DESIGN 5

A R C H I T E C T S

Group DLA
Level 3, 10 Bridge Street
SYDNEY NSW 2000

4th July 2022

Attention: Mr Shane Berry

Dear Shane,

SYDNEY OPERA HOUSE – SHR NO 01685
CONCERT HALL UPGRADE PROJECT
SSD 8663 & S60/2020/010 APPROVALS

OCCUPATION CERTIFICATE REPORT

I write as Sydney Opera House's Heritage Architect, regarding compliance with the following conditions of consent, at completion of works (Occupation Certificate stage):

Section 60 Approval dated 23rd January 2020

- Consent Condition 2 – Heritage Impact Statement Recommendations
- Consent Conditions 3 – 13 Additional Conditions

SSD 8663 Approval dated 12th December 2019

- Consent Condition D4 – Heritage Consultant Certification

The works considered in this certificate are those concerning the upgrade project for the Concert Hall, granted Section 60 (S60) approval under section 63 of the Heritage Act 1977, and State Significant Development (SSD) approval under Section 4.38 of the Environmental Planning and Assessment Act 1979.

NOTE – Both the SSD and S60 Approvals included two major projects at the Opera House, the upgrade project for the Concert Hall, and the Creative Learning Centre project. This report regarding the completion of works and issuing of an Occupation Certificate is only in relation to the upgrade project for the Concert Hall.

The relevant conditions of both these approvals are set out below followed by comments as to the compliance of the completed work.

Since these projects were approved, the *Eminent Architects Panel* (EAP) has been renamed as the *Design Advisory Panel* (DAP), however its membership and role remains the same. This newer title is used throughout the comments below

I, and selected colleagues from our office, Design 5 – Architects, have been advising the Sydney Opera House on heritage and related architectural issues prior to and throughout this project.

Design 5 Architects carried out regular inspections of the project throughout its construction, and most recently on 15 June 2022. We can confirm the works have been substantially completed in accordance with the documentation, with only minor incomplete works ongoing as identified below:

- Final adjustment of operable reflectors and banner drawers on the side walls of the Concert Hall ceiling;
- Completion of works to bronze guardrails in auditorium;
- Minor adjustments to auditorium seating;
- Adjustment of minor fittings such as A/C registers and door hardware;
- Cleaning of precast paving and stairs in the side and northern foyers;
- Completion of cable relocation and repairs external to glass enclosure of new lift;
- Completion of minor repairs to bronze and metal elements around new lift.

S60 CONSENT – CONDITION 2
– HERITAGE IMPACT STATEMENT RECOMMENDATIONS & RESPONSES

2. All recommendations within the Report entitled *Sydney Opera House Concert Hall & Creative Learning Centre Renewal Projects SSD 8663*, Heritage Impact Statement, prepared by Design 5 Architects, 17 October 2018 shall be complied with.

Heritage Impact Statement – Recommendations

The Heritage Impact Statement (HIS), prepared by Design 5 – Architects, dated 17th October 2018, that accompanied both the SSD and Section 60 Applications included both the major upgrade of the Concert Hall, and the construction of a new Creative Learning Centre.

With regard to the Upgrade of the Concert Hall, the HIS assessed the impact of the proposed works against the policies and guidelines in the CMP (4th edition) and summarised these findings as well as providing recommendations on many elements in Section 7.3.3. Only the Recommendations are quoted and commented on below.

The HIS also assessed the project against the State, National and World Heritage Values as well as the Utzon Design Principles. The findings were summarised at the end of each section, however, there were no recommendations as these had already been addressed in the assessment against the CMP in Section 7.3.3.

7.3.3 Concert Hall Renewal Project

Northern Foyer – lower levels

Conditions:

– *The use of bronze panelling on the southern wall in the caves area (Level 2) should be tested and reviewed once the other walls are stripped back, by the Opera House's Conservation Council, Eminent Architects Panel and heritage architect, to determine its appropriateness.*

Comment:

Various options were considered by the Conservation Council and the Design Advisory Panel, however due to the location of fire services and other facilities in this location, it was agreed the bronze panelling would be the most appropriate outcome.

This condition has been complied with.

