Bridge Climb Commentary Manual

2019

AN INTRODUCTION TO BRIDGECLIMB

The Hammon Family Story – 2018 to present

Hammons Holdings is a third-generation Australian family business that has owned and operated Scenic World in the Blue Mountains, NSW for 73 years. Scenic World operates the Scenic Railway, Scenic Skyway, Scenic Cableway and Scenic Walkway, and is the most visited, privately owned tourism attraction in Australia, attracting over 1 million visitors annually.

Through Hammons Holdings' diversification strategy, the Hammon Family Investments Trust is a cornerstone investor in Sydney Zoo (2015) a new tourism attraction in Western Sydney and in 2017 Hammon Family invested in URBN Surf Wave Park, an urban wave park business. Anthea Hammon is also on the Board of Directors for the Western Sydney Airport.

Hammons Holdings is the ultimate holding company of Scenic World group of companies and the trustee of Hammon Family Investments Trust.

In June 2017 Roads and Maritime Services (RMS) invited an Expression of Interest (EOI) to operate Sydney Harbour Bridge Tourism Activities. In late June 2018, RMS awarded contract to Hammons Holdings via a concession arrangement to allow a single operator to operate existing, and potentially expanded, tourism activities for a period of 20 years, commencing 1 October 2018. Since 1998, RMS has had a contract in place with the incumbent operator – Ottto Holdings Pty Ltd, known in market as BridgeClimb Sydney ('The Climb of Your Life').

The next 20-year vision from Hammons Holdings is to give the bridge back to the people – more access, more affordable options, more products to enjoy – and to introduce innovation and technology to bring the bridge's history/people/vistas, in fact the full story of its purpose and connectivity, to life in an exciting and social way. This is one of the most iconic tourist attractions in Australia and whilst the 'hero' climb has been a thrill for lots of visitors, it is extremely exclusive. RMS is keen to provide more value to tourists and Sydney-siders alike, seeing ongoing investment to help drive the increasing tourism goals on both a domestic and international level.

Paul Cave AM Story – 1998 to 2018

Few could imagine the awesome challenge that the actualisation of BridgeClimb presented to founder, Paul Cave.

The Sentimental Value

It was during Paul Cave's first meeting with his future father-in-law that the now famous 'ticket' was mentioned…

….Paul's late father in-law, George Skinner, lined up overnight and on the day the bridge opened he purchased the first rail ticket (number 0001) sold to the public for crossing the Bridge on 20th March 1932. The trip was from Wynyard Station to Milsons Point. He inherited this ticket, never forgetting its significance or the journey it has subsequently taken him on.

The Inspiration

In 1989, he helped conduct a Young Presidents Organisation (YPO) World Congress in Sydney, which included a climb over the Sydney Harbour Bridge. Inspired by this experience, the personal dream to share the Bridge summit with everyone was born.

Paul made his first climb with three RTA workers while organising the YPO Climb. He remembers his, "heart skipping a beat", "wearing no safety gear" and "climbing through old cranes and over collapsible hand rails on the arch."

In 1990, 600-plus YPO Congress attendees climbed the Bridge over three days. He and the YPO climbers moved through the Southern Abutment Tower, up the King Post East ladder and Eastern chord, across the summit and then down the Western chord and King Post East ladder. The King Post West ladders were a later addition made by BridgeClimb. The RTA was extremely helpful in allowing the unexpectedly high number of climbers.

The interest from the YPO congress was overwhelmingly positive. Paul witnessed their enthusiastic reaction and the dream was born.

The Challenge

To realise this dream, it took nearly ten years of liaison and consultation with dozens of organisations, such as State and Local Government bodies and community groups. Issues included safety considerations, logistics, media, heritage and conservation. A comprehensive Proposal and Business Plan, together with an Environmental Impact Statement, was completed for submission to Government. Despite facing many challenges he never let go of the dream of BridgeClimb becoming a reality. His vision, commitment, persistence and entrepreneurial skills were fundamental to BridgeClimb's creation.

The famous ticket

History of No 1 and No 5 Cumberland Street

In the beginning…

Naming of Cumberland Street

Governor Lachlan Macquarie officially named Cumberland Street in 1810; prior to this it was unofficially called Church Row. In the early 19th century this name had been changed to York Street and by 1912 the Sydney Council had renamed it York Street North. In 1919 it was again changed to its present name of Cumberland Street, however, it wasn't gazetted as Cumberland Street until 1974.

The Archways

JJC Bradfield's earliest vision was for green parkland to continue under each archway and the southern approach span. The archways at No. 1, 3 & 5 Cumberland Street were originally breezeways, accessible to all from either end. However, two years after the Bridge was built, the archways were filled with the large glazed walls that still exist today. AJ Brown was the architect involved in the transformation of the archways.

It was thought that each archway could contain space to lease and therefore generate good revenue for The Rocks area. These spaces have evolved into the areas occupied by BridgeClimb today.

BridgeClimb when the arches were used by Darrell Lea as their manufacturing plant from 1936.

Early Tenants

The first occupants of the archways were Darrell Lea Chocolates and the publisher/printing firm, New Century Press.

Darrell Lea began operating in Sydney in 1927 as a confectionery store and used the archways as an enlarged kitchen to help cope with product demand.

The chocolate factory was fitted out in 1936-38 and included an onsite store. The faint imprint of the factory name can be seen at the front of Number 1 under the paint. During this time the factory address was No. 1 York Street. York Street was gazetted as, 'Cumberland Street', not long after Darrell Lea vacated the premises in 1963.

No. 1 subsequently operated as a mechanics garage for Porsche vehicles. No. 1 was also the headquarters for the RTA tow trucks and recovery vehicles, prior to BridgeClimb occupancy. The RTA in partnership with BridgeClimb relocated the tow trucks to the northern abutment towers in March 2000.

No. 5 Cumberland Street was later used by the NSW Department of Public Works as a joinery workshop. Downstairs you can still see the green sawdust extraction ducts.

BridgeClimb Tenancy

BridgeClimb took up the lease at No. 5 on 1 January 1998. The redevelopment work began in April that year. Constant updates and improvements were undertaken.

No. 1 was occupied from September 1998.

Number 3 Cumberland Street

This archway was home to the Indigenous Performing Arts School, NAISDA (National Aboriginal and Islander Skills Development Association) until they relocated in August 2006. Today it is the new home of the exciting new BridgeClimb Base and Visitor Centre.

Cutting of the Tunnels

Prior to BridgeClimb actually climbing the bridge there was the small problem of gaining access to it. This was achieved by the cutting of the tunnel leading to the approach span. Before work could begin approval had to be secured from various government, engineering and heritage authorities.

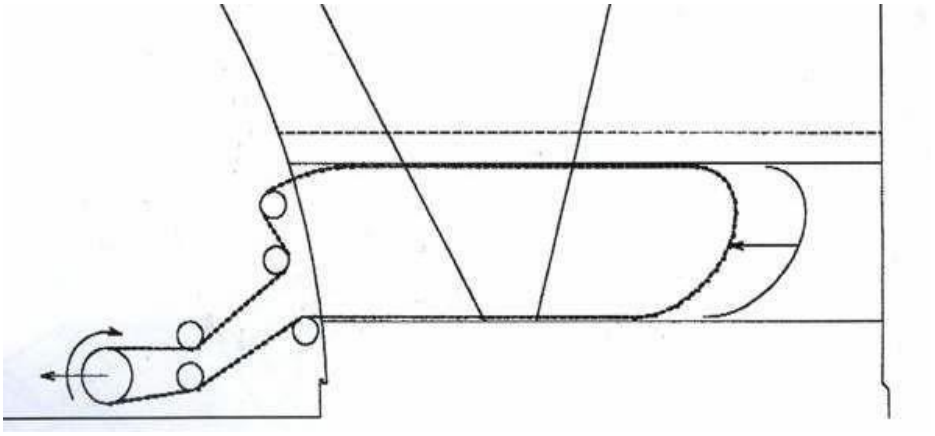
The tunnel is 9 metres in length and consists of a 5 metre thick concrete outer layer on the abutment side facing George Street and a 2.5 metre thick reinforced concrete inner layer on the upper level of No. 5. Sandwiched in between is a 400mm sandstone rock fill.

The engineering company employed to cut the tunnel was Berry Wallsawing Pty. Ltd of Melbourne. Their proposed method of cutting such a massive amount of concrete was to use a method called Diamond Wire Sawing. This method of cutting through concrete was first developed in Italy in the 1970's and was used to cut marble.

The way in which this was done involved the use of a flexible cutting tool consisting of a multi strand cable with diamond coated steel 'beads' fixed along its length at regular intervals. This cable was passed around the concrete and joined to form an endless loop and directed by a series of guiding pulleys attached to a driving flywheel which is then pulled back, thus putting the cable under tension as it is pulled through the concrete.

Initially there were core testing holes drilled through the 9 metres of concrete and these provided a surprise for the drilling team. The rock infill effectively acted as a natural drain for the road deck above and was filled with 70 plus years of water. The test holes provided an outlet for this and test drilling was postponed as an estimated 200 litres of water per minute poured out of the hole, which at 18mm meant that it would be a long process to drain enough water before drilling could resume. It eventually took 5 days to empty for this to happen.

Whilst it might appear that this water would be an inconvenience; it actually turned out to be very handy. Diamond wire sawing is a very messy business as the wire itself requires lubricating constantly with water. The outflow from the holes meant that this water could in fact be utilised for this purpose. The water was collected in barrels and filtered. The clean water was then pumped into the bore holes and lubricated the revolving diamond wire as it gradually pulled its way through at a surface speed of 28-32 metres per second with an effective cutting rate in excess of 2 square metres per hour.



Typical cutting arrangement for the side cuts

9 metres of concrete was far too big to handle in one go so it was decided to split the core into sections in order to remove it. This was done using hydraulic splitters. Small bore holes were drilled and wedge shaped splitters were then inserted and hydraulic power was used to split the blocks into smaller pieces. These were then fork lifted into bins and taken away for disposal.

The gross tonnage of reinforced concreted removed from the tunnel was 49 tonnes.

Bridge Climb – The Facts

- 4.0 million people have climbed the Sydney Harbour Bridge with BridgeClimb Sydney.
- Over 20 million people have visited the BridgeClimb Sydney website since October 1998.
  65% of climbers are international visitors, 23% of climbers live in Sydney and 12% are domestic visitors to Sydney.

- Celebrities such as Oprah Winfrey, Will Smith, Matt Damon, Nicole Kidman, Kylie Minogue, Justin Timberlake, Cameron Diaz, Robert De Niro, Pierce Brosnan, Cate Blanchett, Teri Hatcher, Prince Harry, and Crown Prince Frederik and Crown Princess Mary of Denmark.

- The oldest climber to date was 100 year old Mrs Chris Muller.
- The most frequent climber is a 91 year old from Sydney. He has completed 125 climbs (probably more to date).

- On the BridgeClimb route, climbers will scale 1332 stairs. On the Express Climb, climbers will climb 1002 stairs.

- The largest Bridge Suit is size 6XL and was worn by a contestant from The Biggest Loser (Australia).
- The tallest Bridge Suit was worn by the UK' s tallest man, Neil Fingleton. Neil is 233cm (7ft 7) tall.
- It is estimated that over 5000 couples have become engaged whilst climbing the Bridge with BridgeClimb Sydney.
- There have been 27 weddings (Possibly more to date) on top on the Sydney Harbour Bridge and one in the Pylon Lookout.

- BridgeClimb Sydney has donated over $5.5 million worth of climbs to various charities, schools and other organisations.
- BridgeClimb Sydney is open up to 24 hours a day, 364 days a year. The earliest dawn climbs depart at 3:15am.

- BridgeClimb Sydney's base under the arches of the southern approach was once used by the RMS as a tow-truck depot and before that by Darrell Lea as a chocolate factory.

- All equipment used during the climb has been modified or designed specifically for BridgeClimb Sydney's operation

History of Climb Leader Intake Names

SYDS, OLLIES, MILLIES, LIZZIES (Olympic Mascots)
DENISONS, CLARKS, SHARKS (Islands of the harbour)
COOKS, MACQUARIES (Early explorers)
RIVETS, GRANITES, STEELS (Bridge elements)
SUMMITS, BRADFIELDS, ENNIS, FREEMANS (Famous bridge figures) DAWES,
BLUES, BENNELONGS (Harbour Points)
KELLYS, WHEELERS, HOGANS (Famous Bridge workers)
De GROOTS, LANGS, PRIMROSES (Ribbon cutters)
GREENWAYS, UTZONS, SEIDLERS, TAITS (Architects) THREE
BEES, DUNBARS, CURRAJONGS (Shipwrecks)
SCARBOROUGH, SIRIUS, SUPPLY (First Fleeters)

The Bridge – The Construction Years

People of the Bridge Construction

Dr John Job Crew Bradfield (1867 – 1943)

Dr Bradfield is quoted as saying that the Bridge is "…divinely outclassed in beauty and infinitely out spanned only by the blue arch of heaven, and God's beautiful bow in the clouds, the Rainbow".

John Job (pronounced Jobe) Crew Bradfield was born on Rainbow Street in Sandgate, Queensland on the 26th of December 1867.

Bradfield attended North Ipswich Public School and then Ipswich Grammar School where he achieved a scholarship and matriculated as Dux (1881-1885).

In 1889, Bradfield was awarded a Bachelor of Engineering. He won many awards as well as the University Gold Medal.

After working as a Draftsman with the Queensland Government Railways, Bradfield joined the New South Wales Department of Public Works in 1891.

In 1896, he gained his Master of Engineering degree with First-Class Honours.

In 1912, he was appointed Chief Engineer of the Sydney Harbour Bridge and the Metropolitan Railway Construction.

July 1913, the Parliamentary Standing Committee recommended his scheme for bridging the Harbour.

In 1914, Bradfield travelled through Great Britain, Europe and America to investigate the latest technologies in long-span bridge building and underground railway construction.

After worldwide tenders were called for a cantilever bridge in September 1921, Bradfield was again sent overseas. In March, 1922 he interviewed the prospective tenderers and asked if they would be prepared to submit tenders for an arch bridge if given the opportunity.

On his return to Australia, Bradfield recommended that an arch-style bridge should be considered. Subsequently the Sydney Harbour Bridge Act was passed on 24 November 1922, which at last authorised the construction of a bridge across the Harbour.

In 1924, Bradfield received the first degree of Doctor of Science in Engineering awarded by Sydney University. It was gained for his thesis entitled, "The City and Suburban Electric Railways and the Sydney Harbour Bridge". Incidentally, one of Bradfield's examiners in 1923 prior to receipt of a Doctorate of Science from the University of Sydney was another notable Australian civil engineer, Lieutenant General Sir John Monash, whose image appears on the current Australian $100 bank note.

In 1932 The Australian Institution of Engineers, awarded him the Peter Nicol Russell Memorial Medal. In 1933

he was awarded the Kernot Memorial Medal from the University of Melbourne.

In 1934 Bradfield also received the Telford Gold Medal from the Institution of Civil Engineers in London. In

1948, the local Commonwealth electorate in which he lived was named Bradfield in his honour.

Throughout the construction of the Bridge, Dr Bradfield checked and supervised all aspects of the design and construction. At its opening in 1932, the Governor, Sir Philip Game named the road linking the City and Northern Suburbs, 'The Bradfield Highway.'

Dr Bradfield was by no means a young man when the Bridge was finally opened. He was in fact 64 years and three months old at the time.

Dr Bradfield retired from Public Service in 1933; however, he acted as a consulting engineer on projects such as the Story Bridge and the St Lucia Bridge in Brisbane. He also had an interest in irrigation and water conservation and as a result, was involved in the construction of the Cataract and Burrinjuck Dams in New South Wales.

The NSW premier at the time, J T Lang wrote of him, "Bradfield was probably the first man to plan for Sydney as a city of two million people".

Dr John Job Crew Bradfield passed away at his home in Gordon on the 23rd September 1943 and is buried in St. Johns Anglican Cemetery in St. Ives.

Mr Lawrence Ennis O.B.E (1872 – 1938)

Mr. Lawrence Ennis was the Director of Construction for the Sydney Harbour Bridge from 1924 to 1932.

Mr. Ennis held the position of General Manager of Dorman Long and Co Ltd. when tenders were originally called for the Sydney Harbour Bridge in November 1921.

The British companies, Sir William Arrol and Co Ltd., as well as, the Cleveland Bridge and Engineering Co Ltd., proposed to tender. However, due to the death of the Managing Director of the Cleveland Bridge and Engineering Co Ltd., this did not eventuate.

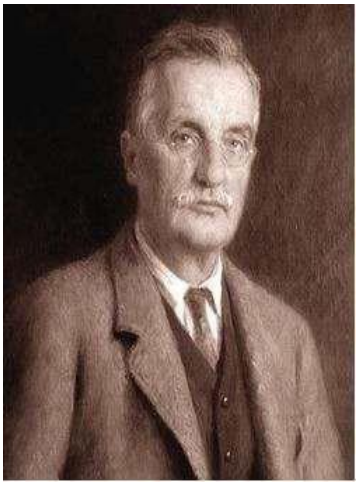
The Dorman Long and Co Ltd., now with Mr. Ennis as Director, decided to take over the work done by the Cleveland Bridge and Engineering Co Ltd. and submitted several tenders based on the designs of Sir Ralph Freeman.

Today Dorman Long and Co Ltd is a subsidiary of the Cleveland Bridge and Engineering Co Ltd.

Lawrence Ennis then travelled to Sydney to finalise details of the tenders. When one of the Dorman Long and Co Ltd. tenders was officially accepted on 24 March 1924, Ennis was appointed Director of Construction, a title he retained for the duration of the Sydney Harbour Bridge Project.

Mr. Lawrence Ennis was one of a five-man official party, who stood on top of the Arch when it was joined on 19 August, 1930. Mr. Clarence 'Clarrie' Hipwell (Superintendent of steel-work erection), Mr. Alfred Martin (Mr. Ennis' assistant), Sir Ralph Freeman and Dr
Bradfield also were on the Arch.

Sir Arthur Dorman



Sir Arthur Dorman was born in 1848 at Ashford, Kent, UK. When he was just 22 he was sent to work in an Iron foundry at Stockton on Tees in northern England, where a family relative was a partner in a steel making business. He learned the arts of the trade from the shop floor up and by 1875 was able to form a partnership with Albert de Laude Long and take over the West Marsh Ironworks in Middlesbrough, UK.

With the development of new steel-making technologies their business expanded and production and quality of product soon outstripped that of their competitors. In 1902 they merged with Bell Bros and took over the North Eastern Steel Co. By 1914 they were the largest steel producers in Britain and employed over 20,000 people.

A purpose built town, aptly named Dormanstown was built close to their Redcar works to house many of the employees. The firm became a very successful business during the First World War by supplying the vast majority of the shells that were used by the British army. By the end of the war Britain was even supplying its allies.

John Arthur Dorman was made a KBE in 1918 and a baronet in 1923 in recognition of his contributions to the nation. His son was killed in the First War and in his memory he gave the Dorman Museum to the town of Middlesbrough.

Sir Ralph Freeman (1880 – 1950)

Sir Ralph Freeman was the Design Engineer for the Sydney Harbour Bridge. Before this, he was a consulting engineer to the Cleveland Bridge and Engineering Co Ltd where he had been engaged for some years on calculations and production of designs for the proposed bridge over Sydney Harbour.

When Dorman Long and Co Ltd. took over due to the unfortunate withdrawal of the Cleveland Bridge and Engineering Co Ltd., Freeman's services were retained for the project. At the time, Freeman was a senior partner of a consulting firm called, Sir Douglas Fox and Partners. The firm later changed its name to Freeman, Fox and Partners.

It was Freeman's design, based on Dr JJC Bradfield's specifications, that was used for the construction of the Sydney Harbour Bridge. Ralph Freeman submitted no fewer than seven possible designs for Sydney. His plan for a two-hinged arch of 503 metres was eventually chosen by the State Government.

Freeman should also be remembered for his design work on the Victoria Falls Bridge (1905) over the Zambezi River in Southern Africa, the Birchenough Bridge which spans the Sava river in Zimbabwe (1935) and is a smaller replica of the Sydney Harbour Bridge, and the Furness Shipbuilding yard in the United Kingdom and the widely- publicised, Newcastle-on-Tyne Bridge which some regarded as the miniature forerunner of Sydney's Harbour Bridge.

For his works throughout England as an outstanding Bridge Designer and Engineer he received a Knighthood in 1947. His son, Ralph Freeman the Second, visited Sydney as a young man during the building of the Sydney Harbour Bridge. He later succeeded his father as a partner in the firm of Freeman and Fox and was knighted in 1970 while serving as consulting engineer to the Queen. Ralph Freeman the Second was also involved in building the Auckland Harbour Bridge in New Zealand.

The family's passion for large-scale bridge building was also passed onto his eldest son Anthony, who unfortunately died in 1997 from injuries sustained during the construction of the Vasco da Gama Bridge in Lisbon.

Thomas Tait

Thomas Tait (1882–1954) Tait was born in Paisley 1882 and was the son of a master stonemason. He was educated at the John Neilson Educational Institution, Oakshawhead, Paisley, a school which was founded by a wealthy Scottish grocer John Neilson who establish a fund to finance the education of boys who would not otherwise be able to afford an education. Tait started his apprenticeship as an architect with the Scottish company James Donald before travelling extensively in Europe where he later studied under the French engineer and watchmaker Eugene Bourdon.

Tait returned to Britain in 1905 where he settled in London and joined the architectural firm of Sir John Burnet & Partners of London and Glasgow, for which he was later to become the principal designer.

In 1914 Tait left Sir John Burnet & Partners under a cloud after being found to be 'moonlighting' by working for the rival practice of Trehearne and Norman without the knowledge of Burnet. He travelled to New York where he found employment with the American architect Don Barber.

Thomas Tait returned to London in 1915 and resumed working for Trehearne and Norman before eventually reconciling with John Burnet in 1918. Tait worked extensively in the UK, Europe, South Africa, Egypt and here in Australia. The arrival, in 1930, of the American architect Francis Lorne leads Tait into pursuing a more Modernist architectural direction.

The firm soon became one of the most influential architectural firms in the UK and in 1930 Tait became a partner in the company that was to become known as Burnet, Tait and Lorne.

Tait retired from the partnership in 1952, and the practice was taken on by his eldest son, Gordon. Thomas Tait continued his association with Burnet, Tait and Lorne in the capacity of consultant until his death in 1954 at the age of 72.

Tait became famous for, amongst other notable private buildings, the work he did on the design of war memorials. These include The Great Western Railway War Memorial in Paddington Station London, and the (now destroyed) Port Tewfik War Memorial near Suez, Egypt. These he designed in collaboration with the Yorkshire sculptor Charles Sergeant Jagger.

His design for the pylons can be seen as distinctive "city gates" of Sydney, which, for over 30 years were also among the principle elements of the skyscraper skyline of Sydney. Thomas Tait was a consultant architect to the Imperial War Graves Commission and worked extensively on the design of battlefield markers and war cemeteries in the Dardanelles, Sinai and Palestine. Along with Burnet they are perhaps best remembered for the Lone Pine Memorial at Gallipoli.

Tait's design for the pylons are easily viewed as distinctive 'city gates', a visual reminder that one is entering an important and very modern city. Tait's design is stripped classical with distinct 'art deco' overtones, thus managing to keep their shape both restrained and somewhat plain.

Bradfield had suggested in the original tender for the construction of the bridge that it could be illuminated as "a fitting tribute to our soldiers".

As James Weirick says in his article in 'Bridging Sydney' (Caroline Mackaness ed. 2006):

"The silent forms of the bridge pylons are thus part of a greater project. They stand as sentinels on the massive batters of the abutment towers – at once timeless monuments in the tradition of city walls and city gates; products of their time, as memorial markers of the British Empire; and pointers to the future, as proto-skyscrapers rising above the wharves and warehouses of the port city". (Taken from 'Bridging Sydney' by James Weirick 2007)

The visual need for the piers and pylons in not explicitly stated by Bradfield in his report, although he goes to some length to justify the extra cost of granite compared with concrete facing. Considering that the additional cost of the towers was estimated at £750,000, it is surprising that there was not more debate about their inclusion.

Symbolism

The focus on the Bridge at times of national and local celebrations keeps it in the public eye and evokes memories of the opening ceremony in 1932.

Nationally, it was seen as a symbol of modernity and industrial maturity. The maximum use of Australian materials and labour in its construction was a vital requirement during the tendering period. Built at a time when Australia relied heavily on primary export, it was evidence of the nation's growing technological prowess.

Internationally, the Bridge was seen as a great achievement at the time of worldwide economic depression. Its fame was reinforced by constant references in the British press (often portrayed as a triumph of British engineering).

The City Railway construction lasted 10 years and employed more people, but there was no pride and affection with working on the railway. The Bridge, however, gives people a sense of awe and pride, especially if they worked on it.

Expressions of the Bridge's symbolic role range from representations of the Bridge on souvenirs, in cartoons, on T-shirts, to its appearance in paintings, photography and film.

Significance

Significance of the Sydney Harbour Bridge

The Sydney Harbour Bridge (SHB) is an Australian icon recognized both domestically and internationally. It represents a rich variety of cultural and symbolic values for Sydney and the Australian community at large.

The combination of the dramatic engineering of the SHB and natural landforms of Sydney Harbour provide a memorable visual impact.

The SHB was a world class feat of engineering when it was completed in 1932 and is a major contribution to the development of Sydney's transport system. It provides evidence for social history in the technical achievements and working conditions of the 1930s, and has an ongoing importance as a focus for local and national celebration.

Historical Significance

- The Bridge is the link that promoted the development of the North Shore.

- The Bridge became the focus for political tensions as exemplified by the De Groot incident.

- It is Dr Bradfield's crowning achievement, to which he devoted more than half of his working life. The credit for the realization of the Bridge is also due to the contractors Dorman Long and to the English engineer, Sir Ralph Freeman. It was Freeman's finest bridge but his contribution was marred by the famous dispute with Bradfield over who was the designer.

- Along with the city railway system, the Sydney Harbour Bridge is the most important event in the development of Sydney's transport system and has been in continuous use for over 78 years.

- Evidence of 1920's and 1930's working conditions can still be appreciated and stand in harsh contrast to the safety standards of today.

- It was the major public work of the time, representing a substantial investment by the taxpayers of NSW.

- It was nicknamed 'The Iron Lung' as it kept so many people employed and alive during the Great Depression. The Great Depression began in 1929 and reached its peak in mid 1932 when almost thirty-two per cent of Australians were out of work.

- Prior to the 1932 opening of the Bridge there was on average 75 ferries an hour between the Southern and Northern shores. By 1904 they were carrying approximately 19 million passengers per year, reaching a peak of 47 million in 1927. After 1932 this figure fell to below 20 million.

Significance of the Structural Design

Dr J.J.C. Bradfield's design of the arch and pylons was closely based on New York's Hell Gate Bridge which was designed in 1905 by Gustav Lindenthal and built between 1912 and 1916.

The pylons were designed by the New York architect Henry Hornbostel and are considered by some to represent the classic "triumphal arch", a monument used primarily to celebrate a victory at war. The world famous Arc de Triomphe in Paris is perhaps the most famous example. The span of the SHB is, however, 205m greater in length than the American bridge and contains the heaviest steelwork of its kind ever constructed. This, as well as subsequent changes to the design and construction methods made by Dorman Long & Co, are what set the Sydney Harbour Bridge apart as an aesthetic and technical achievement.

In terms of steel arch spans, the Sydney Harbour Bridge ranks fifth in the world. The four largest are: The Chaotianmen Bridge in China at 552m, the Lupu Bridge, also in China at 550m, the New River Gorge Bridge in the USA at 518m and the Bayone Bridge, in New York at 504m (as of 2009). However its reputation as the 'World's Greatest Steel Arch', rests on its combination of span, width and load bearing capacity, as well as the difficulties which needed to be overcome during its construction.

By the time the Harbour Bridge was conceived, the heyday of the railway era was over and the motor car was the rapidly emerging, and much preferred mode of transport. Bridge designs reflected this shift away from the heavy locomotive and although spans continued to increase, lighter live loads needed to be imposed.

Significance of the Approach Spans

While the approach spans are less significant structurally than the arch, they are a vital and integral part of the Bridge, forming the connection to the shores on each side. The sweeping curve of the approach span on the north side is particularly distinctive.

It was on the northern and southern approaches that the Bridge was officially opened. The largest crowd ever seen in Sydney assembled and the now infamous De Groot 'incident' took place.

Significance of the Pylons and Abutment Towers

The granite-faced pylons and abutment towers are an important piece of Art Deco architectural design, heavily influenced by English architect, Thomas Tait. Appropriately for an engineering project, the amount of decoration is small, but there are unmistakable Art Deco influences: The use of granite with its lustre and obvious expense and the stripped appearance of the pylons paired with the zigzag pattern of the steel arch.

Sydney Harbour Bridge

Cost of the Bridge

The tender price for the construction for the Sydney Harbour Bridge was £4,217,721/11 and 10 pence. Converted into today's currency, and allowing for inflation etc, the cost of building the same bridge today would be
$2,312,553,396.15

The details of the contract

It is also customary for tenderers for major projects to include a "Schedule of Quantities and Prices" listing the costs of the many components that make up the tender submission. The value of such information can readily be seen when, as most frequently happens, additional work is needed somewhere or other on the job. This schedule title is therefore also included in the list. The Sydney Harbour Bridge schedule of quantities included twenty-eight items, adding up to 4,217,721 pounds, eleven shillings and ten pence. As might be expected, the largest single item was for the manufacture, supply, fabrication, delivery and erection of silicon steel at 1,749,215 pounds, ten shillings and sixpence. Another feature of public interest was the supply and laying of the granite for the pylons at 406,908 pounds, six shillings and eight pence.

Sydney Harbour Bridge Measurements

Heights, weights and distances of various elements of the Sydney Harbour Bridge differ immensely in reference guides and books. To ensure consistency in the BridgeClimb Experience, the following facts & figures should be utilised in your commentary.

As the Sydney Harbour Bridge was built pre-metric, all figures have been provided in imperial with an approximate metric equivalent.

LENGTH	IMPERIAL	METRIC
LENGTH OF ARCH	1,650 FT	503 M
LENGTH OF BRIDGE INCLUDING SPANS	3,770 FT	1149 M
WIDTH		
WIDTH OF DECK	159 FT AND 11¾ INCH	48.70 M
WIDTH OF ROADWAY (BRADFIELD HWY)	57 FT	17.40 M

HEIGHT

(Approx above mean level)		
Height to Top of Aircraft Beacon	458 ft	141 m
Height to Summit of Top Chord to Water	437 ft and 6 inch	133.50
Height of Rail Level Above Harbour	190.02 ft	57.90 m
Shipping Clearance at High Water	172 ft and 6 inch	52.60 m

WEIGHT

Total Weight of Steel	52,300 tons	53,140 t
Total Weight of Steel and Rivets	54,500 tons	55,373 t
Total Weight of Steel in Arch	38,000 tons	38,609 t

DISTANCES

From Summit of Top Chord to Roadway	247 ft and 6 inch	75.40 m
From Catwalk to Road	163 ft	49.70 m
Between Bottom Chords Prior to Cable Release	3ft and 6 inch	1.07 m
Between Top and Bottom Chords at Summit	60 ft	18.30 m
Height of King Posts	187 ft and 9 inch	57 m

PYLONS

Height above mean Sea Level	285 ft	89 m
Base of Each Abutment Tower	222 ft x 162 ft	67.7 m x 49.9 m

Cables

Most of the cables used for the Sydney Harbour Bridge were later employed as suspension cables on the Walter Taylor suspension bridge over the Brisbane River at Indooroopilly, Queensland. The rest of them were transported to Chipinge, Zimbabwe and used to support the roadway on an arch bridge designed by Ralph Freeman over the Save River.

The actual idea of holding the arch with cables wasn't in the original plans and only came into being in 1926; two years after tenders for construction had closed.

The Link Plates holding the cables were of forged steel, each of 9 ½ inches (24 cm) in thickness and weighed in at 33 tons each.

The 'Link Plates' or Fishtails to which the cables are attached (Figure 5, shown here) were removed and are now buried somewhere under the foreshore at Milsons point. The exact location is unknown.

Transporting the cables to Australia

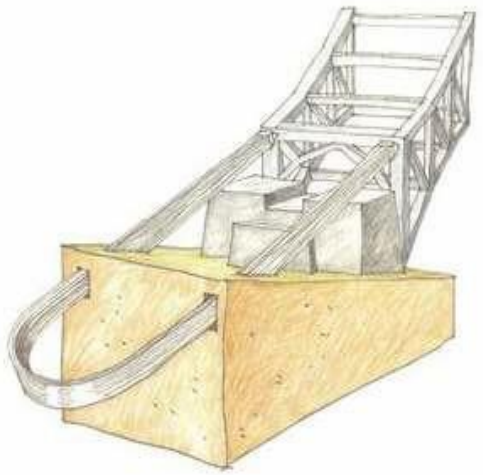
The 128 cables used in the construction of the Sydney Harbour Bridge were transported from the UK onboard the SS Newton Elm, but it wasn't all plain sailing. On Dec. 18, 1931, the vessel ran aground near Crescent Head, 180 miles north of Newcastle with a cargo which included the huge cables destined for the bridge. The ship was refloated and repaired in Sydney before returning to England.

On the 8th February 1944, the Newton Elm was requisitioned by the Ministry of War Transport and renamed Becheville, and on June 6th 1944, she sailed in the convoy 'Corncob 1', for France where she arrived off the Normandy coast on June 7th.

The Newton Elm unloading steel for the Sydney Harbour Bridge at Milsons Point Sydney Harbour

The Newton Elm (Becheville) was scuttled on June 9th and was sacrificed to form part of a breakwater for a 'Mulberry Harbour' on the coast of Normandy. The specific breakwater was 'Gooseberry 5', located off Sword Beach, at Ouisttreham, Normandy.

	IMPERIAL	METRIC
NUMBER OF CABLES:	128 ON NORTH & SOUTH	
NUMBER OF WIRES:	217 WIRES PER CABLE	
DIAMETER PER CABLE:	2 ¾ IN	70 MM
LENGTH PER CABLE:	1,200 FT	366M
END TO END THE CABLES WOULD STRETCH FOR:	60 MILES	96.5 KM
WEIGHT PER CABLE:	8.5 TONS	8.6 T
TOTAL WEIGHT OF CABLES:	200 TONS	
LOAD TEST (EACH CABLE WAS TESTED TO FAILURE AT):	460 TONS	
ACTUAL PULL ON EACH CABLE (ESTIMATED):	110 TONS	
ANCHORAGE TUNNELS	25 X 6 FT X 132 FT DEEP 45° ANGLE	7.7 X 1.8M X 40 M DEEP 45° ANGLE

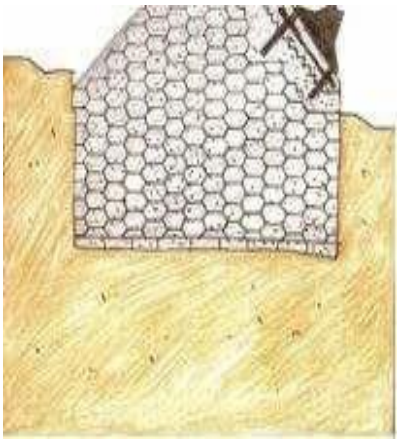


The u-shaped arrangement of the 128 tie-back cables buried underground.

Skewbacks

Excavations for the skewbacks were 40ft wide by 90ft long and to a depth from 30ft to 40ft (12.2 m by 27.4m by 9.1mts to 12.2m) and cover an area of 504 square feet (47 square metres). Exploratory holes were then drilled to a depth of 75ft (23 metres). The initial angle of construction was set at 30°.

The concrete is steel reinforced and sets at 28 days with a strength rating of 430 tons per square foot and is poured in hexagonal sections. The pressure transmitted through the skewbacks amounts to 800,000lbs per square inch, and through them into the rock foundations at a pressure of 15 tons per square foot.



The above Diagram illustrates the hexagonal formation of the concrete in the foundations (skewbacks) under the Abutment Towers.

Bearings

	Imperial	Metric
Each main bearing weighs:	296 tons	300 t
Each main pin base area:	21 ft x 24 ft	6.4 m x 7.3 m
Each main pin diameter:	14.5 in	368 mm
Each main pin length:	13 ft and 8 in	4.2 m
Weight of each pin:	300 tons	
Weight of each live thrust:	19,700 tons (or 13 tons per sq ft)	

The bearing pins are the only major piece of steelwork on the bridge not produced by Dorman Long & Co. They were manufactured by the Darlington Forge Company of Darlington England.

There are 24 holding down bolts on each bearing pin. Each bolt is 4.5 inches in diameter (11.75 cm).

Constructions

Coffer dams were erected to ensure no water seepage into the foundations. The foundations for the bearing pins were only 50ft (15m) from waters edge.

The Road Decking

	IMPERIAL	METRIC
Total length of road decking:	3,770 ft	1,149 m
Total length of decking on bridge:	502.92 m	
Highest point of road deck:	172 ft	52.42 m
Highest point of road deck above foreshore:	160 ft	48.76 m
Total rise over the length f the arch (centre)	12 ft	3.65 m
Width of decking – approach spans	160 ft	45.72 m
Width of decking – bridge	150 ft	48.76 m

Creeper Cranes

The original creeper cranes, as seen in the photo above, comprise of the main jib, which has a lifting capacity of 122 tons and in front of this was a 'walking crane' and behind were two derrick cranes, or 'jiggers', each with a lifting capacity of 2.5 tons. The main jib was for hoisting the steelwork and the two jiggers were used for positioning or canting the steel into place.

The cost of each creeper crane was more than £45,000 when purchased in England and about £50,000 by the time they were erected on the bridge, and they weighed approximately 565 tons each.

The creeper cranes were supplied by Wellman Smith and Owen Engineering Corporation of Darlaston UK. The

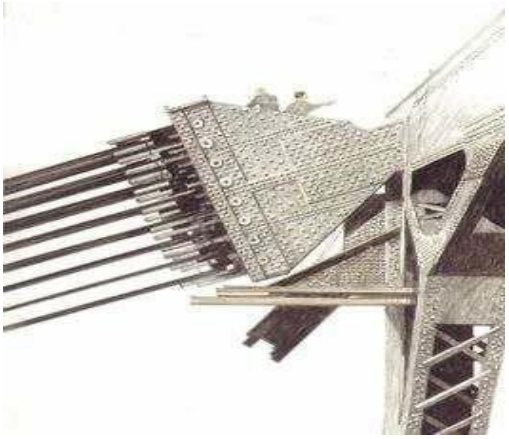
first creeper crane was erected on Southern side in October 1928.

The creeper crane driver never actually saw the bridge he was building from the crane he controlled and had to rely solely on telephone communications to guide him as he positioned the massive steel sections. A special chest telephone harness was designed to enable the driver to relay and receive messages at the same time a driving the crane.

Each section of the bridge was advance by 60 ft (18m) with each lift. The

heaviest single lift achieved by a creeper crane was 114 tons.

A creeper crane used during construction of the Sydney Harbour Bridge. These cranes were purpose built by Wellman Smith Owen Engineering Corporation Ltd of Darlaston, Staffordshire UK.Lighting on the Sydney Harbour Bridge



The 128 tie-back cable assembly attached to the Bridge at the top of the King Posts.

Construction

The Steelwork

The bridge is made up of approximately 550,000 individual pieces of steel.

Below is a rough break-up of where the different types of steel were used and why. As we walk around the climb routes, especially the lower arch, the logos of BHP and Dorman, Long & Co. are clearly visible, as they are embossed on the steel.

Silicon steel:	Chords, Hangers, trusses (beams that connect upper and lower chords), Lower chord transverses ('laterals')
Carbon steel:	All deck structures bearings, approach Spans, upper chord transverses ('laterals').

140 tons of the bearing pins are forged steel.

Mixed steel on the arches:

Silicon steel has been used for 'flanges', while carbon used for 'webs' and angles', (see figure 6). The BHP logo is easy to see on many diagonals of the upper and lower arch.

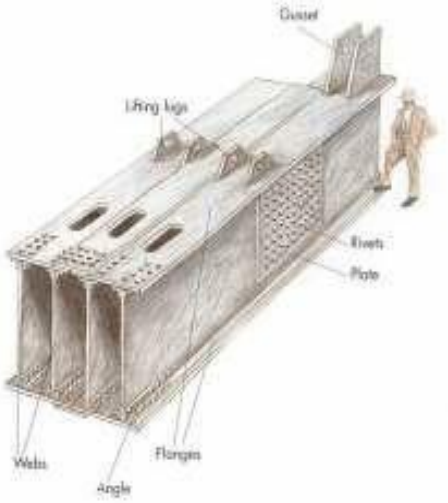
Also the diagonal cross girders which span the arch between the east and west chords are a mixture of both Silicon and Carbon steels.

The basic reason for choosing a type of steel was determined by the strength required in certain sections. Silicon had a tensile* strength about 30% greater than Carbon although estimated to be about 25% more expensive. Carbon could have been used everywhere if used in greater amounts but this would have added huge material and erection costs.

* Tensile strength refers to the ability of an object to resist deforming or breaking under tension (stretching).

Tensile strength of Silicon and Carbon

Silicon steel tensile breaking strength up to 42.3 tons / sq inch
Carbon steel tensile breaking strength up to 32.2 tons / sq inch



Where did the Steel come from?

BHP (Broken Hill Proprietary Co.) supplied the carbon steel from steelworks located in Newcastle, NSW, their first Australian workshops which opened in 1915.

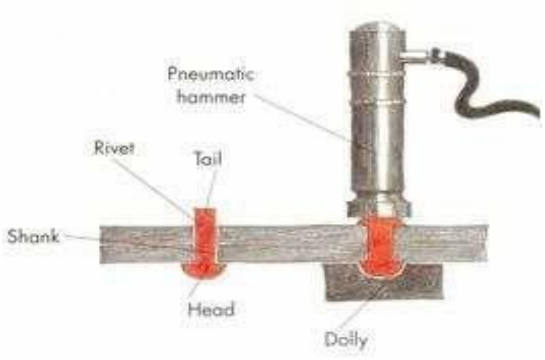
Dorman, Long and Co. Ltd workshops at Middlesbrough, North Eastern England, supplied some carbon and all the silicon steel. In the tendering process, this company proposed one of the highest usages of BHP steel where possible and they were one of only two tenders that proposed fabricating the whole of the metal work at Milson's Point. Therefore, the bridge would still be an Australian bridge.

Another factor considered in selecting Dorman, Long and Co was that they were a British company. It was thought only fitting that they be involved in the construction of the greatest bridge in the Commonwealth.

Dorman, Long and Co was also a world renowned steel maker. Ralph Freeman was a consultant to Cleveland Bridge and Engineering Company, a competitor nearby which Bradfield had visited. The sudden death of the Chairman of the Cleveland Bridge Company forced the withdrawal of their tender and Freeman was given permission to take his designs to Dorman, Long and Co.

Cleveland Bridge and Dorman, Long and Co merged into a single organization in 1990, The Cleveland Group. This company was recently involved with the construction of the steel supporting arch for the new Wembley Football Stadium in London.

Rivets



Between 5 and 6 million rivets were utilized during the construction of the Sydney Harbour Bridge (SHB), making it one of the largest riveted steel structures in the world. Of all the rivets used, exactly 101,559 rivets were cut out during the construction as a result of being faulty or loose fitting. The longest rivet was 16 inches (approx 395mm) and the heaviest was 6.5lbs (2.94835kg). The total weight of the rivets used is estimated to be in the region of 3,200 tons. 2,500 tons of rivets were installed in the workshops at Milson's Point whilst the remaining 700 tons were installed in situ as the steel sections were joined together.

Most reference to the manufacture of the rivets for the Sydney Harbour Bridge seem to indicate they were made by McPherson's Pty Ltd of Melbourne, a claim they also make on their website, however there is also another claim. The British company Park Bridge Iron Works of Ashton under Lyme can also be found in some reference material as being responsible for the manufacture of the rivets. This claim is still under investigation due to the company going out of business in 1963 and subsequent records difficult to source.

There has been some question of the rivets being made in Czechoslovakia, however no written reference can be found to this effect. It remains a mystery where this suggestion originated. A Czech Urban Myth?

As with the design of the bridge, meticulous preparation also went into the design and manufacture of the rivets. Never had rivets been used in such numbers and size and for a mammoth bridge building project, anywhere in the world. In truth, the rivets used in the construction of the Sydney Harbour Bridge were new, in that never have rivets been subjected to the controls over their manufacture as these. The nature of the extensive testing of the rivets was to determine their ductility. Ductility is an engineering term applied to solids, in particular metals, and refers to their capability of being drawn out into wire, threads, or even pressed flat……without cracking.

A piece of the rivet shank was cut off and great pressure was placed on each end until it was pressed completely flat. And not the faintest of cracks were detected. Not satisfied with this, the same machine was used to press the same piece of metal flat by pressing the already flat piece from either side. Again, no cracks were detected. This then is the ductility of the metal rivets used in the construction of the Sydney Harbour Bridge.

Rivets and Not Welding

Why rivets and not a welded bridge? Although welding had been invented as far back as the 1830's, it was still very much in its infancy with respect to large structural steelwork frames.

Progress was slow in the development of electric welding techniques, and it wasn't until 1934 that the British government licensed its use in major building structures, however many engineers were still reluctant to risk their reputations on such new technologies. The savings to be had over traditional rivets were thought to be minimal given the extra amount of detail required by engineers and designers before their projects were given the go ahead.

There are many accounts of 'firsts' in welded structures, and especially bridges, however most of these were of such small scale that they were considered as insignificant as far as major structures were concerned.

In 1931 a small gantry of welded steelwork was built for the LNER (The London & North Eastern Railway) in Darlington UK. It only contained 79 tons of steel and it is reasonable to assume that it was an experiment for this new form of construction. It wasn't until 1938 that fully welded structures were accepted by the major institutions in the UK, and welding as opposed to rivets in all forms of engineering from shipbuilding to bridge construction was fully embraced by the outbreak of WWII in 1939.

Approach Spans

Both approach spans were built between 1927 and 1928 with the Southern approach span the first to be completed in 1927.

The five sections of the approach spans on either side of the harbour are constructed in the Warren truss design and each weighs approximately 1,200 tons (1,219 tonnes). Though constructed using mild (carbon) steel, not as strong as the silicon steel used for the arch, it is however, more than capable of carrying the loads required.

The southern approach span consists of five carbon steel spans in a straight line, ascending on a grade of 1 in 40 leading to the main arch span. The first span is the longest at 72.5 m, designed to clear George Street, and the other four spans are each 53 m long.

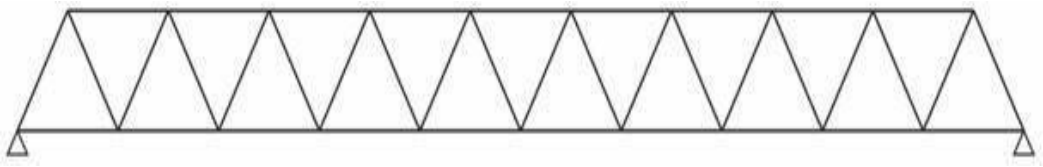
Each truss is supported by a granite faced concrete pier measuring 5.2 x 4.3 m at the cap.

The tallest pier is 34.4 m from the cap to the bedrock and the north approach main span has a curve of 1,423ft (433.7m) radius.

The combined length of the approach spans is 646 metres.

Warren Truss Design

Truss designed bridges are one of the oldest forms of modern bridge design and are composed Park Bridge Iron Works of Ashton under Lyme of connected elements (typically straight) which may be stressed from tension, compression, or in some cases, both, in response to dynamic live loads. As is the case of the Sydney Harbour Bridge (SHB). Because the truss design is an effective and efficient use of steel it is therefore an economical way in which to build bridges.



Warren Truss design which was patented in 1848 by its designers.

The SHB approach spans are of a particular type of truss design called a Warren Truss. There are

some 28 other truss designs including Allan truss and Brunel truss.

The Warren truss was patented in 1848 by its designers, British engineers James Warren and Willoughby Theobald Monzani.

The main feature of the Warren truss design is in that it consists of longitudinal members joined only by angled cross-members. These then form alternately inverted equilateral triangle-shaped spaces along its entire length. It is this shape which ensures that no individual strut, beam, or tie is subject to bending, or torsional straining forces, but only to tension or compression. This configuration combines strength with economy of materials and can therefore be made relatively light.

The Warren truss design has been in use since the early 1900's in the building of aircraft, especially the fuselages and the Interplane wing strut layout of early biplanes such as the Italian First World War Ansaldo SVA.

Warren truss designs were used in building aircrafts such as the Italian First World War aircraft Ansaldo SVA

How was the arch joined?

Once the Lower Chord steel work had been completed, guiding pins were mounted on each of the southern half arches. Corresponding mounts with a square hole were constructed on the northern half arches to guide them home. The tie-back cables could now be loosened.

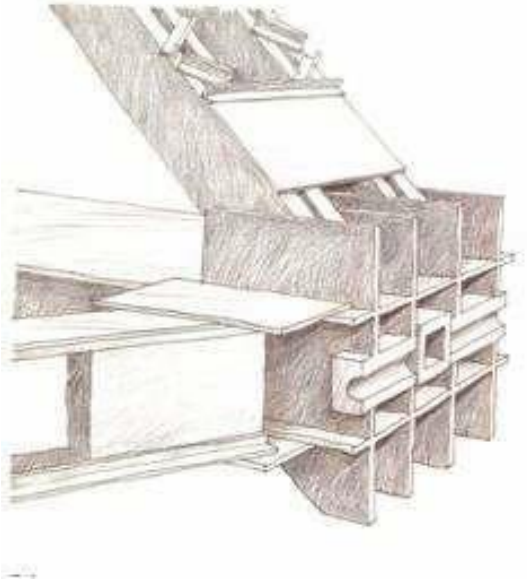
On the 19th of August 1930 at 11am the gap between the arches was only 114mm on the east and 120mm on the west. The tie-back cables continued to be loosened. At 4:15pm the arches touched, however as the steels cooled with the setting sun it contracted and the arch drew apart again. Over the next 5 hours the cables continued to be loosened. Finally at 10pm the temperature was an even 62°Fahrenheit (16.6° C) across the entire bridge and the arches touched again. The Sydney Harbour Bridge was now a 3 pin structure with the centre guiding pins acting like a pinned joint as the steel work expanded and contracted during the next few days.

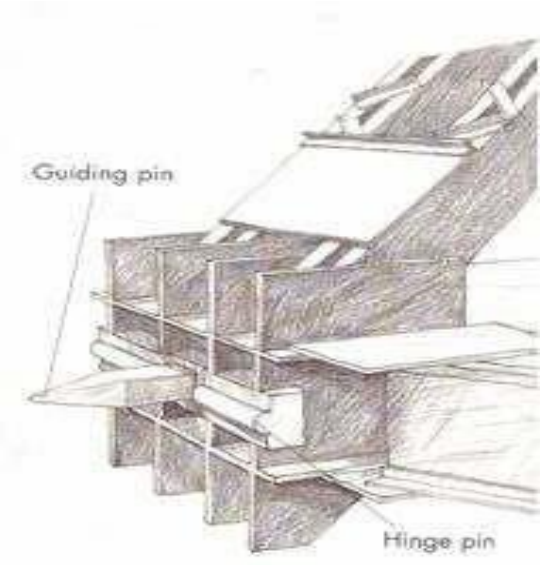
The steel work on the Upper Chord could now be completed. A gap was left in the Upper Chord on the eastern and the western sides. During this process the Lower Chord was supporting the entire load of the bridge. The ends of the Upper Cords were then supported by vertical half-members from the Lower Chord.

Large hydraulic jacks were inserted into the Upper Chord gaps. Applying forces of 8400 tons, the jacks pushed the arches apart again. The guiding pin apparatus was removed and the jacks slowly closed. Permanent steel packers were placed in the gaps on the Lower Chord.

Permanent steel packers also replaced the jacks as they were removed from the Upper Chord. Both arches could now be riveted together. The structure was now in its final design state, a 2-pin structure with pin supports only at the shore bases.

The remaining steel work was installed and the arch was complete. Work then began on erecting the hangers and the road deck.





The mating half of the Guiding pin apparatus.

Joining the Arch

Mr Ennis often told the tale of the joining of the Arch at speaking engagements down the years.

“There were only five men up there in the darkness when the actual closure took place – our Chief Erector, Mr Hipwell, my assistant, Mr Alfred Martin, Mr Freeman, Dr Bradfield and myself.”

"When we realised what had just taken place we were so overawed with the mightiness of it all that we did not speak – I for one could not – and I think each was conscious of the feeling of the other. The silence to me was most impressive, and when I could trust myself to speak I broke the silence saying, ‘Well boys thank God she is home.’

"Next morning, when the Union Jack and the Australian Flag were unfurled to denote the arch was closed; someone began to sing, ‘God Save the King’ and the workmen, mainly ex-servicemen, sprang to attention and saluted the flags. I will never forget the moment as long as I live.”

But Tom Ovary was a Boilermakers apprentice, with a different view of history;

“There were two cranes and they were just almost together… and we got picked up right on top of the crane… and came right down on the other side.”

Interviewer: “So you would have actually got across the Harbour before Mr Ennis crossed?” “Yes that’s for sure….Yes we beat him (chuckling)”.

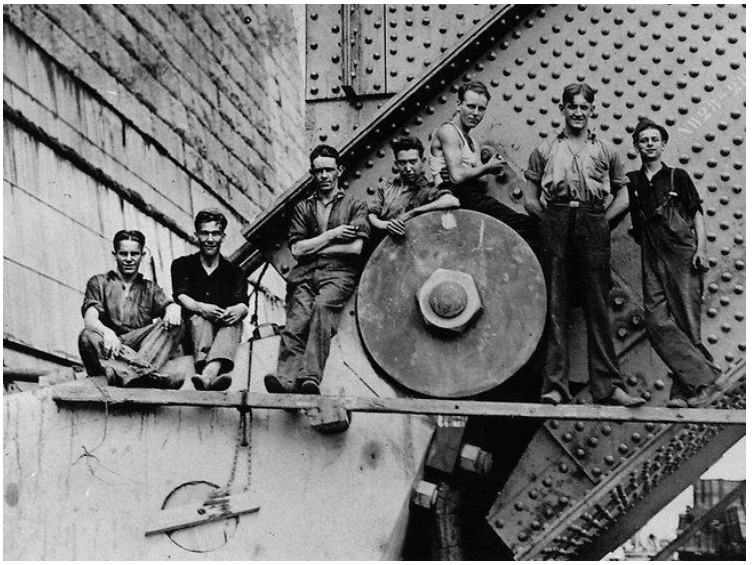
What they said…

Bill Brindle was Assistant to the Public Works Photographer and had an overview of the whole project: “If you talk about human relationships, my experience of the Harbour Bridge was always that I’ve never worked with a more honest, hardworking crowd who were dedicated to their jobs. Their relationships with each other were to my mind excellent. I think that they knew that they were battling against the elements and against all the engineering problems to get this thing across and it gave them more or less a common cause.”

Lawrence Ennis in the official souvenir program (pp 48-49) wrote; “I wish to pay tribute to the men we engaged on the work. I must admit that when I first came to Australia I had doubts as to whether we could obtain the men with sufficient experience to carry out the work with the high standard of accuracy that was required. My doubts were soon dispelled. The Australian workmen proved to be as good as tradesman as any that I have had the experience with in Britain or America. They gave us of their very best, and the successful completion of the work could never have been attained without their whole-hearted co-operation.”

Bradfield himself came from a working class background and never forgot it. His regard for his workers is captured in advice he gave to one of his engineers, Frank Litchfield, before sending him out for the first time on fieldwork surveying city railway tunnels.

"You'll be down amongst the tunnellers working in muddy and hazardous conditions. The language can be a bit blue and usually revolves around beer, women and horses. Take no notice of this. With few exceptions they are decent family men. If you show them respect they will do anything willingly for you; but if you try and boss them around you will get nowhere and neither will the job."

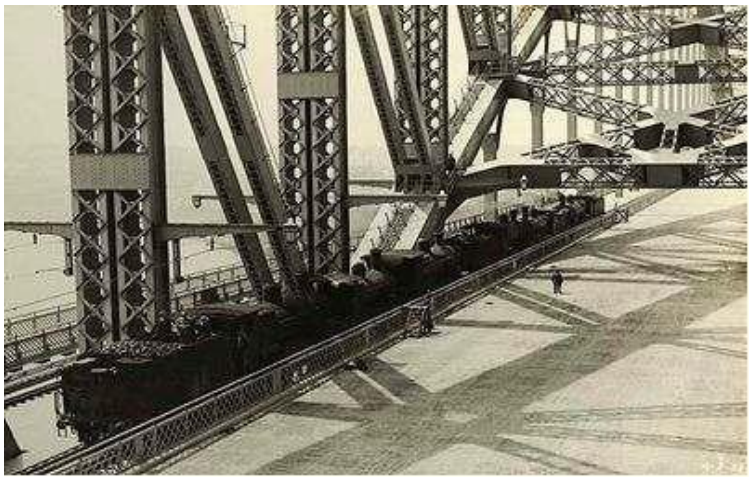


Bradfield was known by those who worked under him as a hard task master. But it was his view that you hired good men and paid them a decent living. His views of the Bridge Workers were well known at the time and often quoted: "The Bridge Workers are wonderful men. They earn every penny of their pay. Australia should be proud of them."

Whilst the arches were being joined in Sydney, 17,000 kms away another Australian celebration was underway in London as Sir Donald Bradman reached 130 runs against England in the Ashes. This would help Australia go on to win the Test 2-1 and Bradman would be remembered for his 334 runs at Headingley.

Load Testing the Sydney Harbour Bridge

The Bridge was originally designed to carry four rail lanes, (two train lines, two tram lines) six road lanes and two pedestrian walkways.



Its total capacity at the time was estimated at 160 trains per hour, 12,000 vehicles per hour (based on a vehicle speed of between 15 and 20 mph) and 40,000 pedestrians per hour. The designed loading allows for totally congested road, rail and footways.

There can have been little doubt in anyone's mind about the strength of the Sydney Harbour Bridge and its ability to do the job for which it was designed. But the conscientious and meticulous Dr. (J.J.C) Bradfield had still arranged a series of punishing tests for the structure.

In January and February of 1932, the Bridge was load tested. 96 steam locomotives, each weighing 7.6 tonnes, and 48 tenders were shunted onto the Bridge in various configurations. First, one side was loaded up and then the other; next one end, then the other. Loads were concentrated on the critical 'quarter points' of the span; and many other arrangements were tried.

Of the 96 locomotives used very few of them were 'live', that is "in steam", in fact most were 'dead' engines which had been retired in large part due to the depression, and hauled in from Hornsby especially for the job of load testing. A couple of engines, however, a Z.19-class 0-6-0 tender loco and two D.50-class 2-8-0 tender locos were in steam and their additional weight brought the total 'live load' test to more than 8,200 tons.

Load Testing

Freeman and Ennis later complained that Bradfield had actually overloaded the Bridge by 20 per cent during this process. Thousands of measurements were taken over a three-week period to check the deflection or deformation of the Bridge under these severe strains.

The allowable deflection under maximum load for the Sydney Harbour Bridge was 4" (10.6 cm), which Freeman had worked out from his office in London for a bridge he had not seen for some 18 months. When measured under full stress it was discovered that the actual deflection was to within an amazing ⅛" of Freeman's estimate.

After the three-week testing period the Bridge was declared to have "passed with flying colours" – conforming with every one of the designers' and builders' expectations.

Steam locomotives waiting at North Sydney Station.

Despite the lack of safety equipment back in the 1930's there was still a great deal of concern when it was decided to test load the bridge with 'live' steam engines, after all the railway tracks, including those laid especially for the occasion on the eastern side of the bridge, were supported by wooden sleepers. The risk of fire was a real one.

It was decided therefore that all the live engines were to drop their fires on a bed of galvanised steel just outside North Sydney station, thereby having enough steam to get them onto the bridge and back without risking sparks falling from the engines.

The Railway Sleepers

The wooden sleepers are reported to have come from two different places, however the common denominator between the two is the name Allen Taylor. Allen Taylor was born in Wagga Wagga, New South Wales, in 1864. He became a timber and shipping agent early in 1892, running his business from his home in the Sydney suburb of Annandale until 1895. By 1895 the business had grown enough for him to open an office in Union Street, Pyrmont.

Taylor became an alderman with Annandale Council in 1894. In 1902 he was elected to the Sydney City Council as the alderman for Pyrmont Ward. He served continuously for ten years and as Lord Mayor of Sydney for six years and was knighted for his contribution to civic affairs in 1911. Taylor Square was named in his honour, and he is credited with bringing many improvements to the Sydney metropolitan area.

Allen Taylor and Co had links to the Bulahdelah and Myall Lakes National Park (an hours drive from Newcastle) area where it is also suggested that timber was sought for the sleepers, using the historic Wootton Railway, built by Taylor, tin the early 1990's, to haul timber from the forests west of Wootton down to the Myall Lakes for transport to Sydney. These timbers are also reported to have been used in the construction of Melbourne docks.

Records, however seem to show that the majority of the timber for the railways was sourced from in the Milton district, in the Shoalhaven on the South Coast of New South Wales and was considered by many at the time to have been the best of its kind in the world.

In all a total of 37,000 super feet (approx 11,300 m) of Iron- bark sleepers to be used In the main decking of the Sydney Harbour Bridge. A super foot in simple terms is 1ft x 1ft x 1 inch, which was the standard measurement of timer in Australia and New Zealand at the time.

On 6th July 1933 the New Zealand government also commissioned 40 local men from Milton to cut and additional 40,000 sleepers for the New Zealand railways.

As both Milton and Bulahdelah lay claim to supplying the timber for the sleepers it may well be that both played a part, however further research may be required in order to settle the matter once and for all.

The Workers On the Sydney Harbour Bridge

The Number of Workers on the Sydney Harbour Bridge

Below is the approximate number of men working directly on the project including the arch, approaches, workshops and quarry for each year:

Year ending 30th June 1926	=	not found
Year ending 30th June 1927	=	1,250
Year ending 30th June 1928	=	1,450
Year ending 30th June 1929	=	1,650
Year ending 30th June 1930	=	1,654* Year
ending 30th June 1931	=	1,509* Year
ending 30th June 1932	=	not found

* Actual numbers

The builders, Dorman, Long & Co. were chosen by John Bradfield partly because they specified in their quote that:

- The bridge will be fabricated wholly at Milson's Point, Sydney, by Australian workmen
- The piers and abutments will be constructed of Moruya granite, Nepean River sand and NSW cement
- The bridge will be erected by Australian labour (Not all the labour necessary for construction was available in Australia so about 20 key staff were sent out from Britain and approximately 90 stonemasons and other granite workers were sent from Scotland and Italy.).
- Work at night or on Sundays was not allowed, except in the case of an emergency or under special orders from the Engineer or Architect.

Working Hours

Working hours per week started at 48 but were reduced to 44 as economic conditions worsened. To absorb some of the large number of unemployed, the hours were further reduced to 35 1/5 per man per week, working over four days. This allowed additional men to be employed to maintain construction over a full five day week. The hours were reduced again to 33 per man per week in January 1931. In April of that year, to offset against lost time due to wet weather, the hours were returned to 35 1/5 per man per week.

At the peak of the production of steelwork in 1929, the fabricating workshops needed to expand the shifts from one per day to three. The average number of men employed on the first shift was 420, on the second shift 150 and on the third, 40.

Characters During Construction

That we have a bridge to cross our Harbour is due to the workers who built it, as much as the architects, politicians or engineers. We can only imagine what life must have been like as a worker on the Bridge and the extraordinary camaraderie they must have experienced, the sense of making history, the enormous pride in conquering the elements and the many challenges they must have faced.

The following are interviews that endeavour to give us a first-hand sense of what it was like to construct one of the most challenging engineering feats in Australian history.

The First Day on the Job

Historians have recorded that all those that laboured on the Bridge 'were caught up in the sheer size and daring of the job'. Jack Rue, a boilermaker's apprentice on the Bridge, recalls, "When you look back at it, they were bloody hard days – in comparison to what you get to do today. But I wouldn't have swapped the experience for quids. It was the biggest job ever, not only in Sydney, but in Australia; and at that time it was one of the engineering wonders of the world".

Hugh Dunn, who was employed as a Riveter on the arch, remembers his first day: "Well, I'll say this much, it was as good a job as I've ever been on; they were wonderful, the staging's were beautiful, suited you lovely, and I was very happy to work on the Bridge. But there was one thing that struck me very funny, I always think about it too. When I got the job first, I got the squad together and the tools and by this time the panel of the arch was out six panels and I got on the launch and they took us out to what they called the 'working punt'. The cage came down, we got the gear in the cage and up we went and as we went up, the Sydney ferries were getting smaller and smaller and I thought, 'Christ, I'll never work on this job'. But as soon as I stepped on the chord I lost my fear and I had no more fear from that day on."

Tom Tomrop, one of a select group of twelve Steel Erectors, who along with the crane drivers erected the Bridge, reckoned: "To build the creeper cranes was one of the hardest jobs I've ever been on in all my life. You had to hang on by your eyelashes you know, and you know, tricky, you couldn't stand up there, you had to hang on. A mate of mine asked me; 'I wonder if I could get a job there (he's right down and out)'. I said, 'You'll have to see the boss. You see that fellow Ben Tucker…' Anyway, he got a job and he only stuck to it about three hours and he left himself. He'd rather be on the dole than be on a creeper crane…"

A Photo Taken by Tom Tomrop

Conditions inside the Chords

George Everndon, a holder up on the arch, remembers life inside the Bridge. "It was deafening and practically no lighting at all and as I just told you before like, I used to stand on the heads of the rivets to try and get a balance to hold the rivet in firm position and sort of… sometimes we'd have a bit of staging, but mostly we had to find our own footing. We had to wear leather gloves there to stop the sparks and that flying off the rivets and the scale that would come off the rivets like, after you put them in. There was always like, when you turned the pneumatic riveter on the machine on, the sparks used to fly and I'd often have burns on my neck and arms sort of thing…"

Cookers and Catchers

Vera Lawson worked in Dorman Longs' office at Dawes Point as a comptometer operator, but sometimes her boss took her out to see the workers: "I saw the rivet cookers throwing the almost-white-hot-rivets. They flew like sparklers through the air, shedding burning scale everywhere, before landing in the catcher's bucket. Sometimes the burning hot scale got down inside the men's boots. Not being able to get their boots off quick enough, they rushed for the nearest water bucket. Up in the chords of the arch it was worse. Mostly there was nowhere to stand a bucket. That caused quite a few claims for compensation. I know. I had to fill in the forms."

