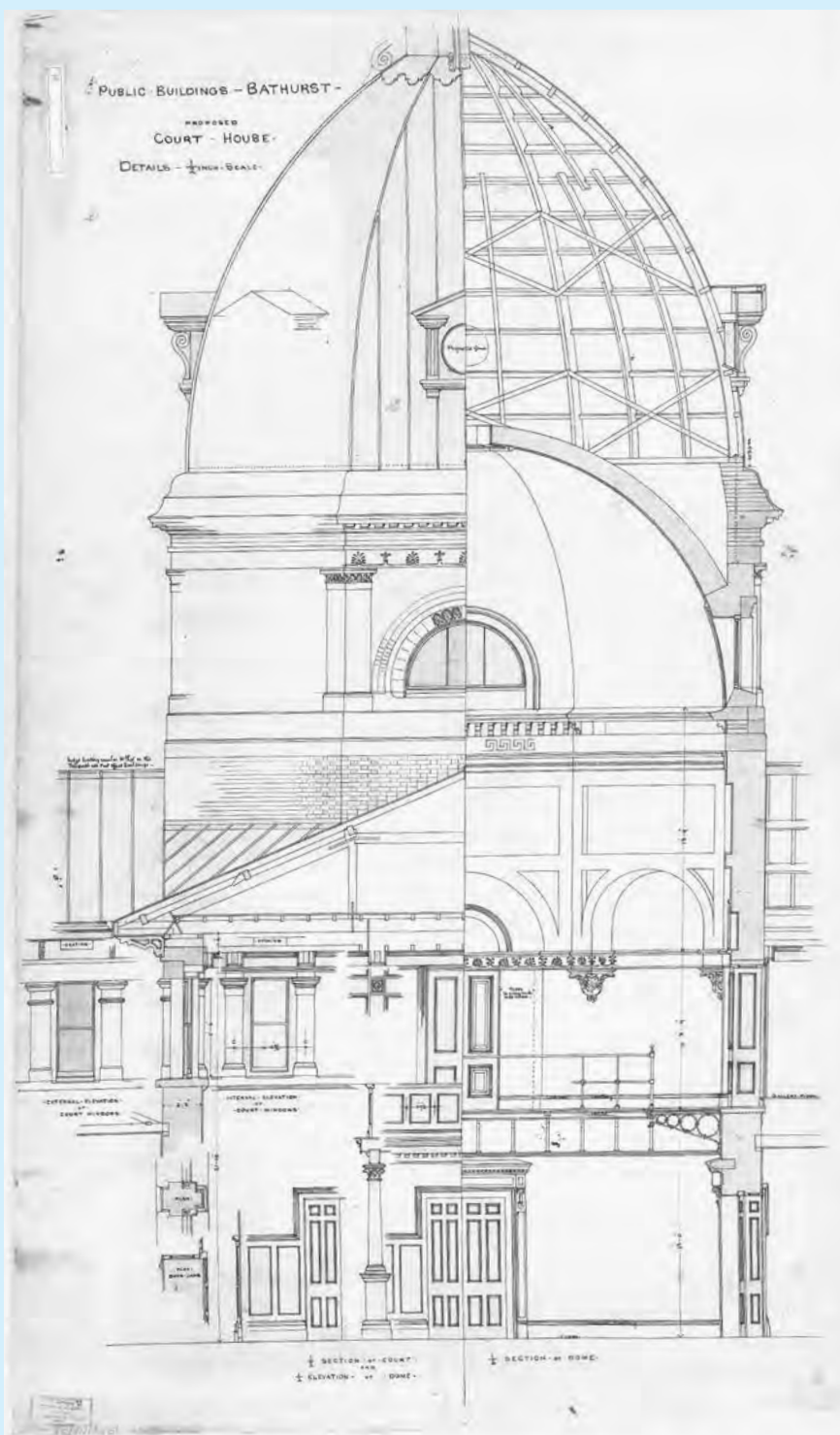
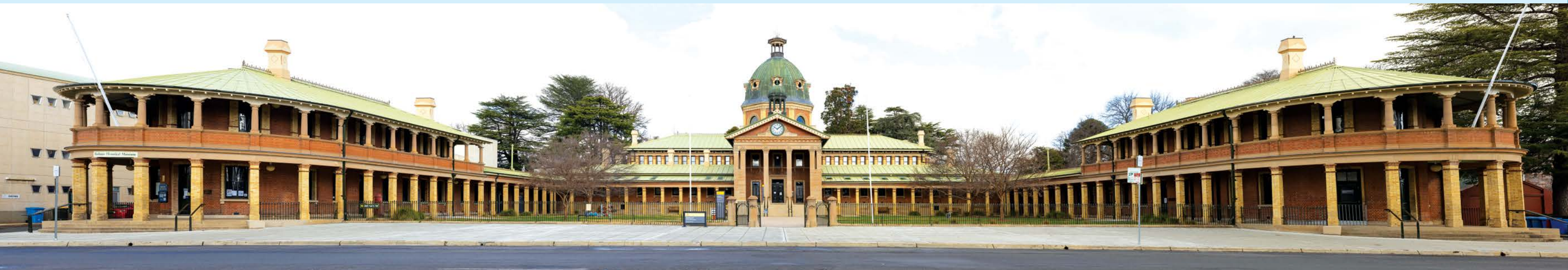
Early 2020: Conservation of the Bathurst Courthouse facades began, at the start of the Covid pandemic.

The project employed local heritage tradespeople where possible, which boosted regional heritage skills. The pandemic and associated regional travel restrictions and lockdowns made the work challenging.

2022: The project received a National Trust Highly Commended award for conservation.

Additional Minister's Stonework Program Courthouse Conservation Projects:

- Banco Court, part of Sydney's historic Supreme Court Complex*
- Central Local Court, Sydney*
- Darlinghurst Courthouse*
- Old Registry Office, Sydney Supreme Court House*
- Parkes Court House*
- Singleton Court House*
- Maitland Court House*
- East Maitland Court House*
- Manly Local Court*
- Wagga Wagga Court House*
- Katoomba Court House*
- Old Parramatta Courthouse Tower*
- Wellington Court House*



Above: Bathurst Courthouse flanked by the former Post and Telegraph Office wings, built around an earlier courthouse that was demolished on completion of the current courthouse. Photograph by NSW Spatial Services.

Far left: Workers lowering a replacement Yellowblock stone cornice for the base of the dome. Photograph by NSW Public Works.

Left: Original drawing of the central domed section by James Barnet, 1870s (Plan Service, NSW Public Works).

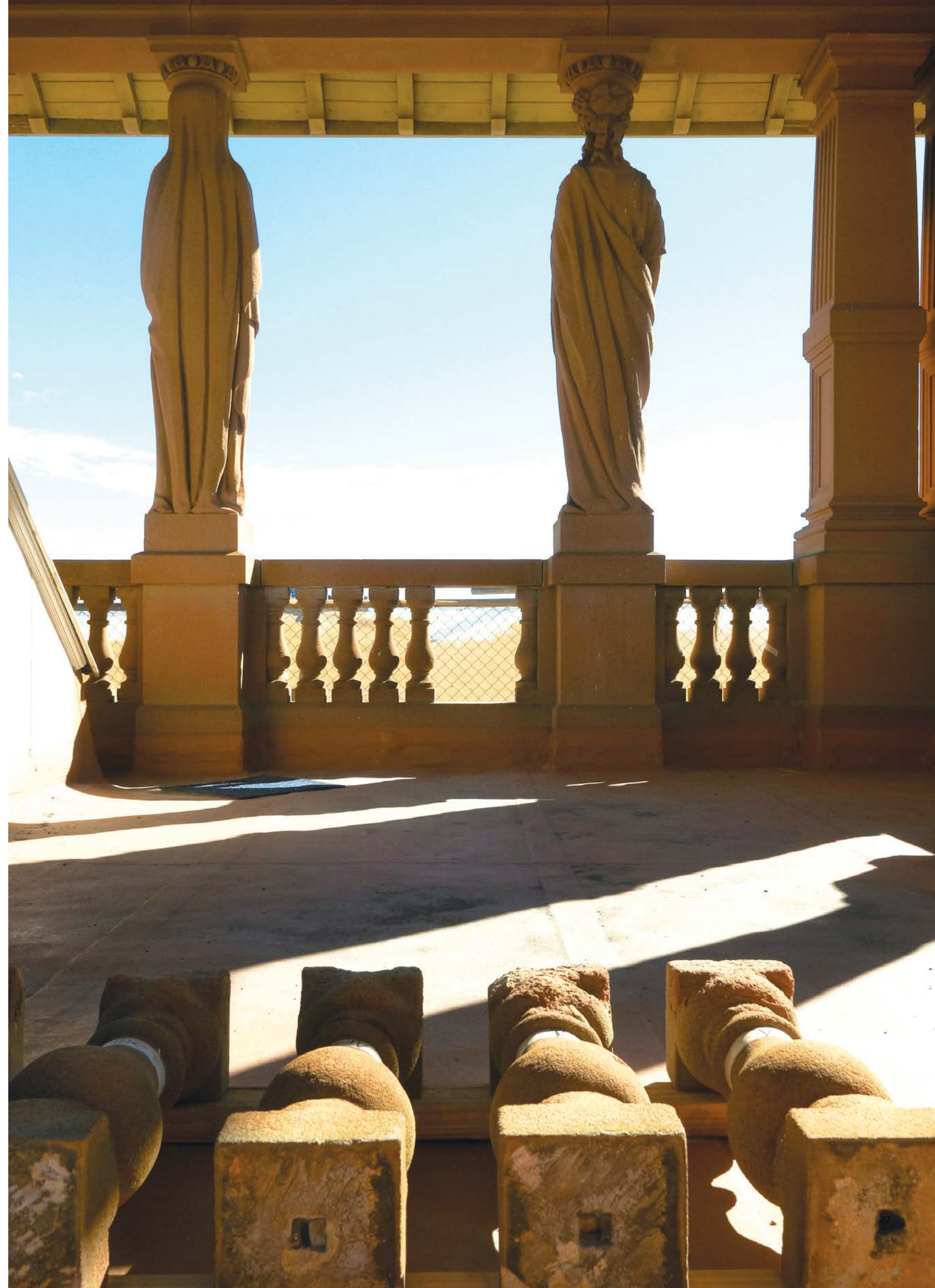
Although much of the material for the original construction of the courthouse complex was sourced locally, more than 900 tons of Pymont sandstone was transported from Sydney to Bathurst where it was worked and carved on site. The conservation project included replacing the dome's deteriorated stone cornice and the wings' base stones with Yellow Block Sandstone from the Minister's Stonework Program stockpile, harvested from a Pymont development site in 2017.

Many of the 27 rendered brick chimneys were extensively cracked and were dismantled and rebuilt with seismic strengthening. The corroded galvanised steel, flat-pan roof sheeting was replaced where required, with specially made sheets to match the original profile. Missing decorative metal ridge-cresting and timber finials were reconstructed based on original drawings and historical photographs.

The 16 colours of the original paint scheme were reconstructed as authentically as possible based on physical and documentary evidence.

Additional works were extensive and varied. They included stone desalination, installation of bird proofing, biocide treatment, masonry repointing, refixing loose copper seams, timber repairs and the installation of protective lead weathering.

The completed conservation works, by giving positive protective measures to a significant cultural fabric, have greatly enhanced the feeling of civic pride inspired by this important regional landmark.