Treatment to Box Fronts, Perimeter Wall and Stage Surround

Conditions:

- *A full panel size prototype or mock-up of the laminated brush box diffusion panel should be tested in situ and the pattern refined if required. This mock-up test is presently planned for November 2018.*
- *The original tapered bronze guard-rails surrounding the boxes and the front of the circle should, if possible, be retained.*

Comment:

A full size prototype of one of the laminated brush box diffusion panels was installed on the prompt (west) side of the stalls area as noted in the condition and remained in place throughout all performances and use of Concert Hall until it was replaced with the final version during the works. Issues identified with the prototype were addressed and refined in the final works.

The tapered bronze guardrails have all been retained and adjusted / reconfigured only where required.

These conditions have been complied with.

Acoustic Reflectors (for non-amplified performance)

Conditions:

- *Before manufacture of the final reflectors, the final colour and finish is prototyped in situ in the Concert Hall and approved by the Opera House's Conservation Council, Eminent Architects Panel, and heritage architect.*
- *An original acrylic cloud reflector in good condition is identified and archived as part of the Opera House's collection.*

Comment:

A number of prototype tests for the colour and finish of the over-stage acoustic reflectors were carried out in situ. These were viewed and assessed by the whole design team, the Conservation Council and Design Advisory Panel, and the heritage architect. Each test was a refinement on the previous until the final colour and finish was agreed.

Two of the acrylic cloud reflectors have been archived as part of the Opera House's collection.

These conditions have been complied with.

Side-wall reflector panels

Conditions:

- *Before commencement of works on the plywood ceiling, the process and methodology for dismantling a full panel, cutting out, construction, and operation of these retractable side reflector panels, is tested via a full size operational prototype.*
- *The existing white birch panels are retained and reinstated in their original locations, and not replaced with new as these are book and end-matched from a single log with panels above.*
- *Cuts across an original sheet junction are avoided wherever possible, and where this is not possible, the sheet junction is retained in its existing location.*
- *There is minimal visual interruption of existing white birch plywood, and preferably, the cut out section to accommodate the reflector is used as the face of the new reflector to ensure it matches.*
- *Reflector panels are fully retracted and the original plywood surface finishes flush with the existing plywood when reflector panel is not required.*

Comment:

The contractors tested the methodology for cutting out a full size mock-up of the panel of plywood off-site in their workshop. The mechanism for operating the panels was first tested on a full size mock-up off-site and then again on site.

All white birch panels on the wall sections of the ceiling were retained and applied to the face of the new operable side-wall reflector panels.

Some cuts across panel junctions were unavoidable, however all panels, junctions and joint gaskets have been retained in their original locations.

As mentioned above, all plywood cut out for reflectors have been refixed to the face of the new operable reflector panels, so that when these units are not deployed, the original plywood is in its original location and the grain and colour match.

When operable side-wall reflector panels for acoustic performance are fully retracted, the original plywood face on these panels aligns flush with adjacent panels.

These conditions have been complied with.

Acoustic Drapes (for amplified performance)

Conditions:

- *Before commencement of works on the plywood ceiling, the process and methodology for cutting out, constructing, and operating these new panels, both in the crown and the side walls, be tested via a full size operational prototype that includes a full size drape.*
- *The automated acoustic absorption drapes rising from the floor and manually deployed drapes on the box fronts etc, should be tested with a full-sized mock-up to ensure all technical and design issues are resolved.*
- *The cloth material used for the drapes and banners is to be plain, without pattern, and the colour based on the signature magenta of the seat upholstery, grading towards black, closest to the stage, as indicated on the renders provided in the application.*
- *The location and configuration of all drapes respect the geometry of the interior.*
- *All drapes are fully retractable and the machinery / hardware for their automation / deployment is fully concealed from the auditorium.*
- *The substantial modifications to the ceiling crown and side walls to accommodate the drapes and their machinery is as least intrusive as possible, so that when retracted, the crown and side walls look as close as possible to their original configuration.*
- *The existing white birch rings are retained and not replaced as these ring elements are matched from a single log with other ceiling panels.*
- *There is minimal loss of existing white birch plywood, and preferably, the cut out section to accommodate each acoustic drape unit is used as the lower face of its access panel to ensure it matches.*
- *Drapes and access panels are fully retracted and sit flush with the existing plywood or brush box when acoustic drapes are not required.*
- *The indirect lighting of wall and ceiling panels around the perimeter of the hall is retained and not impacted by the drapes, regardless of their deployment.*

