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## **Creation of a collection facility and relocation of the Western Australian Museum's collections**

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### **Abstract**

Risks associated with fire hazards of thousands of litres of ethanol preserved specimens and the incipient hazard of asbestos in the main collection and curatorial building of the Western Australian Museum demanded attention. The building was closed to the public in February 2003 and vacated by March 2005. The safe and secure movement of more than 3.5 million items to a modern collections store was a major achievement in preventive conservation. More than 130,000 litres of ethanol preserved natural science specimens are now secure in a compliant store with a new wet-mist fire suppression system. The building conversion program and relocation into a tilt-slab concrete warehouse was achieved at a cost of only \$1000 per square metre and a total project cost of \$11 million. The paper reviews the challenges of moving collections and staff and demonstrates how good outcomes can be achieved through team work. The work demonstrates the need for conservators to integrate their skills with those of consultants, engineers, architects, builders and labourers.

### **Introduction**

A Fire Safety Audit conducted in 2000 on the Francis Street Building (FSB) by Archer Fire Safety Management noted five violations of the BCA codes (Building Code of Australia) under the escape hazards category. In addition five examples of poor housekeeping that related to Combustible Goods stored around Dangerous Goods and incorrect storage of Dangerous Goods were noted. The report found that the site was not licensed for the quantities of Dangerous Goods stored and handled and that staff were insufficiently trained and that several of the fume cabinets were found to be not operating! When the FSB was designed in the early 1960's to house administration and curatorial staff of the Western Australian Museum it was considered state of the art when opened and was hailed as a major achievement in collection management, but after 30 years of expanded collections and staff it was clearly not functional or compliant. Designed with central core storage on two floors, each surrounded by a protecting suite of office-laboratories, it was a good engineering concept. Ethanol storage for the wet collections was housed in a lower basement and a wet laboratory was in the upper basement. Structural steel columns running the full height of the building through gaps in the concrete slab floors were lagged with limpet asbestos for fire security. Over the ensuing decades, the bonding agents holding the asbestos clumps in place gradually broke down. This resulted in a wide-spread distribution of asbestos in the ceiling pans. In 1986, to protect staff and visitors, the Museum placed a ban on ceiling access for servicing mechanical and electrical building systems in the FSB. This has meant that the extensive air-conditioning, hydraulic and electrical services in the ceiling spaces have not been inspected or serviced for many years. Although four years of minor works from 1989 to 1993 had seen asbestos removed from the fifth floor steel structure and elements of the first floor, attempts to encapsulate the columns in the upper basement were never proved to be effective.

### **Attempted resolution of the building hazards**

In 1998 the museum engaged quantity surveyors Ralph Beattie Bosworth who determined that asbestos removal and renovation to meet BCA requirements would have cost \$15.42 million dollars and the replacement of the building shell was costed at \$16.24M. Additional costs of appropriate laboratories, full air-conditioning, relocating staff and collections, temporary accommodation for objects and people

brought the cost of the project to roughly \$32 million. The museum management had also drastically underestimated the quantity of ethanol on site and this had major cost implications. By 2002 the revised total budget estimate of \$49.8m was put forward to the government, to be cash-flowed over 3 years, but the case was rejected. Cabinet noted (10/07/2002) and endorsed that the removal of asbestos from the FSB was not a cost effective option! The health and safety of staff was managed by regular air monitoring for asbestos particles and there were no cases of respirable asbestos reported from over the five year period until the building was vacated. A Ministerial Steering Committee was established in October 2002 to plan for the future relocation of the collections. An asbestos incident occurred in February 2003 in which a ceiling tile had become dislodged in an office and this had deposited asbestos on a desk and the floor. The Minister for Culture and the Arts, the Hon Sheila McHale, made the decision to close the museum to the public which removed access to exhibition areas on the ground, first and fifth floors. Seventeen sites were assessed and only the Welshpool site satisfied all the criteria for availability, location, functionality, size, cost and long-term storage potential. The 3.5hectare site at Kew Street Welshpool had an existing 9,000 m<sup>2</sup> tilt slab concrete factory, a 5,000m<sup>2</sup> Colourbond steel warehouse and a 1,200 m<sup>2</sup> brick administration building of 2½ storeys and was purchased for \$7.5 million. Detailed planning to relocate the FSB functions began in earnest and the author was appointed as Relocation Director in July 2003.