Vincent Kelly

Jack Rue remembered: "A bloke called Kelly fell 150 feet[4] off the deck of the Bridge into the water and survived with only two broken ribs. When they got him out, his boots were split right open and were up round his thighs. They gave him a gold watch."

Dave Irvine was a Riveter. He wrote to Dorman Long in England, was offered a job in 1926 and claims to have been the 'first Riveter on the job' – working there for 5½ years. "I remember the day Kelly fell. He and Mo Moore, another Riveter, were very good mates on the job, but, both being very good divers and swimmers, there was jealousy there. Anyway, Kelly fell, feet first, and Moore had to be restrained from jumping in to save him. Kelly was back at work in two weeks. He got a watch from Dorman Long and a medal – I don't know who gave him that."

Vincent Kelly

A Riveter named Vincent (Ned) Kelly was the only man known to have survived a fall from the Bridge into the Harbour during construction. Jack Rue remembered, "A bloke called Kelly fell 150 feet (he actually fell 182 ft. ed.) off the deck of the Bridge into the water and survived with only two broken ribs. When they got him out his boots were split right open and were up around his thighs. He was presented with a gold watch for his troubles".

Kelly was working on a girder under deck level, 182 feet above the water, when his drill broke, upsetting his balance. Clutching the compression air hose, he hurtled down but throughout the fall Kelly did not lose consciousness or presence of mind. Realising he would hit the water; he covered his ears and eyes with his hands and managed to fall feet first.

Dave Irvine was a Riveter. He wrote to Dorman Long in England, was offered a job in 1926 and claims to have been the "first Riveter on the job". Having worked on the project for 5½ years, Irvine stated; "I remember the day Kelly fell. He and Mo Moore, another Riveter, were very good mates on the job, but both being very good divers and swimmers there was always that little bit of jealousy. Anyway Kelly fell, feet first, and Moore had to be restrained from jumping in to save him. Kelly was back at work in two weeks. He got a watch from Dorman Long and a medal. I don't know who gave him that".

Sydney Harbour is approximately 10m deep where Kelly fell, but he came up swimming to be picked up by a passing launch. Kelly broke three ribs in the fall and was severely shocked but was back at work in a few weeks.

It is reported widely that Kelly was a member of the Balmain Amateur Swimming Club, which may have a bearing on his survival from such a fall. The Balmain Amateur Swimming Club was formed in 1884 and was one of the first of many such clubs formed in the Sydney suburbs.

The medal Vincent Kelly received was given to him by Lawrence Ennis (Director of Construction). Vincent

died in 1982, aged in his eighties.

Moruya

Reg Saunders was an apprentice stonemason; "There were 40,000 stones on the pylons and piers. I was an apprentice and it took me a fortnight to complete one, but the qualified men would have races to see who was the quickest. One week would be the average time a mason would take to finish a stone. A man, Zealo, gloried in beating his workmates at finishing a stone."
There were actually 173,000 blocks used on the pylons and piers.

Toilet Habits on the Arch

Jo Wheeler was a dedicated crane driver; he took his place in the crane and didn't leave it until 5 o'clock. He did all his own firing, throwing coal into the furnace, it was a steam crane. This involved using a square-mouthed shovel of course, along with the shovelling of the coal into the furnace, Wheeler used to also use this shovel as a means of easing himself, because the lavatory was some considerable distance. This was a very handy tool, because as well as using it for the firing of the crane and Jo's movements, he also used to use it for frying sausages.

Life in the Workshops

February of 1927 found Charles Brown, 15 years old, working as an apprentice Boilermaker on the Bridge.

Brown's starting wage was under a pound a week, and for that he remembers: "You came to work in your overalls and found a nail or a bolt to hang your coat on. Morning tea was unthought-of officially. In the winter you could light a fire in a kerosene tin; and if the shop foreman, Alf Muttit, or the Manager Henry Martin weren't around, you might boil a billy; but if they came around you had to kick it over before they saw it".

"There was no washing time in those days. There were a few cold water taps that were used to hose down the dirt floor to stop the dust coming up. If you wanted to wash after finishing you used the cold tap or a bucket."

"You got no annual leave and had to be off at least three days to qualify for compensation. The union meetings were run by a giant of an Irish blacksmith called Reardon. Colin Tannock, head of the Ironworkers Union, was a very volatile speaker and he and Reardon made for an entertaining meeting. It was an education in unionism."

But put 1,400 men out in the open air, get them building 'the biggest job ever', aim it at a point in space 300 feet above the Harbour and there's bound to be some fun. "We apprentices used to dive off the wharf into the Harbour for a swim during the half-hour lunch break in the summer, or sneak through the hole in the fence down to the Lavender Bay baths. During the lunchtime, Frenchy and another fellow used to have the Crown and Anchor boards out. Sometimes, I'd lose my tram fare home. I'd have to scale it round and round the outside of the tram, pursued by the conductor!"

Dogmen and Tin Hares (Steel Erectors)

During the eight years it took to build the Bridge, there were between 1,200 and 1,400 workers on the structure at any one time.

The Great Depression was challenging to most in Sydney and making a living was at the forefront of most peoples' minds. The obviously dangerous working conditions, which included working at heights up to 140 metres without a 'safety net', didn't deter the workers who needed to provide meals for themselves and their families.

Two of the most dangerous jobs were performed by Dogmen and Steel Erectors (dubbed Tin Hares).

Dogmen helped coordinate the hoisting of loads up to the top of the Bridge by communicating with the crane drivers by telephone (i.e. left, up, right, etc). The quickest way to the top was to ride up with the load so they could coordinate the delivery. Once new steel sections had been delivered by the Dogmen, they were greeted by the Tin Hares.

Dogmen were not limited to just the Bridge site, as there were many cranes in Moruya, where the granite blocks were quarried and shaped.

Henry Waters, aged 50, died when working as a Dogman in Moruya.

Curiously, out of approximately 150 Riggers, there were only 12 Tin Hares. Six were positioned on each end of the arch, their job was to jockey each steel piece into position. They would fasten each piece into position, tightening the sections into place with nuts and bolts and check that the angles were correct before any riveting could take place. "There was nowhere to stand" said Harry Tomthrop, one of the most experienced Tin Hares. "We were hanging on by our eyelashes."

Harry was a strong Union man who had worked on skyscrapers in New York. Harry gave evidence at the NSW Arbitration Commission in the hope of getting danger money. The judge that was presiding over the case was (ironically) named, Judge Swindell. He came to the site one day to investigate and apparently walked out on the Arch, took an uneasy look down and said, "Give 'em what they want." They won the case!

Certain skills were paid at a higher rate, for example the creeper crane drivers were regarded as technical or engineering staff and earned £1,000 per year, a remarkable sum for the times. A carpenter earned on average
£7-15 shillings a week, a concreter on a four day week would earn £4 per week. An average council worker, if you were lucky enough to have a job at the time would earn approximately £4-10shillings a week.

While there was a little extra money in their pockets, there was still no extra safety equipment. Many of the men suffered hearing loss later in life due to excessive construction noise.

Working Conditions

The building of the Sydney Harbour Bridge was a very dangerous occupation. There were no safety rails or nets, little or no scaffolding and no helmets – all basic safety features that we now take for granted.

Dorman Long and Co Ltd. General Manager, Mr Lawrence Ennis once said, "Every day those men went up on to the Bridge, they went… not knowing whether they would come down alive or not".

But the men seemed proud of their ability to work with these conditions, and their safety record for the project was commendable considering the circumstances. Altogether 16 men lost their lives, 13 of which were employees of Dorman Long and 3 were Public Works Department employees; a phenomenal statistic compared to the 56 people that died building the Forth Rail Bridge in Scotland or the 139 fatalities that occurred on the Brooklyn Bridge in the USA (both constructed during the 1880s). More recently 121 people were killed during the construction of the Snowy Mountains Scheme during the 1950s and 1960s.

The 16 Men

On the Bridge – 3 Deaths

Sydney Edward Addison, 25, married, Boilermaker's Assistant (1905 – 1930)

Fell from the arch 6th March 1930, when his long-handled spanner slipped as he was bolting up for the riveters. A diver found his body later standing upright in the mud at the bottom of the Harbour.

John Alexander 'Felix' Faulkener, 40, Rigger or Tin Hare (1891 – 1931)

Faulkener died on 30th March 1931 after his leg had been crushed by a steel plate. He was working on deck level at the time. Felix was the second of the two riggers to die on the job. He was laughing when a sliding steel plate crushed his leg.

Thomas McKeown, 48, Rigger, born in Ireland (1881 – 1929)

McKeown was killed 27th March 1929 by a fall from a painting gantry which was suspended from the Bridge's road deck. When the platform that McKeown and two others were standing on started to fall, his companions grabbed at the bridge structure and held on for dear life. But as McKeown fell, he lunged desperately for some chains hanging from a crane only to become entangled in them. He was going so fast that the chains ripped off a leg and a hand before he hit the ground.

On the Pylons – 2 Deaths

John Henry Webb, 23, Painter, born in England (1908 – 1931)

On 31st July 1931, John Henry Webb fell 40 metres from a cross girder inside the south pylons.

James Campbell, 45, Foreman Rigger (1887 – 1932)

Fell from the north–west pylon on 9th January 1932, whilst dismantling scaffolding. A gust of wind caught a derrick, knocking him over the side. Witnesses described him turning over and over in the air as he plummeted nearly 50 metres before his head was severed by a steel bracket holding a streetlight.

On the Approach Spans – 5 Deaths

Frederick Gillon, about 25, Rigger (1905 – 1930)

Gillon was killed instantly when a sheerleg (a floating crane) collapsed on July 25th 1930, in Junction St., North Sydney.

Robert Graham, 41, Labourer (1890 – 1931)

Killed by a tram on 8th October 1931, while working on the approaches in Alfred St
North Sydney.

Edward Shirley, married, Carpenter (Unknown – 1928)

Carpenter sustained a fractured skull when scaffolding collapsed at the Fitzroy Street arch, Milson's Point. Shirley died in Royal North Shore Hospital four days later on 12th August 1928.

William Woods, 42, Ironworker, born in Scotland (1886 – 1928)

Overbalanced and fell more than 20 metres from an approach span gantry, 24th February 1928.

Nathaniel Swandells, 22, Boilermaker's Labourer, born in Scotland (1905 – 1927)

Killed 6th December 1927 when, working in a riveting gang, he fell from an approach pier.

Milson's Point Workshops – 4 Deaths

James Frances Chilvers, 54, Dogman (1877 – 1931)

Chilvers was killed on 8th July 1931 when struck under the chin by a piece of wood at the Milson's Point Workshops. He was knocked into the water and did not survive.

Robert Craig, 63, Braceman (1863 – 1926)

Braceman was knocked down Milson's Point ballast heap on 14th September 1926.

Alfred Edmonds, 56, Labourer, born in Canada (1875 – 1931)

Had his thumb crushed while packing granite stones at North Sydney and died of tetanus 11 days later on 24th July 1931.

Angel August Peterson, 23, Slinger, born in Sweden (1904 – 1927)

Peterson sustained a fractured spine while stacking stringers at Milson's Point Workshop. He died six months later on 23rd July 1927.

Moruya Granite Quarry – 2 Deaths

Percy Poole 30, Quarryman (1897 –1927)

Poole was crushed by stone on 28th March 1927, at the Moruya Quarry.

Henry Waters, 50, Dogman (1876 – 1926)

Waters died at the Moruya Quarry while riding on the steam-powered loco-crane on 7th April 1926.

Workers Compensation

Workers compensation insurance had to be provided by the contractor as specified under the "Workers Compensation Act, 1916 and Amendment Act, 1920".

If a worker was injured on the job, they received compensation for their time off but not for the injury itself. For example, a rivet fell from the top chord of the approach span and hit George Scott on the lower chord. His two sets of false teeth were smashed beyond repair and no additional compensation was paid.

The dependants of a worker killed on the job were paid between £800 and £1,600 plus £50 for each dependant child. The majority of the men had no dependants, and were therefore awarded £40 burial expenses only.

The opening ceremony committee rejected the idea of having the next of kin of the 16 workers who died during construction march at the opening of the bridge. It was thought that this would introduce "an altogether inharmonious note into an official ceremony".

Sydney Harbour Bridge Timeline

The Sydney Harbour Bridge is the world's largest (but not longest) steel arch bridge. Internationally it is a renowned symbol of Australia.

28th July 1923:	Construction of the Bridge started with the turning of the first sod at North Sydney.
24th March 1924:	The tender is awarded to Dorman Long and Co. Ltd., of Middlesbrough, England.
December 1924:	Clearance begins for site of the workshops

5th January 1925:	Commencement on the excavations for the foundations of the approach span piers and bearing pins.
26th March 1925:	Foundation stones of the Dawes Point southern abutment tower set by Governor of NSW; His Excellency Sir Dudley De Chair and Secretary for Public Works and Minister for Railways; the Hon. R.T. Ball M.L.A.
September 1925:	The erection of the approach span steelwork begins.
May 1926:	Workshops and machinery are ready for production
26th October 1928:	The erection of the arch steelwork begins.
19th August 1930:	Joining of the arch permanently linking the north and south shores of Sydney Harbour occurs at 10pm.
8th September 1930:	Closure of the arch is complete
April 1931:	The road deck is completed.
16th January 1932:	The last stone is set in the north-west pylon.
21st January 1932:	The last rivet is driven in.
February 1932:	Load testing of the road deck
19th March 1932:	Saturday; the Sydney Harbour Bridge is officially opened.
9th September 1932:	Sydney Harbour Bridge is handed over to the Department of Main Roads with the exception of areas occupied by tram and rail lines.
16th September 1932:	Dorman, Long & Co maintenance contract expires
29th June 1959:	Trams are replaced with buses and the Department of Main Roads was given responsibility to convert tram lines to road use.
October 1988:	Completed payments of all finance loans used to construct the Bridge.

PYLONS

Construction and Design

Construction

Construction for the abutment towers on the southern side began in 1925. The abutment towers, like the piers, are constructed of concrete and were initially to be left in this fashion, however Bradfield believed that a more elegant and appropriate finish would be more in keeping with the grandness of the bridge and decided on a granite facing as being the more appropriate, despite the objections from some members of the government committee formed to oversee the project. One such objector was the Chief Railway Commissioner, Keith Aird Fraser.

The foundation stone for the south east pylon was laid on the 26th of March 1925 and the concrete structures began to take shape.

The concrete for the entire abutment towers was mixed by a gang of only six men. The northern side was equally served by a similar number. Incredible as it may seem that it took only six workmen to mix a vast amount of concrete, the actual pouring of the mix was also achieved by a further six. Each six man gang was responsible for fitting the reinforcing rods, pouring the concrete and packed it by hand.

In total each gang poured and packed a total of 95,000 cubic metres (sixty thousand cubic yards) in five years. Once each tower reached a height of 47 metres from ground level, reinforced concrete floors were then created to build and launch the creeper cranes which would be later used to erect the arch itself.

Each gang had only one concrete mixer manned by five men. There were in addition only two stonemasons and their labourers set all the stone, two Dogmen and crane drivers lifted all the material, six carpenters handled the formwork and only three men positioned all the reinforcing. Two labourers poured all the concrete and two men packed it in position.

Jack McCrae was a concrete packer, who wrote: “They were awkward places and that concerned the main floor as it was called, which was about a hundred and fifty feet up. Somewhere near present deck level and the beams and struts on that were very awkward. I can remember being sent down in one of these beams and I think, what I can remember of it now it was about six feet square and perhaps about ten feet deep and that’s also concrete reinforced steel rods and I can remember I had great difficulty getting down between these steel rods where I had to go because the concrete was being more or less poured down on top of me.

I was equipped with an oilskin suit and also I remember I had to have a sou’wester on my head, to keep the stuff from, you know, being poured all over me. But that was one of the most awkward jobs I ever had there but still and all I know I got all over the thing correctly because, when it was stripped there was no - what they call ‘boney’ stuff - everything had to be a good smooth finish.”

Design

The design for the bridge itself was heavily influenced by the design of the Hell Gate Bridge, designed by Gustav Lindenthal. Lindenthal was however much criticized for "sullying the structural art of bridge-making with subjective, visual considerations", that is, adding the pylons, thought to be un-necessary, and even more so, un- necessarily faced with granite.

Lindenthal’s assistant, O.H Ammann, defended the use of granite as a finishing material to the pylons, arguing that they "give expression to the solidity of the abutments to resist the great thrust of the arch". He also added that they gave structure to the arch by adding weight to the foundations of the abutments. Both these arguments were later to be used by Bradfield in order to justify the use of Moruya granite on the Sydney Harbour Bridge.

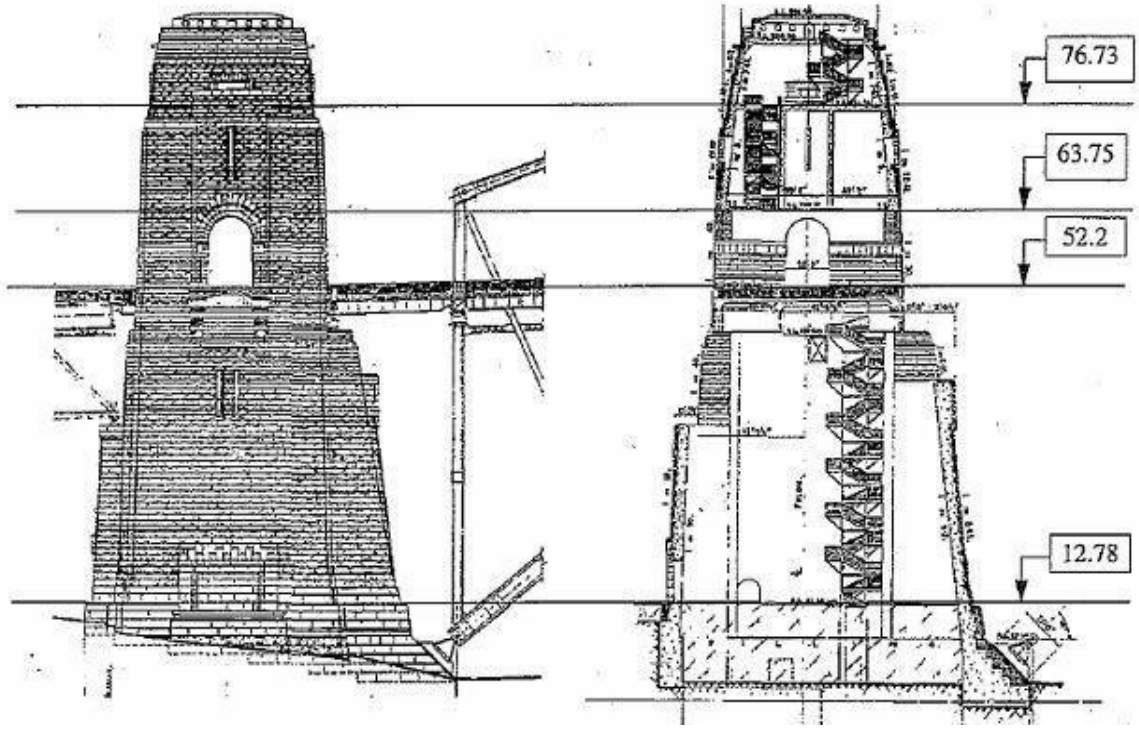
Other American bridges, similar in design to the Sydney Harbour Bridge, have also used granite finishes, perhaps most notably for the pylons is the Camden Bridge in Philadelphia. Granite-faced abutments were also planned for the Bayonne Bridge in New Jersey but these were actually never built.

Structurally the pylons themselves are un-necessary, that is to say that they play no significant part in supporting the main arch, in fact they are deliberately set back from the ends of the arch in order not to detract from the graceful lines of the arch. Bradfield was quite specific in his designs to ensure that the main arch stands alone as a central and unencumbered iconic structure.

Bradfield wrote: “The granite faced towers and pylons, simple and elegant, are the architectural features of the bridge and harmonise with the lines of the arch. They give the touch of distinction to the bridge, which would otherwise be an immense utilitarian steel structure.”

The pylons however are an integral part of the overall structure and whilst considered by many as somewhat of an 'afterthought' the role they do play is significant in that they add weight to the foundations, or 'skewbacks' for the abutment towers, atop of which the pylons themselves sit.

So in order to understand the role the pylons play in the design and function of the bridge one must first understand the significance of the abutment towers and how they were an integral and fundamental part of Bradfield’s overall bridge design.



Elevation of Pylon & Abutment Tower and the long section through Pylon & Abutment Tower

The terms abutment and pylons, and the relationship they have to the bridge has been defined by the Sydney Harbour Bridge CMP—Inventory Records, prepared for the bridge in August 1997: “The term ‘pylons’ is widely used to refer to the whole of the masonry construction at each end of the arch … The abutment tower is the structure that supports the deck between the arch and the approach spans and takes the thrust of the main arch bearings at its base. The pylons are the two towers built on top of the abutment tower starting at deck level.” [1]

On the 26th of March 1925, within the first few months of Dorman Long & Co beginning work on the site which would eventually become the Sydney Harbour Bridge, the foundation stones were laid for the southern abutment tower by the then Governor, Sir Dudley de Chair and the Minister for Public Works, Hon R. T. Ball.

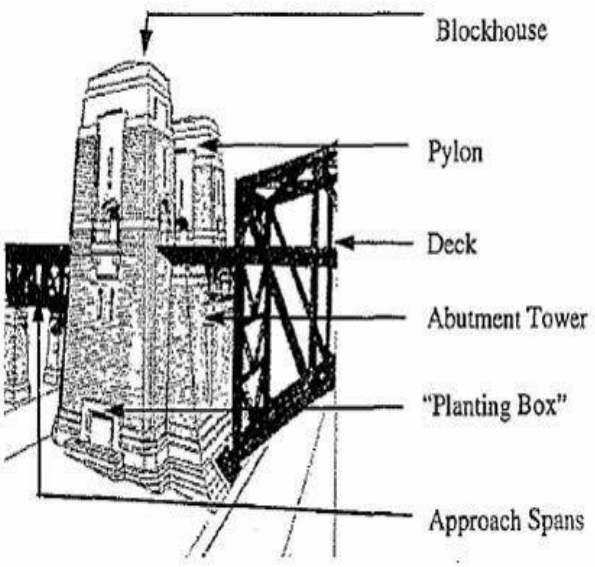
Also in attendance were the Premier of NSW Sir George Fuller, Sir Arthur Dorman and Sir Hugh Bell of Dorman Long.

From 1932, when the bridge was completed, Bradfield had always planned that the abutment towers themselves were to be the space reserved for the workshops and offices for the maintenance crews, whose task it would be to maintain the bridge for generations to come.

The basic layout for each of the four abutment towers, two on either side of the harbour, were, in 1932, the same, although substantial renovations have taken place over the years and significant changes have been made to accommodate entirely different functions than those envisaged by Bradfield. For example the North East pylon is now the exhaust outlet for the Sydney Harbour Tunnel which opened on the 30th August 1992.

The two abutment towers on the south side have changed little from their original design, except where the RTA has added more internal office space and BridgeClimb has refurbished the South East pylon to that as we see it today.

Each abutment tower is divided into three separate compartments. The internal walls are 1.2m thick and designed to support the pylon walls directly above them.



Sections of the Sydney Harbour Bridge Pylon

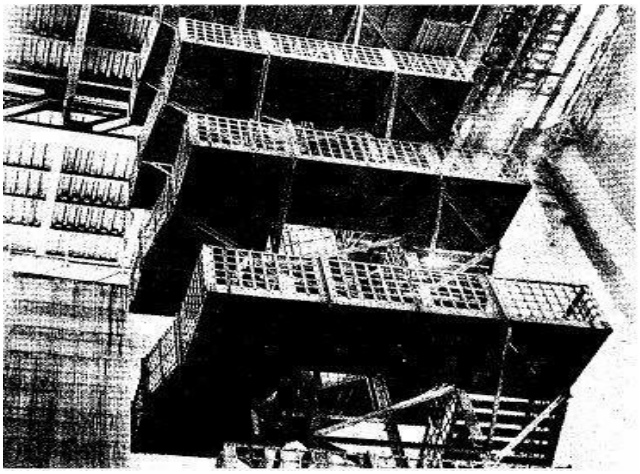
The immense size of the project was a major concern for the designers as they faced the problems of both shrinkage and cracking of such a large amount of concrete. For advice on how to overcome these problems Bradfield turned to the structural engineer and concrete specialist Dr. Oscar Faber CBE, in London. Faber had pioneered the use of concrete and had designed the testing methods for concrete which were to become the standard within the building industry. Faber was awarded the CBE (Commander of the Order of the British Empire) for his work on the British Houses of Commons in London.

In order to prevent cracking and shrinkage the construction of the 1.2 m walls were done in two sections with the inner section cast first. The inner section had a minimum thickness of 1 m and was reinforced with horizontal steel bars. It wasn't until six months later the outer section of concrete was poured, which is approximately 0.6 m thick was cast directly behind the granite facing.

The granite facing for the abutment towers and the pylons alternates in thickness between 500 mm and 350 mm giving them a stepped profile to create a strong and lasting bond to the concrete. Hooked steel bars were also employed to fix each stone in place.

The central chamber forms an immense space covering an area of 26.5 m in width by 36 m long. Originally this space was open right up to the underside of the deck level 43 m above. The concrete slabs which cover the outer chambers directly under the pylons support the deck structure. A transverse walkway, known now as the mezzanine floor, spans the entire width of the central chamber and links the eastern and western sides just below the deck level. This floor level was originally known by another name altogether, it was called “Lovers Lane”, an area we will come back to at a later in this manual.

Below is the original steel staircase in the RTA workshop before the internal lift was installed.



On the morning of Saturday 5th of May 1934, at 10.00am the Mayor of North Sydney, Alderman Hodgson, formally opened the lift which Whitford had installed at the bottom of the south eastern pylon and would take people to the mezzanine level. The lift carried a maximum of 21 passengers, most of these would be directly from the trams which ran from the city to Dawes Point and the base of the abutment towers. The lift will operate daily from 10am to10 pm.

Prior to the lifts installation the only way to visit the pylon lookout was to climb the 253 steps up to the mezzanine level, or Lovers Leap as it was called.

On the outside of the abutment towers, on both the North and South sides, the design incorporated twin 'Planting Boxes'. These are still seen today but are not as significant a feature as both Tait and Bradfield has envisaged. They are accentuated architecturally and made to look like balconies but what would be the opening to the balcony is merely a blank wall surrounded by a plain architrave. According to Bradfield's doctoral thesis of 1923, the beds were to be planted with poplars and rosemary in a war memorial theme.

South East Pylon-Abutment Tower

Both the Southern and Northern abutment towers have spiral staircases and landings that form a square pattern surrounding internal lifts. These rise 47.3 m from the workshop floor level to the transverse walkway, or mezzanine level. These lifts first became operational in 1929 and were originally for the purpose of taking VIPs for tours on the arch.

The current RTA workshop space was originally a car park for approximately 50 cars, from which people could access the South East Pylon via the spiral staircase or the lift that was installed and opened by the Mayor of North Sydney Alderman Hodgson, accompanied by Mrs Hodgson, on Saturday on 5th May 1934.

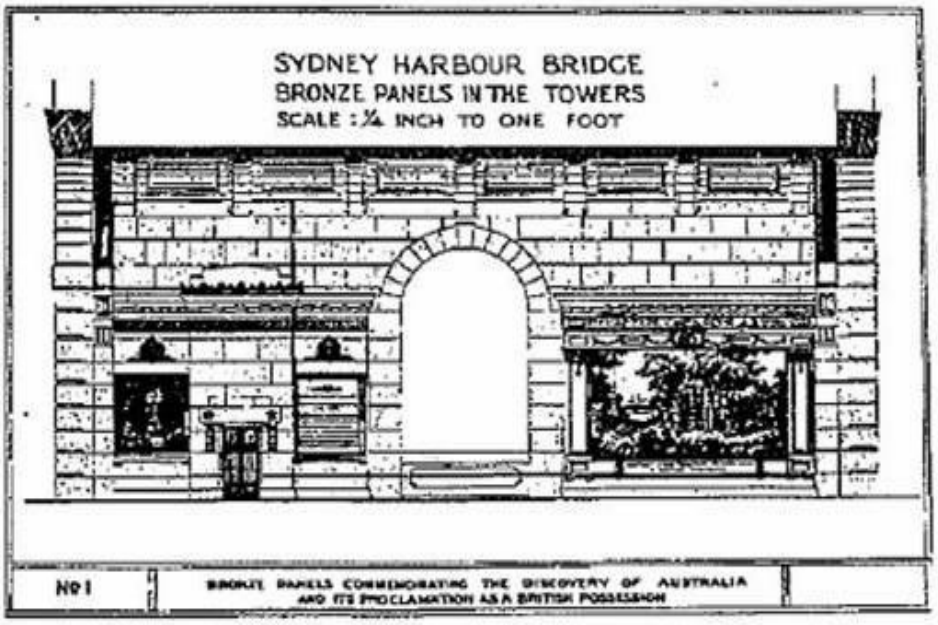
South West Pylon-Abutment Tower

At the completion of the bridge the South West Pylon, whilst of the same design internally as all the other pylons, was used to house the Bradfield Museum. Dr. Bradfield's collection of memorabilia was displayed which included a display of plans, printed material, models, photographs and assorted engineering artefacts such as chrome- plated rivets, lengths of anchorage cable, opening ribbon and tools. The museum was open on weekends for about fifty years (from 1932 to 1981).

The engineering museum featured Robert Bowden's photographs of the construction and a portrait gallery of the principal engineers who worked on the Bridge between the 1920s and 1960s. It also housed a reference archive of an estimated 5,000 original plans, blueprints, illustrations and sketches.

The original museum space was then later used to house the RTA Driver Aid Computer (known as the Programmable Logic Control) for the lane changing system on the Bradfield highway. Dr. Bradfield's plan room, where the original plans for the design of the bridge were located, was itself later converted to house the SRA's (State Rail Authority of NSW) Signals Communication Room, which was installed in 1995-6.

The 'blockhouse' at the top of the south west pylon now houses the radio transmitter controlling the tow trucks on the bridge and has aerials on the roof along with a rack on which paint samples can be see undergoing weathering tests. The tow trucks that service the bridge were themselves garaged for many years in No1
Cumberland Street before being relocated to the northern end of the harbour.



Bradfield's original design for the Pylon walls

The Importance Bradfield Placed on the Abutment Towers and the Pylons

Bradfield had originally planned to install exquisitely cast bronze panels on the face of all four pylons, and although they were never actually installed it is however a clear indication of just how important these locations were that such grandiose plaque's were considered at all.

The Granite

The granite used for the Sydney Harbour Bridge is from the Silurian age, which dates back some 443.7 ± 1.5 million years. The Silurian system was first identified by the British geologist Sir Roderick Impey Murchison whist researching sedimentary rock features in South Wales, UK, in the 1830's, and is named after a Celtic tribe of Wales, the Silures.

The granite for the facing of the abutment towers and the pylons was quarried from the NSW coastal town of Moruya.

In 1868, John Young the contractor for the Sydney GPO, leased land from the Louttit family on the south side of the river and opened a quarry, shipping stone to Sydney.

Architect, James Barnett used the granite for his decorative work on the columns of the Sydney GPO in the early

1870's. The granite from Moruya Quarry was also used for the statue of Captain Cook in the Sydney Botanical Gardens, St Mary's Cathedral and the Headquarters of the Bank of NSW.

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The Quarry was taken over in 1924 by the Sydney Harbour Bridge contractors, Dorman Long and Co, who chose granite as the material for the Bridge Pylons and abutment towers. The company built “Granite Town” adjacent to the Quarry, which consisted of a 1,000 acre village with mostly 4 rooms, low rent cottages that existed between 1924 and 1931. Granite Town housed some 300 people in all, this included 74 Stonemasons, 11 Masons Apprentices, 15 Quarrymen, 46 Labourers, 15 Office Staff, 9 Crane Drivers, 17 Blacksmiths, 9 Carpenters and office workers. The total staff number was 250. Masons, tool-smiths and quarry workers were recruited on good wages from Aberdeenshire, Scotland (noted for their skills as granite masons), and Italy. The Italians were mainly single men

Labour shortage

The Moruya Quarry had created a labour shortage in Scotland and the impact it had back in Scotland can be seen by a newspaper report from The Morning Bulletin (Rockhampton) on Wednesday 24th March 1926: “A Labour correspondent in the Aberdeen "Evening Express" writes with enthusiasm of the "big exodus of Aberdeen granite workers for Australia quite the biggest thing in the history of the industry."

A total of 150 stone dressers, toolsmiths and quarry workers, accompanied in many cases by their wives and families would be engaged, the migration being promoted by the Australian Government in conjunction with Messrs. Dorman, Long and Co. The building of the Harbour Bridge in Sydney has occasioned the engagements. The rate of pay for stone dressers is £6 16s. 8d. for the 40-hour week. The writer of the article says that the Aberdeen granite trade will be severely affected by the departure of so many skilled craftsmen.”

(Ref: Not Forgotten - Memorials In Stone, Christine Greig)

Transporting the Granite to Sydney

The granite used on the pylons, piers and abutment towers was transported to Sydney from Moruya in three lighters[2] special commissioned by Dorman Long & Co. and built at the Walsh Bay dockyard in Newcastle. These lighters were named: The Sir Dudley de Chair, The Dorlonco and The Sir Arthur Dorman.

The Sir Dudley de Chair

This lighter was named after Admiral Sir Dudley Rawson Stratford de Chair who was the former governor of NSW from February 28, 1924 to April 9, 1930. She was renamed Terka in 1928 and later served as a minesweeper and water carrier for the Royal Australian Navy in 1940. She capsized and sank on 26th March 1944 in Madang, Papua New Guinea.

Terka is the Aboriginal word for 'Kangaroo'.

Dorlonco

Named for obvious reasons (Dorman Long & Co), she was later renamed The Sir Hugh T Bell before being acquired by the Adelaide Steamship Co and renamed Tolga. As with The Sir Dudley de Chair, she too was destined to become a minesweeper and water carrier for the Royal Australian Navy. She was scuttled in April
1946 after being declared as un-seaworthy.

The Sir Arthur Dorman

Named after Sir Arthur Dorman K.B.E. the Chairman and managing director of Dorman Long & Co. She too was acquired by the Adelaide Steamship Co in 1928 and renamed Toorie.

From 1940 until 1943 she served as a minesweeper for the Royal Australian Navy. She was eventually sold to a shipyard in Panama in 1956 where she was broken up for scrap.

Toorie is the aboriginal word for 'Water Hen'.

These three lighters were Dorman Long's first purchases for the construction of the Sydney Harbour Bridge. Each ship had a load capacity of 400 tons.

Moruya Granite Facts

- The cost of the granite: The cut granite cost £50,000, which by a comparative retail price index for 2010, would equate to approximately $3.5million in today's money.
- The Moruya granite used on the Sydney Harbour Bridge was tested for its overall strength and records show that it was able to withstand a pressure of 1200 tons per square foot.
- In total 18,000 cubic metres of rock facing were required for the Bridge abutments and pylons.
- All excess granite left over from when it was cut in the quarries was crushed and used as ballast in the ships used to transport the granite blocks to Sydney. It was later mixed in the concrete for the Bridge to create additional strength.
- Each stone was cut to size and completely finished at the quarry then numbered for fitting into place.
- The granite cleaning was originally done using hand held wire brushes, water & hydrochloric acid.
- The same Moruya granite was also used for the Cenotaph in Martin Place, designed by Sir Bertram Mackennal and on the 25th April 1927. The 23 stones used to build the Cenotaph were reportedly cut from a single 2,000 ton block of granite and weighs 20 tons. Bradfield supervised the construction of the Cenotaph, and it is reported, he did so without requesting any payment for his services.
- The two statues are modelled on actual servicemen. The Soldier was modelled on Private William Pigott Darby from the 15th Infantry Battalion, an Irishman from Monasterevin, Ireland who died in Brisbane on the 15th of November 1935. The model for the sailor was Leading Seaman John William Varco, who enlisted at the tender age of just 13. He was later awarded the Commonwealth Distinguished Service Medal in 1918 (one of 60 Australians to earn this honour) and died in October 1948.

Abutment Towers and Pylon Statistics: At a Glance

	Metric	Imperial
Height (above mean sea level)	285 ft	89 m
Base	222 x 162 ft	67.7x 49.4 m
Base of each Abutment Tower	223.1x 157.48ft	68 x 48 m
Weight of Abutment Towers (total weight)	115,000 tons	

Pylon Timeline

1932	The Sydney Harbour Bridge opened with two temporary post offices installed in the Pylons, including the South East Pylon. For two weeks only, visitors could send souvenir telegrams from the Pylon with specially designed Sydney Harbour Bridge stamps.

1933 ~ 1934	On the 2nd anniversary of the opening of the Sydney Harbour Bridge, an enterprising businessman named Archer Whitford converted the pylon into a popular tourist venue. The South East Pylon was the property of the Department of Main Road (now Transport Roads & Maritime Services – formerly The Roads & Traffic Authority) and leased by Whitford in late November 1933, under his company name 'Sights of Sydney Pty Ltd'. It opened to the public on 19 March 1934.
1942 ~ 1945	During WWII all tourist activities ceased in the pylon from the 14 July 1942 when the four Harbour Bridge pylons were taken over by the Australian Military Forces until the end of the war.
1948	'All Australian Exhibition' opens in the South East pylon on the 17 December 1948. It was managed by Mrs. Yvonne Rentoul.
1971	Mrs. Rentoul's lease expired and for a decade the Pylon Lookout was not open to the public.
1982	The South East Pylon re-opened in 1982 with an exhibition marking the Bridge's 50th anniversary. A post office was operated temporarily from the Pylon in March 1982.
1987	In December 1987 the South East Pylon housed a Bicentennial Exhibition.
April 2000	The South East Pylon is again closed to the public and the Roads & Traffic Authority and BridgeClimb commence work for the installation of a new exhibition: 'Proud Arch'. The exhibition opened in November 2000.
June 2003	The South East Pylon Lookout closed for 4 weeks for the installation of a new exhibition. On 23 June 2003, the Pylon Lookout re-opened to the public.

The Southern Pylons in the 1930s.

Stories from the Pylon

The Mystery of 'George' and the Pylon

The well known, and erroneous, story of George, the bridge labourer who mysteriously 'fell' into the concrete whilst the pylons were being built, is precisely that….erroneous.

Sadly, however the truth isn't that far removed from fiction, simply the geography and name are wrong. It wasn't George that was accidentally lost for all time but rather a 38 year old unemployed taxi driver named Ernest Alfred Arthur Roe of David-street, Lakemba, formally a resident of St. Kilda, in Melbourne. He was killed when he fell 150 feet down the shaft of the northern pylon on the night of Monday 19 August 1935. Of the many people who have fallen from all areas of the Sydney Harbour Bridge, this is thought to have been the first, and quite possibly the last to have fallen inside the pylon.

Launch of the Sydney Harbour Bridge

Children's Day Celebrations

On 16 March 1932, 3 days before the official opening 52,000 school children from schools all over NSW marched across the bridge in celebration of its completion.

The Crowds

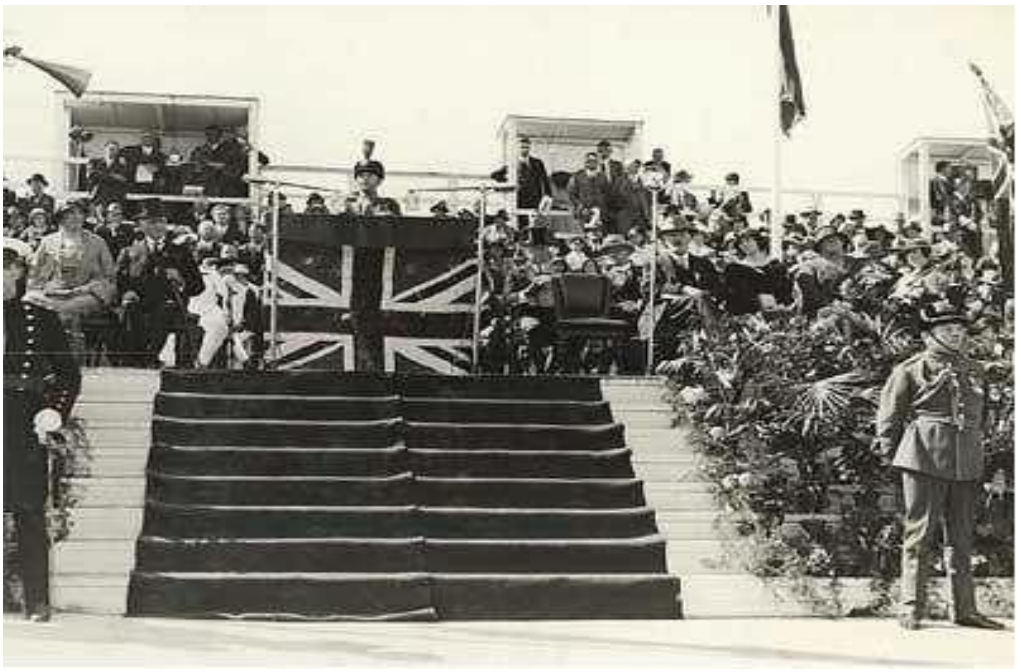
Against the background of the Depression, the community's response to and involvement in the opening celebrations of the Sydney Harbour Bridge on Saturday 19th March 1932, was spectacular (the day had been proclaimed a Public Holiday by the State Government). Remarkable crowds (estimated between 300,000-1 million people) lined the city and Harbour foreshores. Few other events in NSW, before or since, have achieved such participation and publicity, both within and outside the State.

One report says, one million people took part in the celebrations. It was very much an event worthy of the completion of what was generally then regarded as, "The grandest bridge not only in the British Empire, but in the whole world".
Police reports suggest that the crime rate in Victoria plummeted to virtually zero as most of the petty criminals headed for Sydney. It was thought that there were good pickings to be had both for pickpockets and burglars as many homes would be empty with the occupants attending the opening ceremony.

The Ceremony

The ceremony commenced at 10 am on the southern approach to the Bridge, opposite the Sydney Observatory.

After an appropriate round of speeches, including the reading of a special message from King George V, read by the Governor of NSW, Sir Phillip Game, the NSW Premier; the Hon John T Lang officially cut the ribbon with a pair of jewel-encrusted gold plated scissors and declared the Sydney Harbour Bridge, open.



Sir Phillip Game reading the message from King George V.

At the Summit, a ribbon in the centre of the Bridge was severed and fell on either side of the decking while airplanes dipped to the top of the Arch in salute. The official party then motored across the Bridge to the Northern Pylons where a second ribbon was cut by the Mayor of North Sydney (Alderman H L Primrose) to signify entry into the Northern Suburbs.

The opening proceedings were broadcast direct throughout Australia, as well as to Great Britain and America; such was the significance of the occasion. The Governor General, the Lieutenant-Governor and the Prime Minister were among the high-ranking dignitaries present.

The Procession

The procession was interspersed with various marching bands and also comprised of 27 motorised floats; groups of war veterans; boy scouts; 626 children; and 100 bridge workers. It took approximately 35 minutes for the two kilometre long assemblage to cover the eight-mile route, through the city streets and across the newly opened road deck.

The vast cavalcade of decorated floats represented various aspects of Australian history, trade, industry, agriculture and learning. Among the huge number of marching groups and bands were representatives of Aboriginal Australia, the returned servicemen and also lady lifesavers. The pageant was of surprising size and quality, considering the economic depression of the time.

The procession was assembled at Macquarie Street and Queens Square where it then proceeded along College, Park and York Streets before crossing the bridge towards the Pacific Highway on the northern side. Once on the north side of the harbour it followed a course where it traversed Blue and Miller Streets before once again re- crossing the bridge where it eventually dispersed.

At the same time as the pageant crossed the Bridge a cavalcade of assorted watercraft passed under the bridge from west to east.

Leading this armada was the P&O. R.M.S. 'Maloja' followed by the Orient lines R.M.S. 'Orford'. Others in line astern were Nieuw Zeeland, S.S Kitano Maru, S.S. Moreton Bay, M.S. Viminale. The German S.S. Stasfurt and the Adelaide based ship the M.V. Manunda. These bigger vessels headed a flotilla of over 70 one-class sailing vessels.

3.5 Public Access

After the pageant had passed, the public swarmed across the Bridge roadway, rail tracks, tram tracks and footpaths. Vehicular traffic did not 'take over' the main deck until midnight.

The public walk across the deck was an event not repeated until the Bridge's 50th anniversary in 1982. Some enthusiastic spectators on the day celebrated by unofficially climbing up the Arch - a preview of BridgeClimb, inaugurated 66 years later in October 1998. One particular young boy and his father were chased all the way over the Arch by the Police who called out to them to come down.

One individual story of the day tells of the infamous Bea Miles, (a Sydney eccentric 1902-1973), who tried to drag a tram driver out of his cabin so that she could drive the tram over the Bridge.

Ancillary Events

The Opening Day also featured a procession of ocean liners and other vessels from various nations passing under the Bridge from west to east, a display of speed launch manoeuvres and an aerial display by the Royal Australian Air Force.

The evening saw a Venetian Carnival on the Harbour boasting a "feast of lanterns" as well as a spectacular fireworks display. The Bridge was floodlit from warships in the harbour and major buildings in the city were also floodlit, some with specially designed motifs to mark the occasion. A grand concert led by the NSW Associated Male Choirs was held in Sydney Town Hall. All other theatres in the city also had special performances to celebrate the occasion.

An historical pageant and garden party was held at Wentworth House, Vaucluse, in which all the descendants of all of Sydney's oldest families were invited to join.

Balls and dinners were also organised for before, during and after the 19th March. Sporting events arranged for the day included a sailing regatta, race meeting, surf carnival, athletic meeting, tennis exhibition and cricket match. There was also an international swimming event held at Manly with many current and former world champions taking part (see below for more sporting events):

- An interstate cricket match between NSW and SA was held at the Sydney Cricket Ground, with leading international players invited to participated (Result as yet unknown).
- Australian Jockey Club celebratory race meeting held at Randwick racecourse
- A sailing regatta for all classes of sailing and show craft.

- Arial bombing display over Fort Denison
- An Olympiad athletics meeting was held at Manly Oval
- Surf lifesaving championship carnival was held at Bondi Beach
- An exhibition of lawn tennis was held at the NSW Lawn Tennis Association's ground at Rushcutters Bay

Celebration activities continued virtually unabated for two weeks (an amazing 18 days from 19 March 1932 – 1 April 1932).

Special souvenir tickets were issued to people crossing the Bridge by train and two post offices were set up (in the south-east pylon and the base of the northern pylons) to issue the new commemorative stamps and telegrams on specially printed forms.

The opening ceremony and the entire range of associated activities were greeted and enjoyed by the people of Sydney with great enthusiasm and patriotism.

Trains and trams commenced running in the afternoon, and for the first time Wynyard Station came into operation. Trams were terminated at Wynyard whilst trains ran straight through to Central and beyond. The city section of the city circle train layout designed by Bradfield was opened for use on the 28th February 1932.

The Opening Day Official Program: Abridged

Governor Sir Philip Game opened the official proceedings at 10 am with a congratulatory message from King George V.

The two kilometre long Historic Pageant contained 27 floats, military bands, war veterans and boy scouts. The pageant was led by the Young Australia League Band followed by 656 specially selected children from regional NSW schools, 100 bridge workers and a 'party of 25 picked Aborigines'

The Boy Who Rode 1,400km Into History

In 1931 in the small Victorian town of Leongatha a nine year old boy called Lennie Gwyther worked long and hard on his father's potato farm after his father (Captain Leo Tennyson Gwyther) suffered a broken leg. His father asked Lennie what reward he would like, to which the young boy answered: "To see the Sydney Harbour Bridge", and thus began the epic adventure which took this nine year old boy and his faithful old horse Ginger Mick on a 900 mile (1,400kms) journey from Victoria to Sydney.....alone!

The journey would take almost two months to complete and in each town along the way Lennie and Ginger Mick were greeted as heroes as stories began to appear in local papers of this amazing boy and his dream to see the Sydney Harbour Bridge. Upon his arrival in Martin Place he was met by thousands of cheering people and was even invited to ride across the Bridge as part of the opening ceremony.

His father had already planned for the boys return trip by boat back to Melbourne, but despite the hardship Lennie loved the journey up from Victoria that he decided he would simply turn around and ride all the way back home.

The De Groot Incident

While the opening was spectacular in every sense of the word, there was one minor incident which provided such controversy and amusement that it has since entered Australian folklore.

A relatively unknown Irishman, Captain Francis De Groot, rode into history when he attempted to prevent Premier Lang from opening the Bridge.

De Groot was an active member of a Para-military fascist organization known as the New Guard. The New Guard saw Lang's schemes as Communist and feared NSW to be slowly moving towards revolution (inspired by the Russian Revolution 15 years earlier). The New Guard was dismayed when it was announced that Lang was to officially open the Bridge instead of inviting a member of the Royal Family or the Governor. They vowed to stop him.

Dressed in his Captains uniform, to which as a former serving officer he was entitled, he rode behind the Governor-General's cavalry guard, to which he had not been invited and was not therefore entitled. De Groot managed to arrive at the ceremony undetected, which was perhaps surprising considering he was wearing a cap instead of the usual cocked hat of a captain. His horse was not a military mount, it was a 16.5 hand chestnut called "Mick" which had been borrowed by The New Guards leader Eric Campbell, from a Pymble Ladies College schoolgirl from Turramurra named Margo Wishart.

As the official party continued with the speeches, De Groot galloped forward and slashed the ribbon with his sword, declaring the Bridge open in the name of the, "Decent citizens of New South Wales".

He was unceremoniously pulled from his horse by police superintendent, Bill Mackay. De Groot was arrested and taken to the Darlinghurst reception centre, a psychiatric hospital, instead of the police station, where the anticipated bail money was already waiting. The official speeches continued with little realization of the disturbance at the ribbon.

At the ceremony, the ribbon was hurriedly tied back together and everything proceeded on schedule without further interruption.

De Groot was defended by Charles Aubrey Roger Hardwick and seven days later, after being declared sane, De Groot was fined the maximum penalty of five pounds. Charges of damaging a ribbon to the extent of two pounds and of using threatening words were dismissed, but De Groot was fined for offensive behaviour in a public place (on the Bradfield Highway). Though convicted of offensive behaviour, De Groot served a writ on the New South Wales police alleging wrongful arrest, and ultimately won an out of court settlement of "a tidy sum".

Following his release, De Groot sought refuge at Nutcote Cottage, home of his good friends May Gibbs (famous for the Gumnut Babies) and her husband, J. O. Kelly. Nutcote was actually built and designed for May Gibbs in the Spanish Mission style by the English architect B.J Waterhouse (OBE) in 1924. It remained May's home and studio until her death in 1969. After being saved from redevelopment plans in the 1980s, Nutcote was purchased by North Sydney Council in 1990 to commemorate the life and works of May Gibbs.

The Arresting Officers

William John Mackay (know as Big Bill) the arresting Superintendent was a Scotsman and served as Police Commissioner from 24th March 1935 until his retirement in 1948. It was during the days of the great depression that MacKay was given the task organising the police strike breaking activity at the Rothbury coal mine on December 16, 1929 at the Hunter Valley's Rothbury Colliery in which one young worker, Norman Brown, was shot dead and dozens more injured as 4000 unionised miners marched to stop the use of scab labour at the mine. The strike was broken and the miners eventually returned to work on reduced wages.

Mackay later admitted that he feared reprisals as a result of being the arresting officer, though he was determined that there was only to be one rule of law and order in Sydney and that was the police and not the New Guard.

Mackay founded the Police Rescue Squad in 1942 and died at his Edgecliff home on 22nd January 1948.

The first Head of the Squad was Sergeant Harry Ware who worked on the Bridge during the construction and later became a Rigger with the Department of Main Roads before joining the police force.

Francis De Groot's Sword (Sabre)

Francis De Groot was a very complex character from Australian history. Born in Dublin with Dutch heritage, De Groot was Roman Catholic and loyal to the Crown. He lived in Australia from 1910 – 14, enlisted in Ireland at the out break of World War I and fought on the Western Front with the 15th Hussars Cavalry Regiment. During the war he rose to the rank of Captain.

After the war he returned to Australia to continue a reproduction antique furniture business in Rushcutters Bay. With the social upheaval caused by the Great Depression De Groot feared a communist takeover of the country. So he joined the New Guard, a right wing paramilitary organisation opposed to the left wing Labor Government of Jack Lang.

The New Guard opposed Jack Lang's plans to open the Sydney Harbour Bridge, they believed that honour should fall if not to the Monarch then at least to the Monarch's representative in Australia. With calls from New Guard members to kidnap or assassinate Lang, De Groot appealed for moderation and proposed that he would open the Bridge.

After the 'Bridge Incident' as De Groot referred to it, he went back to his furniture business. In World War II De Groot again served in the armed forces, this time the Australian Army and rose to the rank of Major, serving his time in charge of a prisoner of war camp called Greta near Newcastle, NSW. After the war De Groot settled in to the good life in his Castle Hill home with his wife Bessie. The death of his brother led him to return to Ireland for good to care for his five young now fatherless nephews. It was to one of these nephews that he later entrusted the Sword. Francis De Groot died in Ireland on 1st April 1969.

The Search for the Sword

Captain Francis De Groot always wanted the Sword to return to Australia, preferably to Sydney and close to the Bridge. So in August 2000, Paul Cave openly declared his intention to find De Groot's Sword. He launched a public appeal to locate the sword and have it returned to Sydney. Since that time at least three swords have been brought to Paul's attention and on two of these occasions the swords have proven not to be the famous ribbon slashing sabre.

There were a number of leads as to the swords whereabouts. A conversation came to light between De Groot and his godson, Dr John Nicholson. De Groot told John he was giving his sword to his nephew, Frank. In 2002, Brian Wright the Author of "In the name of Decent Citizens" was sure that De Groot's nephew Frank had the sword and wrote to Frank to inquire on Paul's behalf.

But it was not until March 2004 that Frank De Groot, Captain Francis De Groot's nephew, came forward and told Andrew Moore he had the sword. Andrew is the associate Professor of History at UWS and author of "Irish Fascist, Australian Legend". Andrew Moore was in Ireland giving a lecture on Irish Australian History at University College Dublin when Frank De Groot approached him and said "I can solve the mystery of the sword, I have it". Negotiations commenced and The National Museum of Australia offered $10,000 to bring The Sword to Canberra.

Fortuitously, Paul Cave's Project Director John Bowe happened to be in Ireland at that time and also had a family connection with De Groot's family. This connection combined with Francis De Groot's wish to have the sword returned to Sydney and the Bridge, and a more substantial sum of money offered, helped to convince (young) Frank De Groot to sell The Sword to Paul Cave.

The contract entered into between Paul Cave and (young) Frank De Groot requires that the price paid for the sword remains confidential and this will be respected by Paul Cave. However The Sword has been insured for the sum of $1 million.

The Sword has now become a part of Paul Cave's personal memorabilia collection. It will make public appearances on occasion, to raise funds for various charitable events of personal interest to him. The first public appearance was on the 18th March 2007 at a fundraiser for the late Professor Chris O'Brien's Comprehensive Sydney Cancer Centre Royal Prince Alfred Hospital. On that evening, The Sword helped to raise $5 million dollars for the Sydney Cancer Centre.

The Sword

The Sword is actually a Sabre and has only one sharp edge. It is a standard cavalry issue Pattern 1908 Mark 1 sabre of the cut and thrust variety favoured at the time.

According to the proof markings on the Sword it was manufactured at the Royal Arms Factory Enfield (UK) in December 1914. On the grip of the Sword is the inscription 'F. E. DE GROOT. 15TH HRS', indicating the sword was issued to Francis De Groot when he served with the 15th Hussars Cavalry Regiment on the Western Front in World War I.

The blade itself has the following inscription 'CARRIED BY CAPT. F. E. DE GROOT DURING 1914 – 1918 WAR AND USED BY HIM TO CUT RIBBON AT OPENING OF SYDNEY HARBOUR BRIDGE 19TH MARCH 1932'.

The guard hilt of De Groot's Sword is leather bound, this is unusual as hilts were normally painted in 'khaki'. Officers carried swords with a decorated polished metal hilt, however as De Groot rose to the rank of Captain in the field he may never have been issued with an officers sword.

The Sword was carried in a scabbard and attached to De Groot's shoulder belt via the Sam Browne Sword Frog. De Groot's Sword Frog has an engraved oval shaped silver plate secured to it. The engraving reads 'F.E DE GROOT R.C. 15TH HUSSARS'.

R.C. is an abbreviation for Roman Catholic.

The New Guard

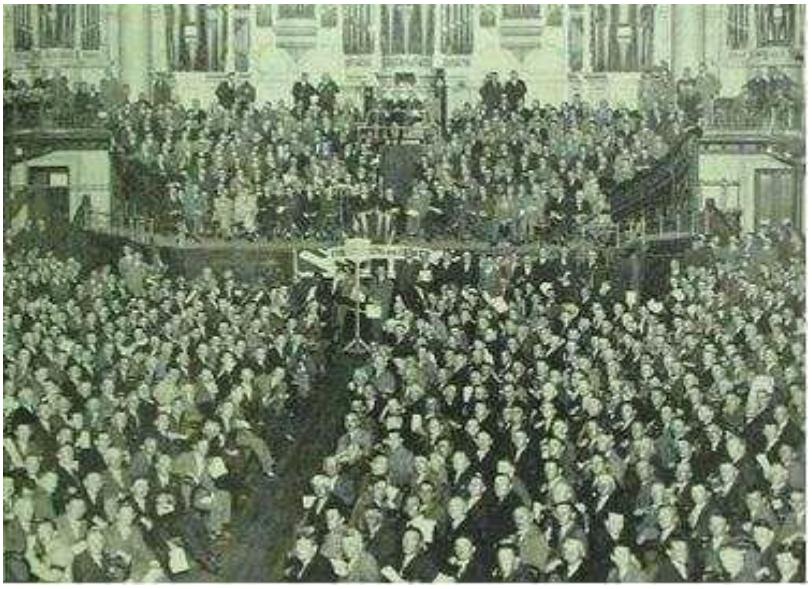
Much has been made of the De Groot incident and his involvement with the organisation The New Guard, but who exactly were The New Guard?

As mentioned above the New Guard was an organisation opposed to the Premier Jack Lang opening the bridge, but they themselves evolved from another organisation, The Old Guard. The Old Guard were a group of ultra Conservative business men who believed that the refusal to cut public expenditure in the face of a global depression was fiscal suicide, and they sought to redress the problems that would inevitably arise from the Lang governments policies by forming a secretive paramilitary movement who would in turn be ready to assist the police in restoring law and order when eventually the country turned to riot, as sure it must.

Eric Campbell was among those in waiting, however the refusal to openly confront the government, and especially Lang himself, angered Campbell greatly. He thus broke away from the Old Guard and with a few followers, he formed The New Guard. This time they openly sought confrontation with the Lang government, who they believed were by now nothing more than communist traitors. The basis of The New Guards belief and structure lie in their undying loyalty to the throne, and to the freedom and liberty of all its subjects. These views, though shared by The Old Guard differed in one important aspect; the "Suppression of any disloyal and immoral elements in Governmental, industrial and social circles." For Campbell, who saw the Lang government as nothing more than an alien, thus illegal regime, it meant that he retained the constitutional right to revolt against it.

Like The Old Guard, The New Guard was also run on paramilitary lines with a total of 93 sections in Sydney alone. Policy was discated by a general Council, though in truth it is probably most likely that Campbell had the last word on which direction The New Guard would go.

Mass meetings and rallies were held and attendances were impressive with over 3000 attending one at the Sydney Town Hall on 22 July 1931. By the end of 1931 the police estimated the strength of the New Guard at 36000 in Sydney, with up to another 3000 member in rural areas. Among its named members was Charles Kingsford Smith.



The New Guard became increasingly aggressive, and was now taking up arms against theirs, and their countries enemies, the communists. The confrontations culminated in "The Battle of Bankstown" on 26th February 1932, when an all-out brawl broke out between 200 New Guardsmen, labour supporters and the police outside the local cinema.

It was at a meeting at Lane Cove on January 11th 1932 that Campbell publicly announced that he (The New Guard) would never allow Lang to open the Sydney Harbour Bridge. At another mass rally on February 17th on the North Shore 3000 New Guardsman were seen for the first time to give the fascist salute in a declaration of opposition to Lang and all and any communists in positions of power in NSW.

Campbell called for full mobilisation of his supporters in a show of strength, and in an attempt to show the authorities that they would be totally unprepared to stop any full scale action should he chose it.

Under Sgt William J MacKay (See above), the police had a man of equal determination to stop the antics of Campbell and his New Guard. On 2 March 1932, he met with Campbell and De Groot in their offices and made them swear not to condone any more violent acts.

One can only imagine his astonishment when De Groot performed the act for which he has now become so famous, or infamous? And it was MacKay himself that dragged De Groot from his horse and into the South East pylon where he was arrested.

Sydney Harbour Bridge Pylon Museum

The Sydney Harbour Bridge Pylon Museum

The Sydney Harbour Bridge Pylon Lookout is the original Sydney lookout providing three levels of exhibits and spectacular views of the city of Sydney.

The Pylon Lookout is located 87 metres above mean sea level in the South East Pylon. The pylons themselves stand 89 metres high. There are 200 stairs leading to the first grand entrance hall, the first of three levels of exhibits where visitors can discover the history of the bridge, its construction and the stories of the men who built it. Around 120,000 people from all over the world visit the Pylon Lookout each year to experience the panoramic views across the Harbour from the open-air lookout.

History of the Pylon Lookout

Whilst not structurally necessary, the Pylons are however a significant and integral part of the Sydney Harbour Bridge. Their primary role being aesthetic they complement the overall design through their art deco architecture and cenotaph like stature.

They were designed by the Scottish architect Thomas Tait and were a deliberate and reasoned addition to the original design by Dr Bradfield. Whilst somewhat costly at an estimated £750,000 (1/4 of the Bridge's total cost) they are seen by most people today as money well spent.

The Pylon Exhibition: 1934

In November of 1933, Archer Whitford had completed arrangements with the Main Roads Board to lease the South East Pylon of the Harbour Bridge and convert it into "a magnificent show place that every Australian would be proud of". Whitford leased the pylon under his company's name: 'Sights of Sydney Pty Ltd'.

Archer Whitford was a Sydney businessman who would later, in July 1934, be one of six people who would submit tenders for the construction of an amusement park and swimming pool (adjacent to the Northern Pylons and Abutment Towers), on the site of the old workshops at Lavender Bay. This would ultimately become Luna Park and the North Sydney pool. Archer Whitford's tender was however unsuccessful and he then concentrated his efforts on making the South East Pylon the major tourist attraction in Sydney.

On February 17th 1934 the South East Pylon was officially opened as a National Tourist Resort.

On March 19th 1934 Archer Whitford opened the South East Pylon Lookout to the public. There was an exhibition aimed at highlighting Sydney as a major city and the pylon and bridge as major tourist attractions. There were 51 girls employed in the pylon and all the girls were smartly dressed, each wearing the colourful uniforms of the various departments, these were office girls, reception girls and the Cafe attendants. They were chosen for being the most attractive and charming of girls who looked extremely attractive in their various colours with the monogrammed 'Bridge' insignia emblazoned on their caps and dresses.

Just a few of the 51 smartly dressed Pylon employees

The Archer Whitford exhibition consisted of 101 separate exhibits and was titled “Looking down on Sydney”. Amongst these 101 exhibits were a camera obscura, an Aboriginal museum, model railway and the Supreme Café. There was also a "Mother's Nook", a grandiose drawing room space where customers were encouraged to write ‘dutiful letters home'. There was also a strange contraption called a 'Pashometer' on which visitors were encouraged to measure their sex appeal.

As with the original opening in 1932, the South East pylon was again granted a Post Office license with the post office opened from 9 March 1934 until its closure on 14 July 1942.

This Post Office however, unlike that of 1932, was actually a Non-Official Post Office, the equivalent of a licensed

The First Landing

On the first landing of the pylon was found the official entrance to the enormous showplace. Here visitors were greeted by the grandeur of the Reception Room, with its array of antique leather covered lounge chairs. A turnstile was installed at this point, and having paid the requisite entrance fee and entered this large space, there were then seen many items of "unusual interest", as the advertising suggested. Among these were the 'Eagle Table" (see below) and the grand 'Mothers Nook'.

Pashometer

The ‘Pashometer’ was an American invention that was first shown in Australia at the Electrical Exhibition staged at the Sydney Town Hall in march 1934 and which was considered to be an ingenious 'animal magnetism' machine which was designed to measure blood circulation by electrical sensitivity. The ‘Pashometer’ was thus claimed to register accurately those “incalculable components of character and temperament commonly known as personality, or animal magnetism”. It was said that the ‘Pashometer’, like the camera, cannot lie.

Perhaps, however, all was not well in the world of ‘Pashometers’ as was witnessed when an employee of Whitford’s exhibition lodged a claim in the local court for overtime she claimed she was owed: “An operation of a contrivance known as "the Pashometer," which is purported to register personality, was explained to the Industrial Magistrate (Mr. Prior) today, during the hearing of a claim by Elsie Gammell, for £55 from the Publicity Ltd., for wages and- overtime alleged to be due.