Comment:

The contractors tested the methodology for cutting out a full size mock-up of the panel of plywood off-site in their workshop. All white birch panels cut out of the wall sections of the ceiling were retained and applied to the face of the new operable acoustic drawer units. The only sections that could not be salvaged were for the narrow banner drapes in the ceiling crown – due to the manner in which they had been constructed in this location. These limited narrow sections are being colour matched with new white birch plywood and will not be discernible by the audience or performers. The mechanisms were tested by prototype. Issues identified with the original design for the banner deployment in the ceiling crown have been refined and the result is even less visibility of the presence of these banners when they are fully withdrawn than originally envisaged.

Both the automated acoustic absorption drapes rising from the floor and those draped over the box fronts were tested by prototype before installation. All technical and design issues have been resolved.

The colour and nature of the cloth used for the acoustic drapes is as required in the above condition.

The location and configuration of all acoustic drapes respects the geometry and configuration of the ceiling, walls and box fronts.

All drapes are fully retractable and when not deployed, are full concealed from view.

Due to the complex layering of backing material over the plywood ring sections of the ceiling crown, the narrow cut out sections for the banners could not be salvaged. These limited narrow sections are being colour matched with new white birch plywood and will not be discernible by the audience or performers.
The drawer sections for the drapes on the wall part of the ceiling will sit flush when fully withdrawn. The plywood sections in the ceiling crown are slightly larger than the penetration and will sit just below it when these banners are fully raised. Visual tests on site have confirmed that this configuration will provide a less visible intervention than what was originally designed.
The indirect lighting around the perimeter of the auditorium has been retained and its configuration respected. It will not be concealed by the acoustic drapes when these are deployed.

These conditions have been complied with wherever this has been possible. Where it has not been possible, the intent of these conditions have been met.

Lighting arrays

Conditions:

- *Lighting bars and fittings deployed for any performance are minimum in number and as efficient as possible.*
- *Lighting arrays between the reflectors are not enclosed, and arranged and placed to minimise their visibility from the auditorium and maximise views towards the grand organ.*
- *Lighting bars / trusses over the stalls are only deployed when necessary and removed when not required.*
- *Every effort is made by production and technical crews to minimise clutter from suspended lighting infrastructure for each performance.*

Comment:

The intent of these conditions have been a primary objective for the theatre equipment design and installation. It will be management and hirers who determine what is deployed and how. This will be an important part of ongoing management of the use of the Concert Hall.

At the time of writing this report, the light fittings themselves are not in place however, the support frames are and temporary fittings are in place until the permanent ones arrive. The design intent for the finished installation is to achieve the objective outlined in this condition.

Speaker arrays

Conditions:

- *Speaker arrays are as small as possible to minimise their visual presence.*
- *For non-amplified performance, at least the centre 3 speaker arrays are raised high towards the ceiling or preferably, removed. This should apply to all other speaker arrays wherever and whenever this is possible.*
- *Speaker arrays deployed anywhere in the space for any performance are minimum in number.*

Comment:

The final speaker design comprised a total of 3 speaker arrays suspended over the front of the stage. It is the intent of the design that the centre speaker is raised as high as possible during non-amplified performance. The advantage of this design is that as speaker technology advances with speakers likely to become smaller, they can be upgraded and their visual impact potentially reduced.

As with the lighting, it will be management and hirers who determine what equipment is deployed and how. This will be an important part of ongoing management of the use of the Concert Hall.

'Cannon-port' openings and air delivery registers

Conditions:

- *A full size mock-up of the 'canon-port' infill panels should be assembled and approved before these particular works commence.*
- *The 'cannon-port' infill panels are closely fitted with a fine shadow line to delineate the extent of the original opening, and match the adjacent white birch as closely as possible.*
- *New air delivery registers in the soffits over the boxes should respect the geometry of the ceiling, plywood panels and adjacent registers, have white birch surrounds with narrow slot registers, and visually sit 'quietly' in their location.*

Comment:

The 'canon-port' infill panels were tested and the details set out in the above condition followed.

A full size prototype of the new air delivery registers in the soffits over the boxes was tested and it was found the retention of plywood between each of the narrow slots would not be possible. An alternative metal housing / surround was tested in a range of colours with a slightly lighter tone than the plywood selected and used. These now registers sit 'quietly' in the ceiling and do not compete with or detract from the geometry of the original black registers nearby.

