Architectural Heritage: RAIA REPORT FORMAT

This report is to be the outcome from the data entry.

This report follows the UIA format with some additional fields and full details that will be referred to from UIA.

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Image:		

SYDNEY OPERA HOUSE

This document presents details of heritage buildings developed for Internet searches. An indexing form on the internet allows the on-line submission of this information. This document is intended to let anyone who is willing to participate forward the RAIA information about buildings to be added to the system without using the Web.

Importance of the criteria column lets you to point at the particularly importance of one or several elements of description of the building. You can here indicate (decreasing order A,B,C,D,E, ie International, National, State, Regional, Local) whether an element of description appears to you as decisive in its selection for the index.

Name of the Criteria	Importance of the	Your Building
	criteria	

Name of the Criteria	Importance of the	Your Building
	criteria	

TABLE n° 1 : DESCRIPTION OF BUILDING / SITE

Current name	Sydney Opera House
Previous or other name(s)	Sydney Opera House
Present owner	NSW Government (managed by the Sydney Opera House Trust)
Status of the owner	Government
Materials and techniques	Each vault consists of two components: a pre-cast, pre-stressed concrete rib, which is combined with a pre-cast shell section covered in tiles.
Description	A reinforced concrete platform is submounted by clusters of reinforced concrete vaulted structures in three groups which contain a large hall for 3000 and a small hall for 1200 people plus recording hall, rehearsal studio, administration and a restaurant. The base is clad with precast panels faced in reconstituted red granite and this material is also used for the paving of the waterfront promenade which surrounds the platform. The shells are clad in white ceramic coated tiles. Large expanses of glazing provide dramatic views into and out of the foyers. (AHC Register).
	The shells are covered by precast concrete lids which are clad in white tiles. The central tiles are glazed white and the border tiles matt cream. (Kerr 1999 p 52).
	The continuous glass walls are supported by light steel mullions supported off the concrete ribs. (Kerr 1999 p 57).
	Utzon's plan set the two largest halls side by side upon the platform. It made possible this dramatic sculptural elevations. The halls had their stage set to the south which maximised views of the harbour from the northern foyers and from the glass walled passages as the public passed round to the northern end. (Kerr 1999 p 17).
	This was part of the experience of arriving by car and ascending the stairway to a light, airy tall sculptural rib vaulted space. (Kerr 1999 p 17).
	Plywood panels were developed as part of the internal lining which concealed the services.
Year of project design	1957
Year of beginning of construction	1958
Year of end of construction	1973
Initial Design (if differs from description)	

Changes to initial changes	Forecourt completed 1988
	Upgrade works 1988-1997
Documentation and References	Books Anderson, Max and Pierre Cochrane, Julius Poole and Gibson – The First Eighty Years, 1986 p 181- 185
	Australian Heritage Commission, Register of the National Estate Database No 002353, Sydney Opera House and Surrounds, Sydney NSW.
	Baume, Michael. <i>The Sydney Opera House Affair</i> . Camden, N.J.: Thomas Nelson and Sons, 1967. NA9840.A79S9. section, p103. Isometric view of major hall shells, p106.
	Ching, Francis D. K <i>Architecture: Form, Space, and Order.</i> New York: Van Nostrand Reinhold, 1979. ISBN 0-442-21535-5. LC 79-18045. NA2760.C46. exterior perspective drawings, p380. — A nice graphic introduction to architectural ideas.
	Clark, Roger H. and Michael Pause. <i>Precedents in Architecture</i> . New York Van Nostrand Reinhold, 1985. Geometry diagram, p191. Reduction diagram p210.
	Commonwealth Department of the Environment Sports and Territories (DEST) and the NSW Department of Urban Affairs and Planning, Sydney Opera House and Its Harbour Setting. A draft nomination of the Sydney Opera House in its Harbour Setting for inscription on the World Heritage List by the Government of Australia 1996. (Unpublished). Plans, sections and elevations in Section 7.4.
	Drew, Philip Sydney Opera House (J–rn Utzon), Phaidon Press Ltd., London (Great Britain), 1995.
	Drew, Philip <i>The Masterpiece J⊸rn Utzon: A Secret Life</i> , Hardie Grant Books, 1999
	Kerr, James Semple, Sydney Opera House. An Interim Plan for the Conservation of the Sydney Opera House and Its Site for NSW Public Works on behalf of the Sydney Opera House Trust, December 1993.
	Kerr, James Semple, Sydney Opera House. A Revised Plan for the Conservation of the Sydney Opera House and Its Site for NSW Public Works on behalf of the Sydney Opera House Trust, May 1999.
	Picon, Antoine <i>L'art de l'ingénier</i> , Éditions du Centre Georges Pompidou, Paris (France), 1997.