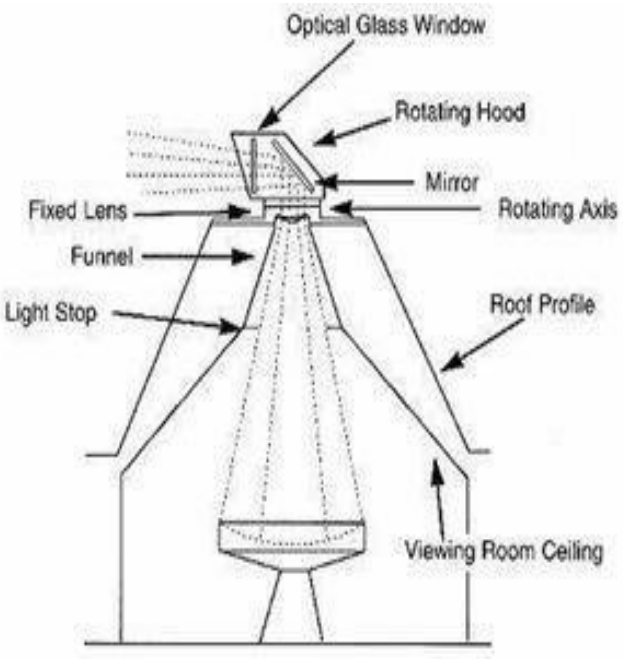
D. O'Dea, representing the Shop Assistants Union, said that Gammel operated a Pashometer on the Harbour Bridge. She worked it from the back, and let the people think they were getting cards, which revealed them as sheiks.

Gammel, in evidence, said that when she set the machine in operation the lights glowed. She did not know what figures on the machine purported to represent.

The magistrate ruled against O'Dea's contention that the girl's duties came under those of a shop assistant, and dismissed the case. Settlement was reached in a similar claim by another girl."

Maybe 'Pashometers' did lie…?

Camera Obscura (Latin for dark room)



Perhaps the biggest attraction the pylon had to offer, apart from the splendid view it offered of the city and surrounds, was the newly acquired electric camera obscura. This amazing contraption allowed people to view the surrounding area in full 360° on a circular plate situated just below the bunkhouse roof.

A camera obscura is an ingenious optical device which projects an image of the surrounding area on a flat screen, or in the pylon's case a circular table suspended from the ceiling. The first camera obscura was built by an Iraqi scientist named Abu Ali Al-Hasan Ibn al-Haytham, born in Basra (965-1039 AD) and who carried out practical experiments on optics which he later published in his 'Book of Optics'. The device was also known to the great Philosopher Aristotle who used it as an example of how light travels in straight lines.

The camera obscura, however has its origins dating back even further to the Chinese philosopher, and the founder of Mohism, Mo-Ti (470 BCE to 390 BCE). The actual phrase camera obscura is generally thought to have been first used by the German astronomer Johannes Kepler in the early 17th century.

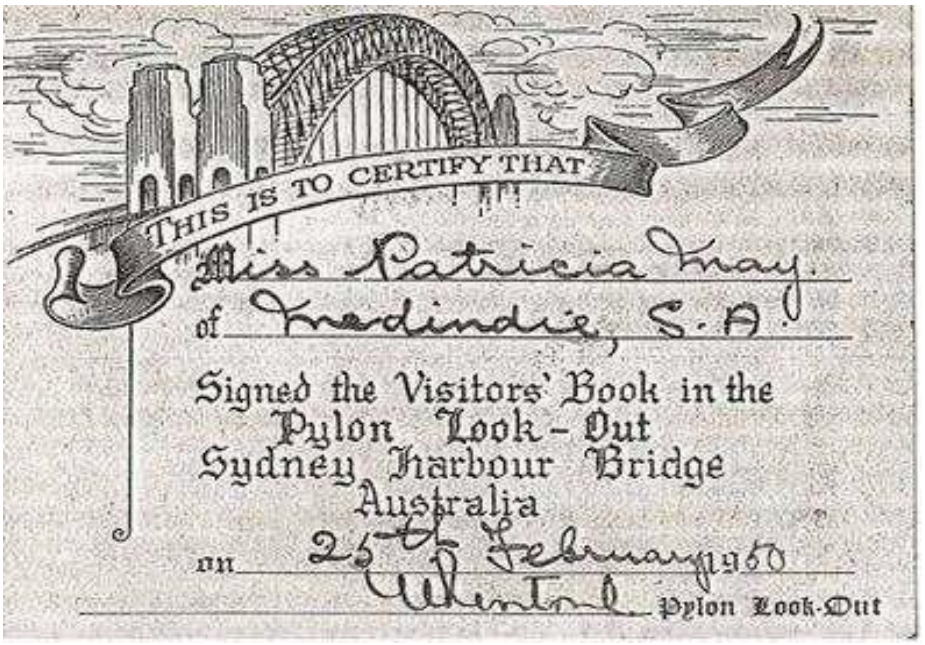
The term Camera Obscura is from the Latin words:
Camera is a vaulted chamber or room and
Obscura means dark

Hence Camera Obscura literally means darkened chamber or room.

Initially large and immovable objects Camera Obscura's were developed over many years, when in the 18th Century they had at last been made portable and were to become the forerunner to today's modern cameras. Such devices were used by the founding fathers of modern photography, including William Fox Talbot.

Signatures of the Mighty

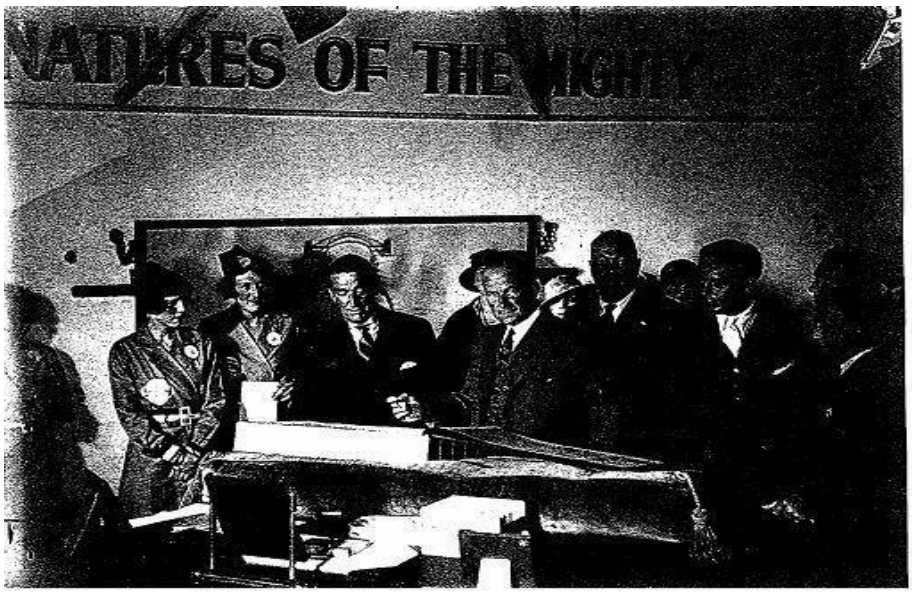
A special 'Visitor's Book' was available for people to sign called the 'Signatures of the Mighty', comments were also encouraged, hopefully full of praise for the exhibition and of course the fabulous view from the top. One such comment was written by the then leader of the federal Labour Party, James Scullin, he wrote: "A magnificent exhibition; truly unique".



A Visitors Books called 'Signatures of the Mighty" was available for people to sign.

Among the many other signatures were those of the record breaking British pilots Charles William Anderson Scott and Tom Campbell Black. Scott became world famous when he broke the England–Australia solo flight record in 1931, and Black is best remembered for winning the London to Melbourne Centenary Air Race in 1934, accompanied by Scott.

The Duke of Gloucester, The Prince Henry, later to become Governor-General of Australia in 1944, also signed the book on his first successful visit to Australia in 1934.



Signatures of the Mighty guest book being signed by The Duke of Gloucester in 1934, who later became the Governor General of Australia in 1944.

As with nearly all the attractions for the visitor to enjoy, the act of signing the visitor's book came at a cost. The charge for entering your name into the annals of Pylon history was 3d (three pence). However, there was more to it than just signing your name. Each signatory was then given a memento and a small souvenir of their visit in return for their three pence spent. This memento and souvenir consisted of a card printed in scripted gold letters, with dotted lines for your signature, thereby chronicling the fact of your visit. This card was itself signed by several government dignitaries whose job it was to look after the welfare of the bridge.

The accompanying souvenir consisted of a small pebble of granite, reportedly to be an actual chip of one of the thousands of blocks shaped and placed in the great walls of this magnificent structure.

The present day location of the 'Signatures of the Mighty' book is now unknown and research continues into eventually uncovering it, and hopefully restoring it to its former place of honour back in the pylon.

The Eagle Table

On display also was the then famous 'Eagle Table'. The Eagle Table is reputed to have cost 400 guineas, approximately $1,800 in today's money, and was said to have been specially built for one a member of the English nobility during the reign of George II (1683-1760). It was later sold at Christies auction house and was reported to have been sold for a bargain price of 250 guineas ($900).

Australian's Men who made the Grade

Today, as there was back in 1934, there are 200 steps winding their way up from road deck level to the first public chamber and adorning the walls of this staircase were many photographs of famous Australian's who, it was decided, had 'Made the Grade'. Each photograph carried a short biography of the individual concerned; among them were photos of Sir Arthur Rickard, a renowned property developer, and the former Prime Minister of Australia, The Rt Hon. William (Billy) Hughes.

Many more of these photos can be seen on the walls of the 'Mothers Nook'. Today we

have signs reminding us of the spirit of the bridge workers which read:

- Blood sweat and fears
- A new form in a new era
- Complex tasks simple tools

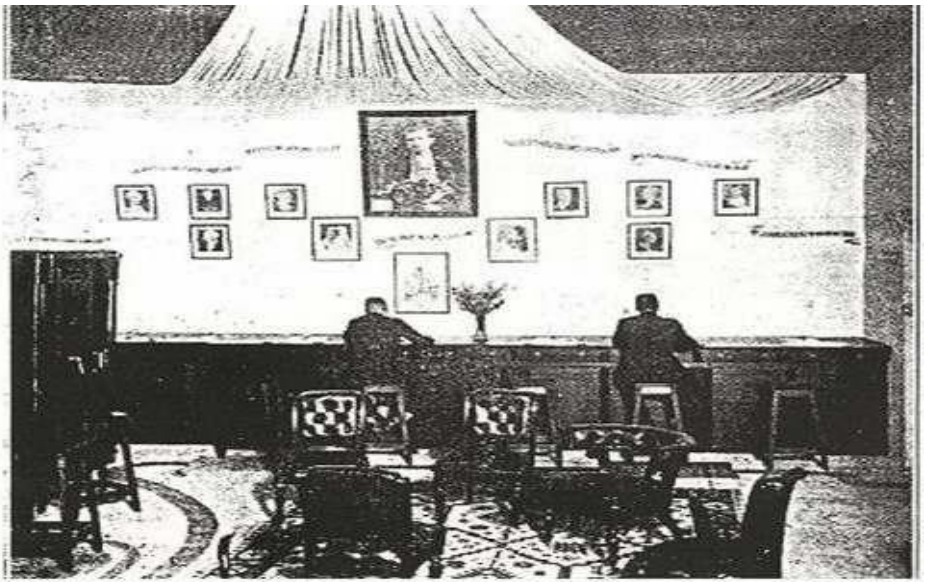
Mothers and Fathers Nook

Like the Mothers Nook where it was possible to write letters on Pylon headed notepaper and where there were displayed large photographs of well known Australian mothers, there was also a Fathers Nook. Again this offered the opportunity for men to sit rest and write letters and postcards to friends, family and loved ones.

In both spaces there were glass display cabinets. In the Mothers Nook there was a cabinet displaying what was called "Women's Wants", a display of the items "utilised by the female in her daily peregrinations" (as described in the official program). It is assumed that such items would include hats, gloves, handbags and its various contents.

The Fathers Nook displayed a similar glass case in which were the "Men's Wants". One can only assume that the items in this display were things such as cigarette case, lighter, pocket watch etc (this is only an assumption as the details of both cases have been lost in the annals of time.

Above both the "Women's Wants" and the "Men's Wants" displays were equally amusing tableau of women's and men's "Hates" One is left to ponder what must have been written on these tableau's as they too have failed the test of time.



Mothers Nook

The Tashi Lama Exhibition

The Tashi Lama statue

For reasons known best to Archer Whitford a Buddhist exhibition was organised and proudly on display was a wooden Tibetan statue which, in the Buddhist tradition, was a talisman for good luck. Quite a novelty in its own right it soon became known to many sightseers as the 'Lucky Man of the Harbour Bridge'.

The Tibetan word 'Tashi' or sometimes spelt 'Trashi' means "good fortune" or "auspiciousness" which can be found in many names of places and people in Tibet. The "Tashi Lama" is a title used in older English sources to refer to the Panchen Lama, who is the highest ranking lama after the Dalai Lama.

The Crown Jewels

A replica set of the British Crown Jewels, of which the originals have been housed in the aptly named Jewel House at the Tower of London since 1303, were on display and attracted huge attention at the time. Many people are thought to have believed them to be the originals, though there are no recorded accounts of anyone attempting to steal them as was the case with the originals in 1671 by the infamous Irishman, Colonel Thomas Blood.

Café Supreme

A lavish café, aptly named 'Café Supreme' offered customers an assortment of hot and cold food and was a welcome sight after ascending the 200 steps from the road deck level.

The café was advertised as serving a: "…Luncheon overlooking a beautiful vista of the harbour. You can also buy ice cream, chocolates, cigarettes and ice cold fruit drinks, at the buffet".

Souvenir Shop

As with today's pylon exhibition there was also a souvenir shop back in 1932. This offered customers a wide variety of souvenirs ranging from tie pins to snow cones to information brochures on the many exhibits on display, as well as general information on Sydney and the harbour. It also claimed to have some "Unusual souvenirs… All Australian made and first rate quality and your choice of more than 200 low priced lines in Sydney's highest shop".

Whilst it isn't known exactly how 'unusual' the souvenirs were, it would appear from the surviving newspaper advertisements at the time that it was a very well stocked shop nonetheless.

Telescopes

On the viewing deck at the top level of the lookout 16 telescopes were installed to allow visitors unparalleled vistas of Sydney. Unfortunately the make and magnification of these particular telescopes is now lost to time, as too are the telescopes themselves.

The Sydney Morning Herald of 17 February 1934 wrote of this increasingly popular attraction:

“A number of the American tourists from the SS Lurline (an American cruise liner) yesterday looked down on Sydney from the top of the south-eastern pylon of The Sydney Harbour Bridge They praised what they saw The consensus of opinion was that- they had not seen anything more enchanting during their tour. An American boy looking through a telescope saw "most of the animals at the Zoo”. One of the giraffes could be seen clearly It was also possible through the telescopes to tell the time from the clock in top tower at the Showground”

Finding your specific location to view was made all the easier by the installation of the copper location indicator on the top of the parapet wall. This is still there today and although many of the locations marked are now either gone altogether, or cannot be seen due to the ever expanding city skyline, it is a wonderful reminder of how the city of Sydney must have looked to the people in the days and years after the bridge was completed.

Today there is an additional location detector in place consisting of a plate glass surround etched with the position of many of the original locations found on the copper cladding.

Sydney Harbour Bridge Times

The Sydney Harbour Bridge Times was a locally produced newspaper especially printed for sale in the pylon although where it was actually printed is unknown. It was, and still is, the only newspaper in the world ever to be produced for a bridge, and the South East Pylon is the only pylon in the world to have had its very own newspaper.

An image of the only newspaper in the world ever to be produced for a bridge, The Sydney Harbour Times.
The Pylon Times was a fully fledged newspaper with news and advertisements from all over Australia and the rest of the world.

Aboriginal museum

Also within the pylon Archer Whitford had established a museum of the aboriginal life in Australia. This included both the actual accounts of aboriginal life and also many aboriginal artefacts gathered from all over the country. This exhibition was the biggest of its kind anywhere in Australia and proved to be very informative, especially to the many visitors who came from overseas and had limited knowledge of the plight of the aboriginal people prior to European settlement in 1788.

Spanish Armada

Replicas of the Spanish Armada, the fleet sent by king Phillip of Spain in 1588, to attack England, was also a very popular exhibition, especially with children. These replica ships were all built to scale

Mulga Wood Store

Mulga trees are an Australian only tree in that they only grow in central Australia and in no other part of the world. The wood is carved and polished and are considered quite a valuable commodity. There were many examples on display and all were for sale.

Wind Gauge

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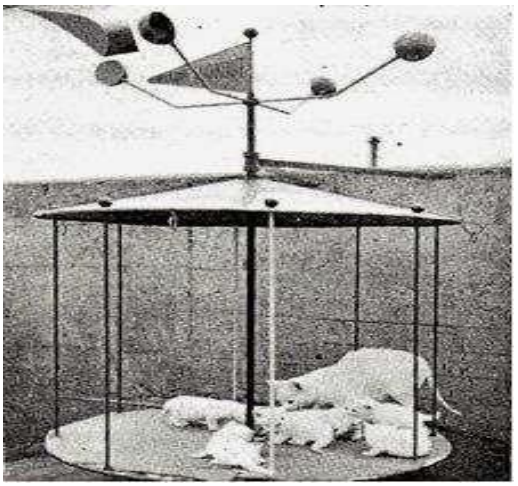
In July 1934 Archer Whitford received official permission from the Department of Defence to erect a wind gauge on top of the pylon. This was to serve as an indicator for the direction of the wind for aviators passing over the Sydney Harbour Bridge



Other Exhibitions and Attractions

All Australian Exhibition

On the 17th of December 1948 the new 'All Australian Exhibition' was opened to the public under the management of Mrs. Yvonne Rentoul.

Sydney Dioramas and Photo Studio

The Pylon exhibition had its own photographic studio where visitors could have their photo taken against a number of printed backgrounds called “dioramas”. These curtain backgrounds were specially designed and printed on Australian cotton by Annan Fabrics Ltd of Mosman.

What is a diorama?

A diorama can be defined as a scene that captures a moment in time. This simple definition is fairly broad and covers a large area however this is the very nature of a diorama. It can be almost anything as long as it captures a moment in time and displays some type of scene with multiple objects. This display of multiple objects and how they interact is the second most important aspect of a diorama because it shows us a complete scene.

An example of a diorama today is The "Royal Clock". This is located on the upper level of the southern half of the Queen Victoria Building, Sydney and is designed by Neil Glasser and made by Thwaites & Reed of Hastings in England. This popular diorama displays animated scenes of English royalty.

The Royal Clock located at the Queen Victoria Building, Sydney is a sequence of dioramas depicting scenes of Australia's history.

Dioramas on display

There were six dioramas on the first main exhibition chamber on the first floor of the Pylon.

These depicted the history of Australia and its industries along with its sporting prowess. These six dioramas were:

1. The department of Immigration: Advance Australia. This depicted Australia Day with Capt Arthur Phillip raising the British flag upon arrival in Sydney Cove on the 26th January 1788.
2. Rich Harvest: A depiction of the rich and diverse agriculture of Australia.
3. Sunshine and Opportunity: The depiction of a vast land of sunshine, beaches and the good life.
4. Streamlined farming: Depicted the union of primary and secondary industries and the improvement in farming techniques. It also highlighted the fact that Australia was now manufacturing its own machinery instead of importing them, as had been the case for many years previously.
5. Land of Sport: Depicted the love of sport that has become a national past time with many Australians.
6. Wines from the Soil: This illustrated the growing industry of wine making in Australia and traces its origins back to the first fleet and the planting of vines in Bridge Street, Sydney, which produced Australia's first home grown wine in the 1790's.

The second chamber contained the next set of dioramas. These were:

7. Building for the Future: This depicted Australian banking, defence and transport along with other secondary industries.
8. Waste into Paper: This showed the development of the paper and cardboard industries and thereby reducing the need for importation of such products.
9. Salute the Navy: This depicted the tradition and pride that Australia has in its navy.
10. Industrial Improvement: This highlighted a secondary industry which had reached a milestone in 1948 with the introduction of the all Australian made Holden car.

11. The Island Continent: This diorama depicted the tie that Australia had with the 'Mother' country (England) and its links via the sea routes and the introduction of new and improved cruise liners such as the Orient Line's R.M.S. Orcades.

12. Australians are Air minded: This depicted the advances in air aviation and celebrated the likes of Sir Charles Kingsford Smith and other great Australian airmen and women.

Other Dioramas

On the next level there was another, unique diorama built entirely out of confectionary by MacRobinson & Co Ltd. Sir

Macpherson David Robertson owned the MacRobertson's Steam Confectionery Company and was the major confectioner in Australia. He was also renowned for his generosity and by 1933 he had reportedly given away an estimated £360,000, much of which went to the British, Australian and New Zealand Antarctic expeditions of 1929 and 1930. As a reward for his support Sir Douglas Mawson named MacRobertson Land in Antarctica in his honour.

Two further dioramas were exhibited in which were shown models of two proposed luxury hotels and a holiday camp, all planned to be built in the up and coming north shore suburb of Narrabeen.

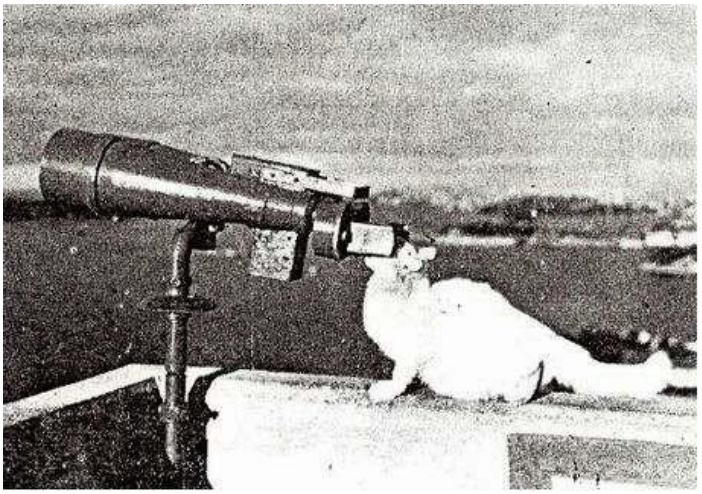
Other Attractions

Another of many features of the Pylon was a vast map of the world showing, with the aid of 20 large clocks, controlled by a master clock, the time in various parts of the world.

There was also an assortment of rather antiquated arcade games.

On the landing before reaching the top level there was an exhibition and display of a little known Australian industry, the manufacture of carpets. Visitors were welcome to admire the quality and beauty of the fine examples on display.

The array of sixteen telescopes was also available for visitors to view the amazing sights of Sydney from the narrow viewing platform surrounding the blockhouse. This is explained in greater detail in 6.2.12. Giant Japanese binoculars were also on display. These binoculars were reported as having been captured from a Japanese naval ship in the vicinity of Hiroshima at the end of the Second World War.



One of the famous white cats of the Pylon peering through the giant Japanese binoculars.

On the walls of the winding staircase leading up to an exhibition chamber were photographs of various famous actors and sportsmen, especially jockeys. There were also a number of humorous cartoons by the Black and White Artists illustrating the distinctive nature of the Australian character. The Black and White Artists were formally known as The Australian Cartoonists Association formed in 1924 and later called the Black and White Artists Club. Their legacy to the cartoonist industry is the prestigious Stanley Award, or The Stanley's, awarded annually to the best cartoonist in Australia.

Rifle Range

On the second level there was a miniature rifle range where visitors were encouraged to test their marksmanship.

Map of NSW

On the third level there was displayed a map of NSW, however not just any map of NSW. This was in fact the largest map of NSW ever made (as of 1948). The scale of this map was 4 miles to 1 inch (6.4km to 2.54cm). The standard topographical maps of today are on a scale of 1:250 000 (1cm on a map represents 2.5km on the ground). The map was also electrically lit and at a cost of 3d (three pence) one simply had to move a dial pointer to the number beside the name of the town you wished to see and it will be illuminated.

On the landings between the next two levels were photographs and more dioramas depicting the life of mining in Australia, and especially the mining of silver, lead and zinc ore by the mining company, Zinc Corporation Ltd, later taken over by Consolidated Zinc Corporation Limited which itself merged with Rio Tinto mining in 1962 to become today's Rio Tinto Zinc (RTZ).

The Pylon Tearooms

The former Café supreme of Archer Whitford's tenure had now been replaced by the more modern Pylon Tearooms and Buffet. The fare was very much the same as before with an assortment of homemade scones and cakes, chocolates, confectionary and cigarettes.

The backdrop to the tearooms was a hand painted mural depicting life in Sydney. This could quite possibly be the 'Magic Picture' however it has yet to be established if this is the case.

The Magic Picture

The Magic Picture was situated on this level and was produced with the collaboration of two of Australia's most distinguished artists and fashion photographers. Bill Constable, who for many years was the set designer for the Australian Ballet, and Noel Rubie, one of the first fashion photographers in Australia, and possibly the world, to appreciate the beauty of African women as fashion models and who had previously spent six months travelling and photographing on Africa's Gold Coast.

Unfortunately no record of this 'Magic Picture' can now be found, however it was advertised as being of a size and composition never before seen in Australia.

Model Railway

The exhibition of Archer Whitford boasted the "largest and best model railway in Australia". This model railway was still to be found in Yvonne Rentoul's 'All Australian Exhibition. It was a double track, elevated model rail layout which ran in a circle from the second landing to the top parapet lookout, a distance of over 36 meters (40 yards). Visitors were of course encouraged to operate this model themselves, at a cost.

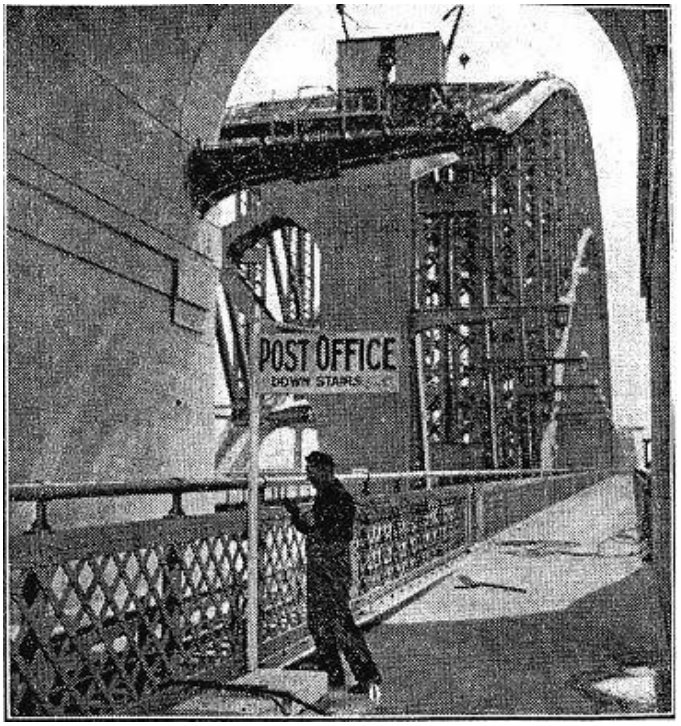
Captain Cook's Cottage

A fine and detailed model of Captain Cook's Cottage was on display, the original of which was erected in Fitzroy Gardens in Melbourne. Captain Cook's Cottage was originally built in 1755 in Great Ayton Yorkshire England and later donated to the people and state of Victoria as a centenary gift.

In 1934 the cottage was moved, brick by brick from Great Ayton to Melbourne. It was shipped in 253 crates complete with a cutting of original ivy which had grown on the building. This same ivy now covers the cottage.

Captain Cook's Cottage. In 1934 the cottage was moved brick by brick from Great Ayton Yorkshire England to Fitzroy Gardens in Melbourne Australia. A model replica was displayed at the Pylon.

The Original Pylon Post Offices: 1932



A post office for the despatch of souvenir telegrams is being erected in the centre of the southern pylon.

From March 19th until April 2nd 1932, a post and telegraph office was opened within the south-east and north- east pylons of the Sydney Harbour Bridge. All normal postal transactions were performed, with the exception of the issuing of money orders. There was also no facility in place to allow for conducting any banking business. Souvenir telegrams, which were issued on elegantly designed telegraph forms, and could be sent from either office. They could then be collected, on application, at the destination post office at the opposite end of the bridge.

Judging from the photo below it would seem that the Post Office, at least in the South East Pylon, was originally situated on the mezzanine floor and most likely in the office at the base of the stairs leading from the mezzanine to the eastern catwalk. Later it is most certainly sited in the Pylon proper.

Telegrams were also received from interstate offices and were transmitted to the bridge Post Offices, however they had to be specifically and clearly addressed to the 'South-east Pylon" or "North-East Pylon" as the case may be, and followed by the desired office of destination, in this case, The Sydney Harbour Bridge.

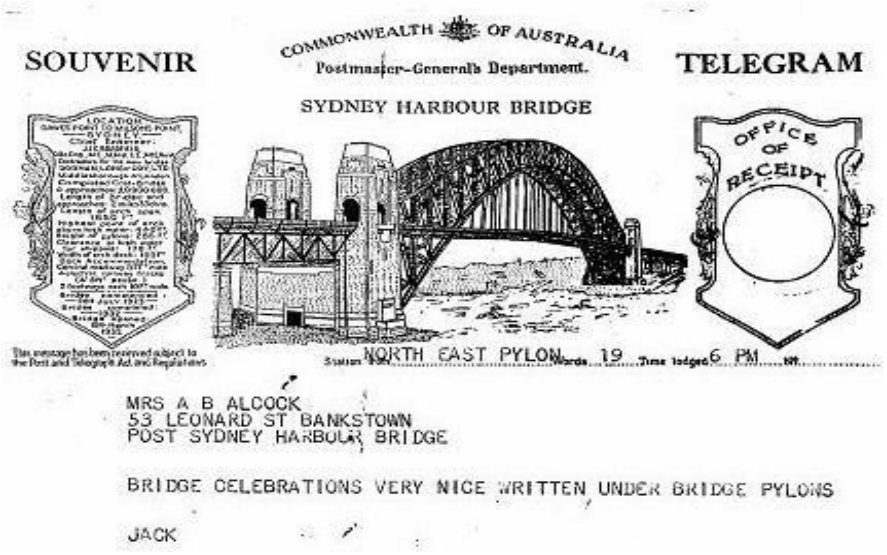
A special stamp was designed and printed for the mail actually posted within the bridge pylons, and the souvenir telegrams, would also bear the imprint of this stamp. Special post boxes, along with public telephones, designed in special cabinets, and used primarily for long-distance telephone calls, were situated within each pylon entrance.

The First Telegram

The first telegram sent from the Pylon Post Office was sent by the Post Master Archer Whitford to the Acting Premier Mr. Percy Pease. The message it contained was a greeting from "the smallest, but not the least important, post office in the world," situated in the Sydney Harbour Bridge pylon.

The message also stated that this was the only post office on any bridge in the world, and the telegram was one of the first ever to be sent from there.

Mr. Pease dutifully replied, expressing his appreciation on receiving the telegram, and wishing Mr. Whitford's new Post Office every success.



Pylon Stamps

Such was the anticipated success of this new tourist attraction that an estimated 72,800 stamps were printed for the pylon Post Offices, although there is some debate as to the actual number sold, as opposed to the number printed.

There were 4 stamps issued as First Day covers, two red 2d stamps and a blue 3d along with a green 5/- (5 shilling) stamps. The design featured the bridge from the south-east, with the cruise liner, R.M.S. Orford passing beneath. These stamps were first issued to the pylon Post Offices on the 14th March 1932, with Mr Archer Whitford as the authorised Post Master.

Forgery and Fraud

At the time of the opening of the Sydney Harbour Bridge, and with it the Pylon Post Offices in 1932 two of Australia's stamps were forged with the sole intention of defrauding the Australia Post, and hence the Commonwealth of Australia. Back in 1932 the post office came under the control of the Post Master General which itself was a senior government position.

The first of the two Australian stamps forged was the 2d red (two pence) King George V Head which had been around in various forms since 1913. Unlike today this particular stamp had remained almost unchanged over the intervening years and many millions had been printed.

The second forged stamp was of the then recently opened Sydney Harbour Bridge stamp. This was also a 2d (two penny) red value which was the domestic postage rate of the day. As with the King George V Head stamp many millions of these (not the First Day Covers) had been sold, and as such even half good forgery would have been very difficult to detect.

There was a gang of three men operating this forgery scam in an attempt to sell forged Irish Sweepstake tickets. It was an Adelaide philatelist (stamp collector) who eventually detected the forgery and notified the local police. All three men were later arrested and the police uncovered and seized 60,000 forged stamps. The reason they were detected and identified as forgeries was that the collector noticed that the stamp was un-watermarked and line perforated. It was perhaps somewhat surprising that no-one else in the country had actually noticed this discrepancy before.

Two professional forgers, Harry Stewart Elderfield and Charles Jackson were later sentenced to 12 months imprisonment.

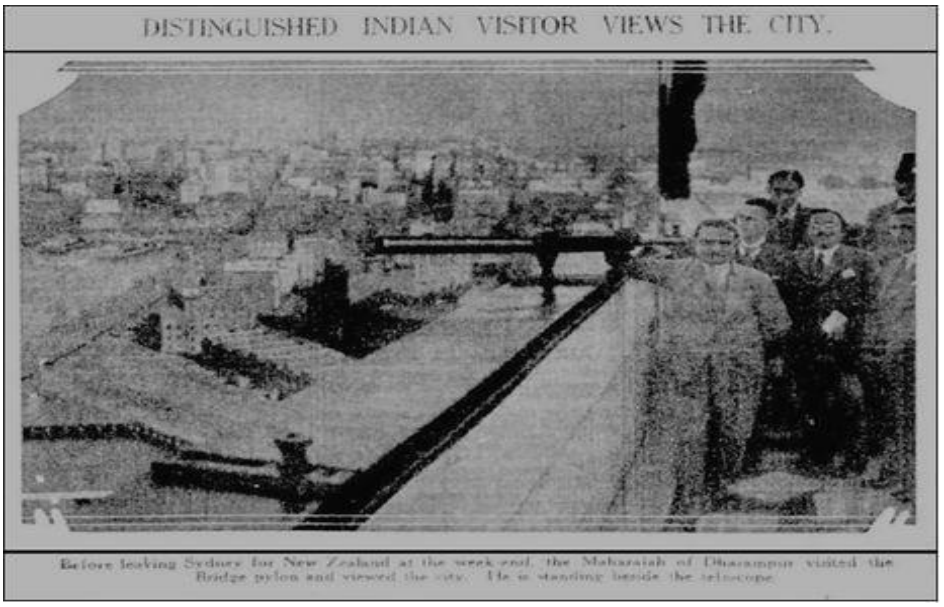
In a strange quirk of fate it would appear that there are no genuinely used examples of the 2d Bridge forgery, and all mint examples of it and the 2d George V would appear to have been somehow 'lost from police evidence'.

Today a First Day cover of the four stamps issued from the Pylon are said to be worth somewhere between $3,500 - $5,500, depending upon it's condition.

Similarly a First Day of Use stamp, a stamp actually sold in the pylon Post Office on the day, are thought to be worth in the region of between $850- $1,750, again depending upon their condition.

The Famous and Influential Visitors of the Pylon

A number of famous people made a point of visiting the Pylon Lookout exhibition as it was THE place to see, and in some cases, THE place to be seen, as it is with Maharaja Maharana Vijayadevji II: The Maharaja of Dharampur, who ruled the ancient state of Dharampur (India) until it all came to an abrupt end when independence and partition came suddenly in 1947, forcing him to relinquish control over his beloved principality. There were many such famous people who visited the Pylon Lookout and left their names in the Visitors Book, sadly now lost.



The Maharaja of Dharampur, Maharana Shree Vijayadevji II made a visit to the Pylon Lookout during his visit to Australia and New Zealand for a health visit.

The Pylon at a Cost

The cost of visiting the Pylon Exhibition was a relatively cheap 6d (in old money), which, compared the cost of a front row stall at the cinema in Sydney in the 1930's was 2/- (two shillings), was a considered by most visitors to be a very affordable family experience. The final cost, however, of enjoying all the attractions the pylon had to offer was perhaps a different matter, as The West Australian of Saturday 19 March 1938 rather cynically reported; "You'll pay sixpence to go in, but you'll pay a lot more to come out."

Of the 101 other attractions there was included various animal exhibits, such as a magnificent rooster complete with an 18 foot (6metres) tail. There was also a collection of 'funny mirrors' which distorted the image and 'penny peep' shows.

The Pylon Closes its Doors to Visitors

From 1942 to 1945 the Pylon was closed to visitors and on the 14 July 1942 all tourist activities ceased war in the Pacific. The Pylon was taken over by the Australian Military Forces. The unit charged with protecting Sydney and its harbour was the 101st Anti-aircraft Battery.

1982: The Re-Opening

The South East Pylon re-opened in 1982 with an exhibition marking the Bridge's 50th anniversary. The refurbishment included a certain amount of material from the original 1932 museum, sadly however many of the original exhibits have disappeared without trace.

In the first week of operation there were in excess of 4,000 people who came to view this newly opened attraction and many came with the sole intention of buying one of the Department of Main Roads (DMRs) limited edition commemorative envelopes, each of which had a specially designed postmark, or to call in at the recently established temporary Post Office, which was opened for the first week only. Others came to simply admire the view or remind themselves what it had been like over ten years earlier or to see what changes had taken place to the ever expanding skyline in the meantime.

Admission to the Pylon was currently 50 cents for adults and 30 cents for pensioners and for children. The Pylon was only open on Saturdays, Sundays and Mondays between 9.30 a.m. and 5.00 p.m.

The Pylon Exhibition was laid out so that on the first level was a comprehensive and informative photographic record about the construction of the Bridge from its beginnings in 1924 until its completion in 1932.

Toilets, seating and a water fountain, along with the small twin viewing platforms were on the middle level. A small shop selling brochures was also situated on this level, much like the present day layout.

The top level remains the same today as it was in 1982 with the narrow viewing platform and parapet walls.

Bicentennial Exhibition 1987

In 1987 a 'Bicentennial Exhibition' was opened to mark the 200th anniversary of European settlement in Australia in 1988.

On the 18th of December 1987, a group of past and present bridge workers gathered outside the RTA workshops, at the base of the abutment tower to celebrate the official opening of the Bicentennial Exhibition. Inside the pylon itself were displays of school work from local students.

The pylon bicentennial exhibition was also dedicated to the men and women who contributed to the design, construction and maintenance of the bridge and a plaque was unveiled to honour these people by the NSW Minister for transport, and Labour MP, the Hon T.W. Sheahan.

A group of past and present bridge workers celebrate the official opening of the Bicentennial Exhibition.

The Proud Arch Exhibition

In April of 2000 the South East Pylon is closed to the public and the Roads & Traffic Authority in association with BridgeClimb commenced work for the installation of a new exhibition - 'Proud Arch'.

In November of 2000 The South East Pylon Lookout opens to the public with a landmark exhibition celebrating the 'Proud Arch'. The exhibition included the glass directional finder in the observation level of the lookout. This compliments the copper clad directional indicator originally installed in the 1930's.

Included too are the many and various acquisitions of important heritage artefacts which started life in the original Bradfield Museum artefacts. Many of these items are still on display today in the main viewing chambers, whilst others can be found at Bridge Climb's new Exhibition and Visitors Centre at No. 5 Cumberland Street.

'Proud Arch' tells the story of J.J.C. Bradfield, Chief Engineer of the Sydney Harbour Bridge and his amazing achievement: It chronicled the design, construction and the dedication of an amazing team of dedicated men and women, without whom the Sydney Harbour Bridge would not perhaps have become the national and internationally world renowned icon that it is, and to them it shall forever remain the 'Proud Arch'.

The Honour Roll

The Pylon Lookout released an 'Honour Roll', a brochure which sets out to formally recognize the people who worked on the Sydney Harbour Bridge. The 'Honour Roll' was a project aimed at detailing and recording the actual names of the workers and the contribution each of them made to the construction of the Sydney Harbour Bridge. Of those workers there are 460 who have so far been identified and their efforts recorded for posterity.

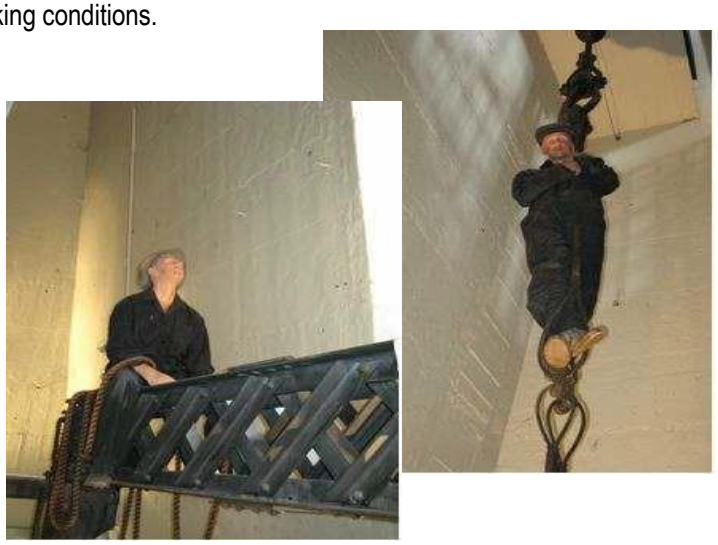
Of those whose names remain yet to be discovered 'The Honour Roll' is a testament to their memory and commemorates their contribution. The 'Honour Roll' covers the period from the initial Bridge Enabling Act of 1922 to the commencement of construction on the northern approaches, to the actual opening of the bridge itself in 1932.

BridgeClimb: The Exhibition, June 2003

The South East Pylon Lookout closes for a period of four weeks for the installation of a new exhibition. On 23 June 2003, the Pylon Lookout re-opened with new exhibits including the installation of a 'Dangerous Works' model which highlights aspects of working conditions experienced during construction of the Sydney Harbour Bridge, and two spectacular stained glass memorial feature windows depicting the skill and dedication of the workers who made the Bridge.

Dangerous Works' Model Exhibit

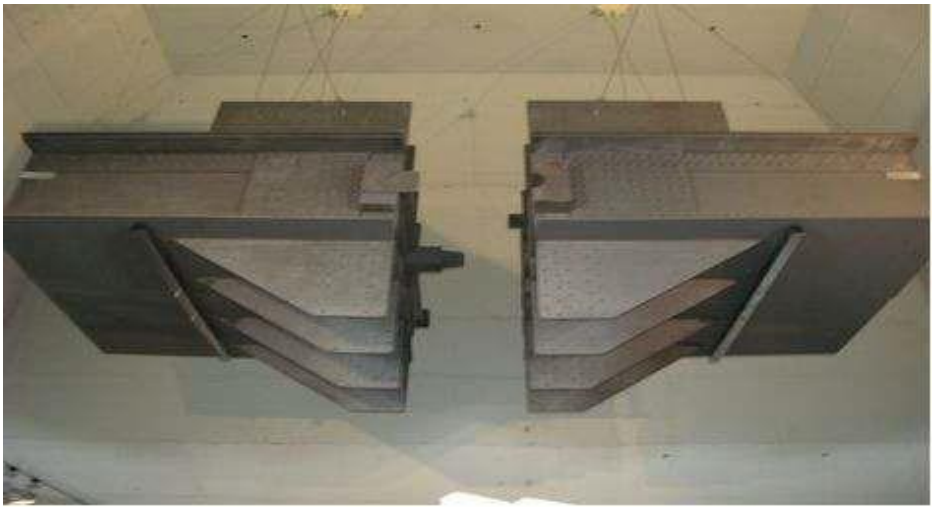
A cantilevered structure and sculpted figures, modelled from photographs taken during construction, demonstrate how the Bridge was built and highlights aspects of the working conditions.



Working conditions are highlighted by using sculpted figures, modelled from photographs

Joining of the Arches Exhibit

Suspended from the ceiling at the Pylon Lookout is an original half-scale plywood model of the massive centre pin that was used to fasten the two half arches together.



An original half-scale plywood model of the centre pin as displayed in the Pylon.

Work and Workers' Stained Glass Windows Exhibit

The cathedral-like windows were designed by Australia's foremost stained glass artist, Robin Seville. The windows were commissioned by BridgeClimb in 2003.

They depict the different trade workers during the construction of the bridge.

The trades represented are: Painters, Riveters, Stonemasons, Riggers, Surveyors and Concreters.

Stained glass windows depicting the different trade workers during the construction of the Bridge.

A showcase of Bridge artefacts and historic souvenirs including: a Micrometer Theodolite [3], Reverend Frank Cash's Camera (Minox camera used to take photos of the Sydney Harbour Bridge under construction) and a collection of model Hinges and Bearings and JJC Bradfield memorabilia.

There is also an 8 minute audio-visual presentation featuring rare archive footage taken during the construction by Henry Mallard and the Rev. Frank Cash.

At present the Pylon Lookout is open to the public 7 days a week from 10am to 5pm (excluding Christmas Day).

Peter Nichol Russell Medal (Institute of Engineers Australia) awarded to Dr Bradfield in 1932 for contribution to science and engineering, its highest honour.

The Sydney Harbour Bridge Opening Medal 1932 awarded to Dr Bradfield and others involved in construction of the Bridge.

A Gold Fob Watch presented to Dr Bradfield by the NSW Public Works Department in 1916 for 15 years of service.

Pylon to Pylon Tightrope Walk

In 1973 the Frenchman Philippe Petit walked a tightrope across the Bradfield highway when he walked from the Northeast to the Northwest pylons. He actually crossed five times before eventually being arrested and fined
$200.

Petit later went on to tightrope walk between the Twin Towers of the World trade Centre on 7 August 1974. This walk he did eight times before being arrested.

'Man on a Wire' a documentary which centres on Philippe Petit's walk between the Twin Towers earned the Director, James Marsh worldwide acclaim, including the Sundance Film Festival's World Cinema Jury and Audience awards in 2008

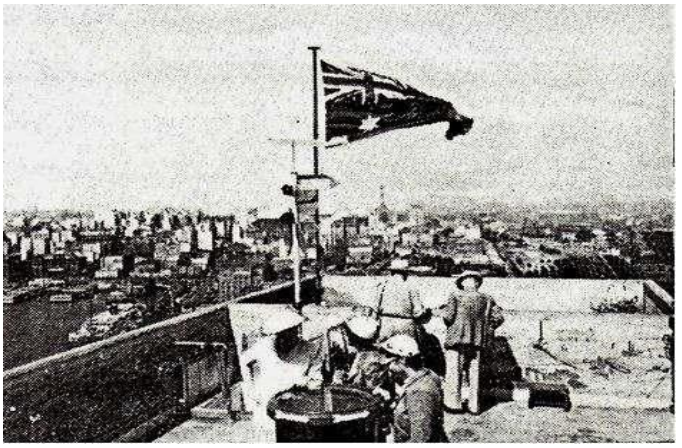
Trivia: A person who walks tightropes is called a 'Funambulist'

To watch Philippe Petit's amazing feat watch:

(http://www.youtube.com/watch?v=UWCOQnRLwQQ).

The Bridge at War

From 1942 to 1945 the Pylon was closed to visitors and on the 14 July 1942 all tourist activities ceased. The Pylon was taken over by the Australian Military Forces. The unit charged with protecting Sydney and its harbour was the 101st Anti-aircraft Battery.



Structural engineering work was done in order to adapt the pylons for military use. The original pyramidal blockhouse roofs were first levelled off and the parapets were then added, thereby raising the top of the pylons by more than a metre and in doing so significantly changing the architectural proportions of the pylons. Some remains of the gun mountings can still be seen today.

The Government agreed to provide compensation to Archer Whitford for any losses incurred through the Commonwealth's occupation of the pylon. The pylons themselves were modified to include a new gun deck and parapets and the situating of anti-aircraft guns designed to assist in both Australia's defence and general war effort. Gun emplacements were installed on all four pylons.

The Bofors guns installed on the gun deck of the south east pylon was a 40mm gun designed by A.B. Bofors of Sweden in 1929. They were adopted by the British army in 1938 and many were later shipped to Australia at the outbreak of the Second World War.

In addition to the Bofors were also two Lewis guns or more correctly known as Lewis automatic machine guns, a rapid fire American designed weapon first invented in 1911. It had a rate of fire of between 500 to 600 rounds per minute as opposed to the Bofors which could fire 120 rounds per minute (the later L70 increased its fire rate to 330 rounds per minute). From 1942 to 1945 the Pylon was closed to visitors.

The Bofors replaced the Lewis guns altogether in August of 1942.

Initial testing of the Bofors loading and firing mechanism showed there to be problems maintaining the rapid fire rate required of the gun. Although much improved in 1930, when the 40mm gun was first introduced the guns used to defend Sydney and its harbour chose a local company of Commonwealth Moulding Pty Ltd, of Arncliffe, to further develop and manufacture the firing mechanism in 1941.

An example of the actual firing mechanism used on the Pylon to defend Sydney and its harbour. This is on display at the Powerhouse Museum's Castle Hill site.

The installation of the weapons on the pylons cost a total of £4960, a considerable sum of money at the time, thus indicating the importance of the pylons as a defensive position for the defence of both the harbour and the bridge.

Sleeping quarters were also installed and the pylons were manned around the clock.

Although Sydney was never actually invaded from the air, only by the Japanese midget submarines in the attack on the USS Chicago on the night of the 31 May 1942, in which 21 sailors died aboard the converted Sydney ferry, Kuttabul the guns were however fired in a case of what is now called 'friendly fire'

A Commanding Officer of the pylon gun emplacements, Lt Col, Whiston, in an interview on 11th May 1999, said that whilst no enemy action was encountered the gunners on the south east pylon were expert marksman. This they proved in an incident he recounted when the service men stationed atop the pylon complained of the American airmen continually 'buzzing' the Sydney Harbour Bridge in acts of 'Top Gun' bravado.

In an act of frustration a gunner let fire with a round from a machine gun into the wing of the American plane. The flyer immediately reported the incident to his commanding officer, who had already been advised of the annoyance felt by the man in the pylon at these random and un-necessary daredevil acts, and who on hearing this from his flying ace was reported to have said that he should be happy to have learned that the men defending their city were as good at their job as he was at his.

There were apparently no further instances of the bridge being 'buzzed' by allied airmen again, Col Whiston said. The

guns were finally removed from all the pylons on 23 October 1944.

In another act of derring-do the Australian pilot Flight Lieutenant Peter Isaacson, who flew Lancaster bombers in Europe during WWII and was later to receive the Distinguished Flying Cross, actually flew one of the enormous bombers under the bridge. This incident occurred in October 1943, while Isaacson was on a flight to raise money for war bonds; A far-cry perhaps from the seemingly reckless acts of his American counterparts.

Another interesting, but little known fact of this period, in which the pylons, and hence, the bridge itself, was a military installation, was that the bridge was actually mined by the Australian army, and would have been blown up in the event of an attack by enemy forces.

The details of this are scarce and little is known of the actual location of the planned charges, however it is known and recorded that Dr Bradfield himself was asked where best to place the explosives for maximum effect.

(Some of the information above relating to the cost and location of the gun emplacements was provided by M. Arthur Kennedy. Mona Vale. Sydney) Traffic

Mrs Yvonne Rentoul

Mrs. Yvonne Rentoul, the wife of the then manager of the Hotel Australia, operated the Pylon Lookout between 1948 and 1971, together with Mr. L. Kippax as Manager and Mrs. Connelly as Secretary.

Mrs. Rentoul was a dedicated cat lover, who at one stage owned up to 60 white cats. The cats lived in the roof top cattery and soon became a very popular tourist attraction in their own right. Such was the popularity of the white cats that Mrs. Rentoul ended up making a small profit from selling the kittens as souvenirs. They were described as "A joy for kiddies and a delight for adults".

They also became an eye-catching feature of the Pylon publicity. One brochure declared their "immaculate garb and priestly aloofness make them trustworthy keepers of the Wishing Wells secrets". In the Pylon Visitors Book, one young local visitor proudly wrote, "I'll bet they haven't got cats on the Eiffel Tower!" [8]

The ever growing family of friendly felines lived in a 'cattage' on the roof of the Pylon Lookout. This was accessed by 14 steps up a ladder from the Parapet or observation level. Here they had their very own merry-go-round. They roamed freely on the roof garden and also 'guarded' a wishing well and fishpond which was located there. It was only in wet weather that the cats were seen to be inside, or most likely taking shelter under the fishpond. Other than that they were always seen sitting on the narrow parapet walls. They were fed by the attendants and always ate their meals on top of the parapets.

Mrs. Rentoul applied for a license to operate a Post Office in the Pylon in 1953, however the Post Office did not reopen as the authorities refused the request submitted on behalf of the company operating the concession.

Mrs. Rentoul's lease expired in 1971 and was not renewed, most likely because of her expanding family of white cats, for which it was considered she could not provide suitable living conditions.

The pylon was to remain empty for over a decade, being used mainly for storage by the Department of Main Roads (DMR).

Significance of the Traffic Engineering

The Sydney Harbour Bridge (SHB) was seen as part of the transport scheme for the development of the metropolis, as a means of opening up the North Shore to settlement. Even Greenway predicted this back in 1815.

When the city was overtaken by the Bubonic Plague in 1900, the slum conditions could no longer be ignored. A push was on, among the more progressive professional to “re-house slum dwellers and professionals alike in new, clean, garden suburbs”. Transport was at the heart of these plans.

There was little discussion about the coming dominance of the motor car although people like Bradfield knew this would be the way of the future. It was not until 1959, after the tram tracks had been converted to roadway, and that private vehicles became the dominant mode of transport. Coping with the rapid increase in motor vehicles has been a continuing concern, despite efforts to maximize flow by changing peak hour lanes.

Freeman's original design for the bridge estimated the number of cars, trains and people it would carry in any given 12 hour period to be: 72,000 cars, 2,000 trains and 500,000 people.

Today's Comparison:

Vehicle statistics across the SHB on a daily basis : Approximately 136,000 vehicles travel across the SHB form the Northern suburbs to the City and an estimated 145,000 vehicles travel across the Sydney Harbour Bridge in the opposite direction. These numbers drop by as much as10% on Saturdays and 20% on Sundays.

By 1976 one-billion vehicles had crossed the SHB. The first 500 million crossings took over 33 years while the second 500 million took less than 11 years.

The comprehensive road and rail systems planned by Bradfield have never been completed so the Bridge cannot be blamed in isolation for the continuing traffic problems Sydney road commuters experience almost daily.

The construction of the SHB as a long awaited link was the most important event in the development of Sydney's ever expanding transport system.

RTA and Traffic Management

Computers at the Transport Management Centre (TMC) in nearby Redfern control the traffic flow in Sydney and throughout the state of NSW. The TMC's mission is at all times to ensure the most effective utilisation of the NSW roads network, while maintaining the highest levels of safety.

A series of closed circuit television (CCTV) cameras continually monitor traffic on all major roads in Sydney and any incidents or delays that occur. There are five cameras monitoring the traffic flow on the SHB. One near Observatory Hill, facing north, one on the South Western Pylon facing south, one on the north western chord facing south and one along the Warringah Freeway facing south.

The cameras can be moved to zoom in or zoom out on traffic or individual vehicles if necessary. These actions are controlled from the TMC centre in Redfern. Breakdowns and accidents on the Bridge are monitored by CCTV, immediate accident and breakdown response is activated from the TMC. Traffic Emergency Patrols and if necessary, emergency services are immediately dispatched.

The system used to monitor traffic is an RTA designed and manufactured state of the art system called SCATS (Sydney Coordinated Adaptive Traffic System). SCATS is a local product but is now widely used in other cities throughout Australia and has been sold and distributed overseas. As of 30 June 2010, SCATS was licensed to
32,847 intersections, in 141 cities, across 24 countries worldwide.

There is a separate, self contained Transport Management Centre for the tunnel located next to the northern
Bridge tollgates.

The Bradfield Highway is reportedly the busiest highway in Australia thus requiring 24hr monitoring.

Traffic control measures were vastly different back in 1932, when, traffic control measures consisted of a policeman stationed on point duty at each end of the approaches. All vehicles entering a lane were required to remain in that particular lane until they had crossed the Bridge. This remained in operation until 1951 when rubber lane markers were laid. These were removed, under police escort, for the twice daily peak hour lane change.

In 1966 the restriction on changing of lanes was eventually cancelled and in 1977, closed-circuit television surveillance through 20 cameras, and a system of movable median strips was installed, however, the manual placing and removal of rubber flaps ('flapping') continued until 1985 when the current Electronic Lane Control Signals were finally installed.

Toll Operations

The toll gates on the SHB are managed by the Financial Division of the RTA.

For the financial year ending 2010 the toll revenue collected on the SHB was $84,785 million.

Funds raised from toll collection on the SHB go to paying off the Sydney Harbour Tunnel until 2022. After which it will be transferred to public ownership.

In 2009 cash tolls were phased out and E-Toll became the only way to pay a toll on the SHB.

The traffic lanes on the SHB are all between 2.85 and 3 metres in width and each lane can carry 2,600 vehicles per hour.

When tolls were introduced at the opening of the bridge toll collectors were forced to risk life and limb by standing on makeshift timber islands in the middle of the road, with just a light handrail around them for protection from accidents, and absolutely no protection from the weather. This remained until December 1932 when temporary toll barriers and booths were added.

The fees charged for crossing the bridge were complicated, with a number of different charges in place, for example there was a charge of one penny per head of sheep, or pigs and 3 shillings for vehicles over 3 tons. Each car was charged 6 pence plus extra for passengers: 3 pence for adults, a penny per child. It cost 3 pence to ride a bicycle over the bridge but pedestrians were allowed to cross for free.

Toll Table as of 1932: At a glance

There are also other indications of how the bridge has changed over time. In 1932 the tolls were:	
Motor cars and motorcycles with side cars	6 pence
Sulkies, buggies and hand carts	3 pence
Vans, lorries, wagons over 2 tons	1 shilling
Horse and rider	3 pence
Horse and cattle as loose stock	2 pence a head
Sheep or pigs	1 penny a head

Sydney Harbour Bridge Tow Truck Operation Facts

- RTA Recovery Vehicles (Tow Trucks) are managed by the Traffic & Transport Directorate of the RTA.
- The RTA manages, assist and remove vehicles that have been involved in an accident or breakdown on the SHB. Private towing vehicles are not permitted on the SHB so the RTA undertakes all tow offs from the SHB including those where the NRMA is called.
- The towing service is provided free of charge to the motorist by the RTA. In the 1950's it was an offence to run out of petrol on the SHB. Today it is no longer an offence and there is no charge or fine associated with running out of petrol.

- If Motorists are involved in an accident or breakdown on the SHB they are asked to stay within their vehicle, activate hazard lights, call NRMA from within car and await assistance.

- The Sydney Harbour Bridge is constantly monitored by the Transport Management Centre.
- The Tow Truck Operations Centre also has twenty screen monitors where the SHB and the Western Distributor are constantly monitored for accidents and breakdowns.
- During the peak traffic period of 6.30am to 9.30am the RTA will generally have a Tow Truck in assistance within six minutes.
- The RTA currently average 150 tow operations per month, the vast majority of these being motorist running out of fuel.
- The RTA currently have 10 tow trucks including a range of small, medium and large vehicles to ensure the capacity to tow vehicles ranging in size from motor bikes to semi trailers and buses from the SHB.
- The largest tow truck in the RTA fleet has a towing capacity of 58 tonnes which allows them to tow a fully laden B double semi trailer.

Maintenance

Maintenance Cranes

In 1997, the new maintenance cranes on the Sydney Harbour Bridge (SHB) where handed over to the Roads and Traffic Authority (RTA). Because of the application for heritage listing, the cranes had to resemble the four original cranes which serviced the Bridge for 67 years.

Three of the four original cranes are now in storage in Rockdale awaiting their future. The whereabouts of the missing forth crane is unknown.

A few facts:

- The cranes operate hydraulically and are powered by electricity (there are buzz bars that run along the chords in the enclosed boxes marked “DANGER”). To move up the arch they wind up on a cable that is attached to the summit.

Interesting reads on the old cranes: http://www.icssydney.com.au/index.php?id=413
http://www.icssydney.com.au/index.php?id=416

- The boxes marked: DANGER, carry 415 volts (3-phase power and telephone line).
- Computers oversee the crane's operation.
- Sensors tell hydraulic arms when to lift so cranes can pass over cross-members.
- Platforms can be lowered to deck level and can be locked together to form a single platform or 'L' shape configuration to make maintenance of hangers more efficient.
- The cranes are operated by two crane drivers (the old cranes required eight men who physically laid a 25 metre chain in front of each crane when they had to be moved).
- Travel to the Summit takes approximately 20 minutes, with top speed being 25 metres per minute. The old cranes took five days to move from Pitt Street to the Summit.
- They have been designed with BridgeClimb in mind – hence the ability of climb groups to pass under them.
- The new Sydney Harbour Bridge Cranes cost approximately $1,000,000 each.

SASM: The Southern Approach Span Maintenance Project

In March 2003 the RTA (now RMS) began a major project to repaint the entire Southern Approach Span of the SHB. The existing lead based paint on the structure is being entirely removed and a new high performance painting system is being applied to all of the steelwork. The work involves repainting some 90,000 sq m of steelwork, is expected to cost $49 million and is due for completion in late 2014 (weather permitting).

Funding for the works has been provided by Road Network Infrastructure Maintenance (RNIM), a branch of the RTA, now renamed RMS as of November 1st 2011. All work will be undertaken in accordance with the Australian Standards and Environmental Protection Authority, as well as the RMS's internal Environmental and Noise Management Guidelines.

In reference to the works the following have been taken into consideration in relation to possible impacts and will be constantly monitored during the SASM work; topography, drainage and watercourses, vegetation, land use, residences, noise, access, footpaths/cycle ways, visual amenity and air quality. Major repainting has not taken place on the Southern Approach Spans for 15 years prior to commencement.

Robots - Two autonomous grit-blasting robots now form part of the SASM project team, helping to improve the safety, efficiency and quality of the grit-blasting process. The operator simply has to position the robot in the general area that needs to be blasted (exact positioning is not required because the robot is clever enough to work out where it is), the robot scans the structure and builds it's own 3D map of the steelwork, then once the operator is happy that the area is safe to blast he sets the emergency stop button and presses the 'start blasting' button on the Operator Control Unit, then the robot gets on with the blasting.

Because robots can move in ways that humans cannot, it can achieve a consistency of blast that even the most experienced blasters could not match. The blasters are powerful enough to cut through clothing and skin. UTS has signed a deal to commercialise the robot design in a bid to crack the international market for cleaning major structures.

(http://www.sbs.com.au/news/article/2013/07/18/robots-repaint-sydney-harbour-bridge)
(http://sabreautonomous.com.au/products/bridge-blasting-robot/)

Occupational Health and Safety Precautions

Work areas inside the access platforms are fully contained. By designing small containments and using air extractors to filter and remove airborne particles, the exposure risk to workers and the general public from airborne lead has been absolutely minimised. Paint and abrasive blasting debris are sealed into drums at the work site. The drums are removed from the site by a licensed transporter to a regulated disposal facility.

Continuous atmospheric monitoring also takes place outside of the containment to ensure the effectiveness of the containment and prevent any potential risks to BridgeClimb, the general public and the environment

The former Australian company of Heggies, now part of the global environmental firm of SLR Management Ltd, was commissioned by the RMS to conduct an ambient air quality monitoring programme as part of the environmental monitoring program associated with the repainting works of the Southern Approach span. Air quality samples are collected at three locations surrounding the blasting works, using a High Volume Air Sampler, with a Total Suspended Particulate (TSP) Hood. Samples are analysed at a NATA accredited laboratory for TSP and Lead.

Street Lighting

Original lighting for the Bridge comprised over 292 fittings of several types. Perhaps the most significant were those that spanned over the road deck on the end of a cantilever bracket. Whilst the original light fixtures have been replaced, the cantilever brackets can still be seen (these arms are the only pieces of curved steel used on the Bridge).

The original light fixtures used on the Bridge were poorly designed as they mainly emitted light in a horizontal direction and not downward, where it was most needed. Improvements inevitably happened with time, especially in 1955 when diffusers were added to deflect light onto the road deck. With the construction of the Cahill Expressway, the lighting was slowly upgraded. By 1968, all the original light fittings had been replaced except on the four sets on the Bridge Stairs.

Ultimo and White Bay Power Stations provided the original power supply for bridge lighting. Power was delivered to substations in Argyle St, NW pylon, SW pylon and Milsons Point Station. The site and buildings of White Bay Power Station are now disused and derelict (it can be seen to the right of the Anzac Bridge from Sydney Harbour Bridge), whereas the site and buildings of Ultimo Power Station are now the Powerhouse Museum.

Floodlighting

Floodlighting of the Bridge did not begin until the 1960's; however, the Bridge was lit during its opening in 1932, using searchlights from warships.

Permanent floodlighting of the Bridge was installed on the eastern side by 1962 with 'Mercury Vapour Lamps'. The western side was not lit until 1984.

Modifications to the floodlighting on the Sydney Harbour Bridge (SHB) again occurred in 1988. In 1992, electrics giant, 'Phillips' sponsored a major modification and all the mercury vapour floodlights were replaced by the Metal Halide Lamp system we see today.

In all there are 350 Metal Halide Lamps which are replaced every four years by RMS.

The SHB is floodlit for 6-7 hours every evening (between dusk and 1am on weekdays, 2am on weekends). The average cost to light the SHB is $12 - $13 per hour, or an annual cost of $30,000.

OTHER INTERESTING COMMENTARY

The Australian Coat of Arms

Kangaroo and Emu Myth

The idea that the Australian Coat of Arms features a kangaroo and emu because they are the only animals that don't walk backwards is an urban myth. Both animals can walk backwards but do so infrequently.

It is highly likely that the idea of using the kangaroo and emu was because they are only found on the Australian continent and were large enough to be positioned together holding up the shield.

Daredevil flights Under the Sydney Harbour Bridge

Kittyhawks under the Sydney Harbour Bridge

In February 1942, 2nd Lieutenant, Frank Stiertz of the USAF flew his Kittyhawk underneath the SHB. This angered local authorities and Stiertz was grounded for two weeks after the incident. He died the following month after crashing his plane whilst practicing touch-and-go landings at Bankstown.

Early in May, 1942 on a Sunday afternoon traffic on the bridge came to a standstill as two US Kittyhawks flew under the Harbour Bridge.

The Americans, it appeared, had a passion for aerial displays and were often seen 'buzzing' the SHB.