S60 CONSENT – CONDITIONS 3 to 13

3. NEW ELEMENTS

Any new elements proposed, including precast elements and concrete finishes, must match the existing in both form and finish. This should be determined in consultation with the nominated heritage consultant working closely with an experienced concrete expert to ensure seamless consistency. The Heritage Council delegate must be included at the benchmark and prototype reviewing stage. SOH must provide Heritage NSW with a schedule of overall timeframes for reviewing benchmarks and prototypes so that adequate notice is provided, and resources and time can be allocated to meet SOH critical dates.

Comment:

All new elements, including precast elements and concrete finishes match the existing in both form and finish. New concrete elements vary slightly from the original but it is anticipated that there may be some time before these elements cure to their final colour.

The Heritage Council delegation reviewed benchmarks and prototypes throughout the works as required in this condition.

This condition has been complied with.

4. PROTOTYPING

The Heritage Council delegate must be included in the review and comment of prototyping of the following elements:

a) Over-stage acoustic reflectors;
b) Side wall reflectors;
c) Paneled box front;
d) Acoustic drapes;
e) Lighting/Speaker Arrays; and,
f) Canon ports and diffusers.

SOH must provide Heritage NSW with a schedule of overall timeframes for reviewing prototypes so that adequate notice is provided, and resources and time can be allocated to meet SOH critical dates.

Comment:

The Heritage Council delegate was included in the review of prototypes for all elements listed.

This condition has been complied with.

5. SIGNIFICANCE ASSESSMENT

Further research is required to assess the significance of the following equipment prior to removal:

a) Mechanical equipment and machinery within plantroom 17;
b) Theatre machinery and equipment in the Concert Hall; and,
c) Mechanical equipment and machinery above the Concert Hall.

This should be done by an appropriately qualified expert in consultation with the nominated heritage advisor and submitted to Heritage NSW. The assessment should include archival recording with the equipment in situ.

Comment:

The equipment and machinery in plantroom 17 were assessed as to their significance and those considered significant retained and archived as part of the Opera House's collection.

The theatre machinery and equipment within the Concert Hall and in the tech zone above it were assessed by technical experts within the Opera House in consultation with the heritage architect. Significant equipment was identified, removed and then boxed up, retained and archived as part of the Opera House's collection.

All equipment was archivally recorded while in situ.

The report – *Concert Hall – Significance Assessment of Mechanical Equipment and Theatre Machinery*, dated 21/02/20 and prepared by Design 5 was forwarded to Heritage NSW on 6 April 2020.

This condition has been complied with.

6. BATHROOM/DRESSING ROOM AUDIT

The final Peter Hall bathroom/dressing room audit should be submitted to Heritage NSW prior to the commencement of any demolition within these spaces. The audit should also identify which of these spaces will be impacted by the proposed works.

Comment:

No bathrooms in front-of-house foyer areas have been affected by the works. Only three dressing rooms with associated bathrooms on Level 1 have been affected. 1999 bathrooms adjacent to the Orchestra Assembly Room were slightly affected but their original design regimes were retained and respected.

All new bathroom facilities in this project were required to meet accessibility standards, but utilise the basic design regime of the original bathrooms (small format grey tiles, shadow cornices and baffled lighting).

We confirm that a full audit in table format of the existing Peter Hall designed bathroom and dressing rooms, prepared by our office, was provided to Heritage NSW on 30 March 2020 in accordance with this condition.

7. CREATIVE LEARNING CENTRE

The new entry doors to the proposed Creative Learning Centre should be designed to be reversible and able to be removed easily in the future.

Comment:

The Creative Learning Centre was not part of this Concert Hall project.

8. CONSERVATION MANAGEMENT PLAN

The Conservation Management Plan must be updated to reflect the significant changes to the spaces, forms, fabric and materials of the SOH. The updated CMP is to be submitted within 6 months of the completion of the Building Renewal Program to the satisfaction of the Heritage Council. Further refinement of the 'at rest' policy can be undertaken as part of the update.

Comment:

This condition will be addressed.

9. INTERPRETATION STRATEGY

The Renewal Interpretation Strategy must be updated to include a plan for the future interpretation of a selection of the remaining reflectors. This is to be submitted within 6 months of the completion of the Concert Hall Renewal Project to the satisfaction of the Heritage Council.