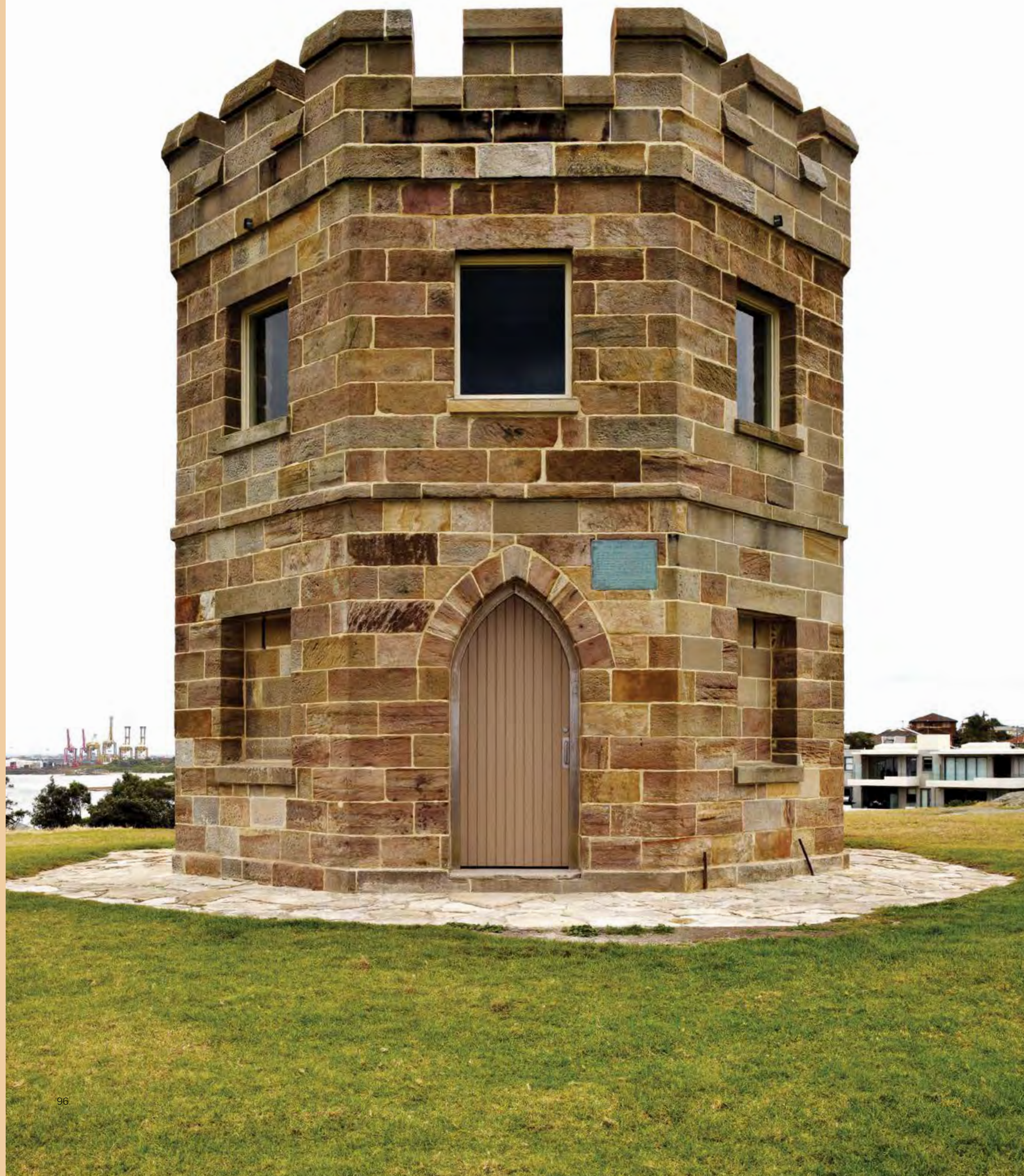


QUEEN VICTORIA MEMORIAL



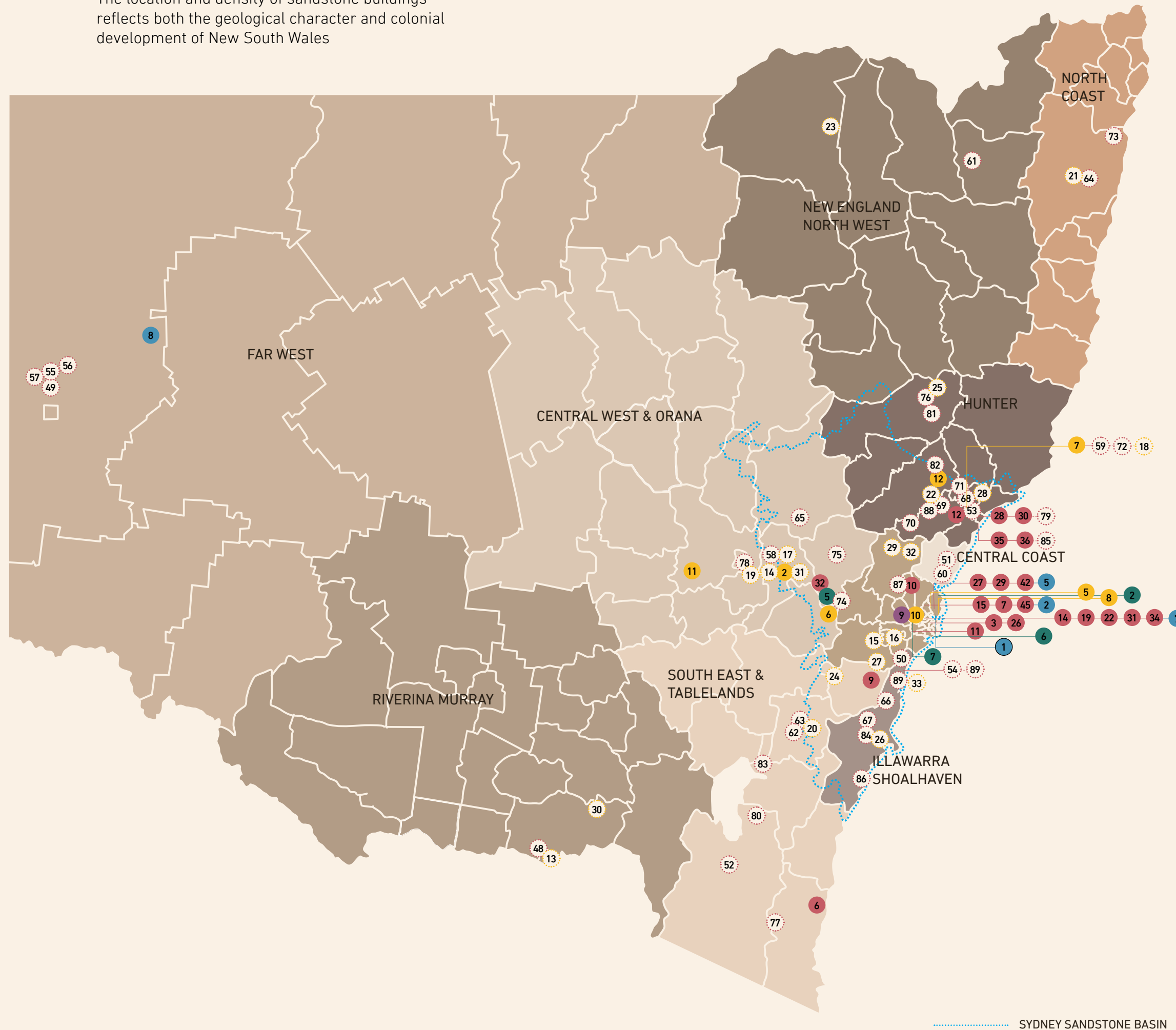








The location and density of sandstone buildings reflects both the geological character and colonial development of New South Wales



The State of Stone

The Minister's Stonework Program has assessed, diagnosed, prioritised and/or treated the causes of deterioration at 95 significant heritage sandstone sites across the state of NSW. Those listed below as 'Conserved Assets' on sites listed below will last another 100 years if routine maintenance follows. Others assets have received a 'condition audit' identifying

CONSERVED ASSETS

EDUCATION

1. Annandale Public School
2. Annandale North Public School
3. Arncliffe Public School
4. Austratia St Public School
5. Balmain Public School
6. Bega Public School
7. Bondi Beach Public School
8. Bourke Street Public School
9. Bowral Public School
10. Brewongle Environment Education Centre
11. Canterbury Public School
12. Cessnock High School
13. Cleveland Street Intensive High School*
14. Concord Public School
15. Coogee Public School
16. Crown Street Public School
17. Darlinghurst Public School
18. Department of Education Building
19. Dulwich High School of Visual Arts and Design East
20. East Sydney Technical College, Natinal Arts School
21. Erskinville Public School
22. Fort Street High School
23. Gardeners Road Public School
24. Glebe Public School
25. Glenmore Rd Public School
26. Green Square Public School
27. Greenwich Public School
28. Greta Public School
29. Hunters Hill Public School
30. Jerrys Plains Public School
31. Leichhardt Public School

GARDENS & PARKS

32. Lithgow Public School
33. Marcus Clarke, Ultimo TAFE
34. Marrickville Public School
35. Newcastle East Public School
36. Newcastle TAFE
37. Newtown Perform Arts High School
38. Nicholson St Public School
39. Paddington Public School
40. Plunkett Street Public School
41. Rozelle Public School
42. Ryde Public School
43. Sydney Girls High School
44. Ultimo TAFE
45. Waverley Public School
46. Woollahra Public School
47. Yudi Gunyi Public School (originally Waterloo PS)

JUSTICE

1. Banco Court, Supreme Court Complex
2. Bathurst Courthouse
3. Central Local Courthouse
4. Darlinghurst Court House
5. Hornsby Court House
6. Katoomba Court House
7. Maitland Court House
8. Manly Court House
9. Old Registry Building, Supreme Court Complex
10. Parramatta Court House
11. Parkes Courthouse
12. Singleton Courthouse

1. Centennial Park:
 - Charles Dickens Statue
 - Comrie Memorial Fountain
 - Diana The Huntress
 - Paddington Gates
 - Woollahra Gates
 - Musgrave Gates
 - We Won (The Footballer)
 - Moore Park Piers
2. Barrenjoey Lighthouse & Cottages
3. Fort Denison
4. Goat Island Convict Wall
5. Hartley Historical Village
6. Macquarie Watchtower
7. Parramatta Park:
 - Macquarie Culvert
 - Observatory Transit Piers
8. Royal Botanic Gardens:
 - Choragic Monument of Lysicrates
 - Domain Lodge and Gates
 - Farm Cove Seawall*
 - Gate Keeper's Lodge
 - Governor Phillip fountain
 - Henry Kendall Seat
 - Levi Fountain
 - Lion Gate Piers
 - Macquarie Culvert
 - Macquarie Lodge
 - Outer Domain Piers
 - Palace Garden Gates
 - Rose Garden Piers
 - Tapeian Way
 - Wollomooloo Gates

their priority needs to enable planning for budgets and programs of work. Whole portfolios or complex sites have received 'strategic plans' to navigate the scale and complexity of the work on busy, sensitive operational sites like hospitals and courts. These maps show the breadth and diversity of the Program's achievements over 30 plus years.

CONDITION AUDITS

HEALTH

1. Gladesville Hospital
2. Prince of Wales Hospital
3. Redfern Community Health Centre
4. Royal Prince Alfred Hospital
5. Ryde Hospital
6. Sydney Hospital
7. Thomas Walker Hospital* Thomas Walker Boathouse
8. Wilcannia Hospital

ARTS/CULTURE

1. Art Gallery NSW
2. Arts Exchange Building, The Rocks
3. Australian Museum
4. Belmain Watch House
5. Fort Phillip Precinct
6. Former Ultimo Post Office
7. Power House Museum
8. State Library of NSW
9. Sydney Observatory

MISCELLANEOUS

1. Callan Park
- Main Entrance Gates
- Kirkbride Block Male Gate
2. Chief Secretary's Building
3. Darlinghurst Fire Station
4. Dawes Point Sentry Box
5. Government House
6. Macquarie Lodge
7. James Martin Statue
8. Land Titles Office
9. Old Kings School, Parramatta
10. Department of Lands Building

EDUCATION

48. Albury Public School
49. Alma Public School
50. Appin Public School
51. Awaba Public School
52. Berridale Public School
53. Beresfield Public School
54. Berrima Public School
55. Broken Hill Public School
56. Broken Hill North Public School
57. Burke Ward Public School
58. Dubbo Public School
59. East Maitland Public School
60. Erina Heights Public School
61. Glen Innes Public School
62. Goulburn Public School,
63. Goulburn North Public School
64. Grafton Public School
65. Ilford Public School
66. Jamberoo Public School
67. Kangaroo Valley Public School
68. Kearsley Public School
69. Kurri Kurri Public School
70. Laguna Public School
71. Largs Public School
72. Maitland Public School
73. Maclean Public School
74. Mount Victoria Public School
75. Mudgee Public School
76. Murrurundi Public School
77. Nimmitabel Public School
78. Orange Public School
79. Plattsburg Public School
80. Queanbeyan Public School
81. Scone Public School
82. Singleton Public School

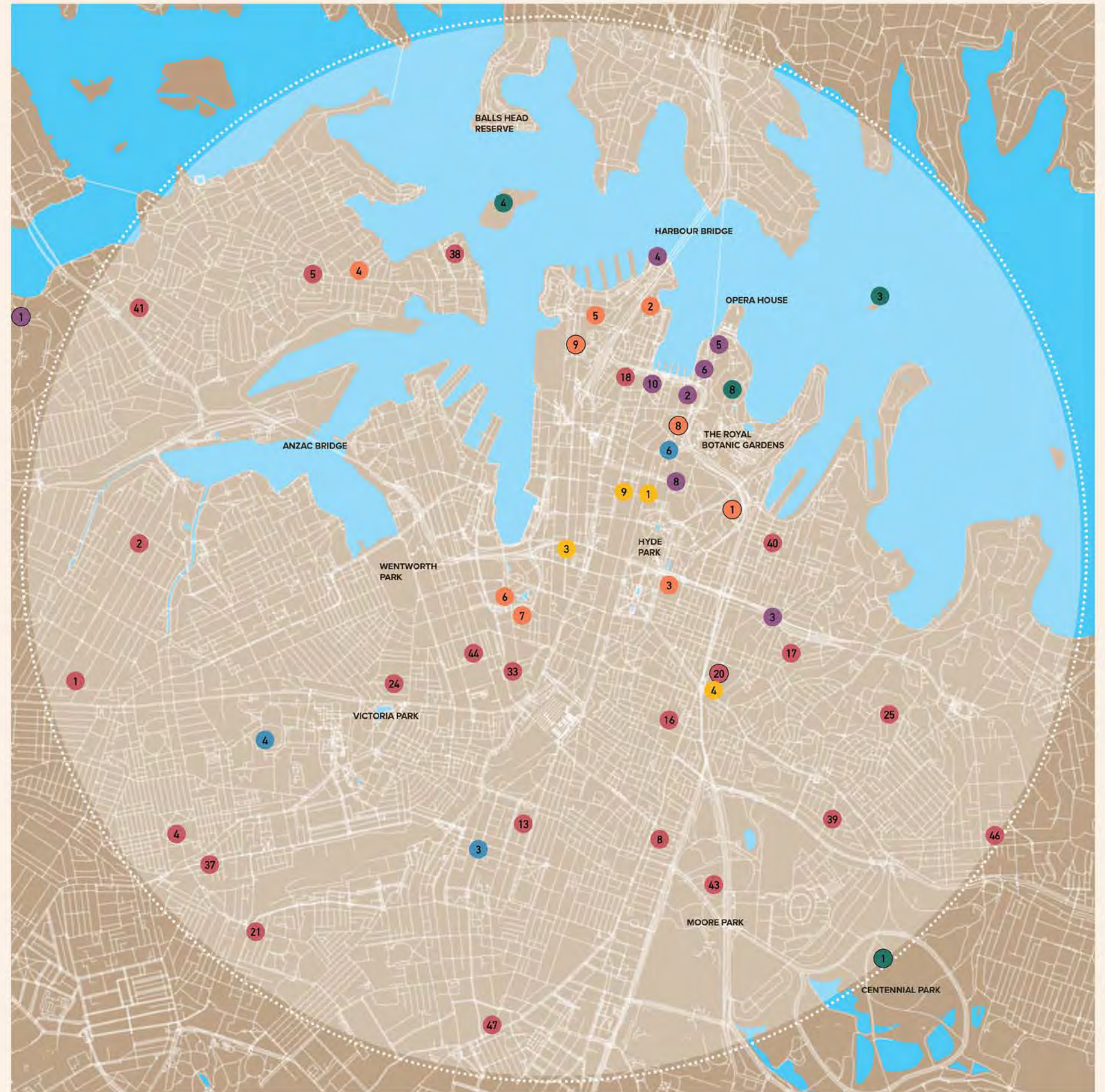
JUSTICE

13. Albury Courthouse
14. Blayney Courthouse
15. Camden Courthouse
16. Campbelltown Courthouse
17. Dubbo Courthouse,
18. East Maitland Courthouse,
19. Forbes Courthouse
20. Goulburn Courthouse,
21. Grafton Courthouse
22. Kurri Kurri Courthouse
23. Moree Courthouse
24. Moss Vale Courthouse
25. Murrurundi Courthouse
26. Nowra Courthouse
27. Picton Courthouse
28. Raymond Terrace Court-house
29. Richmond Courthouse
30. Wagga Wagga Courthouse
31. Wellington Courthouse
32. Windsor Courthouse
33. Wollongong Courthouse