Atop the pylons were mounted anti-aircraft armaments in the form of 40mm Bofors guns and machine guns, and it was during one of these displays of bravado that the hitherto unused guns was brought into action. Under the command of Lt Col Whiston the gunner was asked to put a round into the wing of an American low flyer, without of course injuring either pilot or plane. The intention was to show that whilst the pilot had excellent command of his plane, so too did the Australian gunner have excellent command over his weapon.

The pilot returned to his base and immediately reported the incident to his commanding officer, who had already been advised previously about his pilot's actions close to the bridge. His response was to suggest that the pilot should be thankful that the gunner was such a good shot and perhaps in future they should show a little more respect for their allies.

Dutch Courage

After evacuating 11 aircraft from Singapore the Dutch airline KLM were coerced into selling them to the USAAF. Unhappy at this situation and the loss of their planes the Dutch pilots decided to go one better than their American allies. On the 14 May 1942 the Dutch decided to make a spectacular flight over Sydney Harbour. 10 serviceable aircraft were ordered to make a test flight over the Sydney Harbour Bridge. 50 passengers were on board. Approaching from the heads, several aircraft flew over the Dutch destroyer, Tromp however; three of the planes altered course without warning.

A DC-2, DC-3 and DC-5 lined up the bridge approaching line astern from the east, the planes passed under the Bridge, made a wide turn and then flew in single line under the Bridge again before returning to Kingsford Smith Airport. Although no permission had been granted, and a fine of £100 ($200) for each person involved was supposedly imposed, no further action was taken.

24 Squadron Wirraways

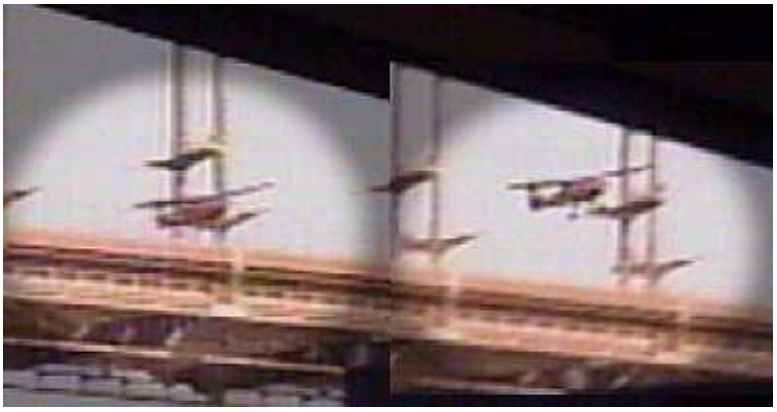
In 1943, a flight of 24 Squadron RAAF Wirraways were carrying out a leaflet drop over Sydney. Their Leader, Flying Officer Geoffrey Stevenson decided to take a slight detour under the Sydney Harbour Bridge. The rest of the flight followed him. One pilot who changed his mind at the last moment, just managed to pull up and clear the top of the Bridge. Fortunately for Stevenson and the other pilots there were no serious ramifications from their Commanding Officer when they returned to Bankstown airfield.

"Q for Queenie"

On the 22nd of October 1943 Flight-Lieutenant Peter Isaacson, was touring Australia in Lancaster Bomber named, "Q-for Queenie". In what was described as dare devil flying, Isaacson flew the bomber full of journalists under the Bridge from east to west. The stunt was designed to raise funds for the war loan.

No. 94 Squadron Mosquitoes

During V-P (Victory in the Pacific) Day celebrations on 16th of August 1945, three No. 94 Squadron Mosquitoes flew under the Bridge.



Single - Engine Gazelle

On the 5th of May 2004, Louis Campbell, a 23 year old former flying instructor and Griffith University graduate from Geebung on Brisbane's north side, and a male passenger, the plane's owner, Sunshine Coast aerial photographer Peter Bellingham, flew under the Bridge. Ms. Campbell, who stated she did not know it was illegal to fly under the Bridge, faced a maximum two year jail term.

Did you know? Australia's first powered flight

The first controlled, powered flight of an airplane in Australia was made by the world famous escapologist Harry Houdini.

On March 18, 1910, whilst on a visit to Australia, Harry Houdini brought with him his newly purchased German built Voisin biplane. At the small township of Digger's Rest, (30 km. north-west of Melbourne), Victoria Houdini flew his US$5,000 biplane for about 100 yards to become the first aviator to fly a controlled flight in Australia. He was also the first to record his efforts on film.

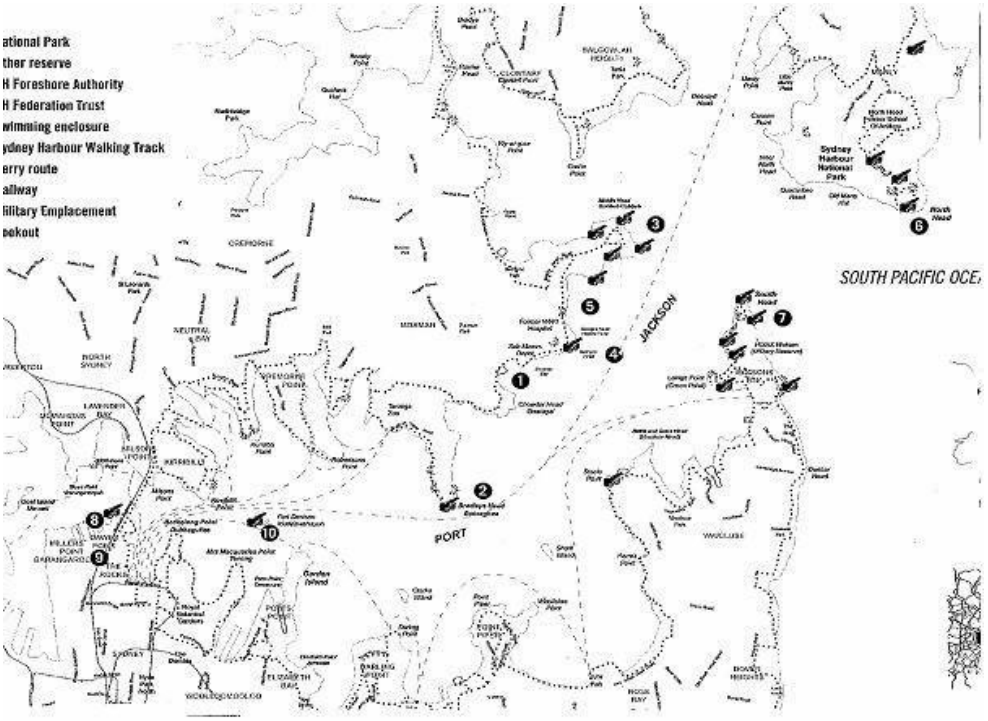
Later, on March 21st, he again set another Australian aviation record when he flew his Voisin biplane for a total time of 7 min. 37 sec, covering a distance of about 6 miles (9.5kms). He is reported to have reached the dizzy height of almost 100ft (30.5mt).

Houdini later flew his biplane in an aviation air show at Rose Hill racecourse on Monday 25th April 1910.

The Harbour at War

Military Installations around Sydney Harbour

The entrance to Sydney Cove was guarded by a fortification just one year after the First Fleet arrived. A fortification was constructed in 1789 by Lieutenant William Dawes (1762-1836) on what has now become known as Dawes Point, below the southern approach span of the SHB. Originally called Point Maskelyne in honour of the British Astronomer Royal, Dr Nevil Maskelyne, the Point like many other areas in the new colony, came to be known by the name of the person who inhabited it, and so it was that the this peninsula came to be known as Dawes Point.



Map reproduced from 'Fortress Sydney' prepared by The Australian Army Artillery Museum in association with The Department of Environment, SHFA, SHFT and The Heritage branch of NSW Dept of Planning.

Early Installations

Sydney's earliest forts were Fort Phillip, Fort Macquarie and Dawes Point Battery. They're primary purpose was to fend off enemy ships that may come close to the town and to beat down any potential convict uprisings in the new colony. In particular, they were to protect the colony against England's perceived enemies of the day, most notably the Spanish in 1790-1791, and later the French under Napoleon in 1810, and lastly the Russian Pacific fleet during the time of the Crimean war of the 1850's. It was thought that all three would sooner or later be arriving to claim the land they believed belonged to them.

Dawes Point Battery was disbanded in the mid 19th Century and the original buildings were demolished in 1925 to make way for the Bridge. The whole site and foundations were recently excavated in 1995, revealing works from the 1830s including the original gunpowder magazine.

Catalysts for Military Improvements

Sydney's early defence history was primarily influenced by events in Europe where England had grave concerns about the threats from its continental neighbours. These threats soon filtered down to the fledgling colony where the authorities were urged to build ill equipped and poorly planned fortifications, until, that is, they ran out of money, guns, or momentum, leaving the new defences unfinished and wholly inadequate. As mentioned above the main concerns were:

The Napoleonic Wars (1803 to 1815) and following the French Revolution of 1789 and the fear of French invasion at the start of the 19th century. A single, rock-cut battery was built around 1801 at Georges Head, facing the entrance to Port Jackson. The battery was not actively garrisoned and soon fell into disrepair.

When two American warships, the Peacock and the Vincennes, from the United States Exploring Expedition arrived unannounced on the night of 30th November 1839, alarm bells rang and a series of defences were hastily built at Kirribilli Point, Pinchgut and Bradley's Head, but these were mainly to comfort the citizens of Sydney rather than ward off any serious attack. These forts were under-gunned and poorly designed. They all continued to focus on defence of the inner harbour.

The Crimean War: (1853-1856) and Fear of a Russian Invasion in the 1850's.

Fortifications were built at Middle Head, South Head and Bradley's Head, when a scheme was developed to arm the outer harbour. After the arrival of Governor Denison in January 1855, and in the middle of the refortification program, the scheme was abandoned and once again the emphasis shifted back to the inner harbour. Existing fortifications were reinforced and finally completed. Fort Denison and Bradley's Head were upgraded. Sandstone fortifications, remnants that survive today, were also built on Garden Island. In 1855, the Royal Navy began berthing ships at the island.

Defending Ourselves

In 1870, British garrison troops withdrew from Australia and the colony was expected to defend itself at its own expense. In March 1877 two military advisers, Sir Peter Henry Scratchley and Sir William Francis Drummond Jervois arrived in the colony to coordinate colonial defences and to ensure defence strategies served imperial, rather than local interests. Following their report of 1878 a string of works were undertaken at outer and inner Middle Head, Georges Head, South Head, Steele Point and Bradleys Head, however new technologies and improvements in armaments led to a near redundancy of the fortifications by the 1880's. In 1885 they also designed and built a fort at Bare Island to defend the southern approaches to Botany Bay.

There were also three gun emplacements set up for the defence of eastern Sydney in the late 1890's. These were situated at Signal Hill, Vaucluse, Ben Buckler, Bondi, and Shark Point, Clovelly. The single batteries consisted of a gun pit that incorporated a Mark '6' 9.2" (234mm) British-made breech-loading Armstrong 'disappearing' gun. The disappearing guns were prevalent at the end of the nineteenth century throughout Britain, its colonies and the United States. They were chosen because of their range and power, and upon firing and recoil, the gun retracted into its concealed pit and was therefore a lesser target to attacking naval vessels. The domed metal shield that covered the gun pit was devised to deflect incoming shells striking the battery. The defence work started by Scratchley and Jervois served Sydney until after WWI.

In the 1920's the development of the fortress system reached its peak. Defence sites began to be re-equipped with modern breech-loading 9.2" naval guns. These comprised the seven two-gun 'Mark 10' 9.2" batteries completed by World War Two. The new Sydney batteries comprised North Fort at North Head, and the Banks Battery at La Perouse. These sites still exist (minus the guns).

Sydney began to take on a more fortified appearance during WWII. More temporary gun emplacements were set up along the coast.

In Sydney Harbour, garrison companies were recruited to guard strategic installations including the forts, anti- aircraft guns and searchlights.

The only fatal attack in Sydney Harbour came from Japanese midget submarines, entering the Harbour on 30th May 1942.

Sydney's active coastal defence ceased at the end of WWII. During the 1950's, the batteries on George Heights and Middle Head were dismantled. The city's defence installations were used for other military purposes including training and storage. The tunnels at Middle Head were used to train some of Australia's troops sent to Vietnam. The training course was called the, 'Code of Conduct' and included lessons in how to withstand torture and interrogation.

Some fortifications have also been used as film sets (Middle Head in Stone and Bare Island in Mission Impossible II). Fort Denison is open to the public for tours and functions.

WWII Comes to Sydney

The Reconnaissance Flight

On the night of 29 May 1942, five large Japanese submarines positioned themselves 56 kms northeast of Sydney Heads. At approximately 4:20am the next day, submarine I21 launched a reconnaissance Curtis type biplane, piloted by 27 year old Flying Warrant Officer, Susumu Ito. It flew over the Man of War anchorage in Sydney Harbour, circled the USS Chicago and departed due east. The aircraft returned to I21 to report the presence of 'battleships and cruisers' moored in the Harbour. The flotilla's commanding officer decided to attack the Harbour with Midget submarines the next night.

The aircraft had been heard and seen from Garden Island. Duty officer, Lieutenant Wilson was sent out to the Chicago to see if they knew anything about it. Wilson spoke with the Chicago's officer of the watch who thought it an American Cruiser's aircraft. This conclusion was later questioned when it was identified that there was no other American cruiser in the vicinity.

It appears that at the time, little significance was placed on the sighting despite an air raid warning being issued by Fighter Sector Headquarters at 5.07am. Later, another unidentified aircraft was sighted in the Newcastle area. RAAF fighters sent to intercept were unsuccessful.

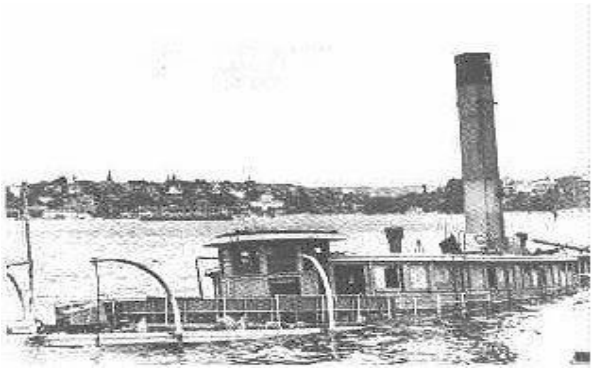
Attack on Sydney Harbour

The next day, the five large submarines approached to within 11 kms of Sydney Heads. At 4.30 pm, the Japanese released three Midget submarines to enter Sydney Harbour. A series of detection loops had been laid on the seabed at the Harbour entrance to detect shipping entering or leaving.

1st Entry

The first attempted entry was made by Midget 14 and was unsuccessful. The Midget sub crossed the loop at 20:01 and was caught in the anti-submarine net that ran between Steele Point and Georges Head. Unable to free the craft from the net, the crew scuttled and at 22:35 destroyed the sub and themselves.

2nd Entry



The second entry was made by Midget 24. It crossed the loop unobserved at 21:48 and was not sighted until 22:50. It was found in the proximity of Garden Island and was seen proceeding towards the Sydney Harbour Bridge.

Midget 24 was fired on by the Chicago and turned towards the North Shore (the USS Chicago also hit Fort Denison, thinking that it was a submarine). The same Midget sub was next sighted in the vicinity of Bradley's Head where it was kept under surveillance.

The new gun emplacement at Bradley's head had only just been made operational and whilst they did have the midget submarine within their sights they were unable to fire due to the lack of a telephone.

They were unable to contact anyone to ask permission to fire their guns as permission must be given before the discharge of any live ammunition. (This account was given by Lt Col Whiston, officer in charge of gun emplacements, Sydney Harbour)

At 00:30, Midget 24 fired two torpedoes from the area of Bradley's Head towards Garden Island. One of the torpedoes failed to explode. It passed under the USS Chicago and ran ashore on Garden Island. The second torpedo passed under a Dutch Submarine and a converted ferry, the accommodation ship HMAS Kuttabul. It exploded as it hit the sea wall behind the Kuttabul and caused a huge wave, wrecking the ferry by sinking it stern first. 19 Australian and 2 British sailors lost their lives.

Midget 24 then escaped from the Harbour at 01:58. In November 2006 the wreck of the M24 was discovered off Broken Bay. It contains the remains of the two Japanese submariners, Sub-Lieutenant Katsuhisa Ban and Petty Officer Memoru Ashibe. It has since been declared an historic shipwreck under the Commonwealth Historic Shipwreck Act 197.

3rd Entry

At 22:52, Midget 21 made an unsuccessful attempt to enter the Harbour and failed to reach the loop area. She was sighted by the duty anti-submarine vessel HMAS Yandra on patrol, and later by the HAMS Lauriana.

Two separate attacks were made on Midget 21 when the Yandra attempted to ram the submarine at 22:58, before launching a second attack of depth charges at 23:07. Midget 21 then disappeared.

4th Entry

Midget 21 finally entered the Harbour at 03.00, crossing the loop area. The Midget proceeded up the Harbour unobserved until reaching Bradley's Head where it was sighted and fired upon at 03:50 by the HMAS Kanimbla.

The midget sub was detected again in Taylor's Bay (east side of Bradley's Head) and attacked with depth chargers at 05:00 and then intermittently until 08:27. The great amount of damage done to Midget 21 was evident in the wreck when it was recovered. Unable to neither continue the attack, nor escape the harbour the decision was made to scuttle the submarine. Demolition charges had been fired but the fuses failed to explode. Both crew members were later recovered with evidence of self-inflicted gun shots to the head.

The four Japanese submariners killed that morning on Midgets 21 and 14, were cremated at the Eastern Suburbs crematorium on the 9th of June 1942. Commander Matsuo was one of the submariners killed. His mother visited Australia in 1968 and placed a wreath on the Sydney Cenotaph. She also visited Garden Island where her son was killed.

Larger Mother Submarines

Mother submarines were responsible for launching the Midget submarines. These mother submarines were moored some seven miles east of Sydney.

(1) Mother submarine I22 – launched Midget 21 (2) Mother submarine
I24 – launched Midget 24 (3) Mother submarine I27 – launched Midget 14
(4) Mother submarine I21 – launched Bi-plane for reconnaissance
(5) Mother submarine I29 – positioned off Sydney that night

After the attacks of May 30 and June 1, 1942, the mother submarines then commenced their attacks along the east coast of Australia. Between June 1942 and June 1943, 17 merchant ships were destroyed and 440 lives lost.

Midget Submarines

Each Midget submarine was battery operated, carried an Officer and a Petty Officer, and two 450mm torpedoes. They were 23.9m long and had a beam of 1.8m.

When and Why Has the Bridge Been Closed?

During its operational life spanning over seventy five years the Sydney Harbour Bridge has only been closed on a handful of occasions including the following:

Year:	Reason
1932	Sydney Harbour Bridge Opened
1946	Victory Day Celebrations - 20,000 Servicemen & women marched across the Bridge
1972	Bomb hoax. Closed for 35 minutes
1982	50th Anniversary Celebrations
1992*	60th Anniversary Celebrations
1999	All lanes closed for the erection of new flag poles by helicopter
1999	Host City Marathon
2000	Reconciliation Walk
2000	Men's Olympic Marathon
2000	Women's Olympic marathon
2001	Sydney Marathon 2001
2002	Sydney Marathon 2002
2005	Mark Webber drives Williams F1 car across Bridge
2007	75th Birthday Celebrations
2008	WYD pilgrimage across the Bridge
2009	Breakfast on the Bridge
2010	Breakfast on the Bridge
2012	Closed for waterproofing and resurfacing
2013	Blackmores Sydney Marathon, September

Paul Hogan

Paul Hogan was born on the 8th of October 1939 in Lightning Ridge NSW and grew up in Sydney. He was educated in Parramatta and left school at 15 years of age. He took on 25 different jobs before starting on the Sydney Harbour Bridge. Included in these 25 jobs was an apprenticeship in the moulding trade and a swimming pool attendant. Later he worked as a bricklayer's labourer and flour mill attendant.

At the age of 23, Paul got a job as a rigger on the Sydney Harbour Bridge. He had no fear of heights. In his youth he competed in the State Diving Championships, took up boxing and had his nose broken more than once.

Paul's typically Australian working-class philosophy and humour as depicted on 'The Paul Hogan Show' endeared him to popular audiences. Critics, however, were generally impervious to his charm. Hogan also starred in television commercials. A cigarette advertisement which exhorted, "Anyhow, ave a Winfield," was one of the most successful marketing campaigns in Australian history. In 1984, Hogan made a series of tourist advertisements promoting Australia in the United States of America. His familiar line, "Throw another shrimp on the barbie," brought in such a flood of American visitors that he was made Australian of the Year (1985). His response to this award was typical - "Yeah, well I'm not insulted by it".

In 1986 he consolidated his profile with his starring role in 'Crocodile Dundee' – at that stage, the most commercially successful Australian film ever made. The idea for the film came to Hogan while shooting tourist commercials in New York

Hogan has said that he is the character, 'Mick Dundee'. "I've invented a character who looks like me, talks like me and has the same sense of humour as me. I subscribe to the John Wayne theory of acting – always be yourself!" Hogan was awarded The Golden Globe Award in 1987 for the 'Best Performance By An Actor In A Comedy/Musical Motion Picture'. Following the runaway success of Crocodile Dundee, Hogan made a sequel, Crocodile Dundee II. In 1990, Paul Hogan divorced his wife, Noeline in 1986 and married his Crocodile Dundee co-star, Linda Kozlowski in 1990.

Sydney's NYE Fireworks

Sydney's New Year's Eve midnight fireworks display is regarded as one of the largest and most technologically advanced annual pyrotechnic display on the planet. Each year delivers a new and much awaited theme and artistic concept.

The fireworks display attracts over 1 million people in, on and around the Harbour. In Australia, over 2 million watch the live television broadcast and almost 1 billion people tune in internationally.

The fireworks display is designed and performed by Sydney's Foti International Fireworks. 2010 will mark the eleventh consecutive year Foti International Fireworks have produced the entire show.

The fireworks are specially developed at Foti's Australian and Chinese manufacturing plants and 80% of the fireworks on the Bridge are manufactured by the Foti family.

It takes approximately 6,000 hours of design and preparation to produce the NYE Fireworks.

Interesting facts of the 2008 Fireworks

- More than 5,000 kilograms of explosive devices will be fired into the sky (up from 3,000kg in 2007)

- Around 11,000 shells, 10,000 shooting comets and 100,000 individual pyrotechnic effects are used in the display
- 112,000kg of equipment is needed to put on the show
- The display requires a pyrotechnic crew of 40
- The 9pm Family Fireworks will run for 8 minutes and is synchronised to popular songs and scores from movie soundtracks
- The 9pm Family Fireworks display will use four fireworks barges.
- At Midnight the Creation Storm arrives with 12 minutes of fireworks which will burst into the sky synchronised to music as the Bridge Effect comes alive
- Seven city building rooftops and seven barges are used for the Midnight Fireworks display and of course, the Sydney Harbour Bridge
- The fireworks on the Sydney Harbour Bridge and barges are fully digitally launched, requiring 12 computers that will shoot a total of 9,200 cues
- There were fourteen 20-foot shipping containers full of fireworks pyrotechnics and 60,000 metres of wires and cables needed to put on the show.
- There were 57 firing points on the Sydney Harbour Bridge itself. Approximately 10,000 shells, 7000 shooting comets and a total of 80,000 individual pyrotechnic effects were incorporated into the display.
- The fireworks on the Sydney Harbour Bridge and barges were fully digitally launched. Twelve computers shooting 7500 cues were required. It was the largest Australian fireworks display to use such cutting edge technology.
- More than 40,000m of wires and cables were required to interface with the computers to launch the display.
- Twelve 20 foot shipping containers full of pyrotechnic resources were used. A total of 84,000kg of equipment was employed.

http://fotifireworks.com.au/

Did you know?

The cost of the 2011/2012 fireworks is an estimated $6.3m. The estimated benefit to Sydney's economy is expected to be in the region of $156m.

Sydney and its Surroundings

Dawes Point

Dawes Point is located under the southern approach span of the Sydney Harbour Bridge and over the years has seen many uses due to its unique geography. Successive generations of Aboriginal and European people have used Dawes Point as a lookout, a point of defence, shelter and as a natural starting point to cross the Harbour.

Dawes Point was originally called Point Maskelyne in honour of the Reverend Dr Nevile Maskelyne. Maskelyne, the British Astronomer Royal, had sent the first astronomical instruments to the colony with Lieutenant William Dawes in 1788. Dawes used these instruments to set up the first observatory on this site and the point was later changed to 'Dawes Point' in his honour. In addition to the observatory there was also a cemetery for prisoners executed at Sydney Gaol.

While Dawes was interested in astronomical studies, he also took a keen interest in the local aborigines and became an expert on their languages. His ambition was to produce the first dictionary of aboriginal words, which he did when he befriended a young Aboriginal woman called Patyegarang of the Eora tribe. They taught one another their respective languages however due to there being no common language between the various tribes in the Sydney area it was of somewhat limited use. Despite planning to settle in New South Wales, Dawes returned to England with the Marine Corps in 1791. In 1792, Dawes succeeded to the post of the Governor of Sierra Leone in Africa which he held for three terms until 1803. Dawes died in Antigua in 1836.

Dawes Point Battery

Dawes Point was also the site of Dawes Point Battery. The Battery, built under the direction of George 'Blaster' Barney, originally consisted of 5, 4.2lb muzzle loading, smooth bore cannon taken from the Sirius. It was built in 1791 to protect the fledgling colony from England's enemies at the time, most notably Spain, although the gunpowder magazine was actually built earlier in 1789. The battery was upgraded in 1819 when the then governor, Lachlan Macquarie, ordered convict architect Francis Greenway, to design and construct a castellated fort on Dawes Point. Other buildings were added in the early 1800's in response to other perceived threats at the time, including Napoleon's French army in 1810. The last major upgrade was in the 1850's during the Crimean War where it was believed there were further fears of an attack by the Russian Pacific Fleet. The battery received additional subterranean powder magazines and the Royal Artillery moved took charge of the installation.

Dawes Point then became the command post for the other fortifications being built by Barney in and around Sydney Harbour, including Fort Denison.

The cannon on view at Dawes Point are not the original cannon from the Sirius. The actual whereabouts of these cannon is unknown. The cannons on display are of two makes, Walker and Low Moor.

Walker Cannons

Walker cannons were manufactured from 1757 to 1821 in Rotherham, Lancashire, UK. They originally started making cannon for the American war of independence and went on to manufacture about 80 of the 105 guns aboard HMS Victory, Nelson's flagship at the Battle of Trafalgar.

The Low Moor and Walker stamps on the cannon trunnions.

Low Moor

Low Moor cannons were manufactured by the Low Moor Iron Company of Bradford, Yorkshire, a long-time British government contractor and also known in official records by the names of the proprietors Thomas and Charles Hood.

When the main defence of Sydney was eventually moved to the entrance of the harbour in the late 1800's Dawes Point battery became largely obsolete. It was used to accommodate the Commandant of the Australian Military from 1901 to 1903.

The Fort was largely demolished to make way for the Bridge in 1925. Archaeological excavations in the 1990s revealed extensive remains, including the two underground rooms for storing gunpowder. These remains have been incorporated into a redesign of the park to commemorate the site's long and diverse history.

Dawes Point has a number of other historical points of significance. The first refinement of salt from sea water occurred here in 1790. The first slaughterhouse was located here and was often referred to as Slaughter House Point.

Dawes Point was also used as a cemetery for prisoners executed at Old Sydney Gaol from1797 to around 1830.

Also situated at Dawes Point was the Water Police Courthouse which was constructed from stone taken from the original observatory, and later from Dawes Point fort. This building was demolished in the resumptions to make way for the approach span. When demolished there was found what is possibly the first sandstone headstone ever to have been quarried in Sydney.

On the sandstone is the inscription "R.R. 1789". These are the initials of Major Robert Ross, the first Lieutenant Governor of NSW.

The sandstone inscription "R.R. 1789". The initials of Major Robert Ross, the first Lieutenant Governor of NSW. The

palm trees situated around Dawes Point are Canary Island Date Palms (Phoenix Canariensis), and are perhaps the finest examples of the species in the Sydney region.

Geological & Mining Museum

The Geological & Mining Museum, later known as The Earth Exchange, started life as a power station. In 1901 the Fitzgerald's Royal Commission Plan for Sydney suggested a suitable site for a power station in the city, and in 1902 plans were drawn up by Government Architect Walter Vernon for an Electric Light Station and Workshop in a six level structure spanning George Street and Hickson Rd, complete with an octagonal chimney stack on the northern side.

The building would also house an attic level behind Romanesque style parapets and would be topped off with a gabled roof, however after further consideration these plans were altered, and in 1903 a revision to the plans showed a two level structure facing George Street and a three levels high structure facing Hickson Rd, again with an octagonal chimney stack 60 metres high on the northern side.

Construction started in 1902, however, there appears to have been great uncertainty about the viability of the project occurred by 1904. As a consequence only the lower part of the building was constructed for a power station and workshops and work was ceased. The building stood unfinished and roofless for quite some time and no generating equipment was ever installed.

Eventually the site was given to the NSW Mines Department for a museum in 1908 and opened as a mining museum on 1 November 1909 following further renovations.

Other tenants have used the building during its long history and in 1930 the first floor was taken over by The Julian Ashton's Art School and remained there until the Mid 1970's. In 1989 the building was transferred to the Geological and Mining Museum Trust under a 99 year lease secured with the Sydney Cove Redevelopment Authority, and the name of the Museum was changed to "The Earth Exchange", in line with the parallel re- branding of the NSW Museum of Applied Arts and Sciences to the new name, The Powerhouse Museum. The museum closed permanently in 1995. It is now occupied as office space for various different companies.

The Park Hyatt Hotel

The Park Hyatt hotel is one of Sydney's premier, and most expensive hotels. It has 158 guest rooms on four floors, most of which have private balconies overlooking the Opera House or the Sydney Harbour Bridge and has an underground car park for 77 vehicles. The most expensive room is the $6,600 per night Governor's suite featuring six balconies, a dining room and a marble bathroom with a spa and panoramic private viewing window of the Opera House.

Among its most famous guest have been Richard Branson, Madonna, Robert De Nero, Britney Spears, Sylvester Stallone and Elle Macpherson, Elton John, Tom Cruise and Katie Holmes and Nicole Kidman and Keith Urban spent their wedding night there. The Rolling Stones once held a party on the roof.

In January 2008 the hotel was sold to a private Japanese property investor for $201.6 million, which represents a price of $1.276 million per room.

The hotel was built by Brookfield-Multiplex and started in 1998. It was completed in January 1990. It received the prestigious Master Builders Association Excellence in Construction Award.

The Park Hyatt Hotel is one of the most exclusive hotels in Sydney. Recently it has undergone a major refurbishment program lasting almost 12 months. It opened again on 1 February 2012. The refurbishment included elegant new rooms, swish new design and even a new floor, housing three panoramic suites – one of which is the largest suite in Sydney, at 350m^2. The interior design was led by the interior designers BARstudio of Melbourne. The most expensive suite will set you back $16,000 per night.
http://www.theaustralian.com.au/news/nation/suite-luxury-is-just-a-snip-at-16000-a-night/story-e6frg6nf-1226306621954

Port Jackson

Port Jackson was first recorded, and so named, by Lt James Cook in 1770 when he passed by what he saw as just another inlet on the east coast as he continued his journey north from Botany Bay (Stingray Bay). He named the place Port Jackson in honour of his friend and benefactor Sir George Jackson who was one of the Lord Commissioners of the British Admiralty (Deputy Secretary to the Admiralty) and Judge advocate of the Fleet. Jackson later married the daughter of Sir George Duckett (Grace) and by Royal Licence assumed the name and the coat of arms of the Duckett family and became a baronet Sir George Duckett in 1797.

Circular Quay

Circular Quay was originally an estuary of shallow water featuring mudflats, partially exposed at low tide. The estuary covered an area of approximately 5 hectares.

Construction for Circular Quay begun in 1837 under the command of Lieutenant Colonel George (Blasting) Barney and it was originally called "Semi-Circular Quay", this being the actual shape of the quay, however, by 1843 the prefix 'Semi' was already beginning to disappear from most maps of the area, and has all but disappeared for good today. Initial construction was completed in 1847, however further work was undertaken in 1850. The low lying areas were eventually raised by 2 feet (600mm).

As the population of Sydney grew, and seashore trade increased, the shallow water and mudflats became an obstacle to the handling of passengers and cargo.

The Circular Quay wharf complex hosts five commuter ferry wharves and is the terminus for all public ferry routes in Sydney Harbour and the Parramatta River.

Sydney Ferries are the major ferry operator and their ferries connect 39 destinations from Parramatta in the west, to Manly in the north and Watsons Bay in the east. Sydney Ferries have been providing ferry services on Sydney Harbour for over 135 years.

Circular Quay railway station was opened on 20 January 1956 and the elevated Cahill Expressway was opened on 14 March 1958.

Semi-Circular Quay Naval Dockyard (MCA Building)

Today we see the Museum of Contemporary Art building occupying the western edge of Circular Quay but back in 1796 there was a naval dockyard situated on this site consisting of four docks. This was the first purpose built dockyard in Australia, and was built under the orders of Governor Hunter for the repair of convict transport ships and naval vessels. It was also responsible for the rebuilding HMS Supply of the first Fleet.

By 1800 there were 35 convicts employed in the dockyards as shipwrights. By 1830 the dockyard had been extended and covered an area from Cadman's Cottage to the northern end of present Circular Quay. The dockyard closed down in the mid 1830s and remained largely unaltered until 1850 when Circular Quay was further extended to approximately its present size. Naval Ordinance took over the site until the early part of the 1900s, when, in 1914 buildings were constructed to house the Department of Agriculture chemical laboratories, followed by the Department of Labor & Industry until at least the 1930s. The current MCA building was originally built for the Maritime Services Board and was in use by them from 1946 to 1953.

In 2009 the NSW government approved a $50 million redevelopment plan for the MCA building with the construction of a new contemporary extension and the refurbishment of the Museum's existing building including the creation of a National Centre for Creative Learning, along with revamped and extended gallery spaces and a new fully accessible entrance.

The MCA is the only institution in Australia dedicated to both collecting and exhibiting contemporary art.

Some of the key elements of the redevelopment are the environmentally sustainable design (ESD) and the reduction of the MCA's carbon footprint. The plans incorporate a seawater heat exchange with a fully integrated air-conditioning system offering energy savings of up to 30%. In addition there will be ESD compliant lighting, energy monitoring throughout the building, insulation of gallery spaces, as well as water and materials recycling.

The Mordant Wing

The Mordant Wing opened on 29 March 2012 and has increased the MCA's total size by almost 50 per cent with the addition of 4,500 square metres, including a new five-storey wing. 18 months of major construction work that has seen $53 million spent on refurbishing the old building under the supervision of Sydney architect Sam Marshall in association with the New South Wales Government Architect's Office. Construction work commenced in August 2010.

The new wing is named after Sydney businessman and philanthropist, Simon Mordant, whose AUD 15 million gift to the museum last year kick-started fund raising that had stalled in the wake of the 2008 global financial crisis.

Sydney Cove International Passenger Terminal

The Sydney Cove International Passenger Terminal was built in 1960 on reclaimed land and is operated by Sydney Ports Authority on a common user basis and comprises a two-level contemporary style Passenger Terminal.

The terminal was modernised in 1987 and refurbished again in 1994 and once more in 2001 at a cost of $22 million. The terminal has restaurants, bars and a hotel. The famous Arthur Murch mural "Foundation of European Settlement", which hangs in the refurbished customs hall, was also restored at a cost of $22,000. The terminal is capable of accommodating the largest cruise vessels currently operating and welcomes an estimated 100,000 passengers to Sydney annually. The average cost of berthing at the terminal for a passenger liner is $275 per hour with an additional port entry charge based on tonnage of 51 cents per tonne. The pilot charge for the Queen Victoria for example is approximately $500. (July 2009 Sydney Ports Authority figures)

The overall berth length is 300 meters, with a depth of 10.4m. Parking is available for 200 vehicles.

http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=4560023

Sydney Ferries

With the exception of Billy Blue (who we shall come to later in this manual), the history of Sydney ferries can be traced back as far back as the arrival of the First Fleet at Sydney Cove. In 1789 the first ferry service proper was established between Sydney Cove and the farming settlement of Parramatta.

On Monday 5th of October 1789 the first ferry, officially named the Rose Hill Packet (otherwise known as 'The Lump'), was launched in Sydney Cove. This was the first convict built ship in Australia.

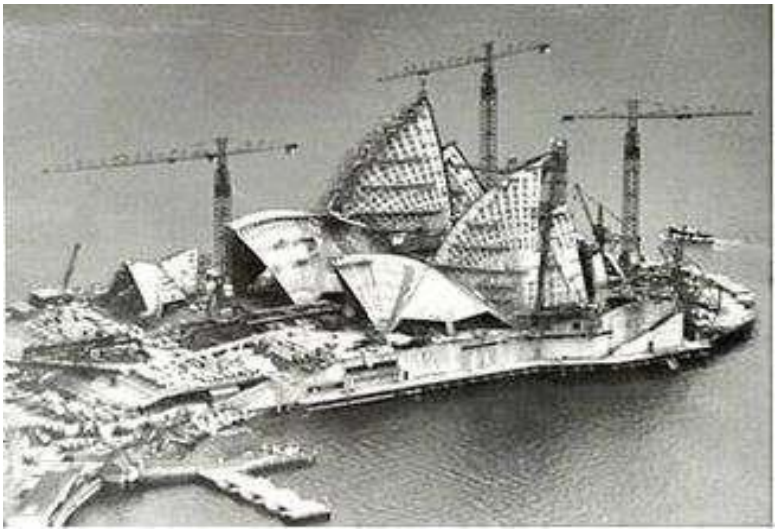
In 1861, Sydney welcomed the establishment of the North Shore Ferry Company, which operated the very first commercial ferry service across Sydney Harbour. Less than 1,000 people at the time were residing on the northern shores of Sydney Harbour.

Sydney Opera House

"To me, it is a great joy to know how much the building is loved by Australians in general and by Sydney siders in particular" Jørn Utzon 2003.

The Sydney Opera House is an Australian Icon, designed by the renowned Danish Architect, Jørn Utzon. It was officially opened by Queen Elizabeth II, on the 20 October 1973, and was inscribed in the World Heritage List in June 2007: The expert evaluation report to the World Heritage Committee stated: "…it stands by itself as one of the indisputable masterpieces of human creativity, not only in the 20th century but in the history of humankind."

Phase 1 of construction began on 2 March 1959 with the laying of the foundations.



The Sydney Opera House cost AUD $102 million to build (originally the project was estimated to cost £3.5 million or $7 million). The money used to pay for the Opera House was largely raised through a public lottery.

The first "Official" performance staged at the Sydney Opera House was the Australian Opera's production of Prokofiev's "War & Peace" on 28 Friday September 1973; however, the first "unofficial" concert at the Opera House was performed for construction workers in 1960, when American performer, political activist and human rights campaigner Paul Robeson sang songs of solidarity and protest to a spellbound crowd.

The Sydney Opera House has an estimated annual audience of 2 million. It plays host to over 3,000 events annually and provides guided tours to over 200,000 visitors per year.

The Sydney Opera House contains approximately 1,000 rooms.

It is a myth that Utzon came up with his design by pondering over an orange peel. It is true, however, that all the individual sails pieced together would form part of a sphere. This concept, called the 'Spherical Solution', allowed for a very stable structure and one, Utzon believed, could be built. Utzon did use an orange to demonstrate this idea.

Sydney Opera House Facts & Figures

- The building covers 4.5 acres with 11 acres of utilised floor space (multi-level flooring).
- Measurements: – 183m (605 ft) long, 120 m (388 ft) wide and 67.4m (222ft) tall.
- The entire building weighs 161,000 tonnes (Just over three times the weight of the Sydney Harbour Bridge).
- The roof is formed by 2,194 pre-cast concrete sections, each sections weighs up to 15.5 tonnes (15 tons) each and are held together with 350 kms of tensioned steel cable. The roofs weigh 27,230 tonnes.
- 1.056 million Swedish ceramic tiles form the sails of the Sydney Opera House.
- The stairs and floors, as well as the exterior and interior walls are faced with pink aggregate granite. Decorative interior timbers include brush box and white birch plywood. There are 6225 sq. m (67,000 Sq ft) of glass installed in over 2000 panes, in 700 different sizes. Theses are made up of 2 layers (1 plain, 1 demi – topaz tinted).
- 28,500 cubic metres (1 million cubic ft) of air per minute is circulated through the building.
- The largest hall is the Concert Hall, which seats 2,679 people.
- The power required to illuminate the Opera House is equivalent to a town of 25,000 people and is distributed over 645 kms of electrical cables.
- There is underground car park with space for 1,100 cars costing an estimated $40million to build.
- The Concert Hall Grand Organ is the largest mechanical organ in the world, with 10,154 pipes and took 10 years to build.
- The Sydney Opera House sails were built using three tower cranes made in France specifically for this job, costing $100,000 each. Sydney Opera House was one of the first buildings in Australia constructed using tower cranes.
- On 4 October 1980 Arnold Schwarzenegger won his final Mr. Olympia body building title in the Opera House.
- The Opera House made worldwide news in March 2003 when two climbers painted a "No War" slogan at the top of one sail. The repair bill for this was later revealed to be over $100,000. Both protesters were jailed for their efforts.

The Opera House Story

In the late 1950's, the NSW government established an appeal fund to finance the construction of an opera house for Sydney, and initiated a worldwide competition for a suitable design.

Design entrants were free to choose any approach they desired and were not constricted by budgetary requirements.

There were 233 design entries from 28 countries submitted, including entries from Australia, England, Germany, French Morocco, Iran and Kenya.

Jørn Utzon's (pronounced, "Yawn Oot-zan") design was chosen as the 'winner', however, his design was arguably beyond the capabilities of engineering at that time. Utzon arrived in Australia for the first time in July 1957. On 7 August 1957 a fund raising meeting was held at the Sydney Town Hall at which Utzon displayed the first model of the Opera House. Utzon then returned to Denmark to work on the plans with the help of engineering firm Ove Arup and Partners of London.

Utzon invested a couple of years in reworking the design and it was not until 1961 before he had solved the problem of how to build the distinguishing 'sails' of the roof. The solution, as mentioned earlier, was called the "Spherical Solution".

The venture experienced massive budget blowouts and there were occasions when the New South Wales Government was tempted to call a halt to the project.

In 1966, arguments about cost and the interior design, along with the Government withholding progress payments, reached a crisis point and on 28 February Jørn Utzon resigned from the project, never to return and see the completion of his work.

The building was finally completed by Peter Hall from the NSW Department of Public Works, in conjunction with architects; Lionel Todd, David Littlemore and Ted Farmer. The Sydney Opera House was opened on 20 October 1973, by Her Majesty Queen Elizabeth II.

In 1999, Jørn Utzon was re-engaged to develop a set of design principles to act as a guide for all future changes to the building. As Utzon said in 2000, "As time passes and needs change, it is natural to modify the building to suit the needs and technique of the day".

In 2001, the NSW Government provided $69.3 million for several projects to improve the facilities and environment for performing arts companies, patrons and visitors. These projects seek to redress some of the practical limitations affecting the day-to-day workings of Sydney Opera House, while preserving its unique heritage.

Jørn Utzon had agreed to be the architect for these projects. This is believed to be an unprecedented situation - to have the architect of one of the world's most iconic buildings back, working on his own creation more than 30 years after he was last involved. He was to be assisted by his Denmark-based architect son, Jan (pronounced, "Ýarn'), and leading Australian architect, Richard Johnson of Johnson Pilton Walker.

Sadly Jørn Utzon died of a heart attack in Copenhagen on 29 November 2008 aged 90, never having seen his beloved Opera House. On 25 March 2009, a state memorial and reconciliation concert for Utzon was held in the Concert Hall of the Sydney Opera House.

The Sydney Opera House was included in the National Heritage List on 12 July 2005, and inscribed on the World Heritage List on 28 June 2007.

http://www.sydneyoperahouse.com/about/house_history_landing.aspx

The Graeme Thorne Mystery: Sydney's First Ever Kidnapping

On 1 June 1960 the lucky winning Opera House lottery number 3932 was pulled from a barrel in the State Lottery Office in Barrack Street, Sydney. The 'lucky' winner was a 37 year old travelling salesman named Bazil Thorne of Bondi. His winnings were £100,000 (today estimated to be over $5 million). Bazil and Freda Thorne had two children, Graeme and Belinda (8 and 3 years old). Graeme was a student at one of Sydney's more expensive schools, Scots College.

On 7 July 1960, Graeme left to go to school as usual and simply disappeared. Before long the police had been informed and it was whilst Sergeant Larry O'Shea was busy taking notes in the Thorne's home that the phone rang. A man with a pronounced European accent asked to speak to Mr Thorne. Sergeant O'Shea grabbed the phone and pretended to be Mr Thorne only to hear the words "I have your son and I want £25,000 by 5pm this afternoon". The threat worsened when it was said that failure to deliver meant that Graeme would be "fed to the sharks".

As it was only 36 days since the lottery win, it was obvious that this was related to the £100,000 win.

This case of kidnapping was so unexpected in Australia that the Crimes Act of the day didn't even have it listed as a crime.

A press conference was called and the story made every TV and radio station, and every newspaper carried the story as front page news. A search of the area around Bondi was launched and became the biggest ever police operation in Australian history at the time.

During the investigation it was revealed that Mrs Thorne remembered that a short time after the lottery win, a man with a heavy European accent and wearing dark glasses had knocked on her door and asked for a Mr. Bognor, a name which Mrs. Thorne didn't recognize. The man then asked her if her phone number was 307113, which was correct though it was not listed in the telephone directory. It was later revealed that an employee at the Lotteries had given the Thorne's phone number to the mysterious caller with the European accent. In 1960 in Sydney, there was no secrecy attached to the name, address or phone number of a lottery winner.

At 6.00pm the following day some of Graeme's belongings were found in bush land on the outskirts of Sydney at Wakehurst Parkway. More items were found about a mile away from the first on the following Monday. The question everyone wanted answered was: Is Graeme still alive?

Sadly on 16 August 1960, five weeks after Graeme Thorne went missing; his body was discovered under an overhanging ledge of rock in the scrub on a vacant block of land only fifteen yards from an occupied house in Grandview Grove, Seaforth. His hands and feet were tied with rope and a silk scarf had been knotted tightly around the neck. The body was wrapped in a chequered car rug and Graeme still wore his Scots College blazer.

The only clue the police had to go on now was a report of a car seen in the area at the time of the kidnapping. An iridescent blue 1955 Ford Customline. Neighbours of the Thorne's had a near neighbour named Stephen Bradley who drove the same type of car, however he, and his wife were seen as such good people that they were never brought to the attention of the police, even when they moved out of their house the same day that Graeme had disappeared. Eventually they did contact the police advising them also that Mr Bradley had a strong Hungarian accent.

Eight days after the discovery of Graeme's body, Stephen Bradley was interviewed at his place of work in Darlinghurst. Bradley was now living in an apartment on Osborne Road in Manly.

The day after his interview Bradley's wife Magda, and her thirteen-year-old son, Peter, booked a one-way ticket to London on the ocean liner Himalaya. Four days later, Bradley also booked a ticket for himself and their two other children, Helen, seven, and Robert, eight, on the same ship. The next day the Himalaya with all the Bradley's' on board left Sydney Harbour.

Following an appeal for the car, the police received a call from a local used car dealer who had brought it at an auction. Immediately the police carried out tests and it soon became clear that Bradley was their main suspect, however getting him back to Sydney would be a problem as the Himalaya was long gone.

The captain of the Himalaya was contacted and asked to keep Bradley under surveillance. When the ship arrived at Colombo on 10 October Bradley was called into the Purser's office and confronted by officers of the Ceylon Police Harbour Patrol. He protested his innocence, but was locked up, whilst his wife and children were allowed to continue on to London, unable to come to terms with the idea that her husband could have carried out such a terrible crime.

With all the evidence they could gather, police were sent to Colombo from Sydney and an extradition hearing was arranged. Given the political hostility between Ceylon (Sri Lanka) and Britain at the time, it wasn't an easy hearing, but eventually Stephen Bradley was brought back to Sydney in handcuffs on 19 November 1960.

Stephen Bradley's trial opened at the Sydney Central Criminal Court on March 20, 1961. It was a long and complicated trial which centred on mostly forensic evidence. Eventually the jury were sent for deliberation.

A verdict by 10 to 8 found Stephen Bradley guilty of the murder of Graeme Thorne. The judge, Mr. Justice Clancy, delivered his sentence almost immediately: "Stephen Leslie Bradley, the sentence of this court is that you are sentenced to penal servitude for life."

Magda Bradley divorced her husband in 1965 and went to live in Europe. Bazil, Freda and Belinda Thorne moved out of Bondi to nearby Rose Bay. Bazil Thorne died suddenly in 1978 having never fully recovered from the ordeal of the kidnapping of his son.

Despite suggestions to the contrary Stephen Bradley never implicated his wife Magda in any way.

On October 6th, 1968, while playing tennis with other protected prisoners, Stephen Bradley dropped dead of a heart attack. He was forty-three years of age.

It is as a result of this tragic story associated with the 'lucky' winning of the Opera house lottery that today's lottery winners are now given the option to remain anonymous.

Bennelong Point

Bennelong Point forms the promontory between Farm Cove and Sydney Cove. Originally it was a rocky headland with a narrow tidal channel separating a small island at its tip. The Aboriginal name for the Point was Tu-bow- gule meaning ‘meeting of the waters’.

The point unofficially became known as; ‘Cattle Point’ or ‘Limeburners Point’ when cattle and horses, brought out by the First Fleet were offloaded on the headland in January 1788.

The name Cattle Point continued in use for two years until 1791, when Governor Phillip had a hut built on the point for an Aboriginal man named Bennelong. The point thereafter became known as ‘Bennelong Point’.

Bennelong had been captured in November of 1789 under Governor Arthur Phillip’s plan to persuade the Aborigines of the benefits of a European civilised life. Bennelong freely instructed the British of the Eora culture, language and clan structures. Bennelong readily acquired the English language and customs and dined with Governor Phillip frequently. The Governor utilised Bennelong as a mediator between the two cultures. Bennelong succumbed to the excesses of the European lifestyle of the day, most notably alcohol and died at Kissing Point (now known as Ryde) on 3 January 1813.

The construction of Fort Macquarie at Bennelong Point begun in December 1817 and was completed in February 1821. Designed by Francis Greenway, the Fort was a 130 sq ft (39 sq m) stone fortress and was intended to prevent convict departures from Sydney Cove and repel surprise enemy attacks from the Harbour. It was armed with 15 cannons, 10 twenty four pounders, and 5 six pounders. The process of constructing the fort was difficult.

The artisan in-charge complained Greenway had never provided proper plans and frequently changed details during construction.

Military opinion later deemed the fort of ornamental value only and inadequate for the defence of Sydney Cove.

In 1854, Fort Macquarie became a drill ground for the Colonial Volunteer Artillery. The Fort was used by the Royal Artillery in 1856 before being occupied by the Volunteer Naval Brigade. The Fort was demolished in 1901 to make way for construction of the Bennelong Point Tram Depot.

Bennelong Point Tram Depot opened on 10 August 1902 and was also known as the ‘Fort Macquarie Depot’ or ‘The Shed.’ Designed by the NSW Government, it included a number of jetties on the eastern side of the point. These jetties served as berths for the growing number of excursion ferries. Known locally as the 'Picnic Jetties', the berths were a lively place on weekends.

Landscape and Town Planning Design

Despite the earlier fears of many people that the Bridge would overwhelm the Harbour, by the 1930s there was almost universal approval of the design.

A height limit of 46 metres was imposed on all city buildings by the City of Sydney Council in 1912. The dominant city landmarks before the bridge were the towers of the General Post Office (GPO) and the Lands Building at 76 and 61 metres respectively, both obviously built before this height limit was imposed. This restriction was lifted in 1957 and in 1964 the authority empowered to overturn local development decisions was turned over to the State Planning Authority (SPA).

The GPO Clock Tower main façade (circa 1900) located at No. 1 Martin Place.

The GPO building and clock tower, which stands at 76 metres, was constructed in various stages from 1866 to 1891, replacing a smaller post office which had occupied the site since the 1830's. It was designed by the colonial architect James Barnet. The clock which weighs 25 tonnes was built in England by the Shropshire firm of J. B. Joyce and Company. The bell itself weighs five tonnes and has a diameter of two metres.

In 1941 during the Second World War great concerns were held for the GPO; in particular its vulnerability from aerial attacks by the Japanese. The Post Office being one of the key communication centres of the city and equipped with vital communication equipment was seen as priority target for the enemies.

In 1942 the decision was made to remove the clock tower. The laborious task of dismantling the 1,500 tons (1,530 tonnes) stone structure was undertaken by various government departments. Each stone was removed, numbered and listed using the original 1890's plans. The stones were then placed into storage. When the tower was finally dismantled all the key parts were stored throughout Sydney, the clock was at the Government Stores depot (Mascot), the bells were at a storage facility at Sydenham and the iron and masonry found itself at the Maroubra Telephone Exchange.

The government eventually rebuilt the refurbished clock tower and replaced it back on the top of the GPO building in 1963.

The Lands Department Building

Located on the block bound by Bridge, Loftus, Bent and Gresham Streets, The Lands Department building was built in two stages between 1876 and 1891. This building was designed by James Barnet (he also designed the Customs House) and is often quoted as the tallest building in Sydney at the time of the opening of the Sydney Harbour Bridge, however it was in fact the second tallest. The GPO clock tower at 76 metres was 15 metres higher than the 61 metres of the Lands Department Building clock tower. The clock itself has four faces each of 2.5 metres in diameter; however the clock was a later edition to the building and was not installed until 1938. The onion shaped dome is made of copper.

The scale of the buildings in the CBD and in North Sydney has increased significantly since the 1930s but the Bridge still stands dominant in the vicinity of the Harbour because development of the foreshores has been of a comparatively low-scale. There has been much talk about the possible sell off of this building as high end apartments or hotel. The cost? Around $80 million.

(http://adsabs.harvard.edu/full/1984PASAu...5..606W)

The Lands and Department Building as it stands today

City Circle

The layout for the City Circle was designed by Bradfield, though in fact it is not a circle as such but a horse shoe shaped configuration first proposed in a report submitted to the government in 1915.

The City Circle was built in stages. The first stations to open were St. James and Museum, in 1926, as part of the initial electrification of Sydney railways. Next was the "western limb" through Town Hall and Wynyard, which opened in 1932, in conjunction with the opening of the Sydney Harbour Bridge. This section contains four tunnels. Two connected to the Harbour Bridge, while the two City Circle tunnels terminated at Wynyard. In 1956 the dead ends at St. James and Wynyard were joined and the "missing link" – Circular Quay – was opened.

Such was the expectations of the new rail system that he is quoted as proclaiming:

"The time of journey from Central station around the loop, back to Central, with a 30 second stop at Wynyard Square, and a 20 second stop at all other stations will be 11 minutes 38seconds."

A far cry from the reality of today's passenger experience.

Government House

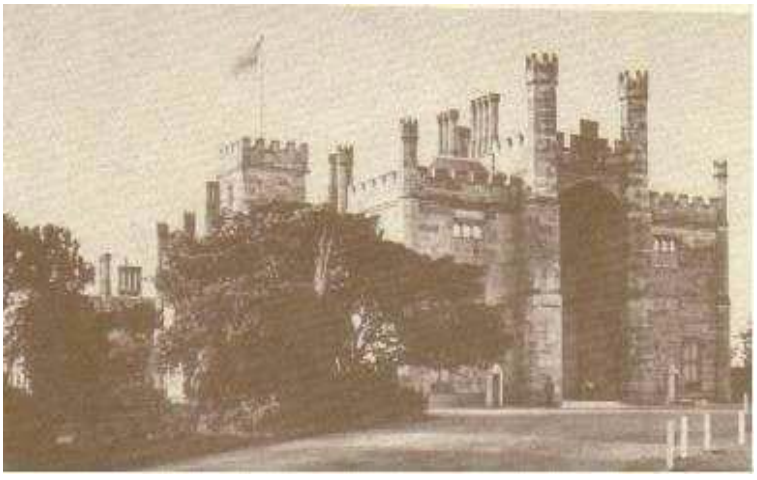
The first residence for the Governor of New South Wales was a portable canvas house, brought to Australia by Captain Arthur Phillip on the First Fleet, in the January of 1788. This was situated on the eastern side of the Tank Stream which flowed into Sydney Cove. In front of which was erected a flag staff which few the Union flag (more commonly known as the Union Jack) and near which was planted various fruit plants they had brought with them from Rio de Janerio and the Cape.

To highlight the hardship endured in those early days of colonisation, six months after landing, only four of the officers actually had wooden huts in which to live. The sheer hardness of the gum trees blunted most of the tools they had, and the easier cabbage palms they had used instead, had, by now been almost exhausted.

A two-storey residence soon replaced the canvas house and was to become the home to nine Governors of NSW. The Museum of Sydney now occupies this original site.

In 1816, Governor Lachlan Macquarie commissioned colonial architect, Francis Greenway to design a new Government House, but only the stables were built. These are now the Conservatorium of Music. The building is an example of the Gothic Revival architecture, featuring crenellated battlements, turrets and detailed interiors.

Macquarie's passion for building was considered extravagant. Lord Bathurst, the Financial Controller, prevented Macquarie from building the new house once the stables were complete.



It was not until 1834, under Governor Sir Richard Bourke, that the plan to construct a new residence was approved. The commission was awarded to Edward Blore, Architect to King William IV, and the architect of Buckingham Palace in London. The colonial architect, Mortimer Lewis modified Blore's plans.

The foundation stones for Government House were laid in 1838, however, due to a severe economic depression; the building was not completed until 1845. The house cost an unprecedented £46,000. It has since been the home to 27 governors from 1846 to 1996.

In 1868, and during the first ever official visit by a member of the British Royal family to Australia, Prince Alfred, Duke of Edinburgh, an Irishman named Henry James O'Farrell attempted to assassinate the Prince at Clontarf Beach. The injured Prince was taken to Government House and attended to by the then Governors wife Lady Belmore who transformed the drawing room into an operating theatre where surgeons removed the bullet lodged in the Prince's abdomen. After $30,000 was raised as a memorial to the occasion the Prince elected that the money be spent on a new hospital, hence the Royal Prince Alfred Hospital (RPA) at Camperdown was founded.

To this day Government House is the most sophisticated example of a Gothic revival building from early colonial New South Wales. Although greatly redecorated, the interior retains its late nineteenth century feel.

In 1996 the house was opened to the public. Although the Governor now resides elsewhere, Government House continues to be used for official receptions, dinners and investitures. Admission to Government House is free. Today it is run by The Historic Houses Trust.

Government House has a garden area of 5 hectares. Over the years there have been many alterations to the original design, these include a front portico which was added in 1873, an eastern veranda, built in 1879 and further extensions to the ballroom and Governor's study in 1900 and 1901. It now houses 12 rooms, mostly for official purposes, on the ground floor and 13 bedrooms on the second floor, plus many spaces designed for offices and services.

The Sydney Conservatorium of Music

The Sydney Conservatorium of Music was formally rebuilt as the stables for Government House by the ex-convict and government architect Francis Greenaway. However prior to the foundation stone for the stables being laid on December 16th 1817, by the ten governor Lachlan Macquarie, the site is thought to be the original site of the first government bakery in the new colony, this building adjoined the first windmill erected on government land; Boston's Mill.

John Boston was a free settler who arrived on board the 'Surprize' in 1794(5), and started a salt business in 1795 on Bennelong Point, which sadly ended in financial disaster. Undeterred Boston went on to become the colonies first commercial brewer in 1796. Sadly this venture was also doomed to failure. Boston is thought to have built his mill in 1802 however there are plans of the Domain which show a mill already there in 1800. Whether this is the original Boston's Mill is unknown. In March of 1815 Governor Macquarie order the removal of all the buildings before assigning Francis Greenway the task of preparing plans for the construction of the new stables and other accommodation for Government House.

The present conservatorium was proposed in 1915 and the building was converted at a cost of £22,000 and was the first conservatorium of its kind in Australia when it opened on 6th March 1916. The building was very much based on modern European conservatoriums of the day. In 1990 it amalgamated with the University of Sydney, but it was only in 2005 when the Music Department and the Conservatorium united. They now form a unified research institution of world renown.

A major refurbishment of the Conservatorium began in 1998 and finished in 2001 at a cost of $145 million. It now has two recital halls, a 600 seat auditorium and the very latest in audio technology. Some sections of the building were constructed on rubber pads to reduce ground borne noise from the passing of trains, and the two recital halls were separately supported on steel springs to provide even lower internal ground borne noise levels.

The Royal Botanic Gardens

The Royal Botanic Gardens, originally called the Sydney Botanic Garden, are a short walk east, around the water's edge from the Sydney Opera House and are located on a picturesque area of land between the Harbour and the eastern part of the central business district. The land occupied by the Royal Botanic Gardens is the site of the first prolonged European encounters with Indigenous Australians and is significant in the transformation of modern Australia.

Australia's long history of collection and study of plants began with the appointment by Governor Lachlan Macquarie of Charles Fraser, in 1816 as superintendent of the gardens. Three years later he was appointed to the position of colonial botanist, which also came with a handsome salary of 5s. a day.

The Gardens were established in June of 1816 and include the site of the earliest cultivated land on the Australian continent. They are the third oldest gardens in the Southern Hemisphere and originally consisted of a single garden, however this was added to with the introduction of smaller 'sub gardens' and consequently the name changed from the single 'Garden' to the plural 'Gardens' in keeping with its expansion. The gardens as we know them today were well established by 1820.

The Gardens have more than one million specimens. It is Australia's oldest scientific institution and one of the world's leading botanic gardens. The Gardens sit on an undulating piece of land with superb harbour views from elevated areas.

A walkway skirts around the harbour-front and is popular with lunchtime walkers and joggers. A hop-on, hop-off train exists for the less energetic.

The Royal Botanic Gardens are open daily at 6.30am and close at sunset. Entry to the Gardens is free.

The Royal Botanic Gardens Facts

Authority:	Botanic Gardens Trust, Department of the Environment and Conservation (NSW)
Established:	1816
Area:	35 ha
Location:	Mrs Macquaries Rd, Sydney
Open:	Monday to Sunday daylight hours.
Tropical Centre:	10 am to 4 pm daily
Number of Paid Staff:	50
Number of Volunteers:	50 – 100
Percentage of Plants Labelled:	60%
Percentage Native Aust Plants:	30%
Special Collections:	Grevillea, Wollemi Pine

- Special attractions include the Sydney Tropical Centre, comprising the Arc and Pyramid Glasshouses, displaying plants of the world's tropical zones.

- A four-bed display called, 'Cadi Jam Ora: First Encounters,' has been developed to explore the encounters between the Aboriginal and European people.
- The Gardens also contain a specimen of the previously believed extinct Wollemi Pine.

- Number of plants in Royal Botanic Gardens: 45,124.

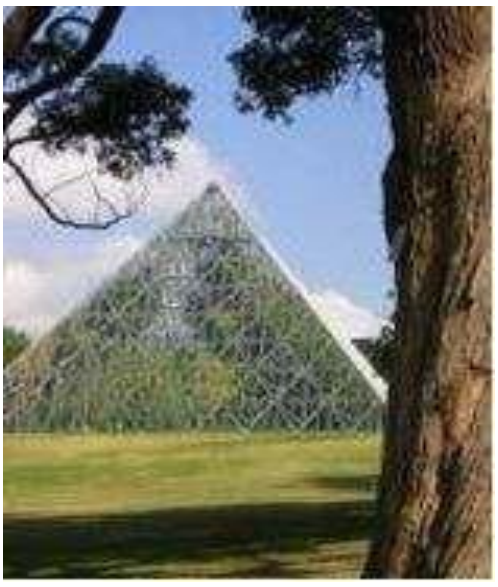
- Number of preserved plant specimens in Herbarium: over one million.

- Wildlife: includes Sulphur-crested Cockatoo, White Ibis, Brush-tailed Possum, Flying Fox.

- Number of visitors: about 3 million (Royal Botanic Gardens) and 4 million (Domain) per year.

- In 1862 Sydney's first zoo was opened within the Royal Botanic Gardens and remained there until 1883, when the majority of its animals were transferred to Moore Park.

- The Royal Botanic Gardens reluctantly hosts approximately 11,000 grey-headed flying foxes. Numbers have tripled in the past decade and as a result they're gradually overwhelming and killing off the historic Palm Grove, a world-renowned tree collection dating back to 1828.



The Glasshouse located at Sydney's Royal Botanic Gardens

Farm Cove

By July 1788 there was already a government owned and planted field comprising of 9 acres of corn intended for the survival of the colony. It was thus named Farm Cove. It was at this point that the agriculture and horticulture of Australia was established, and through the Botanic Gardens it still continues to this day.

From a purely agricultural perspective, the land proved not to be as productive as first thought and the farm was eventually moved to Parramatta, where the soil was far more fertile and crops could be grown in greater quantity.

The retaining wall which skirts Farm Cove was begun in 1848 and was not fully completed until 1878, some thirty years in the making. One reason why this took so long was the discovery of gold in Bathurst in 1852 and many of the workers packed their shovels and headed west in search of their fortune.

The aboriginal name for Farm Cove was Woccanmagully.

Mrs Macquarie's Chair

Mrs Macquarie's Chair was a 'gift' from her husband, the governor Lachlan Macquarie to his wife Elizabeth, who, homesick for England and missing news from friends and family, would sit and wait patiently for incoming ships bringing letters from home. Elizabeth Street in the city was named in her honour and was previously named Mulgrave Street.

