

Recent Efforts in Conserving 20th-Century Heritage: The Getty Conservation Institute's Conserving Modern Architecture Initiative

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ABSTRACT Over the last 25 years the conservation of 20th-century heritage has developed into a distinct area of practice, catalysed by the efforts of dedicated international and local interest groups and the forward thinking of a number of government and inter-government organisations who identified, protected and developed approaches to its care. Much has been achieved, but more work is needed to address many of the distinct challenges to conserving the heritage of the 20th century. In 2011, the Getty Conservation Institute (GCI) launched its Conserving Modern Architecture Initiative (CMAI), which seeks to respond to the outstanding current challenges and contribute to advancing practice in this emerging area of conservation. It began with a survey of the field to identify where existing efforts could be best supported and enhanced, or where knowledge gaps could be potentially filled. In response the GCI built a comprehensive program to meet these identified needs and five years later, a number of activities and projects are underway. These include a series of publications, a training program, historic and technical research and two field projects at Louis Kahn's Salk Biological Institute (1965) and the house of Ray and Charles Eames (1949), both in California. This paper outlines current GCI efforts, reports on initial outcomes and describes forthcoming activities.

KEYWORDS 20th-century heritage, Getty Conservation Institute, historic thematic framework, Salk Biological Institute, Eames House, conserving modern heritage

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Introduction

Towards the end of the 20th century increasing interest in and appreciation for the architectural and engineering achievements of the era emerged and efforts began to identify those places worthy of protection and conservation. By the turn of the century conserving modern heritage was established as a distinct area of practice with a number of special interest groups, professional organisations and conservation institutions working to advance this cause. Much has now been achieved and in most places, there is now largely consensus that the heritage of the 20th century is worthy of care and conservation.

But despite the concerted efforts by dedicated professionals and communities and the successful conservation of many key buildings of modern era, many challenges remain. The 20th century was one of unprecedented change characterised by technological, social

and economic advances, huge scale rebuilding in the aftermath of two World Wars, rapid population growth, mass migration and the shift from rural to urban societies. Architecture, an important tool in the change of 20th century, experimented with new ways of living and working, utilising innovative constructions techniques, a huge array of new industrialised materials resulting in great changes in the building industry and many new built and urban forms. These characteristics of 20th-century architecture and planning give rise to new conservation challenges such as material and technical problems, questions of obsolescence and adaptation, along with the usual conservation issues of managing change inherent in conservation work.

Effectively tackling these issues demands leadership, strategic research, and brokering with industry to develop appropriate repair techniques that translate research into practice and achieve conservation aims. A concerted effort



Figure 1 Participants at the 'Colloquium to Advance the Practice of Conserving Modern Heritage', held at the Getty Centre, 2013 (Source: The Getty Conservation Institute).

to bring together and distribute existing information as well as identify and fill information gaps is also needed.

In response to these challenges, in 2011, the Getty Conservation Institute (GCI) launched the Conserving Modern Architecture Initiative (CMAI) with the goal of advancing the practice of conserving 20th-century heritage, through research and investigation, the development of practical conservation solutions, and the creation and distribution of information through training programs and publications.

The CMAI Program Develops

Following the launch of the CMAI, the GCI reached out to colleagues working around the world to better understand what work was underway and where there was a need for targeted research or activities to advance practice. This investigation work culminated in 2013 when the GCI convened A Colloquium to Advance the Practice of Conserving Modern Heritage involving some 60 international experts to discuss the current challenges and needs of the field (video available online at http://www.getty.edu/conservation/our_projects/field_projects/cmai/cmai_colloquium.html). A number of recommendations emerged from this colloquium, which helped scope the GCI's work and best target it to the needs of the field in a way that complimented and built upon the work of others already engaged in this endeavor (Normandin and MacDonald 2013) (Figure 1).

Following the Colloquium, the GCI confirmed the goals of its program, organised around six key areas as:

1. Engaging with, and, supporting the profession.
2. Model Field Projects: Identify and develop model field

projects that draw upon methodological and technical research outcomes and demonstrate improved approaches and methods.

3. Scientific Research: Develop and implement scientific research projects related to materials-based conservation challenges in order to advance applicable conservation techniques.
4. Education and Training: Develop training programs and materials for practitioners targeted to specific needs in the field.
5. Key Resources: Create new literature and widely disseminate existing resources including philosophical and technical materials, guidance on the application of conservation methods, and lessons learned from GCI field projects.
6. Public Programming: Host lectures and workshops on topics related to the conservation of modern architecture with relevance to a wide professional audience.

The GCI engages with and supports the work of others involved in conserving 20th century in various ways, from convening meetings, supporting conferences and events and other specific activities. The Historic Thematic Framework project, which is described later in this paper is an example of work that grew out of initial support for an activity initiated by the ICOMOS ISC20.