### **Initial concept plans and provisional staged development**

A team from the Department of Housing and Works Daniel Walton from the architectural firm Hames Sharley and museum staff began the detailed planning processes for the relocation and development of the Kew Street facility. Estimates of the most basic form of building fit-out and full climate control to half the building came to between \$7.5 and \$8 million. The budget allocation of \$4.8 million meant that the new wet laboratories could not be fully fitted out and it was planned to utilise the existing evaporative air conditioning system to provide cooling for the balance of the site. The first stage involved removal of the dry collections and staff from the FSB but the wet collections would remain on site, since they were fire protected by FM200 (heptalfluoropropane). The works included separation of major collection areas, a proper quarantine zone, a loading bay that would take semi-trailers and spaces that were separated by a floor to ceiling steel stud wall, clad in galvanised iron to provide a full museum climate control zone in the northern end of the collections building. The library, a rare books and archives and general store were to be on the ground floor of the front office building which would also house the administrative and dry collections curatorial staff.

It was planned to allow for controlled air leakage into the Stage 2 zone to take in history items from the Willetton store materials and Blinco Street objects. Budget constraints meant that the development of full climate control to the second half of the 9,000m<sup>2</sup> site and the erection of full shelving systems would have to be done in future years. The second stage included moving the iconic Blue Whale into the collections building for conservation work on the skeleton, to set up workshops and fabrication facility and to erect a storage vault. It was envisaged that a new conservation caustic treatment tank farm would be established on the southern end of the property. The 3rd stage involved erection of a secondary wet store to full safety specifications and the conversion of Stage 1 to fully equipped wet and dry research collection areas and alcohol compliant facility. The erection of a mezzanine level in the northern end of the collections building would allow removal of staff and the library from office building which would facilitate the sale of the administration wing for an estimated \$2 million to recover extra costs associated with the staged development of the site. The final stage saw the erection of a purpose built conservation laboratory and integrated workshop facility. The provisional Stage 1 plan saw \$150,000 being sunk to provide temporary fume hood facilities in the Jubilee wing for urgent work on wet specimens but the Dangerous Goods issues would have remained largely unresolved. The

budget meant that wet collections curators would be officed in Welshpool and the collections would stay in Perth and this would have resulted in lost productivity and reduced opportunity to attract research funding. Faced with such issues, museum morale began to plummet and the thoughts of a new horizon and opportunities to correct decades of neglect began to evaporate.

### **Basic infrastructural costs**

The first priority was staff safety then collection security and safety. The planning team initially focused on moving the dry collections to the warehouse in Welshpool while waiting for the collections building to be fitted out with all plant and facilities. With no new shelving to resolve the chronic overcrowding and no collection separation a saving of \$1.61 million would have been effected. Abolition of all air conditioning would have saved \$1.5 million and so the total reductions would have aligned the project with the indicative budget of \$4.3-4.8 million. It was acknowledged that the anthropological collection of wooden and bark artefacts would crack and warp. Double handling would also increase the risk of accidental damage to the collections but there seemed to be no alternatives, given the restrictive budget. These were indeed grim times.