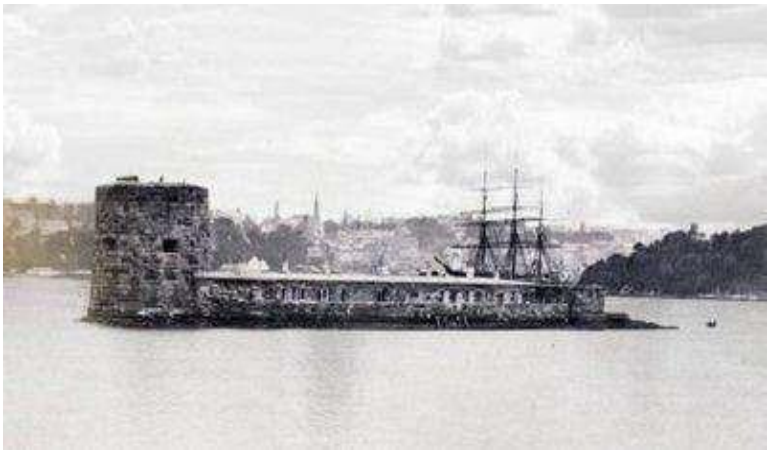
In 1816 a gang of 10 convicts under the command of Nicholas Delaney was instructed to cut a roadway from Government House to the rocky point now known as Mrs Macquarie's Chair. When they reached the point they, of their own volition, carved a resting place for Mrs Macquarie. In gratitude of their efforts the governor issued them with five gallons of rum.

Above the chair is an inscription recording the completion of Mrs. Macquarie's Road on the 13th of June 1816.

Fort Denison

Prior to the fort, a 25 metre high pyramid-shaped rock island lay four hundred metres north of Mrs. Macquarie's Point. The island was covered with scrub and had an area of one fifth of a hectare. When the First Fleet arrived in Sydney it became known as 'Rock Island'. The Aborigines called the island, "Mat-te-wan-ye." or (Muddawahnyuh)

Rock Island became more commonly know as 'Pinch Gut' in the colony. It is thought the name was given for two possible reasons. Initially, early convict prisoners who misbehaved were sent there (the first within a few weeks of the birth of the settlement) with only a ration of ships biscuits and a bucket of water to live on. The second refers to 'pinch-gut' as being an old nautical term, meaning the narrowing of a channel of water.

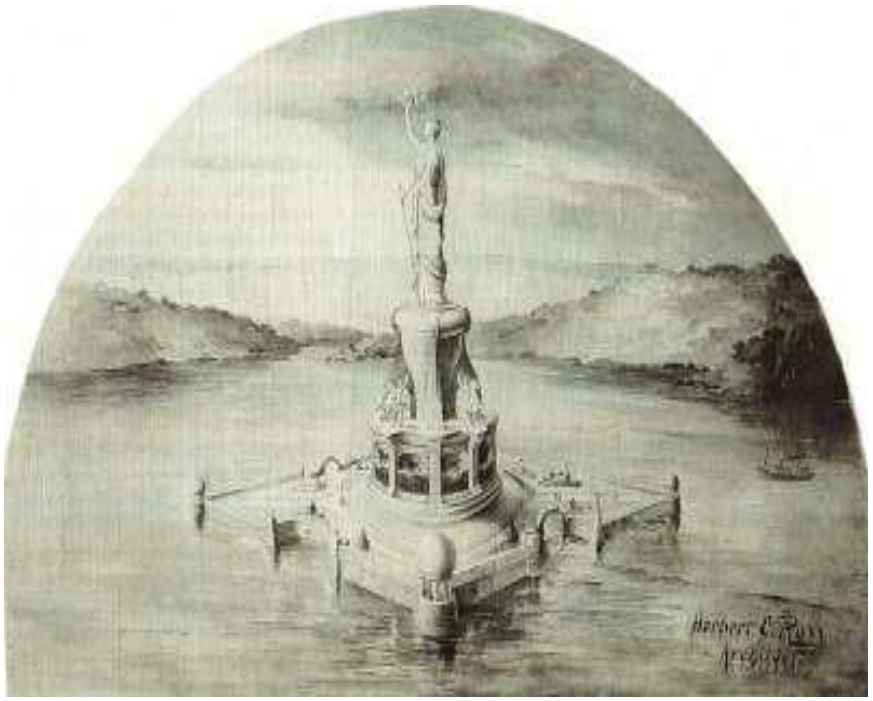


Fort Denison c1885

An Irishman by the name of Francis Morgan, who was convicted for murder in Dublin and sentenced to serve the rest of his life in Australia, was probably the most famous prisoner sent to Pinch Gut. In October 1796, Morgan was again convicted of murder, this time of fellow convict Simon Raven and he was subsequently sentenced to death. In order to stem the rising crime rate, Governor John Hunter ordered his body to be hung from the highest point on Rock Island from a gibbet post. Morgan's body remained on the island for four years. It served as a reminder to the incoming convicts that punishment in the new colony was harsh and very public. It also had the effect of alarming the Aboriginal population who never visited the island again.

Strange but true…..

Amazingly in 1900, a proposal was put forward for a giant monument to Federation to go on the site of Fort Denison which was designed by the architect Herbert Ross. Considered as a monument to Federation the idea was to erect a giant 'Statue of Liberty' where Fort Dennison now stands. The statue would hold aloft a wreath of stars each representing the federated colonies of Australia.



Australia's 'Statue of Liberty'

In Defence of the Harbour

During the night of 29th of November 1839 two American warships, the USS Vincennes and USS Peacock, entered Sydney Heads before dawn and moored in Sydney Cove undetected, much to the shock of the local Authorities. The American Consul highlighted the situation by stating that if the USA had been at war, the ships could have reduced Sydney to ashes and sailed out undetected. This painful embarrassment renewed a call for fortification on Pinch Gut.

Pinch Gut was quarried to sea-level and the 10,000 tonnes of stone used by Colonel George Barney in the building and reclamation of Circular Quay. Quarrying was finished in the 1840's, but the island remained barren for the next 10 years.

Rev. John Dunmore-Lang, the prominent Presbyterian cleric and statesman, along with a number of others, were outraged at the folly of quarrying Pinch Gut. They argued that invaders would be more likely to land at Botany Bay and approach overland.

In 1855, the British allotted £17,000 to build a fort (the actual cost was £16,550), this was perhaps in response to fears of a Russian invasion as a result of the Crimean War, or other possible enemies of the British Empire at the time. That same year, a contract to build the Fort was awarded to Mr. W. Randle who had been instrumental in the construction of the railway to Parramatta. The 8,000 tons of stone used in the construction of the Fort were obtained from Thrupp's Quarry at Kurraba Point, Neutral Bay.

The fort had quarters for a garrison of 24 soldiers and one officer and was manned by Royal Artillerymen from England and was equipped with two, ten-inch and ten, 8-inch 32-pound guns with an estimated range of about 1700 metres. Three 32-pound guns still remain in the round Martello tower. The tower is renowned for being one of the finest examples of its kind in the world with its whispering gallery acoustics.

In 1857 the sandstone Martello Tower was completed, and the island was renamed Fort Denison, after Governor William Denison in 1862, and was the last Martello Tower to be built by the British anywhere. The name Martello comes from a circular stone tower built at Mortella Point in Corsica. When French troops occupied Corsica in 1794, Corsican patriots pleaded for British help to drive them out. However, the French occupying the Martello tower beat off the two hour bombardment by HMS Lowestoft with ease. After the design's defensive capabilities were thus proven, Martello Towers proliferated along the South Kent coast into Sussex as a line of defensive forts. This was during the time of the Napoleonic Wars, when there was an urgent need to defend the South Coast of England against possible invasion.

As no fort is considered complete without an independent water supply, there is a well on the island with a capacity of 22,500 gallons.

In 1901 control of the island was passed to the Sydney Harbour Trust, which was succeeded in 1936 by the Maritime Services Board. During World War II it was fortified with a 3 inch gun for use against ships and aircraft, with an officer and thirty men stationed there.

In 1942, the top of the Martello Tower was accidentally shelled by the American cruiser, USS Chicago, during the Japanese midget submarine attack on Sydney Harbour. A thin crack can still be seen on the eastern side of the tower wall.

Although the fort was a defence installation, it has never fired a shot in anger.

In 1913 a lighthouse beacon built in Birmingham, England, and shipped to Sydney, replaced the 8-inch (20-cm) gun on the roof of the Martello Tower, and today Fort Denison is used as a lighthouse on the main shipping channel and as the central tide register for NSW. The original tidal gauge was installed in 1866. General tide movements and variations arising from earthquakes, once recorded by an ink-pen on a moving roll of graph paper, are now recorded by computer.

The distance between the Fort Denison Tower and the Bradley's Head column is precisely, one nautical mile. Ships have used this measure for speed trials since 1875.

In 1995, management of the Island was transferred from the Maritime Services Board to the National Parks and Wildlife Service and it became part of Sydney Harbour National Park.

Every day at one o'clock a cannon is fired as a time indicator and can be heard all around the harbour. Fort Denison is one of the most interesting historical sites in Australia. Visitors can see the cannons, dungeon-like rooms below, which were once used to store gunpowder and the superb Martello Tower with its 3m-thick stone walls. Tours are run through Cadman's Cottage, The Rocks.

Taronga Zoo

The first actual zoo in Sydney was opened in the Botanic Gardens however it was not a public zoo. Taronga zoo, as we know it today, was also not the first public zoo in Sydney. The first public zoo was opened on a site known as Billy Goat Swamp in Moore Park. The zoo was officially opened in 1884 and operated by the Zoological Society of NSW. The Society was founded in 1879.

After a visit to Germany in 1908, the elected Secretary of the Zoo, Albert Sherbourne Le Souef returned to Sydney with a vision for a new zoo, based on the bar-less exhibits of Hamburg Zoo. The site at Moore Park was deemed too small and not suited to this vision. A new site for the zoo was sought. On April 24th 1912, the NSW Government granted 43 acres of land north of the Harbour, previously part of Ashton Park. Another 9 acres were granted in April 1916.

In 1913, management of the Zoo passed to the New Zoological Gardens Trust, which later became the Taronga Zoological Park Trust. Taronga Zoo was officially opened on October 7th, 1916.

The first exhibits to be built included the seal ponds, elephant temple, monkey pits, north entrance, aviaries, and refreshment rooms. In all, 228 mammals, 552 birds and 64 reptiles were moved from Moore Park to Taronga Zoo. Many animals, including the elephants crossed the Harbour aboard a flat-top barge.

New exhibits and facilities were developed over time. The Giraffe House was completed in 1923, the Aquarium in 1927, Floral Clock in 1928, Tahr Mountain in 1932 and the Tiger Pits in 1939. Under the directorship of Edward Hallstrom (1940-60's), several new exhibits were built including those for larger cats, koalas, apes and gorillas. Today it is home to over 2600 Australian and international animals representing approximately 340 species.

After a critical review in 1967, a new philosophy emphasising scientific research, conservation and education began. Many new exhibits were built including; the Platypus and Nocturnal Houses, walk-through Rainforest Aviary, Veterinary Quarantine Centre and Education Centre (funded by the Department of Education). Previous attractions such as elephant rides, miniature trains, monkey circus and merry-go-round gave way to educational facilities.

In June 1973, a new Zoological Parks Board Act of NSW was enacted, replacing the Trust In its long history, Taronga Zoo has only been closed twice. Once, from August to October 1917, when the site was used to house labourers employed on the Sydney wharves during the transport strike, and the second occasion the zoo was closed on Australia Day 1988 to commemorate Australia's Bicentenary.
http://taronga.org.au/about-us/history/history

Admiralty House

The story of Admiralty House in Kirribilli began in 1842, when noted Sydney merchant, and land owner, Robert Campbell leased out 5 acres of Kirribilli Point.

Colonel John George Nathaniel Gibbes, the official Collector of Customs, took out the lease for a period of 21 years at a cost of 30 pounds per year. That same year Colonel Gibbes built a single storied stone house on the point and named it, 'Wotonga'. Wotonga now forms the basic architecture of the current Admiralty House.

After residing on the property for 9 years (7 leasing and 2 as owner), Colonel Gibbes sold the property in 1852 to James Lindsay Travers for £1,533. Between 1851 and 1855, Wotonga's ownership changed hands four times.

In 1855 during the Crimean War, Governor Denison resumed the extreme tip of Kirribilli Point for the purpose of building fortifications to strengthen the defences of Sydney.

Following an agreement with the British Government in 1883, Sydney became the principal Naval Depot for Her Majesty's ships. The NSW Government offered to provide and maintain a residence for the Naval Commander-in- Chief. Wotonga was chosen, the property purchased and the transfer effected in February 1885 in the name of "Her Most Gracious Majesty the Queen". The property was renamed, 'Admiralty House'. Extensive building additions were carried out including a new, second-storey, colonnaded verandah; Gothic-style gate lodge and covered Admirals Walk, leading to the now demolished berth for the Admiral's barge. The stained-glass windows throughout the house bear the coat of arms of all the British Admirals who have lived there.

Eleven Admirals have lived in the house between 1885 and 1913. After the departure of Rear-Admiral, Sir George Patey in 1913, the property was loaned to the Commonwealth Government as a Sydney residence for the Governor-General. Lord Denman was the first Governor-General to occupy the house.

In 1930, at the height of the Depression, the Scullin Government established a Government House in Canberra. Admiralty House was handed back to the State Government, who sold its contents at a public auction in 1931.

In 1936, the Commonwealth reopened Admiralty House as a Sydney residence for the new Governor-General, Lord Gowrie. Successive Governors-General have since used
Admiralty House as their formal residence when in New South Wales

Formal title to Admiralty House finally passed to the Commonwealth by Crown grant in 1948 on condition that it is used only as a residence for the Governor-General.

http://www.gg.gov.au/official-residences/admiralty-house

Kirribilli House

Kirribilli House has been the Prime Minister's official Sydney residence since 1956.

The history of Kirribilli House began in 1854 when Adolphus Frederic Feez purchased an area of approximately half a hectare at Kirribilli Point for £200 from J L Travers who at that time owned Admiralty House, then known as 'Wotonga'. In 1855 Feez erected a Gothic revival style residence, Kirribilli House, on the site.

From 1860 to 1919, ownership of Kirribilli House passed through the Terry, Taylor Lawry and McCrae families before it was advertised for sale on 20th of June 1919. The property was purchased by Mr Arthur Allen for £10,000.

When it was reported that Mr Allen planned to sub-divide the land, there was great public agitation for the house and gardens to be preserved. In response, Prime Minister Hughes gave his approval for the purchase or compulsory acquisition of the property and the land was resumed by special Commonwealth Gazette on 17th of January 1920.

For some years the house was used to accommodate members of the Governor General's staff when Admiralty House was being used by the Governor-General. On some occasions the Governor-General stayed there when on short visits to Sydney.

In 1930 the Commonwealth Government decided to discontinue use of Admiralty House as the residence of the Governor-General when in Sydney and subsequently Kirribilli House was leased to tenants, a practice which continued until 1953. (The decision to discontinue using Admiralty House was reversed some six years later.)

In 1956-57 the Commonwealth Government restored Kirribilli House for use as a residence for overseas guests of the Commonwealth and the Prime Minister of the day and his family. This restoration was undertaken by Mr J L S Mansfield of the firm of Fowell, Mansfield and Maclurcan. Since then, Kirribilli House has welcomed royalty, heads of state and heads of government. The first guest of the Commonwealth after the renovation was His Excellency Mr Nobusuke Kishi, Prime Minister of Japan.

A redecoration was carried out in the 1980s, with the assistance of decorator Mr David Spode.

In the late 1990s further restoration and refurbishment work was undertaken. The doorway between the drawing and dining rooms was widened and the two rooms were refurbished. In consultation with the then Australian Heritage Commission (AHC), the main staircase was reconstructed to its 1880s position in the central hallway and the hallway refurbished. In supporting this work the AHC stated it 'believes that the move will enhance national estate values'. These works were undertaken with the assistance of heritage architect Mr Clive Lucas OBE and interior designer Ms Rosemary Lucas, under the guidance of the Official Establishments Trust.

The cost of running and maintaining Kirribilli House is met by the Department of the Prime Minister and Cabinet from monies appropriated to it for this purpose by Parliament in the annual budget.

Robert Campbell's Storehouses

In 1798, Scottish merchant, Robert Campbell purchased land at the cove which now bears his name (Campbell's Cove). Robert Campbell built a residence, seawall, wharf and storehouse on the 2.5 acre waterfront property. He also built a house which he named "Wharf House".

Campbell used the storehouses for exporting products such as whale oil, seal skins and cedar for more than forty years. Originally two stories high, the storehouses are made of Sydney sandstone and consolidated brick. A third level was added between 1882 and 1887. During the 1890's, a brick extension was added to the northern end of the stores, known as Bay 11.

The 20th century saw an influx of recreational activity in Sydney Cove and the decline of commercial shipping. Most maritime activities were also moved to Darling Harbour and Pyrmont. After the erection of the International Passenger Terminal and ceasing of commercial shipping in the Cove during the 1970's, Sydney Cove Authority took control of the storehouses.

In 1978-79, Campbell's storehouses were redeveloped and now house some fine restaurants such as; Imperial Peking Harbourside, Wolfies Grill and The Waterfront Restaurant. The storehouses now stand between The International Passenger Terminal and the Park Hyatt Hotel.

Robert Campbell

Robert Campbell was born April 28th, 1769 in Greenock, Scotland and became a well-known merchant, pastoralist, politician and philanthropist in the colony. Campbell was recognised as the father of the mercantile community.

Following unprofitable commercial experiences in Scotland, Robert Campbell moved to India in 1796 to become a partner with his elder brother John, in the Calcutta agency house of Campbell Clarke & Co. The firm eventually became known as Campbell & Co in July 1799, when the Clarke family relinquished their interest.

After visiting the colony in 1798 to develop trading connections, Campbell once more returned to Sydney in February 1800 aboard HMS 'Hunter'. With the then Governor William Bligh's permission, Campbell proceeded to build business infrastructure on land bought in 1798 on the western shores of Sydney Cove and on the 11th August 1804 Robert Campbell secured three acres of land fronting the Cove and extending to Dawes Point. This is the area now bearing his name "Campbell's Cove". Campbell & Co was soon heavily involved in the colonies thriving trade.

Campbell was well regarded in the colony for his fair trading, reduced prices and generous credit despite on occasion being criticized by Governor King for attempting to import excessive quantities of spirits.

With an intimate knowledge of the colonial economy, Campbell quickly became involved in public administration. He was appointed Magistrate and Naval Officer by Governor William Bligh in May 1807. As a naval officer, Campbell became responsible for the official action taken to retrieve the spirit stills, illegally imported by John Macarthur. This episode led to what is now more commonly known as "The Rum Rebellion". When Governor Bligh was deposed in January 1808, by a military rebellion, Campbell was dismissed from the public duties of Naval Officer and Colonial Treasurer.

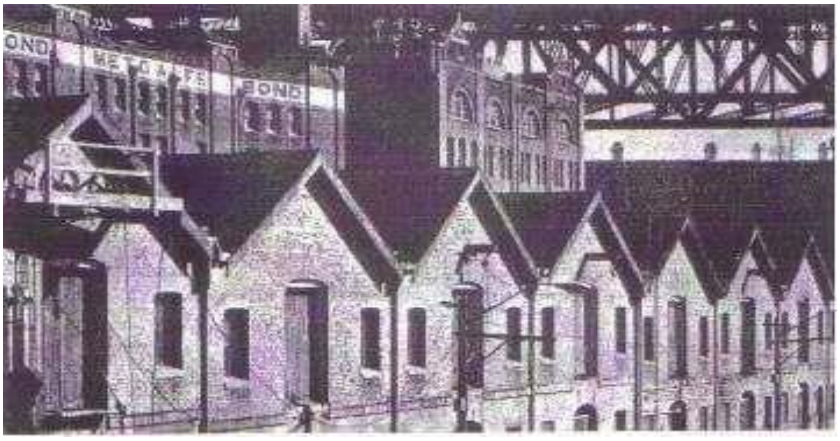
Campbell died at Duntroon on the 15th April 1846, and was buried at St John's church, Parramatta.

The Metcalfe Bond Stores

The Metcalfe Bond Stores are found between George St. and Hickson Rd., The Rocks. The Stores comprise two adjacent buildings, built by Upward and Co from 1912.

The Metcalfe Bond Stores stands upon the site of the former garden and orchard for Robert Campbell's Wharf House (1800-1883). Part of this site was later used as a quarry that sourced the sandstone used to build many of the early buildings in The Rocks area.

In 1912, a three storey warehouse, used by Upward and Co was and demolished to allow for the formation of Hickson Road. To create a new storage space, the Metcalfe Bond buildings were built. The northern section was constructed in 1912, the southern in 1916. Both stores are built in the functionalist tradition with exterior walls of load bearing red brick and darker brick outlines. The interior features timber posts and iron beams, cast by the makers of the Sydney Harbour Bridge, Dorman and Long Co. Ltd.



Metcalfe Bond Stores with Campbell's Storehouses in foreground

The Bond Stores are named after Michael Metcalfe (1813-1890), a prominent Sydney merchant. Metcalfe was one of the founders of the Australasian Steam Navigation (ASN) Company, which built offices on Hickson Road in 1839.

The land on which the Bond Stores stand was leased from the Government for fifty years, under the conditions that the building constructed is of a value of over £10,000. The building reverted back to Government ownership at the conclusion of the lease with Upward and Co staying on as tenants.

Throughout the 1900's the building served as a warehouse.

In January 1970, ownership of the building was passed to the Sydney Cove Redevelopment Authority. During 1972, work started on the renovation and conversion of the Bond Stores to offices, shops and restaurants.

Sydney Observatory

The Sydney Observatory is the oldest observatory in Australia and has made a significant contribution to Australia's scientific history.

Soon after the arrival of the First Fleet, the British Board of Longitude directed Lieutenant Dawes to establish an observatory at Dawes Point.

The current Sydney Observatory is built on the sight of the second windmill in New South Wales, on area initially known as Windmill Hill, Citadel Hill, Fort Phillip and Flagstaff Hill. The first windmill arrived in the colony in 1793, and cost the princely sum of £94. (see Conservatorium of Music for Boston's Mill). The windmill began operating in January 1797 and continued working until 1806, when it fell into disuse; its tower was still in existence up until 1842.

This was one of the first steps towards the Colony's self sufficiency. By 1809 there were seven windmills working in Sydney with an additional one added by 1821, and the first steam driven mill was introduced by John Dickson and opened by Governor Macquarie in 1815 in what is now Darling Harbour. Dickson's steam engine was believed to have been worth the princely sum of £10,000 and was made in his own engineering factory in Southwark, London.

The modern day name of 'Millers Point' echoes this history.

Sydney Observatory was built in 1858 and designed by architect, Alexander Dawson. The observatory provided accurate time readings and enabled observation of the southern sky. The building consisted of an astronomer's residence, a library, a 'computer's room' and a centre square tower 58 feet (17.5 mts) high carrying a time ball that dropped every day at 1.00 p.m. A 12 foot square shed was erected in 1865 to the south of the main building, for thermometers, and a small magnetic observatory was also added. A Government Printer photograph of c.1870 shows the building we see today. An extra wing featuring a second domed chamber for telescopes, and library space, was built in 1877. Recognised as an item of 'state significance' by the New South Wales Government, the Observatory is now heritage listed.

The 1880's saw Sydney Observatory gain international recognition. Under the guidance of Henry Chamberlain Russell, the Observatory took some of the world's first astronomical photographs and involved Sydney in one of the greatest international astronomy projects ever undertaken, 'The Astrographic Catalogue' project. The catalogue was the first completed atlas of the sky. The Sydney catalogue alone took 80 years to complete and consists of 53 volumes. By the mid 1970's, the increasing problems of air pollution and city light made work at the Observatory increasingly difficult.

The Observatory supplied Sydney newspapers with the daily rising and setting times of the sun, moon and planets and in 1982 all observational and scientific work ceased and the Observatory became a museum of astronomy and related fields. The Observatory is now used as a public observatory and guided tours are held nightly.

http://www.teachingheritage.nsw.edu.au/section06/observ_index.php

Sydney Observatory and early time indicators

As human beings started to sail and explore beyond the boundaries of their own lands, the determination of exact locations became difficult. Navigation tended to rely on sightings of land, latitude and soundings.

Governments offered prizes to anyone able to provide an infallible means of determining a ship's position. Various methods were tendered, including lunar observations, lightships placed around the world's oceans, or buoys placed along the popular trade routes.

John Harrison eventually won £20,000 for making the world's first marine chronometer with such accuracy that Captain Cook was able to successfully navigate and chart most of the hitherto unknown world. His charts are still used today with very few amendments.

With accurate time, navigators could determine their longitude from observations of the stars or the sun. Latitude had been determined by the 'height' of the sun at midday. The Polynesians, ancient Egyptians and early European explorers successfully used this method.

It was very important for the early explorers in Sydney to know the exact time to enable the land to be accurately mapped. Navigators also needed to reset their chronometers for safe passage back to Britain. As all time was measured from a point in Greenwich, London (Greenwich Mean Time: GMT) a Time Ball was erected on the roof of Flamsteed House, the home of the Greenwich Observatory in order that all seafarers could set their chronometers at exactly 12 noon. This method was soon to be taken up at the Sydney observatory when the first time ball was erected here in 1858.

The Sydney time ball on Observatory Hill was visible to all ships moored in the Harbour. To allow an accurate observation of the sun passing the meridian at Observatory Hill, it was decided to delineate the correct time at
13:00 with the dropping of the time ball and the firing of a canon from Dawes Point Battery. At 5 minutes to one the ball is hoisted to the top of the mast and at exactly 13.00 it will drop, confirming the exact time for all captains
within Sydney Harbour to set their time pieces. In later years the canon has been fired from Fort Denison, and can still be heard today.

Night-sky commentary

Weather permitting most people regardless of background are quite impressed with a brief tour around the night sky especially when their star sign is pointed out to them for the first time (as is often the case). While a good working knowledge of everything astronomical could seem a near impossible task astronomical commentary from the arch of the bridge is definitely simplified by the phenomenon known as "light pollution" where the city's light greatly dilutes the number of visible stars so that only the brighter objects can be seen. This tends to leave us with only the main constellations, planets and other occasional objects.

Some basics:

From our earthly point of reference the rotation of our planet makes the Sun, moon, stars and planets appear to move across the sky from east to west. While the objects of our solar system do change their locations in relation to one another over the weeks and months the stars themselves, being so much further away, do not change their positions and thus form the backdrop against which the objects within our solar system are observed. In our twelve month orbit of the Sun we gradually see it work its way right across this backdrop so the stars we can see in the summer nights are different to the stars we see in winter. The Sun, moon and planets all appear to follow roughly the same line across this backdrop of stars and this line is called the "ecliptic" although from our reference point in Sydney the ecliptic is further north in winter and more overhead in summer.

The Stars

Ancient man, in observing the heavens, has grouped the more prominent stars into "constellations". The constellations which fall upon the ecliptic are known as the signs (or houses) of the Zodiac and the dominating zodiacal sign is where the Sun is currently situated. For example, from roughly mid August to Mid September the Sun will be in the constellation of Virgo (the virgin) thus people born in this period will be a "Virgo". It's hardly an exact science as some constellations are larger than others and accordingly house the Sun for different lengths of time but man has always found it easier to just group things into a nice twelve segments.

Some constellations are easier to identify than others. For example, most people in the southern hemisphere can easily find the Southern Cross which is the brightest constellation in our hemisphere and consequently the reason why it adorns the flags of Australia, New Zealand and several other southern nations. Orion (the hunter) is another that many are familiar with while Andromeda or Capricorn can be difficult to discern but once you learn to locate and identify some constellations they then become reference points to help locate others.

Unfortunately most constellations do not resemble what they are meant to represent although Scorpio is a fine exception and once pointed out is easy to recognise. Its neighbour Sagittarius (the archer), on the other hand, looks like a teapot more than anything else and some people know it by that name. Gemini (the twins) is really only identified by the two bright stars Castor and Pollux while Taurus (the bull) is basically identified by the cluster of stars around its head which is close to Orion with whom it is engaged in battle. Not far from Orion can also be seen Sirius, the brightest of all stars in the night sky- otherwise known as the "dog star" it is the larger of Orion's two hunting dogs. The other dog, Procyon, is almost as bright and a little nearer to Orion.

There are many stories or legends which go with the various constellations and few people can resist a short story. Many that we

are familiar with actually come from ancient Greece, Egypt or Babylon although the aboriginals, Maoris and every other ancient and indigenous culture have their own too. Some aboriginal tribes describe the Southern Cross as an eagle's footprint while

"the pointers" nearby are its killing stick and the nearby dark patch in the Milky Way (not visible from the bridge) is its nest. Such tales can typically be found in books of Aboriginal Dreamtime stories.

The Planets

People are always interested in locating various planets and Mercury, Venus, Mars, Jupiter and Saturn are all easily visible when in our part of the night sky. At one time or another of the month the Moon will pass close to each planet which can help to identify it. Remember- the moon and planets are all to be found near the line of the ecliptic so with this in mind you shouldn't confuse a bright star like Sirius for Venus or Jupiter. Venus and Mercury orbiting between Earth and the Sun will therefore never venture far from it and be visible only for a few hours after sunset or before sunrise. Venus is accordingly referred to as the "evening star" or "morning star". The old adage that stars twinkle and planets don't is incorrect as this is only an atmospheric phenomenon which simply depends upon the objects brightness. The brightest stars do not twinkle while fainter planets will. Just look at the suburban lights and you'll see that those far in the distance definitely twinkle while those nearer do not.

Satellites

Occasionally you may be fortunate enough to see a satellite which will look like a star moving slowly across the night sky. Make sure it has no flashing or coloured lights which would actually identify it as an aircraft. There are literally thousands of satellites orbiting our planet, most of which are just "space junk". Most vary in size and description from a small bolt or an astronauts lost glove to spent rocket boosters or the massive International Space Station. They orbit at heights in the hundreds of kilometres and only a tiny percentage of them are bright enough to be seen from urban areas. When you spy a satellite you are merely observing the sun glinting off the objects hull which means you will be able to confirm it as a satellite when it passes into our planet's shadow and disappears. Thus satellites can only be observed for a couple of hours after sunset and before sunrise. If the satellite in question has solar panels there then exists the possibility of witnessing a spectacular "iridium flare" where the panel's mirror-like surface reflects the Sun's light directly at the part of the earth where you are standing. This usually happens just before it vanishes into the Earth's shadow. The website is (http://www.heavens-above.com/) great for highly detailed information on where and when to look for which satellite, and even when to see iridium flares.

Comets and Meteorites

There are many comets also orbiting the Sun although they rarely come near enough to be seen with the naked eye. A comet is popularly described as "a big dirty snowball flying through space". As it passes around the Sun this snowball partially melts which creates the tail we so readily identify with comets but this also leaves behind a permanent dust/debris trail. As our Earth orbits the Sun it regularly passes through these old dust trails which give us our meteorite showers which may last up to a couple of weeks. Also known as "shooting stars" meteorites are most often only dust-like particles burning up (with friction) as they enter the atmosphere. Some particles can be a little bigger and create a spectacular display as they explode into smaller pieces. Other meteorites can be actual rocks which can sometimes be large enough to survive the atmosphere and hit the ground. Astronomers usually know exactly which comet is responsible for each meteorite shower and will predict the intensity of the shower as the "zenith hourly rate" (the estimated number of sightings per hour).

Reference tools such as "star wheels" can be purchased from many sources and provide an easy to use map of the changing night sky and the annually published 'Astronomy 2010 (or 2011, etc) Australia' gives very detailed descriptions and explanations of the visible stars, planets, and other phenomena. Sydney Observatory also prints a (free) monthly star map which can be viewed on their website (http://www.sydneyobservatory.com.au).

Milsons Point

Milsons Point is the body of land which supports the northern end of the Sydney Harbour Bridge and is the home to the North Sydney Olympic Pool and Luna Park.

Before the arrival of the First Fleet in 1788, the aboriginal Cammeraygal People, lived along the Milsons Point foreshore and surrounding bush land. From the beginning of colonial settlement, this site was used by Europeans for picnics and recreational activities.

It can be viewed that the Cammeraygal were the first Australian entrepreneurs in Tourism. In 1789, Governor Phillip paid the Cammeraygal people for performing dances at this site in return for cloth, trinkets and rum.

It wasn't until 1806 that the first permanent settlement was established by James Milson (1783-1872), who grazed a herd of cattle in order to supply the area with fresh milk, paying £8 per year for the lease. He also raised vegetables and supplied fresh spring water to Sydney. Milson also quarried sandstone and constructed a house near the area where the north-east pylon of the SHB is now found. The land Milson settled on was land formally owned by Robert Campbell. Milsons Point became a point for the arrival and departure of ferry crossings and by 1886, was the busiest ferry terminal on the north side of the Harbour.

In 1830, Jamaican ex-convict William (Billy) Blue commenced the first ferry service across Sydney Harbour and by 1860 a regular vehicular ferry service was operating between Milsons Point (by then declared a public landing place) and Fort Macquarie (now the site of the Sydney Opera House). By 1893
Milsons Point housed a tram, train and ferry interchange, which remained a crucial transport link until the construction of the Sydney Harbour Bridge.

By 1893, the Hornsby to St Leonards railway line had been extended to Milsons Point. The rocky slopes were flattened almost to water level to make a platform and the cutaway sandstone was used to fill and widen the shoreline.

Milsons Point railway and tramway stations are / were located at the end of the northern approach to the Sydney Harbour Bridge. The original intention was to have four railway tracks across the bridge but two were used for trams until 1958. The tram tracks were raised to platform level on a timber framework with ramps at each end. This view shows R 9 2029 at Milsons Point tramway station on the last day of tram service on Sydney's north shore, 28 June 1958.

A harbour crossing had been talked about since 1815; however, it was not until 1911 that a high level bridge was proposed. By 1915, a new railway station in Lavender Bay had been constructed, releasing a large amount of land (later to be used for the workshops).

Dorman Long and Co Ltd won the tender to design and construct the bridge in 1923 and occupied the site, plus all the waterfront land adjacent to the Bridge from 1924-1932. To accommodate the two huge workshops, Dorman Long and Co excavated more of the cliff (where Luna Park sits) and used the material to further fill in and flatten the shoreline.

The Dorman Long & Co workshops covered an area of 65,000 cubic yards or 50,000 cubic metres (5 hectares). The cost of building and equipping the workshops was £500,000

A shipping wharf to service the loading and docking of materials was also constructed at this time. It was reputably the largest workshop in the southern hemisphere and extended from where Coney Island is now found to the northern pylon of the SHB.

The Government (as promised) demolished the workshop buildings at the end of the bridge construction. The wharf was the only infrastructure that remained. Since North Sydney lacked recreational facilities, it was agreed the site would be utilised for public amusement. On the 11th of May 1935, a 20 year lease was commenced to build and operate Luna Park (NSW) Pty Ltd.

Luna Park

The first Luna Park was established in 1903 on Coney Island, New York. Amusement parks at this time became very popular and soon, Luna Parks were spreading across the world.

Australia's first Luna Park opened in St Kilda, Melbourne (1912). Due to its enormous success, showman David Atkins was able to convince the operators to open another Luna Park in Glenelg, Adelaide in 1930. Ted Hopkins then joined the team to operate the electrical and mechanical facets. The Park caused much friction in the community (regarding extensions and noise) and was closed permanently.

After searching for another appropriate site, Atkins, Hopkins and Herman Phillips negotiated the lease of the Harbour Bridge Workshop Site and transported the dismantled Glenelg Luna Park to Milsons Point via ship. It took three months, 800 structural workers, 70 electricians and 35 artists (amongst others) to build Luna Park, Sydney. It was opened at 8.00pm on 4 October 1935 and it cost 6 pence to enter (3pence for children) and 6 pence for most rides. The Big Dipper and Coney Island cost 9 pence. The Park was an instant success. After the first year, the admission charge was removed and Luna Park proudly advertised "Admission Free". Luna Park was given to the people of Sydney by the Government, in recognition of the noise and general disruption the Bridge building had caused over the 8 year period.

The lease to the Milsons Point site was sold in 1969 to the World Trade Centre Pty Ltd. They proposed developing the site as a trade centre in which prominent architect Harry Seidler was to build multi-story buildings. The application was rejected and the Park continued.

Luna Park was closed in June 1979 after a tragic fire in the ghost train ride. Six children and one adult were killed.

The striking entrance to Luna Park is a smiling clown with the towers framing the face. The towers themselves are in fact copies from the Chrysler Building in New York. The original design for the face was by the famous Sydney artist Arthur 'Art' Barton, who worked as an artist at Lunar park from it's opening in 1935 until he retired in 1970

In January 1995, after the State Government spent a reported $55m on revamping it, Luna Park was re-opened amid controversy. Local residents lodged a number of noise complaints, largely due to screams coming from the gigantic roller coaster known as 'The Big Dipper'. The company struggled financially and the park was once again closed in February 1996.

Luna Park reopened on 4th April 2004. The redevelopment cost in excess of $80 million and was funded by private investors; Metro Edgley. The reopened park features new facilities such as; 5 star banqueting and the refurbished Crystal Palace Function Centre, 3-storey brassiere and cafe area, 2,000 seat performance space, and a 389-space undercover car park. Located near the NW pylon of the Sydney Harbour Bridge, the face and towers of Luna Park have become iconic to the people of Sydney. Luna Park remains as the original and only Fun Park in Sydney.

On the 19th of February 2010 Luna Park, along with the QVB Building and Sydney Town Hall were all listed on the State Heritage Register.

Star City Casino

Star City Casino is the second largest casino in Australia behind Melbourne's Crown casino.

It houses two floors of gaming and has at present 8 bars, 7 restaurants and 351 hotel rooms and 130 serviced and privately owned apartments. It also has the 2000 seat Lyric theatre and is the only legal casino in Sydney.

In 2008 Tabcorp, the owners announced a $870 redevelopment program called 'Project Star'. The Star, on completion, now boasts more than 20 restaurants, bars and cafes, a new luxury boutique hotel and 16 room spa, upscale retail collection, a 4000 capacity entertainment centre and up-scaled gaming areas.

The new The Star building is designed to embrace the harbour by connecting the building with Sydney and create a focal point for people to enter through, The Star together with Fitzpatrick and Partners, designed a five story building on the site of the Pirrama Road entrance that curved fluidly around the original rear of Star City.

Key to the design was the creation of an entire facade of 147 interlocking glass flags inspired by a laid out deck of cards.

The glass panelled facade is unique and remarkable. The glass sheets have rounded corners and each of the identical louvers is fixed at 60 degrees, angled away from the southerly wind and weather. Measuring 2.8 by 2.4 meters in size, the glass flags all pivot open and shut depending on weather.

Blue Mountains

In 1789, Captain Tench and Lieutenant Dawes made a failed attempt to cross the Blue Mountains. The seemingly impenetrable mountains range was thought of by many, especially the early convict population, as the great barrier to freedom.

The mountains took 25 years to conquer. Blaxland, Wentworth, and Lawson achieved the crossing in 1813. However, an emancipated convict, John Wilson claimed to have crossed the range in 1797. By 1815, William Cox completed a road over the Blue Mountains. You can still walk part of this convict-built road.

Geography

The Blue Mountains rise 60 kilometres west of Sydney and continue westward for a further 70 kilometres before ending in dramatic sandstone cliffs. They are part of the Great Dividing Range which runs along the east coast of Australia.

The mountains cover an area of 1,424 square kilometres (or 550 square miles).

The noticeable peaks seen from the bridge, running north to south include Mt Tomah at 1000m (long sloping mountain), in the middle, the flat-topped Mt Banks at 1062m and Mt Hay at 944m (dome shaped mountain). Mt Banks and Mt Hay overlook the Grose Valley.

The highest peak in the Blue Mountains is Mt Piddington at 1094m. It is located just south of Mt Victoria and overlooks the Megalong Valley. Mt Piddington can not be seen from the Sydney Harbour Bridge.

The region has a population of approximately 74,000. Its major towns include; Glenbrook, Springwood, Wentworth Falls, Leura, Katoomba, Blackheath and Mt. Victoria. Recreational activities such as rock-climbing, abseiling, bushwalking and bird-watching are popular amongst visitors.

Accessible by rail and road, the mountains are between 1-2 hours from Sydney.

The Blue Mountains are so called because of the blue coloured haze that surrounds them. The haze originates from the reflection of sunlight through tiny droplets of Eucalypt oil, released from the leaves of Eucalyptus trees.

In 1788 the Blue Mountains were originally named "Carmarthen Hills" and "Lansdowne Hills" by Governor Phillip; however, it wasn't long after, that the distinctive blue haze surrounding the area saw the change in name to the Blue Mountains

The Greater Blue Mountains were declared a World Heritage site in 2000, making it Australia's 14th World Heritage Area. It was nominated for its outstanding natural values, including the biodiversity of its plant and animal communities, its vegetation, dominated by Australia's unique eucalypts and for the unmatched beauty of its natural landscapes.

Sporting Venues

Olympic Park and Sydney 2000 Olympics

The 2000 Sydney Olympics began on Friday, the 15th of September and finished on Sunday, the 1st of October. The preparation and delivery of the 2000 Olympic Games generated much media and public attention.

A competition was held to design the Opening and Closing Ceremony venue. Competing architects were asked to design a stadium large enough to seat Olympic crowds, yet capable of scaling down (without reconstruction) after the Games were over.

Guidelines for the Sydney Olympic Stadium Competition specified:

The structure should be in keeping with ecologically sustainable development, and the facility should accommodate 100,000 spectators without draining environmental resources.

The stadium should look good and reflect the dignity and importance of the events which would take place there. The

construction of the stadium begun in Sept 1996 and was completed in March 1999 at a cost of $690m.

Covering an area of some 760 ha, in the demographic and geographic heart of Sydney, the site attracted nearly five million spectators, visitors and workers during the Games.

When completed, Telstra Olympic Stadium, as it was originally called, had a capacity of 110,000, making it the largest Olympic Stadium ever built as well as the largest stadium in Australia. In 2003 reconfiguration work was completed to reduce the capacity to 83,500 for a rectangular field and 73,000 for an oval field. Roofs were also added over the North and South stands, which now allow for 90% of all seating to be under cover. The cost of this re-configuration was $80m. The Sydney Arena houses 20,000 seats, the Sydney International Athletic Centre;
15,000 seats and Sydney International Aquatic Centre; 12,500 seats.

The roofs of the stadium cover an area of three hectares and are constructed from translucent polycarbonate to minimise the shadows and patches of direct sunlight on the playing area. Four Boeing 747s would fit side-by-side under the span of the main arches of the grandstands.

On 6 March 1999 a then world record rugby league crowd of 104,583 watched the NRL first round double-header between Newcastle v Manly and Parramatta v St George Illawarra Dragons.

In 1999 the Bledisloe Cup rugby union match between the Australian Wallabies and the New Zealand All Blacks attracted a then world record rugby union crowd of 107,042, however this was bettered in 2000 when a crowd of
109,874 witnessed the New Zealand All Blacks beat the Wallabies 39-35.

Since opening in 1999 more than 10 million people have attended events at the Stadium. Conservation and

sustainability is an important element of all works undertaken at Homebush Bay.

Architects Bligh Lobb, and the engineers and designers involved in the construction of Homebush stadium demonstrated a strong commitment to; energy and water conservation, waste minimization, the maintenance of air, water and soil quality and the protection of significant natural and cultural environments.

The works undertaken have won major environmental awards including the Bradfield Award for engineering.

Sydney Football Stadium

In 1988, the Sydney Football Stadium (SFS) was opened adjacent to the world-famous Sydney Cricket Ground (SCG) in Moore Park. Constructed on the site of the old Sydney Sports Ground at a cost of $68 million, the SFS was to host premier football games for all Australia's football codes (Rugby League, Rugby Union and Soccer). Prior to 1988, football games were held at the Sydney Cricket Ground (SCG).

Designed by modern architects; Philip Cox, Richardson and Taylor (also designers of Sydney's Maritime Museum), the stadium is described locally as the Sydney 'Roller Coaster'. The stadiums' main architectural feature is its saddle roof, which creates a bowl-like effect. The playing surface is 13 metres below street level to reduce the overall profile, a technique employed to harmonise the structure with its residential surroundings.

The roof is supported on a series of steel trusses, which in turn carry the weight of the roof down concrete- encased stanchions. The ribbon roof itself is continuous and sweeps up over the east and west enclosure stand, dipping down over the lower terraces to the north and south of the ground.

Recently the capacity for spectators has been increased from 42,000 to 45,500, of which 44,000 is seated and it is considered a leading venue for visiting rock bands and solo performers. The largest concert crowd was record 52,838 for Robbie Williams in 2006.

In 2002 SFS was renamed, 'Aussie Stadium' in a 5-year sponsorship deal with mortgage lending company, Aussie Home Loans. Aussie Stadium was also a venue for Rugby World Cup in 2003, hosting five games with a total attendance of 168,948.

Sydney Cricket Ground

The historic Sydney Cricket Ground (SCG) was founded in the 1850's when the foundations were first laid by British soldiers and was originally known as the Military and Civil Ground before it was taken over by the NSW Cricket Association in 1875. In 1877 it was renamed the Association Ground and the first match on the newly named ground was played on 25th October 1877 between the Government Printing Office and the Audit Office. The ground was renamed the Sydney Cricket Ground in 1894. Originally the ground incorporated a cycle track which was removed in 1920 as it was considered to detract from the integrity of the venue as a cricket ground.

Today it is the major ground in Sydney for Cricket and Australian Football. The biggest crowd ever recorded for a cricket match was 58,446 on 15th December 1928 for the Second Test Match between Australia and England. The highest ever recorded crowd was on 18th September 1965 when 78,056 fans turned up to watch NRL teams, St George play South Sydney. It also hosted the Empire Games in 1938.

Since the early 1800's, Hyde Park (est. 1810) was the centre for most major sporting activities in Sydney and incorporated a racecourse, exercise ground and cricket ground. This area expanded when in 1868 Moore Park was opened as a public recreation area adjacent to Hyde Park. It was named after the Mayor of Sydney, Charles Moore, who planted a number of Moreton Bay Fig trees in the park. Over time the ground and facilities have been developed to become the 46,000-seat venue that it is today.

The Sydney Cricket ground is now the home of the Sydney Swans Australian Rules Football Team in the winter, and hosts domestic and international cricket in summer.

North Sydney Olympic Pool

Located in Alfred St Milson's Point, the Olympic Pool facilities comprise a 50m heated pool, gymnasium, sauna, spa, indoor 25m pool and café. Historic North Sydney Swimming Pool is unique because of its harbour side location between the Bridge and Luna Park, the strong Art Deco styling and decorative plasterwork of its architecture, and its place in Australia's sporting history

The pool was built on the old Dorman, Long and Co. workshop site (including where Luna Park now sits), where much of the construction work for the Sydney Harbour Bridge had been carried out. It was given to the community of Sydney as a gift for dealing with the noise and inconvenience of the steel fabrication workshops during the 1920's and 30's.

Swimming in Australia was the dominant sport in the 1930's and the success of the Australian Swimming Team at the Los Angeles Olympic Games largely contributed to a boom in Swimming Pool construction. North Sydney (c.1935/36) was one of four Olympic sized pools constructed in Sydney (Enfield and Bankstown built c.1933 and Granville c. 1936) in a short amount of time. Others were proposed and at least seven harbour side pools were re-modelled.

When it was opened in 1936, it was hailed as the 'Wonder Pool of Australasia' because of the high standard of its facilities and the sophistication of its modern filtration system - at that time, one of the most advanced in the world. It is historically significant as the venue for the two Empire Games of 1938 and 1958, now known as The Commonwealth Games.

In all, 86 world records have been made by such swimming greats as Dawn Fraser, Jon Konrads, Shane Gould and Michelle Ford.

Redeveloped in 2001, this pool still holds the distinction of having the most world records set in one facility. Because the pool is open to the elements, the water is more buoyant because of the salt content; hence none of the world records set are recognised under FINA rules.

Credit Suisse Building: One Macquarie Place. Circular Quay

Formally known as The AXA building, it is believed to be partially built on the site of a 'dry store', first built in 1791 and thought to have been built by one of the colonies first builders, James Bloodworth. It was a single story building measuring 27 x 8 meters with Dorma windows and sold items such as clothing, flour and assorted 'dry' provisions.

The modern day Credit Suisse building is a $300m development designed by the architects, Peddle Thorp Walker.

Started in 1986 and completed in 1989, the building stands at 164 meters (538 feet) and is a 50 story commercial building with 46 floors of office space.

The Toaster

Built by Multiplex and completed in 1999, Bennelong Apartments, as they are officially called, but known by most people as "The Toaster" are a series of four buildings housing apartments, a cinema, retails outlets, restaurants and rehearsal space for the Australian Chamber Orchestra.

Unilever House

The Toaster

The Toaster is built on the site of the 1883 RICH & CO WOOLSTORE, which itself was demolished in 1954 to make way for the Unilever Building.

Unilever House was a 14 storey building and on completion in 1971 was one of tallest skyscrapers in Australia at 53mt.

The Toaster was a $600 million 12-storey development housing 234 residencies and has a covered front promenade of over 200mts in length. Facilities within the complex of apartments include Pool, Gym, Spa, Sauna and 24-Hour Concierge service.

Citigroup Centre

The Citigroup Centre building is a 243 m (797 ft) skyscraper. The building has 41 levels of office space, 5 levels of underground parking and 4 levels of commercial space known as "The Galeries". When it was completed in 2000 it was the 8th tallest building in Australia. It now ranks in about 10th place.

Australia Square Tower

Australia Square tower is a 170 m 558 ft tower made of reinforced concrete and was built between 1961 and 1967. From 1967 to 1975 it was officially Australia's tallest building, and at one stage from 1967-73 it was recognised as the tallest building in Southern Hemisphere. This was later awarded to the Carlton Centre of Johannesburg which stands at 223m. In fact it was even awarded the status of being the tallest lightweight concrete building in the world,

The strange tubular shaped building is 41 metres in diameter and has a revolving restaurant located 153 metres above street level called The Summit. The Summit is located on the 47th floor and there is an observatory on the 48th floor.

The tower was designed by Harry Seidler of Blues Point Tower fame and was only given permission to build it on the proviso that it was reduced in height from the original 58 floors to its current 50 floors.

Whilst the tower looks to intense and purposes circular, it is in fact a polygonal and is made up of 20 segments. The reason for the unique shape, given that it was the first such shaped building in Sydney was simply due to the shape of the land on which it was built. The construction allowed for one complete floor to be built every week.

Centrepoint Tower: AMP / Westfield Tower (now known as Sydney Tower Eye)

Centrepoint Tower, now known as the Sydney Tower Eye was begun in late 1970 and the lower part of the building, complete with 52 shops was opened in 1972. The office space above the shopping complex was opened in 1974 and the tower itself was opened to the public in August 1981.

The golden turret has a capacity of 960 persons and contains two levels of restaurants, a coffee lounge, an Observation Deck, two telecommunication transmission levels and three plant levels.

Three double deck lifts provide guests' access to the Observation Deck.

The 1504 fire-isolated sets of pressurized stairs, closely monitored by security, allow patrons direct access to street level, in case of an emergency.

The 420 windows of the tower are cleaned by a semi – automatic window cleaning machine name 'Charlie'. 'Charlie' recycles and filters 50 litres of water and takes two days to clean all the windows.

A 162,000 litre water tank, the tower's primary damping system also acts as a stabilizer for the tower.

56 cables stabilize the tower, each weighing 7 tonnes, and if the strands of these cables were laid end to end, they would reach from Sydney to Alice Springs or from Sydney to New Zealand.

The spire located above the Tower is used for telecommunications and navigation purposes. Sydney

Tower is the first to see the Sydney dawn, and the last to see its final dusk.

http://www.sydneytowereye.com.au/tickets/

Other Bridges of Sydney

The Gladesville Bridge

The Gladesville Bridge spans the Parramatta River and is approximately 6 km from the Sydney Harbour Bridge. Today, it is the 6th longest concrete arch bridge in the world at 305mts. The longest is the Wanxian Bridge in Wanzhau, China at 425mts.

The Gladesville Bridge under construction

The Old Bridge

The old Gladesville Bridge was originally a 245m long, wrought-iron, lattice truss bridge, built in 5 spans with sandstone pylons. It opened to traffic in February 1881, allowing for 2 lanes of vehicular access. It also had a swing opening span to allow for traffic on the river, but this, however, had limitations for both forms of traffic. It was originally strong enough to accommodate a light rail service, which in 1910, extended the tram line from Drummoyne to Ryde. It provided the first bridge access to the north side of the Harbour. Prior to this the closest crossing was a rope-hauled ferry service between Abbotsford and Gladesville

The New Bridge

The final design was accepted and approved in 1957. G. Maunsell and Partners of London, proposed a 305m span, concrete arch bridge that was to be built in 3 sections. Further design development took 5 years.

Construction started in December 1959 and was completed in 1964 (the new Gladesville Bridge opening for traffic on 2nd of October). At that time it held a world record for a concrete arch span bridge.

During construction, low maintenance materials were used to maximise its durability and minimise the maintenance costs over the life expectancy of the bridge.

A major technical feature of the bridge was the arch-jacking procedures which took place during construction. The

foundations of the arch of the bridge were set in Sydney sandstone and are partially submerged in water.

This durable bridge has a life expectancy of a minimum of 100 years, but is likely to be exceeded due to the skill of the designers and constructors and the service of maintenance.

Together with the adjacent Tarban Creek Bridge, the new Gladesville Bridge, when opened helped relieve some of the traffic congestion on the SHB by providing additional traffic capacity to north-west Sydney.

The Gladesville Bridge which is the 6th longest concrete arch bridge in the world

	Imperial	metric
Arch Span	1,000.7 ft	305 m
Height (above mean high water mark)	134.51 ft	41 m
Total width of arch	83 ft	25.3 m
Width of Bridge deck	88.58 ft	27 m
Total length between abutments:	1,902.9 ft	580 m
Weight of arch	22,000 tons	22,353 t
Weight of concrete in arch abutment foundations	25,000 tons	25,401 t
Weight of columns and deck	5,000 tons	5,080.2 t

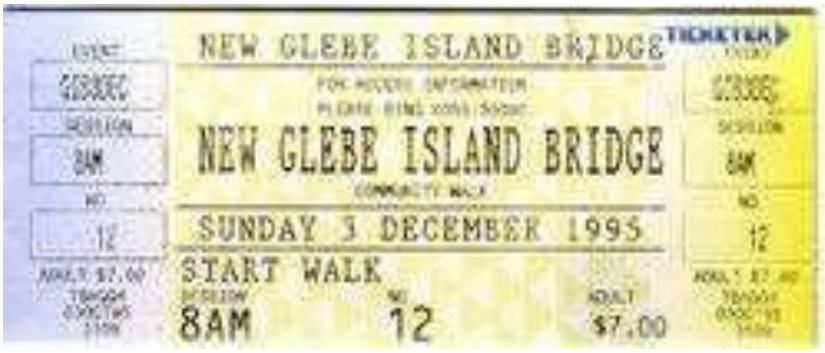
The arch consists of four identical, 6 metre-wide, box-section arch ribs and their height varies from 4.25m at the key, to 7m at the foundations. The deck is made up of sixteen spans of 30m, using precast, post-tensioned girders made continuous at the deck level.

The bridge is a six lane structure with footpaths on both sides. The roadway width allows for three dual lanes for traffic with no emergency stopping lanes or two dual lanes with full emergency stopping lanes. There are raised footpaths on both sides which have 1.85m widths.

Navigation clearance of the Gladesville Bridge is 36.5m high and 61m wide (this allows for moderately sized, commercial ships).

The Anzac Bridge

The Anzac Bridge was completed on 3 December 1995 and tickets were sold for the opening walk with all funds going to the Smith Family.



Tickets were sold at $7 for the opening walk with all funds going to the Smith Family

The Anzac Bridge (acronym for; Australia and New Zealand Army Corps) was designed by the RTA (now RMS). In recognition of this historical partnership, the Australian flag flies from the east pylon (city end) and New Zealand flag from the west pylon. A New Zealand born artist, Alan Somerville, sculptured the 4m-high bronze, World War One Digger (Australian soldier), featured at the west end of the bridge, dedicated on Anzac Day, 2000. On April
27th 2008 and after eight years of standing alone at the western end of the Anzac Bridge, the statue of an Australian digger was finally joined by a 4.2-metre bronze memorial on the eastern end showing a New Zealand digger bowed in silent reflection. This statue was also made by the New Zealand sculptor Alan Somerville.

Facts and figures of the Anzac Bridge

- The Anzac Bridge is:
- The longest cable-stayed bridge in Australia (805m)
- Amongst the longest concrete cable-stayed bridges in the world
- A landmark visible from many of the city's inner metropolitan suburbs
- The closing of the two halves of the Bridge took place on 24 July 1995 in the evening to avoid movements due to temperature changes.

	Dimensions
Length of spans: Main span	345 m
2 secondary spans	140 m
Approach spans	54.5 m, 42 m and 77.95
m	
Total length	805 m
Deck width	32 m
Height of twin towers	120 m
No. of stay cables	
(laid end to end, the cables would stretch 810km)	128
Total amount of concrete used	35,700 cubic metres
Total amount of steel reinforcing	6,635 tonnes
Clearance for shipping	27 m

The ANZAC bridge carries approximately 125,000 vehicles each day, including pedestrians and cyclists.

The bridge is a cable stay structure with two planes of stay cables connecting the towers to the deck via twin edge beams. The edge beams are 1.8 m deep and between 1.5 m and 1.35 m wide. The edge beams are either reinforced concrete or pre stressed depending on the location across the bridge.

The reinforced concrete deck is supported by cross girders spaced at 5.1 m centres.

The spans are supported by 128 stay cables that fan out from the top of two 120 m high towers at either side of the deck, each of which is founded on 56 reinforced concrete piles. The stay cables consist of parallel strand wire comprising between 74 and 25 strands with a maximum length of 195m. The deck originally accommodated six design lanes of traffic as well as a pedestrian/cyclist pathway. The main span is 345 m in length with 142.5m long back spans.

Sydney Harbour Maritime

Sydney Waterways Authority

The Waterways Authority is connected to a maritime history that can be traced back to 1811 when the first Harbour Master was appointed to control the port of Sydney.

In 1901 the Sydney Harbour Trust was formed to take over the Harbour's privately owned wharfage to control, administer and develop the port of Sydney. This left the supervision of the other ports of the State in the hands of the Department of Navigation, NSW.

These arrangements continued until 1936, when the Maritime Services Board (MSB) of NSW commenced operations. The MSB had responsibility for all the ports of NSW (with the exception of Port Kembla) and exercised the general powers of a navigation, pilotage and conservation over all navigable waters in the state.

From 30 June 1995, the MSB and its four subsidiary authorities were abolished under the Port Corporalisation and Waterways Management Act 1995. This resulted in the dissolution of the Maritime Services Board of NSW and the emergence of independent port corporations for Newcastle, Port Kembla and Sydney. In addition, the MSB Waterways was transformed from 1st of July 1995 into a stand-alone, self-funding declared authority called the Waterways Authority.

The Waterways Authority is a State Government agency exercising an on-water management role for the NSW Government on behalf of the broader community.

Waterways' primary responsibilities are to achieve the highest possible standards for the safety of commercial and recreational vessels on NSW navigable waters. Other duties include the protection of the marine environment and the provision of waterways infrastructure.

Sydney Waterways is responsible for:

- The overall management of all NSW navigable waters and includes safety and education on the water.
- The enforcement of Marine Safety Regulations: including environmental legislation.
- The leasing of shipping berths, jetties and wharves within Sydney Harbour and throughout the State of New south Wales.
- The installation and management of navigation aids and advisory signage
- The overall management of approximately 18,000 moorings across the State of NSW
- A comprehensive cleaning service for Sydney Harbour
- The Implementation of ministerial landowner regulations in relation to the seabeds of Sydney Harbour, Botany Bay, Newcastle Harbour and Port Kembla, and the specific land assets and wetland leases thereof.
- The legislative responsibility for all major aquatic events within the state of NSW.

Facts, Figures & Trivia

- There are over 20 ferries and 30 charter vessel operators working within the Sydney Port.
- On a sunny Saturday / Sunday there could be in excess of 1,000 pleasure craft on the Harbour.
- Up to 400 vessels enter Darling Harbour on Saturdays & Sundays.

Water Police

The 'Row Boat Guard' is the oldest link we have today with any form of Police activity in Australia. On 7 August 1789, Governor Phillip formed a Guard of 12 “trusty convicts” to detect smuggling and to prevent the passing of letters between convicts and crews of sailing vessels lying at anchor in the port. The primary duties of the original Water Police were to police both the harbour and the foreshores around Sydney Cove.

In 1820, the operation came under the control of the Master Attendant of the Government Dockyard with two rowboats and crews working full time. The Guard continued to expand and in 1830, Governor Darling directed that a separate water police be established under the superintendence of the head of the Sydney Police. Sydney’s first water police Station stands on Goat Island. It was designed by Mortimer Lewis and constructed by convicts in 1837. As Sydney expanded with the arrival of the second and third fleets the water police also expanded and moved into Cadmans Cottage between 1846 and 1849. The cottage also became a Court of Petty Sessions in 1849 and was extended with new office space and prison cells. In 1854, the cottage was thought to be inadequate for the water police, and in 1855 tenders were sought for the construction of a new police station. Cadmans Cottage did, however, continue to be used as a police lock-up.

In addition to the water police station within Cadmans Cottage there was also a building housing a Water Police Court at Dawes Point.

Cadmans Cottage is the second oldest building still in existence in Sydney, built in 1816. This was completed only a year after the oldest building still standing, which is The Mint building in Macquarie Street, which was built in 1815.

In 1840, the Water Police Force came under the control and supervision of a Water Police Magistrate (as an official body by a special Act of Parliament). The unit occupied the watch house on Garden Island. It was soon moved to Watsons Bay, which was considered ideal, as all ships must past this point to enter or leave the Harbour. In 1841 the Water Police expanded and had three strategic points on the Harbour including; Watsons Bay, Goat Island and Cockatoo Island.

In 1955, a Shallow Water Skin-Diving Unit was formed that could descend 100ft. The Unit was used to recover stolen goods and locate victims of drowning fatalities throughout the Harbour and the State.

Sydney Harbour covers an area of over 57sq. kms (22sq. miles) with the foreshores extending for approximately 317km (200 miles). In 1962, the Water Police patrolled the Harbour and surrounding waterways including up and down the coastline. The Water Police closely co-operate with the Air-Sea Rescue Organisation.

With the introduction of the NSW Marine Area Command in July 1990, the Water Police are equipped with 11 sea going craft and a number of smaller boats, all with electronic navigational aids. The section now employs 123 personnel including divers and support staff.

Currently, the primary base for the Water Police is located at Pyrmont with a secondary base at Botany Bay. An efficient and qualified unit of the NSW Police Force, the Water Police’s duties are:

- Policing the waterways of NSW to reduce marine crime.
- Protecting life and property, both at sea and on inland waters.
- Overseeing aquatic events and controlling spectator craft.
- Coordinating search and rescue off the coast of NSW.
- Diving operations and underwater searches for missing persons and evidence.

Sydney Harbour

When the First Fleet arrived in Port Jackson, they found 13 islands dotting the harbour (including Garden and Glebe Islands and Cattle or Bennelong Point). Now, only 7 remain. Those seen from the Sydney Harbour Bridge include:

Goat Island

Goat Island was originally known as Mel-Mel (meaning, 'the eye') by the Aboriginal population and used as a natural watchtower. Goat Island is one kilometre upstream from the SHB and east of the Balmain shore.

Goat Island was originally called, 'Cockatoo Island' prior to 1820, possibly due to its abundance of vegetation. History however does not reveal the reason for changing its name to Goat Island, although two theories exist. The first proposes that members of the First Fleet kept goats on the island, although this is unlikely due to its distance from the settlement and the risk of goats being stolen by the native population. The second theory proposes the island is shaped like a goat.

As early as 1831 the island was used as a quarry and convicts were set to work cutting stones.

In 1833 the island was used to dump human waste from the convict hulk, The Phoenix, however its first major use was as a gunpowder magazine. From 1833 Goat Island became a main storage centre for most, if not all, the military gunpowder in Sydney, although it had been suggested as a gunpowder store as far back as 1826. Eventually it was seen as an unsuitable site for the storage of such large amounts, especially as nearby areas of Sydney, such as Balmain, became more densely populated.

The gunpowder magazine, known as the Queens Magazine was finished in 1839 and measured 100 feet by 25 feet (31m x 9m approx). This was all carved out of the sandstone rock by shackled convicts. Its actual holding capacity was over 3000 barrels of gunpowder, or cotton powder, however, merchant gunpowder was also stored here, and it was estimated that only as many as 400 barrels of military gunpowder was ever stored here at one time.

In late 1853 an additional magazine, known as the Colonial Magazine, and intended for merchant's gunpowder only, was completed.

By the 1860's the magazines had become vastly overcrowded and dangerous and it was suggested that another, larger, magazine be built away from Sydney town on Spectacle Island, not far from Cockatoo Island. This was begun in 1863. In the meantime several ships were used as floating magazines, namely the brigs 'Cameo' and the
'Lady Mary'. These were to become known as 'Powder Hulks'.

Military explosives were later removed to Spectacle Island leaving only the merchant gunpowder (commercial explosives) on Goat Island. This was mainly used in the great gold rush of 1851-1870's.

Goat Island was also home to its most infamous prisoner, an 18 year old convict named Charles 'Bony' Anderson. Anderson was sent to the colony for the crimes of theft and drunkenness and upon arrival in Sydney he was initially sent to Goat Island for a period of two months. He escaped soon after but was re-captured and given 100 lashes. He was given 100 more lashes every month for various 'crimes', including "looking up from work" and "looking at a steamer on the harbour".

Anderson again escaped and was re-captured, and this time he was punished with 200 lashes. He was then chained to the sandstone rock by a 26ft length of chain attached to his wrist. Bony eventually carved a chair out of the sandstone rock which is still visible today and is known as 'Andersons Couch'. His food was pushed to him at the end of a long wooden pole as many were scared to go near him and at night a wooden cover, with a few breathing holes, was clamped over his body. He became a tourist attraction and would be viewed as an oddity by Sydney siders who would venture near Goat Island and throw him dry biscuits and stale bread.

Anderson was finally sent to the new penal settlement of Norfolk Island where his condition improved under the new penal reforms of the humanitarian Alexander Maconochie. He was finally brought back to Sydney where he died at aged 27 or 28.

During his time on Goat Island Anderson was given a total of 1700 lashes and died insane. Prior to his sentence to Australia, Anderson had been wounded in a naval battle serving in the British Royal Navy, and this was believed to have been the cause of his mental disability.