Westcott, Pat. The Sydney Opera House. Sydney:

Ure Smith, 1965. NA6840.A86W4. auditorium level plan, inside front cover. Podium level plan, inside front cover. Car entrance level plan, inside front cover.
Articles Norberg-Schulz, "J¬rn Utzon: Sydney Opera House, Australia 1957 – 1973" in <u>GA</u> , n. 54, 1980,
Relevant Web Sites:
Sydney Opera House at
 www.artsednet.getty.edu Great Buildings Online: Sydney Opera House at
www.GreatBuildings.com

MODULE 2 : BUILDING / SITE LOCALISATION			
Postal Address: street, n°	Bennelong Point		
Postal Address: town/suburb	Sydney		
Postal Address: Postal code	2000		
Urban centre/city	Sydney		
Local Government area	Sydney City Council		
Region (State)	New South Wales		
Country	Australia		
Regional Context (eg Coastal, urban, rural)	In the CBD of the capital of NSW (Sydney) and located on Sydney Harbour.		
Urban context (ex: Port, new town, etc)	Urban Waterfront		

MODULE 3 : AUTHORS				
Project Design:	Project Design:			
Name, first name, (dates), job, country of origin	А	J¬rn Utzon Architect of Hellenback Denmark Competition Design 1956 Design, documentation and supervision 1957-66		
	В	Hall, Todd and Littlemore, Architects of Sydney Australia Design, documentation and supervision 1966-73 Peter Hall (Design Architect) Lionel Todd David Littlemore Edward Farmer, NSW Government Architect (Ref: Kerr, 1999 p 13-19.)		
Information on the author / the team				
Engineering:				
Name, first name, (dates), job, country of origin	В	Structural Engineers Ove Arup (London) – Design and Documentation – Ronald Jenkins Drew 1999 p 160; Jack Zunz Drew 1999 p264 (Sydney) – Supervision Stage 11 & 111 – Michael Lewis (Aust) Drew 1999 p 256		
		lan McKenzie, Bob Calvin, John Nott		

		Macdonald Wagner and Priddle (Sydney) – Supervision – Stage 1
		Electrical Engineers Zeuthen & Sorensen, Denmark – Initial design Julius Poole & Gibson (Frank Matthews) – initial review and then all work from 1966 (Ref: Anderson & Cochrane JPG p 81) Civil Engineers Christiani and Nielsen Drew1999 p 161
		Mechanical Fire and Hydraulic Services Steensen and Varming of Copenhagen/Sydney – Drew 1999 p 163
		Theatre Techniques Sandro Malmquist of Sweden – Drew 1999 p 163
		Acoustics Dr Vilhelm Lassen Jordan initially – Drew 1999 p 166, p230
		Quantity Surveyor Rider Hunt Drew 1999 p 187
Information on the author / the team		
Construction:		
Name, first name, (dates), job, country of origin	D	STAGE I Civil & Civic Pty Ltd, Australia - \$5.5m – 1958-61
	В	STAGE II M R Hornibrook (NSW) Pty Ltd, Australia - \$12.5m - 1963-67
	С	STAGE III Hornibrook Group, Australia, H R (Sam) Hoare Director in Charge - \$56.5m – 1969-73
Information on the author / the team		
Contracting Authority:		
Name, first name, (dates), job, country of origin	D	NSW Government , Sydney, New South Wales, Australia
		Sydney Opera House Technical Advisory Panel Chairman: Henry Ingham Ashworth, Professor of Architecture Sydney University (Ref: Kerr, 1999 p 13.)
		Other members included: Peter Johnson and Max Anderson (Ref: Anderson & Cochrane JPG p 83)
Information on the author / the team		