### **Engagement with staff and communication challenges**

Fortnightly briefing sessions with the Relocation Director were often very heated as staff expressed concerns about the time lines of the move, the indicative budget and the associated reductions in the building program. Many staff did not see that there was a real risk to their health and to the museum collections in staying in the FSB. There was a lack of confidence in the management team and their ability to deliver a quality outcome for the museum. This frustration was vented in letters sent through organisations such as The Royal Society of Western Australia and by honorary associates to the Minister. Media leaks about the project plan and implementation were reported in a very negative context in The West Australian. Staff also wrote to Dr Ken Michael, chair of the Museum Trustees in which they claimed that the museum was placing the collections at risk and they questioned the authority of the Trustees to be directing the program and felt that the opinions of the curatorial staff were being ignored. Dr Michael explained that the planning committee would take on board many of the curators concerns and find resolutions. Security would be vastly improved through use of an electronic swipe card system and options for secondary compartmentalisation that would see the VESDA (Very Early Smoke Detection Apparatus) efficiency improved would be reviewed. Concerns over fire safety were diminished when it was shown that response times by Fire and Emergency Services Authority (FESA) vehicles were four minutes less for Welshpool than for the city.

It was noted that the temporary accommodation of objects in the warehouse would place them in a worse environment than they had in the FSB, for although there was no humidity control the passive climate control of physical mass, no windows and temperature control created a fair storage environment on the 3rd and 4th floor. The Trustees and the planning committee undertook to review options to ensure that conditions were not any worse than those found in Perth. Concerns over dust mitigation in the industrial suburb of Welshpool were overcome by ensuring that the air handling plant would have the highest level of filtration that can be achieved without the use of activated carbon. Concerns about the potential risk for cross-contamination of the collections from inappropriate fumigation using pesticides lead to a consultancy by Alex Roach (Roach, 2003). Roach noted that the FSB had many defects and that with good design the Welshpool facility would be able to incorporate the best methods of integrated pest management and move away from toxic chemical fumigants. Initial space allocation had focused on permanent and contract research staff so subsequent plans took into account the large number of volunteers and honorary (research) associates.

### **Building and infrastructure project team**

A small team consisting of the two Department of Housing and Works Project Managers and the Relocation Director met every week to check on the progress of the works being done by the electrical, mechanical, hydraulic and air-conditioning engineers. Under the guidance of the external Project Managers the museum had accepted that the project was split into eight packages in order to reduce the overall quantum in each unit. This ensured that more cost-efficient builders, air conditioning engineers, fabricators, laboratory builders etc. could achieve the outcomes without the additional overheads of large construction companies. Through application of a tight selection matrix the team was able to secure preferred consultants and contractors. Weekly meetings with the architects ensured that the requests of staff were taken into consideration and the quantity surveyors provided weekly updates on the progress of the works and associated costs. The team made a calculated decision that all the key issues of security, partial air-conditioning of the collections building would have to be met and had redesigned the facility to achieve these ends. Owing to the close working relationship between the team and the leading consultants the final cost estimates were completed by November 2003.

### **Budget adjustment and management of the relocation program**

The months of November and December 2003 were characterised by staff meetings in which the planning for the relocation was proceeding relatively smoothly but there was an increasing amount of unrest owing to the budget allocation not being finalised and that the plans kept changing. In late December the Relocation Director and the Project Manager from the Department of Housing and Works briefed the Director General about the impasse that had been reached between legitimate staff concerns and the formal budget allocation. In a remarkably frank exchange, the needs of the collection were acknowledged and the addition of more than \$4 million brought the revised total budget to \$10 million. This allowed the architect to finalise plans for the works in the coming months and staff responded positively to the news. In January 2004 the Relocation Team lost its Collection Planner Ross Chadwick who went back to his role as Collection Manager in the Anthropology department. All the work he had done in volumetric assessments with curatorial departments proved to be invaluable. David Gilroy replaced Ross as manager of the collection move. This appointment was greeted with delight by the dozen technical officers, for one of their team had become their leader.



Figure 1: Thylacine specimens from Nullarbor caves packed for transport and storage.