STRATEGIC PLANS

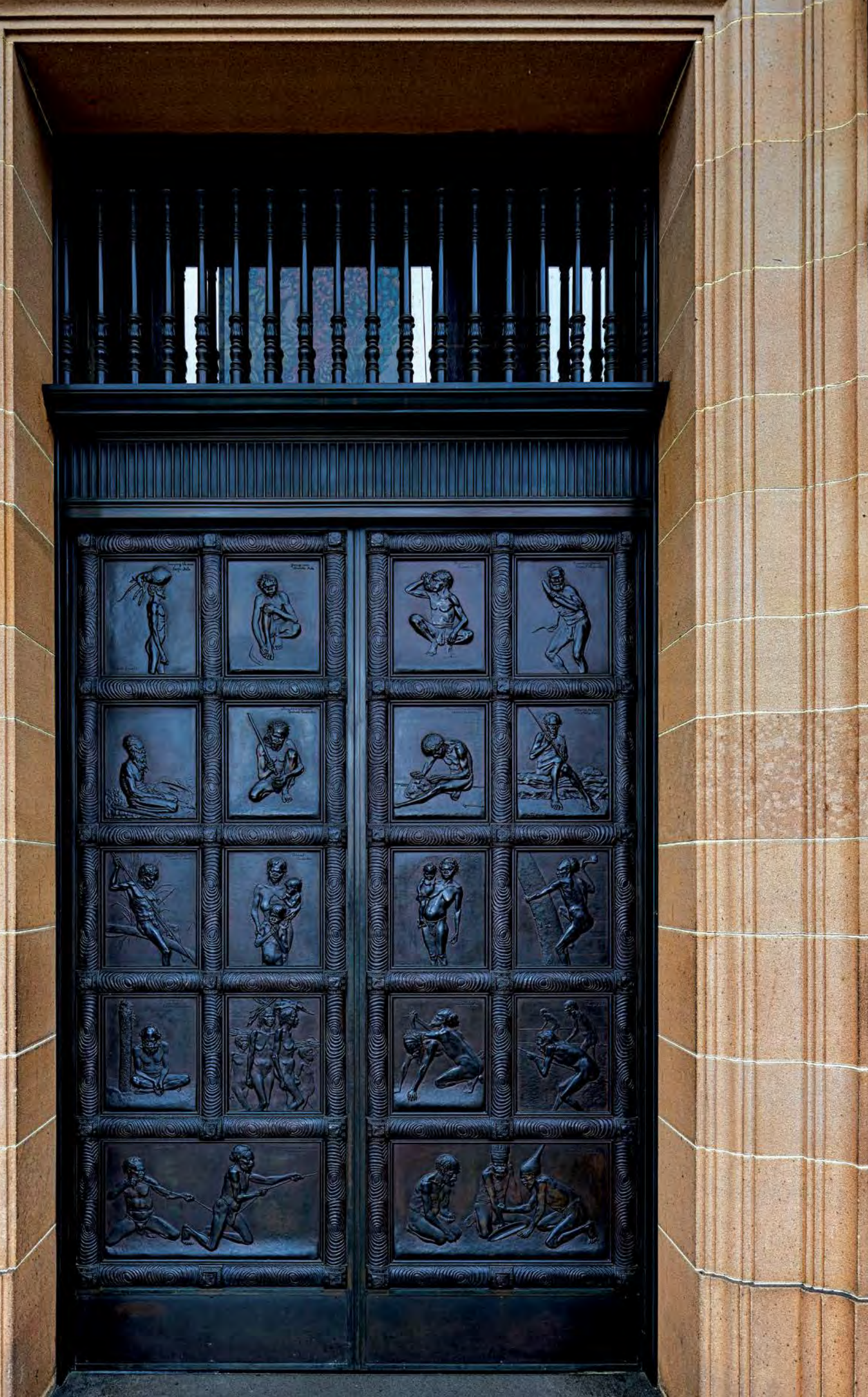
VARIED

1. Art Gallery NSW
1. Callan Park
1. Centennial Park
- All Courts Portfolio
20. East Sydney Technical College, National Arts School
- All Education Portfolio
1. Gladesville Hospital
8. State Library
9. Sydney Hospital

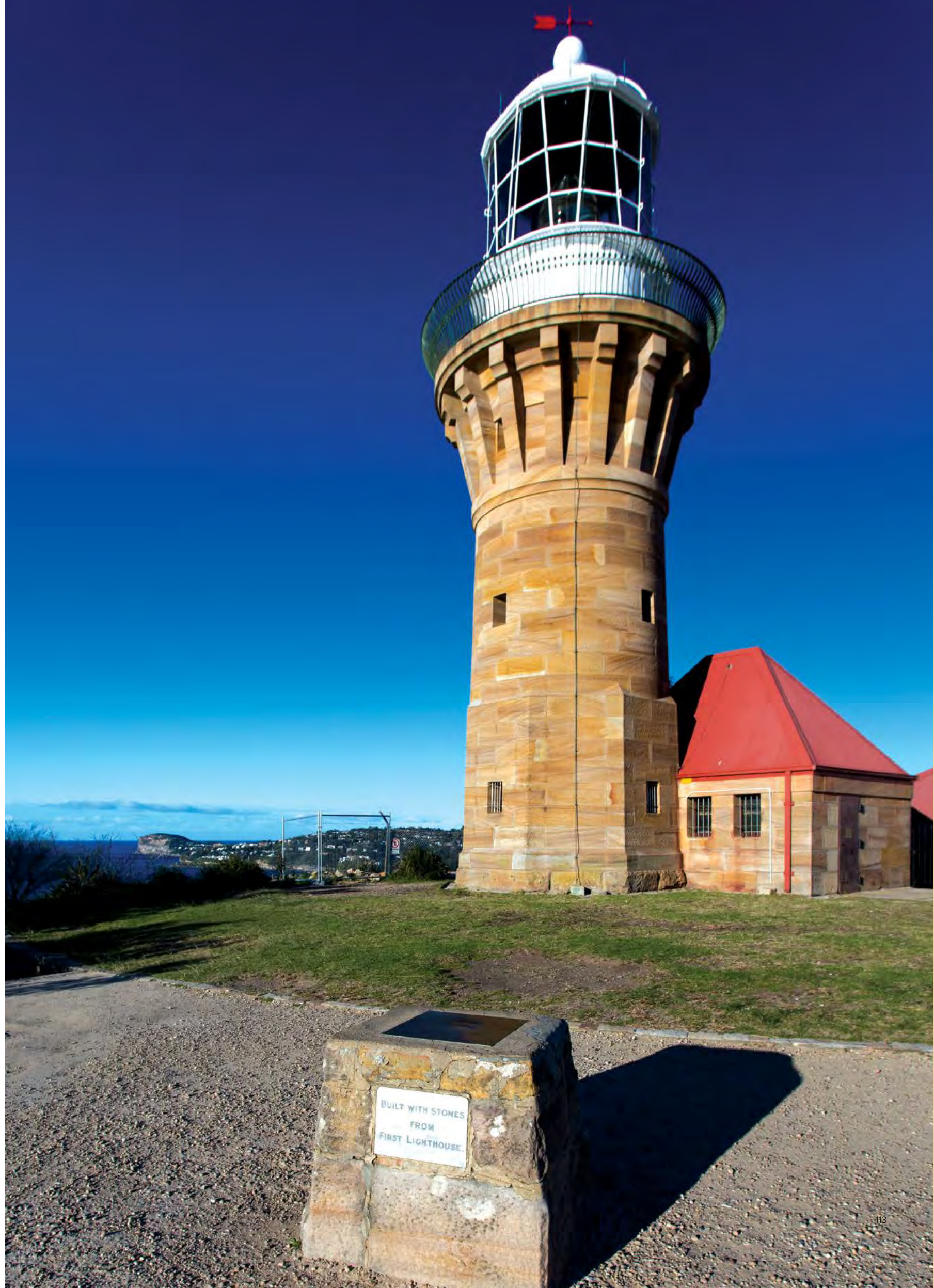


















4 | Conservation

'Conservation means all the processes of looking after a place so as to retain its cultural significance'

The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (Burra Charter)

Conservation



Stone at Fort Street High School, Petersham, is desalinated by Dariusz Piekutowski with a water-captive rinsing system. Photograph by Sebastian Mrugalski, 2023

Conservation is a future focused action, responding to a societal expectation that these buildings will continue in perpetuity. Its guiding principles include understanding the cultural significance of the item, minimal intervention to ensure integrity and authenticity is retained, and the recording of all undertakings.

Common climatic causes of deterioration include salt attack, rising and falling damp, wind erosion and structural cracking. Inappropriate interventions such as impervious pointing and render, and corrosive and abrasive cleaning practices also cause significant damage. Conversely the seemingly benign action of not intervening can accelerate decay. For example, not replacing a stone that has lost its water-shedding profile accelerates the decay of unprotected stones below. Likewise, removal of case hardening through rubbing back increases water and salt ingress.

The objective of the Program is to diagnose and treat the cause, and in doing so make durable long-lasting repairs. Attempts to treat only the symptoms are rare but may be necessary in situations such as Fort Denison in Sydney Harbour or Hornby Lighthouse on South Head, Watson's Bay, where the ingress of salt laden moisture is unavoidable. However, successful treatment of symptoms requires frequent maintenance, so is costly and prone to scheduling and/or process failure.

Conservation is an umbrella term covering all the actions needed to care for heritage buildings. Conservation of stone structures is an interdisciplinary process, requiring many individuals with different expertise working together towards their common goal of extending the life of the asset and retaining its cultural significance.



Hornby Lighthouse in Sydney, where the ingress of salt-laden moisture is unavoidable. Photograph by Sebastian Mrugalski, 2023.



Left: Safety netting over the pediments of the Trades Hall at Newcastle TAFE until repairs can be carried out. Photograph by Michael Nicholson, 2017.

Right: At the Australian Museum, stonemason James Dong patches the top of a stone, rebuilding its water-shedding profile. Photograph by Michael Nicholson, 2020.



Depending upon the circumstances, the Program uses a number of conservation processes. They begin with understanding the operational environment of the asset, the funding context and a comprehensive condition assessment.

The site survey includes structural and drainage investigations, mortar analysis and salt-level testing. During the condition assessment, a tactile survey known as a safety audit is carried out in which a comprehensive, all-areas assessment is carried out from an elevated platform or crane, the building condition documented, the causes of decay diagnosed, and the treatments discussed and scoped. At the same time, any unstable high-level stone is removed, strapped or secured to ensure it won't fall into publicly accessible areas.

Not Just a Pretty Face

Historic documents such as photographs, drawings and earlier studies are analysed, together with the physical condition of the buildings, to develop a scope of repairs. Conservation actions include the installation of lead weathering to overhanging stone elements to protect the stone and mortar joints, paint removal, stone cleaning, repointing, desalination and stone patching.

Carved features provide more than a decorative interest to the building, they protect the facade. Elements such as stone cornices, string courses (decorative horizontal bands on the exterior wall of a building), gargoyles and sills are devices for water shedding and weather protection – particularly over doorways and windows.

Preventative conservation is favoured over stone replacement. Stone is by necessity replaced when it has lost its structural integrity, or been substantially eroded and is unfortunately no longer performing its water shedding function.

Initiating Ground-Breaking Research

Research and development in building conservation methods and materials is rarely done in Australia. Reasons for this

include a lack of funding and resources, and a lack of industry wide co-ordination of research aims and objectives. The Minister's Stonework Program therefore plays a key role in setting the benchmark in technical expertise, and has collaborated with universities, research organisations and specialist tradespeople to investigate a range of issues associated with conserving stone.

Chemical treatments have been used in Europe for decades to conserve deteriorating stonework. Due to the significant differences in our climatic and geographical context, as well as the differing stone properties between Europe and Australia, the Program tested European chemicals on local stones to determine their compatibility. This research was undertaken in association with the CSIRO and the University of Technology in the late 1990s and early 2000s. These chemicals attempt to penetrate deep into the stone, binding the friable and delaminating surface stone to the sound stone below. Clay-rich Sydney sandstones tend to have much lower permeability than European sandstones, consequently the laboratory results showed the chemical penetration to be much shallower. This meant it did not reliably bind to sound stone. Further research into chemical binders and their applicability in Australia is therefore needed.

Alternative methods of stabilising decayed stone include patching cracks and depressions that attract water ingress, with synthetic stone (a combination of epoxy and sand, or a softer lime-mortar patch) to shed water and prevent its ingress, accompanied by inserting fine stainless-steel reinforcing pins to give armature to the patch.

Collaboration between the Program's heritage architects, specialist tradespeople and the CSIRO in the 1990s led to the development of stone patching materials and techniques, helping to retain a building's significant fabric instead of replacing it.

continued page 127



A condition audit is a tactile survey in which a comprehensive assessment is carried out from an elevated platform or crane...

Above: Stonemason Ian Goulding removes a dangerous piece of delaminated stone. Photograph by Douglas Frost, 2019.

Right: Heritage architect Joy Singh and stonemason Ian Goulding inspect the facades of former Darlinghurst Police Station. Photograph by Douglas Frost, 2019.



Former Darlinghurst Police Station, Forbes Street, Darlinghurst



Above: Small stainless steel pins were installed to finish flush with the stone wall at Fort Denison. This provides objective information on the rate of surface loss over time to develop a cyclic desalination program. Photograph NSW Public Works.

Left: This kiosk at Sydney Hospital has been badly affected by both rising and falling damp, so the remaining stone continues to suffer. Much of the facade was replaced with faux-stone in the 1980s when there was no suitable replacement stone to undertake necessary repairs. Photograph by Sebastian Mrugalski, 2023.

continued from page 123

As well as understanding the causes of stone decay, to be able to develop effective conservation actions it is necessary to quantify the level of deterioration. The Minister's Stonework Program heritage architects therefore developed a method to objectively measure stone surface loss by installing small monitoring pins that end flush to the stone. Measurements are taken of the exposed pin to record the amount of stone loss over time. This has proved to be an effective low-impact diagnostic tool.