MODULE 4 : TYPOLOGY	
Type (single building/complex)	Single Building

Initial use		Performing Arts Concert Halls
Present use		Performing Arts Concert Halls
Planned use)		Performing Arts Concert Halls
Architectural Style	С	Expressionist Modern or late 20 th Century Structuralist

MODULE 5 : EVALUATION (Analysis of significance)			
MODULE 5 : EVALUATION (Analysis of Background	significance	In January 1956 the NSW Government announced an international competition for two halls for a range of performing arts. There was no set budget. The assessors were Henry Ingham Ashworth (Sydney University), John Leslie Martin (Cambridge University), Cobden Parkes (NSW Government) and Eero Saarinen (USA). There were about 900 registrations and 220 entries. The winner, J—rn Utzon, was announced in January 1957. Most people found it a spectacular sculpture on the grand scale (Kerr, 1999 p 13-15). (Drew 1999 p 97). From 1957-66 the design developed and the ribbed pre-cast roof system extended skills and pushed technology to the limit. Construction had commenced early 1959 long before all the design was resolved. (Kerr 1999 p 15-18) During the design phase Utzon was to say "we are here to nudge the frontiers of science – this is an opportunity to improve the latest technology, to develop new ideas and to test new methods and materials." (Anderson & Cochrane, JPG, p82) By 1966, with the roof structure more than half completed Utzon left due to stresses between him and the government. A panel of architects was then appointed to complete the project (viz Peter Hall, Lionel Todd, David Littlemore and Ted Farmer). (Kerr 1999, p 18-20) The building was constructed in three stages (I Platform, II Roof, III Completion) and finally reached practical completion on 31//8/1973 at a total cost of about \$100m. (Kerr 1999 p 24). The fore court was designed by Andrew Andersons (NSW Government) and completed in 1988. Upgrade works were undertaken from 1988-1997 at a cost of \$117m. (Kerr 1999 p 27).	
		In September 1998 Denton Corker and Marshall	
Tachnical		were appointed to advise on future works affecting the Opera House and the site. (Kerr 1999 p 29).	
Technical	Ι Δ	The Cydney Oneye Heyes are badies within it-	
Comments	A	The Sydney Opera House embodies within its structure the integration of sophisticated geometry, technology and art. The discovery of a controlling geometry for the curved roof forms was the single	

most difficult challenge faced by Utzon. The final solution was spherical planes which were made up of a series of ribs. It epitomises the extraordinary creative potential of the assembly of prefabricated, repeated components. "Because I have moulded space with geometrically defined shapes, the whole enclosure of the void is fully defined and the surface of the enclosure is desirable in a number of similar elements. These similar elements can be mass produced – and when their relationship has been clarified they can be assembled like a big jigsaw puzzle in space". (Utzon 1965). (DEST p 101) The precast segments 4.6m long were fixed together with two part epoxy resin held together by prestressing tendons of 15.2mm diameter strands. This was at the time a structural innovation. The ribs radiate from a solid concrete pedestal springing up to a ridge beam. The cross section varies from a T at the pedestal to a solid and then an open Y at the ridge. The shell was faced with white tiles. The final result was a joint Utzon/Ove Arup solution. (DEST p 180) The resulting significance of the structure can be described in several ways. First as a superior structural system compared with other structures of the time eg Saarinen's TWA Terminal is a massive structure built on a forest of scaffolding and Nervis roofs are by comparison simple shapes. (DEST p 182) The design and construction was a remarkable feat of visualisation, description and calculation carried out when the use of computers was limited to numerical calculations. (DEST p 182) The superstructure was at the forefront of structural and constructional development in the world and as such is one of universal technical value. . (DEST p Social D Comments The Sydney Opera House has been a successful performing arts centre of world renown and a popular gathering point of festivals. It has achieved the status of cultural icon. (DEST p 101). It has been the scene of many notable achievements in the performing arts and has associations with many important artistic performers. (AHC Register, Statement of Significance). **Aesthetic** Comments Α In their report, the competition judges remarked prophetically about the submitted drawings; "They present a concept of an Opera House which is capable of becoming one of the great buildings of the world." (Arts Ed Net). The Opera House is a spectacular creative response to Sydney Harbour. Its design is so appropriate for