Early on, two field projects were identified and initiated, the Eames House and Salk Biological Institute conservation projects. Unusually for the GCI, both projects were located in southern California, recognising the significant contribution of post-war modernism from the USA and enabling the GCI to draw from local experiences of international relevance, to help target the broader aims of the initiative and model approaches, methods and practical

solutions cognoscente of the ground practice. All the GCI's field projects provide the opportunity to understand typical conservation challenges in depth, undertake detailed research that is not always possible on a privately funded project and draw from international experience and expertise where needed. In identifying projects, the potential to tackle problems of broader relevance is assessed, as well as whether the GCI has the necessary skills to address these and how potential solutions may be more widely promulgated so that they help develop practice and contribute to the field at large. Both these field projects met these criteria, and importantly had the potential to demonstrate how the typical conservation approach could be applied to a modern place as well as how a rigorous process of scientific analysis and investigation could inform difficult technical problems. These projects are discussed in turn below.

Complementing the GCI's program of field projects, the Getty Foundation launched the Keeping it Modern grant program in 2014. Keeping It Modern supports projects of outstanding architectural significance that promise to advance conservation practices. Grants focus on the creation of conservation management plans that guide long-term maintenance and conservation policies, the thorough investigation of building conditions, and the testing and analysis of modern materials. To date 45 projects have been funded from all over the world, ranging from seminal residences such as Frank Lloyd Wright's Robie House (1908–1910) Chicago, and Le Corbusier's Apartment and Studio (1930s), Paris, to large institutions such as the Sydney Opera House, by Jørn Utzon (1973), Pier Luigi Nervi's Flaminio Stadium, 1960, Rome, the Children's Library, Accra (1966) by Nickson and Borys, and churches such as Coventry Cathedral (1962), by Sir Basil Spence, the Henry Luce Chapel, Taiwan, 1962 by I. M. Pei and Cristo Obrero Church, one of Uruguayan engineer Eladio Dieste's many reinforced brick structures. The program has provided for the necessary investigation and planning work to be undertaken to conserve these important buildings serving as important models for good practice (see http://www.getty.edu/foundation/initiatives/current/keeping_it_modern/index.html).

The need for training to build the capacity of professionals working to conserve modern heritage was identified in the GCI's 2012 Colloquium. In response, the GCI sought to identify training opportunities and events undertaken internationally to assess the status quo and further identify where to target efforts. Since 2015, the GCI has held annual workshops for recipients of the Getty

Foundation's Keeping it Modern Grants in partnership with London-based 20th-Century Society, on conservation management planning for modern heritage. To date over 30 project teams from various parts of the world have come together over the three workshops to share their experiences and hone their skills in applying the conservation management approach to modern buildings.

The CMAI program has hosted four graduate interns to date and currently has a GCI Fellow dedicated to the initiative. This provides opportunities for young professionals to engage in this emerging area of practice. Recently a new entry level position was created to further this aim.

In February 2016 the 4th International Iconic Houses Conference, 'A California State of Mind: The Modern House Museum in Southern California,' was hosted by the GCI and the Getty Foundation at the Getty Center. The event was attended by more than 120 stewards and professionals involved in the conservation of many of the world's most important modern houses. The three-day lecture and tour program offered a variety of perspectives on the current state of 20th-century house museums in Southern California. The GCI hosted two workshops for conference participants. The first, on conservation management plans, discussed how to use this internationally recognised tool to provide a framework for the care and conservation of historic places based on an understanding of their significance. The second workshop focused on securing sustainable funding for small house museums—an ongoing challenge for those responsible for their care. Various other training activities are planned for the future and this area will remain a key component of the work.

As a non-government organisation the GCI is not directly involved in the assessment or listing of modern heritage. However, given the importance of this task as a first step towards conservation, GCI projects that ultimately achieve this task have been integral to the initiative. The first of these is the development of a historic thematic framework, discussed below. The second is integral to another GCI long-term project, Survey LA and Historic Places LA. This initiative undertaken by the City of Los Angeles and supported by the Getty, aimed to undertake a comprehensive city-wide survey, ambitiously surveying over 880,000 land parcels to identify places worthy of identifying as being of heritage significance. In the city of Los Angeles, the Survey LA work purposefully targeted the recent past as an essential contribution to the City and its built heritage. Historic places LA (historicplacesla.org) the result of this work is an on-line, publically accessible system that inventories, maps and protects those places

identified in the survey and identified those places that are statutorily protected. The inventory uses the open-source platform known as Arches developed by the GCI and World Monuments Fund for inventorying and manages heritage places (archesproject.org).

In the USA, buildings are eligible for listing once they are 50 years old, unless they are exceptional or part of an eligible older district. In many parts of the USA, there has been recent effort to identify and protect at a national, state and local government level places from the mid century on and growing interest in an acceptance for modern resources. Conserving mid-century modern is now very much part of practice in the USA as a result. Cities such as Palm Springs have leveraged off their modern heritage to create distinctive lifestyle and tourism opportunities for their city. Cities like Columbus in Ohio, Michigan, Austin in Texas and others are actively exploring their mid century heritage. This work is continuing and in some cities the focus is starting to shift to the 1970s and beyond.