Unwelcome biological growth on stone ranges from micro-moulds and lichens to fully grown fig trees, and leads to physical and chemical damage. The Program's heritage architects worked with the School of Geosciences at the University of Sydney to investigate suitable biocide treatments to prevent biological regrowth after façade cleaning. Trials were undertaken in Centennial Park over many years. The results were positive and have since benefited the wider stone-conservation industry.

A Salty Tale

Salt weathering is an important consideration in managing and maintaining sandstone buildings. Along with air pollution, soluble salts represent one of the most significant causes of stone decay. There are many ways in which stonework can become contaminated with salts. Air pollution is a major source of sulfates and nitrates. Salts may enter the stone in solution via rain water, by wind, blown from the sea or as rising damp. Detergents used for cleaning contain high levels of salts, as do fertilisers used in the landscape surrounding buildings.

Damage is caused to the stone when salt-laden moisture evaporates near the stone face: salt crystals grow and accumulate within the pores near the surface and generate enormous stress that forces the surface grains apart, turning them into a powder.



Conservator Peter Maxwell carrying out treatment trials during the condition assessment of the bronze sculptures 'Offerings of War and Peace' outside the Art Gallery of NSW. Photograph by Douglas Frost, 2016.



Above: The Sydney Hospital façade features typical cornice deterioration patterns. Damp conditions result in black staining, biological growth, erosion and cracking. Photograph by Douglas Frost, 2020.



Right: Bondi Beach Public School prior to repairs. Salt-laden conditions and wind erosion have caused stone deterioration. Photograph by NSW Public Works, 2017.

Below: Lead weatherings provide physical protection over the stone cornice and pediment of the Australian Museum. The Minister's Stonework Program has developed best practice lead detailing as a preservation measure to prolong the life of the stone. Photography by NSW Public Works, 2017.



Right: The Australian Museum following façade repairs in 2020. The stone has been carefully cleaned, the open joints repointed, highly deteriorated stone has been replaced and lead weatherings have been installed to encourage water to drain freely away from the façade. Photography by Michael Nicholson, 2020.

Below: Research into sourcing repointing sands was carried out in 2011 - 2013 and resulted in establishing a sand library to assist in specifying repointing mixes. Photograph by NSW Public Works, 2012.



*Preventative conservation is favoured...
retaining non-renewable, original material
in culturally sensitive buildings...*

The longevity of culturally significant stone can be prolonged by reducing the amount of accumulated salts and pollutants. Lowering the salt levels in stone is known as desalination and is far more cost-effective than replacing stone with the added advantage of retaining non-renewable, original material in culturally sensitive buildings, eliminating the need to source and quarry suitable replacement stone.

The approach and methods of desalination currently undertaken are largely based on research carried out by the University of Sydney's School of Geosciences in collaboration with the Minister's Stonework Program in the early 2000s.

The study aimed to reproduce field desalination processes and compare the effectiveness of various desalination treatments under laboratory conditions. Several deteriorated sandstone blocks from Sydney Hospital and the Australian Museum were used for laboratory testing, the objective being to determine the most effective methods to remove the build-up of salts below the surface of the stone. Later, conservation works at Fort Denison built on this knowledge to develop rapid on-site salt level testing of captured desalinated water. This meant we no longer had to use destructive testing to calculate salt levels in stone.

Pointing the Way to Go

The process of replacing defective mortar in stonework and brickwork joints is known as repointing, and is a common activity in heritage masonry projects. Mortar serves an important function in wicking water and salt out of the stone. Salt can evaporate more readily from lime mortar, preventing salt attack.

Sand makes up most of a repointing mix. Sand performance and its selection for repointing mortars is therefore critical in achieving a good result. With the wrong sand, repointing can have a detrimental effect on heritage items. Considerations in

choosing sands include the right combination of grain sizes, appropriate colour and texture; its shape including sharpness, and the presence of impurities and clay which can cause mortar cracking through swelling and shrinkage.

By 2012, the supply of Kurnell building sands was diminishing so the Minister's Stonework Program took the initiative in identifying alternative mortar sands and developing best-practice specifications for repointing. Studies were done into what sand characteristics were needed for repointing of heritage structures and their availability. Independent sand testing was commissioned and the data collected, centralised and made available to the heritage-building industry and wider community.

The research team comprised the Program's heritage architects, heritage specialists and stonemasons. They worked with geologists, TAFE stonemasonry teachers and private stonemasonry firms to understand the current practices and gaps in the industry, to improve the art and science of masonry repointing. Technical sand specifications were prepared and a repointing sand library was established. This project received the National Trust Research Award in 2013.

A Watertight Solution

Preventive conservation measures are often concerned with keeping water out of the stone and lead coverings known as lead weatherings are an important measure in prolonging the life of the stone. Lead sheets are applied to overhanging stone facade elements and assist in shedding water and preventing contamination of salt laden rainwater. The Program's heritage roofers have developed best-practice lead weathering detailing to protect both new and original stone from gradual environmental deterioration.

Bird guano is both visually detracting, salt laden, and chemically corrosive to stonework. Keeping birds away from stone ledges



Right: Conservation of a carving sheltered under the overhanging cornice at Sydney Hospital. The cracked stone is stabilised by injecting a consolidating material to prolong the life of the stone.

Below: Salt-level testing of captured water during stone desalination at Fort Street High School. Photograph by Sebastian Mrugalski, 2023







The Program has developed a non-invasive, visually recessive bird-proofing system... the whole system is invisible from the ground and reversible.

is difficult. The Program has developed a non-invasive, visually recessive bird-proofing system which consists of a stainless-steel pole on a plate foot. The plate foot sits in the bed joint of stone or brickwork and therefore does not impact significant fabric. Stainless steel wire lines are tensioned between the poles. Most significantly the whole system is invisible from the ground and reversible.

Previous page: Water borne salt attack is actively damaging significant stonework and threatening the allegorical carving of Justice at Sydney Central Local Court. The Program is currently advising on required treatments, repairs and preventative maintenance needs across the state's heritage sandstone court portfolio. Photograph by Sebastian Mrugalski, 2023.

Left: The Program's subtle, non-invasive and durable bird proofing system. Barely visible when viewed from the ground at Bathurst Courthouse. Photograph by NSW Public Works, 2022.



Australia's First Museum

The Australian Museum

The Australian Museum on the corner of Sydney's College and William streets forms part of a precinct that stretches south from Benelong Point to Oxford Street. This is known as 'The Sandstone Precinct' and is arguably one of the State's finest heritage streetscapes.

The evolution of the museum's buildings on its current site from 1846 reflects society's cultural development, its changing views on science and on what constitutes a museum. Starting out as a storehouse of artefacts, it has grown to become one of the nation's most important scientific research, educational and cultural institutions.

The opening of the Lewis Wing – which was designed in the Greek Revival style – in May 1857 took place during a period of significant change for the colony, triggered by the onset of the goldrush in 1851. Designed by Colonial Architect Mortimer Lewis, it includes the Long Gallery.

In order to house the museum's rapidly growing collection, Colonial Architect James Barnet was put in charge of building the neoclassical west wing along College Street that opened in 1868. The commission of the Barnet Wing, planned on the grandest scale, represents the growing wealth of New South Wales in the 1860s. The first large public building built in that time, its size and imposing presence established a precedent for subsequent buildings such as the Sydney GPO and the Colonial Secretary's Office.

The completion of the Vernon Wing in 1910 similarly represented the changing social attitudes of the Edwardian era, with its increasing focus on recreational and cultural pursuits. After this, the museum disseminated information to the broader community, particularly through public education programs.

The next big addition was in 1963, when the floor space almost doubled with the opening of the William Street Wing designed in the International Style by Government Architect EH Farmer.

Its construction is associated with the post-WWII economic boom that began in Sydney from about 1957. One of the city's first government cultural facilities built after that date, it helped meet the pent-up demand for new buildings that had been delayed due to the depression, war and post-war austerity.

The wing takes the form of a six-storey extension linked to the Lewis Wing that houses the scientific and research collections, the reference library and a public restaurant. There are also two basement floors that provide a working space for scientific staff.

The Courtyard Building was part of the great boom in public works of the 1980s associated with the 1988 Bicentennial.

Left: The College Street facade at completion of work in 2020. Photograph by Michael Nicholson, 2020.



The Barnet Wing, constructed between 1861 and 1866, seen from Hyde Park, c 1866. To the right is a bronze statue of Captain James Cook.

From 'a beautiful collection of rare and curious specimens of Natural History' as Lord Bathurst imagined from London in 1827, the Australian Museum has grown to become an internationally recognised collection of more than 21 million cultural and scientific objects.

1846-57: Lewis Wing built, designed by Mortimer Lewis, Colonial Architect.

1861-68: Barnet Wing built, designed by James Barnet, Colonial Architect.

1896-1910: Vernon Wing built, designed by Walter Vernon, Government Architect.

1959-63: William Street Wing built, designed by EH Farmer, Government Architect.

1986-88: Courtyard Building built, designed by Colin Still, Government Architects Office.

2016: the carbon-neutral glass box entry pavilion on William Street known as the Crystal Hall was built, designed by Neeson Murcutt Architects.

Minister's Stonework Program façade conservation works:

1990s: the Lewis and Barnet wings

2002-03: the Barnet and Vernon wings

2020: the Barnet Wing

IN 1993, Department of Public Works won the Royal Australian Institute of Architects Francis Greenway Restoration Award (as part of a compilation of Minister's Stonework Program projects).



Above: At more than one-metre tall, these Corinthian capitals, carved by William McGill, are like a forest of trees. Photograph by Michael Nicholson, 2002.



Above: Masons kneel within the College Street pediment, underneath the new rosettes, 2002.

Top left: Night at the museum: restrictions in force on Macquarie Street in 2020 meant that work using cranes had to be done after dark. Photograph by Michael Nicholson.



The completed College Street facade of the Australian Museum's Barnet Wing. Photograph by Michael Nicholson, 2020.

In 2016, which was 125 years after its debut on College Street, the Australian Museum built a new entry on William Street known as the Crystal Hall. This was followed in 2020 by significant internal renovations that transformed its exhibition spaces and created new education facilities.

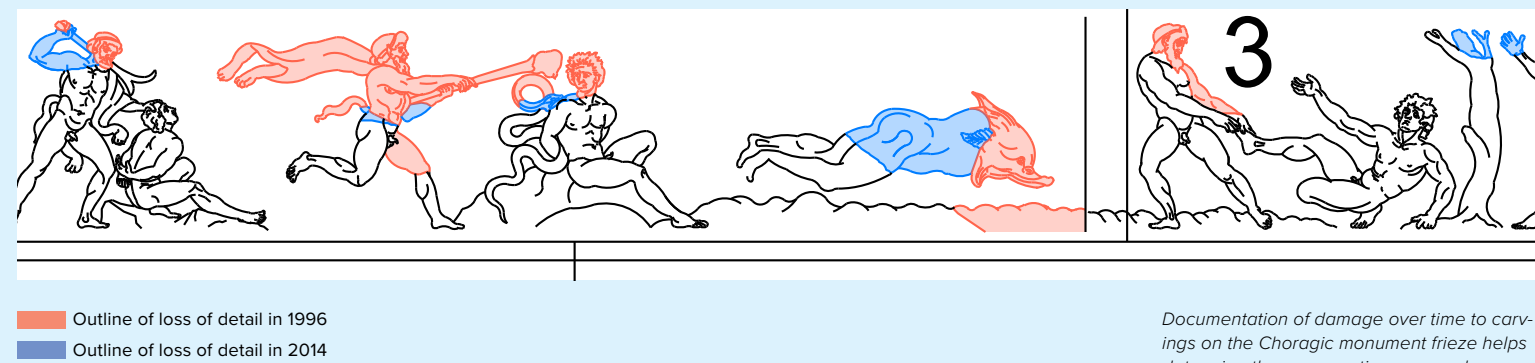
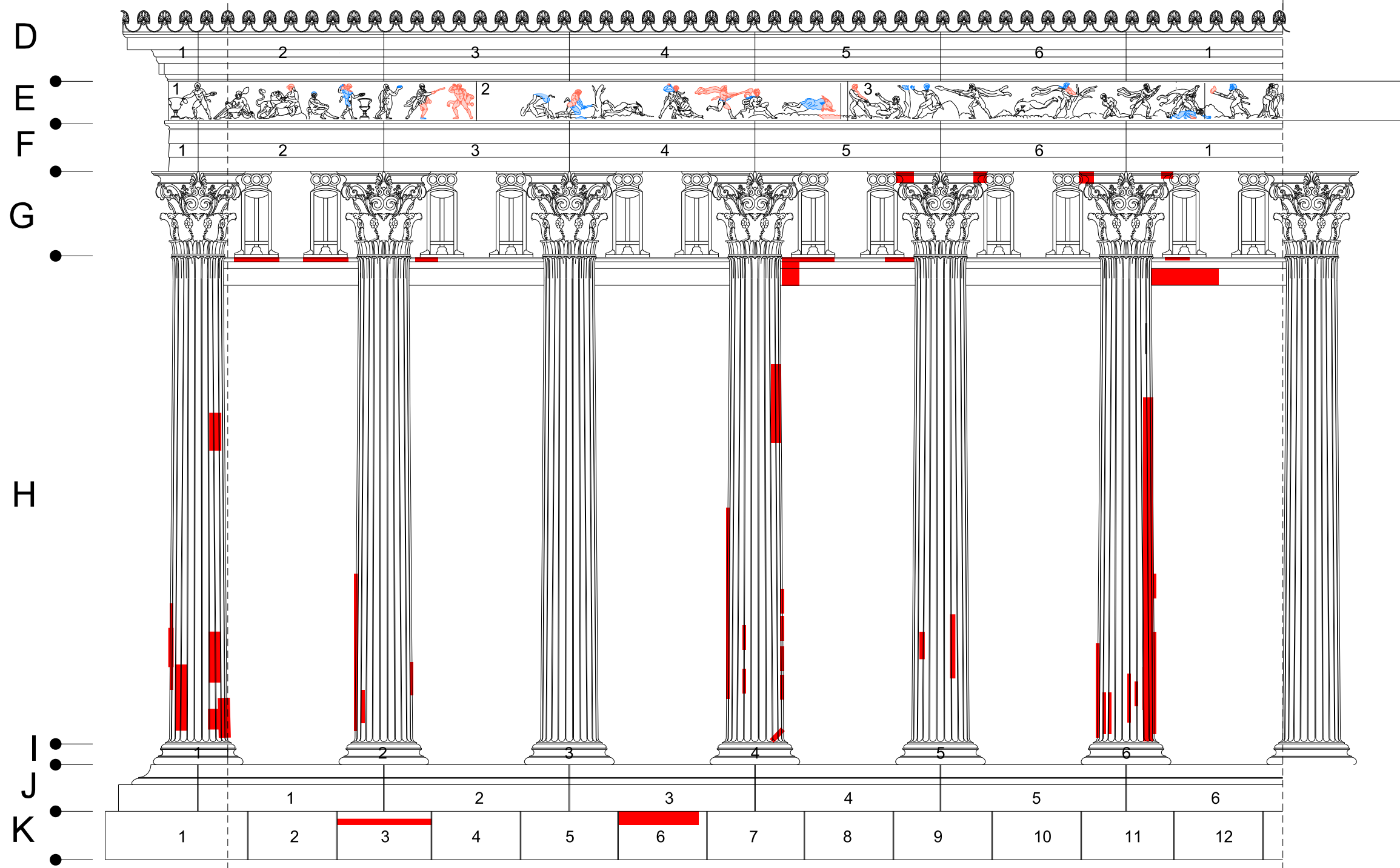
As a result of all these additions, extensions and alterations, the museum complex now contains a variety of buildings that form a fascinating assortment of architectural designs. They showcase the ideals of the nineteenth, twentieth and twenty-first centuries and are complementary in their scale, materials, colour and fenestration.