The appointment was pivotal since David had more than 28 years of experience as a conservator at the WA Museum and his highly developed complex negotiation and communication skills were put to immediate use. His role in the success of the relocation program has recently been recognised by the Museums Australia (WA) award for the most outstanding museum worker for 2006 from a large museum. Maggie Myers from the museum's conservation department worked as the Principal Conservation Planner from July 2003 to December 2004 when all the dry collections had been relocated. The Relocation Team had 99 years of accumulated experience in museums and in conservation of collections but they had never moved museums.

### **Relocation of the office of the CEO, Library and the Relocation Team**

The Executive Director, the main administration team and the library were relocated from the 2nd floor of the FSB to Welshpool in January 2004. The old compactus library shelving was re-erected as fixed shelving as there was a greatly increased floor area available. The Relocation Team, consisting of Director, Logistics Coordinator and the Administration Assistant were relocated from Perth at the same time, while the Collection Planner and Conservation Manager had work stations established at Welshpool but were principally operating out of the Perth site. The clearing of the 2nd floor of the FSB enabled packed materials to be moved from the main collection areas on the 3rd and 4th floor and were prepared for moving. Relocated staff were able to maintain their public presence through retention of existing phone numbers by utilising the connectivity via the fibre-optic line between Perth and Welshpool. During the relocation project all non-essential field work was postponed and curatorial staff and technical officers were encouraged to prepare the collections for relocation.



Figure 2: Relocated library with former compactus as static shelving.



### **The Kew Street Relocation Steering Committee (KRSC)**

Following Ministerial endorsement of the revised plan for the museum relocation to Kew Street on January 7th 2004, a steering committee consisting of the Chair of the Museum Trustees, the Director General of the Department of Culture and the Arts, the Executive Director of the Museum, the Human Resources Manager, the Chief Finance Officer and the Communications Manager from the Department of Culture and the Arts, Project Managers from the Department of Housing and Works combined with the Relocation Project Manager and Director to form the team. The KRSC constantly reviewed the budget and further refined the options for all aspects of the collection centre. Adriana Marramiero was the Project Officer who recorded the minutes and coordinated actions arising. Owing to a commitment of the Director General to the Minister that “it will all be done by Christmas” the KRSC had a massive task in hand. The group met every week at 07:30 for 1½ hours and then disbursed to their normal day jobs in and around the city. It was only after several months of these early morning meetings that the frequency was reduced to once a fortnight and the timing set back to 08:00. Major concerns from the wet curatorial staff were that the evaporative cooling system would not provide good collection care so the Relocation Director travelled to Darwin and Melbourne to review their wet stores. The review resulted in a complete turn around of position which saw the KRSC instruct the architects, the fire engineers, the hydraulic and electrical consultants to urgently revise plans with the air-conditioning engineers for a refrigerative air conditioning and a wet-mist fire suppression system. The Director General agreed to increase the budget by cash flowing from other departmental projects, thus additional funds were obtained that enabled the optimum wet solution to be found. The addition of a 440 kVA emergency power-generating unit provided continuity of power to the air-conditioning plant, to all the freezers and ultra freezers and to the five high pressure pumps that provided the power to disburse up to 25,000 litres of distilled water at 100 Bar through the wet store. The air conditioning plant would provide a very high level of filtered air.



Figure 3: (a) lower west side of “wet store” and (b) thorny devils (*Moloch horridus*)

The Executive Director Gary Morgan resigned in March 2004 to pursue alternative career options. Allanah Lucas from ArtsWA became the Acting Executive Director and immediately set up weekly meetings with Diana Jones, Acting Director of Science and Culture, and the Relocation Director to resolve issues and bring them back to the KRSC for endorsement. This streamlined the processes of

adjustment of plans and resulted in the team winning the argument that it was most cost effective to air-condition the whole of the 9,000m<sup>2</sup> site of the main collections building. The team also achieved compartmentalisation of the collection areas into seven boxes, each with their own VESDA. David Gilroy's proposal to have the air-return ducts changed to allow for a mobile exhaust facility to be attached cost an additional \$50,000 but it also provided for a series of exhaust tubes that went through the roof to enable spent fumigants to be safely removed from the collection boxes. Each collection box is sealed at the floor and roof levels and passed a 95% smoke retention test for 30 minutes, which demonstrated compliance with the relevant BCA code. The Acting CEO, Science and Culture and Relocation Directors also achieved the addition of a fully fire suppressed compartmentalised vault for storage of the dry holotypes, the arms and armour collection and the meteorites. Reviews of the progress by the KRSC noted that some sections of staff seemed reluctant to engage with the relocation and were apparently preoccupied with completing the revamping of the indigenous culture gallery, Katta Djinoong, which was being rebuilt on the upper floor of the Beaufort Street wing. The Acting CEO communicated in the clearest terms that unless staff were part of the Katta Djinoong team their role was to be focused on packing the collections in order to be ready to begin the move in August 2004.



Figure 4: Fumigant extraction tubes located in the return air and exit corridors

Reports from consultants had indicated that a building fit out and conversion program would be effected by August, hence the time line imposed on the Relocation Team. It was envisioned that the air conditioning plant would be operational and the collections would be able to be moved into their final resting place, without any double handling. Part of the communication strategy in demonstrating that the museum was moving to Welshpool saw the number of operational computers and telephones drastically reduced at the FSB and all the facilities were provided in Welshpool. Other factors took into account the fact that several curatorial staff had to acquit research grants, which had fixed contractual

time lines. In some instances granting bodies allowed for a time extension, but in many instances there was no recognition that the museum was facing the biggest crisis in its 113-year history.

### **Intensive packing and the trial move**

The program of intensive packing, supervised by Maggie Myers and David Gilroy, began in mid April and continued through the trial move and was ultimately concluded by December when all the dry collections had been relocated. A trial pack and move from the FSB to Welshpool was conducted to ensure that the methodology of moving tens of thousands of Perth cabinet and compactus shelving draws on mobilised cabinet assemblies would work. Data loggers recorded the vibrations and accelerations of the collections during the preparation of the objects, their placement into the transport modules, loading into and out of the truck. The trial set of objects and mobilised cabinets was repeated for a reverse run. Data showed that a maximum of 3.5 grams of acceleration was recorded during the double move which was much less than the typical peak levels of 32.5 and 60.8gm recorded during normal curatorial handling procedures. Achieving full focus from the aquatic zoology staff was not possible until after the middle of July when they had finished running of the World Congress of Malacology. This severely impacted on the preparation of the dry collection for relocation and the curatorial staff kept revising their volumetric projections, which had a knock on effect on how the logistics of the move could be coordinated. Three temporary work stations in the Jubilee Wing were shared between the Kew Street staff who had already relocated and those who had been redistributed across the Perth site.



Figure 5: Allied Pickfords team members with a “Perth Cabinet” on a six-wheeled trolley leaving the FSB loaded with collection materials.



### **Changes to building programs and adjustments in relocation schedules**

The August deadline for the opening of Katta Djinoong could not be met because of complications in providing air conditioning into the upper floor of the Heritage listed building. Installation of a new sub-floor system of supply ducts was complex and there were four months of delays in securing a lift, which had to come from Italy by ship, and in stabilising the floor. When works began to cut the hole for the lift well, it was found that the Georgian landing was one solid slab of slightly reinforced concrete, with little visible means of support. Urgent works by consulting engineers enabled a series of girders to be positioned underneath the slab and this ensured that the public were not at risk. The bonus of this work was that a new track lighting system was installed in the foyer of the Beaufort Street wing. The gallery was finally opened in January 2005.

Rather than pretend that the move would not impact on the public face of the museum it was acknowledged that there would be some negative impacts and that strategies were needed to alleviate undue criticism. Once staff had relocated to Welshpool there was an ever decreasing flow of staff into the city centre and so the communication strategy was changed. The planned Common Room for Welshpool based researchers to engage with the public in the Jubilee wing on the Perth Cultural Centre site was abandoned in favour of providing the Discovery Centre with a new freezer and refrigerator for storing biological specimens until they could be brought to the attention of curatorial staff.

Back at Welshpool the main move was delayed by three months until the air conditioning plant was fully operational. Fabrication delays associated with the giant fan, which pushes 76m<sup>3</sup> of air per second around the collections building, and the main electrical switch board meant that the testing of the plant could not be completed before the middle of November. As soon as one area of the building fit out was completed, collection items were moved in from either the temporary temperature controlled storage area in the warehouse or from the FSB. David Gilroy, Maggie Myers and all the Relocation Team worked at a frenetic but safe pace and managed to move the remaining 75% of the collection in six weeks. Thus the original promise of the Director General to the Minister that all the dry collections would be moved by the end of the year was met. The team from Allied Pickfords worked in a very supportive and responsive fashion and competed amongst themselves for the “Gilroy prize” of a slab of beer for the team who achieved the lowest level of vibration and acceleration during the week under review. By the middle of March 2005 more than 3.5 million items and wet specimens in more than 120,000 litres of alcohol had been relocated to Kew Street.

### **Improved communications**

In April 2004 Jodie Pudney, a communications and media strategist was seconded from another department in the Minister’s portfolio to improve communications about the relocation project. Regular communications were of great benefit in providing clear and accurate descriptions of the program to the staff. These bulletins were sent to museum staff via their e-mail and were printed out and put up on notice boards throughout the Perth site, where fewer and fewer computers were still connected to the network. The newsletters came out every two weeks and reported on how the relocation was proceeding. Right up until three weeks before the Christmas deadline many staff believed that their collections would not be moved for two to three years! By the middle of November approximately 25 percent of the total collection volume had been relocated to the new centre. Rather than attempting to hide the real project challenges of getting the complex plant and equipment operational, the communication team told the story straight. The movement of the iconic Blue Whale, located on the 5th floor of the FSB since 1971, was turned from a negative public issue into a very positive one by open communications. Media attention was courted and the crane operation of removing the skull,

jaw bones, rostrum and beak of the 25 metre long whale up through the roof were reported in The West Australian and on three television channels.

### **Completion of Perth site relocation**

The Relocation Project Team was formally disbanded in February 2005 but David Gilroy continued to manage the project technical officers until the move of the wet collections had been completed in March 2005. Maggie Myers returned to her substantive role in conservation at the beginning of the New Year. Ian MacLeod continued in the role of Relocation Director and assumed the responsibilities of Acting Director of Science and Culture from mid February until November to allow for the smooth transition to a fully functional Collections and Research Centre. The internal Project Manager Kent Jarman took up an administrative position in the Department of Culture and the Arts. Adriana Marramiero provided total administrative support until the final object had been relocated and then she became a Project Officer with the new Perth Site Manager. The museum's new Chief Executive Officer, Dr Dawn Casey, commenced work in February 2005 just before the finalisation of the move of the 130,000 litres of wet specimens.



Figure 6: Corridor in the main collections building showing viewable storage and air-conditioning supply ducts.

### **Conclusion**

With the successful completion of the relocation project the Western Australian Museum has demonstrated that it can take on a project and bring it in on time and on budget. Although the final cost to complete the works was \$11 million, the additional funds were for elements of the project that had been outside the original scope of the project budget of \$10 million. More than 3.9 million objects have been relocated and are now stored in a much cleaner and more accessible environment of 9,000 m<sup>2</sup> of heavily filtered and fully climate controlled air space. A new fully climate controlled Indigenous cultural material gallery Katta Djinoong has been opened and a semi-redundant exhibition gallery has been converted into an award winning exhibition space.

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