The following sections describe some of the project work undertaken by the GCI since that time, presenting the GCI's two field projects in California, the Eames House and the Salk Biological Institute, and the Historic Thematic Framework that the GCI has been developing to assist in advancing the recognition and protection of 20th-century heritage. The projects described in this article illustrate the range of activities that the GCI is engaged in from broader historically based research, to conservation methodology and technical research and the development of new methods and approaches.

Developing a Historic Thematic Framework as a Catalyst for the Identification and Conservation of 20th-Century Heritage¹

The first GCI project created under the CMAI was the development of an historic thematic framework to assist in the identification and ultimately protection of places of heritage significance from the 20th century. Internationally, professional and scholarly interest in the identification, conservation, and promotion of 20th-century heritage places is growing, yet significant works of the era are underrepresented on heritage registers from local inventories to the World Heritage List. As much of the world's heritage from this period is unrecognised or undervalued it is thus at risk and in need of analysis and protection. This vulnerable situation can be attributed to a variety of factors, many of which have been as previously discussed. While heritage professionals and

scholars have taken notice, general public awareness and appreciation has lagged.

It can be difficult to overcome the perception that recent buildings and sites don't qualify as heritage, a notion that is reinforced by some national and local inventories and official registers with the inclusion of age thresholds for listed structures. These thresholds typically range from thirty to fifty years from the time a building or site is constructed, sufficient time for many 20th-century resources to fall into disrepair or to the wrecking ball. Add to this the sheer proliferation of 20th-century structures and sites, and the need for a solid methodology for the identification, documentation, and listing of 20th century built cultural becomes apparent.

Thematic frameworks are an important tool used by scholars, governments and other agencies charged with recognising and understanding heritage places in order to identify and evaluate their heritage resources. The International Committee for the Conservation of Industrial Heritage (TICCIH) for example has over the years undertaken thematic studies that have greatly assisted in understanding some of the predominate industrial heritage typologies, traced their emergence and development and helped to characterise the built heritage the represents these themes². In 2009, the ICOMOS International Specialist Committee on 20th Century (ISC20) identified the need to investigate the potential to develop a historic thematic framework for 20th-century heritage and began to advance this work with other key organisations including TICCIH, DOCOMOMO, and the International Union of Architects (UIA).

Although the GCI had not yet launched their CMAI initiative, by 2010 the GCI was beginning to work to support other institutions committed to conserving modern heritage. In 2011, in order to catalyse the thematic framework idea, the GCI organised and sponsored a two-day meeting that brought together ICOMOS ISC20 thematic framework subcommittee members, together with an international group of invitees experienced with thematic frameworks for heritage assessment, as well as expertise with a range of 20th-century heritage types across a wide geographic span. Representatives of key organisations involved in the identification and conservation of significant 20th-century heritage places were also involved. A representative from the World Heritage Centre (WHC) also attended in order to facilitate the integration of the work with the WHC's earlier efforts in this area and to ensure that the direction of the project would be consistent with the Centre's needs in relation to the listing process. The



Figure 2 The Palace of Assembly in Chandigarh, India (Le Corbusier, 1963) is an example of a place that represents the theme of internationalism, the rise of nation states and human rights (Source: Susan MacDonald).

Figure 3 Stirling and Gowan's Engineering building (1963) at the University of Leicester, England is an example of a place that represents the theme of mass education (Source: Susan MacDonald).

meeting goals were to discuss whether such a framework was possible, gain the consensus of TICCIH, DOCOMOMO, ICOMOS, and the UIA on the framework outline, and to identify key historic themes for the 20th century. The meeting concluded that although an ambitious undertaking, a 20th-century thematic framework would provide a much-needed tool for evaluating the built heritage of the last century (MacDonald and Ostergren 2011).

However, despite great enthusiasm for this project it was difficult to advance further without funding and significant institutional commitment. In 2015 the GCI agreed to undertake this project and began by creating a project review group with representatives from various cultural heritage groups to help provide guidance and review during the development of the thematic framework report³. In 2017, Australian consultants Susan Marsden and Peter Spearritt were engaged to undertake this work with additional advice from Leo Schmidt (Germany) and Julian Holder (UK). The goal was to maintain a global perspective and identify the most significant themes, while creating a succinct and manageable framework. The work used the outcome of the expert meeting held in 2011, testing, revising, developing and elaborating the themes identified during the first expert meeting.

Ten themes were identified of universal relevance:

- rapid urbanisation and the growth of large cities,
- accelerated scientific and technological development,
- industrialised and mechanised agriculture,
- world trade and global corporations,

- mass communication and transportation systems,
- internationalisation, the rise of nation states and human rights,
- preserving the natural environment, buildings and landscapes
- popular culture and tourism
- cultural institutions, mass education, and religions,
- war and its aftermath.

For each theme, generic examples and specific places have been identified to illustrate how the themes relate to sites worthy of protection. By creating a short but far-reaching list of themes, the report attempts to condense the most important factors influencing the 20th century into a manageable report that is both compact and usable (Figure 2, Figure 3).