When the Bubonic Plague reached Sydney in 1900, Goat Island became a quarantine zone for a bacteriological station to investigate the disease. Scientists from the Health Department subsequently discovered that it was fleas carried by rats that were spreading the Plague.

In 1901 the island was used by the newly formed Sydney Harbour Trust (now Maritime Services Board) as a base for cleaning up the Harbour, and in 1919, a shipyard was constructed on the island which had the capability of building ships of up to 500 tonnes. This remained in operation from the 1950's through to the 1970's. Ships were built and serviced for the Maritime Services Board.

The island had a workforce of over 300 people, though by the 1980's there were only fifteen families still living on the island full time. There were no shops and electricity wasn't connected until the 1930's.

The island was opened to school groups in 1974 with tours run by the Maritime Services Board and in 1984 the island was opened for public tours. The last permanent residents left the island in 1979 and later the MBS sold the island to National Parks and Wildlife Service, and in 1990 Goat Island was added to the Sydney Harbour National Park list.

Between 1996 and 1999 the island was used for filming the popular police television drama series, Water Rats. (BRW Magazine recently reported that the cost of producing one episode of a drama such as Water Rats was about $400,000 with a series costing as much as $5 million.)

Cockatoo Island

The name Cockatoo Island was first recorded in 1839, though the island's history reaches back much further: fossil remains found on the island date back at least 180 million years. The local Aborigines called Cockatoo Island 'Biloela'

Cockatoo is the largest of the islands in Sydney Harbour, though when the first colonialists arrived it covered an area of no more than 12.9 hectares. This was later increased to its current size of 17.9 hectares, through extensive cutting, reclamation and filling. As most of the island was used to reclaim the land there was little left for natural vegetation, thus the growing of food was a major problem. In order to overcome these issues 60 convicts serving their time on Norfolk Island were returned to Sydney and put to work constructing silos for wheat storage into the sandstone. Though most of these silos were in fact destroyed by later works on the island, excavations done during WWII uncovered at least two silos in excellent order.

In an irony of fate it was the very same sandstone that the convicts cut from the rock that went to make their very own cells and dungeons and also that of their wardens. By 1842 there were 323 male convicts and wardens living and working on the island. For the convicts the thought of escape was discouraged by the tales of man eating sharks said to live in the harbour. Many, but not all were deterred from trying and records show that only one successful attempt was made when the convict Frederick Ward, later more commonly known as the bushranger "Thunderbolt", who, with another convict, swam ashore in September of 1863 under cover of heavy fog. The fate of the other convict remains a mystery.

The island was to become one of the most important naval dockyards in Australian history and the convicts were put to work over the coming decades clearing the land and building two large dry docks. The first, the Fitzroy dock, was completed in 1857, the second, the Sutherland, in 1890. These remained in constant naval use until the Captain Cook dry dock was completed at garden island in 1945.

The prison on Cockatoo, hitherto an all male affair was, at a later date, made into a women's prison. The prison was opened in 1870 and finally closed in 1908, though its structure still remains, which is more than can be said of the soldiers quarters. This was demolished in in 1950's when the staff living and working on the island wanted to install a bowling green.

In 1911 the Royal Australian Navy was established and Cockatoo Island was used to supply naval vessels sailing out of Sydney. In 1913, just prior to the outbreak of WWI, it was taken over by the Commonwealth Government as a defence establishment. By 1916 the cruiser HMAS Brisbane, was completed and this was the first of many such commissions that saw the dockyard through the war years. The workforce at the dockyard peaked at 2,800 men.

Garden Island

Garden Island is owned by the Commonwealth Government and is Australia's main naval port and ship repair site. It is the main base for the Navy Fleet on Australia's east coast.

Captain Arthur Phillip allotted the less than five hectares island to the crew of HMS Sirius to grow vegetables ten days after the arrival of the First Fleet in 1788. They continued to grow crops on the island until 1810. The rock carvings, dating from this time are the oldest white graffiti in Australia – consisting of carved initials – 'FM', 'IR' and
'WB' and have the year 1788 engraved beneath them. 'FM' was most likely Frederick Meredith who belonged to the Sirius and went on to become a police constable. This also represents the only remaining physical evidence of the First Fleet on the island. These artefacts remained largely forgotten until they were 'rediscovered' in the
1920's.

The identity of one of the early gardeners is known, and was to go on to greater fame as Australia's first bushranger named John Caesar or more commonly known as 'Black Caesar.' He was a Jamaican servant living in Deptford, London, who was convicted of the theft of £12 and transported to Australia for seven years with the first fleet in 1788. Caesar was a known as a 'Bolter,' a convict who escaped from custody and 'bolted' into the bush. He was in fact captured a number of times, usually as the result of the 5 gallons of rum on offer as a reward, but he always managed to escape time and again, until that is, a free settler named John Wimbow tracked him down to an area of bush land known then as Liberty Plains, near the present-day Concord/Strathfield. There Wimbow shot and killed Black Caesar on 15th of February 1796.

As stated, Garden Island remained a working garden until about 1810. The severe lack of fresh water was one of the main reasons for its final demise.

The 1820's saw the construction of sandstone fortifications to protect Sydney from a feared Russian attack before the Royal Navy began berthing ships at the island in 1855.

The title 'Royal Australian Navy' was granted by King George V on the 10th of July 1911. On 1st July 1913 all naval establishments in the Australia were handed over by the British Admiralty to the Commonwealth government and the Royal Australian Navy. These facilities included Garden Island and the island became the RAN's main fleet base and principal ship refitting dockyard. During WW1 alone, 852 ships were serviced on the island.

In 1923 the NSW Government claimed the island as its property and after seven years of legal argument the High
Court and the Privy Council ruled that the NSW claim as indeed valid.

With the outbreak of WW II in 1939 the Commonwealth Government resumed the island under wartime powers and in 1945 purchased it from NSW for the sum of £638,000.

Between 1940 and 1945 the building of the Captain Cook Graving Dock (the largest dry dock in the Southern Hemisphere: Graving literally means cleaning) was the biggest engineering project in Australia, as was filling in the strait that separated the Garden from the mainland. Twelve hectares of seabed were reclaimed, thereby effectively linking the island to the shore at Potts Point. When the graving dock was finally completed in 1945, it measured a total of 345 metres long, 45 metres wide and 14 metres deep with a capacity of almost 260 million litres of water. This development helped make Garden Island one of the most important naval bases in the southern hemisphere.

The giant Hammerhead Crane (above) used in the Captain Cook Graving Dock took seven years to build, and was, at the time, the largest crane in the Southern Hemisphere, being built specifically to lift warship engines, boilers, gun turrets and guns of up to 250 tons. The crane remains the largest dockside crane in Australia. Like the Sydney Harbour Bridge it was constructed using rivets; approximately 250,000 of them.

Garden Island today is used by the Navy Defence and ADI Limited. ADI Ltd. manages and operates the dry and floating docks and a range of ship maintenance facilities. The general population of the island varies depending on the work being done and the number of ships in port.

Garden Island was where the converted ferry, The Kuttabul was berthed when it was sunk on the night of May 31st, 1942 by a Japanese Type A midget submarine. Used as an accommodation ship, 21 Australian and British sailors were killed during the attack. The original target for the attack was the USS Chicago. Two torpedos were fired. One torpedo ran aground on Garden Island and failed to explode. The other passed under the Chicago, under the Dutch submarine K-9 and under the Kuttabul, but struck the sea wall against which the Kuttabul was moored. The explosion damaged the Dutch submarine and sunk the Kuttabul, killing 19 Australian and 2 British sailors and wounding 10 others.

The establishment, HMAS Kuttabul, whose primary role is to provide administrative, training and logistics support to defence personnel, both uniform and civilian, employed within the Sydney area was commissioned on January 1st 1943 to commemorate this event and the sacrifice of those men.

A 1997 agreement provided limited public access to the northern section of Garden Island. It is the first time the island has been opened to the public in over 150 years.

Garden Island also boasts what is claimed to be Australia's first lawn tennis court. Built in 1880, it is still in use, although the lawn was replaced in 1960

Shark Island

Shark Island is a timbered islet lying 1km off Rose Bay. Its name is derived from the shape of the island and was originally known as 'Boambilli' by the Aboriginal locals.

In 1879 Shark Island briefly became a public recreation reserve before conversion to a stock and dog quarantine area. In the late 1890s, the quarantine station was moved to Athol Bight and the island again became a public reserve. Between 1890 and 1911 amenities for picnickers and a walkway around the island featuring artificial caves and seating were constructed.

During WWII Shark Island was occupied by the Navy as a storage depot. Two small areas of the island remain under Navy control housing equipment used to demagnetise naval vessels.

The island is a constant danger to shipping, necessitating the building of a lighthouse featuring a fixed white light in 1890. An upgrade in 1924 saw the installation of the present flashing light.

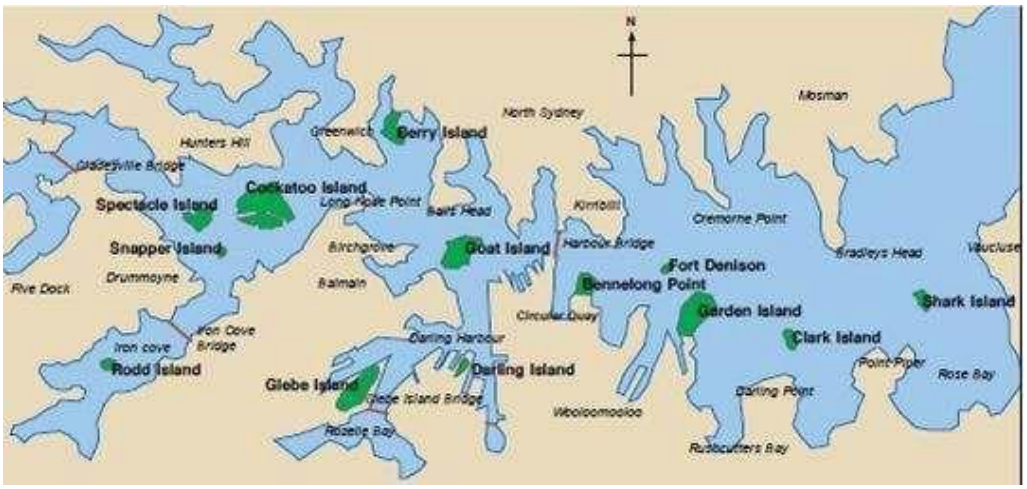
In 1975 the Maritime Services Board handed Shark Island to the Sydney Harbour National Park and a program is currently underway to restore the island to its Edwardian condition and conserve its trees.

Clark Island

Clark Island is a 0.9 hectares island located off the tip of Darling Point and was named after marine officer Lieutenant Ralph Clark, who arrived in Sydney with the First Fleet.

In 1789, Lieutenant Clark tried to cultivate a vegetable garden on this one-hectare island. He was forced to abandon the idea when his crops were repeatedly stolen.
Prior to Lieutenant Clark's arrival, the island was regularly used as a meeting place for Aboriginal tribes.

The Bays of Sydney Harbour



The Eastern Suburb Bays

Rose Bay

This area was named after The Right Honourable George Rose, joint Secretary to the British Treasury (with Thomas Steele). The name, Rose Bay was used as early as 1788 by Captain John Hunter.

The northern half of Lyne Park was the home of the Flying Boat Service, established in 1938. The first flying boat took off from Rose Bay 5 July 1938 en route to Singapore, and then on to Southampton, England. The Flying Boat was the first aircraft to arrive in Australia with an automatic pilot. It was also the first aircraft with a galley and steward. Originally intended for mail they carried on 15 passengers and a crew of 5. They were by any standards luxurious, and the only 'class' available was First Class.

Qantas started with just 2 C Class Empire Flying Boats and at their height there were 31 flying boats operating between Southampton and Sydney which they ran three times a week.

Such was the size and luxury of these aircraft they even had room for a mini putting green. The journey itself involved 31 stops for refuelling. Their average speed was 160 mph or 257 kph reducing the time taken to travel to England by air to an unbelievable nine days. Significantly faster than a sea journey and three days faster than the much smaller, land-based DH86 biplanes they had replaced.

However, at a time when the average wage was just £4 a week, the cost of a flight to England was £220. This was more than a years wage for most people.

The Rose Bay flying boat terminal was finally closed in 1977.

Rushcutters Bay

Through common usage, the area became known for the two rush-cutters who had lost their lives at the site, displacing the former aboriginal name for the locality, which records at the NSW Geographical Names Board show to have been Kogarah.

The stream dividing the park is formed by two creeks; one flowing from present-day Darlinghurst and the other, from Glenmore Brook starting in Woollahra and passing through lower Paddington.

Rushcutters Bay was the home of the first major stadium in Sydney. Opened in 1908 it was an open roofed stadium seating 17,000 spectators. Later a roof was added in 1911 and it became known as 'The old Tin Shed'; perhaps best remembered now for the World Heavyweight Boxing Championship on, strangely enough, Boxing Day in 1908, between the Canadian Tommy Burns and America's Jack Johnson. Johnson went on to become the first black heavyweight champion of the World when the fight was stopped by police in round 14, after Burns had been knocked out, and the referee awarded the fight on points to Johnson. It is still the only time that the world heavyweight title prize has been held in Australia. On the day over 60,000 people tried to get into this fight. 20,000 were successful with 40,000 listening to the roar ofthe crowd outside. The stadium was closed in 1970.

Point Piper

Considered by many to be Sydney's most expensive suburb, however according to property analysts RP Data, the most expensive suburb for real estate in Australia is Darling Point with Rose Bay coming in at 18th. (Data correct as of 2009). The area was originally called Eliza Point, later to become Point Piper when the 190 acre (76 ha.) land grant was given to Captain John Piper ('Naval Officer' of the Colony) in 1816. After Piper found himself in financial difficulties, the Grant was bought in 1827 by Daniel Cooper who bequeathed it to the son of his nephew. The land changed hands to William Cooper for $100,000, who, in 1883, built Woollahra House. The first subdivision on the Point took place around 1882 with the release of foreshore land in 1899. On title deeds the name, Point Piper Estate is often given. It is now considered one of the more exclusive residential areas in Sydney today.

Double Bay

Originally known as Keltie or Kelties Bay (in honour of James Keltie the master of the Sirius, the flag ship of the First Fleet), the name was changed to, Double Bay in about 1821. The suburb has two swimming areas. The beachfront known as Seven Shillings Beach was named when an Aboriginal called Gurrah sold his fishing rights to the beach to William Busby for 7 shillings. The second, Redleaf Pool (named after local house; 'Redleaf') also purchased by William Busby, is protected by shark nets. Double Bay today has cultivated its image as an exclusive shopping centre, offering imported and local furniture, clothing and food. Double Bay is continental in character and has endeavoured to retain its village atmosphere.

Watsons Bay

Iconic for visitors and Sydney siders alike, Watsons Bay today hosts Doyles (Seafood Restaurant) and is a gateway for other attractions in the area such as The Gap, The Macquarie Light and The Hornby Lighthouse.

Historically, the northern half of present-day Robertson Park (2.5 acres of waterside parkland named in honour of 5 times NSW premier Sir John Robertson) was granted to Thomas Watson in 1834. Watson was a master seaman on the Sirius and later became harbourmaster. He built 'Clovelly', a marine villa, on the eastern end of the grant.

In the 1860's Watson's Bay became a popular recreation area with its hotel, beaches, views from 'The Gap' and a private zoo (with a lion which the children could ride, a tiger which took the zoo-keeper's arm, and a retired elephant); a horse-drawn bus service operated from Circular Quay to Watson's Bay by 1869.

The aboriginal name for Watson's Bay is Kooti.

South Head Signal Station was established on the 20th of January 1790, by Captain John Hunter of HMS Sirius, as a 'Lookout Post' with a flagstaff to signal to the Governor when a ship appeared off shore. One of the main reasons for the position of the signal station was that for the past 18 months a party of marines had been dispatched weekly to Botany Bay on the look out for ships arriving from England who were unaware that the fledgling colony had moved from Botany Bay to Port Jackson. The present sandstone tower was begun in the 1840's (Mortimer Lewis, architect) and completed in the 1890's.

The Station ceased as a government funded station in March 1992, however the Signal Station has since undergone a major refurbishment, both internal and external. In addition to a repaint, carpet has been updated and an air conditioner has been fitted to make working conditions more comfortable for the many Coast Guard volunteers who man the base every day of the year, except Christmas Day.

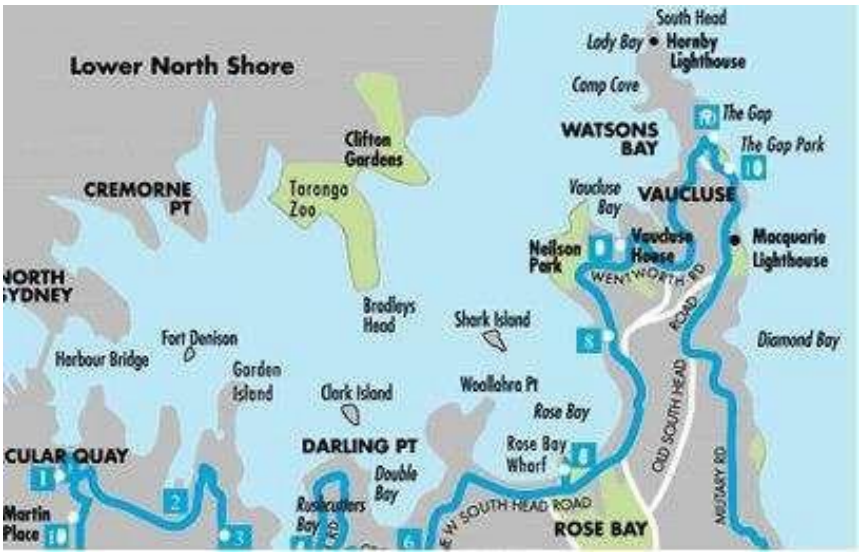
Neutral Bay

Neutral Bay was so named by Governor Arthur Phillip after an outbreak of war between England and France as a place where foreign ships could be moored while waiting for their status as either friendly or enemy vessels would be checked. The Aboriginal name for the area was 'Wirra-birra'. Arthur Phillip considered that Neutral Bay was far enough away from Sydney Cove to discourage convicts from escaping on these vessels and also far enough away to keep possible enemy ships at a safe distance from the main settlement.[

The little bay off to the west of Neutral Bay is called Careening Cove. James Milson (Milson's Point) began an abattoir and quarry at Careening Cove from a land grant that he received in 1817. "Careening" means to lay a boat on her side to scrape the hull free of marine growth.

Macquarie Lighthouse

The Macquarie lighthouse is located on Old South Head Road, Vaucluse. The original lighthouse was built over a two year period from 1816 to 1818 under the supervision of the convict architect Francis Greenway, who was himself responsible to Captain John Gill, Acting Principal Engineer to the Colony at the time. The responsibility for the design can be attributed to both men. The original lighthouse was replaced in 1883 by the present structure (designed by the colonial James Barnet) and was built slightly to the west of the original site. Electric power for the light was generated by two dynamos driven by 'towns gas' engines up to 1912. It was then replaced by incandescent kerosene gas apparatus until 1933 when a bivalve Fresnel lens was installed. The light was connected to the city electricity mains but with diesel powered stand-by. The original structure was to the east and often referred to as the 'Macquarie Tower'. In 1976 the Macquarie Lighthouse was fully automated and the last light station staff left the site in 1989.



The very first semi-permanent illuminated beacon for shipping was actually a large fire in a tripod-mounted iron basket erected at Sydney Harbour's South Head in 1794; Although it is recorded that a fire had previously been lit on South Head for the arrival of the 'Bellona' on the 15th January 1793.

Did you know?

Geologically speaking, Port Jackson is a drowned river valley, or ria. It is 19 km long with a surface area, at mean high water mark, excluding islands, of 5,255 hectares. The estuary's volume at high tide is 562,000 megalitres or 123,622,717,544.08732 British gallons. The perimeter of the estuary is 317 kilometers.

Sydney Harbour has an average depth of 10.7 metres. This was determined after a five year study by the NSW Maritime Authority which concluded in 2004.

The Western Bays

Lavender Bay

Originally Lavender Bay was called Quibaree Bay after the Aboriginal word for spring of fresh water and was renamed Hulk Bay in the early nineteenth century and finally renamed Lavender Bay in the 1850's. This was named after George Lavender the boatswain on the 'The Phoenix'.

The Phoenix was the first and last prison hulk in Sydney. She was a transport ship that ran aground on Sow & Pigs Reef just inside the harbour entrance where she remained for 24 hours before being set afloat. Discovered to be in very poor condition she was finally anchored in what came to be called Phoenix, or Hulk bay. She served as a prison hulk for 11 years from 1826 to 1835, taking the overspill from the already overcrowded goals of the new colony. She was the home to 260 convicts, most awaiting transport to the even harsher penal colonies of Norfolk Island and Van Diemen's Land

The Australian Crawl : Fred Cavill an Englishman settled in Australia in 1879 and started a swimming bath at Lavender Bay in 1901. Fred had 6 sons, 3 of whom Sydney (named after the City), Arthur and Dick played an important role in the development of the crawl swimming stroke.

Sydney Cavill wrote whilst visiting Samoa that he raced a female swimmer who gave him the hardest race of his life. He noted with amazement that she swam an overarm stroke, but did not kick at all. Later Sydney tied his legs together and discovered that he could as quickly with his legs ties together as he could with his legs free using any other stroke. Sydney wrote home to his brother Arthur about it.

Arthur later used this technique in a bet against Syd Davis when they raced. Arthur tied his legs together and won the race. Another brother Dick Cavill perfected the style by adding an up and down motion kick to the stroke, instead of the usual scissor kick. From here the Australian Crawl as we know it today a Freestyle was born.

Many of the bridge workers would use the Cavill Baths at Lavender Bay during their lunch breaks or on their days off. There is a possible chance that members of the Cavill family taught some of the workers how to swim, which would be vital if they were to survive the fall into the harbour.

Blues Point

Blues Point Road is one of a very few roads in North Sydney which were constructed by convict labour. It was built from Billy Blue's 'Northampton Farm' to the newly created township of St Leonards.

Blues Point Tower stands on the site of a house owned by Moses Bell and designed by Edmund Blanket. Moses Bell was part owner of the Star of Hope mine at Hill End near Bathurst in which was discovered the largest single gold nugget ever found on the planet, weighing in at a staggering 286 kgs, containing an estimated 5000 ounces of gold on 19th October 1872.
The deepest part of Sydney Harbour is about 47.2m down between Dawes Point and Blues Point, conveniently
placed for those multi-storey container ships making the tricky left-hand turn into White Bay

Blues Point Tower

Blues Point Tower was completed 1961and stands at 83 mts tall, which, at the time was the highest residential apartment block in Sydney, a record it held until 1969. It is built as a concrete frame structure, and stands 25 storeys high.

The tower has 144 apartments, comprising seven per floor up to the 12th floor; six per floor to the 18th floor; and four (three-bedroom apartments) per floor to the 24th. The top floor was reserved for a laundry and drying area, which could claim the best views in Sydney.

Blues Point Tower was never meant to be a stand alone apartment block. The designer, Harry Seidler intended it to be only the first stage of a complex of seven or eight such towers.

In addition to the towers themselves there were plans for 10 or more medium-rise apartment blocks and several smaller ones along the foreshore.

When it opened to the public in late 1961, an average flat cost about £3,500, which was about half the price of a two-bedroom fibro house in Ryde. One of the first residents was Harry Seidler's brother, Marcel, a well known photographer. Over the years, Blues Point Tower has had more than its fair share of celebrity tenants, the most famous being Rupert Murdoch during the 1960s.

The top floor 3 bedroom apartment was sold in September 2009 for $1,320,000.

Milsons Point

Milsons Point was named after James Milson who arrived in Sydney in 1806. He built what was probably the first house in the area and became a wealthy man until a bushfire in 1826 destroyed everything he owned, including the title deeds to his property. A legal dispute over land rights with the government followed and Milson eventually settled for a much small portion than he had had previously. Nonetheless he still prospered with the help of Robert Campbell, with whom he who had been a fellow passenger on his journey to Australia on board the Albion. His son, also James, eventually went into partnership with Campbell.

McMahons Point

McMahons point was named after Michael McMahon, an Irish-born brush and comb manufacturer and a prominent local who became mayor of North Sydney in 1890.

From 1906 McMahons Point became a busy ferry destination carrying over 6,000,000 passengers per year prior to the opening of the Bridge in 1932.

Berry's Bay

The first recorded use of the area was in 1825 when Edward Wollstonecraft leased 524 acres of North Sydney. In 1853 Alexander Berry leased a large portion of the area. A coal storage depot and later a distillery occupied the area until 1877 when the land was leased to the NSW Torpedo Corps as a submarine mining depot until 1889, and came to be known as Torpedo bay. A wool store occupied the area until the early 1900's. In 1912 the Quarantine Depot was established in Berrys Bay to service the boats operating to and from the Quarantine station at North Head.

In August 1920 the land was leased to the Anglo-Persian Oil Company Ltd (the predecessor of BP) for a period of 50 years. The first storage tank was built in the bay in 1922. Oil was to be associated with the bay right through until 1996 when most of the oil storage tanks were demolished and the area decontaminated. This was completed in 2002. In 2003 the State Government handed over the site to North Sydney Council and the area returned to public parkland.

Balls Head

The Aboriginal name for Balls Head is 'Yerroulbine' and is the site of great aboriginal significance, containing many archaeological remains. It is also believed that Balls Head was a site where Aboriginal men came to perform sacred corroborees to honour their ancestors of the Dreamtime.

Balls head is named after Lieutenant Henry Lidgbird Ball, Commander of the ship 'Supply' of the first fleet, and the man who discovered Lord Howe Island. The area remained largely undeveloped until the early part of the 20th century, being the last remaining part of the large Wollstonecraft Estate.

Balls Head was declared public parkland in 1926. Within the park there is a flagpole which is situated 300ft above sea level, marking the highest point west of the Harbour Bridge. In early settlement times it is believed to have been used as means of communication with Government House.

Manns Point

Manns Point is perhaps best known as one end of the first tunnel ever built connecting the two sides of Sydney Harbour. Sadly the tunnel is now flooded and is virtually a forgotten part of Sydney's history. Originally built between Long Nose Point, Balmain, and Manns Point, Greenwich, the tunnel took nine years to complete, the same time as the bridge however it was built much earlier, from 1913 to 1924. Intended to carry submarine electricity cables for the electric tramway system on the north side of the Harbour the tunnel suffered damage as the result of dragging anchors and was finally flooded in 1930. The cables themselves remained in use until 1969 when the north shore became self sufficient in power supply. From end to end the tunnel measures 1,760 feet (533 metres)

Snails Bay-Birchgrove

Snails Bay is so called because of quantity of sea snails in the bay. The area was part of the vast estate called Birch Grove which covered 30 acres and originally granted to George Whitfield by Governor Hunter in 1796 and was to become known as Whitfield's Farm. The whole of the Birchgrove area was known to the Aboriginals as Yerroulbin, meaning "swift running waters". In 1810, Lieutenant John Birch, paymaster of the 73rd Regiment, purchased the property and named it Birch Grove. It's thought this was in reference to the estimated 500 orange trees growing in the area.

Johnstons Bay-White Bay

Named after Lieutenant Colonel George Johnston, the man who was later to arrest Governor William Bligh and take control of the colony, albeit briefly.

White Bay

White Bay is named after Whites Creek at the head of the bay. White Bay power station was built on a 38,000 square metre site beginning in 1912 and was designed to service the increased need for electricity with the growing number of people and trams in Sydney. White Bay power station was the longest serving of Sydney's metropolitan power stations and ceased production on Christmas Day 1983. In 2000, the site was sold to the Sydney Harbour Foreshore Authority for about $4m.

Walsh Bay

Prior to 1900 the area now known as Walsh Bay was called Towns Wharves. This was named after Robert Towns, a merchant trader who acquired the land in 1844. Towns Wharves continued to prosper until 1873 when Towns died. His wife Sarah continued the business until she sold it in 1876 to another merchant who also had property in the Millers Point area, Charles Parbury. There was no sea wall and the harbour foreshore was awash with rubbish and infested with rats. The plague of 1900 was to change all this. Known as The Resumptions the area was cleared and the sea wall built. Towns Wharves was acquired as part of the Public Purchasers Acquisition Act (1901) and much of the area was demolished under the guidance of the newly-formed Sydney Harbour Trust (later to become the Maritime Services Board). During the 1850's Towns served several terms as president of the Bank of New South Wales.

Those wharves that survived were renewed but whole streets were to disappear as the high cliffs dominating the landscape were cut back to form what is now Hickson Road. New double-decked finger wharves were built and also series of bridges were constructed to connect the upper levels to Millers Point. In 1919, the wharves between Dawes point and Millers point were named Walsh Bay in honour of H.D. Walsh, the chief engineer of the Sydney Harbour Trust. The Walsh Bay wharves fell into decline in the 1970's due to changes in shipping technology, that is, containerization. The wharves were originally constructed using an estimated 4000 wood piles, 40 metres long and driven into the harbour sea bed. Native turpentine trees were used because of their resistance to sea water and decay.

The Pier One Hotel (formally known as the Sebel Pier One Hotel), was fully refurbished and reopened in 2015. It has 189 rooms and 4 Harbour Balcony suites. The restaurant and bar called 'The Gantry', has tables inside with harbour views or waterside tables outside. A conference centre called "Water' at Pier One, has expansive views across to Luna Park and the rest of Sydney Harbour and has 9 meeting rooms and a large function room which can cater for up to 220 pax seated. In 2014 The American Tv show 'Modern Family' used the balcony for a scene from their "Australian episode', where they climbed the bridge. Originally opened in 1912 as a shipping wharf with a frontage of 620ft (187 metres) in length and used primarily by

the Orient Steam Navigation Company, and P&O Steam Navigation Company.

From 1913 The Royal Military Service New Zealand used the wharf and in 1923 Pier One became the main place of berthing for large P&O and Orient liners that had moved from Circular Quay due to their increased size. This continued until 1963 when the wharf was used as a cargo wharf up until 1977 when work begun to redevelop the wharf for commercial use. The wharf included shops and amusements until it was further developed and the current hotel was opened in 1999.

Piers 2 and 3 were built in 1900 and are the last wharves remaining in their original state and is under the management of the NSW State Government and is used for cultural and exhibition purposes.

In the early 1980s Wharves 4/5 were refurbished and leased to the Ministry for the Arts and now house the Sydney Theatre Company and the Sydney Dance Company.

Piers 6 and 7 house some of Sydney's most desirable residential property. There are 239 residential apartments and 49 boat moorings. When offered for sale off the plans in 2000 the properties set a new Australian record for real estate sales with almost $400million worth of real estate exchanged in only 10 days

Pier 8 and 9 were built in 1912 are the only three level wharves in Walsh Bay and were originally designed for the booming wool trade. Today it is used as office space and was the home of Murdoch Magazines until it was purchased by the Seven Network in 2004 for $77. Within the building there is a room known as the Dead Room. This is the room that once housed the bodies of soldiers who had died and were awaiting repatriation overseas for burial, or the bodies of those who died on voyages, until they could be collected.

The redevelopment of Walsh Bay has won over 60 local and international awards.

Barangaroo

Formally East Darling Harbour it was renamed Barangaroo in 2006. Barangaroo is named after an important indigenous woman from Sydney's early history who was a leading figure in the story of the early colonisation of Australia and the wife of Bennelong, after whom Bennelong Point - the site of the Sydney Opera House - is named. Barangaroo is thought to have been very a strong-willed woman who once struck a soldier for whipping a convict. She died shortly after childbirth in 1791. Her son, named Dilbong, also died shortly after. Both bodies were cremated and buried in the grounds of Government House.

Barangaroo: The woman

It is generally accepted that the actual birth date of Barangaroo isn't known, but what is known is that she was of the Cammeraygal tribe and believed to have been in her late 30's when the first fleet arrived in 1788. Already previously married with two children, all of whom had since died of what is thought to have been smallpox, a disease introduced into Australia by the Europeans, she was, by 1790, the wife of Bennelong.

Barangaroo: The site

The area covers 22 hectares of NSW government owned land and has a foreshore of 1.4 kms. It is managed by the Barangaroo Delivery Authority. Originally it was simply a jagged shoreline until it was reclaimed and a windmill was erected before it was taken over for wharves which served the growing amount of shipping coming to Australia from all over the world. The wharves became part of what was to become known as 'The Hungry Mile', a place where workers would line up daily in search of work during the depression of the 1920's

(Additional information taken from: The Daily Telegraph. 21/02/2012)

In March 2012 The Barangaroo Delivery Authority appointed a world leading consultancy, AEA Consulting, to undertake a study to explore cultural development opportunities for Sydney and to put forward specific options for the future of the Barangaroo site.

According to the Barangaroo official website the estimated cost of redevelopment is expected to be in the region of $6 billion and will begin in 2011. The forecast is that over a period of time some 23,000 people will live and work in the precinct with 33,000 people expected to visit Barangaroo each day, that's approximately 12 million people per year.

An artist impression of Barangaroo; Barangaroo.com/media_fact_sheet_2012

Timeline for completion of Barangaroo

2011 Construction of Headland Park and Barangaroo South commences.
2012 - 14 Headland Park and Barangaroo South construction continues.
2015 Headland Park opens. First buildings at Barangaroo South complete.
Barangaroo/ Wynyard pedestrian links complete.

Currently the wharf area at Barangaroo nearest to Darling Harbour is the home to a temporary cruise passenger terminal. This will relocate to White Bay in 2013.

Work commenced on the Barangaroo South site in October 2011 which occupies 7.5 of the total 22 acre site. Some of the key components of this area will be the three commercial towers, two of which will reach 180m, whilst the third, and highest, will top out at 209m. In addition there will be 800 residential apartments and a mixture of convenience, lifestyle and fashion stores, cafes and restaurants. It is estimated that this development will eventually create over 6000 new jobs.

Given the historical nature of the area the NSW government ordered the excavation of four large pits to examine any potential archaeological remains that may still exist in the six hectare area now renamed Headland Park.

Upon completion Headland Park will contain an estimated 675 trees, 2,200 shrubs and 70,000 other plants, all of which have been cultivated by Andreasons Green nursery at Mangrove Mountain.

On the 17th of July 2008 Pope Benedict XVI delivered Mass as part of World Youth Day to an estimated audience of 150,000 people.

The Barangaroo Harbour Control Tower

Opened in 1974 by the Hon L.A. Punch, the 87m tower has a three story control centre starting at the 82 metre level. 38mm rock anchors were driven 7.9 metres into the solid bedrock to form the foundations of the reinforced concrete tower. The tower is manned 24 hours a day, 7 days a week: The radar system used controls all berthing in both Sydney harbour and also Botany Bay with an extended radius of 30kms seaward. The tower is known colloquially known as 'The Pill' … because it controls all the 'berthing' in Sydney.

The reinforced concrete tower which stands at 87 metres high has its operations level at 82 metres. The tower is constructed on a bedrock foundation. Rock anchors, 38 millimetres in diameter, are driven 7.9 metres down to provide adequate anchorage. The structure was originally designed in prestressed concrete but was finally built in reinforced concrete to improve damping of wind generated vibration

Plans for the tower were originally drawn up in 1972 after two ships collided in the shipping channel near Millers Point. Today the tower is gathering dust since Sydney Ports relocated its harbour control operations to Port Botany in May 2011. Its future is still uncertain.

The Harbour Control Tower located in Barangaroo

Marine Ecology

Sydney Harbour has more marine species than any other harbour in the world. Over 600 marine animals have so far been identified.

Sydney Harbour waters are protected by the Fisheries Management Act 1994. The NSW Department of Primary Industries is responsible for the administration of the Act which provides a framework for the protection of living aquatic resources.

Sydney Harbour waters are rich with plankton, the basis of the marine food chain. Small corals, dazzling red and pink gorgonian sea fans and lavish sponge gardens make the Harbour an enchanting and colourful underwater treasure.

Large areas of kelp forests and rocky intertidal zones provide ideal habitat for a host of animals including sea stars, sea urchins, nudibranchs (sea slugs), crabs and lobsters.

Patches of sea grass (the only flowering plant found underwater) provide habitat for sea horses and a nursery for fish stocks. These ecosystems are separated by large areas of sand; home to prawns, eels and rays.

Fish

583 fish species can be found in Sydney waters including species unique to the Harbour. A few of the local fish rival the tropical species in colouration. Local fish species include:

- Stripey
- Fan Bellied Leatherjacket
- Eastern Pomfred
- Eastern Hula Fish
- Black Bream
- Trevally
- Flathead
- Yellowtail

Warm currents in summer sweep from the Great Barrier Reef into the Harbour, bringing many tropical fish. These species travel 3,000km and live in the Harbour until they perish in the cool winter waters.

Mussels

Sydney Harbour has experienced a huge influx in the number of mussels over the past decade. Millions of mussels have colonised piers, marinas and rock ledges around the Harbour, baffling scientists.

Mussels feed on plankton and organic matter by filtering seawater. This filtration activity helps maintain water clarity when mussels are in abundance. Good clarity enables light to penetrate the water to assist plant growth (e.g. sea grasses) on the sea floor. When filtering dirty seawater, mussels accumulate certain toxins (heavy metals, aromatic hydrocarbons) in their tissue and are not suitable for harvesting.

Other Marine Life

Other marine animals found occasionally in Sydney Harbour include sharks, seals, penguins, whales and dolphins.

These animals sometimes unfortunately consume litter which has been tossed overboard, resulting in the animals choking and eventually drowning. Local councils have now been made accountable for any storm water drains or outlets that flow into the Harbour. This has helped to reduce the pollution levels in all of Sydney's waterways. The water quality is the cleanest Sydney has seen for 30 years.

Tributaries

An abundance of marine life can be found throughout the Harbour and the tributaries that flow into it. The Parramatta River is the major artery, fed by smaller creeks such as the Duck and Subiaco Creeks. The river has been given a reprieve after decades of industrial waste from factories which lined its shores. Mangroves are no longer cleared and are slowly returning along the river banks. Eels are occasionally spotted down-river.

Aquatic Reserves

One of the best ways to protect sensitive fish habitats is to create aquatic reserves. Although often small in size, these sights provide protection to a number of different habitats. All reserves are recognised for the importance of their species diversity and serve conservation, scientific, educational and recreational purposes. Within the aquatic reserve at North Harbour, the collection of intertidal invertebrates and marine vegetation (including algae) is strictly prohibited. Line fishing is allowed, providing anglers bring their own bait to the site.

NSW fisheries do not allow collecting methods which damage intertidal habitats. Any animal may be taken with bare or gloved hands. Destructive implements such as mattocks, chisels and crowbars are banned. In sand and mud areas, pliers or yabbie pumps may be used to collect pippies, cockles, nippers (yabbies), blood worms and squirt worms. On rock platforms, a single bladed knife is the only harvesting implement allowed. In sea grass beds, mangroves and salt marshes, the use of spade or fork may not be used.

Restrictions have also been placed on the taking of octopus from marine waters. It is illegal to take octopus from the Harbour or any rock platform within Port Jackson. In recent years, the number of intertidal species has reduced due to collecting for food and bait. The collection of sea urchins, crabs, snails and worms from intertidal zones is also prohibited.

Whales

Cetaceans (whales, porpoises and dolphins) are warm blooded, air breathing marine mammals. About 80 species of Cetacea exist today, 43 of these live in or migrate through Australian waters.

Whales feed in two different ways:

1. Baleen whales filter plankton (tiny animals and plants that float in the water) through fringed plates which hang from the roof of their mouths. These plates are made up of a horny substance called baleen. Baleen whales may gulp at their food and squeeze the water out, or swim with their mouths open until enough food builds up on their baleen plates.

2. Tooth whales have teeth used to feed on fish, squid or even other whales. Three

common species to Sydney waters are:

Southern Right Whale (of the Balaenidae family)

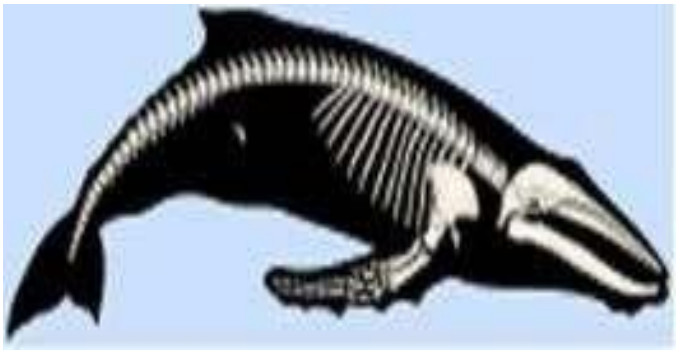
A Baleen Whale is recognisable by its flat, low profile when at the surface and its lack of dorsal fins. It also can be distinguished by the V-shaped vapour cloud produced by the blow hole. Around the head of Right Whales are hairy lumps called callosities. Along with the white markings on the underside, researchers use the callosities to distinguish individual whales.

It was dubbed, the Right Whale because it of its slow, swim movement and was easy prey for whaling ships (making it the 'right' type to catch). This species spend the Australian summer in the food-rich Southern Ocean, gorging themselves on krill. During the winter, the whales migrate to the southern Australian waters to mate and give birth. During this time they do not feed.

Growing to a maximum length of 18m and weighing 96 tonnes, their main diet comprises krill (shrimp) and is supplemented by plankton.

Humpback Whale (Megaptera Novaeangliae)

Distinguished by two long flippers, this whale has a dorsal fin that is clearly visible when surfacing to blow. It also has an arching, curved back which gives the whales its name.



Megaptera novaeangliae

Humpback Whales are famous for the singing and acrobatics of the courting males and recent evidence suggests whale songs vary slightly each year. Like the Right Whales, Humpbacks migrate up the coast of Australia during the winter. However, Humpbacks move further north to breed, preferring the warm tropical waters of Queensland and the Kimberley.

The Humpback has been protected since 1965. While Sydney Harbour has played host to visiting Southern Right Whales, it is unusual to see Humpback Whales venturing into areas such as the Harbour, as they prefer more open waters.

Humpbacks grow to a maximum length of 16m and a weight of 48 tonnes. They feed mainly on krill.

Bottle-nosed Dolphin (Tursiops truncatus)

Named because of their distinctive bottle-shaped beak, these cetaceans have a tall, curved dorsal fin. The most common of dolphin species, it is found in all warm and temperate oceans of the world although usually stay within 800km of land. They can travel between 5-11kph and peak, when looking for food, at 35kph. Occasionally, dolphins have rescued an injured diver by raising them to the surface, a behaviour they also show towards injured members of their own species. Male Bottle-nosed dolphins can grow as large as 4m, as can weigh 440kg. Their diet consists mainly of fish.

Sharks

Sharks play a vital role in marine environments as predators and scavengers. There are over 370 species of sharks world-wide with 166 occurring in Australian waters. Sydney Harbour in particular has hosted 60 recorded species, with about half of these commonly habituating the Harbour.

Port Jackson Shark (Heterodontus portusjacksoni):

Also known as a Bullhead or Oyster-crusher, this species has a large, blunt head with a distinctive horn. It is also recognisable by dark, harness-shaped markings on the body. It is found from south-western Australian waters to Byron Bay in northern NSW. On the central NSW coast, breeding occurs in late winter and spring, when females lay 10-16 eggs in rock fissures on inshore reefs (usually less than 5m deep). The eggs are about 15cm long, 8cm wide and have spiral flanges (which help retain them in rock fissures). Empty egg cases are often washed up on Sydney beaches. Adult females migrate south in summer, some as far as 800km, returning north in winter. Size: males mature at 75cm (8-10 years); females, 85-5 cm (11-14 years).

Crested Port Jackson Shark (Heterodontus geleatus):

Also known as Crested Bullhead or Crested Horn Shark, it is not as common as Heterodontus portjacksoni (Port Jackson Shark). It is found from Batemans Bay in southern NSW to Moreton Bay, southern Qld. Diet consists of molluscs, crustaceans, echinoids and small fish. This species lays spiral, flanged egg cases. Size: males mature at approximately 60cm; females, 70cm (hatch at 22cm).

Spotted Wobbegong (Orectolobus maculatus):

A robust Carpet Shark found in the southern coast of Australian waters. This shark is large and well camouflaged (yellowish to greenish brown colourings with distinctive darker saddle patterns and numerous white rings). It has been sighted resting during the day in shallow waters but at night prey on large bottom-dwelling animals such as crabs, rock lobsters, octopuses and reef fishes. The Wobbegong have been known to be aggressive to humans if molested or in the presence of speared fish. Size: born in a litter of up to 37 pups at 20cm, they mature to at least 300cm.

Banded Wobbegong (Orectolobus ornatus):

Also known as Ornate Wobbegong, Carpet Shark and Golf Wobbegong, this species is found in Indonesia, PNG and Australia. A nocturnal feeder, it rests on the bottom of the sea-bed during the day. There is evidence to suggest that large specimens have attacked divers. Currently there is no commercial use for this species although the skin is sometimes used for leather (size and maturity averages are similar to Orectolobus maculatus).

Blind Shark (Brachaelurus waddi):

Also known as the Brown Cat Shark, this species is found in eastern Australian waters. Stout, with long single- lobed nasal barbells and nostrils situated near the snout, this species is light brown to black (dorsally) with pale spots. Often caught by rock fishermen, it is reported to live a long time out of water. Its habit of closing its eyes when caught has led to its common name of, Blind shark. It can be commonly seen in rock pools around Sydney beaches.

Grey Nurse Shark (Carcharias Taurus):

Also known as a Sand Tiger Shark or a Spotted Ragged Tooth, it can be found in sub-tropical and temperate waters from the surf zone to a depth of 190m. Until recently, the Grey Nurse had an undeserved reputation as a man-eater, which led to indiscriminate killings of the species. Now considered endangered, it is protected in NSW, making it the first shark anywhere in the world to receive this status. Grey Nurses give birth to live young; however, before birth the embryonic sharks eat the ova inside the egg case. Surviving embryos (at about 55mm) hatch into the uterus. They then develop teeth (at about 10cm) and begin to hunt and consume other embryos in the uterus. Size: mature at 3.6m.

Bull shark (Carcharhinus leucas)

Also known as the whaler shark or the Zambezi shark it is common worldwide in warm, shallow waters along coasts and in rivers and is believed to be unpredictable and often displays aggressive behaviour. Many experts suggest they may be more dangerous to humans than any other species of shark, claiming they are more likely to attack humans than even the Great White or Tiger shark. Bull sharks can tolerate fresh water and are known to travel up rivers and estuaries; however they are not freshwater sharks. Bull sharks are large and stout. Males can reach 2.1 m and weigh 91 kg. Females can be much larger: up to 4 m and 318 kg.

Shark Attacks in Sydney Harbour

Shark sightings in Sydney Harbour created public concern in the months leading up to the 2000 Sydney Olympics. The Games were scheduled to start with athletes jumping into Sydney Harbour for the Triathlon event.

Despite statistics showing that the last person killed by a shark in Sydney Harbour was in 1963, when actress Martha Hathaway was killed by a bull shark at Middle Harbour, Olympic organizers took every precaution to reassure the athletes.

The last non-fatal shark attack took place on 11 February 2009 when navy specialist clearance diver able seaman Paul Degelder, 31 was attacked off Woolloomooloo Bay, losing a hand and part of his leg to what is believed to have been a Bull shark.

Statistics

- Between the years1799 and 1999 there have been 30 recorded shark attacks in Sydney Harbour.
- The earliest recorded attack in Australia was in 1791 when an indigenous female was fatally injured on the North Coast of NSW.
- The last fatal attack occurred in 1963.
- Between 1963 and 1999 five shark attacks were recorded in Sydney Harbour.
- Open boat sailing in Sydney Harbour has never recorded an attack on an overturned sailor throughout its 140 year history.
- Over the past 50 years, for the whole of Australia, there have been 53 recorded fatalities due to shark attacks. This averages at 1.06 per year. There have been 24 in the last 20 years. Compare this with another statistics which may be surprising: On average there are 2-3 deaths per year from Bee stings in Australia (Dr van Nunen Royal North Shore Hospital Allergy Unit. Feb 3rd 1989). (Source: The Manly Daily).

Shark Nets

Shark Nets were first introduced to Sydney in 1937 at a time when shark populations were deemed to be large, due to numerous attacks. The attacks were fuelled by the dumping of offal from the Homebush abattoirs which were discharged into the ocean via the Malabar sewerage outfall. These discharges occurred between 1916 and 1970.

69 sharks were netted at Sydney's beaches in 2001/2002. The shark nets used in Australia are typically employed in the open ocean, approximately 200m from shore in about 10m of water. They do not form complete enclosures, instead creating a 200m wide and 6m deep barrier. As such, they do not form a complete barrier and sharks can get past.

Since their introduction there has not been a fatality due to shark attack on a netted beach.

Nets are viewed as controversial due to the death of other species such as dolphins, turtles, rays and whales.

Bats in Sydney

Twilight and Night Climbs frequently offer Climbers a close-up view of bats in an urban environment. Whilst Micro-bats are seen in and around the Sydney Harbour Bridge, the most frequently sighted bats are the Grey- headed Flying Foxes. It is estimated that the bat population in Sydney's Royal Botanical Gardens has recently risen to almost 22,000.

Grey-headed Flying Fox (Pteropus poliocephalus)

The Grey-headed Flying Fox is one of the largest bats in Australia with a wing span of up to 1m and weigh up to 1kg. They feed on pollen, nectar, eucalyptus blossoms and fruit from a wide variety of trees, particularly the Moreton Bay Fig. Their love of these fruits is the reason they are also called "Fruit Bats". They live in groups known as camps.

These protected species play a vital role in the regeneration of eastern Australian rainforests as they pollinate the flowers of Eucalypts and Paperbarks and disperse the seeds of rainforest plants. The great distances they can fly means they carry pollen and seeds far from the parent tree.

To identify these creatures look for:

- Collar of orange/brown fur fully encircling the neck
- Head grey, belly fur greyish
- Fur that covers legs to toes

Flying Foxes were reported as camping in Sydney's Royal Botanic Gardens as far back as 1916 and again camps were established in 1920. These were the last records of Flying Foxes in the gardens prior to the current camp established in 1989. Host trees in the colony have been damaged under the weight of bat camps and now pose as a danger for visitors of the gardens.

A development plan to manage bat numbers within the Botanic Gardens in order to reduce damage to specimen trees without adversely impacting on the Flying Foxes is currently in operation.

The major Bat Camp in Sydney is located at the Ku-ring-gai Flying Fox Reserve in Gordon. Population counts at the camps have estimated that there are as many as 425,000 in the 212 known camps. Their nightly feeding forages are generally undertaken within a radius of 30kms from this location although they have been recorded as travelling distances of up to 80kms. They can also undertake seasonal migrations up to 800kms in search of flowering trees.

The Ku-Ring-Gai Bat Conservation Society Inc. is the primary group studying these creatures. The group holds 'Bat Walks' with an experienced speaker, which includes meeting hand-reared Flying Foxes and a conducted walk to watch the evening fly-out.

There are 19 species of Micro-bat living in the Sydney basin area and 33 species in South-eastern Australia alone, few of which and can be seen from the Sydney Harbour Bridge. The most common being the Gould's Wattled Bat (Chalinolobus gouldii). Micro-bats may be difficult to see, looking like moths darting in and out of spotlights. Small, with a wing span of up to 30cm, Micro-bats roost in urban areas under loose bark, the metal caps of power poles, in telephone junction boxes, tree hollows, rock crevices, roofs and the cavities of buildings.

Micro-bats feed mainly on insects and can consume up to 50% of their body mass in each night (records have included up to 500 insect items per hour). They have two foraging and feed styles which include the 'on-the-wing' and 'sit and wait' styles.

The echolocation used by Micro-bats is different for each species. The range of echolocation is normally between 5-200 kilohertz.

Other Facts on Bats

Across wider Australia, there are approximately 70 different species of bat. This constitutes almost 10% of the world's bat species.

Bats have been known to live up to 25 years. Life-spans are normally around 10 years.

The smallest mammal in the world is a bat, discovered in Malaysia and weighs just 1.5grams (less than the weight of an empty match-box).

During the early periods of weaning, the young will attach to their mothers nipple via a locking mechanism of their teeth. Once they become too large to accompany the mother they remain within a communal nursery.

All bats have sight and are not blind at all. Flying Foxes rely primarily on smell and sight whereas Insectivorous Bats rely on echolocation, sight (in familiar areas) and smell (when locating their young within a communal bat nursery).

Cave nurseries of the common Bent-Wing Bat (a micro-bat species that can be seen around urban areas) are known to have densities of up to 3,000 young bats per sq mt.

Navigation and Lights on the Harbour

Sydney Harbour is world renowned for its natural deep water channels and is a thriving port, catering to an unrivalled mix of commercial shipping and recreational boating activities. A number of different navigational lights are used on the Harbour to assist watercraft. These include:

- Green 'starboard' lights
- Red 'port' lights
- White lights used to mark particular hazards or navigational features.

History of Navigational Lighting

The navigation lights used on Sydney Harbour follow an international code ratified in Switzerland in 1935 under the International Association of Lighthouses Authority.

How the System Works

Up river (away from the sea): Green lights are passed on the starboard side of the vessel (right side) Red lights are passed on the port side of the vessel (left side of your vessel) Pass oncoming boats on your port side (left side of vessel /opposite to road rules) When proceeding upriver, vessels will remain closest to the green starboard lights

Down river (toward the sea) reverses the above

Note: The United States of America utilises the above system in reverse.

Other navigational markers include:

Small craft must adhere to the boating rules, they are more mobile and less restricted than larger vessels like ferries, cruise ships and tankers so often give way to them.

The shallowest point in the Shipping Channel under the bridge is 20m.

The Bridge is also used as a navigational marker and has centred triangular symbols below the road deck on both sides to guide passing vessels. Similar symbols are seen on Goat Island (white triangles known as “the leads”).

Sydney Harbour Boating Authorities:

Sydney Ports Corporation controls commercial shipping movements on the Harbour and the NSW Maritime Authority ensures safe and sustainable ports and waterways.

Sydney Harbour Tunnel

In announcing the tunnel concept on 13 March 1986, NSW Premier - Hon. Neville Wran Q.C., M.P. stated, “This is perhaps the most significant civil engineering project in our history next to the Harbour Bridge and the proposal seems to solve the three basic problems engineering, financial and environmental”.

Traffic volumes on the Bridge were expected to exceed 230,000 by 2000 and without the Tunnel, one peak period would have possibly lasted 13 hours.

Construction

Construction of the Sydney Harbour Tunnel commenced in January 1988 as a joint venture of Transfield (an Australian construction firm) and Kumagai (an international construction group responsible for the building of the Hong Kong Tunnel).

The tunnel provides two dual carriageway road links extending 2.3km between the Warringah Freeway (north of the Harbour) and the Cahill Expressway (south of the Harbour). It provides three major sections:

1. Twin 900m land tunnels between the Warringah Freeway (just north of the High Street Overpass) and Milsons Point.

2. A 960m immersed tube (made up of eight prefabricated reinforced concrete units) between Milsons Point and the concourse west of the Opera House.

3. Twin 400m land tunnels between the concourse and the Cahill Expressway (just north of the Domain Tunnel).

Ventilation Stations for the Tunnel are underground at Milsons Point (in the north pylons of the Sydney Harbour Bridge). Air circulated through the Tunnel is drawn back via a buried concrete duct by fans in the pylons and discharged at the top.

Building and Positioning the Tubes

The eight immersed tube units were constructed in a massive casting basin at Port Kembla, 80kms south of Sydney. Each unit is 120m long, 26m wide, 7.5m high and weighs 23,000 tonnes. A waterproof membrane was fixed to the base and waterproof seal was applied to the rest of the exterior. Units were sealed at each end with steel bulkheads. The basin was then flooded, the units floated and towed individually to Sydney. In 1989 the units were positioned in a trench dredged across the Harbour then progressively joined and sealed before covered with fill and protected on both sides by rock amour.

The immersed tube is 27m below sea level at its maximum depth and can withstand the impact of earthquakes and sinking

ships.

Sea walls were built around the construction zones at Bradfield Park, Milsons Point (on the north side) and the Forecourt at the Sydney Opera House (on the south side).

During construction, some lanes of the Warringah Freeway needed to be temporarily closed.

Tolls and the Tunnel

Traffic in each tunnel is one way and a toll is collected on the north side (from south- bound traffic only). Dangerous or inflammable goods are prohibited from the tunnel which has a vehicle clearance of 4.5m.

The Tunnel was the largest privately funded Public Works project in Australia. It was built for a fixed price of $408 million (as per 1986 value) or $554 million in actual dollar costs over the construction period. Currently privately operated, the Tunnel will be handed over to the State Government at no charge in 2022 debt free and worth an estimated $2 billion. The toll collected for use of the Tunnel together with bridge toll, help to service the loan on the project.

Impacts on Traffic

Two key environmental features minimise the impact of the Tunnel. Firstly, an eastern city bypass has been created without the need for new approach roads. Also, a unique muffled ventilation system (to reduce noise) using the northern pylons has avoided the need for surface structures to be built (as similar tunnels overseas have needed).

Harbour crossing capacity has been boosted by a stated 50% and gives motorists the freedom of choice on how best to get to their chosen destination.

Traffic is monitored around the clock from a Control Centre with direct links to emergency services at the Tunnel's northern exit. Road-mounted loop detectors linked to computers alert Tunnel Operators to traffic disruptions. All sections of the Tunnel are monitored by closed-circuit television and heat detectors. Telephones along the Tunnel allow stranded motorists to alert emergency vehicles on 24 hour standby. Numerous other safety and emergency measures in the Tunnel include a radio override system that can be activated as required.

During construction, a survey marker (brass rod set in stone, placed in the Domain during the 1920's) was unearthed in September 1988. This long-lost relic was used to ensure the two ends of the Sydney Harbour Bridge met correctly and was also used to help correctly position the immersed tunnel units. The marker was one of several not shown on Lands Department maps.

The four lane tunnel was opened by the Premier of NSW, Mr. John Fahey on Sunday 30th of August 1992. Since opening,

the amount of traffic crossing the Harbour has increased by 20%.

Notable Shipwrecks of Sydney Harbour

Wreck of the Dunbar

On the wild and stormy night of 20 August 1857, the three-masted sailing ship, Dunbar struck the rocks a little south of The Gap at South Head with a loss of one hundred and twenty one passengers and crew. The Dunbar, named after the Australian ship owner Duncan Dunbar, was under the command of Captain James Green at the time of the tragedy. She was 1321 tons, only a few years old and had been built originally as a troop ship during the Crimean war but was later converted for the Britain-to-Australia trade run after her first visit to Australia in
1856. She was built at a cost of over £30.000. At the time of her completion she was the largest ship ever built by
James Laing and Sons Sunderland, UK.

The sole survivor was a 23 year old Irishmen, able seaman James Johnson, clung to the rocks for 36 hours before he was rescued. According to evidence he gave at the inquest to the disaster, the ship sighted Botany Bay early in the evening of the 20th and sailed north to Port Jackson in heavy seas.

The weather became worse and at about midnight, a glimpse of the Macquarie Light was seen through a break in the weather and the Captain sailed north to make a sighting of North Head and to determine the entrance to the Harbour. As Captain Green turned the Dunbar to line up with what he thought were the heads, lookouts on the bow shouted, "Breakers ahead!"

The ship was immediately put hard a-port, but it was too late - two minutes later it slammed into the rocks and began to break-up. It wasn't until the next morning when staff at the signal station saw the wreckage that they realised the disaster had occurred.

A tragedy of this scale caused a sensation within the colony and an estimated 20,000 people lined George Street for the funeral procession on August 24 when many of the victims were buried at St Stephens Church, Newtown.

Able Seaman Johnson became a hero figure and household name in New South Wales at the time. He spent the remainder of his working life in the lighthouse service in New South Wales, becoming the assistant head keeper at Nobby's lighthouse, Newcastle, where, ironically he assisted in the rescue of the sole survivor of the SS Cawarra in 1866, on the notorious Oyster Bank at Newcastle.

In 1930, as a remembrance to those who lost their lives on this fateful night, a plaque and anchor from the ship were set in place near where the ship went down

The Dunbar was one of the two wrecks that led to the establishment in 1858 of the Hornby Lighthouse on the tip of South Head. The second wreck was that of the 886 ton Scottish ship Catherine Adamson in October, 1857 with the loss of 22 more lives and a mere nine weeks after the Dunbar tragedy. As with the victims of the Dunbar, those recovered from the Catherine Adamson were also buried in a mass grave in St Stephens Church, Newtown.

The Three Bees

On 6 May 1814, after unloading her cargo of 210 Irish male convicts in Sydney Cove, the Three Bees lay at anchor. The alarm was soon sounded when she was seen to be on fire with an estimated 130 casks of gunpowder on board, although in reality she was carrying 30 casks only. In danger of exploding at any time the inhabitants of Sydney started to evacuate, headed by Governor Macarthur himself. On board also were 14 fully loaded cannon which began to fire at random, narrowly missing everything except Captain Piper's house, where a swivel ball crashed through the window and shattered the corner of his writing desk. The Three Bees eventually drifted out into Sydney cove and after two hours of anxious waiting the expected explosion didn't eventuate, although there was a stifled explosion from the water soaked powder. The ship eventually sunk somewhere in the area of the present day Opera House and its wreck has never been found.

The Greycliffe Disaster

On 3 November 1927, the Watson's Bay bound ferry, Greycliffe departed Circular Quay. The Greycliffe was known as, 'The School Boat', as it was largely used by school children returning home. On board this day were also many other commuters including Australia's first female pilot

Captain William Barnes had 30 years experience on Sydney Harbour. As he navigated the ship around Garden Island, he noted several other ferries entering Circular Quay. Barnes, however, failed to notice the 7600 ton, 460ft long passenger liner, Tahiti approaching at full steam from behind.

The Tahiti's Captain, Thomas Carson knew the stipulated course would result in his path being crossed by the Greycliffe. A combination of speed and congestion resulted in the Tahiti being unable to alter course. Carson could only sound his horn, aware of the impending disaster. A fare collector on the Greycliffe alerted passengers of the approaching Tahiti and passengers jumped overboard, school children screamed and mothers snatched up their children and ran to escape in vain.

At first it seemed the Tahiti might just push Greycliffe aside, but with a sickening creak and snap of splintering timber, the Tahiti's sharp steel bow cut through the wooden ferry like an axe. Decks crashed and passengers were flung in all directions.

When finally the Tahiti came to a stop, survivors had managed to find lifebelts or bits of floating debris to hang onto whilst dead bodies floated to the surface around them. Survivors were taken ashore by nearby ferries and the dead were taken to The Man of War steps. As night fell, many were still missing. The search continued until well after nightfall.

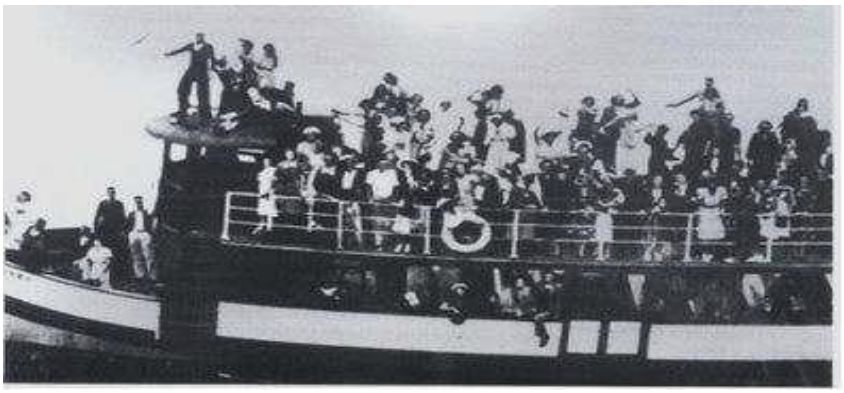
The first day after the accident, 13 bodies were recovered. Bodies continued to surface and were recovered by divers for the following 21 days. The final death toll of the Greycliffe Disaster was 40. Their ages ranged from 2 to 81 years old.

The Rodney Ferry Disaster

1938 saw the celebrations of 150 years of European settlement in Sydney. There was a lot going on and the Harbour was the focus of much of the attention. The USS Louisville represented the United States and its crew made many friends during the week of celebrations.

On Sunday, the13th February, Sydneysiders took to the water to farewell the Americans. Between 80 and 150 people, mostly women and children, were aboard the private ferry Rodney, a double-decker ferry, licensed to carry 211 passengers with a maximum of 60 on the top deck.

As the warship approached Bradley's Head, its crew were dismissed from parade and rushed to the ships railing to wave and cheer to their friends.



The Rodney Ferry just prior to capsizing (1938)

On-board the Rodney, most of the passengers were crammed onto the top deck, and they all rushed over to one side to cheer back to the crew of the Louisville. At the same time the Rodney was turning. The ferry, under momentum, slowly rolled over but did not sink straight away.

The Louisville stopped its engines and lowered its boats. Many of the men from the Louisville dived overboard and along with many others, were able to rescue most of the passengers. 19 people died and dozens were injured. As rescuers tried to tow the stricken ferry to shore, she sank off Bradley's Head in 40 feet of water.

Sydney to Hobart Yacht Race

Australia's famous Sydney to Hobart Yacht Race begins on Boxing Day each year. Yachts leave Sydney Harbour on a 628-nautical-mile (1,170 km) voyage across the open sea to Hobart, Tasmania.

Initiated in 1945, the first event featured just nine yachts. British Naval Officer, John Illingworth skippered the first winner, Rani. It was Illingworth who convinced a group of friends to turn their Christmas cruise into an annual race.

The race now comprises two divisions: the International Measurement System (IMS), based on a computer assessment of speed and conditions; and the Tasman Performance Handicap System, for those yachts not ruled under the IMS.

Stragglers can finish up to seven days after leaving Sydney. The race has earned a reputation as one of the world's toughest open sea challenges.

During the infamous 1998 race, a massive storm bore down on the fleet of yachts with fierce winds of up to 90 knots recorded. Tragically, six competitors died. Fifty five were pulled from the sea by helicopters and only 44 of the 115 boats reached the finish line.

The modern Sydney to Hobart racer is a far cry from the yachts that competed in 1945. Rani took over six days to reach Hobart, compared with the 2005 winner, Wild Oats XI, which completed the race in a record breaking 1 day 18 hours 40 minutes 10 seconds.