		its setting"we worked 6 months using sea charts and imagining it from the bridge" (Utzon 1965) that it acts as a pivotal sculpture in the round day and night (DEST p 101)
Contextual	l	
Comments	С	In the Sydney Opera House Utzon realised the great synthesis of earth and sky, landscape and city, vista and intimacy, thought and feeling, in terms of unity of technology and organic form. Hence, we may safely say that the Sydney Opera House represents a masterpiece of human creative genius and a most significant step in the history of modern architecture. (DEST p 172).
		An ICOMOS expert meeting on Contemporary Architecture in 1985 identified the Sydney Opera House as one of four theatres and opera houses of outstanding universal value. The others are Sullivans Auditorium Building, Chicago 1889, Perret Theatre Champs Elysees, Paris 1911 and Scharoun Philharmonic Concert Hall, Berlin 1963. (DEST p 118)
		Norberg-Schulz's comment about the Sydney Opera House in the context of modern architecture confirmed that the Sydney Opera House is so tied to its site that it takes upon itself the role of a symbol for the city if not the whole continent. It is seen as a vital step in the history of modern architecture, which resolves the division between thought and feeling (creativity and actuality) and, as such, is of outstanding universal value. (DEST p 119)
Historical		
Comments	В	The influence of Utzon's father, a naval architect, lead to Utzon's interest in curved shapes and an attention to detail.
		J¬rn Utzon was also inspired by Frank Lloyd Wright and Mies Van Der Rohe and the architecture from a number of cultures. "The platform as an architectural element is a fascinating feature" is an impression from the Mexican temples and the hovering roofs over leave the spaces between free were like Japanese houses. His first sketches for the Sydney Opera House were shell like floating in space like clouds. (DEST p168)
		The 1950s and 60s saw a new need for expressions which is widely illustrated throughout the world (eg Kahn, Aalto, Saarinen). The Opera House is also organic which was to flow through the Sydney region in the 1960s. Urzon considered the Opera House as a sculpture, something you never tire of. (DEST p 170)
		The Opera House has been likened to Gropius and the Bauhaus School whose rationalism and aesthetic satisfaction are essential unifying qualities

of the new architecture and life its	elf. (DEST p172)

		of the new architecture and life itself. (DEST p172)
Originality		
Comments	A	The body of Utzon's built work is not large and despite the variety it is consistent in its sympathetic response to the setting and the needs of individual and collective clients. The Sydney Opera House is the highlight of his extraordinary creativity and pursuit of excellence. (DEST p110). Later works by Utzon included Kuwait's National Assembly Building (1971-83) and Bagsvaerd Church near Copenhagen 1976 (both of which use precast components and concrete shells). (Drew 1999 p 446-467, 437 – 445). These further reinforce his creative genius. Norberg Schulz concludes that Utzon's Opera House within its setting represents a masterpiece of human creative genius and a most significant step in the history of modern architecture. (DEST p 58)

AWARDS FOR EXCELLENCE	
	Awards (from Kerr 1999, p38) 1969 Queen's Award to Industry 1972 Association of Consulting Engineers, Australia. Excellence Award, for the glass walls. 1973 Royal Australian Institute of Architects, Gold Medal, awarded to J⊸rn Utzon. 1973 Special Award. UK Institution of Structural Engineers. 1974 Royal Australian Institute of Architects. Merit Award, for work of outstanding environmental design. 1974 Illuminating Engineering Society of Australia. Meritorious Lighting Award, for the Opera House. 1980 Royal Australian Institute of Architects (NSW Chapter), Civic Design Award, for the Opera House. 1988 Royal Australian Institute of Architects (NSW Chapter), Lloyd Rees Award, for the Opera House forecourt as part of the Circular Quay and Macquarie Street revitalisation. 1988 Royal Australian Institute of Architects. National Civic Design Award, for the Opera House forecourt as part of the Circular Quay and Macquarie Street revitalisation. 1988 Illuminating Engineering Society of Australia. Certificate of Commendation, for the shell floodlighting. 1992 Royal Australian Institute of Architects (NSW) Chapter). The Commemorative Sulman Award, for the Sydney Opera House, architect: J⊸rn Utzon.