The thematic historic framework will be published in late 2018 and available online on the GCI's website. It will provide a useful tool for heritage organisations, agencies at the international, national and local level to identify those places of importance for conservation. It relieves institutions from the need to start over in identifying key themes and can be adapted at regional and local levels to the specific historical, social and cultural context. It will also assist the World Heritage Committee in its consideration of nominations to the World Heritage List by facilitating their contextualisation in relation to the history of the 20th century and the comparative analysis of sites.



Figure 4 The Eames House and studio is nestled into the hillside behind a row of eucalypts and looks out across the meadow (Source: Julius Shulman).

Conserving the Ephemeral: Applying the Conservation Planning Methodology to Modern Architecture at the House of Ray and Charles Eames⁴

The first of the GCI's two CMAI field projects is an internationally renowned work of modern architecture; the Eames House and Studio, designed by Charles and Ray Eames in 1949, which is located in the Pacific Palisades area of Los Angeles. Set on a bluff above Pacific Coast Highway, the house consists of two structures, a living space and a working space, connected by an open courtyard set in an open landscape and houses, with a rich collection inside. The house and studio, which are nestled between a hillside and a row of stately eucalyptus trees, enjoy views across a wide meadow to the ocean beyond. The standard, light, factory steel framing forms a delicate web, which is filled with a variety of materials—transparent and translucent glass, and opaque panels, some brightly painted and others a soft gray. The house is filled with a diverse array of furnishings and objects that Ray and Charles Eames collected throughout their lives. Toys, folk art, brightly coloured textiles, seashells, and stones sit comfortably alongside antiques, abstract expressionist paintings, and Eames-designed furnishings. The house and studio, including the living room and kitchen interior furnishings, appear today much as they upon Ray Eames's death in 1988 (Figure 4).

The Eames House was constructed as Case Study House No. 8, under *Arts and Architecture* magazine's influential Case Study House program. Initiated by John Entenza,

the publication's editor, the program was devised to promote the design and construction of innovative, low-cost, prototypical modern houses that would serve the needs of postwar families. The site, house, studio, and interior collections tell a remarkable story about the architecture of this period, including the role of California modernism within an international context, and provide an intimate view into the life of its occupants, opening a new understanding about the human side of modernism.

In 1988, ownership of the house passed to Charles's daughter, Lucia, who together with her five children felt a keen responsibility to conserve the place as Charles and Ray had left it. In 2004, the family established the nonprofit Charles and Ray Eames House Preservation Foundation to preserve and protect the site and provide educational experiences that celebrate the creative legacy of Charles and Ray Eames. The Eames Foundation is conscious of the importance of capturing the creator's narrative and strategically planning for the site's practical long-term conservation and interpretation, but on a day-by-day basis a range of materials conservation and management issues compete for attention.

Since 2011 the GCI has been working with the Eames Foundation on the conservation of the house, landscape and collection, which together contribute to this internationally significant exemplar of modern heritage. The work includes understanding and assessing the current condition of the house, its contents, and setting, to design and implement conservation measures, and to develop a long-term conservation management plan and a maintenance

components, their vulnerabilities and their performance needs as a public house museum, a collaborative process ensued to develop pragmatic management policies to conserve all the values of the place.

The CMP assessment process emphasised the need to focus attention on the remarkable interior, and its contents and collections assembled over the lifetimes of Ray and Charles Eames, which form an intrinsic part of the site's significance. The evolution of the way the Eames used the house, and the examples of prototype furniture within the collection were identified as key elements in the CMP, with policies to recognise the priorities to conserve these components. The monitoring of the environmental conditions of the house by GCI provided scientific data to inform policies to manage the condition and storage of the significant collections and ephemera within the house⁵.

The significance assessment also focused attention on key landscaping features of the site, including the rows of mature eucalypts, most notably along the east elevation of the building complex⁶. The setting of the house on a dramatic mesa above the Pacific Ocean, cut into a steep slope facing a meadow, with splendid views to the sea beyond has also created landscape and water management issues. The need to implement a Landscape Management Plan to manage the risks that the mature eucalypts present to the house has become a key policy recommendation and priority action in the CMP. These policies were iteratively developed following interviews with Ray's former gardener, review of the extensive Eames Office photographic collection, and site analysis by the CMP team. Similarly, the management of Ray's potted plant collection and garden planting practices, well understood by her former gardener and documented in plant lists, was augmented by her granddaughter Lucia Dewey Atwood's knowledge of Ray's floral arrangements, counterpoints which contribute so significantly to the interpretation of the house to the public. In turn, this ephemeral information provided the evidence for the development of CMP policies to manage the potted plant collection and interpret the house.

This work illustrates how the development of a CMP involves an intensive initial phase of gathering, analysing and assessing information about the place, its condition, history and associations. The ephemeral as well as the documentary and physical resources provide the evidence necessary to develop a concise statement of significance, a succinct summary of the property's attributes and values, to which the subsequent conservation policies and priorities directly relate.

The CMP methodology has provided a broad strategic approach to the care and conservation of this extraordinary site and is an invaluable tool for addressing some of the distinct challenges associated with conserving heritage places of the recent past. The CMP has captured the Eames House's spirit of place and provides a deeper understanding of its cultural significance. It identifies how this significance is vulnerable and provides respective policies to protect and sustain these heritage values, along with prioritised actions for implementation. The recognition of the 'importance of preserving ephemeral moments that would otherwise slip away' has given confidence to the Eames Foundation that many of the important intangible values can be preserved beyond this generation's personal memories by implementing the CMP (Yamashita 2014, 13). The CMP will be published by the GCI in late 2018 and will be available online.

The Salk Institute for Biological Studies: Preserving Modern Materials⁷

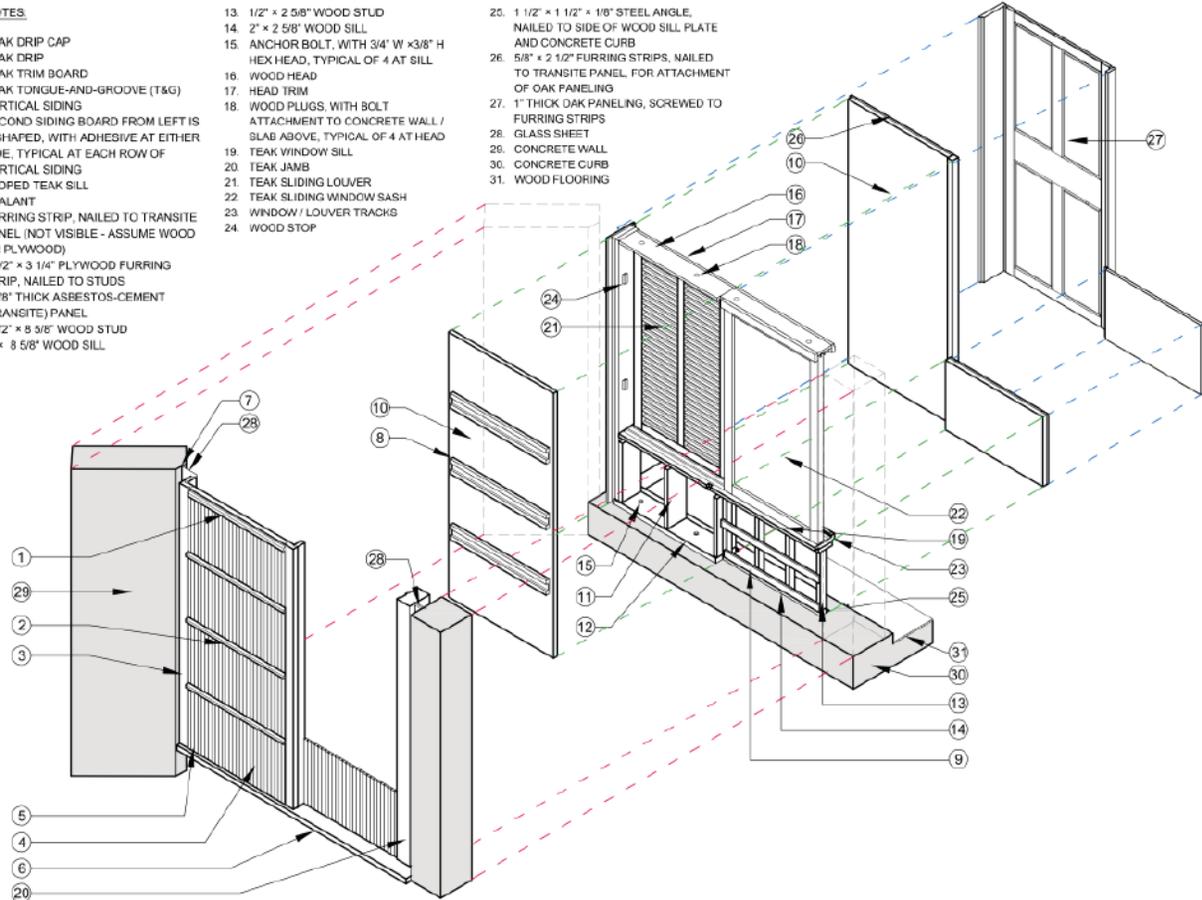
The second of the CMAI field projects is the Salk Institute for Biological Studies in La Jolla, California. Completed in 1965, and one of architect Louis I. Kahn's finest works it is widely considered to be a masterpiece of modern architecture of international significance. Kahn was commissioned by Dr. Jonas Salk, developer of the polio vaccine, to design an inspiring campus for his new scientific research institute on a coastal bluff overlooking the Pacific Ocean. Kahn's design consists of two nearly identical wings of laboratory, study, and office space that mirror each other on either side of a paved central plaza. The exterior materials palette consists of concrete, teak, glass, travertine, lead, and steel. The innovative, teak window wall assemblies, set within the concrete walls of the studies and offices, are one of the principle architectural features of the site, expressing a human scale element within the monumental structure. The window walls are prefabricated assemblies, constructed with softwood and teak framing, transite board sheathing, exterior teak siding and trim, and interior oak paneling, with different combinations of horizontal sliding teak window sashes, louvers, and/or paneled shutters (Figure 6–8).