In 1982, the race featured the closest finish in the event history. After sailing for 628 nautical miles, Condor of Bermuda crossed the finish line just seven seconds ahead of Sydney Maxi, Apollo.

The race starts at 1pm on Boxing Day, with yachts departing from 400 metres north of Shark Island.

Australia Day – 26th January

A Brief History

On 26 January 1788, Captain Arthur Phillip took formal possession of the Colony of New South Wales and became its first Governor. The fledging colony soon began to celebrate the anniversary of this date with drinking and merriment.

The first official celebrations were held in 1818 to mark the 30th anniversary of colonial settlement. Governor Macquarie officiated with a thirty gun salute during the day and a dinner ball at Government House that evening.

In the early 19th century, the anniversary was known as Foundation Day and was usually marked with sporting events. One of these, the Anniversary Regatta was first held in 1836 and is still held to this day on the Harbour on Australia Day.

In the early years, the celebrations were mainly private but in 1838 celebrations became a day for all, with the Harbour foreshore crowded as they gathered for Sydney's first annual fireworks display.

In 1946 the Commonwealth Government, States and Territories agreed to observe one national day - 'Australia Day' under one banner on the same day.

The National Australia Day Council was formed in 1979 and encouraged grass roots celebrations, working with the local government authorities to promote wider celebration of Australia Day.

In the Bi-Centenary year (1988) celebrations included a re-enactment of the First Fleet journey, which departed from Portsmouth on May 13th, 1987 and arrived in Australia on January 18th 1988. Britain then presented the tall ship, Young Endeavour to Australia as its bi-centennial present.

Alongside the celebrations, 1988 was named, 'The Year of Mourning' for Australia's Aboriginal People, who also regarded the year as a celebration of survival.

For Indigenous Australians

Australia day means different things to different people and evokes a variety of mixed emotions, particularly for Indigenous Australians. The day raises feelings about past and continuing inequities faced by the first Australians. For many, it is a day to reflect on past loss and suffering. Our national day is an important opportunity to recognise the honoured place Indigenous Australians in our nation's history and to promote understanding, respect and reconciliation.

Celebrations on the Harbour

Woggan-ma-gule

The traditional cleansing ceremony marks the official start of the Australia Day celebrations (08:00-08:20) with the Governor in attendance. Woggan-ma-gule takes place on the sacred sites of the native Cadigal people in Sydney's Royal Botanical Gardens. A visually stunning ceremony, it highlights traditional dance and song.

Ferrython

With an estimated 1 million plus spectators in 2008, harbour ferries are transformed with streamers and balloons (and these days, sponsors logos) and packed with passengers to 'put on a show' for people on shore. The race starts in front of the Opera House and is marked by the firing of the canon on Fort Denison. The ferries then loop around to Shark Island and turn back towards the city and under the Sydney Harbour Bridge. There is much glory for the skipper of the victorious ferry in this event, so you can see every trick in the book including smoke screens as the ferry race toward the finish line under the Sydney Harbour Bridge.

The Australia Day Surfboard Challenge

A 4km surfboard race for professionals and amateurs. The race commences at Farm Cove and finishes at Blues Point Reserve, McMahons Point.

Historic Fleet Display in Farm Cove

About 40 historic vessels, parts of the Harbours' working past, gather close to Farm Cove's shore. Information plaques explaining their history specifications are placed along the sea wall.

Australia Day Parade

The Harbour fills with magnificent tall ships and a myriad of other watercraft in the Australia parade. This cavalcade sails the length of the Harbour to Bradley's head. Anyone with a boat can participate, and all you have to do to enter is dress up your vessel on your best Australia Day gear. Prizes are awarded to the best dressed vessels. An estimated 2,500 leisure craft, ferries, fire tugs, square-rigged tall ships, racing yachts, skiffs old and new, celebrated the occasion.

Australia Day Regatta

This is the world's oldest continuous regatta. In 2008 there were more than 800 sailors crewing 120 yachts and skiffs which contested the 172nd Australia Day Regatta.

Wheelchair Race

This 10km race, starting and finishing on Alfred Street, Circular Quay is internationally respected and attracts the world's best athletes, many of them world record holders and Paralympics medallists. The gruelling 5 km course winds through the historic Rocks area and is completed twice by athletes. Competitors reach speeds of up to 50km/hr and the winner usually finishing around the 20 minute mark. That's 2 minutes per kilometre. Pretty fast!

http://www.australiaday.org.au/

Sydney Early History

Colonising Australia

A Purpose for Colonising

Nothing was done about colonising the region until Joseph Banks, the botanist on the Cook expedition, urged the British Government to act. Banks' influence, combined with The American War of Independence in 1778, acted as major catalysts in the decision to settle Australia. Until then Britain had sent surplus convicts to the Americas. The war prevented this and forced Britain to find an alternative. In short Britain needed a new gaol.

The decision to send the First Fleet to the farthest flung outpost of the British Empire was commissioned by (Thomas Townshend) Lord Sydney (1733-1800), Home Secretary to the State. For 62 years (1788-1850) approximately 150,000 convicts were sent out to Australia on 806 ships under the British policy of Transportation, with almost 90,000 of them sent to New South Wales alone. Tasmania received more than 60,000 convicts directly from England with more sent later from other colonies. By 1829 convicts, or ex-convicts, made up approximately 65% of the population of New South Wales.

Why Were Convicts Sent to the Colonies?

The initial and political reason was really quite simple: In 1776 The American War of Independence begins and the former American colonies refuse to accept British convicts. Still wishing to rid the country of its criminal element the British Government sought to establish a convict colony in West Africa which ended in disaster with most of the convicts dying from disease and privation or simply escaping into the African bush.

In August 1783 peace was established with America and once again convicts were sent out to the new colonies, with most sent to Maryland.

In March 1784, 179 convicts were despatched on board HMS Mercury, however a mutiny occurred in Torbay, Devon and many convicts managed to escape with those remaining eventually landing on the Mosquito Coast in Central America after being rejected by the newly independent United States.

It soon became necessary to find an alternative to the Americas and it was (Thomas Townsend) Lord Sydney, as British Home Secretary, who on 18th August 1786, wrote to the Treasury and advised that the convict situation could be best solved by sending future transportations to the newly discovered Great Southern Land: Australia.

The Convicts

Times were harsh in the 18th century and though rife for many reasons, crime certainly didn't pay if one was caught. Under British law of the late 1700's people could be hanged if convicted of sending threatening letters, cutting down trees in 'an Avenue or Garden', forging counterfeit money, housebreaking during the day, picking a pocket of more than a shilling, as well as the more serious crimes of rape, murder and treason. In addition here is a list of other offences punishable by transportation:

- Thefts under the value one shilling
- Receiving stolen goods, jewels and plate
- Stealing lead, iron or copper
- Stealing ore from black lead mines
- Stealing from furnished lodgings
- Setting fire to underwood
- Stealing letters
- Assault with intent to rob
- Stealing fish from a pond or river
- Stealing roots, trees or plants
- Bigamy
- Assaulting, cutting or burning clothes
- Counterfeiting the copper coin
- Clandestine marriage
- Stealing a shroud from a grave
- Watermen carrying too many passengers on the Thames, if any drowned
- Incorrigible rogues who broke out of prison and persons reprieved from capital punishment
- Stealing naval stores.

In the late 1820's and 1830's the death penalty was removed from many of the lesser offences and replaced with automatic transportation. Whilst the great majority of convicts were transported for ordinary crimes, others found themselves in New South Wales as a result of political activities or affairs of honour.

Of all the convicts to embark on the first fleet by far the largest number came from Newgate Prison, now the site of the Old Bailey in London. On route to the waiting ships some spectators claimed that they had personal items stolen as the convicts passed by hats and watches etc.

No convict of the First Fleet was convicted of a political crime.

Transportation or Prison?

Much is said of the fear that prisoners held of being sentenced to transportation to the Colonies when convicted of crimes back in England, and in most cases this was a genuine fear of the unknown, however, there is another side of the story that is seldom told; that of prisoners who, for them, transportation to a foreign land was in fact preferable to the alternative, the fate that awaited them should they remain at His Majesty's pleasure for the 'term of their natural life'.

Prison conditions in England back in the 1800's were, in general, deplorable, but for one class of prisoner they were beyond bearable. These were the 'upper class' or "Gentlemen Convicts" as they were known. Most, like their more famous counterparts, Francis Greenway, William Redfern and D'arcy Wentworth, were convicted of 'white collar' crime, such as fraud and forgery. For these convicts the humiliation of conviction was compounded by the humiliation they would suffer within their social circle after their sentence had been served. Some were driven to suicide by the shame they felt by their criminal exposure, hence for many the prospect of transportation to a land where they would not feel the social stigma of being a convict was preferable to the shame of remaining an outcast within their 'class'.

Others even saw transportation as a 'business opportunity', a place where they could either make amends for their crime and seek to re-establish their social standing within other 'Gentlemen Convicts', or to continue with their illegal practices in a society that were unaware of their former circumstances.

Whilst many reports filtered back to England, detailing the harsh conditions that many suffered during their time, these were, by and large, the fate of those whose crimes were of a more 'criminal' nature, e.g. murder, assault, theft, etc, than those whose crimes were more 'genteel' in nature.

Reports also suggested that there was already a 'class system' evolving in the virgin colony and that many of the "Gentlemen' had done very well for themselves as a result. Some even choosing to remain in the colonies and establishing businesses that otherwise they could never have had the opportunity to given their crimes for which they were convicted.

Social standing often meant that certain individuals were 'favoured' by the authorities, sometimes in the hope that their kindness would be recognised by the often wealthy families of those in their charge, but mainly for the experience and expertise they brought to the often overworked and under resourced administrators and accountants charged with overseeing the fledgling colony. Being educated was indeed a bonus, and many were given another title, that of "Special" which was used interchangeably with "educated".

The authorities in London were of a different persuasion and were alarmed by the perceived ease with which the upper class were seemingly treated, the effects being that word was spreading amongst the criminal fraternity, both upper and lower, that transportation in itself was not really a deterrent for crimes, and was often seen as preferable to serving time in London's dark and overcrowded prisons, or worse the rotting prison hulks. Prison hulks were moored along the Thames and in the coastal towns from where the convict transports were dispatched. Not all the prisoners confined to the hulks were, however, destined for Australia. For many prisoners these ancient, rotting and overcrowded 'hell holes' were to spell home for many years, if not the rest of their lives. The land based jails of Newgate, Bridewell, Fleet, Clerkenwell New prison and the Gate prison next to Westminster Abbey, where the great diarist Samuel Pepys was briefly held, were equally overcrowded and wholly unsanitary institutions which held more dread than anything that could be imagined in a faraway land called Australia.

Such was the concern that in 1827 the government in NSW, under Governor Ralph Darling decided to create a 'special' penal settlement which was designed to cater for 'Gentlemen Convicts', or those who were deemed 'educated', or classed as 'special'. It is described as:

"The class of gentlemen convicts (as they are called), i.e. persons who in England belonged to the upper or middle ranks, being devoid of mechanical skill, and unfit for common agricultural labour, occasion a greater perplexity. At one time, a penal settlement named Wellington Valley was made in the interior at a distance of about 250 miles from the coast, where the gentlemen convicts were employed in light agricultural work, such as tending sheep, and were thus removed from the society and luxuries of the towns. This measure being the means of inflicting a much severer punishment than that usually endured by the upper classes of convicts, had the effect of spreading great alarm among criminals of the same rank in London who were lying in prison under sentence of transportation"

The first European to discover Wellington Valley was John Oxley, Surveyor-General for the colony, on 19 August 1817, during his exploration of the Lachlan Valley.

The party of explorers entered the valley through Glenfinlass (Curra Creek) finding and naming the Bell and Macquarie Rivers. Oxley called the valley "The Vale of Tempe". As the news of the Battle of Waterloo had reached the colony before Oxley left on his exploration he called the valley Wellington after the Duke of Wellington. In 1819 Oxley wrote of a depot established at Wellington to assist with further exploration to the west. In January 1823 Lieutenant Percy Simpson was commissioned by Governor Sir Thomas Brisbane to establish a settlement at Wellington Valley. Simpson left Bathurst on 14 February arriving on 24 February 1823, with him was a party of thirty soldiers and fifty convicts. Governor Brisbane believed that the removal of ungovernable convicts to remote stations would facilitate the government's role in preparing the continent for private pastoral interests.

The Wellington station was planned as the first in a large network of penal establishments spreading north-west along the Macquarie River and across the interior. However, these plans were never realised and soon after it was established, the Wellington settlement became neglected. The convict population at Wellington Valley was intended to be as many as 500 convicts but it only averaged about 70 and never exceeded 100. By 1829 Governor Darling had decided that the settlement was not economically viable and on 5 January 1831 advised the Secretary of State that the settlement had been abandoned.

Law and order

The fledgling convict community at Sydney Cove found itself in a legally unprecedented position in its first few years of settlement as there was no established form of law and order in place; instead there was the new Governor, Arthur Phillip and his entourage, convicts, marines and the wives of marines, but no police force. The whole idea of an established police force was itself a new concept and the world's first professional force was only recently formed in 1749 in London by the author and magistrate Henry Fielding, and consisted of only eight men. They were originally called The Bow Street Runners due to their being a branch of Bow Street Magistrates court and paid for by the court itself.

Previously there had been an 'unofficial' force of what was commonly called 'thief takers' who were, for the most part, as criminal as those who they were supposed to 'take.' A London-wide police force was not set up until 1829.

The problem for the new colony was that legally the colony was a military establishment and as such with all the military garrisons in other colonies there was a Judge Advocate to deal with matters of discipline, however these were restricted solely to the behaviour of the soldiers and not prisoners. Punishment in the military consisted of just two options; flogging or death. The person whose job it was to arrange these punishments was the Provost. The first Judge Advocate to be appointed to the position in Sydney was Captain David Collins of the marines, who was not a lawyer and had no legal training, while the Provost was another officer named Henry Brewer.

Law and order in Sydney, which effectively meant all criminal offences, were therefore dealt with by court martial under the Mutiny Act and the Articles of War. As such a tribunal was established and this tribunal was constituted as the Criminal Court. It comprised of the Judge Advocate and six naval or military officers. The officers of the marines included a major, 4 captains and 14 lieutenants. The problem was that many of the Marine officers objected to being asked to sit as members of the criminal court, maintaining that they were not paid for this duty, maintaining also that they were solders and not jailers or policemen. They were led in this 'mutiny' by Major Robert Ross, who urged his men not to undertake these roles.

In an effort to find a way of actually policing the colony Governor Phillip was forced to look to the convicts themselves for these roles. The first convict supervisors, understandably so perhaps, were very unpopular with their fellow convicts.

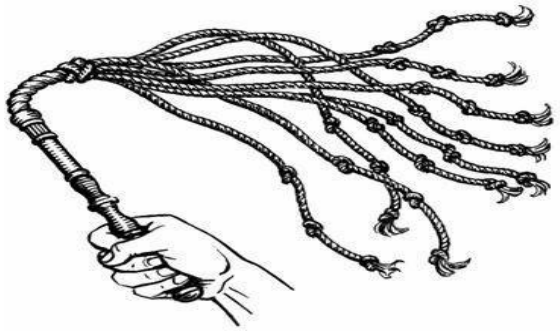
The administration of punishment in the form of flogging was done by convicts called "Scroungers". They were trained in the art of flogging in Hyde Park, where they used dummies to practice on. Even so, there were never enough 'scroungers' to meet demand.

There were a number of names given to the act of being punished by flogging, these include: “Getting a red shirt” and “Meeting the Three Sisters”, which refer to the flogging triangle as seen above. The extent of the flogging depended on the crime committed and examples are given in which convicts were flogged up to 100 lashes for being absent from work and 50 lashes for drunk and disorderly. Other ‘crimes’ which merited 50 lashes or more included; disrespect to a Master, theft, lurking at an inappropriate hour and feigning sickness.

The implement used in flogging was traditionally the ‘Cat o nine tails’ or simply ‘The Cat’. This was a long instrument consisting of woven cords splayed into nine separate ends, however in Australia these were normally made of leather and had lead or bone weights sewn into the tips, designed to inflict maximum damage and maximum pain.

It is often thought that the phrase “No room to swing a cat” has its origin with this form of punishment, however this is debatable and there is little evidence to confirm it. The phrase itself is perhaps first recorded in the 17th century in Richard Kephale's Medela Pestilentiae, of 1665:

"They had not space enough (according to the vulgar saying) to swing a Cat in."
but the actual term ‘cat o nine tails’, with its nautical implications for punishment, doesn’t make an appearance until 1695 in William Congreve's Love for Love.



‘Cat o Nine Tails’ Whip

"If you should give such language at sea, you'd have a cat-o'-nine-tails laid cross your shoulders."

As an example of the severity of the punishments; On April 12th 1790 one Thomas Halford was found guilty of stealing 3 pounds of potatoes valued at one shilling & six pence. He was sentenced to 2,000 lashes.

In July 1789 convict John Harris proposed the formation of a night watch to keep an eye on not only the houses and gardens of the officers, but also those of the convicts themselves, who were beginning to establish small gardens in an effort to become self sufficient in a colony that was in danger of near starvation at one point.

By November 1789 Judge Advocate, Captain David Collins, was reporting back to London that the night watch had been very effective: There were fewer crimes. When there were crimes the culprits were usually caught.

Hangings

As mentioned already the first hanging in the colony was that of Thomas Barrett , aged on the 27th of February 1788 for theft of government stores.

From October 1788 to March 1789, 7 marines robbed the government stores while they were on guard duty. Six were sentenced to death and were hanged the day following their trial. The seventh turned King's evidence and was acquitted.

The first woman to be hanged in Australia was Ann Davis on the 23rd of November 1789. She was a 30-year-old convict who was publicly hanged for theft.

George Stroud (or Stroode) was publicly hanged outside Darlinghurst Goal on the 29th of October 1841 for the murder of his wife. He was executed along with Robert Hudson. Stroud and Hudson were the first men executed at, but not in, Darlinghurst Gaol. It is reported that between 600 to 700 people attended the execution.

Henry James O'Farrell was the first person to be hanged within Darlinghurst Gaol on the 21st of April 1868 for the attempted assassination of Prince Alfred Duke of Edinburgh on the 12th of March 1868 in the Sydney suburb of Clontarf. (See detailed account above).

O'Farrell was defended at his trial by the then Sydney politician and famed orator William Bede Dalley. Dalley, of Irish decent is the subject of the mysterious 'Green man" statue by the artist James White, and which can be found half hidden amongst the trees in Hyde Park. Despite Dalley's best efforts to get O'Farrell acquitted on the grounds of insanity he was found guilty and hanged.

WILLIAM BEDE DALLEY STATUE: UNVEILED IN 1898

Louisa Collins, aged 41, was said to have poisoned both her husbands (Charles Andrews and Michael Peter Collins) with an arsenic product known as "Rough on Rats". She was sentenced to death at 09.00 on the 8th of December 1888. She was the first and only female prisoner of the 76 hanged at Darlinghurst Goal, and became the last woman to be executed in NSW.

The last woman to be executed in Australia was Marjorie Jean Maude Wright at 08.00 on the morning of the 19th of February 1951, having been convicted of murder. Her accomplices Robert Clayton 32, and Norman Andrews 38, were also hanged two hours later, at 10.00. Clayton's last words were "Goodbye Charlie" and Andrews's last words "Goodbye Robert"

She was the last woman to be hanged before the death penalty was abolished

Ronald Ryan was the last person hanged in Australia on the 3rd of February 1967 Ryan was found guilty of shooting and killing prison officer George Hodson during an escape from Pentridge Prison Victoria in 1965.

The First Fleet

The 11 ships of the First Fleet, carrying the soon to be first Governor of NSW, Arthur Phillip left from Portsmouth on 3 May 1787 and consisted of:

1 Frigate	HMS Sirius (Formally named The Berwick)
4 Storeships	Supply (armed tender), The Golden Grove, Borrowdale and Fishburn
6 Transports	The Scarborough, Lady Penryn, Friendship, Charlotte, Prince of Wales and the Alexander.

The passengers on board amounted to 759 convicts including the first black convict Thomas Orford, aged 23 and nine North Americans. There were 252 marines, 20 government officials, 210 Royal Navy seamen and 233 merchant seamen, as well as marine wives with their children. In addition there were also convict children, bringing the total number of people arriving in Australia to1487. They arrived at Botany Bay between the 18th and
20th of January 1788. Some provisions that made it to Sydney as part of the First Fleet Inventory included
interesting items such as 300 gallons of brandy, sugarcanes, 44 sheep, 7 horses, 29 sheep, 74 swine, 6 rabbits, 7 cattle, 589 women's petticoats, banana and cocoa seeds, 6 bullet moulds and one piano.

The death toll for the first fleet was 48, or 3% of its total. This was significantly more than the 270 who perished on the second voyage, almost a third of the convicts the fleet was carrying. This was to become the highest mortality rate in Australian transportation history.

The Scarborough

The Scarborough was a transport ship of 430 tons, built at Scarborough in 1782. She arrived with 208 male convicts under the command of the ship's master, Captain John Charles Marshall after leaving Portsmouth on 13th May 1787. She left Port Jackson on 5 May 1788 and headed back to England via Lord Howe Island and China, arriving back on the 15 June 1789.

On 19 January 1790 she once again set sail for Sydney with the second fleet, carrying a further 253 male convicts, again under the command of John Marshall. She arrived back in Port Jackson on 28 June 1790 after 160 days at sea. The Marshall Islands in the Pacific Ocean are named after John Marshall.

Sirius

The Sirius was the flag ship of the first fleet. Formally built in 1780 for the Baltic trade routes and called 'The Berwick" she weighed approximately 511 tons, however there is some mystery concerning this as she was rebuilt by the Royal Navy and accurate records of her original weight as 'The Berwick' are scarce, though there are suggestions that she weighed 520 tons when completed. She carried a crew of 160 men and was fitted with 16 (some say 20. see Ida Lee reference) guns and was commanded by Captain John Hunter and carried the soon to become first Governor of NSW, Arthur Phillip. She left Portsmouth on the 13th May 1787 with 1480 men, women and children on board and arrived first in Botany Bay (Frenchman's Beach, La Perouse) on 24 January 1788. She later sailed into Port Jackson on the 26 January 1788. Hunter was in fact initially appointed post-captain and served as second in command to Phillip this period of time, resuming the post of captain upon arrival in Australia.

On 2 October 1788 she was ordered to sail from Port Jackson to the Cape of Good Hope in an effort to gather supplies for the near starving population of Sydney, a voyage that would take her seven months. The Sirius arrived in Table Bay on 2 January 1789 and was back in Sydney by May of the same year.

After returning to Port Jackson she was again ordered to re-supply the near starving colony, only this time from China. She was also ordered to call at Norfolk Island on the way to China. The Sirius headed for Norfolk Island on the 6th March 1790. On March 19th she was wrecked on a reef as she attempted to enter Sydney Bay in an effort to land much needed supplies.

The anchor from the wrecked Sirius was raised in 1905 and, along with a cannon; both were put on display in Macquarie Place in 1907. The anchor stands embedded in a rock faced quartzite capping atop a massive sandstone pedestal.

As a result of the loss of the Sirius Captain Arthur Phillip was recalled to England where he was put on trial by Court Marshall. He was honourably acquitted and on the 15th February 1795 he sailed on board as Commander of HMS Reliance to take up his new post as Governor of NSW, arriving in Sydney on 5th September 1795.

The anchor from the wrecked Sirius along with a cannon; on display in Macquarie Place.

The Supply

The Supply was a brig of 170 tons, the smallest and fastest vessel of the first fleet which left England on the 13th of May 1787 and arrived in Australia in on the 26th of January 1788. She only had a standing crew of 55 men and was captained by Henry Bull. It appears she was built in America in 1759 and was commissioned by the Admiralty in October 1786, although there is some doubt about her true origin.

The Supply was much faster and lighter than her contemporise and as a result it is said that Captain Phillip said on her into Port Jackson in advance of the rest of the first fleet. Here she would arrive a full day ahead of the others.

After the wreck of the Sirius she was the only link with the outside world and made a number of trips to seek further supplies in order to keep the fledgling colony alive. She later returned to England where she was renamed the 'Thomas &

Nancy' and became a coal carrier until 1806 (or thereabouts).

From 1801 to 1834, approximately 329 convict ships arrived in New South Wales. Convict transportation from England and Ireland to New South Wales ended in 1840, Tasmania (Van Diemen's Land) 1852, and Western Australia in 1868,

The Journey

The hazardous voyage of some 24,241 km (39,011 miles) left Portsmouth, on Sunday 13th of May 1787 and took approximately 250 days, 68 of which were spent in port en route. The Fleet travelled via the Isle of Wight, Tenerife in the Canary Islands, Rio de Janeiro and Cape Town. Passengers suffered great discomfort. Convicts were chained for the full term at sea and as many as 50 were packed into small barred compartments. Ships that carried female convicts soon became 'floating brothels'. It was expected that women would be taken to officer's cabins or thrown in with the crew (in fact, a British judge advocated this practice in 1817). As well as dealing with dysentery, scurvy and sea-sickness, discipline was particularly harsh. 'Officials' were recruited from waterside taverns and tended to behave brutally. 48 convicts died before reaching Australia.

Conditions on board the transport ships:

The following extracts are taken from an article, entitled 'Secondary Punishments', published in The Law Magazine; or Quarterly Review of Jurisprudence, for January, 1832; and April, 1832. Vol VII, Saunders and Benning, London, 1832.. It deals with The Report From Select Committee on Secondary Punishments, House of Commons, 1832, and gives a good insight into the system of punishment at the time and prevailing attitudes towards it.

"There was two rows of sleeping berths, one above the other, extend on each side of the between-decks of the convict-ship, each berth being six feet square, and calculated to hold four convicts, every one thus possessing eighteen inches space to sleep in, - and this was considered ample space too".

"The hospital is in the fore-part of the ship, with a bulk-head across, separating it from the prison, having two doors with locks to keep out intruders; - while a separate prison is built for the boys, to cut off all intercourse between them and the men. Strong wooden stanchions, thick studded with nails, are fixed round the fore and main hatchways, between decks, in which is a door with three padlocks, to let the convicts out and in, and secure them at night".

"Each (male) prisoner is allowed one pair of shoes, three shirts, two pair of trousers (sic) and other warm clothing on his embarkation, besides a bed, pillow, and blanket - while Bibles, Testaments, prayer-books, and psalters, are distributed among the messes (A psalter is a volume containing the Book of Psalms, often with other devotional material bound in as well, such as a liturgical calendar and litany of the Saints)".

On 18 January 1788, Captain Phillip (on board HMS Supply) arrived in Botany Bay. On first observation he found the site inappropriate for permanent settlement. It was baron, shallow and sandy and lacked a fresh water source or protected anchorage. When the rest of the Fleet arrived on the 19th Phillip decided to investigate the inlet further to the north (Port Jackson). Phillip discovered pristine forest, fresh water (later called Tank Stream) and a well-sheltered harbour. On the 26th of January, on the foreshore of Sydney Cove, the British flag was ceremoniously raised, proclaiming the land, the Colony of New South Wales. Some historians suggest the actual spot where the Union Jack was first raised was in fact on the corner of what is now George Street and Argyll Street, The Rocks.

It is quite a remarkable fact, and a testament to the captains and crews of the convict transportations that not a single convict ship was wrecked during the first 45 years of transportation. The Amphitrite, which sailed from London in August 1833 with 106 women convicts and 12 children on board, was the first convict ship to be lost. She was wrecked only 62 kilometres from London, and one kilometre from land. There were only three survivors.

Chronology of the First Fleet

1786		Lord Sydney writes to the Treasury requesting the provision of ships to carry convicts to New South Wales.
1787	January 6	The first group of convicts are embarked on Alexander at Woolwich, London.
	May 13	First Fleet sails from Portsmouth, Hampshire.
	June 3	Arrival at Madeira. Water and fresh supplies taken on board.
	July 14	Fleet crosses equator
	August 6	Arrival at Rio de Janeiro. Fleet undergoes repairs, takes on fresh water and supplies.
	September 4	Fleet departs Rio.
	October 14	Arrival at Cape of Good Hope. Fresh supplies and livestock taken on board.
	November 12	Departure from the Cape. (Table Bay)
	November 25	Captain Phillip divides the Fleet and sails ahead with the four fastest ships.
	January 3	Coast of Van Diemens Land (Tasmania) sighted.
	January 18 to 19	The first division of the Fleet anchors at Botany Bay.
	January 20	The remainder of the Fleet arrives.
	January 26	All Fleet ships anchor in Sydney Cove, Port Jackson. Captain Phillip and officers go ashore, raise the flag and toast the new colony. Two French ships commanded by La Perouse enter Botany Bay.
	February 15	The Supply sails for Norfolk Island carrying a small party to establish a settlement.
	March 10	The La Perouse expedition leaves Botany Bay. Charlotte, Lady Penrhyn and Scarborough sail for China.
	July 14	Borrowdale, Alexander, Friendship and Prince of Wales sail for England.
	October 2	Golden Grove sails for Norfolk Island with a party of convicts, returning to Port Jackson
	November 10	Sirius sails for Cape of Good Hope for supplies.
	November 19	Fishburn and Golden Grove sail for England. Only Supply now remains.

First Impressions

It has recently been shown that the Eora People, coastal inhabitants of the Sydney area, have lived here for 50,000 years (a grindstone for bread making was recently found). The aboriginal name for the area was, 'Warrane' (meaning 'of this place'). In 1788, Phillip approximated that there were 1500 aborigines living within a 10 mile radius of Sydney Cove. We can only imagine what they thought, witnessing the appearance of the First Fleeters clambering over the Rocks.

As the historian, Kelly states, "To the people who arrived, convicts and their keepers alike, it was a different world. Sydney Cove, to those accustomed to life in the English world, it was like hell on Earth. The sights and smells were a daily reminder that this was a harsh land and perhaps one of the cruellest penitentiaries in existence".

Declarations of discontent were rife, and executive officer Major Robert Ross wrote in 1788, "I do not scruple to pronounce that in the whole world there is not a worse country than what we have seen of this."

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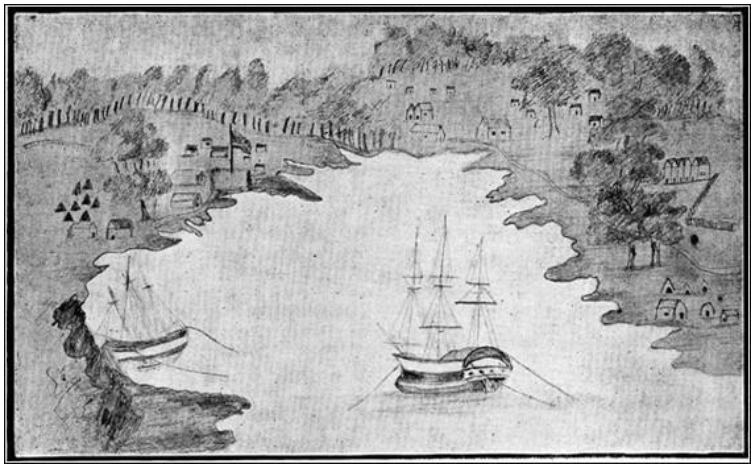
Governor Phillip, however, retained an optimistic approach, describing Sydney Harbour as one of the finest harbours in the world. He knew that the newly established colony would always depend upon its harbour and maritime connections, especially in the important developmental years. He was also of the opinion that Sydney should not remain a gaol, but rather become an important outpost of English colonisation.



First Sketch of Sydney cove

Left is a reproduction of what is quite probably the first sketch ever made of Circular Quay and the beginning of the city of Sydney. It was drawn by Captain John Hunter on August 20, 1788, seven months after the first landing here. The path on the right is the George street North of to-day. The building close to the fence behind the trees on the right is the first hospital. The path ended about what is now the intersection of George and Essex streets. The flagstaff on the left stood where Loftus street now joins Circular Quay. On the left of the flagstaff is the canvas hut of Governor Philip, the first Government House.

Convicts

Convict Deaths in the First Year

By the end of the first year of colonisation, 55 people had died of illness (four marines, 27 male convicts and 13 female convicts and 11 children), four had been killed by aborigines, five were executed and 14 were lost in the bush or at sea, presumed dead.

The most common cause of death in the early days of colonisation was "heat sickness" (heat stroke) followed by snake bite.

Convict Population

Official records show that by the end of 1791, the convict population of Parramatta exceeded that of Sydney Town. There were 1,628 people living at Parramatta, a further 1,259 had made Sydney their home. 1,172 people lived on Norfolk Island at a settlement also called Sydney

Class Systems

Unusually, convicts had a great deal of independence and freedom in Sydney. Freedom was viewed as an effective rehabilitation tool, and those reformed were able to earn a decent living.

A definite class structure emerged between Free Settlers and Emancipists. Many Emancipists were able to prosper in business, effectively 'class-climbing', to become wealthy and respected members of Sydney society (e.g. William Blue, Francis Greenway). Emancipists could employ convicts, a practice despised by soldiers and Free Settlers.

In a letter written in 1827 by Peter Cunningham, Royal Navy (Superintendent of Convict Transports.) two distinct terms were used to distinguish the children of the colony:

"Our colonial born brethren are best known here by the name Currency in contradiction to Sterling" (he was referring to those born in the Mother country)

The name was originally given by a facetious paymaster in the 73rd Regiment...the pound currency at the time inferior to the pound sterling.

Labour

The first male convicts were brought ashore one day after the convoy of the First Fleet arrived. They were marched to the site of the government lumbar yard, stripped, washed, inspected and had their statistics recorded. Any skilled individuals (such as blacksmiths, carpenters and stonemasons) were retained and employed on government works programs. The remaining convicts were assigned to labouring work for property owners or farmers.

Convicts were the only source of physical labour. They cut the stone, washed the clothes, cleared the scrub, baked the bread, cut the timber, carried loads and made the roads. Whilst it was hard work there was, at the end of the day, some free time for paid work and even leisure. They were allowed to work for the government for pay in their own time and this many used to pay for their accommodation in the Rocks.

Convicts were not expected to work on Saturday afternoons in order they have the time to tend to whatever food they could grow themselves.

The women had both paid and unpaid work, which included weaving, cooking, house-keeping, prostitution and millinery. Convict, Sarah Bird became Australia's first female publican in the colony when, in 1797, she bought a pub called 'The Three Jolly Settlers' for the princely sum of £20, whilst another woman to become a famous publican was a former servant girl called Sarah Baxter who opened the Royal Admiral pub in 1798. She was barely nineteen years old at the time.

For the male convicts there were the chain gangs or 'Iron Gangs' as they were called, however for troublesome and hardened female prisoners, these were sent to the 'Female Factory'. The first Female Factory was built at Parramatta in 1804 and initially consisted of a single long room with a fireplace at one end for the women to cook on. Another female factory and three-storey barracks was built in Parramatta in1821 and was mainly used to house women who had committed local offences, convict women with children and convict girls who were unsuitable for work with the settlers.

Health, Rations and Discipline

When the first fleet arrived in Sydney Cove in 1788 it was with enough food supplies which, it was believed, would last for two years. Each convict was initially issued a weekly ration of:

Beef 7lb or Pork 4lb Dried peas 3
pints Bread/flour 7lb Butter 6 oz
Flour 1lb or rice 1/2lb

Female convicts and the wives of the Marines guarding them, were, on the other hand, only issued with two thirds of a male convict's ration.

Farming in the new colony was hard and despite their efforts the first crop they planted failed to germinate as it had been overheated on the journey out and was planted in the summer.

Many convicts suffered dietary deficiencies from the journey, therefore it was imperative that the colony become self sufficient in food production. Originally the area we know today as Farm Cove was used to try and grow corn but this attempt was largely ineffective. Within six months of their arrival Governor Phillip reported that 36 marines and 66 convicts were receiving medical treatment, and that 52 unfit for labour because of old age or infirmity.

A typical daily ration for a Convict was:

Breakfast:	one bread roll and a bowl of skilly (oatmeal, water and meat)
Lunch:	one bread roll and a pound of dry, salted meat
Dinner:	one bread roll and if lucky, a cup of tea

With the new settlement came new diseases. One epidemic (thought to be smallpox) is claimed to have decimated the local Cadigal and Wangal population of Sydney in April of 1789, most of the Cadigal population is thought to have died as a result of this epidemic. The source of the epidemic is debated by historians today considering only one person in the First Fleet died of this disease, however using smallpox scabs, as a form of self inoculation against the disease, was quite commonplace in England. Other theories suggest that the disease was brought by Malay traders, pearlers and Trepang (a type of sea slug) fishers in the north of Australia.

Convict Trivia

The first marriage was between William Parr and Mary MacCormick at the corner of Bligh and Hunter Streets in Sydney on 10 February 1788.

In the Muster & Census returns those over 12 years were classified as adults

According to parish records from 1804-1814 only 55% of males & 24% of females of those born overseas were able to sign their name. The percentages were slightly better for the local born, 63% of males & 44% of females.

20% of the first convicts transported were women, most were in their middle 20's, a few were early teens, several were aged up to 82 years. 50% had been tried in Middlesex, some at county Assizes (Devon, Kent & Sussex), the rest were at Quarter Sessions (Old Bailey)

The Second Fleet

The second fleet, consisting of the transport ships Neptune, Scarborough, and Surprise sailed from Portsmouth on the 19 January 1790 with a total of 939 male convicts and 78 females on board. When it finally arrived at Port Jackson only 692 males and 67 females were still alive and of those more than 500 hundred were sick or dying. The death rates for the ships of the second fleet were one death to every 3.1 convicts on board the Neptune, one death to every 3.5 convicts on board the Scarborough and one death to every 7.1 convicts on board the Surprise.

The Third Fleet

The third fleet, consisting of 11 ships left England over a period of three months in February, March and April of 1791, carrying over 2000 convicts and other crew and officials.

The first ship to arrive in Port Jackson was the 'Mary Ann' with its cargo of female convicts and provisions on the 9th of July 1791. Given that she was the first to arrive there is some debate as to whether she was in fact the first of the third fleet or the last of the second fleet.

The second ship to arrive was the 'Matilda' which arrived 3 weeks later on the 1st of August 1791. The 'Admiral Barrington' was the last ship to arrive and she didn't make Port Jackson until some 14 weeks after the Mary Ann on the 16th October 1791.

The Convict Ship That Never Was.

The ‘Success’

The “Convict Ship” that never was: The “Success” was a 621 ton, teak built ship first launched in Natmoo, Burma, by the British company of Cockerell & Co. of Calcutta in 1840. She finished life as a trading ship after being purchased by Frederick Mangles, of London. In 1843 she sailed with emigrants to the infant Swan River settlement in WA.

The Success returned to the trade routes to India and later the West Indies before eventually returning to transporting more free emigrants to Australia between 1845-1847.

On her last voyage to Melbourne her crew deserted her and joined the great Australian gold rush of 1851, leaving no-one to sail her back to England. It was here that she was converted into a prison hulk and remained in Melbourne for a number of years. From about 1860 to 1869 the Success was used to incarcerate women and boys. Following this the ship was used to store ammunition. In 1890 the government, finding no further use for her, sold her at auction. In 1890 the Success was sold to Alexander Phillips.

It was Phillips who, along with his business partners, decided to convert the ailing hulk into an exhibition ship.

Despite the mere fact that it never did never transported ‘real convicts’ to the colonies, transporting instead free emigrants, it was seen as an business opportunity too good to be true and with the remnants of the convict transportations in abundance, leg irons and manacles etc, it was transformed into a floating museum and exhibition, quickly gaining notoriety amid the various and bizarre claims as to its history.

The newly transformed “genuine convict ship’ was sailed up from Melbourne where is was then moored in Circular Quay, wowing vast crowds of onlookers eager to get a glimpse into the world that was, for many, the lot of their forefathers.


THE WASHINGTON TIMES FRIDAY JUNE 5, 1914.

The World's Most Remarkable Exhibition!

THE OLD BRITISH

CONVICT SHIP "SUCCESS"

The Oldest Ship Afloat (Launched 1790 A. D.) and Only Remaining Convict Ship in the World

NOW AT SEVENTH STREET WHARF, WASHINGTON

On a Final Tour of the World, on Her Way to San Francisco, Where She Will Be a Feature of the Great Panama Exposition

"THE OCEAN HELL"

THIS WONDERFUL VESSEL HAS MADE HISTORY

This Wonderful Vessel Has Been Visited by Over 15,000,000 (15,000,000 PEOPLE)

Governor Foss, of Mass., Wrote:

Governor Pothier, of R. I., Wrote:

Governor Mann, of Virginia, Wrote:

What the Press of Two Continents Say of the Convict Ship "Success"

AMERICA

GREAT BRITAIN

AMERICA

The Convict Ship Will Never Again Be Seen in Washington

Admission 25 cts.

Open to the Public From Tomorrow 10 A.M. and Daily Thereafter From 10 A.M. to 10 P.M., Pier 7th St. Wharf, Washington

NOTE—The Convict Ship is Lighted Throughout by Electricity and Can Be Inspected by Night as Well as by Day

Admission 25 cts.

After a long spell in Sydney the ‘genuine fake’ left for an anticipated tour of England in 1895, where again it attracted huge crowds.

In 1911 the Success was bought by an Isle of Man syndicate assembled by David Smith of Worthington, Indiana. She was sailed into Boston Harbour in 1912. Between 1912 and 1915 visitors on the Eastern seaboard flocked to see the ship. In 1915 Success passed through the Panama Canal to the west coast and was a major attraction at the Panama-Pacific Exposition in San Francisco. Later she drew large crowds in Seattle and Portland. From 1917 to 1919 she was shown on the Mississippi and Ohio River systems, going as far as Pittsburgh.

The bogus propaganda which surrounded the Success advertised her as "The oldest ship afloat" and also a "genuine convict transport ship (which it never was). Also it was not the oldest ship afloat either, being launched in 1840, and not 1790 as claimed.

The end came for the fake convict ship on July 4, 1946, when she had been sunk and half raised, half frozen, in the ice of Lake Erie. A fire broke out and she was burned below the waterline. A sad, fate for a ship that lived the lie.

Colonising The Rocks

The Rocks is traditionally perceived to be the birthplace of colonial Australia. Although the Cadigal People had hunted and fished in the area for centuries, it was the convict population who made it their home, whilst the governor, Governor Phillip, officers and other men and women of position located themselves in the more desirable eastern slopes of the Tank Stream which ran through the heart of what is now Circular Quay. The Cadigal name for the Rocks was Tallawoladah.

Whilst initially forced to suffer the same fate as the convicts he brought to Australia, living under canvas, albeit on a far nicer plot than the Rocks, Governor Phillip soon began construction of more permanent buildings. Firstly basic wattle and daub, similar to those being raised on the other side of the cove, and later proper brick buildings were erected. For these they needed clay to make the bricks, and this they found in an area soon to be known as Brickfields.

The Building Blocks of Sydney

Many of the bricks produced by the convict population can still be found today, displaying their distinctive markings, most uniquely individual. The convict brick mark of a broad arrow was introduced in 1819. Some early Australian bricks have a thumbprint, thought to be a tally mark, while others carry paw prints from dogs, cats and possums scavenging for food among the bricks set out to dry. The broad arrow was replaced by a dazzling variety of marks pressed into the brick frog (the shallow depression in the top surface of a brick) including animal designs, stars, heel prints and even a military medal.

Mortar for building

Neither limestone nor chalk was to be found in the vicinity of Sydney Cove, and shells were burnt for lime in the first months of settlement. Governor Phillip is said to have brought a little lime from England to the settlement, but he had to try and obtain more locally even for his own house. In the 1850s and 1860s the activities of the shell diggers had become a problem in the Sydney region, and were resulting in the depletion of oyster supplies, a problem overcome only when the establishment of railway connections in the 1870s enabled rock lime to be brought from inland.

Animal hair such as horse hair was sometimes mixed in the mortar, or human hair if necessary. In 1832 it was reported that four hundred convicts were being shorn at Norfolk Island to provide hair for the purpose.

The area of Brickfields was centred on what is now modern day Paddy's Market and covers parts of Elizabeth, George, Bathurst and Goulburn Streets. A track was cut in order to transport the clay back down the hill to Sydney Cove, and this was gradually widened to become what is now George Street.

Clay continued to be dug from Brickfield Hill until as late as the 1840's.

The area known as Brickfield Hill was an actual Sydney postal address until the introduction of post codes in 1967 and could effectively be seen as the area from Town Hall to Central Station.

Governor Phillip reserved a portion of this area for the convict women of the First Fleet. The women were landed and placed in tents on the west side of the Sydney Cove on February 6, 1788, and were thus the first settlers of the Rocks

The early days of colonisation were without doubt tough for the residents of The Rocks. The first 10 years of settlement were undoubtedly the toughest and life was strictly regulated by the authorities. A "curfew" bell rang out between the hours of 8 and 9 at night, and working hours were from sunrise to sunset. Quite soon after settlement small wattle and daub houses, followed by more substantial weatherboard or rubble stone houses appeared. Areas were marked out and fences erected. Small businesses were started and pubs built. As more convicts arrived they too found lodgings in The Rocks area with fellow convict families. By 1805 there was a church, St Philip's, and also the first walled jail in Australia.

The Irish born convict Henry Keck was appointed the first 'governor of the goal' when it was first opened on the corners of George and Essex streets in 1837. Keck arrived in 1832 in the company of his mistress Sarah Whitehouse, who was masquerading as a governess. He claimed his actual wife, Teresa had died back in Ireland, however this proved not to be true and Teresa actually landed in Sydney in 1835. She was later made 'matron of the gaol'. This goal lasted until 1841, when on March 7th 119 men and boys and 39 women prisoners were marched across Sydney Cove to their new home of Woolloomooloo Stockade, later renamed Darlinghurst jail.

There had been a goal in the area prior to the 1837 goal, this had been erected in 1797 and was originally only a thatched log building. It burned down in 1781 and was replaced by a stone built building which remained for the next forty years, however this was also not a walled structure and was finally demolished in 1832 and replaced with a more secure structure.

Work begun on Darlinghurst jail in 1836 as it soon became clear that the Rocks goal couldn't cope with the continual influx of new convicts. It eventually took 50 years to complete, however it opened its doors in 1841. Keck was again appointed governor and held this position for a further 8 years.

The Rocks was also the site of Sydney's first hospital, consisting of approximately 100 tents. Australia's first qualified medical staff amounted to one principle surgeon and four assistants. There were no trained nurses, and what nursing staffs there was consisted of untrained and unpaid convicts. This makeshift hospital went on to serve the needs of the colony for almost 28 years until Governor Macquarie had a new Hospital constructed in Macquarie Street by 1816.

Street names were not formally used until 1810 although the residents themselves knew very well the myriad of laneways and alleys which ran through the area.

By 1855 there were 37 pubs listed as licensed taverns in The Rocks-Millers Point area, of which only two are in operation today; the Lord Nelson and the Hero of Waterloo.

George Street in The Rocks was the first road made by Europeans following their arrival in Sydney Cove in January 1788. The original track was determined by the lines of tents erected for shelter, including a hospital and bake house. The "road" was little more than a dirt path; there were no carriages, carts or other wheeled vehicles and only a handful of horses, and so the population walked. The track ran partly along a ledge of flat rock above the waterline. It is most probable that this track may have been made by the Cadigal people who had been living in the area for millennia and who continued to bake fish on the flat rocks by the water's edge after the arrival of the Europeans

Initially George Street was known as Sergeant-major's Row or Spring Row; then it became High street, a name it retained until 1810, when Macquarie gave the street its present title in honour of his majesty, King George III

In 1790 Governor Phillip and Surveyor Augustus Alt laid out a town plan with High Street (George Street) running between the planned site of Government House and the Landing Place to the east of this site. As set out, George Street was 205 feet (63 m) wide and a mile (1.6 km) long. On either side of the street huts were to be at a distance of 60 feet (18.5 m) from each other, with a garden area allotted at the rear of each hut. The huts were to be built of wattle and daub and the roofs were thatched, and were to

be 12 by 24 feet (4 by 8 m).

The new street and the huts were built by the convicts from July 1790. By September 1790 bricks were being fired for a barracks and store house, a wharf was built just to the east of this site and 27 huts were being built along High Street (George Street).

Skilled engineers began arriving in the 1820s and the roads benefited from the new road building methods of Thomas Telford and John MacAdam. Their techniques were adapted to colonial conditions, and the old method of simply 'throwing up' a road was abandoned. Roads began to be constructed in strata of graded broken stone, laid in cambered beds and given a final coat of ironstone.

By the 1880s, Sydney was a thriving commercial centre with a growing population and expanding city precinct. A city of dirt streets presented poorly and contributed to muddy erosion, much to the annoyance of shopkeepers. Steel shod horses, buggies and carriages, being the backbone of personal and commercial transportation, needed a firm and stable surface with good traction and the ability of the surface to minimise noise.

After trial using local sandstone proved a failure in heavy traffic areas as the stone paving wore quickly and had a tendency to cracking, woodblock paving was introduced because they substantially reduced noise, looked attractive, minimised dust, were far more durable and easily cleaned. Australia also had an ample supply of hardwood perfect for the job. The best timbers for woodblocks were found to be Australian Class 1 hardwoods including blue gum, red gum, ironbark, black butt, tallowwood, mahogany and turpentine. The blocks were brick- shaped and laid in a stretcher bond pattern. The surface of the woodblocks was top-dressed with tar, pea-gravel and sand to provide a firm surface and to combat slipperiness.

The section of George Street between Dawes Point and Argyle Street was paved in 1888. So effective was the introduction of woodblocks that George Street North did not require maintenance for five years, thus proving the cost and labour effectiveness of using woodblocks.

The woodblocks were washed down every night in an effort to reduce the amount of dust and debris from the horse drawn carriages plying their trade up and down Sydney's main thoroughfare.

In order to keep the streets clean throughout the day, the council employed 'block boys' to pick up rubbish and horse droppings. They were affectionately called 'sparrow starvers' because in the droppings were undigested seeds, that the sparrows ate. It became a much sort after job by local lads and often led to a career on the council.

What happened to the woodblocks?

The gradual replacement of horse and cart with much heavier automobiles saw an increase in wear of the woodblocks. They were progressively removed from most parts of the city and replaced with asphalt. The woodblocks were considered perfect for firewood and during the Great Depression, young boys were often caught helping themselves to one or two to heat the family home and cook dinner. The Council also gave redundant woodblocks to the elderly and disadvantaged.

The Origin of Some Local Street Names

Lower Fort Street	This Street got its name from the original path that led from the soldier's barracks on Dawes Point to Fort Phillip, the first fort to be built in Australia (now Observatory Hill). George Street, west of the Harbour Bridge became part of Lower Fort Street in 1963.
Hickson Road	This is a relatively new road and was built from late 1909 and continued until the 1920's. It is named after R. R. P. Hickson who was the chairman of the Sydney Harbour Trust from 1901 to 1912.

Cahill Expressway The Cahill Expressway was named in honour of John Joseph Cahill in 1958. Cahill was the

Premier of NSW from 1952 to 1959.

Argyle Street — Argyle Street was named by Governor Lachlan Macquarie in 1810 after the Scottish county of Argyle, the place of his birth. This Street was originally in two parts until a ridge between The Rocks and Millers Point was cut through in the 1840's. This is now called The Argyle Cut.

Essex Street — Named by Macquarie in 1810 after Robert Devereux the 3rd Earl of Essex. In the early days, the grade of the hills it traversed was so steep, it was impassable by carriages. The street was originally lined by many fine houses alternated by empty blocks which were not built on until the grade of the road was lessened and access was improved.

To make way for the southern approach span of the Sydney Harbour Bridge this, the main and most important road in the area was demolished. This road led out to the end of what is now Dawes Point and was originally called Windmill Row because it lead to three windmills operated by the convict and miller Jack Leighton, who occupied the land on the Point from about 1815. It was later changed to Princes Street by Governor Macquarie in 1810 to honour the Prince of Wales. (In June 1826 after drinking too much alcohol Jack Leighton fell from one of his own windmills and was killed).

Prince Street. The Rocks

Development of The Rocks

Today The Rocks is a cosmopolitan community rich in entertainment, attractions and heritage. Among the most frequented attractions are:

The Rocks Farmers Markets: Open 9am – 3pm Fridays. Jack Mundey Place (corner of Argyle and George streets)

The Rocks Weekend Markets: Open 10am – 5pm Saturdays and Sundays on Playfair and George Streets.

Superstitions

It was a superstition of the times that certain artefacts were hidden within cavities of a house. Included in these would have been the roof space, under the floorboards and the chimney. Even the walls themselves have revealed secrets that could only have been placed there with the knowledge of the tradesmen that built them. In Europe in general, but the UK in particular, history has unearthed a wealth of items deliberately hidden in such places, and these items range from the mundane to the bizarre. It is not surprising then that such items are now being discovered in Australia, including The Rocks.

Foremost among these strange items are shoes. Usually children's shoes, and mostly worn to the point of destruction. However, other strange things have been discovered, including dead cats.

So what is the reason for this strange phenomenon?

In Europe in the 18th century it was a custom amongst many, but usually the poorer members of the population, that concealing items in hidden places would bring protection to the inhabitants of the house. The shoes for example are nearly always children's shoes and more than likely worn by successive members of the family as shoes themselves were an expensive item.

By secreting them away it was thought that this would draw evil spirits into small inaccessible places where they would have trouble finding their way out, thus protecting the rest of the house from harm. The fact that children's shoes were most common suggests that it was believed that evil spirits are themselves drawn to innocent children as a means of infiltrating the family household.

The idea of hiding dead cats, and it is now widely believed that they were in fact already dead when hidden, and not just stray moggies that had wondered off and gotten stuck and died, is the long tradition that cats appear to have with the underworld.

It is not surprising therefore that such customs found their way to Australia. A strange new world full of uncertainty would surely have led many to seek refuge in traditions from the old country in order to protect themselves and their families. This may well explain the existence of strange items now being discovered within the older houses of The Rocks area as more and more are being renovated over time.

Other strange items have recently been unearthed. During the construction of the ANA Hotel in Cumberland Street in 1989 three mysterious objects were discovered. These were an Egyptian "ushabti" figure made around 400 BC, a topaz ring inset made in the first century BC, and a Roman coin dating to 123 BC. It is unclear how these objects were brought to Australia, and by whom?

Women of the Rocks

In 1788, women formed one third of the settlement's convicts. By 1800, there was one woman to every four men. This did not change for the next 40 years and many of the colony's unique characteristics (especially life in The Rocks) stemmed from this imbalance. The 188 female convicts of the First Fleet were made up of Irish, English and Scots (in that order) and were housed in tents in The Rocks.

Women were told to dress in London clothing. They would be lined up for inspection and the prettiest would be chosen by the officials. Desperate men would skulk around the Female Factories (where women convicts were put to work), looking for wives. Women found this opportunistic because if they were married, they could be assigned to Free Settlers. Women were subjected to harsh punishment and were sexually vulnerable and very much aware that in such a male dominated society nothing would come easy. The women of The Rocks developed their own style of living, which was not always pleasing or thought proper by Governors and other officials.

There were however those who saw the opportunity for a new start and many women made their name in trade and real estate. One such woman was Mary Reibey, who arrived on board the 'Royal Admiral' in 1791, having been convicted for horse theft. Mary (christened Molly) started out from a small house in The Rocks where she married Tom Raby (Raiby and Reibey, he used all three spellings), a junior officer on the Britannia. Tom Reibey had borrowed money from the wealthy merchant Robert Campbell, and went on to amass a fortune from trade and shipping, especially to the Pacific and later China. Tom Reibey died in 1811 and Mary took control of the business empire. She had a number of fine houses built in Sydney, paying as much as £1100 for one block of land in George Street in 1827. She was also a shareholder in the Bank of New South Wales and her sons were directors and shareholders in Van Diemen's Land banks where she had also brought a number of properties.

In 1816 she had an income of over £1000 per year. Mary died in Newtown on 30th May 1855 still living off the rents from her properties.

Dorothy Handland and was believed to be the oldest female convict transported also became Australia's first known suicide. She died by hanging herself from a gum tree in Sydney Cove in 1789.

Free Settlers

Free Settlers started arriving in 1793. Australia's 'convict stain' stigma was seen as a potential inhibitor to the commercial development of the colony. In the early days the local population of The Rocks, primarily the lower part leading down to the water's edge was generally working class. The locals were mostly prostitutes, carters, pimps, packers, coal lumpers and larrikins. Over time the area became synonymous with debauchery, attracting individuals frequenting boarding houses and pubs.

Commissioner J.T. Bigg, on being sent to report on the Colony's affairs, commented that; upon being let out of Hyde Park Barracks, the convicts…

"…resort to a particular part of town called The Rocks, a place distinguished… for the practice of every debauchery and villainy… The Rocks [is] chiefly inhabited by the most profligate and depraved part of the population."

The convicts were allowed to wear ordinary civilian clothing until 1810. It was then that Governor Lachlan Macquarie decided to differentiate between the free settlers and the convicts by assigning prisoners with uniforms marked, "PB" (Prison Barracks) which had buttons down the sides of their legs to allow the removal of leg irons.

Housing

Housing was of utmost importance and the early settlers on the Rocks soon realized that their basic wattle and daub houses wouldn't last. An alternative was needed and the answer lies right beneath their feet: Sandstone.

The convicts were put to work officially quarrying sandstone. Enormous amounts were quarried from the Rocks area, and by the 1830's they had begun to quarry their way through what is now the Argyle Cut. The remains of their efforts were dumped in the mangrove swamps at the head of the Tank Stream and formed the foundations of what is now Circular Quay.

It wasn't long before they realized that the sandstone of the Rocks wasn't of the best quality and an alternative was needed. The answer was found in Pyrmont, when by the 1850's there were about 50 quarries in operation.

There was already a quarry in existence and this was started by the first fleet's lone stonemason, Samuel Peyton, a Londoner who was transported for larceny. He was put to work training a number of unskilled convict labourers in the art of stonemasonry and established the first quarry on what was later to be known as Bennelong Point. Peyton and his men worked in the quarry for over 40 years and gradually the hillside was slowly chiselled away to create the sheer rock face that lines the eastern shore of Sydney Cove today.

The later sites quarried various types of stone and some of these quarries were given nicknames referring to the type stone they cut. One they called 'Hellhole' where the stone was as hard as all hell, but the stone most liked best they nicknamed 'Paradise'. It was soft stone, relatively easy to carve and coloured to a beautiful, warm, golden colour. There was also an in between was a stone called which they called 'Purgatory'.

By the 1823 there were an estimated 1200 people living in the Rocks area. The majority of its residents were working class who deriving their living from the wharves which surround the area.

After the end of convict transports in 1840 there was a new influx of immigrants, many of which came to seek their fortune in the newly discovered goldfields of Victoria in 1851. With this increase came the need for more accommodation and the Rocks soon became a thriving, if somewhat, congested area. In 1852 an estimated 370,000 people came to Australia in search of a better life, this was greater than the total number of convicts that had landed in the 70 years since the first fleet in 1788.

The Fatal Tree

Where the present-day railway emerges from the tunnel from Wynyard stood the 'Fatal Tree' or 'Hanging Tree'. This was used initially for all public executions but was later replaced in about 1798 by a nine metre high scaffold. The present day intersection of Essex and Harrington Streets was known for many years as Gallows Hill.

It was normal that all prisoners were required to watch the grisly spectacle along with the prison guards. Executions generally took place at either 9.00 or 10.00 am and the condemned man (or woman) would be given one hour of religious devotion

in which to make peace with their maker, and to address the crowd if they wished.

On February 28th 1788, within a week of arriving on the first fleet, seventeen year old John Barrett became the first man to be publicly executed in Australia for stealing butter. He was hung at the 'Fatal Tree'. In the years 1826 to 1837, 1296 people were sentenced to death in NSW, and of those, 377 were actually hanged. In 1830 alone over 50 people were hung, outnumbering those executed in England for the same period, where 46 people met their death in this way. Public executions were finally abolished in NSW in 1855 although private executions continued until 1939.

Letters from Home

It was unusual circumstances which led to the establishment of the first post office in Sydney. Most, if not all, of the ships that arrived in Port Jackson brought letters and parcels from the homeland, and on many occasions these contained valuables meant for the officers and government officials.

All that was required to get hold of these potentially valuable items was that someone had simply to go on board ship to collect them; however impersonation became so prevalent that the Lieutenant-Governor (Colonel Paterson) in 1809 was forced to appoint a postmaster in order to prevent the theft of His Majesty's mail. So it was that Mr. Isaac Nichols became the first postmaster in Sydney. His actual duties were quite easy; although the role was to become immense as it was to become the forerunner for what is now Australia Post. His task was to collect the letters and parcels from ships and convey them to his own office, which was originally at Isaac Nichols own house in Lower George Street, The Rocks, where the addressees had then to collect them and pay a fee of one shilling (10 cents) for each letter, two shillings and sixpence (25c) for each parcel up to 20 lb (9 kgs), and five shillings (50c) for anything over that weight.

In 1810 Governor Macquarie confirmed this arrangement and issued a proclamation sanctioning the establishment of the first post office in Sydney, which was later established in Circular Quay. Upon the arrival of each ship Nichols would post a list outside his house of people for whom there was mail.

It is perhaps a strange quirk of fate that Isaac Nichols himself had been transported from England in 1790 having been convicted and found guilty of stealing.

New South Wales was the first place in any country to adopt adhesive stamps for the pre-payment of postage.

The Rocks Push

The Rocks Push was a gang of men and women local to the Rocks area and who from the 1870's to the 1890's were engaged in all manner crime, such as theft and assault, especially against the police. The female members were primarily used to lure unsuspecting travellers and seamen into situations where they were then robbed by the male members of the gang. The Rocks Push was often at odds with other local gangs, most notably The Glebe Push and the Argyle Cut Push, though there were other gangs with equally individual names, for example: The Forty Thieves Push from Surrey Hills and the Straw Hat Push. Leadership was usually determined by bare knuckle boxing matches with one notable bout in March 1871 between the leaders of a Roman Catholic Push, the Greens, Larry Foley, and Sandy Ross the leader of the protestant gang known as the Orange Push. The fight lasted 71 rounds and was still unresolved by the time the police moved in to put a stop to the fight.

One member of The Rocks Push that went on to fame and fortune was Albert Griffiths, better known as 'Young Griffo'. Griffiths was a prize fighter who later went on to become Australian featherweight champion, a title he held for many years. In 1890 Griffiths fought Torpedo Billy Murphy, New Zealand's first ever boxing champion for the World Featherweight title and won in the 15th round after Murphy retired. He defended the title four times before vacating it to fight at a higher weight. His last bout was in 1904.

Development and Modernisation

From the outset, Sydney was almost totally reliant on shipping, as ships linked the people of Sydney to the outside world. Ships transported supplies to the Colony and were integral for the trading of goods for commercial export. Exported products included seal skins and oil from the Humpback, Right and Sperm Whales. In 1806 alone, 33 ships sailed into Sydney and 31 sailed out.

The Rocks was cluttered with boarding and lodging houses. Boarding houses were clean and respectable businesses providing short term accommodation from one night to a fortnight. In contrast, lodging houses provided squalid housing for local populations. Most of these were located around George, Harrington, Cumberland and Gloucester Streets.

Between 1871 and 1891 the population in The Rocks grew by about 20%. At the same time many buildings were being converted into warehouses and factories. As a result, accommodation became scarce, and by 1891 there were approximately seven people to each house in The Rocks.

In Long's Lane, off Cumberland Street, seven houses shared one tap and one toilet. Thirty five people were forced to share these facilities. These conditions were largely ignored by the Government, the City Council and landlords.

With the construction of the approach spans, beginning in 1924, an estimated 800 people were forced to leave their homes. Below the Southern approach span can be seen the original foundations of The Harbour View Hotel, built in 1843 and demolished to make way for the approach span.

The current Harbour View Hotel was built in 1924 on land which had been set aside for religious purposes in 1915. It was a joint venture between the government land owners and the brewers Tooth & Co, who financed the building.

In total, with both the northern and southern approach spans, 768 properties were demolished; 488 on the north side and 280 on the southern side.

Running directly under the approach span was Princes Street (formally Windmill Row) named by Governor Macquarie in honour of the Prince Regent, as was the custom at the time. Macquarie also named George Street after the king and Pitt Street after the Prime Minister of England.

Despite the traditional view of The Rocks being a rough, and in places, a slum area, this particular part was in fact a rather well sought after piece of real estate. The reason being that it was high ground and with no sewage system in place until 1857 being above and not below any sewage runoff certainly had its benefits.

There were a number of famous people who lived in the area; most notable were two of Australia's Prime Ministers. Edmund Barton, Australia's first, lived in Cumberland Street, and the fourth Prime Minister, George Reid lived in Princes Street.

In 1796, Robert Sidaway, a former convict and now free man, opened a short-lived public playhouse in Windmill Row, known simply as The Theatre. There was however a makeshift theatre operating in Sydney from as early as 1794.

In 1863 the people of The Rocks were the first to witness a demonstration of electricity. A giant battery powered arc lamp was illuminated in celebration of the marriage of the Prince of Wales. Electricity had been around since the 1840's in NSW but this was predominately for the telegraph system and used low voltage from extremely large batteries. The new Sydney Arcade was electrically lit in 1882, and the first power station in Sydney was opened in Regent Street, Redfern. In 1892 Pitt Street and Elizabeth Street were the first publicly lit streets in Sydney.

The Black Death

On the 19th January 1900 the bubonic plague finally broke out in Sydney following an earlier outbreak in Hong Kong in 1894. The government was aware of the possibility of the outbreak given the newly established trade routes for shipping to South East Asia. Despite a final death toll of 535 people, only 5 were residents of the Rocks. Australia's first victim was 33 year old Arthur Payne, a delivery man who lived at No10 Ferry Lane and who had links to the wharves in and around The Rocks, working mostly out of Central Wharf, Miller Point. On or about midday of January 19th 1900, Payne fell ill with severe stomach pains, giddiness and headaches whilst driving through the city and within four hours had very agonising pains in his groin. These lasted all through the day and into the night before a small round lesion was discovered on the back of his leg. On the 25th January, Payne, along with his family, and all those who had been in contact with him over the past few days were put into quarantine at the maritime Quarantine station. Tests were taken of the infections and it was soon discovered that the plague in the form of Bacillus Pestis Bubonica was evident. Mr Payne endured that which bares his name for a further four more days before finally being declared free of the disease and he made a full recovery.