Conservation of the Australian Museum's sandstone facades was an early Minister's Stonework Program project. The priority areas were undertaken in the 1990s, the grand College Street pediment in 2001-02, and the remaining College Street facades in 2020.

In the most recent tranche of repairs, the Program assembled some of the team who had worked on the museum site 20 years prior. This was important because prior knowledge and experience is invaluable for complex highly significant sites. It reduces unforeseen risks and enables knowledge sharing and succession planning for the next round of repairs in decades to come. The project was extremely challenging because the scoping needed to be undertaken at night. Construction of the Sydney Light Rail prevented lane closures on College Street (which is a designated emergency evacuation route from the CBD).

Many of the architects, engineers, stonemasons and roofers worked on all three phases of conservation. This is a significant feature of the stability of the Program, in which knowledge of sites – gained through first-hand experience – is retained and built up over time.

Works have included replacing deteriorated stone elements such as pediment rosettes, cornices and string courses, installation of protective lead weathering to overhanging elements, and stone desalination. A rare opportunity existed during the 2001 works, when oversized pediment replacement stones could be quarried to size from the sandstone-harvesting operations occurring at the former CSR site in Pymont, a perfect performance and colour match for this site.



Creating Biographies Of Stone

Carvings Recording

Recording cultural heritage items is an integral part of every conservation project. Recording creates baseline reference information before and after a change occurs. This is critical to assess changes to condition, and its causes over time. The value of these 'biographies' of stone continues in perpetuity, enabling informed decisions for future conservation treatments, interpretation and reconstruction.

The Minister's Stonework Program records information about heritage items using a variety of techniques. Measured drawings are prepared for every project. They include clear quantitative and locational information allowing the big picture and the detail to be presented accurately, and clearly. These are archived 'as built' at project completion.

Significant stone carvings are photographed, measured and drawn, and sometimes 3-D scanned or cast in plaster from a mould.



Plaster mould from a section of the Coat of Arms at the Local Central Court, Liverpool Street, Sydney. Photograph by Heritage Stoneworks 2023.



A 3D scan of the unicorn head from the coat of arms at the National Art School. Scan by Heritage Stoneworks 2023.

MOULDING

When the form of a significant carving is at risk of loss, there are a few options for recording the details for posterity and potential future replacement.

If a carving still has most of its shape, one of the options is to gently take a latex mould, and then create a positive plaster copy from it. This plaster copy can then be stored until required. It forms a great foundation for a stonemason to re-carve when the time arises, and is particularly useful for partial indents into complex carvings, when there are no flat surfaces or points of reference to work off. The Minister's Stonework Program and Heritage StoneWorks have many plaster copies from a variety of buildings safely stored as a record, and a base model for any future replacement.

SCANNING

The Minister's Stonework Program is periodically trialing the 3D scanning of at-risk carvings, and recording them in a digital format.

3D scanning is a useful tool to document millimetre-accurate detail. It can capture intricate facade elements before they are lost to time and surface erosion. 3D scans can help to recreate complex carved forms during future conservation work by providing high quality reference points.



PALACE GARDEN GATES. CARVINGS RECORDING

*The Royal Botanic Gardens, Sydney
Education & Interpretation*

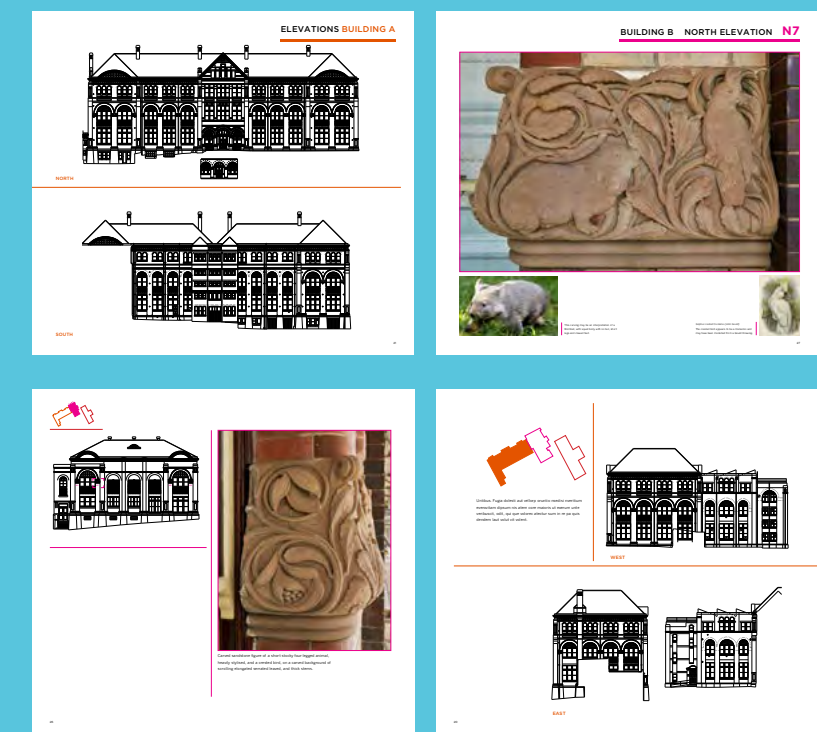
The Palace Garden Gate was conceived as a memorial to the Garden Palace that was destroyed by fire in 1882, along with many items of profound cultural significance to First Nations and the colony. The gate was built in 1888 as part of the colonial centenary celebrations and forms the Macquarie Street entrance to the Royal Botanic Gardens. It is significant because the quality and splendour of the design and carvings reflect the growing Australian nationalism in Sydney at the end of the nineteenth century. It is also significant because of its association with the former Garden Palace building and grounds, and Colonial Architect James Barnet.

The entranceway consists of iron gates and finials, and four highly carved sandstone piers with flanking sandstone walls. The sandstone

piers are made of Yellow Block Sandstone, most likely from the Saunders Quarry in Pyrmont. The decoratively carved swags of each pier depict Australian native and exotic species of flowers, foliage, fruit, nuts and seeds. The entranceway's flora were identified by a botanist at the Royal Botanic Gardens as including English oak leaves and roses interspersed with native flannel flowers, waratahs and fire-wheels.

The recording of the sandstone carving was undertaken in 2000 by the Minister's Stonework Program. The objectives were to document the original detail of the carving and to capture its extant condition.

The drawings are both beautiful and technically useful and accurate, providing qualitative and quantitative information. They were



ULTIMO TAFE CARVINGS RECORDING

*Winner of the 2015 National Trust Award for
Education & Interpretation*

The Sandstone Carvings Recording Ultimo TAFE (Formerly Sydney Technical College) presents a photographic record of close to 100 sandstone carvings adorning Buildings A, B & C. They depict Australian flora and fauna at a time when the College was promoting a national style of decoration in advance of Federation in 1901.

The location of each carving has been cross referenced to elevation drawings and is supported by historical research. This academic input has been proven to be critical to determining conservation methodologies and strategies.

The document also provides an excellent record of the condition of the stone in 2012.

prepared by a multidisciplinary team: Jaime Plaza from the Royal Botanic Gardens took the photographs; Heritage Architect Vivian Sioutas did the main drawings (by overlaying tracing paper on the photographs); Stonemason Michael Murray Landers then drew over these to indicate the measured cross-sectional information.

Recordings of this nature assist in monitoring the condition of carvings over time and provide a comprehensive set of documents for reconstruction if required.



5 | Legacy

'These buildings are paragons of sustainability'

*Abbie Galvin,
NSW Government Architect, 2020*

Legacy



Above: Designed by James Barnet and built in 1874 as the Tarban Creek Asylum Stores and Works building, it is now occupied by Giant Steps Day Care. In 2021-2022 the Program undertook extensive repairs to stabilise sandstone pediments, chimneys and roof framing and reinstate the slate roof. Photograph by Sebastian Mrugalski, 2023.

Right: Original acroterion atop replacement scrolls on the pediment of the Victoria Pavilion of Royal Prince Alfred Hospital, Camperdown. Photograph by Michael Nicholson, 2008.

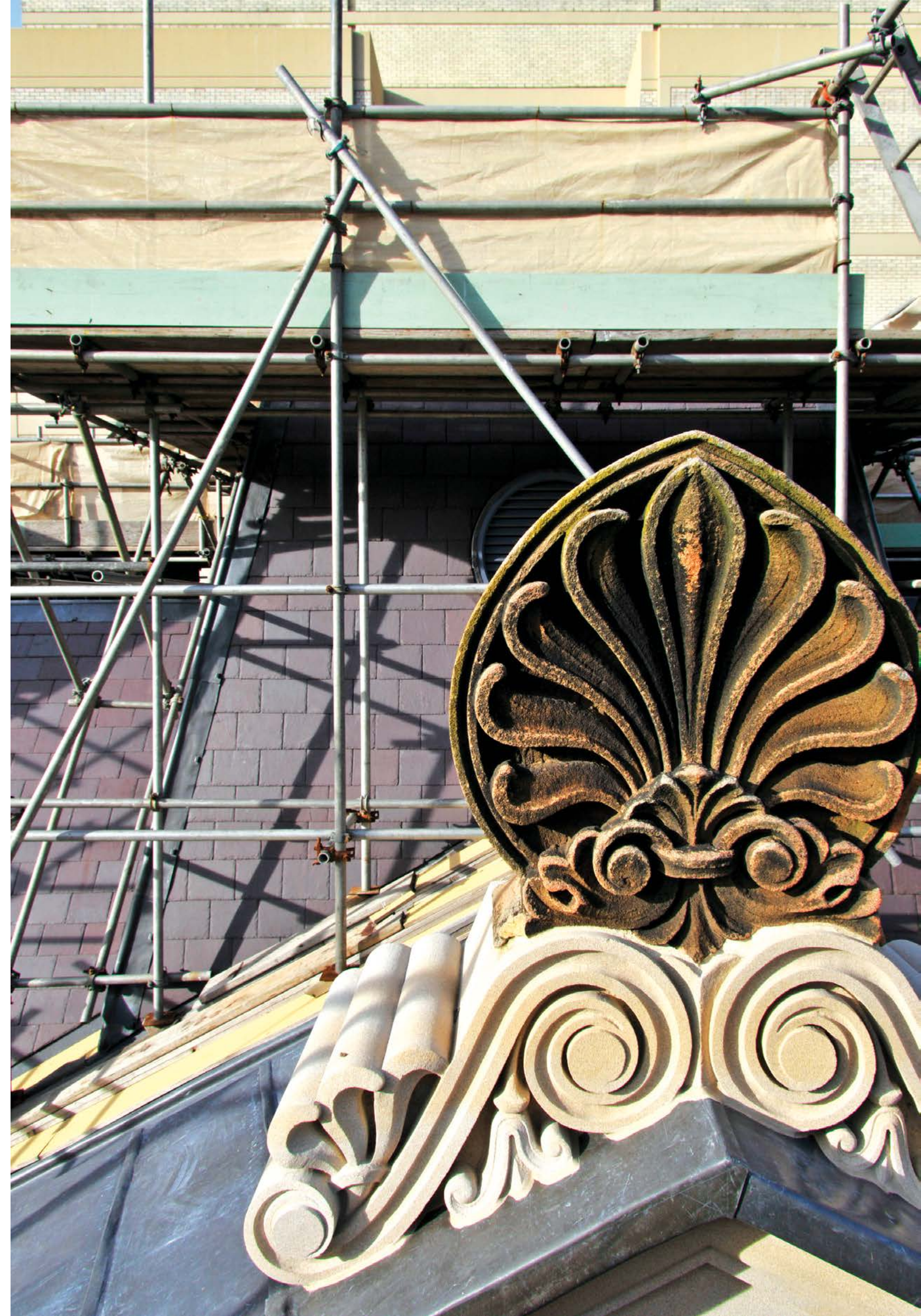
Previous page: Ionic-style capital, Art Gallery NSW built in 1901. Photograph by Michael Nicholson, 2012.

Conservation is a future focused action, responding to a societal expectation that these buildings will continue in perpetuity. The advocacy of the Program in the 1980s by the passionate architects, stonemasons and heritage specialists of the Department of Public Works and Services provided the impetus and firm foundations for the Centenary Stonework Program to prosper. Since starting in 1991 with an annual budget of \$4.5 million, the Program has been highly awarded and recognised for excellence and leadership in stonework conservation.

For the first 10 years, the Program operated within the bounds of the Treasury-allocated fund, priority projects being fully funded by the Program for the agency asset owners. Prioritisation of assets across the State is first and foremost about reducing the highest instances of public-safety risk and the loss of heritage significance through decay. Other material considerations that determine priorities include the asset's condition, prominence, significance and key operational use.

Durable Results

Inter-agency relationships are also important in progressing the Program's objective of managing the government maintenance backlog. The Program offers impartial, expert consultancy support to agency asset managers, who have ultimate responsibility for their assets. Those that choose to partner with the Program do so because they receive high-quality, durable results based on value-for-money government principles. This is significant for sites like schools and hospitals, where the reliability and longevity of the work means a reduced frequency of disruption to site occupants and operations.