TABLE n° 2: STATE OF BUILDING / SITE

MODULE 1 : ANALYSIS OF CURRENT STATE		
Building Condition		Building is in a Good Condition
Evaluation of danger (decreasing order A,B,C,D,E)	E	The building is in no danger generally, although all future work should comply with the Conservation Plan (Kerr 1999).
Nature of danger		
Comments		

MODULE 2 : PROTECTION	
Current Heritage Listing	Australia Government Heritage Register Register of the National Estate
Administrative level of protection (Statutory or Non-Statutory)	Statutory
Authority / Institution providing listing	Australian Heritage Commission Register of the National Estate
Registration Reference	Reference 002353 file No 1/12/036/0449
Planned restoration	Nil, although a current contract is to advise on future works.
Current Heritage Listing	NSW State Government Heritage Register
Administrative level of protection (Statutory or Non-Statutory)	Statutory
Authority / Institution providing listing	NSW Government – Heritage Inventory
Registration Reference	
Planned restoration	Nil, although a current contract is to advise on future works
Current Heritage Listing	Sydney City Council – Heritage Register
Administrative level of protection (Statutory or Non-Statutory)	Statutory
Authority / Institution providing listing	Sydney City Council
	Central Sydney Local Environment Plan (1992)
Registration Reference	Item 1064
Planned restoration	Nil, although a current contract is to advise on future works
Current Heritage Listing	Classified in Community Register (National Trust)
Administrative level of protection (Statutory or Non-Statutory)	Non Statutory
Authority / Institution providing listing	National Trust of Australia (NSW)
Registration Reference	
Planned restoration	Nil, although a current contract is to advise on future works

Current Heritage Listing	Royal Australian Institute of Architects National Register of Significant 20 th Century Architecture
Administrative level of protection (Statutory or Non-Statutory)	Non-Statutory
Authority / Institution providing listing	Royal Australian Institute of Architects
Registration Reference	(TBA)
Planned restoration	NIL

TABLE n° 3: CHARACTERISATION OF THE BUILDING / SITE (Significance of the building under the Stated Criteria)

Categories of Criteria			
MODULE 1 : PERIOD OF DESIGN / CON	STRUCTIO	N	
Outstanding national importance in demonstrating the principal characteristics of a particular class or period of design.	В	The Sydney Opera House is an architectural masterpiece of concrete construction using curved precast sections. It was at its time a structural innovation and a remarkable feat of visualisation, description and calculation. It was seen as an organic form of the highest quality	
		for its period of concept design and implementation.	
MODULE 2 : FORMAL ARCHITECTURA	L VALUE		
Outstanding national importance in exhibiting particular aesthetic characteristics.	A	Situated on Sydney Harbour and reminiscent of billowing sails, the Opera House has exceptional high aesthetic qualities. The design was the winner of an international architectural competition against 220 other entries.	
		The design has a certain lyricism which reinforces its aesthetic qualities in its setting.	
		Utzon's design was awarded first prize not only because it looked so extraordinary and seemed to belong so well to its setting but also because of the way it solved the planning problems. In their report, the competition judges remarked prophetically about the submitted drawings; "They present a concept of an Opera House which is capable of becoming one of the great buildings of the world."	
MODULE 3: RELATION TO THE LOCAT	TION		
Outstanding national importance in establishing a high degree of creative achievement.	A	The Opera House is a spectacular creative response to its location on Sydney Harbour. It has a synergy with its setting that it has led it to become a symbol for Sydney and Australia.	
		It is a masterly creative response involving the synthesis of earth, sky, landscape and city which unifies technology and organic form. It is a strong sculptural form seen in the round both day and night.	
MODULE 4: MONUMENTAL OR SYMBOLICAL SIGNIFICANCE			
Having outstanding monumental and symbolic importance to the development of architecture and the history of architecture.	В	The Opera House is recognised internationally as a symbol of Sydney and Australia and because of its creative, technical and aesthetic qualities is an outstanding piece of Architecture. It is considered as a monumental building of world renown which is equal to any other great theatre/opera house or concrete shell structure of its period.	
		It epitomises the modern movement of architecture	

and organic form of the 1950s and 1960s.