The ship 'Kintuck' had docked in Sydney and had stayed between the 9th of January and the 20th of January, the time when Mr Paine contracted the disease, and could be seen as the most likely culprit. In an all there were about 13 ships which may have been responsible. Both Darling Harbour and The Rocks areas were put into quarantine and teams of rat-catchers were employed to rid the area of the flea ridden rats. Initially a bounty of two pence per rat was offered but this was later reduced to one penny due to the large number of claims being made.

Enterprising individuals soon realised that there was money to be made from this exercise and took full advantage of the situation by simply catching a pair of rats and 'breeding' from them. Being prolific breeders this was a relatively lucrative business. The authorities, however, soon became aware of this and measures were put into place whereby evidence of capture was required before money was exchanged.

Whilst the wharves were at a standstill the government paid six shillings per day for every genuine Rocks resident to compensate for loss of earnings. Many unemployed people migrated to The Rocks in order to try and claim the assistance. It wasn't only rats that were caught as The Sydney Harbour Trust records show; between 28th of November 1901 and 22nd August 1902:

"there were removed to Goat Island, to be burnt there, no less than 2,524 rats, 1,068 cats, 1,260 dogs, 283 bags of meat, 305 bags of fish, 1,467 fowls, 25 parrots, 23 sheep, 14 pigs, 1 bullock, 9 calves, 9 goats, 5 hares, 3 kangaroos, 162 rabbits, 48 bags of chaff, 8 bales of straw, 3 flying foxes and two sharks".

The Government introduced special teams who's task it was to inspect properties in The Rocks and if necessary to remove families and demolish houses in a concerted effort to eradicate the plague. It has, however, been argued that the purchase was more for the acquisition of prime real estate than for improving living conditions. Inoculations were also introduced in an effort to stem the tide of infections in March 1900.

The plague was effectively over by August 1900.

The plague was not the only disease prevalent in the run down Rocks area. There were outbreaks of Smallpox and Typhus, both of which caused the deaths of many more residents that the plague ever did.

It was, however, the very name of the plague itself; "The Black Death" that wrought fear into the heart of the population, most of whom came from Europe and were well aware of the devastation it had wreaked in earlier times, most notably the great plague of London (1664–1666) in which more that 70,000 people died. It was only the great fire of London in 1666 which saved more unfortunate souls from the same fate. (see below for the great fire of Sydney)

The Rocks in the 20th Century

The 20th Century was a time of modernization in The Rocks. In 1900, the government bought much of The Rocks area. The reasons for the purchase was twofold; the need to eradicate the area of the bubonic plague and also to make way for the construction of the Harbour Bridge and expressways. After the purchase, hundreds of buildings were demolished and streets disappeared. This was the beginning of a Government plan to replace Sydney's most historic area with 'modern' buildings. In the 1960's, the local population with the help of the NSW Builders' Labourers' Federation took on the NSW State Government and its modernization plan. After numerous street battles, marches and union "Green Bans" the Government's plan was defeated. The Rocks would be preserved for future generations to enjoy.

Pubs at The Rocks

The Lord Nelson: The Lord Nelson was formally the home of Mr William Wells. Wells was a plasterer by trade who was granted a conditional pardon in 1837 and was later granted a license to open one of the first pubs in Sydney, The Shipwright Arms on the corner of Kent and Argyle Streets. This was later renamed The Sailors Return. Wells owned the two storied house opposite the pub which he built in 1836. In 1840 Wells again changed the name of his pub from The Sailors Return to The Quarryman's Arms, presumably in recognition of the quarries of sandstone found in the area and the quarrymen who drank at the pub. In 1841 Wells sold the Quarryman's Arms and obtained a license to open his home us as a pub, which he called The Lord Nelson.

The Hero of Waterloo: This old public house was built in 1843 by the same builder of the Garrison Church, the stonemason George Paton. The building is of original sandstone carved from the Argyll cut and is one of the oldest surviving pubs in Australia, having been continuously serving beer since 1845.

The history of the pub signs dates back many centuries beginning with the Romans who displayed vine leaves to indicate that a particular establishment sold wine. In the middle ages in Britain religious pilgrimages were a 'must do' and monasteries themselves established wayside inns to cater for thirsty pilgrims. Pub signs as we know them today were initially introduced as a form of visual advertising to otherwise illiterate population.

The Palisade Hotel: Built in 1912 and designed by the architect Henry D Walsh, the Palisade Hotel replaced an earlier hotel of the same name. The name is believed to have arisen from the palisade fencing which was found between Munn and Bettington streets (this has long since been replaced with ornate iron fencing). The pub was a favourite among the wharfies who worked along the 'hungry mile'. It was also a favourite haunt of the bridge workers during construction. For many men it was the last pub they would see before being shipped off to Gallipoli where they fought and died as 'diggers'.

The Harbour View Hotel: The original Harbour View Hotel was built in 1843 and was later demolished to make way for the approach span. The current Harbour View Hotel was built in 1924 on land which had been set aside for religious purposes in 1915. It was a joint venture between the government land owners and the brewers Tooth & Co, who financed the building. The building's significance has been recognized by the various authorities, having an order placed on it in 1989 by the Heritage Office and listing Permanent Conservation by the same authority in 1999 on the State Heritage register. The Council of the City of Sydney has included the hotel in its Local Environment Plan as a building of local Significance.

The Glenmore Hotel: The Glenmore was originally built in the 1880's but was located on the other side of Cumberland Street, however it was demolished to make way for the building of the Cahill Expressway and was rebuilt at its current site in 1921. Similar to the Harbour View Hotel, the Glenmore was built by the brewers Tooth & Co and as it predates the Harbour View Hotel by 3 years it makes it one of the last surviving pre Sydney Harbour Bridge buildings in Cumberland Street.

The Australian Hotel: The Australian Hotel was originally to be found on George Street next to where the Museum of Contemporary Art now stands. It is reported that it first opened for business as a public house on August 12th 1884, and it has had a continual license ever since, making it the oldest licensed public house in the city of Sydney. The old building was demolished in 1900, as were many properties in the Rocks area, due to the outbreak of the plague. A newly licensed premises was opened at 116 Cumberland Street until 1913 when the current building was completed and the license was transferred. It has remained in operation ever since.

The Australian Hotel is listed on the State Heritage register and the Conservation and Heritage Register for Sydney Harbour Foreshore Authority; it is also listed on these non-statutory Heritage registers:

- Register for the National Estate
- Register of the National Trust of Australia (NSW)
- Royal Australian Institute of Architects Register of 20th Century Buildings of Significance

The 'other' claim to fame associated with The Australian Hotel can found on the small plaque located on the side of the pub.

This plaque commemorates the murder of John William Manners on the night of June 8th 1956. He was shot outside the pub after an altercation with a fellow drinker, George Joseph Hackett. Hackett was detained but later acquitted of the murder due to lack of evidence. No gun was ever found and no witnesses ever came forward.

The Mercantile Hotel: Yet another Tooth & Co built public house dating from 1915 and is today listed on the National Register of Historic Places. The building is a fine example of federation free style architecture and was designed by Tooth & Co's resident architects Spain and Cosh.

Now part of the hotel, No 27 George Street was originally a shop and a separate premises, having served as a light refreshment room, a mixed business and café in its time. From 1963-1989 Marine Specimens Pty Ltd ran a Shell Shop, providing a library and reading area on the first floor, and from 1968 it became = a meeting place for the Malacological Society (Malacology is the branch of invertebrate zoology which deals with the study of the Mollusca (mollusks or molluscs). The hotel didn't take over the shop until 1989 when the upstairs was made into accommodation, and in 1993 the downstairs shop was finally incorporated into the hotel proper.

The Pissoir

Directly under the Bridge in George Street, is Sydney's last remaining and still fully functioning, Pissoir. Made around 1880 this was originally located on Observatory Hill but later was removed in 1971. After being offered to museums and historical societies as an antique it was finally relocated to George Street in 1975.

NB: Please do not stage above the Pissoir as this is still a fully functioning public toilet

The last remaining and fully functional Pissoir located directly under the Bridge along George Street.

The Rum Rebellion

From 1792 to 1810 the military force in Sydney was comprised of a specially raised unit called The New South Wales Corps; however they came to be known primarily as The Rum Corps, though they had a number of other nicknames, Botany Bay Rangers, The Rum Puncheon Corps and quite fittingly as it turned out, The Condemned Regiment. The Rum Corps came from the monopoly that they enjoyed in the buying and selling of that most precious commodity of the day, rum. On the 6th August 1806 the new Governor of NSW, William Bligh, arrived in Port Jackson. Having survived the now infamous “Mutiny on the Bounty” episode in 1789 Bligh was seen as an extremely hot-tempered man who swore frequently and was infuriated by any incompetence he saw in his staff. He soon determined that the officers of the Rum Corps were concerned more in their own personal interest and financial gain than they were for the safety and security of the new colony. He noted that many of the small independent and non-military farmers were being discriminated against when trading within the colony. Bligh was determined to address the problems and soon came into conflict with the Corps officers, despite the fact that he was only exercising his legitimate authority as Governor.

The conflict came to a head on January 26th 1808, when troops, led by Lt-Col. George Johnston, arrested Bligh and took over control of the Colony. Many Bligh supporters were also arrested, and some were destined to spend the next two years in convict work gangs.

This incident has now taken its rightful place in Australian folklore as Australia's first and only military coup. The NSW Corps itself remained in control of the colony until 1810 when the British government sent a new Governor, Lachlan Macquarie, along with his own regiment of troops and succeeded in finally disbanding the NSW Corps, and it was sent packing back to England.

Why Rum?

The reason why rum itself became so important in the early days of colonisation was the shortage of money. Only small amounts of legal coinage were brought out with the first fleet and other means of exchange were needed to do business. Rum was in good supply and soon became the chosen method of exchange.

The coins that the original settlers did bring with them were mainly the George III two pence, also called the 'Cartwheel Penny' because of its size. In 1812, in order to relieve the problems caused by the lack of coins, and the reliance on rum instead, Governor Macquarie bought Spanish dollars from India. He then had holes cut in them to discourage exportation. These well known Australian coins were suitably named the 'Holey Dollar' for the larger part of the coin, while the piece cut from the middle was called the 'Dump'. Declared legal tender on September 30th 1813, the 'Dump' was worth about 15 pence, while the Holey Dollar was valued at 5 shillings sterling.

On 12 May 1810, Campbell sailed to England to appear as a witness for Governor Bligh at Lieutenant-Colonel Johnston's trial.

When Campbell returned to the colony in 1815 he found his house, goods and lands mortgaged and his business irreparably encumbered with legal responsibilities.

Despite continuing liabilities, Campbell had rebuilt an imposing mercantile business by the 1820's. In 1826, Campbell admitted his two eldest sons to partnership in the re-established Campbell & Co. and was once again prominent in public affairs.

In 1830, Campbell was one of six who petitioned the King for the abolition of the Transportation Policy to New South Wales and encouraged free immigration.

In 1825, he was given 4000 acres in the newly discovered Limestone Plains area in Argyle County, the site of present-day Canberra, which he called Duntroon and stocked with sheep.

Campbell supported the petitions which lead to the establishment of Sydney's, The King's School in 1832 and became increasingly involved in the Church of England in his later years. Campbell died at Duntroon on the 15th of April 1846, and was buried at St John's Anglican Church, Parramatta.

The Rum Corps

The Rum Corps was raised in England in 1789 and was disbanded as a Corps in Australia in 1808 to become the 102nd Regiment of Foot. In 1810 the corps returned to England and became the 100th Regiment of Foot Royal Dublin Fusiliers, finally disbanding in 1818. The corps saw service in Sydney, Newcastle and also Tasmania. Originally their role was to relieve the troops who had arrived with the first fleet. Under the command of Major Francis Grose, later to become Lieutenant Governor of New South Wales.

Due to their role and remoteness they were largely comprised of paroled prisoners, ex-convicts and general ne'er-do-well. Even the officers themselves were offered only half pay for their services.

The only action the Corps saw whilst in NSW was on the 4th of March 1804 at the Battle of Vinegar Hill, when 266 Irish rebels, working on a government farm at what is now Castle Hill, rose up in arms (stolen) and planned to attack Parramatta. After a forced overnight march 29 members of the Corps joined forces with 50 local militia and set after the rebels who were by now headed for Windsor, where they were eventually engaged. The ringleaders were taken hostage and the revolt was quickly put down.

People of the Colony

Billy Blue

William Blue, born around 1766 in New York (the exact date is unknown), was sentenced to seven years transportation for stealing sugar. He was employed as a 'lumper', the lowest paid labourer whose job it was to unload the cargo ships on the Thames at Deptford, London. Most were carrying cargo from the West Indies, including sugar and cocoa. It was common practice that some cargo would be stolen and for the workers this was seen as an element of their wages. 'Spillage' as it was called was estimated at about 2% of the total cargo, anything more was considered as plunder. On 26th September 1796 Billy Blue was discovered to have carried off a 20lb (9kg) bag of sugar from the ship, Lady Jane Halliday, not once, but 4 times, (it is thought that he stole these for his chocolate-making business). Sentenced on the 4th of October 1796 Billy spent 5 years on prison hulks before leaving for NSW on board the 'Minorca' in 1801. When released from his sentence he showed initiative and tenacity in earning his living.

In 1804, Blue was living in The Rocks area of Sydney, then quite a disreputable part of town, with a woman named Elizabeth Williams, a fellow convict having arrived aboard the female transport ship, Experiment on 24th of June 1804. They were married at St Phillips Church on 27th of April 1805 and their first daughter Susannah was born on 23rd March 1805.

On 31st July 1805 Billy Blue was on the harbour where he worked by servicing the crews of waiting ships with fresh food, when

he sensed something wasn't right at his house, which he could see from the harbour. He returned to find his wife claiming she had been raped by a fellow convict and neighbour named Daniel McKay, a spirit retailer, and also the town jailer with a fearsome reputation as a hard man. McKay denied the charge and through his influence threatened Billy Blue with jail. The case against McKay was dismissed but for McKay the damage to his reputation and standing in the community was fatal. Many saw Billy Blue's defence of his wife's honour as a stand for moral integrity. One such person was none other than the new governor of NSW, William Bligh. Bligh looked favourably on Billy Blue and immediately had McKay incarcerated in on of his own prisons. The reason given was "out of motives of humanity".

Billy Blue had found new fame and standing and by 1807 Blue had acquired a new row boat and became a harbour 'Waterman'. An advertisement appearing in the Sydney Gazette of 2nd August 1807 read: "William Blue respectfully informs the public that he being the only Waterman licensed to ply a ferry in this harbour, they will be accommodated with a tight and clean boat, an active oar and an unalterable inclination to serve those who honour him with their command (sic)".

Blue was also known for collecting and selling oysters as well as almost anything he could find that was saleable. Pictures portray him with a bag over his shoulder. The bag was also mentioned in his obituary as being, 'never empty when he returned home…'

Blue was a very colourful character. His escapades epitomized what had come to be regarded as the Australian virtues of independence; tenacious defence of personal rights against the authorities and, loyalty to his mates.

A Change of Governors

Captain William Bligh, who had survived the mutiny of the Bounty to become Governor of the Colony, had been trying vainly to put an end to the traffic in rum. Many army officers and landowners had become wealthy, trafficking rum. On 26th January 1808, nineteen years after the Bounty mutiny, Bligh was arrested and disposed as Governor by Major Johnston who acted as Governor in his place.

In fear of future punishment for his part in the rebellion, Johnston handed authority to Lieutenant-Governor Foveaux, who held the position until the arrival of the newly appointed, Governor Lachlan Macquarie.

Blue's name appeared among the 150 signatures of the reputable citizens who backed Johnston in arresting Bligh, however this was without doubt a forgery as he was completely illiterate and could only sign with his own mark. The name itself was written in good English under the name of William Blue. In all likelihood this was done without his knowledge, let alone his consent. In appearing to provide this support, Blue had unwittingly done himself a good turn as Governor Macquarie proved to be a great benefactor. In his diary, Macquarie spoke of being regularly rowed by Blue.

Macquarie also entrusted Blue to row his only child, young Lachlan, around the Harbour.

On the 17th of August 1811, Blue was appointed, 'Watchman of Heaving Down Place. To have charge thereof, reside near it and be answerable for such articles as are put in his charge by the Harbour Master." He was sworn in as and invested with the powers of a Constable. Although not a lucrative position, it increased Blue's status and provided him with a small, hexagonal house standing in what are now the grounds of Government House.

In 1817, Governor Macquarie granted William Blue, 'his heirs and assigns, to have and to hold forever', over 80 acres (32 hectares) of land lying in the district of Hunters Hill. The area was known as Murdering Point, but became subsequently referred to as Blue's Point. This included all the land south of the present day, Union Street. He named his property, 'Northampton' Farm and was soon residing there with his family. The grant contained the proviso that 18 acres of the land must be cultivated or the land would revert to the Crown. Billy Blue was, however already the owner of another 80 acres already given to him by Macquarie in April 1814. This area is thought to be at Millers Point.

Billy Blue was appointed Ferryman to the north side. Macquarie had inherited from Bligh the problem of the illegal rum trade. The north side of the Harbour provided many hidden bays where grog could be landed and then conveyed to the settlers at Hawkesbury and further north without passing through the city. Macquarie specifically set Blue to watch for smugglers and was reported to have jokingly said, "You watch them, Billy, and I'll watch you".

Despite his fame and fortune Billy Blue was soon subject to temptation and on the morning of 10th of October

1818 he was arrested for smuggling 120 gallons (546 litres) of rum. This caused huge embarrassment as Blue was a serving constable of the crown, and one entrusted to put an end to this trade. Blue steadfastly refused to give the names of those who were organizing the illegal rum trade. It is quite possible that the ringleaders themselves were none other than the rich and wealthy of Sydney and who would be also be the very ones charged with trying Blue, hence his silence was perhaps an act of self preservation?

Billy Blue was not sentenced to jail though he was evicted from his house. He maintained both his lands and his ferry service and eventually regained the favour of his friend, Governor Macquarie.

After Macquarie was recalled to England in February 1822 Billy Blue's fortunes began to wane, and by 1827 and the father of six children, he was seen mostly as an eccentric who wandered the streets of Sydney dressed in the tattered garb of a naval uniform, twirling his carved stick, which he was never seen without, and demanding to be referred to as 'The Commodore" by all and sundry.

The Old Commodore

Blue's rowing service between Blue's Point (originally called Warungareeyuh) and Dawes Point was a distance of 712 yards. When Blue's service increased from 1 boat to 7, Macquarie reportedly exclaimed, "Why Billy, you have a regular fleet! I'll have to name you Commodore." This pleased Billy Blue and he adopted the name from then on. However, there is another explanation for this name being given to Billy Blue and it goes right back to his early days in Deptford, London. In a report in the Sydney Gazette of 25th October 1832, Blue himself suggests that the nickname predates his arrival in Sydney and in fact dates from the time he was in charge of an old hospital ship called The Enterprise at Tower Hill, London in the 1790's.

Both accounts are interesting in their own right and either or both can be told as fact. The truth of either should, however, not be avowed.

THE OLD COMMODORE

James Cook

James Cook was born on the 27th of October 1728, delivered into this world by the midwife, Ann Mainford, in the village of East Marton Yorkshire, UK. Officially called Marton-in-Cleveland, East Marton was a village in the North Riding of Yorkshire, which is now within the town boundaries of Middlesbrough, in the borough of Middlesbrough and the ceremonial county of North Yorkshire, close to the North Yorkshire moors. James was one of nine children born to James Snr and his wife Grace Cook (nee Mace), of which only four survived, John, James, Margaret and Christiana. His father, James was a Scottish labourer and went on to become a 'Hind' or farm manager at Ayton Hall, the sprawling property of Thomas Skottowe, not far from East Marton, where young James worked with his father on the farm until about the age of 13. It was Thomas Skottowe who initially saw potential in the young James Cook and arranged for him to attend a local village school at Great Ayton.

At 17 James was apprenticed to a shopkeeper in the village of Staithes, Mr William Sanderson, with a view to learning how to run the small family business. It was at Staithes, a seaside town, that the young James beagn his love affair with the sea, a view of which he had constantly from the door of the waterfront shop. After 18 months of shop keeping the young James decided for a more adventurous life and took up a three year apprenticeship in the Merchant Navy under the guidance of a Quaker coal shipper from Whitby, John Walker, the owner, with his brother Henry, of a small fleet of vessels plying the coal trade in England and Europe.

Having had the advantage of early schooling whilst at Great Ayton, James made light work of the finer points of mathematics and

navigation and spent the next two years ferrying coal to ports along the east coast of Britain and then further afield to various ports in the Baltic Sea. As an apprentice James would have received 4 shillings per month and "all found" as a salary for his services. The 'all found' meant his accommodation was included and he was housed with other young apprentices in the house of his Master, John Walker, in Grape Lane, Staithes.

Cooks first seagoing adventure was aboard the collier 'Freelove', ferrying coal between Whitby and London. After seeing service in the Baltic Sea trading routes until 1752 Cook once again served on another Walker Brothers vessel, the 'Friendship' where he served as first mate.

So impressed with Cook's seamanship Walker offered him the command of a coal carrier, but Cook declined the offer and instead in 1755 he volunteered to join the Royal Navy. Cooks name first appears in the Muster Roll of H.M.S. Eagle, under the command of Captain Hamar, on the 27th of June 1755, thus marking what was to become a long and successful association with The Royal Navy. He was listed as 'Masters Mate'. Hamar was later replaced by Captain Pallisar on October 1st 1755.

After serving for a further two years under two other captains Cook finally received his master's warrant and was promoted to master of HMS Pembroke in 1757, it was Cooks 29th birthday, though he had previously spent the past three months patrolling the Scottish coastline as master of the 'Solebay'. It was here on the 'Pembroke' that Cook was to serve under his fourth Captain, John Simcoe.

In 1758, HMS Pembroke crossed the Atlantic as part of Admiral Boscawen's fleet carrying over 14,000 troops to take part in the siege of the French fort of Louisbourg on Cape Breton Island., the town which guarded the entrance to the St Lawrence River. This was during the war between England and France over the disputed sovereignty of Canada. The Pembroke suffered badly on the crossing and was forced to remain in Halifax, Nova Scotia, for repairs while the rest of the fleet continued on to Louisbourg. Eventually, the Pembroke reached Louisbourg just as the fort surrendered.

It was during this voyage that Cook was to make the acquaintance the army engineer and surveyor Samuel Holland. Cook was given the opportunity to learn the art of surveying from Holland with Simcoe actively encouraging Cook's new found love of navigation. HMS Pembroke finally sailed from Halifax as part of the British fleet of almost 160 ships under the command of Sir Charles Saunders, and carrying General Wolfe, heading for Quebec, under the command of the French General, Louise-Joseph, Marquis de Montcalm. Sadly however Captain Simcoe died from pneumonia on 15th of May 1759 and the captaincy was taken over by Captain John Wheelock. The survey group on board HMS Pembroke is to this day still remembered in Canada where a lake in northern Ontario is named Lake Simcoe after John Simcoe. A river flowing into it is called the Holland River after Samuel Holland, while the place where it enters Lake Simcoe is called Cook Bay after James Cook.

After the fall of Quebec on 18th September 1759 Cook stayed on in Canada for a number of years in order conduct marine surveys, for which he was to make quite a name for himself. He did however return to England in the summer months and sail again for the Canadian winters of Newfoundland and Nova Scotia. Cook was the first to chart a hitherto notorious section of the St Lawrence River called The Traverse thus enabling the British Navy unparalleled access to Quebec. He later served as master of HMS Northumberland and produced many charts of the Canadian coastline for the British admiralty. Cook was paid the princely sum of £300 per annum by the Admiralty and in addition, Lord Colville, whose flagship the 'Northumberland' was, paid Cook an extra £50 for his "indefatigable industry" in steering the fleet through the uncharted waterways of the St Lawrence River.

Cook returned to England and on the 21st of December 1762 he married Miss Elizabeth Batts at St Margaret's Church in Little Barking, east of London. She was the daughter of Mary and Samuel Batts who ran Bell Alehouse at Execution Dock in Wapping. They had six children. There is little else known of Cooks private life as many of his personal papers and diaries were destroyed by Elizabeth just prior to Cook's death, apparently on the wishes of Cook himself, however we do know that they moved first to Shadwell in the east end of London before Cook eventually purchased a property at 7 Assembly Row, in Mile End Old Town, again in what is now east London. Cook fathered six children, James, Joseph, Nathaniel, Elizabeth, George and Hugh. Only three survived to adult life, James, Joseph and Nathaniel.

Cook returned to Canada where over the next five years he charted and surveyed both Newfoundland and Labrador, being in command of the 68 tons schooner 'Grenville'.

On the 15th of October 1766, Cook observed a full eclipse of the sun. at the Burgeo Islands, south of Newfoundland.

Cook would later combined the information he gathered in Canada with information that had been gathered at Greenwich by other observers, and was finally able to deduced the longitude of his observation location. Determining longitude was extremely difficult at the time and when his methodology was finally published in 1767. It had far-reaching consequences for Britain and seafaring in general.

In 1768 Lieutenant James Cook was commissioned by the Royal Navy to sail to Tahiti where he and a group of eminent scientists,

most notably the ship's astronomer Charles Green, were to witness the Transit of Venus, a phenomenon predicted in 1716 by the Royal Astronomer Sir Edmund Halley. He predicted that this would occur in 1769 and would not do so again until 1874. In March 1768 the Secretary of the Admiralty purchased a Bark and renamed it the Endeavour. Why HMB and not HMS? In the 18th century, ships were classified by their hull shape. A ship with a flat bow and square stern was called a bark. If the ship didn't fit any category and its captain's rank was lieutenant, this ship was also classified a bark. Cook himself mostly referred to the original ship as "His Britannick Majesty's Bark".

HMB Endeavour was originally a merchant coal collier and was built in Whitby, North Yorkshire. She was launched in 1764 as the Earl of Pembroke and was purchased by the Royal Navy in 1768 for £2,840. 10s. 11d. She had a crew of 85 men, including 12 marines. She also carried a party of naturalists and artists under the patronage of the wealthy botanist, Joseph Banks.

Cook undertook this voyage with a second, secret set of instructions - to search for the great Southern Continent believed to be positioned somewhere in the vicinity of latitudes 35 and 40 degrees south. The land had appeared on various European maps as early as 1569 and was usually referred to as 'Terra Australis Nondum Incognita', though the concept of a great southern land can be traced as far back as the famous Greek cartographer Ptolemy. Its existence owed much to the belief that it was an essential landmass need to counter balance the known landmasses of the northern hemisphere. It was also generally depicted on renaissance maps as being located around the South Pole and being a larger continent than Antarctica, spreading as far north as the Pacific Ocean region.

Cook left Plymouth in August 1768 bound for Tahiti where she remained for three months observing the transit of Venus. The Endeavour left Tahiti and sailed for New Zealand where Cook spent a further six months surveying and mapping the coastline.

Cook sailed west and at 6 a.m. on the 19th of April 1770 land was sighted; Australia or New Holland as it was referred to at the time. The first of the crew to sight land was Lieutenant Zachary (Zachariah) Hicks a 29 year old officer of the watch from Stepney, east London. In his honour Cook named the point of land Point Hicks, later Cape Hicks and even later changed to Cape Everard. Its former name of Point Hicks was finally reinstated in 1970. Today Point Hicks is home to the Point Hicks Lighthouse which was built in 1887-88, and was first lit in May 1890.

The Endeavour sailed north following the coastline until the 21st April when smoke was seen and confirmed that the land was indeed inhabited. On the 22nd April more smoke was seen and the peoples of the Yuin tribe were spotted on the beach. The question that concerned Cook was not that the land was inhabited but did the inhabitants own the land, or merely just occupants of it?

Cook made one attempt to land at what is now Bulli, the land of the Eora tribe but decided to sail along the coastline further still, looking for a suitable place to berth the Endeavour.

At first light on Saturday 28th of April 1770 Cook sailed into a wide bay known to the local Aboriginals as Kamay, but which Cook later named Stingrays Bay or Stingray Bay. It was later called Botanist Bay and eventually came to be known simply as Botany Bay. Stingray Bay was originally so named for the large amount of stingrays both observed and caught by the Endeavour's crew. The name Botany Bay came about at the recommendation of the ships botanist Joseph Banks, a scientist on the Endeavour who was astounded by the sheer variety of new plants he discovered in the area. Cook would also recommend Botany Bay as the site for a penal colony upon his return to England.

Anchored on the southern shore of the area known locally as Gwea the Endeavour stayed for nine days. Cook was to name this place Kurnell. One theory for the name comes from a deviation of an Aboriginal word "collonel". The jury is still out on this theory though.

Kurnell and the landing of Cook's Endeavour also holds another distinction in the history of European settlement of Australia, for it is also the site of the first European generally acknowledged to have died in Australia. Forby Sutherland, according to Cook's journals, died and was buried on May 1st 1770. He is thought to have most probably died of consumption, or tuberculosis, (or simply TB). It was commonly called Consumption because it seemed to consume people from within, with a bloody cough, fever, pallor, and long relentless wasting. There is also the theory that he died in a battle with aboriginal tribesmen in Kurnell. Either way, Cook named Point Sutherland after Forby Sutherland. Since then has come about the area now known as Sutherland Shire.

Cook is not now generally believed to have been the first European to have set foot on the Australian continent. Many believe that this honour goes to the Dutchman William Janszoon who is thought to have landed in the Gulf of Carpentaria on On 26 February 1606, having sailed from the Netherlands on the Duyfken.

Cook left Botany Bay and headed north, never having seen Sydney Harbour. This honour was to fall to his successor Captain

Arthur Phillip in 1788.

The rest of Cook's journey back to England is well known; his running aground on the Great Barrier Reef and seeking shelter and repairs in Cooktown in June 1770. He finally returned to England, landing on the 12th of July 1771 after a journey lasting three years. It was at an audience with the king that Cook was officially made the rank of captain and given command of H.M.S Scorpion, the Endeavour having been refitted and was already on its way south to the Falkland Islands.

Cook was to make his third and final circumnavigation of the globe aboard H.M.S Resolution, sailing from Plymouth on the13th July 1772.

Cook was killed on the morning of the 14th of February 1779 on the beach at Kealakekua Bay, Hawaii.

A Quirk of Fate

There is 230 years between Cook's first arrival in Australia not that far from the Sydney Harbour Bridge of today, but what could possibly link the two?

As all good climb leaders know, there are two types of steel used in the construction of the Sydney Harbour Bridge, carbon and silicon, and all will be aware of the fact that the majority was silicon steel from Dorman Long and Co's own foundry in Middlesbourgh UK. Much of the iron ore used to make this very same silicon steel was dug from mines running under the very house that James Cook was born. A beautiful and fitting coincidence.

Evidence suggests Australia has been inhabited by people for 50,000-120,000 years. The first immigrants, ancestors of the Koori people, arrived by watercraft from islands north of the continent.

During the 17th Century westerners frequently visited the western and northern coastlines of Australia. The first ship and crew to chart the Australian coast and meet with Aboriginal people was the Duyfken captained by Dutchman, Willem Janszoon on 26th of February 1606.

It wasn't until the 22nd of August 1770 that Europeans, led by Lt James Cook in the Endeavour first chartered the NSW coastline. Assuming Australia to be terra nullius (land belonging to no one), the Europeans claimed the whole of the east coast for King George III on the 29th April 1770 at Possession Island, off Cape York Peninsula.

The Cook coat of arms was granted to Cook's widow by King George III. The motto reads: He left nothing un- attempted'

Captain Arthur Phillip

Arthur Phillip (1738-1814), was born on 11 October 1738 in London. He served for four years from 1771 to 1775 in the merchant navy and was made a lieutenant, later transferring to the Royal Navy and serving in the Seven Years War and saw action in the capture of Havana in 1762. With the advent of peace Phillip provisionally retired from the navy in April 1763 on half pay.

Phillip served only periodically in the Royal Navy over the next fifteen years, most notably between 1770 and 1771 on HMS Egmont. In 1774-78 Phillip served with distinction in South American waters where he was made a captain in the Portuguese Navy, which he entered with the Admiralty's permission after the outbreak of the Spanish-Portuguese war. While in the Portuguese navy he was charged with the transport of Portuguese convicts from Lisbon to the Brazil, and was seen as a brave, honest, obedient and self-sacrificing officer. It was this experience that proved invaluable when the British government were seeking a reliable captain for its transports of convicts in the first fleet to Australia in 1788, and the later decision to make Phillip Governor of NSW, although there were those, most notably Lord Howe, who had reservations about the appointment, not believing that Phillip was the person best suited for the position. His farming experience, gained during his years of semi retirement, might well swayed the decision as it was considered essential that the convict population become self sufficient as soon as possible, though the actual truth behind the final decision remains somewhat of a matter of debate still. However, the mere thought of returning to active had Phillip jumping at the opportunity.

He returned to the Royal Navy in 1778. He served on both HMS Ariadne and HMS Europe on the England to India route. He saw no action on either ship and again retired on half-pay on 25 May 1784. Phillip was of the belief that no matter what the situation in the new colony, the foundation of the great British empire should not be founded on the backs of convicts and ne'er do wells, and he vowed that the officials, soldiers and freemen of the colony remain apart from those condemned to servitude.

Phillip's intention was to reform and discipline the convicts, but in a fair and humane way, which in many respects was at odds with the puritanical and overt religious doctrines of the age which aimed mainly at redemption of the soul, no matter what the cost.

After initially landing at Botany Bay on 18 January 1788, Phillip was forced to seek more fertile land and three days later discovered Port Jackson, which he finally relocated to on the 26th January, thus becoming the colony's first governor.

When he first sailed into Port Jackson he is supposed to have said of the sight before him "I have found the finest Harbour in the world capable of sustaining at safe anchorage, a thousand ships of the line. What is meant by 'ships of the line'? Ships of the line were the main British battle ships used in conflicts and battles. They ranged from huge ships of 120 cannon to small gunboats carrying 8 cannon. Probably the most famous of these ships was Horatio Nelson's HMS Victory, which carried almost 100 cannons. It flew his flag at the battle of his famous battle at Trafalgar, in 1805.

These ships were 'rated' according to their size and firepower. The biggest 'rate' being , being around 200 feet long, carrying 100 cannon on three decks, and had crews of around 800 men. Most ships of the day carried elaborate colouring and fancy artwork, however as this was similar for most nations this made distinguishing friend from enemy in the midst of battle very difficult indeed. To counter this; the idea of 'colouring' was agreed to by the most powerful of European navy's of the day.

England - had a black hull, with a yellow stripe along the gun deck, black gun ports
Spain - had black stripes with red gun decks and black gun ports.
America - used black hull with a white stripe on the gun deck.
France - and the lesser powers left their ships natural as they preferred the traditional ways

Captain Phillip's powers as Governor were absolute, as was decreed by the British government in orders he was given prior to departure on 13th May 1787. Phillip remained Governor of NSW for five years.

During the first years of colonisation times were hard and Phillip was determined that the convict population made the best use of their time and skills. He instigated the farming of land, first in what is now known as Farm Cove and later in Parramatta and Toongabbie. It was slow progress and by 1791 only a mere 213 acres were producing crops and the total number of farm animals in the new colony amounted to a mere 126 head, many having been killed for food or had strayed into the bush land, never to be seen again.

One of Phillip's main convictions as a humanitarian was his attitude towards Aboriginals. He would not tolerate the ill treatment of the indigenous peoples and sought to establish friendly and harmonious relations amongst both the convict and aboriginal populations.

Phillip envisaged a harmonious relationship with the local peoples, going so far as to hope that some may even chose to live with them in the new settlement. However this wasn't the case and after two years Phillip ordered the capture of a young aboriginal man called Arabanoo. Sadly Arabanoo died in April 1789 as the result of an epidemic of what is most likely to have been smallpox.

It was during the epidemic that two other aboriginals were brought into the colony, Nanbaree and Booroong. Both stayed and survived the epidemic and went on to become both informants and communicators between the Europeans and the local indigenous peoples.

Phillip later captured and befriended two local inhabitants, even though both men did escape shortly after capture though not for long. Benelong and Colebe and took great pains to both learn their customs and teach them the ways of the European settlers.

Ben-nil-long engraving by James Neagle (1760-1822).

Those found to be abusing their power in any way were severely punished in an attempt to remain on good terms with the locals. Despite himself being injured by a spear during an incident at Manly in September 1790, Phillip showed great restraint and tolerance.

It was eventually this incident that brought about Phillip's decision to return to England on 11th December 1792. He required medical attention for the severe pain he suffered constantly. Despite his intention to return to Australia, Phillip's health became a major issue and he was forced to resign his commission on 23rd July 1793.

By 1796 his health had recovered and he returned to active naval service. He commanded a number of ships before being given the task of securing the Hampshire coastline against the perceived attack by Napoleon. In January 1799 he was promoted to the position a rear admiral and charged with the defence of the entire coastline of England. He did this until his retirement in 1805.

Captain Arthur Phillip died on 31 August 1814. He is buried in Bath at St Nicolas Church, Bathampton.

Francis Greenway

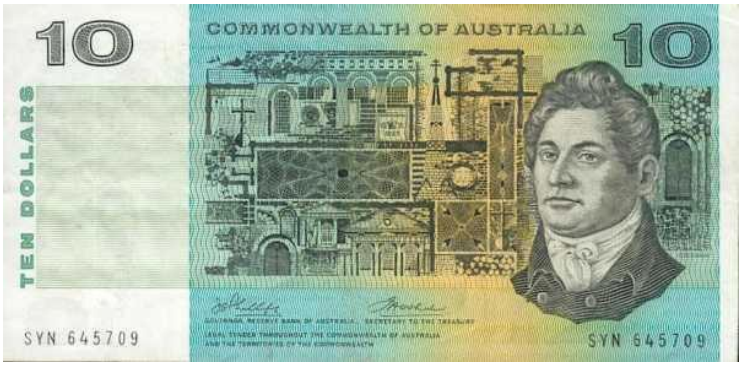
Francis Howard Greenway was born at Mangotsfield, near Bristol, England on the 20 November 1777 and grew up to become a gifted architect in the Bristol and bath areas of South West England. After a period of success he was made a bankrupt in 1809. In 1812 he was charged with the forgery, for which he pleaded guilty, of a financial document and was sentenced to death. This was later commuted to 14 years transportation to the colonies. Greenway arrived in Sydney in February 1814 on the transport

ship General Hewitt, and was followed in July of that year by his wife Mary, whom he had married in 1804, and their three children aboard The Broxbornebury.

Greenway was fortunate in that whilst he was working in Bath he had befriended the now with Admiral Arthur Phillip who was living in retirement at Bath. It was Phillip who wrote to the Governor of the day, Lachlan Macquarie recommending Greenway to him as an architect for the colony. His first assignment was the design of a geometric staircase for Ultimo House.

It was between 1816 and 1818 that Greenway was responsible for the design and construction of the Macquarie Lighthouse (see above). The success of this building brought Greenway instant reward and he was emancipated, given his freedom) by Governor Macquarie, and given the position of acting civil architect and assistant engineer to Captain J. M. Gill, the then inspector of public works.

Greenways finest architectural achievements include Hyde Park Barracks, the Government House, which had been originally built under the direction of James Bloodsworth, a convict builder who was responsible for many of the colony's early buildings between 1788 and 1800, and what is considered to be Greenway's seminal masterpieces, St. James Church, Sydney and St Matthew's Church, Windsor. (Government House was later redesigned and rebuilt by Edward Blore: see above).



There are still 49 buildings in central Sydney which can be attributed as being designed by Francis Greenway. Greenway was known to be a difficult and somewhat arrogant man and had many disagreements with the Governor Macquarie over charges he was accused of making whilst as a government employee. He opened his own architectural practice but soon ran into financial difficulties. His wife, Mary, opened a school for young ladies in an attempt to supplement the family income and he was granted 800 acres on the right bank of the Hunter River, though he still maintained that he should have been entitled city land and not pastoral land. Plus, he argued, he was also entitled to cattle, which were not forthcoming. He was dismissed as the government architect by the next governor, Thomas Brisbane, in 1822.

A lot of what we now know of early colonial life we owe to Greenway who published his Australian Almanac of 1835.

He continued to farm his land but without much success. He died in 1837 and was buried in a small cemetery in a lonely paddock outside East Maitland. There is no tombstone or marker over his grave.

In a fate of irony Greenway's face was shown on the first Australian decimal-currency $10 note in 1966, making him probably the only convicted forger in the world to be honoured on a banknote.

Sydney Town Hall

The idea for a municipal building for the ever growing population of Sydney can be traced back as far as Governor Lachlan Macquarie in 1813; however, it wasn't until the passing of the Sydney Incorporation Act in 1842 that Sydney was officially recognised as a township. The search was then on for a suitable meeting place for the civil dignitaries and it was decided that the old burial grounds in George Street would be the perfect spot.

The area was once cultivated by a certain Captain Shea of the Marines and in which, at his own request, he was duly buried, in 1789. It was then used as a cemetery between 1793 and 1820, however by the 1840s it had become an eyesore and a health hazard. In all it is estimated that some 2,000 burials took place in the cemetery.

To mark the occasion, and to promote the importance of the site, HRH Prince Alfred, Duke of Edinburgh, on the first ever Royal visit to Sydney was invited to lay its foundation stone on 4 April 1868, although at the time neither had permission been given for a Town Hall to be built, nor had plans for any such building been drawn up.

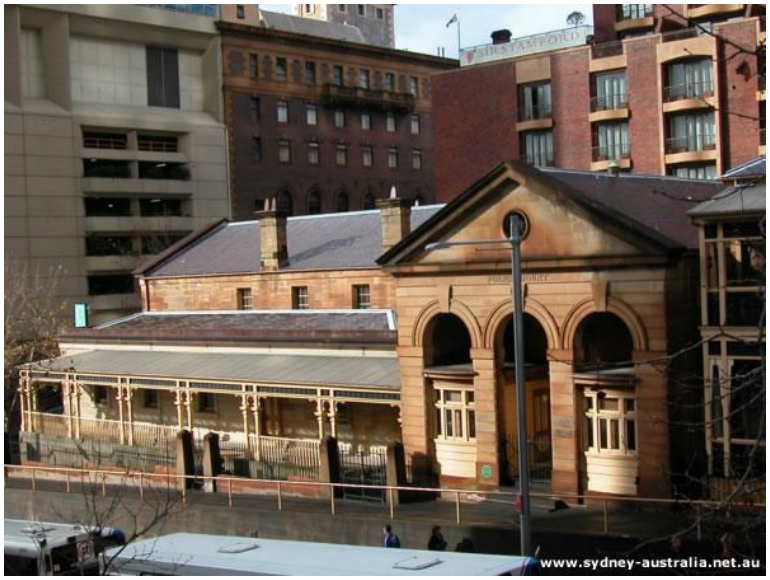
The new Town Hall was eventually built suing honey-coloured 'yellow block' sandstone quarried from nearby Pyrmont between 1868 and 1889. It was designed by the Tasmanian architect J.H. Willson and was modelled on Philadelphia's Second Empire-style City Hall. This style of design was very popular during the Victorian Era and the two buildings are remarkably similar. As the Sydney Harbour Bridge has the nickname "The Iron Lung" or "The Coathanger", so too the Town Hall was once nickmaned "The Wedding Cake Building".

The Town Hall was among the first buildings in Sydney to feature Australian flora as architectural decoration and these are clearly distinguishable in its magnificent stained glass windows. In addition there is also the famous Captain Cook window.

Over the years recent renovations have uncovered even more graves, most notably the vaults found in 1974 and 1991.

The Justice and Police Museum

The Justice and Police museum is located on the corner of Phillip and Albert Streets, Circular Quay and is owned by the Historic Houses Trust.



Originally (1840's) the police and the water court were to be found in the Rocks with the police housed in Cadmans Cottage from 1846, and the court housed in Cumberland Street at the Watchhouse from 1841. As the premises became inadequate for the needs of an expanding community the decision was made to re-locate the courthouse to new premises on the edge of the Domain in 1851.

The colonial architect of the day, Edmund Blacket, was charged with the design of the new courthouse and adjoining offices.

The building was started in 1853 and the sandstone used in construction was brought up from Bennelong Point. The completed building was opened in 1856.

The design of the courthouse was to become a familiar sight in the new colony as it was adopted as the standard design for most, if not all, future courthouses.

The officer put in charge of administering justice was Lieutenant Samuel North. Whilst the courthouse now had anew home, the actual prisoners themselves were still to be found incarcerated in the old Watchhouse in the Rocks as the new lockup itself was still not complete as of 1856. It wasn't until 1858 that this was finally completed as a two storied building comprising officer's quarters on the second level, with offices and cells below.

The new water police station was designed by another colonial architect, Alexandra Dawson, and the sandstone used was this time brought over from the new quarries being mined at Pyrmont. In 1875 additional cells were added and in 1879 a small cottage facing

Albert Street for the use of the court house keeper was also added.

Due to the increased volume of work, and an ever growing population, a further court was added to the expanding complex in 1886, with yet another colonial architect adding his name to the list, James Barnet.

By the 1890's the entire complex comprised of a charge court, a summons court with room for four stipendiary magistrates along with 20 or more court staff, a police station complete with offices, charge rooms, four cells and accommodation for residential officers. As many as 60 prisoners were processed each day.

The water police remained at the Phillips Street offices until 1913 when they were re-located to Dawes Point, and the complex became a general police station.

In 1918 the Phillips Street courts were closed down only to be re-opened again as a traffic court in 1924. They finally closed as a working court in 1980 when the traffic courts were transferred to Castlereagh Street. The building they occupy is the former Mark Foy's department store.

The Phillips Street police station remained until 1985 when operations were eventually transferred to the newly opened Rocks Police Station in 1985.

Surf Lifesaving

Sydney Harbour has many beaches and pools along its 317 kms of shoreline. These include, Nielson Park, Clifton Gardens, Balmoral, Clontarf, Quarantine Beach, Balmain Pool, Camp Cove and Lady Jane beaches. Some of these have shark nets.

Sydney is famous for its surf beaches and from the summit of the SHB you can clearly see the location of two of our most famous; Bondi and Manly.

Swimming became popular from the 1880's but was actually illegal between the hours of 0600 and 1900. Morality rather than safety was the issue. Swimming activities were segregated by gender and bathing suits covered from neck to knee.

In September 1902, William Gocher decided to protest against these laws and declared publicly that he would swim in the surf at Manly at 12 noon. He did and was arrested upon exiting the water. No charges were laid and the popularity of surf bathing quickly grew, leading to a change in the laws that same year.

Dangers of the surf quickly became evident and small volunteer groups of regular surfers formed clubs to help. One of these groups at Bondi became the first formal surf life saving club in the world on 6th of February, 1906.

As the groups grew in numbers and size, it was also clear that a unified front was needed to raise funds and liaise with Government. Hence, the NSW Bathing Association was formed on the 18th of October, 1907. It quickly became a highly respected organisation in the community. Today this is known as, Surf Life Saving Australia.

More recognition came during the celebrations for the opening of the Sydney Harbour Bridge in 1932. A gala and surf carnival was included in official functions.

The hard work of lifesavers was best illustrated on Black Sunday 6th of February 1939 at Bondi, 32 years to the day since the foundation of the club. Freak waves pounded the beach and lifesavers rescued 300 people, including some of their own who were dragged out by those in distress.

To date (2007), approximately 500,000 people have been rescued. Surf lifesaving clubs remain volunteer organisations.

In 2007, the SHB turned 75 and SLSA turned 100. SLSA is in partnership with Australian Tourism to promote safety awareness to visitors.

Black Sunday

February proved to be a bad month for Sydneysiders and the sea. Within the same week that the Rodney was sunk in Sydney Harbour six people were also killed in the surf at Bondi Beach.

On the Sunday 6th February the crowd was in excess of 30,000 people when at approximately 3.00pm disaster struck. Three massive waves followed each other in quick succession and the backwash that followed dragged an estimated 300 off their feet and out passed the breakers.

A massive rescue operation took place and surf lifesavers from other clubs came to help. All in all about 80 surf lifesavers were involved, as were the police and ambulance officers. Of the 300 people involved 35 were retrieved unconscious from the water and sadly 5 people died.

The Longest Arch Bridges in the World

The Sydney Harbour Bridge is regarded as one of the world's largest and greatest steel arch structure for its combination of width, length, weight of steel, load bearing capacity and engineering prowess. However with regards to length, it ranks number 5 on the all time list.

The top 4 are:

Number One: The Chaotianmen Bridge

The two sides of the Chaotianmen Bridge met for the first time on January 25th 2008 and became the world's longest steel arch bridge at 1,721 metres (5,650ft) long with its main arch spanning 552 metres, 49 metres longer than the Sydney Harbour Bridge and 3 metres longer than the previous record holder, the Lupu Bridge in Shanghai. The A$328m bridge is double-decked, with six car lanes running along the uppermost level. The Chaotianmen Bridge is situated in Sichuan Province, China, and spans the Yangtze River. It is approximately
1500 km west of Shanghai in the town of Chongqing. According to some sources, Chongqing is the world's most populated and largest town with estimated 30million inhabitants in an area of 80'000 sq. km.

The Chaotianmen Bridge located in Sichuan Province, China is the world's longest arch bridge

Number Two: The Lupu Bridge

The Lupu Bridge in Shanghai, China, is the second longest arch bridge in the world

The Lupu Bridge is the second longest arch bridge in the world. It has a 550m long arch span. It is the first ever box-arch bridge in the world. The section area of the main arch also sets a record of 9m high by 5m wide.

The Lupu Bridge is also the first major arch bridge to be connected exclusively by welding (except for the single pair of middle sections which are joined by rivets). The length of on-site welding totals more than 40,000m.

There were two records set during construction: The heaviest lifting weight of a single component was 860 tons and the heaviest lifting weight over the arch rib in a river of 480 tons.

The total volume of steel used in the bridge is more than 35,000 tons. It equals the steel used in building three 70,000-ton vessels

The 16 horizontal staying cables used in the bridge are the longest (760 meters), thickest (18cm in diameter), heaviest (110-ton each) and with the greatest tension-pull tonnage (over 1,700 tons) in the world.

You can also climb this bridge too……just like us…!

Number Three: New River Gorge

The bridge was built by US Steel using Cor-Ten Steel. This type of steel accumulates a protective rust coating that prevents further erosion and gives the bridge a rusty look.

New River Gorge, located in West Virginia, USA

Number Four: Bayonne Bridge

The Bayonne Bridge spans the Kill Van Kull River to link Bayonne, NJ and Staten Island, NY.

Current toll at September:	2009: US$8.00 one way Total
Length of Bridge:	5,780 feet (1,762m) Width of
Bridge:	85 feet (26m)
Number of Traffic Lanes:	4 lanes
Width of Roadway:	40 feet (12m) Channel
Clearance of Bridge at Mid-Span:	151feet (46m) Height
of Arch above the water at crown:	325 feet (99m)

The Bayonne Bridge carries a load of 20,000 cars a day with four lanes for traffic. The bridge also incorporates a pedestrian walkway and a cycle way.

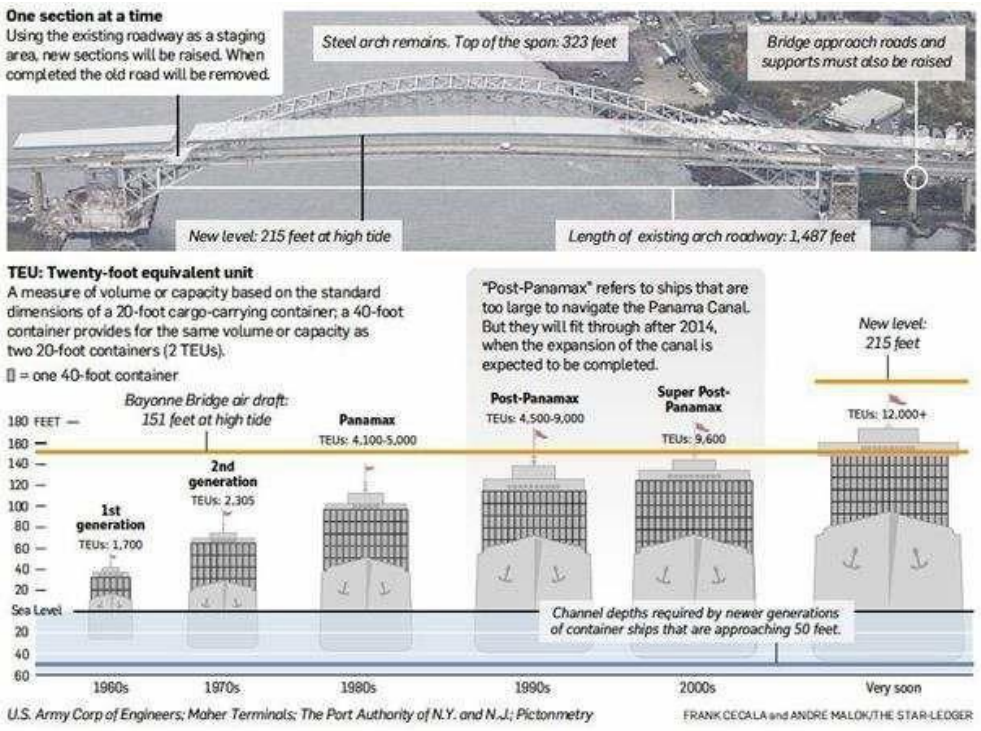
The steel abutments at either end of the bridge were to be encased in stone, but due to the economic constraints of the Great Depression, this project was never started.

In 1931 the Bayonne Bridge became the world's longest spandrel-braced arch at 503.5 metres (just 600 mm longer

than the Sydney Harbour Bridge).

Raising the Bayonne Bridge

On December 29, 2010, the Port Authority announced their "Raise the Roadway" scheme to provide the most effective solution to the Bayonne Bridge clearance issue — raising the bridge's roadway to approximately 215 feet to increase the existing 151-foot navigational clearance restrictions. The 64 feet (19m) of additional air draft will allow the Port of New York and New Jersey to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez and an expanded Panama Canal, to reach the port's main terminals. The project is expected to cost $1 billion and is expected to be completed by 2016.



A video for raising the bridge http://www.youtube.com/watch?v=lW5l6lFFXRU&feature=kp

Could this be the way forward for the Sydney Harbour Bridge of the future?

Other Significant Bridges Around the World

The Tyne Bridge: Newcastle UK

A 'Crescent' shaped, two hinged arch. It has no king posts, with the two chords being joined at the bearing.

Design by Mott Hay & Anderson, the contractor was Dorman, Long and Co. Ralph Freeman was consulted and made use of much of the investigation made for Sydney when designing the structural details and erection scheme of the Tyne Bridge.

It is commonly thought that the Sydney Harbour Bridge in Australia was based on the design for the Tyne Bridge; however this is not true as work started on the Sydney Bridge before they started building the Tyne Bridge.

The confusion is perhaps caused because the Sydney Harbour Bridge took longer to build due to its larger size. The Sydney Harbour Bridge finally opened in 1932, a full three years after the Tyne Bridge.

The Tyne Bridge in Newcastle, UK was first opened on 9 October 1928

In a way similar to the Sydney Harbour Bridge, plans for a crossing of the Tyne can be found as far back as the 19th century. It wasn't, however, until 1924 that plans to build the bridge we see today really took shape.

Work began in August 1925 and it took Dorman, Long and Co., Ltd just three years to complete the massive steel structure. The bridge was built in a fashion similar to that of building a ship, using shipbuilding techniques with rivets and panels which were welded together. The main span of the bridge is a steel arch, which takes the form of a lattice framework. At the time it was the largest single span bridge in the world, but then the record was broken by our very own Sydney Harbour Bridge, in 1932.

Whereas the granite for the Sydney Harbour Bridge came from Moruya, the granite for the Tyne Bridge came from Cornwall. The pylons were also designed as five story warehouses but were never completed.

Passenger and goods lifts were built into the towers to provide access to the Quayside

	Metric
Total length (including approaches)	389 m
Length of main arch span (pier to pier):	162 m
Rise of arch (above pins)	55 m
Clear Height (above high water level):	26 m
Total Height (above high water level):	59 m
Width (bridge):	17 m
Width (approaches):	24 m
Total weight of steelwork (arch only):	3,556 metric tones
Total weight of steelwork (inc approaches):	7,112 metric tones

Total coast of the bridge was £1,200,000

Hell Gate Bridge: New York USA

Spanning from Wards Island to the Long Island shore on the upper east side of Manhattan over a stretch of water known as the Hell Gate for its dangerous navigation, the Hell Gate Bridge was built to carry four railway lines; however it now only operates three lines. One railway track was abandoned in the 1970's. In 1996 it received a comprehensive repaint in "Hell Gate Red".

The Hell Gate Bridge of New York, USA first opened on 30 September 1916, spans an impressive length of 310m

The Victoria Falls Bridge: Africa

The Victoria Falls Bridge is an engineering feat linking Zimbabwe and Zambia. Sir Ralph Freeman was an assistant engineer on this project and together with another engineer G. C. Imbault; they pioneered the cable support system for building arch bridges later used on the Sydney Harbour Bridge.

Located just below the Victoria Falls, and completed in just 14 months, the Bridge made way for modern-day transportation and commerce to reach central Africa. Constructed from steel, the bridge stands 128 metres above the valley floor. The Bridge carries cars, trains and foot traffic and plays host to the world-famous, 111 metre Shearwater Bungy Jump.

The Victoria Falls Bridge connecting Zimbabwe and Zambia Africa opened in 1905. The total length spans 156.5 m

Golden Gate Bridge

The real "Golden Gate" is the strait that the bridge spans. It was first named "Chrysopylae," meaning "golden gate," by Captain John C. Fremont in 1846.

The Golden Gate Bridge was the longest span in the world from its completion until the Verrazano Narrows Bridge was built in New York in 1964. Today, it still has the seventh-longest main span in the world. A few Golden Gate Bridge facts to illustrate its size:

	Imperial	Metric
Total length (Including approaches)	8,981 ft	2,737 m
Middle span	4,200 ft	1,966 m
Width	90 ft	27 m
Clearance above the high water (average):	220 ft	67 m
Total weight when built	894,500 tons	811,500,000 kg
Total weight today (Weight reduced because of new decking material)	887,000 tons	804,700,000 kg

Towers:

- 746 feet (227 m) above the water.
- 500 feet (152 m) above the roadway.
- Each leg is 33 x 54 feet (10 x 16 m).
- Towers weigh 44,000 tons each (40,200,000 kg).
- There are about 600,000 rivets in EACH tower.

Golden Gate Bridge Facts: Construction Details

One of the most interesting Golden Gate Bridge facts is that only eleven workers died during construction, a new safety record for the time. In the 1930s, bridge builders expected 1 fatality per $1 million in construction costs, and builders expected 35 people to die while building the Golden Gate Bridge. One of the bridge's safety innovations was a net suspended under the floor. This net saved the lives of 19 men during construction, and they are often called the members of the "Half Way to Hell Club."

Steel Facts:

- Made in New Jersey, Maryland and Pennsylvania, and shipped through the Panama Canal
- Total weight of steel: 83,000 tons (75,293,000 kg)

Cable Facts:

- Two main cables pass over the tops of the main towers and are secured in concrete anchorages at each end. Each cable is made of 27,572 strands of wire
- There are 80,000 miles, (129,000 km) of wire in the two main cables and it took over six months to spin them
- Cable diameter (including wrapping): 36 3/8 inches (0.92 m)
- Cable length: 7,260 feet (2,332 m)

Lights:

- 128 lights are installed on the bridge roadway. They are 250-watt high pressure sodium lamps installed in 1972
- The 24 tower sidewalk lights are 35-watt low pressure sodium lamps.
- 12 light illuminate each tower, 400 watts each, and an airway beacon tops each tower

Golden Gate Bridge Facts: Traffic

- Average crossings: About 40 million per year, counting both north- and southbound crossings, compared to 33 million crossing the first year it was open.
- Fewest crossings: January, 1982, during a storm which closed U. S. 101 north of the bridge. On January 6, only 3,921 southbound vehicles passed the toll gates.
- Most crossings: October 17th, 1989, after the Loma Prieta earthquake, when Bay Bridge was closed. 162,414 vehicles (counting those going both directions) crossed the bridge that day.
- Total crossings: Through October 30th, 2002, the Golden Gate Bridge Highway District says

1,754,094,967 vehicles crossed the bridge.

- Closures: The Bridge has been closed three times for weather, for gusting winds over 70 mph. It closed briefly for visits by President Franklin D. Roosevelt and French President Charles DeGaulle. It was also closed on its fiftieth birthday.

Golden Gate Bridge Facts - Important Dates

May 25, 1923	The California state legislature passes a law creating the Golden Gate Bridge and Highway District
August 27, 1930	Joseph B. Strauss submits final plans.
November 4, 1930	$35 million bond issue approved by the six counties in the District, by a vote of 145,667 to 46.954.
January 5, 1933	Construction begins.
May 27, 1937	Bridge opens to pedestrians.
May 28, 1937	Bridge opens to automobiles. The toll was 50 cents one way, $1 round trip and 5 cents surcharge if there were more than 3 passengers.
February 22, 1985	The one-billionth car crosses the bridge. Toll is $2 southbound on Friday and Saturday, $1 on all other days. No northbound toll.
May 28, 1987	Bridge closed to vehicles for its fiftieth birthday. An estimated 300,000 pedestrians jammed the bridge.
September 1, 2002	Toll increased to $5 southbound. No northbound toll.

Golden Gate Bridge Facts - Paint

The Golden Gate Bridge's paint colour is orange vermillion, also called international orange. Architect Irving Morrow selected the colour because it blends with the bridge's setting.

The bridge was fully painted when it was first built and then touched up for the next 27 years. In 1965, the original paint was removed because of corrosion and replaced with an inorganic zinc silicate primer and an acrylic emulsion top coat, a project that took 30 years. Today, painters touch up the paint continuously. 38 painters work on the bridge, along with 17 ironworkers who replace corroding steel and rivets.

Tower Bridge: London

In 1884, Horace Jones and John Wolfe Barry started building Tower Bridge but Horace Jones died a year later. Barry continued and it took 8 years to build. 432 men were employed to build the bridge and over the 8 years only 10 men died which is quite exceptional as there were no health and safety rules back then. Two massive piers had to be sunk into the river bed to support the construction and over 11,000 tons of Scottish steel provided the framework for the Towers and Walkways, with 2 million rivets holding it all together. This was then clad in Cornish granite and Portland stone; both to protect the underlying steelwork and to give the Bridge a more pleasing appearance. The Prince of Wales opened Tower Bridge on 30 June 1894. The high walkways were originally completely open, i.e. no roof or windows. By 1910 they were closed as people preferred to wait at street level when the bridge was raised rather then heading up the stairs with heavy loads. On 28 December 1952, a number 78 double decker bus failed to stop as the Bridge began to rise. It just managed to clear the three feet drop to the other bascule. No photographs exit, but an artist's impression immortalized the event. In 1976, Tower Bridge was painted red, white, and blue to celebrate the Queen's Silver Jubilee (25 years as Queen) but the traditional blue and white colour dates back to 1894

When Tower Bridge was powered by steam it raised 600 times a year but now it is powered by electric motors it is raised about 1,000 times a year. Tower Bridge needs to lift to allow tall ships, cruise ships, naval vessels, and other large craft to pass through.

Tower Bridge Quick facts: Location:

London, England
Completion Date: 1894
Length: 880 feet
Type: Movable (bascule), suspension Purpose:
Roadway, pedestrian Materials: Steel, masonry
Longest Single Span: 200 feet
Engineer(s): Sir Horace Jones, Sir John Wolfe-Barry
Tower Bridge is the only moveable bridge of the 29 bridges that cross the Thames

Other Bridges of interest

Millau Viaduct, France	Largest tower of 7	343m
	Clearance to river	270m
	Width	32m
	Longest span	342m
Humber Bridge, UK	Tower height	155.5m
	Main span	1,410m
	Total length	2,220m
Forth Rail Bridge, Scotland	Tower height	100.6m
	Total length	2,528.7m
	Length of span	582.8m
	Total number of rivets	6,500,000
Brooklyn Bridge, NY, USA	Tower height	84m
	Width	26m
	Clearance	41m
	Main span	486m
	Weight (approx)	14,680 tonnes

Did you know?

The Brooklyn Bridge, in New York, is a suspension bridge that contains 23,000 km of wire in its cables. That's enough to stretch more than halfway round the world!

Royal Gorge Bridge, USA	width (pedestrian bridge)	5m
	Clearance to river	321m

Walter Taylor Bridge. Brisbane

The Walter Taylor Bridge is a suspension bridge crossing the Brisbane River between Indooroopilly and Chelmer in Brisbane, Queensland. The bridge is a similar design to the Hercilio Luz Bridge in Florianopolis, Brazil, with the truss carrying the bridge being above the roadway and meeting the cables at non-uniform heights. This means that the suspension cables actually form the top chord of the truss, and this configuration is known as the Steinman (after its inventor) or Florianopolis type.

The bridge is unique among Brisbane bridges in that the two towers of the bridge house residential accommodation, which were occupied until mid 2010 when the last members of the original toll master's family moved out. The bridge was conceived, designed, built and funded by local visionary Walter Taylor, a contractor who lived in Graceville (adjacent to the suburb in Chelmer).

Although there was a rail bridge to Indooroopilly and beyond to the northern suburbs of Brisbane, local residents were frustrated because there was no means by which cars could cross the river. Pedestrians had been able to cross the river on the 2 previous Albert Bridge's from 1875–1893, and from 1895 until the opening of the

The bridge was opened on 14 February 1936 by the Governor of Queensland, Sir Leslie Wilson. The bridge was operated as a toll bridge until the 1960s, with a toll collection booth located at the Northern (Indooroopilly) end. During that time, the bridge was known as the "Indooroopilly Toll Bridge". After Walter Taylor's death in 1955, the bridge was renamed the Walter Taylor Bridge in his honour. The bridge is a suspension bridge and the support cables were actually surplus support cables used to hold up the incomplete halves of the Sydney Harbour Bridge during its construction. When the bridge opened it had the longest span of any suspension bridge in Australia.