Royal Prince Alfred Hospital, Missenden Road, Camperdown



Art Gallery of N.S.W., Art Gallery Road, Sydney



Previous pages: The imposing sandstone portico of the Art Gallery of NSW. Photograph by Michael Nicholson, 2012.

Left: Gladesville Hospital Keeper's House, now Building 38, is the original 1838 Tarban Creek Asylum building. This image shows an iteration of the rear entrance portico, added in the late 1890s when revised legislation enabled patients to arrive by road rather than by water to Bedlam Bay. Photograph by Michael Nicholson, 2019 taken at completion of 3 years of external conservation works.

Right: Sydney Hospital, South Gatehouse, conservation repair undertaken in 2016. Photograph by Sebastian Mrugalski, 2023.



By 2002, agencies began to contribute funds to the Program's projects to optimise use of the scaffold for total facade maintenance works, which helped to increase rates of repair and reduce the backlog. In 2010, the contributory agency funding jumped to about 30 per cent of the total budget. This was needed to create economies of scale for large high-level projects, and to meet the cost of construction rising far beyond the rate of inflation, which was impacting the Program's ability to outpace rates of decay. At this time, the annual program was undertaking four large projects and 22 small ones.

By 2016, the agency contributions matched the Program funding 50/50, and in 2018 jumped again to 75 per cent for some assets. By 2020, the cost of construction was four times higher than a decade earlier and there were eight large construction projects and 14 smaller ones in the annual program. Without these agency co-contributions the Program would not be effective. Agency buy-in to this non-mandatory service offering underscores the Program's whole of government value.

In the wake of the COVID-19 pandemic, due to skilled labour and material shortages, and economic downturn, available funding for corrective maintenance is likely to decline. As we enter the Program's fourth decade, the contributory funding model is likely to change again.

In 2022-23, the Minister's Stonework Program delivered 18 staged conservation projects – including schools, hospitals, and courthouses. To date, the Program has conserved approximately 300 assets across 90 sites. In addition, 62 sites have received safety audits and 16 are scoped for delivery. Eleven portfolio or site-wide costed strategic asset-maintenance plans have been provided to agencies.

Twenty-two apprentices have been seeded to the industry, and about 450 jobs are supported each year including those in conservation and the applied arts. Additionally, over 100 community engagement activities – including skills

demonstrations, talks, workshops and tours – have enlightened the general public, who are overwhelmingly interested in and overjoyed by a perennial good-news story and a salve for our technological age.

Celebrating our Passion

This publication celebrates the passion of the many people who have contributed to the genesis and development of the Program over the last 4 decades. The development of a sound conservation approach, technical expertise and best-practice conservation methods continue to be at the forefront of the work. The Program's work is wholesome, it benefits the community, fostering niche specialist skills connected to the primary materials of our natural and cultural landscape. Those who take part feel a part of something special with real value guided by sustainable principles.

Climate Change

As our historic buildings are vulnerable to climate change we need to take action now to protect them for the future. Increases in rainfall intensity mean we need to increase the capacity of now too-small gutters and downpipes; pooling groundwater due to overwhelmed subsurface drainage increases the risk of damage caused by rising damp and salt contamination of stone; increased climate volatility means roofs are even more critical in protecting assets; and more inclement weather days disrupt progress. These detrimental impacts demand ongoing management rather than a one-off fix.

The impacts of climate change present immediate challenges; the Minister's Stonework Program continues to work towards understanding climate change's physical impacts and introducing innovative approaches for the continued care of our buildings.

The Program will continue to support and improve sustainable conservation methods by sourcing local materials wherever



State Library of NSW, Shakespeare Place, Sydney

The value of these public assets lies in their embodied energy ... their geological immensity, their non-renewable precarity ... and the stories and patina imbued by all who have visited.

possible – such as river sands, lime burned from local discarded oyster shells and stone from the Sydney Basin – as well as supporting the wider use of sustainable materials and construction techniques.

The environmental advantages of conserving heritage buildings are long established. As sequesters of carbon for over 100 years, and some for over 200 years, their demolition is now understood to have a serious negative environmental impact, as well as a cultural one. Prolonging the life of the existing stone is paramount to securing the life of the asset and its ongoing use.

Respecting and caring for public assets are at the heart of the Minister's Stonework Program. Their value lies in their community purpose, their embodied energy, their layers of history, their makers' marks, their local provenance, their geological immensity, their non-renewable precarity, their aspirational expression of political, artistic and cultural ambition, their continuity of service, and the stories and patina imbued by all who have visited.

The Minister's Stonework Program is considered a leader in the field of stone conservation in Australia and provides a fundamental role in continuing the tradition of heritage trades skills. The future of traditional skills is a key objective that is achieved through the system of apprenticeships and knowledge sharing. For Government the Program ensures centralised, expertise delivering quality assurance, safety and prioritised maintenance across the state portfolio of over 800 culturally significant assets.

Previous pages: The imposing sandstone portico of the State Library of NSW following repairs in 2009. Photograph by Michael Nicholson, 2010.

Left: Thomas Walker Hospital showing backview with Boat House. Photograph by Michael Nicholson, 2014.

Next double page spread: State Library of NSW, a view rarely seen of the south elevation finely carved bas-reliefs. Photograph by Douglas Frost, 2017.





List of Awards

2022

Bruce Pettman, recipient of National Trust (NSW) Lifetime Achievement Award for 2022

Bathurst Courthouse Façade and Roofing Conservation Works, National Trust (NSW) Heritage Award, Highly commended – Conservation Built Heritage – Corporate/Government

Callan Park Gates, Inner West Council Built Environment Awards, Commendation Marrickville Medal for Conservation

2021

George Proudman Fellowship, Continuing Tradition, Winner, National Trust (NSW) Heritage Award

2017

Conservation of the Choragic Monument of Lysicrates, National Trust (NSW) Heritage Award, Winner – Conservation: Built Heritage

2016

Macquarie Culvert Parramatta Park, National Trust (NSW) Heritage Award, Winner – Conservation: Landscape

The Yard, National Trust (NSW) Heritage Award, Winner – Publications

Land Titles Office, National Trust (NSW) Heritage Award, Highly commended – Built Heritage

2015

Ultimo TAFE Sandstone Carvings Recording , National Trust (NSW) Heritage Award, Winner – Heritage Recording , Education/ Interpretation

Sydney Observatory, East Dome, National Trust (NSW) Heritage Award, Winner – Adaptive Reuse

2014

Newtown Performing Arts High School, National Trust (NSW) Heritage Award, Winner – Conservation Built Heritage, Corporate/Government

DEC Schools Strategy, National Trust (NSW) Heritage Award, Winner – Research & Investigation/Analyses, Corporate/Government

Thomas Walker Hospital Boat House, National Trust (NSW) Heritage Award, Winner – Conservation Built Heritage, Corporate/Government

2013

Repainting Mortar Sands & Sand Library, National Trust (NSW) Heritage Award, Winner – Research & Investigation/Analyses, Corporate/Government

Public Works NSW – Heritage Services, National Trust (NSW) Heritage Award, Winner – Trade/Skills Award

2011

Faces in the Street, Portraits in Stone, National Trust (NSW) Heritage Award, Highly commended – Interpretation & Presentation – Corporate/Government.

Fort Denison Stonework Conservation, National Trust (NSW) Heritage Award, Highly commended – Conservation Built Heritage for projects over \$1M – Corporate/Government

For Phillip Precinct, National Trust (NSW) Heritage Award, Highly commended – Conservation Built Heritage for projects under \$1M – Corporate/Government

Statue of James Meehan, National Trust (NSW) Heritage Award, Highly commended – Development – Corporate/Government

2010

Rockpool Conservation, National Trust (NSW) Heritage Award, Highly commended – Conservation Built Heritage for projects under \$1M – Corporate/Government

Sydney Hospital, National Trust (NSW) Heritage Award, Highly commended – Conservation Built Heritage for projects under \$1M – Corporate/Government

2009

The Former Mariners Church, National Trust (NSW) Heritage Award, Highly commended – Conservation Built Heritage for projects over \$1M – Corporate/Government

2008

Joy Singh, National Trust (NSW) Heritage Award, Cathy Donnelly Memorial Prize

2007

Cleveland Street Intensive ‘English’ Language High School, National Trust (NSW) Heritage Award, Winner – Conservation Built Heritage for projects over 1\$M – Corporate/Government

Paradise, Purgatory, Hell Hole, the story of the Saunders Quarries, Pyrmont, Publication, National Trust (NSW) Heritage Award, Highly commended – Interpretation & Presentation – Corporate/Government

2006

Chief Secretary’s Building- Refurbishment Project, Heritage Award Highly Commended, Australian Property Institute

Sand Castle, Australian Museum (video), National Trust (NSW) Heritage Award, Highly Commended, Interpretation and Presentation

2005

Australian Museum, National Trust (NSW) Heritage Award, Highly commended – category A1 – Conservation Built Heritage for project over \$500,000 – Corporate/Government

Building 28, National Arts School, National Trust (NSW) Heritage Award, Highly commended – category A1 – Conservation Built Heritage for project over \$500,000 – Corporate/Government

2004

Sydney Hospital Interpretation Banner, National Trust (NSW) Heritage Award, Highly commended – Interpretation & Presentation – Corporate/Government

2003

Rebecca Green, second year stonemasonry student at TAFE, National Woman in Construction Award for Outstanding Student