RAIA RSTCA UIA Nominations		RAIA Format	
MODULE 5 : ATYPICITY			
Having a special association with the life or works of an architect of outstanding importance to our history.	В	J¬rn Utzon is a Danish Architect who won an international competition with his design for the Opera House from 220 entries. He was awarded the Royal Australian Institute of Architects Gold Medal in 1973. Although the body of Utzon's built work is not large, the Sydney Opera House is the highlight of his	
		extraordinary creativity and pursuit of excellence.	
		It is a masterpiece of creative genius from its form, its technical achievements and its relationship to its setting.	
MODULE 6 : CONSTRUCTION / STRUCTURE			
Outstanding national importance in demonstrating a high degree of technical achievement of a particular period.	A	The technical achievements of the Opera House are exceptional. The Sydney Opera House complex is made up of two main buildings, principally of reinforced concrete, that sit on a concrete platform on a foundation of concrete piles. Rising from the platform are the great roof shells, designed to cover the two main halls and foyers. The platform is faced on the outside with huge slabs of reconstituted granite, which are pinkish brown in colour. Similar slabs are also used for the flooring of the waterside walkways and the raised platform that surrounds the buildings. The roof structure is covered with white ceramic tiles.	
		Inside, the two main halls were constructed using a hidden steel framework, faced, outside and inside, with timber. As Utzon intended, they sit as separate structures under the concrete roof, but they are otherwise entirely different from what he proposed, being designed instead by a team of local architects who succeeded him. The glass walls, filling the external openings under the shells, are made of a steel framework supporting laminated, tinted plate glass sheets with bronze fittings. This was also not as proposed by Utzon but still an elegant solution.	

The most revolutionary feature of the opera house is its concrete roof. Utzon produced a design using ribbed vaults of precast concrete. He based the shape on the curve of a sphere-all segments had the same curve and thus could be mass-produced. The segments were precast and lifted into place and held together by prestressing tendons which at the time was a structural innovation.

The roof segments were set with small tiles and lifted onto the shells. The glazed tiles have a slightly irregular surface with a glasslike finish. Utzon, who was something of a perfectionist, spent over a year

working with Swedish manufacturers to develop the tiles specifically for the opera house.

The standardised prefabricated technique used was not only much less costly than any other way of building roofs, it allowed quality control with factory like precision. For example, the one million tiles were laid out on the lids with an accuracy that would have been impossible if they had been set by hand over the curving roof structure.

It was a superior structural system compared with most other buildings of its time.

(Ref: Arts Ed Net)

The Sydney Opera House is a dramatic expression of the genius of a relatively unknown architect, J_rn Utzon (whose subsequent internal fame was in part a result of the design of the building), and of the high quality completion of the work by Hall, Todd and Littlemore, and of the technical support given throughout by the internationally renowned engineering firm of Ove Arup and Partners and finally by M R Hornibrook, the inventive contractor of stages of two and three.

The Sydney Opera House is exceptional significant because of:

- Its spectacular quality as sculpture in the round both by day and night
- Its inspired design solution in response to its setting
- The picturesque quality of the peninsula setting
- The way in which its fabric reflects the contemporary philosophy of creating refined forms from machine-made components
- The way in which the plastic arts, geometry and technology were drawn on to create a structure at the leading edge of endeavour
- The majestic quality of its public spaces contained by powerful structural forms
- The evidence of its fabric in expressing its place in twentieth century architecture (not excluding the troubled history of its construction)
- The seminal influence of some of its design and construction techniques
- Its function as a performing arts centre of world renown
- Its almost mythological status as a cultural icon (then and now) arising from all the above, from the high public interest in its protracted and controversial development; and from its power to attract artists, patrons and tourists on a national and international level.

IMAGE and PLAN

Image:





