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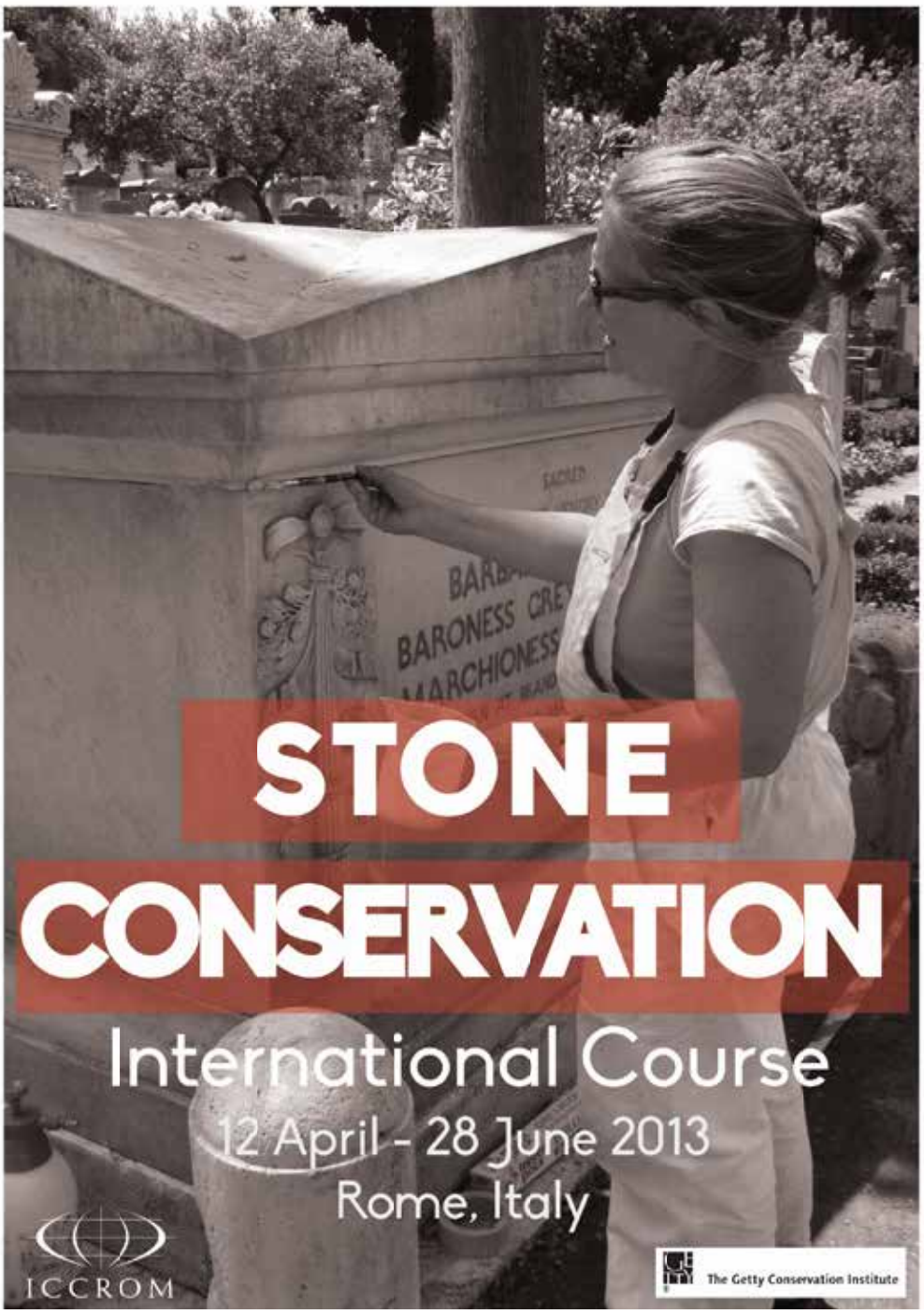

Jennifer Dickens

2013 Lord Mayor's Fellowship

An ISS Institute Fellowship sponsored by

City of Melbourne

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Cover image: The Fellow working in a monument in the Non-Catholic Cemetery in Rome used on the poster advertising the 2013 ICCROM and Getty Stone Conservation Program.

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i. EXECUTIVE SUMMARY

The Fellow, Jenny Dickens is an experienced materials conservator working at Heritage Victoria, the State Government's heritage agency. She also presents lectures at the University of Melbourne's Conservation of Cultural Materials program. She was awarded the City of Melbourne ISSI Fellowship to study stone conservation at ICCROM[1] in Rome for three months in 2013.

The study of stone conservation in Rome and mural conservation in Pisa became a career watershed for the Fellow. The studies gave her both a very thorough grounding and advanced knowledge of international best practice in the field. No training at this level in this subject is available in Australia. Learning from international lecturers and other participants about approaches to stone conservation in their countries also enabled Jenny to examine Australian practices more critically and to draw some new and important conclusions about them.

Before the program in Rome commenced, Jenny visited Pisa where she met the local government administrator, scientist and conservator who worked together to preserve Tuttomondo, a 1989 outdoor mural by Keith Haring. She also was also guided through the innovative scientific studies and outdoor wall painting conservation practices at the mediaeval Campo Santo in Pisa.

She then spent 11 weeks in Rome at ICCROM. The Stone Conservation Course was jointly organised by ICCROM and the Getty (GCI[2]). It comprised lectures, a study tour, laboratory work, hands-on treatments, site visits, readings and library research. Subjects covered were:

- History and theory of conservation practice
- Documentation and analysis
- Stone: Characteristics of the material and its use as a building material
- Deterioration mechanisms
- Conservation interventions and treatments and criteria for selection and implementation.

The new knowledge gained from the Fellowship has been introduced back to Victoria with the Fellow giving over 20 presentations on stone and street art, reaching a wide audience in the heritage industry, tertiary students and the veterans' sector. She has also begun forging connections between government, industry and academia to improve practices as well as using the expertise for overseas to contribute to developing standards.

The main message from the Italian studies was that even very badly damaged stone can be retained and recovered, mainly with careful cleaning, advanced use of carefully formulated mortars, desalination and chemical consolidation. This type of building materials conservation is common overseas and represents considerable financial and material savings when issues such as the exhaustion of quarries and increasing costs of new stone are considered. Original historic stone will show evidence of early hand carving and other craft practices; a protective case-hardened surface and will have weathered to a mellow colour. New stone is often cut by machine, has a soft surface and may not match the remaining original stone in the building in terms of engineering properties or appearance.

The Fellow's overseas experiences demonstrated just how much stone conservation practice in Australia differs from that in most European countries and the USA. While heritage practitioners in Australia use the Burra Charter[3] - which is one of the best heritage conservation policy documents in the world - the outcomes in terms of preservation and retention of original historic materials can be poor. Australia ICOMOS[4] has said[5] that 'it is ... apparent that a decline in the standard of works to heritage places has resulted in a diminishment of the cultural heritage values of some places...'

1 ICCROM - International Centre for the Study of the Preservation and Restoration of Cultural Property, Rome http://www.iccrom.org/

2 GCI – Getty Conservation Institute, Los Angeles http://www.getty.edu/conservation/

3 Australia ICOMOS, The Burra Charter http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf

4 Australia ICOMOS - International Council on Monuments and Sites http://australia.icomos.org/

5 Australia ICOMOS, Traditional Trades Working Group http://australia.icomos.org/get-involved/working-reference-groups/traditional-trades-working-group/

i. EXECUTIVE SUMMARY

Australia ICOMOS says that the decline in traditional trades is the reason for these poor outcomes. This is correct however the Fellow's overseas experience has demonstrated further factors. It is true that the decline in traditional trades must be reversed and recent documents such as the 2011 HTTSP[6] report and Australia ICOMOS's TTWG proposal[7] recommend more training in traditional trades. This is undoubtedly needed.

However the use of tradespeople for all the hands-on work on historic buildings is not always appropriate because the materials and techniques of preserving original fabric are quite different from the processes of creating new fabric. While not all original fabric is significant and worthy of preservation, much is. Traditional tradespeople will always be essential for many aspects of the preservation of historic buildings, however overseas practices show that building materials conservators are essential too. Conservators are trained to preserve original fabric, while most tradespeople are not.

Contrasting the content of the educational program at ICCROM and in other countries with those in Australia demonstrates that the current model of educating heritage professionals is also not leading to the preservation of significant original fabric of historic stone and buildings. This is because most tertiary level programs in Australia concentrate on heritage conservation theory and policy rather than the hands on practice of building materials conservation. And TAFE level training for tradespeople mostly teaches new construction techniques using modern materials (especially since the demise of programs such as the Specialist Centre for Heritage Trades at the Holmesglen Institute of TAFE[8]). To rectify this is recommended that:

1. A new academic program teaching Building Materials Conservation should be created. This could be established at the CCMC[9], University of Melbourne so as to maximise synergies with the existing Cultural Materials Conservation and Urban and Cultural Heritage programs.
2. Standards for stone and building materials identification and conservation practice should be developed to ensure that conservation of significant original fabric is prioritised over replacement where practicable. Governments at all levels should adopt these to ensure consistency of practice.
3. Education of conservation planners, architects and engineers to understand the importance of preserving rather than replacing significant original fabric.
4. Professional development in hands-on techniques for qualified conservators and those trades people who have some experience and sympathy with the preservation of original building materials. This would require bringing experienced buildings materials conservation practitioners from Europe and the USA together with some Australians to teach hands-on skills to conservators, conservation students and tradespeople.
5. To ensure the continued survival of the new skills, it is important to create a livelihood for building materials conservators and those tradespeople who are able to preserve original fabric. Methods to create markets for building materials conservation and traditional trade skills should be implemented. Recommendations 2 and 3 above will assist with this but other initiatives will be needed.

6 Heritage Trade Training Scoping Project (HTTSP) commissioned by CPSISC and Heritage Victoria on behalf of the Australian Heritage Chairs and Officials group. (CPSISC - Construction & Property Services Industry Skills Council) http://www.cpsisc.com.au/projects/Previous_Projects/Heritage_Trade_Training_Scoping_Project

7 Australia ICOMOS, The Burra Charter, ibid

8 Ian Willis, Traditional trades training, a story of failure and success, The Australian TAFE Teacher, Spring 2011 p.10-12. http://www.aeufederal.org.au/Publications/TATT/Spr11p10-12.pdf

9 CCMC - Centre for Cultural Materials Conservation http://shaps.unimelb.edu.au/cultural-materials-conservation

To achieve these five goals it will be necessary for all the stakeholders to work together, as all have important expertise to contribute. This includes CPSISC, ISSI, the Heritage Council of Victoria and the other states, HCOANZ[10], government at all levels, the University of Melbourne, the National Trust and the professional organisations – AICCM[11], Australia ICOMOS, EHA[12] and AIA[13]. However it is recognised that established practices and financial constraints may limit the involvement of some of these groups.

This Fellowship marked a watershed in the Fellow's career and introduced her to many more new concepts, knowledge and approaches than she ever expected. The Fellow's position in government, her long-term relationships in the heritage industry and significant connections to academia will ensure that the knowledge gained will be shared widely. It is critical that Australia's heritage practices change to bring them into line with the rest of the world.

10 HCOANZ – The Heritage Chairs and Officials of Australia and New Zealand http://www.environment.gov.au/heritage/info/hcoanz.html

11 AICCM – Australian Institute for the Conservation of Cultural Materials http://aiccm.org.au/

12 EHA – Engineering Heritage Australia https://www.engineersaustralia.org.au/engineering-heritage-australia

13 AIA – Heritage Committee, Australian Institute of Architects http://www.architecture.com.au/events/state-territory/victorian-chapter/victorian-council

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ii. ABBREVIATIONS/ACRONYMS

AHQF	Australian Heritage Quality Framework proposal (Australia ICOMOS)
AICCM	Australian Institute for the Conservation of Cultural Materials
APESMA	Association of Professional Engineers, Scientists and Managers, Australia (now PA)
CAE	College of Advanced Education
CCAE	Canberra College of Advanced Education (now University of Canberra)
CCMC	Centre for Cultural Materials Conservation, University of Melbourne
CMC	Collections Management and Conservation Working Party of the HCC
CPSISC	Construction & Property Services Industry Skills Council
DOE	Department of Environment (Commonwealth)
DPC	Department of Premier and Cabinet (Victoria)
DTPLI	Department of Transport, Planning and Local Infrastructure (Victoria)
EDTA	Ethylenediaminetetraacetic acid
GCI	Getty Conservation Institute
HCC	Heritage Collections Council (now disbanded)
HCOANZ	Heritage Chairs and Officials of Australia & New Zealand
HO	Heritage Overlay
HTTSP	Heritage Trade Training Scoping Project (Australia ICOMOS)
HV	Heritage Victoria
ICCROM	International Centre for the Study of the Preservation and Restoration of Cultural Property, Rome
ICOM	International Council of Museums
ICOM-CC	International Council of Museums – Committee for Conservation
ICOMOS	International Council on Monuments and Sites
LGA	Local Government Area
MA	Museums Australia
PA	Professionals Australia (formerly APESMA)
SC13	International Stone Conservation Course 2013
TAFE	Technical and Further Education
TTWG	Traditional Trades Working Group (Australia ICOMOS)
Uni Melb	University of Melbourne
VHR	Victorian Heritage Register

iii. DEFINITIONS

Alkoxysilane - An inorganic stone consolidant that forms siloxane bonds to strengthen silica based stones such as sandstone while maintaining breathability.

Burra Charter - The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013. The Burra Charter provides guidance for the conservation and management of places of cultural significance (cultural heritage places).

Conservation (Materials) - Materials conservation aims to minimise change to collection material, to protect items from the adverse effects of climate and chemical deterioration, and to safeguard our heritage not only for here and now but for generations to come. Conservation activities include preservation, restoration, examination, documentation, research, advice, treatment, preventive conservation, training and education.

Conservation (Burra Charter) - Conservation means all the processes of looking after a place so as to retain its cultural significance.

Inpainting - Inpainting is the process of reconstructing lost or deteriorated parts of images.

Maintenance - Maintenance means the continuous protective care of a place and its setting. Maintenance is to be distinguished from repair that involves restoration or reconstruction.

Preservation - Preservation means maintaining a place in its existing state and retarding deterioration. It is recognised that all places and their elements change over time at varying rates.

Restoration (Burra Charter) - Restoration means returning a place to a known earlier state by removing accretions or by reassembling existing elements without the introduction of new material.

Restoration (Materials Conservation) - Restoration involves treatments that enhance the interpretation of cultural heritage—e.g. inpainting losses in an oil painting so that the original appearance of the image is maintained. Restoration may also involve the reassembly of displaced components, removal of extraneous matter or integrating new materials or components in order to stabilise and strengthen the original artefact.

Reconstruction (Burra Charter) - Reconstruction means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material. New material may include recycled material salvaged from other places. This should not be to the detriment of any place of cultural significance.

1. ACKNOWLEDGEMENTS

Jennifer Dickens thanks the following individuals and organisations that have generously given of their time and their expertise to assist, advise and guide her through this Fellowship program.

Awarding Body – International Specialised Skills Institute (ISS Institute)

The International Specialised Skills Institute (ISS Institute) is an independent, national organisation. In 2015 it is celebrating twenty-five (25) years working with Australian governments, industry education institutions and individuals to enable them to gain enhanced skills, knowledge and experience in traditional trades, professions and leading edge technologies.

At the heart of the ISS Institute are our individual Fellows. Under the Overseas Applied Research Fellowship Program the Fellows travel overseas. Upon their return, they are required to pass on what they have learnt by:

- Preparing a detailed report for distribution to government departments, industry and educational institutions
- Recommending improvements to accredited educational courses
- Delivering training activities including workshops, conferences and forums.

Over 350 Australians have received Fellowships, across many industry sectors. In addition, recognised experts from overseas conduct training activities and events. To date, 30 leaders in their field have shared their expertise in Australia.

According to Skills Australia's 'Australian Workforce Futures: A National Workforce Development Strategy 2010'.

> *Australia requires a highly skilled population to maintain and improve our economic position in the face of increasing global competition, and to have the skills to adapt to the introduction of new technology and rapid change. International and Australian research indicates we need a deeper level of skills than currently exists in the Australian labour market to lift productivity. We need a workforce in which more people have skills and knowledge, but also multiple and higher level skills and qualifications. Deepening skills and knowledge across all occupations is crucial to achieving long-term productivity growth. It also reflects the recent trend for jobs to become more complex and the consequent increased demand for higher-level skills. This trend is projected to continue regardless of whether we experience strong or weak economic growth in the future. Future environmental challenges will also create demand for more sustainability related skills and knowledge across a range of industries and occupations.*

In this context, the ISS Institute works with our Fellows, industry and government to identify specific skills and knowledge in Australia that require enhancing, where accredited courses are not available through Australian higher education institutions or other Registered Training Organisations. The Fellows' overseas experience sees them broadening and deepening their own professional knowledge, which they then share with their peers, industry and government upon their return. This is the focus of the ISS Institute's work.

For further information on our Fellows and our work see http://www.issinstitute.org.au.

Jennifer Dickens also thanks the CEO (Bella Irlicht AO) and staff (Ken Greenhill and Paul Sumner) of ISS Institute for their assistance in planning and development of the Fellowship and completion of this report.

Governance and Management:

1. ACKNOWLEDGEMENTS

City of Melbourne - Fellowship Sponsor

The Fellow would particularly like to thank the City of Melbourne for sponsoring this fellowship, and in particular the Right Honourable Robert Doyle, Lord Mayor of Melbourne, for his support of this Fellowship.

Supporters

- Robyn Sloggett, Associate Professor, Director, Centre for Cultural Materials Conservation (CCMC), University of Melbourne
- Marcelle Scott, Centre for Cultural Materials Conservation (CCMC), University of Melbourne
- Joan Whelan, Project Manager, Construction and Property Services Industry Skills Council (CPSISC)
- Susan Macdonald, Head, Getty Conservation Institute (GCI) Field Projects
- David Young, Heritage Consultant and former ISS Institute Fellow

Employer support

- Tracey Avery, former Executive Director, Heritage Victoria, then Department of Planning and Community Development for her generous support which enabled the Fellow to take full opportunity of the Fellowship.
- Tim Smith, Executive Director, Heritage Victoria, Department of Transport, Planning and Local Infrastructure for his support in allowing the Fellow many opportunities to disseminate the knowledge gained during the Fellowship.

Organisations impacted by the Fellowship

Government

- Heritage Victoria, Department of Transport, Planning and Local Infrastructure, Victoria
- Heritage Advisors, town planners and cultural asset managers employed by the 79 Local Government Councils in Victoria
- Veterans' Unit, Department of Premier and Cabinet, Victoria
- Parks Victoria, Department of Environment and Primary Industries, Victoria
- Commonwealth Department of Environment, Canberra

Industry

- Heritage professionals and conservators in private practice in Victoria, including conservators, conservation architects, conservation builders, conservation planners and stone masons
- Construction and Property Services Industry Skills Council (CPSISC)
- ICOMOS
- AICCM
- Museums Australia

1. ACKNOWLEDGEMENTS

Education and Training

- Master of Cultural Materials Conservation program, Centre for Cultural Materials Conservation (CCMC), University of Melbourne
- Aboriginal Cultural Heritage Management Certificate IV program, Latrobe University and Aboriginal Affairs Victoria

2. ABOUT THE FELLOW

Name:

Jennifer Anne Dickens (Jenny)

Employment:

Heritage Officer (Materials Conservation), Heritage Victoria

Qualifications:

- Bachelor of Applied Science in the Conservation of Cultural Materials, Canberra College of Advanced Education (now University of Canberra), 1986
- Post Graduate Diploma of Materials Science and Engineering, Monash University, 2004

Membership/s:

- Australian Institute for the Conservation of Cultural Materials (AICCM)
- International Council of Museums, Committee for Conservation (ICOM-CC)
- The American Institute for Conservation of Historic and Artistic Works (AIC)

Short Biography:

Jenny Dickens has worked in materials conservation for over 30 years, starting as a volunteer in the conservation laboratories at the Australian War Memorial as a teenager in 1982. After gaining a qualification in materials conservation specialising in objects conservation, she conserved objects for a Pacific Island exhibition at the Australian Museum in Sydney, before heading to the USA and Canada to do a series of four month internships at the Smithsonian, Canadian Conservation Institute and the Bishop Museum where she gained valuable experience in many different types of objects.

Returning to Australia in 1989, she spent several years working in conservation outreach across NSW for Museums Australia finding that was an excellent way to consolidate her conservation knowledge. In 1993 she co-founded a business called Sydney Artefacts Conservation that specialised in the conservation of outdoor sculpture and cultural materials. She worked on important items including the Cenotaph in Martin Place and the cross from Mother Mary McKillop's coffin.

Jenny moved to Melbourne in 1995 to work for Heritage Victoria (HV), spending 10 years running the archaeological conservation laboratory where she introduced treatment efficiencies, set up the laboratory treatment part of HV's Conservation Bonds program and implemented conservation documentation and collection management systems. She also set up the new purpose built archaeological conservation laboratory that is currently occupied by Heritage Victoria. During this time (for two months each year) she was also the conservator with Sydney University's Australian Archaeological Expedition to Salento in Italy. In 2004 Jenny studied materials science at Monash University to deepen her knowledge of the structure and behaviour of metals, ceramics and plastics.

In early 2005 Jenny helped set up and began teaching objects conservation subjects at the new Master of Cultural Materials Conservation program at the University of Melbourne as a casual lecturer and continues to do this. She also teaches the collection care component of the Certificate IV in Aboriginal Heritage Management. After maternity leave in 2005/06 she returned to HV's head office. There she provides materials conservation and collections management expertise to the permits, assessments and grants areas. As the only conservator in these areas she is working to change the approach from replacement of important fabric, to preservation of original fabric.

3. AIM OF THE FELLOWSHIP PROGRAM

The Fellowship had a number of aims:

1. To consolidate and extend existing knowledge of the deterioration and conservation of historic stone and concrete items including:
   - » Outdoor murals
   - » Movable stone objects
   - » Indoor and outdoor sculpture
   - » Fountains
   - » Cemetery monuments
   - » Decorative stone details on buildings
   - » Building stone and mortar
   - » Brick and mortar construction.
2. The opportunity to compare heritage practice in Italy and other parts of the world with Australia will be the other important aspect of the Fellowship program. The other participants will come from all over the world and over 11 weeks we will have ample opportunity to understand each other's working environments. The presenters will also illustrate best practice in their countries. The practice in other countries and world's best practice will be evaluated against Australian practice and areas of change and improvements will be suggested.

Badly deteriorated sandstone monument Melbourne General Cemetery. Can stone this badly damaged be recovered by conservation?

3. To use the knowledge gained to ensure optimal outcomes for stone in heritage places when assessing permits for the conservation and restoration of outdoor murals, grave monuments and sculpture, fountains and stone details on buildings. The architects and contractors who do the work are being exposed to new ideas.
4. To incorporate the new findings are being incorporated into Heritage Victoria's policies and the education of its staff, students, other heritage professionals and the owners and custodians of stone objects, monuments and buildings. Specific skills enhancement areas addressed through the Fellowship will be communicated to heritage tradespeople, professionals, managers, owners and the public.

4. THE AUSTRALIAN CONTEXT

The heritage profession in Australia consists of conservation architects and engineers who specify works and trades people such as builders and stone masons who actually do the work. Historians and town planners are also involved, and there are less than five building materials conservators in the whole of Australia. Australia ICOMOS's Traditional Trades Working Group TTWG says that 'the use of traditional trades is an essential part of achieving high quality conservation of culturally significant places in accordance with the Australia ICOMOS Burra Charter 2013.' Trades and craftspeople are almost always employed to preserve historicbuilding materials. This often leads to historic items being remade (restored) and the originals discarded. However it is becoming clear that these approaches can no longer be justified – original historic materials and the evidence of their manufacture are becoming increasingly rare and must be preserved where possible. The high levels of technical proficiency and creative skill available in the past are not often available when the replicas are made. Replacement of original fabric leads to loss of rare surviving examples of 18th and 19th Century heritage craftsmanship.

The Australia ICOMOS Burra Charter (2013) provides guidance for the conservation and management of places of cultural significance in Australia and has been adopted by government agencies at State and Commonwealth levels.

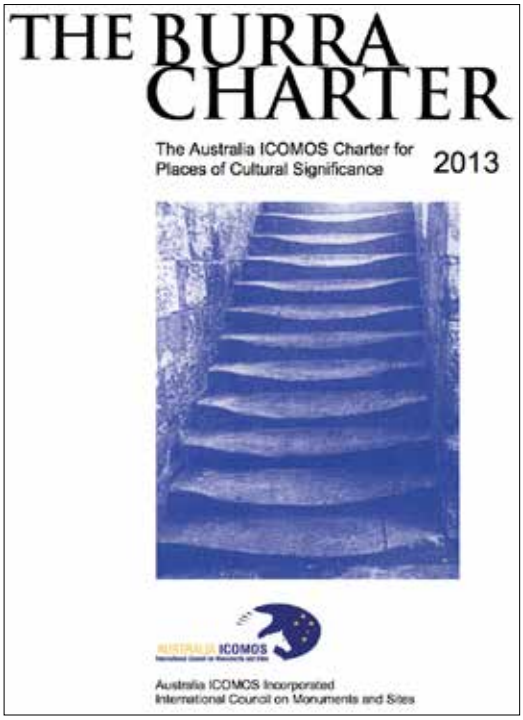
The Burra Charter[1] states:

> **Article 3.1:** Conservation is based on a respect for the existing fabric, use, associations and meanings. It requires a cautious approach of changing as much as necessary but as little as possible.
>
> **Article 4.2:** Traditional techniques and materials are preferred for the conservation of significant fabric. In some circumstances modern techniques and materials which offer substantial conservation benefits may be appropriate.
>
> **Article 17:** Preservation is appropriate where the existing fabric or its condition constitutes evidence of cultural significance, or where insufficient evidence is available to allow other conservation processes to be carried out.
>
> **Article 20.1:** Reconstruction is appropriate only where a place is incomplete through damage or alteration, and only where there is sufficient evidence to reproduce an earlier state of the fabric. In some cases, reconstruction may also be appropriate as part of a use or practice that retains the cultural significance of the place.

However in practice in Australia, Article 20 of the Burra Charter - Reconstruction is often followed to the almost complete exclusion of Article 17 – Preservation. This has led to wholesale replacement of original fabric, much of which could have been repaired and conserved. In fact the decision to choose 17 'Preservation' or 20 'Reconstruction' should be based on the significance of the surviving fabric. However this has not always been correctly identified as not all heritage practitioners are trained to identify materials. The source of this is likely to lie in the traditional way that architects work - they specify and the trades do the work. This unfortunate situation is not caused by the lack of traditional tradespeople but by the exclusive use of tradespeople for all projects and the absence of building materials conservators on most projects. And many of the professionals working in government, the private sector and in ICOMOS have little do not always understanding of the chemistry and physics of the decay and repair of building materials, or realise that building materials can often be conserved rather than replaced. They also appear to be largely unaware of the efficiency of contemporary, scientifically proven methods for the conservation of historic building fabric.

1 The Burra Charter, (referred to a number of times through this report) http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf

4. THE AUSTRALIAN CONTEXT



The Burra Charter The Heritage Trade Training Scoping Project

The Heritage Trade Training Scoping Project

The Heritage Trade Training Scoping Project (HTTSP) conducted in 2011 by Construction & Property Services Industry Skills Council (CPSISC) and Heritage Victoria on behalf of the Heritage Chairs and Officials of Australia & New Zealand (HCOANZ), suggested that:

"…CPSISC … seek to develop a small number of specialist units of competency addressing technical heritage skills for inclusion in the 'heritage restoration stream' of CPC40611 Certificate IV in Building and Construction (Specialist Trades.) … [and] … seek to develop one unit of (heritage) competency to be made available within the elective pools of Certificate III level trade qualifications". [2]

However the HTTSP study did not evaluate the quality of current outcomes for heritage buildings or the level of retention of original fabric in work being currently done. While there are good stonemasons in Australia, there are only a few stonemasons or heritage professionals with the skills and experience to conserve historic stone. This has led to the unfortunate situation where original stone is often replaced when it could have been conserved and retained. In addition unnecessarily aggressive techniques such as sandblasting and chlorine bleaching are being used to clean stone which results in serious damage to historic stone items and will shorten its life. Outdoor murals are often repainted which destroys the work of the original artist.

Heritage Education in Australia

The three ways that built heritage conservation training is delivered is partially responsible for these poor outcomes in retention of original fabric.

1. **Degree programs.** These are offered at one to two institutions in each state. However they mainly concentrate on documentation and the policy and theory of the heritage protection system. Physical conservation is not addressed in any depth.
2. **Short courses.** ICCROM, some universities and state heritage agencies have supported the delivery of technical short courses for a number of years. These are offered for one day up to one or two weeks. While the courses themselves are valuable, they are not offered in a systematic way to provide full coverage of all the concepts of conservation of stone and other building materials. There is no assessment to confirm understanding. In addition much of the profession lacks training in chemistry and so does not gain full understanding of the concepts. A small percentage of Australian heritage professionals have studied overseas but mostly not in the technical conservation areas.
3. **On the job training.** Many heritage professionals and trades people have gained their skills through apprenticeship programs or by working with other experienced professionals. This is valuable for passing on traditional skills but does not cover the chemistry of decay and repair.

2 CPSISC, 2011, Heritage Trade Training Scoping Project (HTTSP). http://www.cpsisc.com.au/projects/Previous_Projects/Heritage_Trade_Training_Scoping_Project

The other reason for the poor outcomes is because the heritage industry appears to be largely unaware of the efficiency of contemporary, scientifically proven methods for the conservation of historic building fabric. The areas where this is most noticeable are:

1. Outdoor murals - Conservation of the original paint, and graffiti prevention and removal methods
2. Management of biological growth
3. Cleaning (including graffiti removal)
4. Treatment of salts
5. Loss compensation using mortar instead of new stone
6. Retention of damaged original stone including the use of injection grouts and chemical consolidation
7. Treatment and re-treatment of fountains
8. Shelter coats and organic consolidation of marble and limestone.

SWOT Analysis

Strengths

- Well-connected and collegiate heritage profession.
- Many members of the industry are open to new approaches.
- Established informal training system.

Weaknesses

- Parts of the heritage industry are resistant to change.
- Increasing age of some heritage professionals.
- Fewer younger practitioners entering heritage trades or professions.
- Lack of understanding of the chemistry of decay and repair of building materials.
- Lack of understanding of the ways that original materials can be retained instead of being replaced

Christ Church Anglican Church, Toorak Road, South Yarra. Damaged stone in the spire was replaced with the same type of stone as used originally. It has never weathered to match the original because of the unforeseen reduction in industrial pollution in the area in recent times. This has led to a permanent jarring contrast between the original and new stones. Conservation of the original stone would have avoided this.

Opportunities

- Retention of original historic materials.
- Lower costs.
- Retention of the work of the original master craftspeople and artists.
- Career advancement for practitioners willing to learn new techniques.
- Bringing world's best practice to Australia.
- Preserving authentic Australian heritage.
- Existence of the Conservation of Cultural Materials program at the University of Melbourne

4. THE AUSTRALIAN CONTEXT

Threats

- The small size of the Australian market may mean that it would be difficult for building conservators to sustain themselves.
- Lack of new stone due to closure or exhaustion of quarries
- Original materials are not valued and there is a lack of understanding of building materials conservation by the Australian public
- Difficult to set up a new tertiary program

Conclusions

This situation leaves Australia in the strange position of having one of the best charters in the world but the worst rate of retention of original fabric and a low standard of works on some buildings. This is confirmed both by the Fellow's experience in Rome, and by Australia ICOMOS itself which stated in 2013 that "it is ... apparent that a decline in the standard of works to heritage places has resulted in a reduction of the cultural heritage values of some places."

Australia ICOMOS says that the decline in traditional trades is the reason for these poor outcomes. This is correct however the Fellow's overseas experience has demonstrated further factors. It is true that the decline in traditional trades must be reversed and recent documents such as the 2011 HTTSP report and Australia ICOMOS's TTWG proposal recommend more training in traditional trades. This is undoubtedly needed. However the use of tradespeople for all the hands-on work on historic buildings is not always appropriate because the materials and techniques of preserving original fabric are quite different from the processes of creating new fabric. While not all original fabric is significant and worthy of preservation, much is. Traditional tradespeople will always be essential for many aspects of the preservation of historic buildings, however overseas practices show that building materials conservators are essential too. Conservators are trained to preserve original fabric, while most tradespeople are not.

5. IDENTIFYING THE SKILLS AND KNOWLEDGE ENHANCEMENTS REQUIRED

There are examples of areas in Australian industries where there are weaknesses in innovation, skills, knowledge, experience, policies and/or formal organisational structures to support the ongoing successful development and recognition of individuals and the particular sector.

The focus of all ISS Institute Fellowships is on applied research and investigation overseas by Australians. The main objective is to enable enhancement and improvement in skills and practice not currently available or implemented in Australia and the subsequent dissemination and sharing of those skills and recommendations throughout the relevant Australian industry, education, government bodies and the community.

Specific skills enhancement areas addressed through the Fellowship will be communicated to heritage tradespeople, professionals, managers, owners and the public. The practice in other countries and world's best practice will be evaluated against Australian practice and areas of change and improvements will be suggested. While the Fellow had identified some specific areas of skills enhancement, the experience in Italy identified a number of others. These are:

Documentation of heritage places and objects

Philosophy of stone conservation - new approaches

Stone quarrying, carving and mortar manufacture

- Lime history and technology
- Marble quarrying
- Sources of stone
- Stone carving

Laboratory examination of stone and mortars

- Analysis of original mortars
- Properties of repair mortars

Properties of stone

Management of biological growth

- Identify materials which are no longer recommended for use as biocides
- Examine optimal biocide materials and methodologies for their use
- Learn how to change the environment to reduce biological growth
- Understanding lichen and algae

Cleaning (including graffiti removal)

- Identify safe and damaging cleaning agents
- Correct use of cleaning agents
- Examine long term effects of residues

Conservation of stone

- Analysis of original mortars

5. IDENTIFYING THE SKILLS AND KNOWLEDGE ENHANCEMENTS REQUIRED

- Unsuitable mortar materials
- Selection and formulation of suitable mortar mixes for different stones
- Investigate ways to retain as much of the original stone as possible.
- New repair materials
- Consolidants and water repellents
- Coatings
- Salts and their mitigation

Outdoor murals

- Cleaning without damaging the original paint
- Consolidation of the original paint to retain it on the mural
- Infilling areas of loss without interfering with the artist's original work
- Examination of materials available for repelling water and graffiti protection
- Environmental control
- Management of outdoor murals

6. THE INTERNATIONAL EXPERIENCE

Destination - Pisa, Italy

Keith Haring Mural Tuttomondo (1989), on the external wall, Church of Sant'Antonio Abate

6. THE INTERNATIONAL EXPERIENCE

Frescoes (1330s – 1630s), Camposanto Monumentale (cemetery building), Piazza dei Miracoli

Contacts

- Professoressa Maria Perla Columbini, University of Pisa - Tuttomondo and Camposanto projects
- Antonio Rava, conservator in private practice in Turin – Tuttomondo project
- Sylvia Panici, Commune de Pisa (Council of the City of Pisa) – Tuttomondo project
- Anton Sutter, Conservator, Opera del Duomo di Pisa – Camposanto project

The first three contacts were made during a visit to Pisa in April when the Fellow first arrived in Italy. The fourth contact was made during the ICCROM stone course study tour.

The Fellow, Jenny Dickens (centre), with Professoressa Maria Perla Columbini, University of Pisa (right) and Antonio Rava, of Rava Srl., Turin, (left) both of whom worked on the Keith Haring Mural in Pisa.

Objectives

Hold high-level discussions on the analysis, conservation and management of outdoor murals and frescos.

Outcomes – Outdoor murals

Background

Tuttomondo was the last mural Keith Haring painted before his death in 1990. By 2009 it was showing significant colour change, it appeared pale and lifeless. This was because carbonate from the support panels was redepositing on to the front of the colours giving the whole mural a white cast. Dirt had also deposited onto the mural in the years since it was painted. It was conserved in 2011 by Antonio Rava and Will Shank after careful analysis by Maria-Perla Columbini identified the pigments and damage.

The Camposanto, also known as the Camposanto Monumentale, was constructed between 1268 and 1464. Most of the walls are covered in frescos which date from 1360 – c.1660. The frescoes were very badly damaged during World War II when an American bomb caused a serious fire and destruction of the roof. This meant that the frescoes were exposed to the weather for 18 months during 1944 and 1945. After the war the damaged frescoes were removed from the wall and attached to asbestos based backings with large amounts of animal glue. They were also extensively over-painted. As they aged these repair materials caused further damage to the frescoes. Treatments to reverse this damage started in 2001 and continues today. As the frescoes of the Camposanto are exposed to the exterior air, monitoring and management of their environment is also needed.

The work at Camposanto is undertaken by the Opera della Primaziale Pisana. This is a conservation group established in the Middle Ages to preserve the buildings and artworks in the Piazza del Duomo di Pisa. These buildings include the Campanile (Leaning Tower), Duomo (Cathedral), Bapistry and Camposanto (Monumental Cemetery). It was incredible to meet fellow conservators who work for a conservation organisation that has existed for 1000 years.

Cleaning without damaging original paint

The paint of Tuttomondo was cleaned with agar gel and one per cent EDTA (Ethylenediaminetetraacetic acid). This gel gently softened the dirt (by removing the calcium) and was then allowed to dry. It was then easily peeled off the paint taking the dirt with it. The results of this gentle cleaning were very good - it had made the colours bright again. Because the Fellow was able to get close to the mural while in the company of Antonio Rava, she was able to see that the cleaning caused no loss of the underlying paint.

The cleaning techniques used on the frescoes at the Camposanto were even more innovative. Biologists first bred bacteria that only eat animal glue. The bacteria in a medium were then placed onto the front of the detached frescoes and were able to remove all the animal glue from the fragile frescoes without any damage to the paint. Solvent and laser cleaning were also used. Professoressa Columbini explained this process as well as her methods for identifying proteins in the binders of wall paintings and the way that some modern conservation materials can make the identification more difficult.

Consolidation of the original paint to retain it on the mural

This was not necessary on Tuttomondo; however in forming a professional relationship with Antonio Rava, the Fellow was able to discuss this issue more generally. In general the Italian approach is less interventive than the Australian approach and the addition of extra materials such as consolidants is avoided where possible.

6. THE INTERNATIONAL EXPERIENCE

Infilling areas of loss without interfering with the artist's original work

Again, inpainting was hardly necessary on Tuttomondo, but was needed for the Camposanto murals. Inpainting was kept to a minimum - small areas were retouched but larger areas where the original could not be determined were left blank. This has caused a lot of controversy at the Camposanto as the public are not used to seeing these losses. There is also controversy because the frescoes seem much paler after treatment and there have been accusations of over cleaning when in fact the paler appearance is due to the removal of the 1950's glue and overpaint.

Conserved frescos at Camposanto Monumentale, Pisa

Examination of materials available for repelling water and graffiti protection

Alkoxysilane was used make the acrylic painted surface of Tuttomondo water repellent which will make the paint last longer. This is an innovative use of alkoxysilane, a material which has previously only been used on unpainted stone and concrete. Professoressa Columbini has found that the alkoxysilane fills natural voids in the acrylic paint and gives it more durability and water repellency. This information has not yet been published. As alkoxysilanes repel water, but do not form a water-proof barrier, they represent the next generation of stone and paint preservation materials.

Documentation of interventions on a large scale

Documentation was not examined in the Fellow's time in Pisa but was taught later, during the ICCROM course in Rome.

Environmental control

Condensation was causing damage to the murals at Camposanto. To combat this, the conservators have developed a very innovative system. They install very fine heating strips in the new backings of the frescos. Near the front of the frescoes are humidity detectors. When condensation causes the humidity to rise above a pre-set level, the heating is activated and raises the temperature of the frescoes very slightly (approx. 1 to 2oC). This evaporates the water that would otherwise form on the face of the frescoes.

Humidity measurements at the Camposanto Monumentale, Pisa

6. THE INTERNATIONAL EXPERIENCE

Management of outdoor artworks

Silvia Panichi is the manager of Initiatives and Cultural Institutions, Cultural Heritage and Museum System for the Commune di Pisa (Council of Pisa) that is equivalent to an Australian local government council. It was very useful to talk to her as one government employee in the heritage field to another. She also organised for the Fellow to be present at the unveiling of the new walkway along the city walls of Pisa. Unfortunately she had a family emergency so the Fellow was not able to talk to her for long. However the following was discussed.

The Commune managed and part funded the conservation of the Haring mural Tuttomondo. In Australia there was a lot of controversy about whether our Haring mural in Collingwood should be conserved or re-painted. In Italy this did not occur, repainting was not considered, and the people of Pisa were very positive about the conservation of their mural. Silvia and Antonio felt that this was because the Italian population is far more knowledgeable about conservation in general and are used to seeing conservators working on large mural and fresco conservation projects. This level of awareness does not exist in Australia.

Silvia also noted that many tourists only stay in Pisa for half a day. They make a quick visit to see the Leaning Tower and then leave. The Commune of Pisa is working to encourage tourists to stay longer in Pisa. This will benefit the economy of Pisa and will also take the pressure off some of the more popular attractions in Italy that are being swamped with visitors. In addition the audience for the Haring mural are not aware of the older outdoor artworks in Pisa. One of the ideas is to use the Haring mural to illustrate the Pisan tradition of outdoor artworks that range from the mediaeval Camposanto frescos to other 17th and 18th Century outdoor artworks visible in Piazza dei Cavalieri in Pisa. The Pisan outdoor art tradition continues in modern times with the Keith Haring mural that dates from 1989.

Frescos on the roof of an open tunnel in Piazza dei Cavalieri, Pisa

Detail of sgraffito work on the exterior of a building in Piazza dei Cavalieri, Pisa

6. THE INTERNATIONAL EXPERIENCE

Destination – Rome Italy

18th International Course on Stone Conservation (SC13), International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) Rome.

ICCROM is an intergovernmental organisation dedicated to the conservation of cultural heritage. Its members are 133 individual nation states. It is the only institution of its kind with a worldwide mandate to promote the conservation of all types of cultural heritage, both movable and immovable. One of the five areas in which it contributes to preserving cultural heritage is by training where it develops new educational tools and materials and organising professional activities.

Contacts

While the physical location of the course was mostly in Rome, 45 high level practitioners from the UK, USA and Europe (Italy, Portugal, Spain, Germany and France) came to Rome to teach in their areas of expertise in stone conservation. They discussed projects from all over the world (Algeria, Austria, Cambodia, France, Germany, Italy, Iran, Jordan, Portugal, Spain, UAE, UK and USA). Specific presenters, their affiliations and the subjects they taught are listed in Attachment A.

The other 18 participants in the program came from all over the world so the Fellow received the benefit of even more international perspectives and developed professional relationships with these participants as well. As the group was together for nearly three months, meaningful relationships were forged.

Objectives

Work towards the attainment of advanced level education in the theory and practice of stone conservation. This was to include new conservation techniques and recent research as well as those traditional practices and materials that are still relevant. Particular areas of importance were conservation of outdoor murals, biocides, cleaning agents, compensation of loss, damaged surfaces and care of fountains.

Classroom at ICCROM

ICCROM Stone Conservation Course SC13

The course was divided into four main modules which included lectures, a study tour, laboratory sessions, hands-on treatments, site visit, extensive readings and library research. The modules were:

- History and Theory of Conservation and documentation
- Stone: Characteristics of the material and its use as a building material
- Deterioration mechanisms; methods of survey and analysis
- Conservation interventions and treatments: criteria for selection and implementation.

A small proportion of the issues the Fellow had identified initially were outside the scope of the course and could not be covered; however the Fellow was still able to extend her thinking in these areas within the framework of her new knowledge. In a few other cases some of the subjects the Fellow had identified had not yet been examined in detail; this helped to identify areas that need further research.

The program also provided a great deal of new information and approaches in other areas of stone conservation as well. As a result the program delivered an extremely thorough grounding in all aspects of current stone conservation practice and turned out to be even more valuable than the Fellow had expected.

The program was also a great opportunity to experience many different (good and bad) teaching styles and methods from the perspective of a student and from the perspective of non-English speakers. This has helped the Fellow to consider and refine her teaching methods.

Finally, the carefully curated reading list (Attachment C) was an invaluable resource for future reference, containing as it did the most up to date publications on the topic of stone conservation. The references were either provided to us or available in ICCROM's magnificent library. Many of these references are not available in Australia.

The ICCROM Stone Conservation Course SC13 was an extremely comprehensive introduction to all aspects of stone conservation. It is not possible to summarise all the new knowledge gained by the Fellow. The outcomes listed below are only a small selection of all the areas covered.

Outcomes of ICCROM SC13 – Documentation

During the program the Fellow heard about many new documentation techniques; however time did not permit us to put many of them into practice. Fortunately, a comprehensive list of websites was provided to enable the participants to research them independently. Techniques flagged included:

- Standard terminology
- Digital photography
- Colour calibration
- Rectified photography
- Mapping
- USB microscope
- Photogrammetry
- High dynamic range photography
- Laser scanning

6. THE INTERNATIONAL EXPERIENCE

Digital colour card for accurate documentation

Outcomes of ICCROM SC13 – Philosophy of stone conservation

Rome contains some excellent examples of the different approaches to stone conservation. This ranges from the wholesale re-use of Roman marbles and other precious stones in churches to the different methods of reconstruction of damaged Roman masonry. Even the Colosseum was shown not to be immune to changes in the fashion of restoration. On one side it is not possible to easily discern which section has been re-built and which is original, while on the other side the differences are very clear. The modern approach is to minimise the appearance of new additions and to attempt to keep as much of the original fabric as possible.

Outcomes of ICCROM SC13 – Stone quarrying, carving and mortar manufacture

Lime history and technology

This area was covered in great detail and enabled us to gain a comprehensive understanding of the importance of lime mortar in historic masonry and how important it was that it be used for all repairs.

Marble quarrying

The Fellow was fortunate to be able to visit Carrara with the group where she visited an underground marble mine and also a display of historical marble quarrying, handling, cutting and transportation methods.

Carrara landscape showing former quarrying areas

Inside a modern, underground marble quarry in Carrara

Sources of stone

The Fellow learnt how all stone, especially decorative stones such as coloured marbles and limestones, were quarried and traded all over the Roman empire. She was also taught about the sources of the marble and other stones used to make sculptures all over the world (including in Australia).

Stone reclaimed from Roman temples used on a mediaeval church floor

6. THE INTERNATIONAL EXPERIENCE

Stone carving

Carlo Nicoli is a third generation stone sculptor who is the director of Studio Nicoli in Carrara. This studio carves marble to create sculptures for artists all over the world. Many artists send them clay or plaster maquettes and Studio Nicoli creates them in marble to the artist's specifications using techniques that are hundreds of years old. The Fellow also had the opportunity to try marble carving in the Rome studio of Peter Rockwell, sculptor. This showed us just how difficult stone carving is.

Interior, Studio Nicoli, Carrara

Conversion of a plaster maquette to a marble sculpture, Studio Nicoli, Carrara

Outcomes of ICCROM SC13 – Laboratory examination of stone and mortars

Examination of stone and mortar properties

In order to characterise stone and mortar and the condition of stone and mortar, it is necessary to be able to document their properties. In the ICCROM labs the Fellow learnt how to measure density, porosity and grain size of new and deteriorated stones and mortars.

Measuring the porosity of stone, ICCROM labs

6. THE INTERNATIONAL EXPERIENCE

Analysis of original mortars

Acid digestion followed by microscopy was used as the main way to identify the aggregates found in mortars. This was generally effective except when there was a high proportion of calcareous materials found in the mortar binder or aggregate. It was useful to be shown how to identify different sand types visually.

Testing mortar properties, ICCROM labs

Evaluation of mortar consolidants

Outcomes of ICCROM SC13 – Management of biological growth

Identify materials which are no longer recommended for use as biocides

Bleaches such as sodium hypochlorite are no longer recommended for cleaning biological growth from stone as they leave chloride residues in the stone and make it unnaturally white. Unfortunately recommendations for the use of these materials are still found in older conservation literature and have been used in Australia based on this.

Examine optimal biocide materials and methodologies for their use

Quaternary ammonium solutions in water or solvent are recommended. In Australia all commercially available quaternary ammonium solutions or 'quats' contain a blue dye because they are made for swimming pool use. However in Europe, dye free quats are readily available and this is recommended for cultural materials, as the long-term effects of dyes are not known. Quats are generally used at low concentrations and do not leave residues (although the blue dyes may).

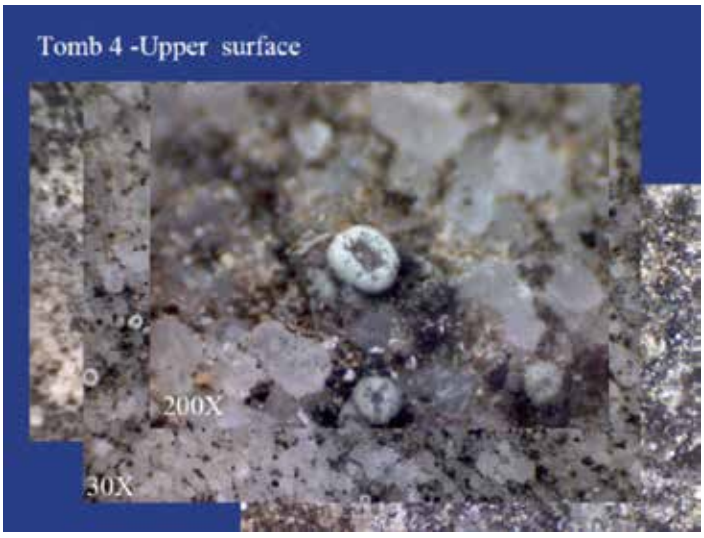
The way that the biocides are used is also important. The usual practice is to apply biocide and then immediately scrub the stone. However this has been shown to remove a lot of stone with the lichen. The recommended method is now to apply the biocide and leave the lichen to die for four to six weeks. Then the dried dead lichen can be easily brushed off with minimal loss of stone.

Learn how to change the environment to reduce biological growth

Water was identified as the main cause of biological growth. Methods to fully or partially shelter stone from rainfall will reduce growth. Attending to water flow off and through buildings and sculptures must also be considered. The use of residual chemicals to reduce vegetation growth is no longer recommended.

Understanding lichens

The group learnt that some types of lichen are more damaging than others. Endolithic lichens grow into the stone and cause the most damage to cultural materials. In nature lichens have a major role in the weathering of rock. Other forms of lichen (Foliose, Fruticose, Squamulose and Leprose) grow on the surface of stone and cause far less damage this showed that it is important to work with botanists to identify the types of lichens that grow in an area to determine whether local lichens are actually damaging stone buildings, monuments or sculpture and need to be removed or not.



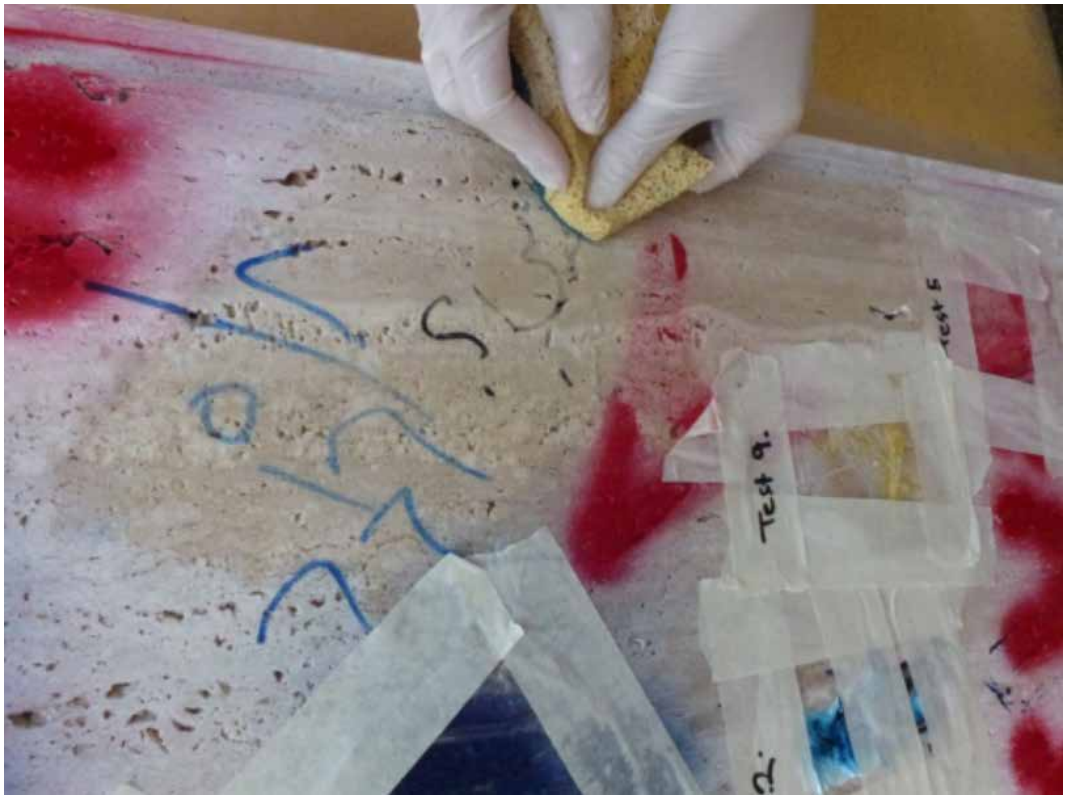
Microphotograph of biological growth on lichen made using a USB microscope

6. THE INTERNATIONAL EXPERIENCE

Outcomes of ICCROM SC13 – Cleaning (including graffiti removal):

Identify safe and damaging cleaning agents

This section was useful as it dealt with graffiti. Unfortunately the products recommended for graffiti removal are not available in Australia and the presenter did not provide enough information on the chemistry of the graffiti removers for the participants to be able to identify similar local products or mix our own. However the Fellow read and learnt how paint, dirt and biological growth can penetrate deep into stone which explains why aggressive abrasive techniques such as sandblasting or high pressure water cause considerable loss of stone.



Testing graffiti removal materials and methods

Correct use of cleaning agents

The Fellow learnt that it is important that the cleaning agent is carefully matched to the material used to create the graffiti. Otherwise unnecessarily aggressive measures will be used when gentler, more precisely targeted chemicals may have been more effective. It was also noted that all cleaning inevitably damages stone, so it is important that any cleaning done is both effective and undamaging. Coating and good maintenance are also needed to reduce the frequency of cleaning.

Examine long term effects of residues

The subject of residues left by cleaning agents was not covered in the stone course. The profession has not yet examined this area and it was identified as an area of further research.

Anti-graffiti coatings

The Fellow learnt that many commercial anti graffiti coatings acted as a barrier to the free movement of water within the stone. This can damage stone and cause spalling, so these materials are not recommended. Alkoxysilanes show potential as anti-graffiti coatings; however more research is needed.

Outcomes of ICCROM SC13 – Conservation of Stone

Unsuitable mortar materials

Through discussion of its chemistry and behaviour, cement was shown to be unsuitable for repair of historic masonry (brick and stone) and was shown to be very damaging. This was important information.

Commercial lime mortars were also not recommended because it is difficult to find out what all the ingredients are. The ageing properties of the novel ingredients often found in these mortars are also unknown. However these materials are being used increasingly and it is hoped that some background into these will be provided in the modern materials program.

The residues left by coatings and cement was discussed in detail and the Fellow had the opportunity to practice methods to remove old pointing. Selection and formulation of suitable mortar mixes for different stones was also covered extensively.

ICCROM students gained extensive experience in the formulation of repair mortars and the importance of different aggregates for different purposes. During the practical session in Parma the Fellow was able to put this knowledge into practice this was very valuable.

Retention of original stone

In Rome and Parma the Fellow was taught how to match mortar to the original stone by colour, texture, composition and properties. Once mixed, the Fellow was able to practice how to inject it into voids. This resulted in an almost invisible repair that greatly strengthened the stone. The stone at Parma Cathedral has been repaired using these methods and was a great example of the way that even badly damaged stone could be retained rather than replaced (as is the unfortunate practice in Australia).

There was not enough time to discuss the use of cement to repair historic cement based masonry. However it was pleasing to hear that a program covering this and other modern materials is in development.

6. THE INTERNATIONAL EXPERIENCE

Parma Cathedral wall, losses in stone repaired with almost invisible mortar repairs

Consolidants and water repellents

The program greatly extended the Fellow's understanding of the use and potential of these important materials for use both in fountains and on outdoor stone buildings and sculpture. When first developed and used by conservators, alkoxysilanes had a poor reputation but with advances in the understanding of their use and chemistry they have become more suitable for historic stone and cement. The current versions that have elastomeric properties have considerably improved performance.

Salts and their mitigation

The teaching on this topic was particularly comprehensive. The Fellow learnt about the sources of salts, types of salts, their behaviour, effects and methods of extraction using different types of poultices. We learnt how some poultices can actually activate salts from deep within the stone and cause more damage.

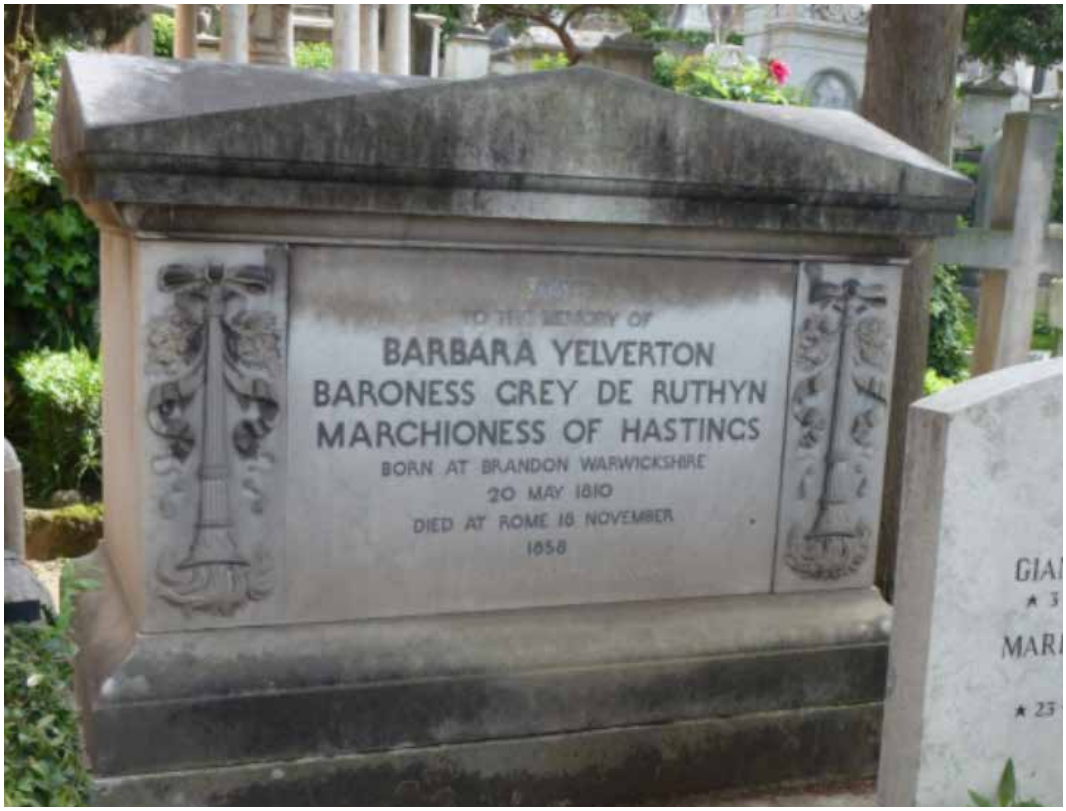
Wall at Hadrian's Villa with losses at the base caused by salts

Practical exercises

The practical exercises in the Non-Catholic Cemetery in Rome and in the workshop of Stefano Volta were immensely valuable in enabling the Fellow to put her learning into practice. The class had the invaluable opportunity to practice the following techniques:

- Identification of biological growth and use of biocides
- Cleaning with low pressure water
- Poultice treatment to reverse the deterioration caused by acid rain
- Laser cleaning
- Consolidation with alkoxysilanes
- Pinning repairs
- Mortar fills to match stone.

6. THE INTERNATIONAL EXPERIENCE



Tomb at the Non-catholic cemetery at Rome, before treatment

Tomb at the Non-catholic cemetery at Rome, after treatment

Concluding Remarks

This Fellowship marked a watershed in the Fellow's career and introduced her to many more new concepts, knowledge and approaches than she ever expected. The understanding that even very badly damaged stone can be retained and recovered was revelatory and has led to a fundamental shift in her professional practice. This concept has already been introduced back to Victoria with the Fellow's presentations reaching a wide audience in the heritage industry, tertiary students and the veterans' sector.

The Fellow's position in government, her long-term relationships in the heritage industry and significant connections to academia ensures that the new knowledge gained will be shared widely. It is critical that Australia's heritage practices change to bring them in line with the rest of the world.

Original stone should be retained not replaced and the profession of building materials conservation must be created. In the future the Fellow hopes to be able to influence the development of an academic program to train building materials conservators.

7. KNOWLEDGE TRANSFER: APPLYING THE OUTCOMES

Initial application of outcomes

To date, the Fellow has given eight presentations on the conservation of stone and outdoor murals. The aim of most of the presentations was to inform the audience about new materials and techniques for the conservation of stone and contrast practice in Europe with that in Australia. The aim of lectures four and five was to impart more detailed technical information as part of an educational program.

Presentations made to date:

1. **2 August 2013 –** Presentation to Heritage Victoria staff giving a general outline of the course
2. **22 November 2013 –** Presentation at the Local Government Heritage Seminar entitled 'Recent Advances in Stone Conservation'
3. **9 December 2013 –** Presentation to the general Victorian heritage community, expanded version of 'Recent Advances in Stone Conservation'
4. Two lectures to the University of Melbourne Masters in Cultural Materials Conservation students. These will be repeated annually.
   a. **24 February 2014 –** Conservation of stone
   b. **1 May 2014 –** Technical Examination of inorganic materials including stone
5. **28 February 2014 –** Contribution in the areas of metal/paint/stone interactions to a workshop called 'Looking after War Memorials and Honour Rolls' with past ISSI fellow David Young. This workshop will be repeated five more times in the twelve months from November 2014.
6. **27 June 2014 –** Presentation to Parks Victoria, expanded version of 'Recent Advances in Stone Conservation'
7. **28 June 2014 –** Presentation to City of Melbourne, expanded version of 'Recent Advances in Stone Conservation'
8. **14 September 2014 –** Organiser and one of the presenters at the 'Keith Haring and the Conservators' seminar. Part of 'fringe' session before the ICOM-CC conference. Antonio Rava (who the Fellow met in Pisa) also presented at this seminar
9. **December 2013 -** Presentation to staff of the local government area of the Department of Transport, Planning and Local Infrastructure
10. **Date TBC –** Presentation to the Australian Institute for the Conservation of Cultural Material, Victorian Division, (conservators' professional group).

The presentations and lectures have been well received by all the audiences.

7. KNOWLEDGE TRANSFER: APPLYING THE OUTCOMES

The Fellow teaching during a workshop on conservation of buildings in Australia following her return from Rome

Longer term application of outcomes

Presentations and lectures

Many of the participants at the above presentations expressed interest in more detailed seminars on the topics covered in the presentation. These include documentation, biological control, mortar matching, consolidation and repair techniques. The Fellow hopes to start these in early 2016. She will also continue to teach at the University of Melbourne using the knowledge she gained during the Fellowship.

Permits

The Fellow issues permits for works to places on the Victorian Heritage Register. Before the permits are issued, the Fellow discusses the works with the consultant, contractor or owner of the place to ensure that the works proposed will preserve the heritage significance of the place. The works approved in these permits is informed by the Fellow's professional development in Rome.

Advice

The Fellow is an active member of HeritageChat, an online discussion group for all heritage professionals in the state of Victoria. She has been providing materials conservation advice in answer to questions approximately every one to two weeks for a number of years. Following her Fellowship she is now also able to supply stone conservation advice to the group. Heritage advisors and staff from other government departments also contact her off list for advice that is freely provided. Since the Fellow returned from Italy, she has also been providing advice to other conservators on the updated materials and methods she learnt about at ICCROM. Finally, the Fellow provides advice to members of the public who call Heritage Victoria with stone preservation problems.

Veterans' heritage

The Fellow sits on the assessment committee for the Department of Premier and Cabinet (DPC) Restoring Community War Memorials and Avenues of Honour Grants Program. This is a very active program where approximately 20 applications for grants are assessed every two months. The majority of these grants are for conservation works to stone war memorials. The Fellow is able to ensure that the works carried out reflect best practice in stone conservation. Many of the war memorials, especially those in outer suburbs and country Victoria, are not listed on the Victorian Heritage Register or Local Government Heritage Overlay. This means that they would not otherwise receive any input from a heritage professional.

7. KNOWLEDGE TRANSFER: APPLYING THE OUTCOMES

Sandstone and marble Boer War memorial, Tatura

8. RECOMMENDATIONS

The Fellow's experience studying at ICCROM in Rome and seeing practices there clearly demonstrated how the current model of educating heritage practitioners and undertaking the physical conservation of Australia's built heritage is not preserving the original fabric of historic stone and buildings. To rectify this is recommended that:

- A new program teaching Building Materials Conservation should be created
- Standards for stone and building conservation practice should be developed.

The exposure to practices during the overseas Fellowship showed why the current model of using tradespeople for all works on historic buildings is not working. It is because the materials and techniques of preserving original fabric are quite different from the processes of building new fabric using traditional practices. Despite this Australia ICOMOS's Traditional Trades Working Group TTWG still says that, "The use of traditional trades is an essential part of achieving high quality conservation of culturally significant places in accordance with the Australia ICOMOS Burra Charter 2013". This is still true however building materials conservators are also essential.

Australia ICOMOS and the state heritage agencies have organised many informal workshops for heritage professionals over the past 30 years. However despite these efforts, Australia is in the strange position of having one of the best charters in the world but the worst rate of retention of original fabric and a low standard of works on some buildings. This is confirmed both by the Fellow's experience in Rome and by Australia ICOMOS itself which stated in 2013 that, "It is ... apparent that a decline in the standard of works to heritage places has resulted in a diminishment of the cultural heritage values of some places..."

This continuing[1] use of traditional trades for all aspects of work on historic places will ensure the continued loss of original fabric and degradation of our built cultural heritage. This is not to say that the few remaining traditional tradespeople working in Australia should be discouraged. In fact these practitioners should be nurtured and retained, especially for the cases where reconstruction is necessary. There will always be a place for new construction on most sites. In some specialised areas such as re-pointing, roof plumbing and carpentry traditional trades will always be needed. In addition some traditional practitioners have developed materials conservation skills and these people are an important part of the Australian Heritage industry and should also be supported. However it is essential that State and Commonwealth heritage agencies recognise and promote the profession of building materials conservators together with those of traditional tradespeople. Building materials conservators should be working side by side with traditional trades and engineers/ architects on most heritage projects.

New education program recommended

Meeting all the other participants and presenters at ICCROM showed the Fellow how important formal building materials conservation programs were to the production of a critical mass of highly skilled and knowledgeable practitioners. It is not practical to send all Australian heritage practitioners to ICCROM in Rome – although this would be an ideal outcome. Instead it is proposed that the skills gap in Australian practice be met by formal training. It is suggested that a program of Building Materials Conservation be developed. This should mirror architectural materials conservation education programs such as the Historic Preservation Program at Columbia University and include historic materials science subjects as well as chemistry. This approach is essential to ensure that the students gain a thorough understanding of the chemistry of deterioration and preservation.

1 Australia ICOMOS, Traditional Trades Working Group and proposed Australian Heritage Quality Framework, http://australia.icomos.org/get-involved/working-reference-groups/traditionaltrades- working-group/

8. RECOMMENDATIONS

It is important that the proposed program includes an assessment component to ensure the participants fully understand the practicalities and to produce graduates who are able to apply best practice. The program should structured so as to be easily accessible to practitioners in Asia as well as those who are working full time and living outside Melbourne. To provide maximum flexibility so as to attract as many participants as possible, a variety of study patterns should be offered:

- Full and part time on-campus study – two intensive modules per month
- Sandwich program of one week per month intensive on-campus modules so that participants can return to their homes for the other three weeks of the month and complete written work from home
- Summer program offering several modules.

Tradespeople wishing to upgrade their qualifications should have a Certificate IV in specialist trades such as stonemasons, hard plasterers, painters etc. Some of these trades are offered at Holmesglen Institute. It is important that pathways are offered for these specialists to gain a Bachelor of Arts to allow them to progress to the higher degree programs. Industry experience should be one pathway. Another important way for current practitioners to learn would be for them to be given the opportunity to undertake practical work with advanced stone conservators in Italy and the UK.

To attract practising conservators and current built heritage professionals as well as new students, there would need to be provision for credit for pre-existing training and experience. It is important that a Postgraduate Diploma is available which can be used as a bridge to the new Master of Building Materials Conservation for the many Australian conservators who trained at the former Canberra College of Advanced Education (Australia's only conservation training program from 1978 to 2002). It should also be open to graduates of the current Master of Cultural Materials Conservation and Master of Urban and Cultural Heritage programs, with credits for common subjects.

Many of the presenters needed for this new program do not live in Australia, so provision will need to be made to bring in overseas presenters for the first five to ten years of the program until local expertise has developed. Many of the presenters for the ICCROM Stone Conservation Course would be suitable. ICCROM is able to provide some practical assistance to countries wishing to duplicate their courses in their home countries.

The new program will also create a hub for research into the specific preservation issues of stone in Australian conditions. This research will build on existing research. Topics could include:

- Behaviour of stone and treatment materials at typical Australian summer weather conditions
- Strength and mechanical properties of Australian stones
- The extent of stone damage caused by Australian lichens
- Treatment of salt damage in very porous limestone
- Consolidation of high clay sandstones
- Graffiti prevention, barriers and removal
- Performance of shelter coats on exterior marble in Australia
- Documentation.

Standards for the heritage industry

Although the Burra Charter was first adopted in 1979, and it remains a great policy document, the heritage industry has never formally adopted detailed standards to guide its work. In addition, traditional tradespeople are finding that they are often undercut by other practitioners using non-traditional materials and short cuts. A common problem is the use of cement (easy to use but damaging to stone) instead of lime mortar (a little more difficult to use but beneficial to masonry). For traditional trade practitioners and building materials conservators to survive, it is important to ensure that they are able to undertake best practice and make a living without being undercut by operators using cheaper poorer quality materials and methods. This can be achieved by Commonwealth and State heritage agencies and local government adopting minimum standards for all works to heritage places.

Heritage Victoria has begun this process by developing a standard for the replacement of corrugated steel roofing. This project is being led by the Fellow who is working with heritage advisors and a conservation builder. In creating the standard they have been examining research, consulting with the wider heritage community and industry. This has led to a related research project that is being done by a Melbourne University student. This 'crowd sourcing' process ensures that the final document will be owned by the heritage industry instead of being imposed from above as has been done in the past. It represents the industry's position on this topic. This is a first for Australia. The next standard to be developed will be for mortars and renders. The Fellow will be able to use the skills gained during the Fellowship to influence this and future standards.

The standards will be put onto Heritage Victoria's website and initially will be accessible to Local Government in Victoria and the public. They will also be distributed under existing information sharing arrangements between the other State and Commonwealth heritage agencies. They are intended to be understandable by everyone involved in the heritage industry – the public, owners and managers of heritage places, local government, heritage advisors and planners, heritage practitioners and staff of state and Commonwealth heritage agencies. Standards will also ensure that the heritage industry is exposed to new practices such as the retention of original stone and research done by students and academics in the proposed new program.

Sandstone lion, Boer War Memorial, South Melbourne. The fellow has given advice on the care of this memorial.

8. RECOMMENDATIONS

Implementation of recommendations

Who should develop the new education program?

All sectors with an interest in heritage conservation will need to work together to develop a new education program, implement standards and change current practices.

Role of Education providers

The Centre for Cultural Materials Conservation (CCMC) at The University of Melbourne is uniquely placed in Australia and Asia to offer a new program of Building Materials Conservation. It currently offers a Masters of Cultural Materials Conservation by course work, and this model (and some subjects) could be adapted at a lower cost than would be needed to set up a new program. CCMC also offer a chemistry-bridging program that would be needed for many Australian heritage practitioners. There is also a conservation program at the University of Canberra, however it is focused on producing graduates with a more general background in conservation. The issues facing Australian historic stone buildings and monuments need to be solved by specialists.

Melbourne University already offers a Master of Urban and Cultural Heritage. Of eight possible subjects offered in the Practice and Technology Elective Stream, only three subjects fully or partially address physical conservation of building materials: Conservation of Architectural Materials, Architectural Finishes and Architectural Conservation in East Asia. While these are valuable, the students are not required to study chemistry and appear to do very little hands on work. This means that they would not be able to fully comprehend the effects of agents of deterioration and the chemistry of deterioration and conservation treatments. The graduates of this program would work in the heritage management areas rather than being skilled to undertake hands on treatment.

Finally, the University of Melbourne contains Emeritus Professor Miles Lewis' unique research archives in building materials technology.

CCMC currently offers the following levels of study and these are also suggested for the proposed new program:

- Postgraduate Diploma in Arts, Cultural Material Conservation (coursework)
- Master of Cultural Materials Conservation (coursework)
- Master of Arts (research)
- Master of Arts (Advanced Seminar and Shorter Thesis)
- Doctor of Philosophy (research).

Holmesglen Institute is providing important training in traditional trades and these skills need to be retained. Some of the practitioners will be able to provide input to the University training and vice versa to ensure that integration of approaches is achieved.

ICCROM has extensive experience in conservation training including proven methods and contacts with expert presenters. It would be well placed to be able to advise on the creation of the proposed program as has worked with other countries in the past to set up training. Its networks and existing programs are a particularly rich resource.

Role of Government – Commonwealth, State, Local

Government (Commonwealth, State and Local) has the largest portfolio of stone buildings in Australia. It is important to educate property managers in government agencies - parks and garden managers, planners in local government who work in the heritage area and local government heritage advisors -

in the importance of using appropriate professionals, materials and techniques and to give them the support to make it easy for them to implement good practice.

Government heritage agencies, both Federal and State, do not generally involve themselves closely in the development of university programs. However they have a role in ensuring that appropriately qualified professionals undertake works. This could be made a condition of permits and such an approach adopted by local government.

The development and implementation of standards for conservation works should be led by state government using existing connections within the HCOANZ (Heritage Chairs and Officials of Australia & New Zealand) network. These standards can be used by all levels of government and could be made a condition of permits. In the past government would have had a role in accrediting practitioners; however this is no longer the case. CPSISC may wish to be involved in this project.

The Getty Conservation Institute may be willing to provide some support as well. It is most appropriate for government to negotiate with them.

The Commonwealth government has created the Australian Heritage Information webpage which provides a centralised portal for access to Australian heritage information from each state and territory. The information and resources include the latest news and publications, guides and toolkits for local government, owners of heritage places, students and researchers. This would be an appropriate location for the proposed standards.[2]

Role of Industry

The 2011 Heritage Trade Training Scoping Project (HTTSP) commissioned by the Construction & Property Services Industry Skills Council (CPSISC) did not recognise the issue of conservation of original fabric. An update of this report is needed focusing on this issue ensuring that the heritage profession continues to work closely with CPSISC.

Other major custodians of historic stone materials are Cemetery Trusts. Most repairs of stone monuments are done by stonemasons and generally involve replacement rather than conservation. In Victoria Cemetery Trusts are constrained by the Cemeteries and Crematoria Act (2003) in that they cannot spend their funds on conservation of older monuments. However Cemetery Trusts do need to recognise the need for professional conservation of their important material.

Role of Professional Associations

The National Engineering Registration Board created the document 'Guideline Heritage and Conservation Engineering', which was devised by the Institute of Engineers Australia (EA), the Association of Professional Engineers, Scientists and Managers, Australia (APESMA) and Consult Australia with representation from both state and territory government, community and professional associations. It was established to provide accreditation for professional engineers competent in Conservation Engineering. EA is now working on the development of a training program for these conservation engineers.

The Professional Associations (Australia ICOMOS and AICCM) may not be of much assistance in the development of a new education program. AICCM mainly represents art and museum conservators and historically, has had little input to the existing conservation training courses; while in Australia ICOMOS' training priorities seems to mainly focus on traditional trades and has no reference to conservators.

While AICCM does offer professional accreditation for its members, this accreditation has no legal standing; is not a requirement for any government jobs or contracts and is completely unknown

2 http://www.environment.gov.au/heritage/info/index.html

beyond AICCM. Professionals Australia (formerly APESMA) may be a more useful partner and should be included in discussions. Their models of training using work-based sandwich courses could be emulated.

Role of Community

The National Trust, Committees of Management, local and regional museums and historical societies and community groups with an interest in the historic environment also need to be made aware of the need for conservation not replacement of historic fabric. The development of standards will also assist these groups in implementing best practice.

Role of International Specialised Skills Institute

ISS Institute's excellent record in bringing professionals to Australia can be utilised to assist both with the development of a new education program and in developing standards. The Fellow can use the connections she made during the Fellowship to assist with identifying appropriate professionals to bring to Australia and subjects to be taught during their visit.

Further Skills Enhancement areas needed

This report identifies numerous areas where skills enhancements are needed. These are all in the area of conservation of historic stone. It is hoped that development of the recommended training program in building materials conservation will address these deficiencies.

Education programs are best developed by educational institutions. It is suggested that the University of Melbourne and Holmesglen Institute work with ISS Institute, CPSISC, ICCROM, the Getty Conservation Institute and Professionals Australia to fund and develop a business case for the development of the new program. AICCM and Australia ICOMOS may also wish to contribute. The business case should include specifying content and the costs to set up and run a new program. It will be necessary to examine overseas programs and use their proven methodologies adapted for Australian conditions.

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Australian Heritage Information http://www.environment.gov.au/heritage/info/index.html

Centre for Cultural Materials Conservation, University of Melbourne, viewed 17 August 2014 http://shaps.unimelb.edu.au/cultural-materials-conservation

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ICCROM http://www.iccrom.org/about/what-is-iccrom/

Museum and library/information services industry training package CUL99 http://training.gov.au/TrainingComponentFiles/NTIS/CUL99_2.pdf

National Engineering Registration Board, Heritage and Conservation Engineering, viewed 24 June 2014, http://www.engineersaustralia.org.au/nerb/heritage-and-conservation-engineering

Professionals Australia http://www.professionalsaustralia.org.au/

10. ATTACHMENTS

10.1 Curriculum and Presenters - 18th International Stone Conservation Course 2013

Module 1: Introductions and Orientation

Module 2: History and Theory of Conservation

Jukka Jokilehto, Architect, Consultant, Rome (former Director, International Training Programmes ICCROM)

- Introduction to the Architectural History of Rome
- History and theory of conservation including international context

Joe King, Director, Sites Unit, ICCROM, Rome

- Values in Conservation

Gionata Rizzi, Architect, Studio Architetto Rizzi, Milan, Italy

- Roman construction techniques
- Types of intervention: Marrying theory with practice

Adriana Maras, Coordinator, PhD studies in Applied Sciences for the protection of the Environment and Cultural Heritage, Università di Roma “La Sapienza”, Rome

- Stones in Roman construction

Giacomo Chiari, Chief Scientist, Science, The Getty Conservation Institute

- Introduction to porous building materials and stone conservation
- Lab: Porosity

Amanda Thursfield, Director, Non-Catholic Cemetery, Rome

- Introduction to the Non-Catholic Cemetery – history and conservation

Nicholas Stanley-Price, Independent Consultant, former Director General of ICCROM and Chairman, Non-Catholic Cemetery, Rome

- Site Visit to the Non-Catholic Cemetery, introduction to tombs

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Module 3: Stone: material characteristics and as a building material

Graham Lott, Sedimentary Petrologist, British Geological Survey, UK

- Geology and mineralogy of building stone
- Stone weathering and decay
- Stone matching and selection
- Lab: Basic microscopy, petrography & stone identification

Peter Rockwell, Sculptor, Rome

- Working techniques of stone (sculpture)
- Walking tour (stone types, tool marks & working techniques)
- Rockwell studio visit

Simon Warrack

- Field trip - Hadrian's Villa and Villa Farnese, Tivoli

Rand Eppich, Architect, Tecnalia, Spain and Ana Almao Vidal, Conservation Projects Manager, Fundación Caja Madrid

- Documentation & Recording Lecture – Guiding principals
- Documentation & Recording Lecture - Tools & Techniques
- Documentation & recording - Photography Demonstration
- Documentation & Recording – Field exercise at Non-Catholic Cemetery
- Documentation & Recording - Processing data collected

John Fidler, President & Chief Technical Officer, John Fidler Preservation Technology Inc, Los Angeles

- Introduction to mortars: history and chemistry
- Masonry systems – stonework & mortar
- Mechanical properties of stone in masonry

David Odgers, Conservator, Odgers Conservation Consultants, UK

- Mortars and uses (components, ratios, tools for mixing & applying) Lab: Mixing lime(s) and cement
- Lab: Mortar pointing & filling

David Odgers and John Fidler

- Lab: Mixing mortars (lime(s) & cement)

Module 4: Deterioration mechanisms; Methods of survey & analysis

David Odgers

- Mortar analysis methods
- Lab: Mortar analysis
- Mortar fabrication and application
- Lab: Mortar fabrication and application
- Mortar fabrication and application
- Non-destructive techniques of investigation demonstration

John Fidler

- Overview of deterioration mechanisms
- Non-destructive techniques of investigation
- Demonstration: Non-destructive techniques of investigation

Giorgio Croci, Professor, Department of Structural and Geotechnical Engineering, La Sapienza University, Rome

- Structural behaviour of masonry constructions & damage, collapse and reinforcement criteria

Marisa Laurenzi Tabasso, Conservation Scientist, Consultant, Rome

- Morphology of stone decay including terminology & mapping techniques

Cristiano Russo, Technical Director, SPC Engineering Srl, Rome, Italy

- Structural issues site visit (Palatino)

Giorgio Croci, Professor, Department of Structural and Geotechnical Engineering, La Sapienza University, Rome

- Case Study – Leaning Tower of Pisa

Sabina Vedovello, Technical Director, Conservazione Beni Culturali, Italy

- Restoration of the Tower of Pisa

Paolo Pastorelloand Marisa Laurenzi Tabasso

- Special lecture on Persepolis at ICCROM

10. ATTACHMENTS

Simon Warrack , Benjamin Marcus & Marisa Laurenzi Tabasso

- Worksite visit & mapping exercise

Marisa Laurenzi Tabasso

- Overview of micro-destructive diagnostic criteria & techniques
- Sampling methodology & techniques

Peter Brimblecombe, Professor of Atmospheric Chemistry, School of Environmental Sciences, University of East Anglia

- Environmental Factors

Ippolito Massari, Engineer, Expert for Humidity and Water, Studio Massari,

- Moisture sources and effects
- Diagnosis of moisture sources
- Moisture & its control
- Methods of control
- Damp building & demonstration of methods of detection

Alison Heritage, Conservation Research Specialist, ICCROM, Rome

- Salts – sources, formation & effects
- Lab: Salt analysis

Giulia Caneva, Professor, Department of Environmental Biology, Terza Università Studi di Roma

- Ecology and mechanisms of biodeterioration; relation to particular types of environments

Ornella Salvadori, Conservation Scientist, Soprintendenza Speciale per il Polo Museale Veneziano, Venice, Italy

- Microbiological deterioration
- Vegetation control

Giulia Caneva and Ornella Salvadori

- Lab: Biodeterioration: Characterization of samples
- Non Catholic Cemetery – in situ examination, sampling & treatment tests
- Biodeterioration and treatment discussion

Module 5: Conservation interventions and treatments; criteria for selection and implementation

Stephen Gee, Director, Peter Inskip + Peter Jenkins Architects, London, UK

- Methodological approach to conservation interventions
- Architectural repairs

Jeff Stott, Structural engineer, Mann Williams Consulting Civil & Structural Engineers, UK

- Structural repairs

Jeff Stott/ Stephen Gee

- Non Catholic Cemetery – structural review with engineers

Gionata Rizzi

- Archaeological repairs

David Odgers

- Emergency & preventive interventions
- Practical repair options
- Wells cathedral

Guy Devreux, Responsible for the Restoration Laboratory, Marbles and Limestone, Vatican City

- Visit to the Vatican Museum: Lab
- Visit to the Vatican Museum: Colonnade
- Structural repair of sculpture, including doweling, packing, and moving

David Odgers, Conservator

- Introduction to cleaning
- Consolidation - lime based & nanolime technology
- Lab: Review of mortar samples & wall pointing analysis (cracking, strength, carbonation, porosity)

Jamie Fairchild, Director, Restorative Techniques Ltd, Bristol, UK

- Graffiti cleaning. Coatings as protection – maintenance, removal & reapplication
- Exercise on Graffiti and cleaning

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David Odgers / Jamie Fairchild

- Cleaning systems
- Cleaning sandstone
- Cleaning limestone
- Cleaning: Possible negative impacts (disasters)

Veronique Vergès Belmin, Head of Stone Department, Laboratoire De Recherche Des Monuments Historiques, Paris

- Desalination methods
- Control & mitigation Poulticing for salts
- Lab: Poulticing, titrations, conductivity measurements
- Lab: Removal and evaluation

Simon Warrack

- Angkor Wat – removal of consolidants for retreatment of deteriorated stone

George Wheeler, Director of Conservation, Graduate School of Architecture, Planning and Preservation, Columbia University, New York

- Introduction to consolidation
- Consolidation - Solvent based
- Consolidants - Alkoxysilane based
- Evaluating performance of consolidants: lab methods and protocols
- Durability and retreatment of silicic acid esther treatments
- Evaluating performance of consolidants: field methods
- Case study: St. Trophime marble consolidation

Gottfried Hauff, Professor and head of the Stone Conservation course, Department of Restoration, University of Applied Sciences, Potsdam, Austria

- Consolidation application methods and object conditions
- Lab: Consolidation application methods
- Water repellents
- The conservation of paint on stone

George Wheeler, Gottfried Hauff and Simon Warrack

- General questions and discussion on consolidation of stone and treatment with water repellents

Ornella Salvadori

- Control & prevention of biological Growth / Methods for evaluating biocides, bioremediation
- Revisit the cemetery to see the work done with biocides

Tom Roby

- Lady Temple Memorial
- Mosaic conservation

José Delgado Rodrigues, Geologist, Conservation Scientist Laboratório Nacional de Engenharia Civil, I.P, Portugal

- Granite

Simon Warrack, SC13 Course Coordinator, Sites Unit – ICCROM, Rome Angkor Wat living heritage

Benjamin Marcus, Project Specialist, SC13 Course Coordinator, Getty Conservation Institute, Los Angeles

- Coral stone

Study Tour

Simon Warrack

- Museum of the Opificio delle Pietre Dure, Florence
- Museum of the Opera del Duomo, Florence

Anton Sutter, Assistente Area Restauro, Opera della Primaziale Pisana, Pisa

- Visit to the scaffolding over the apse of the Duomo, Pisa
- Anton Sutter, Opera della Primaziale Pisana, Pisa Discussion about the re-conservation of the frescoes , Campo Santo Cemetery, Pisa

Carlo Nicoli, Director Nicoli & Lyndam sculptures s.r.l., Carrara

- Visit to marble carving studio

Simon Warrack

- Visit to marble quarry at Carrara

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Gionata Rizzi, David Odgers & Stefano Volta, Conservator-Restorer Consultant, Parma. Italy

- Parma – Cathedral & Baptistery
- Hands on Conservation techniques
  - » Mortar Filling and Integration Exercise
  - » Joining and Fixing Exercise
  - » Mechanical pinning exercise
  - » Cleaning techniques demonstration
  - » Strapping with carbon fibre
  - » Evaluation of results

Renata Codello, Conservation Architect, Soprintendenza per i beni architettonici e paesaggistici di Venezia e laguna and Francesca Sciarretta, Research Associate, Assessment of Monumental Buildings' (CdSM) at the IUAV, University of Venice.

US companies Vertical Access and Comitech

- Doges Palace, Venice

Paolo Pagnin, Lithos Restauri Snc, Venice, Italy

- SS Giovanni e Paolo, Venice – conservation of internal monuments
- Church of the Miracoli, Venice
- San Marco square, Venice

Module 6: Synthesis

- Field work at cemetery
- Final presentations - cemetery

Jeanne Marie Teutonico and Susan Macdonald, Head of Field Projects

Getty Conservation Institute, Los Angeles

- Evaluation of treatment and preparation of future evaluations for the site work.

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