The original Kahn-designed building and campus had been well maintained through careful stewardship and in recognition of their architectural importance. Minor repairs had been carried out to the exterior materials—including the teak window wall assemblies, concrete, and travertine—to address issues as they arose. More significant projects included renovations in the laboratories and a renewal and



KEY NOTES

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| <ol style="list-style-type: none"> 1. TEAK DRIP CAP 2. TEAK DRIP 3. TEAK TRIM BOARD 4. TEAK TONGUE-AND-GROOVE (T&G) VERTICAL SIDING 5. SECOND SIDING BOARD FROM LEFT IS T-SHAPED, WITH ADHESIVE AT EITHER SIDE, TYPICAL AT EACH ROW OF VERTICAL SIDING 6. SLOPED TEAK SILL 7. SEALANT 8. FURRING STRIP, NAILED TO TRANSITE PANEL (NOT VISIBLE - ASSUME WOOD OR PLYWOOD) 9. 2 1/2" x 3 1/4" PLYWOOD FURRING STRIP, NAILED TO STUDS 10. 1 5/8" THICK ASBESTOS-CEMENT (TRANSITE) PANEL 11. 1 1/2" x 8 3/8" WOOD STUD 12. 2" x 8 5/8" WOOD SILL | <ol style="list-style-type: none"> 13. 1/2" x 2 5/8" WOOD STUD 14. 2" x 2 5/8" WOOD SILL 15. ANCHOR BOLT, WITH 3/4" W x 3/8" H HEX HEAD, TYPICAL OF 4 AT SILL 16. WOOD HEAD 17. HEAD TRIM 18. WOOD PLUGS, WITH BOLT ATTACHMENT TO CONCRETE WALL / SLAB ABOVE, TYPICAL OF 4 AT HEAD 19. TEAK WINDOW SILL 20. TEAK JAMB 21. TEAK SLIDING LOUVER 22. TEAK SLIDING WINDOW SASH 23. WINDOW / LOUVER TRACKS 24. WOOD STOP | <ol style="list-style-type: none"> 25. 1 1/2" x 1 1/2" x 1/8" STEEL ANGLE, NAILED TO SIDE OF WOOD SILL PLATE AND CONCRETE CURB 26. 5/8" x 2 1/2" FURRING STRIPS, NAILED TO TRANSITE PANEL FOR ATTACHMENT OF OAK PANELING 27. 1" THICK OAK PANELING, SCREWED TO FURRING STRIPS 28. GLASS SHEET 29. CONCRETE WALL 30. CONCRETE CURB 31. WOOD FLOORING |
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Figure 6 The iconic central plaza at the Salk Institute for Biological Studies in Southern California looks west towards the Pacific Ocean. (Source: Elizabeth Daniels).
Figure 7 A view of a teak window wall assemblies in a west-facing office wing at the Salk Institute, prior to conservation (Source: The Getty Conservation Institute).
Figure 8 Exploded isometric view, illustrating the construction of the teak window wall assemblies at the Salk Institute. (Source: The Getty Conservation Institute).

expansion of the mechanical and electrical systems. In the early 1990s, a major addition—the East Building—was constructed to accommodate increasing programmatic, scientific, and administrative needs. However, by the early 2010s, after nearly fifty years in an exposed marine environment, the building had reached the moment when many

modern buildings demand attention to their fabric, infrastructure and planning. One of the most urgent concerns were the 203 teak wood window wall assemblies, which had weathered to a non-uniform appearance and, in some locations, had deteriorated due to surface erosion of the teak, moisture infiltration, insect infestation, and varying



Figure 9 Prior to conservation, the teak window wall assemblies were weathered, deteriorated, and discolored by a black fungal biofilm and later applications of surface treatments (Source: The Getty Conservation Institute).

Figure 10 During the project mock-up phase, different finishes were applied to sample panels of existing weathered (left) and new (right) teak to trial how they protected the wood, repelled the fungal biofilm, integrated the appearance of new and weathered wood, and performed over time (Source: The Getty Conservation Institute).

maintenance practices over time. Additionally, a fungal biofilm on the surface of the teak gave the wood a black appearance that varied considerably by exposure. Given these conditions, the Salk Institute assumed that total replacement of the window walls might be necessary. However, the institute realised that such a project would result in loss of a significant amount of the building's original material fabric and potentially negatively impact the architectural significance of the site (Figure 9).

In 2013, the Salk Institute partnered with the GCI to determine if there was a way to conserve, rather than replace, the window assemblies and better protect the site's significance. The resulting project, *The Salk Institute for Biological Studies Conservation Project: Teak Window Wall Assemblies*, follows international best-practice conservation methodologies. These practices recommend three basic steps to follow when developing a conservation project for cultural heritage sites: (1) understand the site before intervening; (2) develop conservation policies that both protect the significance of the site and integrate other considerations, such as owner objectives and legal requirements; and (3) select conservation treatments that best comply with the policies, then implement, maintain, and monitor.

The project was divided into two phases: research and investigation to understand the window walls and their conditions, followed by a trial mock-up phase to assess and refine preliminary conservation treatment proposals. The first phase of the work included historical research and an assessment of cultural significance, on-site condition surveys and investigative openings, laboratory analysis of wood samples to determine wood

and fungus species, analysis of past surface treatments, and preliminary diagnoses of weathering and deterioration mechanisms⁸. This work guided the development of treatment recommendations for cleaning, repair, and potential replacement of elements that were deteriorated beyond repair. Conservation treatments were trialed on site through a series of mock-ups, ranging in degree of intervention from moderate to major, then evaluated and refined (Figure 10). The results of this work were used by the Salk Institute and their architect, Wiss, Janney, Elstner Associates, Inc., to develop into a comprehensive project. The construction project that implemented the treatments was completed in 2017, with over two-thirds of the original teak conserved in place and subtle improvements made to improve the long-term performance of the assemblies. The project received a number of awards, including the California Preservation Foundation's President's Award in 2017 (Figure 11).

The teak window wall project successfully demonstrated the importance and efficacy of embedding a conservation-led approach into the care and stewardship of the building and the Salk Institute is now utilising the methodology established in the teak project when planning for the care and maintenance of the site's other significant historic elements such as the concrete. Initial conservation studies and trail repairs for the concrete were undertaken while the construction scaffolding was in place for the teak window wall assemblies

The Salk Institute also received a Keeping It Modern (KIM) grant from the Getty Foundation in 2014 to undertake a CMP for the site by English consultants Peter Inskisp



Figure 11 The teak window wall system following repair in 2017 (Source: Elizabeth Daniels).

and Stephen Gee, working with USA based Wiss Janey Elstner. The KIM grant program compliments the CMAI program by supporting grant projects of outstanding architectural significance that promise to advance conservation practice, with a focus on the creation of CMPs. The adoption of the recently completed CMP will guide the care of the complex, including the buildings, spaces, and material fabric for many years to come. As at the Eames House, this exercise has proven immeasurably important in changing approaches to the place's stewardship and conservation, how this is organised, who is involved and how it is funded, demonstrating the efficacy of this well-established methodology for places from the modern era.

Conclusions

The GCI's program continues to evolve in response to the needs of the field. Where possible work is undertaken in partnership with other organisations working at international, regional or sometimes local levels. Activities range from smaller one-off events to the development of fully fledged research, training, research or field projects.

A recent stand-alone activity includes a workshop held in 2018 in India, which brought together stewards of only three museums designed by Le Corbusier, the Sanskar Kendra (1954) Ahmedabad, the Government Museum and Art Gallery, (1969) Chandigarh and the National Museum of Western Art (1958), Tokyo. The workshop aimed to share knowledge and understanding about these three remarkable buildings, their conservation challenges, discuss potential solutions and create a network for the

stewards of these cultural institutions. It is hoped that this activity will catalyse much needed conservation to the Sanskar Kendra in a way that meets the international standards that such a building deserves.

A new project, Concrete Conservation, launched this year, aims to address the specific technical challenges related to the 20th century's use of modern construction techniques and materials. Addressing such technical challenges has been an aim of the CMAI since the onset. Concrete is one of the most widely used building materials of the 20th century. The early development of concrete in the 19th century, recognition of the structural and expressive potential of reinforced concrete by innovative engineers and architects of the early 20th century, its large-scale industrialisation, and the subsequent explosion of its use in second half of the 20th century, has resulted in a multitude of concrete buildings and structures of a wide variety of types over the last 150 years.

Many of the modern era's most exciting structures exploited concrete in a myriad of creative ways. Like many modern materials, reinforced concrete has raised new and distinct conservation challenges. These issues relate to the lack of appropriate techniques and materials to meet conservation needs, the current lack of knowledge on the efficacy and durability of existing repair solutions, the shortage of training opportunities, and the lack of technical and guidance resources available to professionals.

Although there are many well-constructed, carefully crafted concrete buildings of this time, there are also many buildings suffering deterioration due to poor quality

materials or construction. This is often the result of building at a time when materials were scarce, under pressure for accelerated construction, and with little quality control. The novelty of the material and construction techniques also caused problems, such as the limited understanding of its durability, the inexistence of experienced workers, and the lack of industry standards and regulations. Moreover, these buildings often suffer from the mistaken belief that reinforced concrete was a maintenance free, extremely durable material. The result is a large stock of culturally significant reinforced concrete buildings in need of focused and careful attention.

However, in spite of the development of a multibillion dollar concrete repair industry, the conservation of reinforced concrete has seen little advancement in terms of the development of materials or methods that move closer toward the typical conservation principles of minimum intervention and retention of original fabric. This is particularly damaging to the significance of sites where the concrete is integral to the aesthetic value of the place, such as exposed concrete typical of the protagonists of brutalism, where color and texture were carefully specified.

As the most common building material of the 20th century, reinforced concrete is now challenging conservation practitioners all over the world. With the pioneering concrete structures of the early modern period now nearing 100 years old and the second wave of architectural concrete exemplars, particularly the brutalist buildings of the 1960s, now needing repair, addressing the conservation of concrete heritage is currently critical for the preservation of their cultural significance. A critical mass of professionals adequately skilled in concrete conservation and well versed in practical solutions to the long-term care and conservation of this growing number of culturally significant buildings is essential to sustaining the heritage of the last century and beyond. In 2014 the GCI convened a group of experts in concrete conservation to discuss the critical issues and research needs, which assisted in developing the concrete conservation project (Custance-Baker and MacDonald 2015)

The concrete conservation project involves a number of activities including scientific research, model field projects, the development and delivery of training, and the creation and dissemination of published material on the subject. It has a number of specific goals, which include;

1. To improve the conservation of significant historic concrete buildings and structures;
2. To strengthen and support a community of practice that can develop appropriate concrete conservation

projects and share information;

3. To improve, adapt and develop repair techniques and materials so they are more sympathetic to conservation goals through dedicated scientific research;
4. To improve understanding on the efficacy and long-term effects of typical repair and treatment methods through research and field testing;
5. To develop a methodology for selecting and testing patch repair mortars and hydrophobic coatings;
6. To provide a better understanding about concrete buildings through history and their distinct material characteristics and correlations between characteristics, deterioration and repair;
7. To provide better information and clear guidance on historic concrete and its conservation;
8. To provide training opportunities for professionals involved in concrete conservation.

In 2015 the GCI published *Conserving Concrete Heritage: An Annotated Bibliography*, (Custance-Baker et al. 2015) available online. A set of principles for concrete conservation is also in development. Scientific research projects are commencing in 2018, the first on the performance evaluation of past patch repairs, with more to follow. In late 2018, the first book in a new series *Conserving Modern Architecture* will be published with the aim of sharing current efforts to sustain the concrete heritage of the 20th century. *Concrete: Case Studies in Practice* includes 12 projects that demonstrate typical challenges in repairing concrete structures and how practitioners have approached and met these issues (Figure 12).

Over the next few years the GCI also plans to focus its efforts in developing training for mid-career professionals in conserving modern heritage. In May 2018 the first three-day training course for professionals with an interest in conserving modern architecture was delivered at the Getty in Los Angeles. Partnering with the USA based National Center for Preservation and Technology and Training, the course provided an introductory overview of this subject. It covered conservation methodology and practice related to modern heritage, and focus on some of the most common modern building systems and materials to look at causes of deterioration, diagnostic methods, and best practices for their treatment and repair. Using case studies, such as the Eames House and Salk Institute, the course involved classroom lectures, lab sessions and site visits and aims to equip people with the fundamentals of conserving modern heritage. The first course attracted an international audience; the response suggests that there is a demand for this type of training in many places. The



Figure 12 The National Theatre in London, Denis Lasdun, 1963 is one of the case study projects featured in the Getty publication, *Concrete: case studies from practice*. It demonstrates a careful repair approach that conserves the character and quality of of board marked concrete (Source: Susan MacDonald).

GCI intends to rerun this training, potentially in different locations, as demand requires.

Work has also begun to develop a longer course for mid-career professionals to provide an opportunity for more detailed study in the practical conservation of modern heritage. This course will also be delivered, initially in Los Angeles. All the CMAI training activities will develop didactic materials that can be used by others delivering training in this area of practice, and, will be made available as free downloads.

The GCI team has been fortunate to work with experts from all over the world in developing the CMAI program and in carrying out the various activities to date. This has enabled us to make steady progress that is starting to reap results. The GCI's work is dependent on building relationships and partnering with others already working in this area. As resources for strategic initiatives and research in the heritage sector becomes harder to secure in many parts of the world, leveraging off each other's efforts and collaboration becomes ever more important⁹.

Notes

1. This section is authored by Susan MacDonald, Sheridan Burke and Chandler McCoy.
2. See the TICCIH website for information on their thematic studies at <http://ticcih.org/ticcih-thematic-studies-and-published-reports/>
3. TICCIH, DOCOMOMO, ICOMOS, and a number of

experts in 20th-century heritage from different parts of the world participated in this peer review group.

4. This section is authored by Susan MacDonald and Sheridan Burke.
5. The GCI undertook climate and environmental monitoring of the site between 2012 and 2015.
6. These eucalypts are thought to have been planted by local developer Abbot Kinney in the 1880s.
7. This section is authored by Sara Lardinois and Susan MacDonald.
8. The results of the first phase of the work are summarised in the GCI project report, which is available online (Lardinois 2017). The phase 2 project report work will be available in 2018.
9. Further information on all the CMAI activities, videos from the public lectures and colloquia and CMAI publications is available at http://www.getty.edu/conservation/our_projects/field_projects/cmai/cmai_overview.html.

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