2001

Ministers Centenary Stonework Program, NSW Premier’s Public Sector Awards

1999

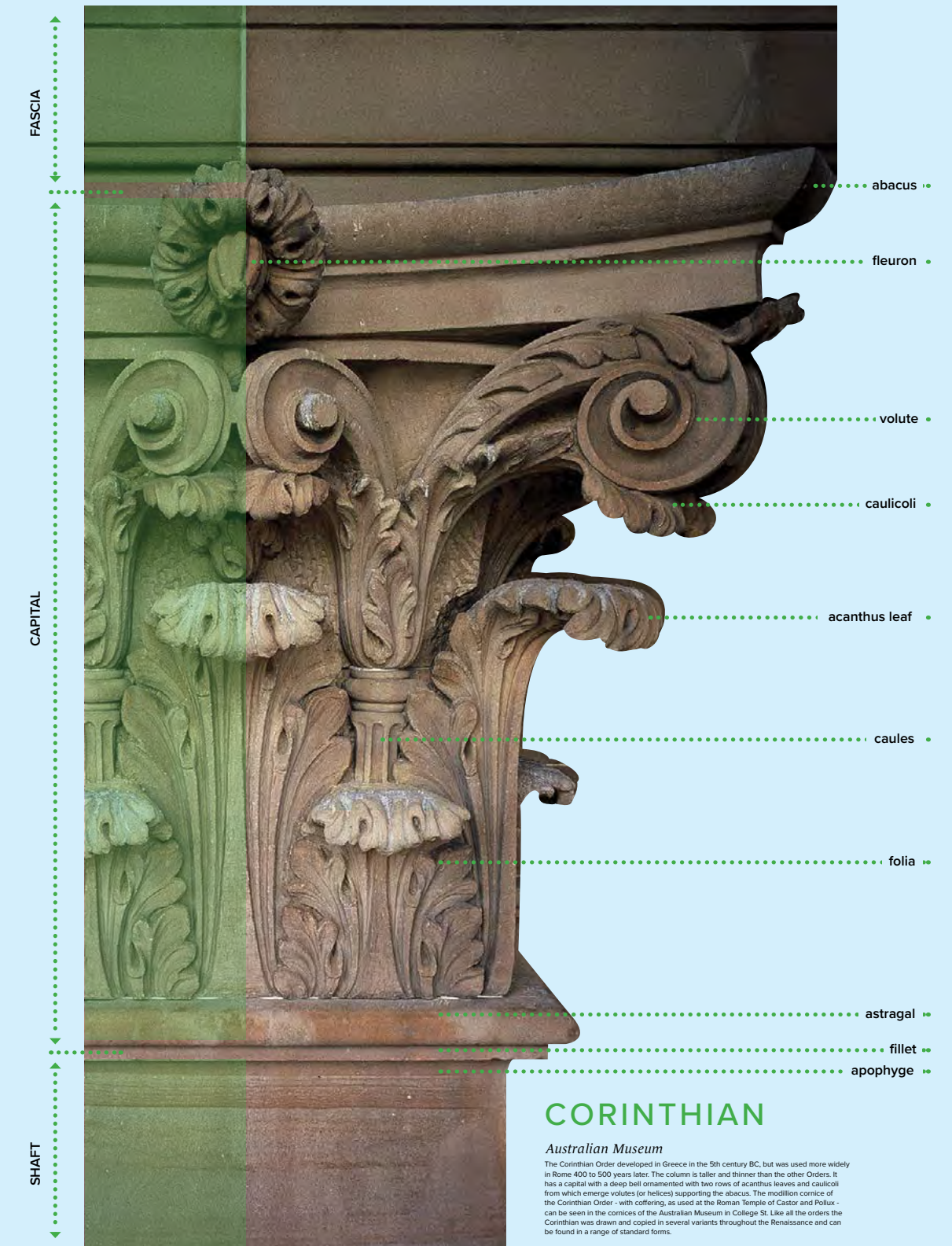
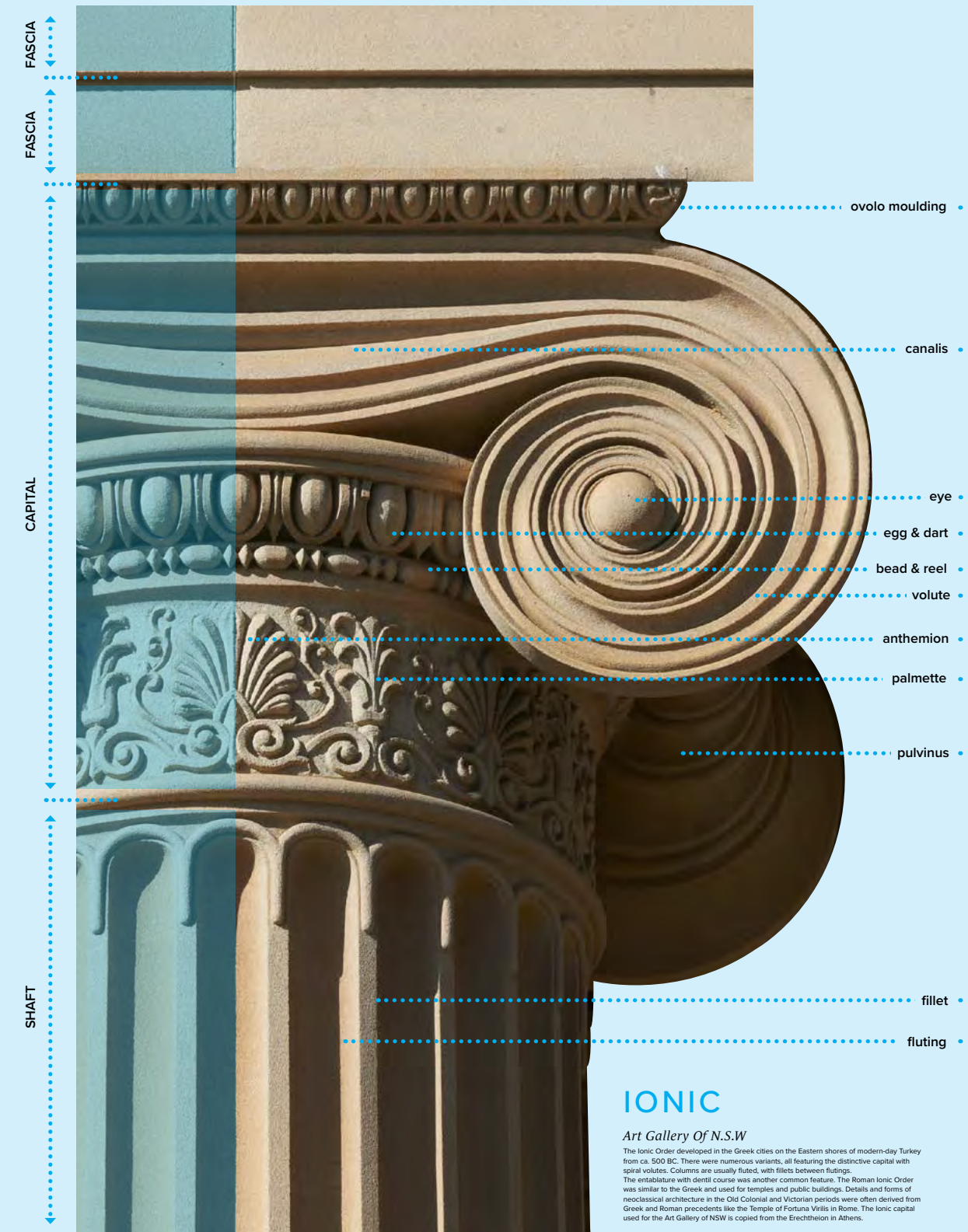
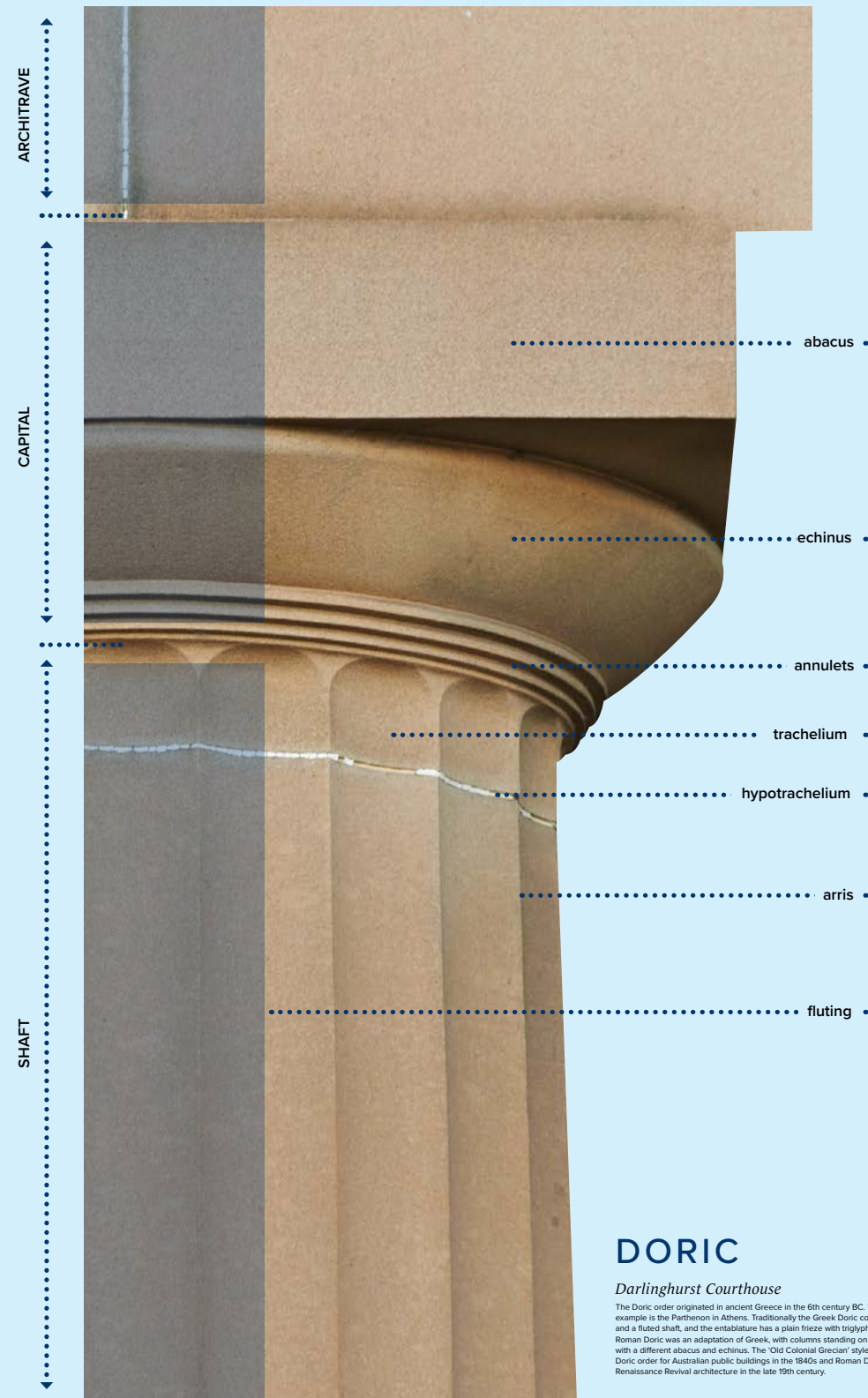
Former Museum of Technology, Sydney Institute of Technology, Building C, National Trust (NSW) Heritage Award, Highly commended Conservation category 2 Government

1993

Sandstone Restoration Programme, Lachlan Macquarie Award for Conservation, NSW Government Architect/Heritage Group, State Projects NSW, Department of Public Works

Capitals

Glossary of Architectural Terms



DORIC

Darlinghurst Courthouse

The Doric order originated in ancient Greece in the 6th century BC. The most famous example is the Parthenon in Athens. Traditionally the Greek Doric column has no base and a fluted shaft, and the entablature has a plain frieze with triglyphs over each column. Roman Doric was an adaptation of Greek, with columns standing on bases and capitals with a different abacus and echinus. The 'Old Colonial Grecian' style popularized the Greek Doric order for Australian public buildings in the 1840s and Roman Doric was popular in Renaissance Revival architecture in the late 19th century.

IONIC

Art Gallery Of N.S.W

The Ionic Order developed in the Greek cities on the Eastern shores of modern-day Turkey from ca. 500 BC. There were numerous variants, all featuring the distinctive capital with spiral volutes. Columns are usually fluted, with fillets between flutings. The entablature with dentil course was another common feature. The Roman Ionic Order was similar to the Greek and used for temples and public buildings. Details and forms of neoclassical architecture in the Old Colonial and Victorian periods were often derived from Greek and Roman precedents like the Temple of Fortuna Virilis in Rome. The Ionic capital used for the Art Gallery of NSW is copied from the Erechtheion in Athens.

CORINTHIAN

Australian Museum

The Corinthian Order developed in Greece in the 5th century BC, but was used more widely in Rome 400 to 500 years later. The column is taller and thinner than the other Orders. It has a capital with a deep bell ornamented with two rows of acanthus leaves and caulicoli from which emerge volutes (or helices) supporting the abacus. The modillion cornice of the Corinthian Order - with coffering, as used at the Roman Temple of Castor and Pollux - can be seen in the cornices of the Australian Museum in College St. Like all the orders the Corinthian was drawn and copied in several variants throughout the Renaissance and can be found in a range of standard forms.

Glossary of Architectural Terms

Abutment – Solid masonry on either side of an arch, counteracting its lateral thrust

Achievement – Heraldic device which typically consists of a shield of arms, motto, supporters, helm, crown and crest. Also called "coat of arms"

Acroterion – Technically the flat pedestal at the apex or end of a pediment in classical Greek temples, intended for sculpture. Also used to refer to the pedestal and its sculpture or ornament together.

Arcade – A regular row of arches supported on columns or piers

Arch Ring – Each separate row of voussoirs making up an arch

Architrave – Lowest of the three main divisions of an entablature, often itself divided into fasciae. Also used for the mouldings around doors and windows

Archivolt – An architrave moulding on the face of an arch following the line of the arch

Ashlar – Masonry with carefully worked beds, finely jointed (generally no more than 4.5mm) and set in horizontal courses. The stones in each course are of the same height, although successive courses may be of different height.

Attic – A storey built on top of a main entablature, generally composed of a plinth, dado and smaller entablature

Broken Pediment – Pediment in which one or both of the cornices or entablatures is left open. Can be described as open topped, open bed, or broken

Console – Bracket in the form of a scroll, supporting a cornice, sculpture or other feature

Coping – The upper course of a wall designed to shed water.

Cornice – The uppermost of the three main divisions of an entablature, or any similar-shaped upper projecting moulding on top of a pedestal or opening or at the junction of a wall and ceiling

Crown – The top part of an arch including the keystone or apex

Dado – Middle part of a pedestal between the plinth and the surbase, or a similar component in an attic storey or balustrade. Also called a die

Dentils – A row of small, square, tooth-like carvings or mouldings usually integrated into the bed moulding of an entablature.

Dexter supporter – Figure or animal supporting the shield of arms (in a coat of arms) on the left hand side when viewed from the front

Elliptical Arch – Arch set out in the form of a half-ellipse

Entablature – The superstructure of the order above the capitals, consisting of architrave, frieze and cornice

Equilateral Arch – Pointed arch with the centres on the springing line where it meets the intrados

Extrados – Outer curve of an arch

Flat Arch – Arch in which stone or brick voussoirs are set out from a point in line with the perpendicular centre below the springing line and the crown is horizontal

Frieze – The middle of the three main divisions of an entablature, essentially a plain horizontal band. The Doric frieze may have triglyphs, while the Ionic or Corinthian may have relief sculpture

Haunch (or shoulder) – The sides of an arch, from springer to approximately one-third the way up, which carry the thrust

Helm – The helmet above the shield in a coat of arms

Impost – Block built into a wall to support an arch below the springer (unless a 'stilted' arch)

Intrados – The inner curve of an arch

Keystone – The central stone of an arch, usually in the shape of a truncated wedge.

Lancet Arch – Pointed arch with the centres on the springing line but outside the lines of the intrados

Modillion – Horizontal ornamental bracket, often ornamented with scroll and acanthus motifs, under the corona of a cornice. A block modillion is not ornamented

Motto – The phrase inscribed on the ribbon of a coat of arms

..acroterion

..triangular pediment

..raking cornice

..helm
..dexter supporter
..sinister supporter

..scrolled pediment

..acroterion

..pediment cornice

..dado

..motto

..cornice

..block modillion

..dentils

..frieze

..architrave

..extrados
..intrados

..archivolt

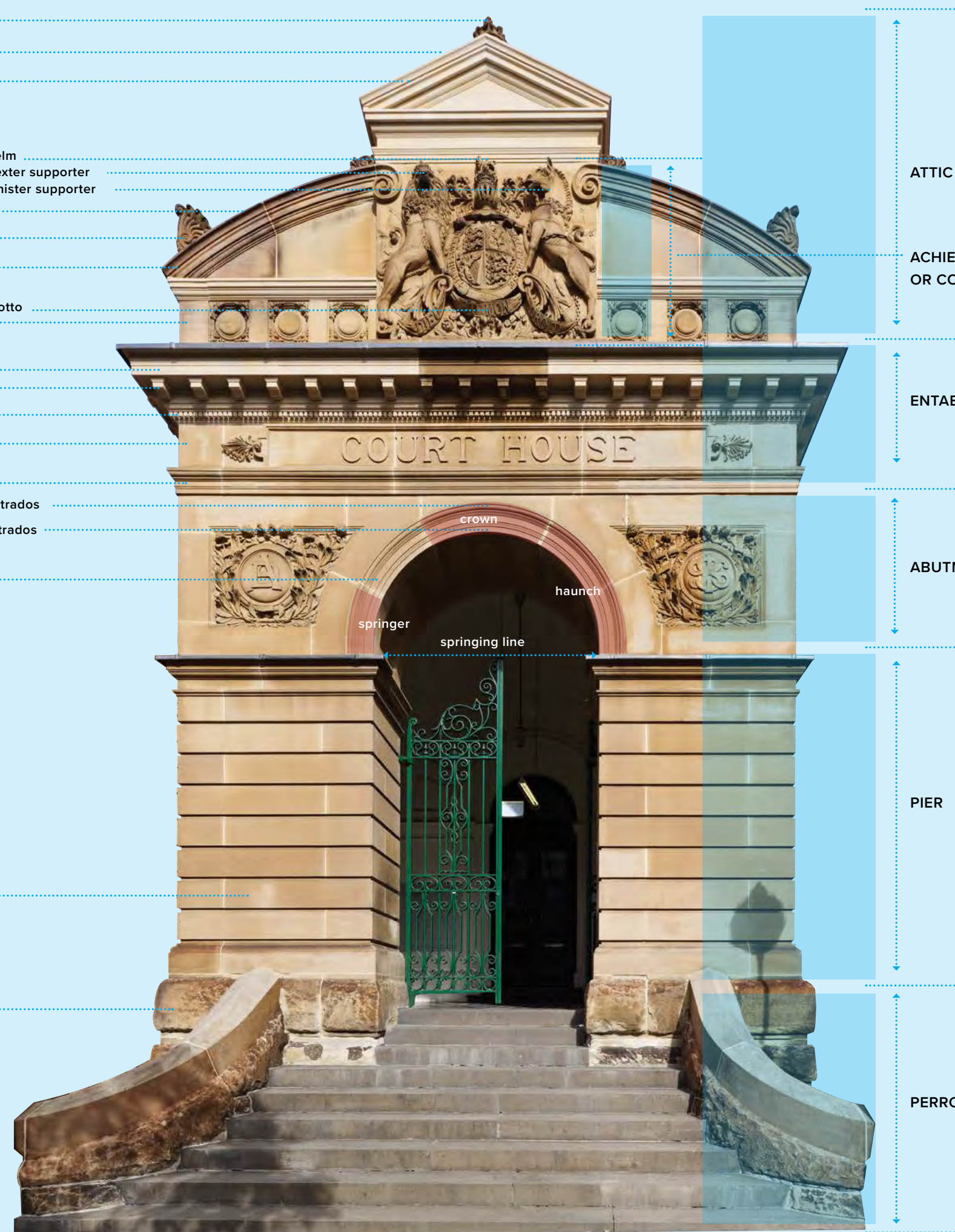
..rusticated ashlar

..plinth

Redfern Courthouse

1898 (Walter Liberty Vernon)

Entrance in 'Federation Free Classical' style. It combines a Triumphal Arch (similar to Chalgrin's famous Arc de Triomphe, Paris, begun 1806), with a late-renaissance style formal doorway of superimposed pediments, one open-topped segmental and one triangular, framing an achievement of arms. The architect has added some unorthodox Greek details (acroterion, honeysuckle) and a curved stairway (or perron) with landing.