Comment:

This condition will be addressed.

10. SIGNIFICANT FABRIC

All significant fabric proposed to be removed must be recorded, carefully removed, catalogued and safely stored and able to be readily reinstated. This includes, but is not limited to:

a) Timber wall paneling within the anteroom and orchestra assembly room;
b) WC fixtures and fittings from the amenities within the anteroom;
c) Paneled box fronts within the Concert Hall;

Comment:

All significant removed fabric was recorded, catalogued and put in safe storage.

The original timber wall panelling in the Anteroom was reinstated in the raised and reconfigured space. The only timber panelling in the Orchestra Assembly Room was the white birch plywood fronts to the lockers. These have been reconfigured and reused where possible.

The original amenities within the Anteroom were raised in level, with their finishes, signature recessed tap / soap holder units and joinery reinstated. Other elements were salvaged and safely stored for potential re-installation elsewhere.

Original box front panelling from the Concert Hall was recorded, catalogued and safely stored. Please note that most of the box fronts had already been replaced in 2011-12 with new flat brush box panels as part of an acoustic trial. These latter fronts were not considered significant and where set aside for potential salvage and reuse in other areas.

This condition has been complied with.

11. HERITAGE CONSULTANT

A suitably qualified and experienced heritage consultant must be nominated for this project. The nominated heritage consultant must provide input into the detailed design, provide heritage information to be imparted to all tradespeople during site inductions, and oversee the works to minimise impacts to heritage values. The nominated heritage consultant must be involved in the selection of appropriate tradespersons, and must be satisfied that all work has been carried out in accordance with the conditions of this consent.

Comment:

We confirm that Design 5 – Architects provided advice and input, including inductions and periodic inspections for the duration of the project.

A detailed schedule of existing fabric and machinery was prepared by Design 5 in 2019 and issued to the design and construction team, the most recent version being Issue 6 dated 30 April 2020. (Concert Hall – Schedule of Existing Affected Fabric and Machinery, Issue 6).

We are satisfied that works have been carried out in accordance with the conditions of consent.

This condition has been complied with.

12. SITE PROTECTION

Significant built elements are to be protected during site preparation and the works from potential damage. Protection systems must ensure significant fabric are not damaged or removed.

Comment:

We confirm that significant built elements that were not altered, were protected from potential damage during the works. Significant fabric was not damaged or removed unless it was being altered as part of the works.

This condition has been complied with.

13. PHOTOGRAPHIC ARCHIVAL RECORDING

A photographic archival recording of works area must be prepared prior to the commencement of works, and following completion of works, in accordance with the NSW Heritage Division publications *How to prepare archival records of heritage items* and *Photographic Recording of Heritage Items using Film or Digital Capture*. The original copy of the archival record must be deposited with Heritage NSW, Department of Premier and Cabinet.

Note the above condition is quoted as modified by a letter dated 20 July 2020 received from Heritage NSW.

Comment:

A Photographic Archival Recording of the project area prior to commencement of works was submitted to Heritage NSW and its receival acknowledged by email on 24 February 2020.

Photographic Archival Recording of the completed Concert Hall upgrade project is currently in preparation and will be submitted in due course.

SSD CONSENT – SCHEDULE 2, PART D

PART D PRIOR TO OCCUPATION OR COMMENCEMENT OF USE NOMINATED HERITAGE CONSULTANT

D4. Prior to occupation or commencement of use, the Applicant shall provide a report to the Planning Secretary and the Heritage Council prepared by the Nominated Heritage Consultant certifying all heritage works have been carried out in accordance with the relevant terms of this consent outlined in condition A2.

Comment:

As the Nominated Heritage Consultant for the Concert Hall upgrade project, we confirm that all heritage works have been carried out in accordance with the conclusions and recommendations in the Heritage Impact Statement, the relevant conditions in the S60 consent, the architects' documentation and advice provided throughout the works.

This letter forms the report required by this condition.

In our opinion, the works that comprise the accessibility, acoustic and functional upgrade of the Concert Hall at the Sydney Opera House, are complete in terms of heritage considerations and fit for occupation.

Yours sincerely,

Alan Croker
director
Design 5 - Architects Pty Ltd

4th July 2022