ATTIC

ACHIEVEMENT OR COAT OF ARMS

ENTABLATURE

ABUTMENT

PIER

PERRON

Ogee Arch – Double curved arch set out from three points of an isosceles triangle: one point in line with the perpendicular centre and two points either side of the curve of the arch

Pediment – Gable-like structure on top of an entablature; in classical architecture, it is triangular in shape and sometimes has a carved tympanum. Smaller pediments are used on doors and windows

Pediment cornice – Any of the cornices belonging to a pediment, such as the horizontal cornice or raking cornices

Perron – Platform and flight of steps in front of the main entrance to a building in the Palladian classical style

Pier – Masonry pillar, usually rectangular in cross-section, supporting an arcade or roof; also the solid portion of a wall between two adjacent windows, doors, or other openings

Plinth – In a column or pilaster, the cube or slab supporting the base; also the supporting cube at the bottom of a pedestal, or the projecting courses of masonry at ground level supporting a wall.

Raking Cornice – Sloping sides of a pediment worked in the form of a cornice

Rise – The internal vertical height of an arch from springing line to the inside edge of the crown

Rustication – Masonry where joints are recessed from the main face, the latter being worked in a distinctive way to create shadows and texture

Scrolled Pediment – Curved or double-curved pediment broken in the centre and terminating in a pair of scrolls

Segmental Arch – Arch in the shape of a segment of a circle, set out from a point in line with the perpendicular centre below the springing line

Semicircular arch (or Roman arch) – Arch in the shape of a semicircle set out from the springing line

Sinister supporter – Figure or animal supporting the shield of arms (in a coat of arms) on the right hand side when viewed from the front

Soffit – The underside face of an arch, beam or cornice

Span – Distance between the inside faces of the uprights (piers or columns) supporting an arch

Spandrel – Masonry forming the roughly triangular space between the haunch of an arch and the abutment

Springer – The lowest voussoir in an arch, its bottom bed laid at the springing line.

Springing Line – The horizontal line at which an arch springs from its supports

Stilted Arch – Arch in which the springing line is raised on supporting masonry above the impost level

String Course – Continuous horizontal band of masonry extending across the facade and in some cases wrapped round decorative features such as columns and arches

Surbase – The mouldings at the top of a pedestal or above a dado

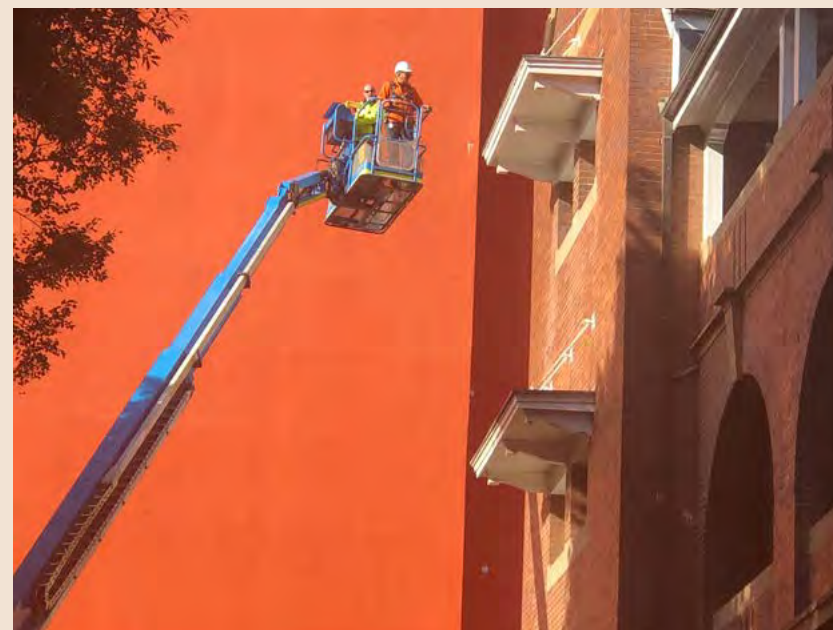
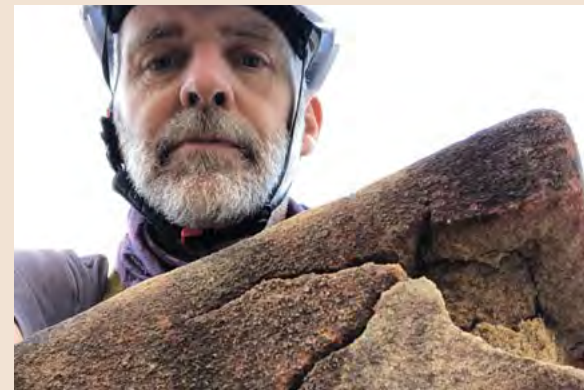
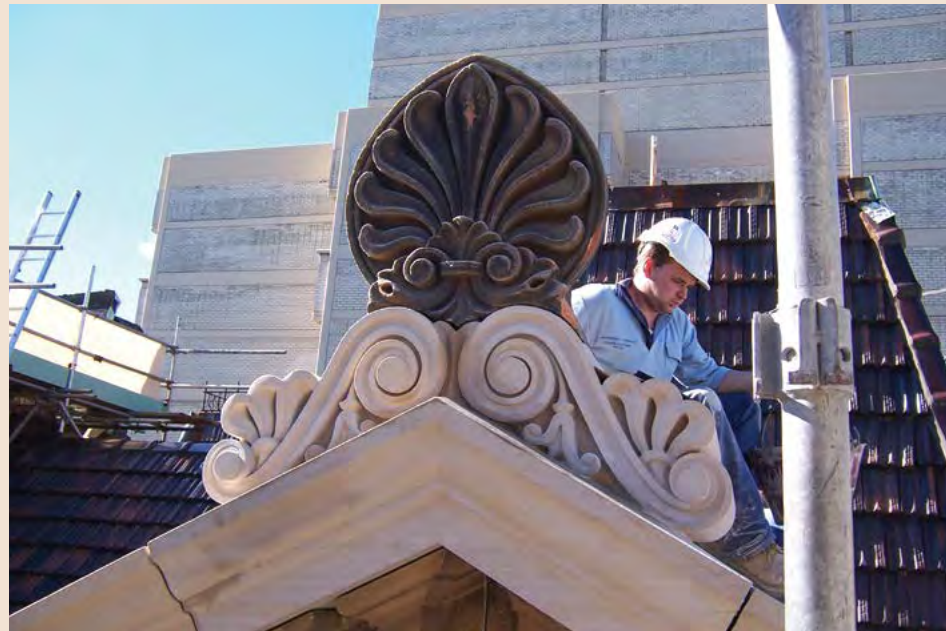
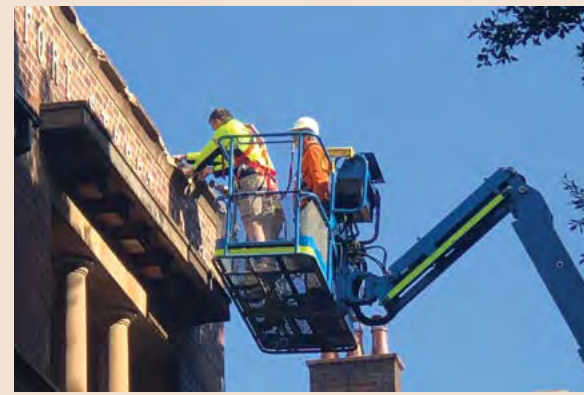
Thrust – The combination of horizontal and vertical forces that (in structural terms) push the arch outwards from its centre

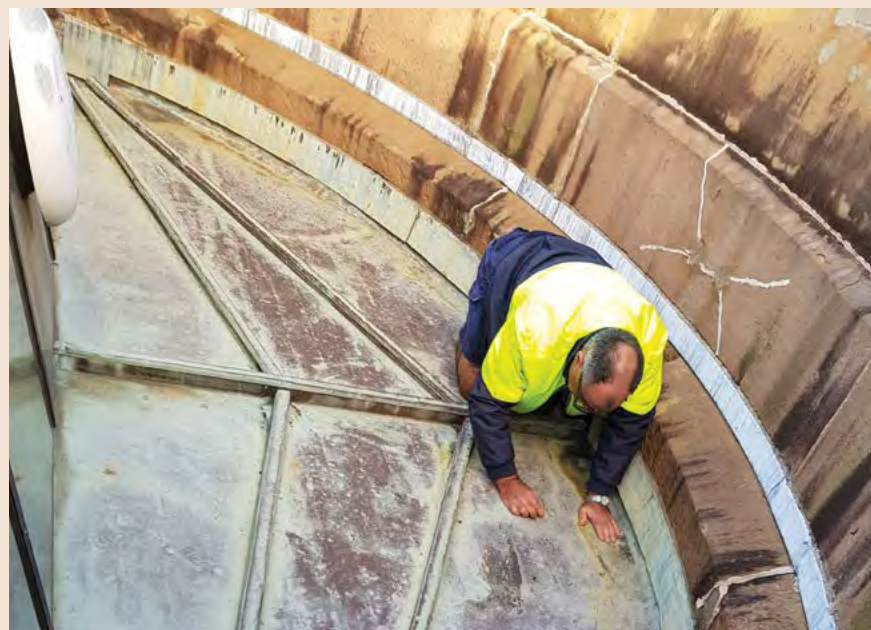
Triangular Pediment – Pediment in the form of a triangle

Tudor Arch (or four-centred arch) – Flat pointed arch set out from two points on the springing line and two points below the springing line

Voussoirs – Wedge shaped stones used in the construction of an arch







ACKNOWLEDGEMENTS

This book represents the cumulative knowledge, and substantial passion and commitment, of several people directly and indirectly associated with the Minister's Stonework Program in New South Wales over many years.

The idea for the book arose from the need to capture the essence and purpose of the Minister's Stonework Program initiative, as well as its achievements, over the past three-plus decades. The Program has moved into a new phase, one in which the alumni of the early Program days are engaged with the newer stewards, providing sage advice and stories of the golden years! to new and equally enthusiastic stewards of our heritage.

We feel that the time is right for this book to be published as a source of information – and hopefully inspiration – to all those interested in the continued care and protection of sandstone built heritage in our State. Its focus on stonework conservation illustrates the special nature of this work, and the substantial value and appeal of our nineteenth and twentieth-century sandstone public buildings. Especially their artisanal and material beauty; and their ties to ancient values, knowledge and geological timeframes. As well as the value of their embodied energy, extended every year by their continuing usefulness as government assets – often still aligned with their original design purpose; in other cases adapted for alternate and often creative uses.

Any mention of the key contributors to the book's contents and development must begin with Margaret Betteridge (the historian and curator who skilfully drew together the many strands of this story), Kate Napier (the key driver and manager of the Minister's Stonework Program, and acting Director of Heritage Environment and Planning in NSW Public Works), Joy Singh (former long-standing manager of the Minister's Stonework Program and now a heritage consultant), Paul Thurloe (Senior Mason and Stonemasonry Manager at Heritage Stoneworks) and Bruce Pettman (former director of Heritage Environment & Planning, NSW Public Works).

We also acknowledge the valuable and detailed information for the book provided by Lionel Glendenning and Anne Higham (on the early years of the Program's inception), Ron Powell (who managed the financial aspects of the program in 2000-10), Alf Pires (former master mason at Heritage Stoneworks) and Abbie Galvin, the Government Architect and sponsor of the Program since 2021.

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The photographers are Michael Nicholson, Douglas Frost and Sebastian Mrugalski, whose beautiful images are essential in appreciating the value of the work.

Over the past three decades, there have been more than 200 professional and tradespeople deeply involved in the Program's day-to-day and year-by-year planning and delivery. We acknowledge their very significant contributions in these changing – and sometimes challenging – political, economic, technical and social times. Their enthusiasm, patience, ideas, restraint and commitment are commended and greatly appreciated by client agencies and the Government. They have established and sustained a very high level of credibility for the Program and its achievements.

In more recent times, the impacts of COVID-19 and its derivatives cannot be overlooked. However, the Minister's Stonework Program was able to keep moving forward in various ways to maintain the output of the good work by all. Now, we look forward to a future supported by research into innovative technologies that will support ongoing conservation improvements. We hope you have enjoyed looking at these images and reading this important story, and trust that such a record as this will be updated and repeated in the years to come.

Previous pages 156 - 171: The Power Behind Stone, various photographs from MSP projects and teams.

Following page: The community of a much loved and significant asset - Callan Park, gathers to show their appreciation for the restoration of the original 1878 Gates, and their reopening, in 2021 for pedestrians, after being closed for decades.



Heritage provides an important sense of place and connection, and can contribute to individual and community wellbeing

Australia State of the Environment Report



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