

Session CS1.1: Documentation—Methodology in Different Contexts

Session Chair: Dan Worth, AIA FAPT

Session Description: Documentation methods and technologies have undergone rapid change and advancement over the last decade. These new and unique tools and techniques of documentation will be examined in this session with four case studies each with very diverse contexts. Speakers from France, Columbia, Italy and Nova Scotia will present and discuss their latest research for utilizing non-destructive documentation technologies (NDT) and methodologies. Perspectives for investigating buildings and landscapes unique to each region will be explored and discussed embracing ancient buildings, cultural landscapes and modern sites.

Learning Objectives:

1. Upon completion, participant will be able to understand and gain knowledge in use of NDT techniques for the characterization of buildings/sites based upon several examples of applications around the world.
2. Upon completion participants will be better prepared to develop strategies to relate diverse research sources and the importance of contrasting historical data with material evidence about the building/site and its materials
3. Upon completion, participant will be able to understand the importance of working closely with a multi-disciplinary team to ensure effective interventions balance conservation principles and cultural values.

Papers:

CS1.1a. Non-Destructive Testing Applied to The Auscultation of Ancient Buildings and Cultural Heritage

Speaker/Conférencier: Olivier Anterrieu, Eng. – INRS & SETEC Canada

Abstract

The preservation and safeguarding of ancient buildings and cultural heritage requires a good understanding of the state and behavior of the structures under consideration. As part of restoration or rehabilitation of an old building, auscultation and diagnostic by Non-Destructive Testing (NDT) can be very useful in characterizing its status. Indeed, NDT technics (GPR, ultrasound, corrosion potential, resistivity, etc.) make it possible to establish a rapid and accurate diagnostic of a structure by analyzing different physical parameters that may vary in space and time. These techniques are sometimes combined to refine the diagnostic and are transcribed into maps to offer restorers and architects factual decision-making elements (identification and characterization of heterogeneities, distribution of moisture, corrosion potential, etc.). In order to analyze the behavior of old structures to determine the kinetics of certain structural parameters (crack opening, for example), another challenge is to prevent the occurrence of generalized degradations. As an example, the Captae® solution developed by Setec represents a major technological leap in the world of instrumentation and monitoring. Captae® is a self-contained, multifunctional mini-central station for simultaneous acquisition, recording and wireless transmission of numerous structural and environmental parameters.

The NDT and the monitoring allow acquiring large volumes of data with measurement supports, resolutions and scales different from each other but also with the point data (sampling). A major challenge lies in the integration, spatial representation and joint interpretation of all the data acquired, in a realistic and intelligible way.

To achieve this objective, research is undertaken in the framework of a PhD at INRS (Quebec City) in partnership with Setec Canada through MITACS, for the development of a new Multi-scale (field, laboratory) and multivariate (physical, chemical) data processing system from NDT and monitoring. This system is based on the use of 3D imaging techniques and innovative data integration methods which considerably increase their representativeness and their exploitation in space and time. These techniques will greatly improve the targeting of restoration operations and therefore reduce the associated costs.

This presentation will show several examples of the application of NDTs implemented in different heritage contexts (Church, rampart, temple, sarcophagus, statue) through missions carried out on the international scene. The first results of the research undertaken at INRS will then be illustrated by an example of application and 3D integration of NDT data on a masonry chapel.

CS1.1b. Archaeology of Architecture. A Methodological Approach for The Knowledge of Historic Buildings

Speaker/Conférencier: David Cohen – Researcher/ Associate Professor, Fundación Erigaie/ Universidad de Los Andes

Abstract

In the last three decades Archaeology of Architecture has consolidated as a field of knowledge that provides essential information for understanding historical buildings, through diagnosis and documentation, as well as in establishing criteria of conservation and restoration.

Despite its advantages, many restoration projects and professionals, at least in Colombia, do not yet include an archaeological approach for the study of buildings, or they simply do not clearly understand the scope of this kind of proposals, particularly when they are historically well documented. In many cases, a historical approach relies only on the information and analysis of documentary sources like contracts, old photos or maps, and architectural plans without contrasting this data with the building's materiality, what was finally built. Archaeological probing of floors and walls may put into evidence different structures, revealing original construction techniques and the configuration of architectural spaces and their changes, allowing a broader frame of interpretation of the houses, their inhabitants and the use of space through time.

Following recent excavations in three heritage buildings in Colombia, the Jesuits Academy or Collegium Maximus of Bogota, the Independence House in Bogota's historical quarter and the Governor's Palace in Cartagena, the presentation emphasizes on the importance of archaeological research as part of any restoration project.

Using stratigraphical methods Archaeology of Architecture has been applied in the above cases. Walls are recognized as archaeological contexts, in which every constructive or finishing event for instance, is considered a stratum. In other cases, it is also possible to identify evidences of demolition or subtraction events that occurred in the past. Every stratum, no matter its condition, can be systematically organized into a chronological sequence, in order to understand how different events (appearance or disappearance of an internal wall, the opening of a new window, or the renovation of a floor) happened.

Through the use of certain archaeometric methods in these buildings, i.e. Scanning Electronic Microscopy in combination with cross and thin sections of bricks, mortars and wall decorations, it has been possible to identify and understand how and when these transformations took place, providing a chronological frame for dating their constructive and finishing elements, complemented with the archaeological analysis of recovered artifacts such as potsherds, coins and other remains, and contrasted with documentary sources.

CS1.1c. “The Restoration of Modern Architecture: Advanced Methods of Analysis to Guarantee Correct and Effective Interventions”

Speaker/Conférencier: Rossana Gabrielli – General Manager, Leonardo S.r.l.

Abstract

The architecture of the world's major cities is characterized by buildings realized between the eighteenth and nineteenth centuries. It is an architecture that has often similar characters in the various geographic areas also distant from each other, because the materials, technologies, the workers with whom it has been realized during this time were much more opportunities to travel than the previous period. That's why we can face similar conservation problems while operating in different parts of the world. What changes it is the geographical context, to know good for the preservation of the works, but other materials and construction techniques have many similarities and similar intervention problems.

In general, we can observe how modern architecture is often characterized by materials and new construction techniques than the historical and the present one; it is therefore necessary to operate with specific methods and techniques also considering the fact that the cases of intervention are still limited and, sometimes it underestimates the particularity of these buildings, both in the constituent materials and technical and architectural and structural solutions adopted. In this area are also to be included, in addition to the buildings made entirely from late nineteenth and early twentieth century, even those restorations performed during that time and throughout the course of the twentieth century of historic buildings with structures or reconstructions that require the same attention and skills to the materials of the period.

In our contribution will illustrate the process of analysis (archaeological, stratigraphical, diagnostical of materials) necessary to the definition of an effective restoration of modern architecture, which must necessarily start from a thorough knowledge of the building on which you operate and environmental context in which it is located. For this reason, it is essential to carry out a campaign of analysis which allows to define in detail the characteristics of the constituent materials and the relative state of conservation, with the aim of understanding how the building is done, what has become during the various interventions, and how it will stand in the future. Only through an accurate path of knowledge we will be able to identify the most effective and corrected restoration methods in terms of compatibility and durability over time and to evaluate, with the passing of time, the maintaining of the standards achieved with the restoration work, and finally, to program an appropriate project maintenance.

CS1.1d. Documenting, Unearthing and Unraveling the Cultural Landscape and Built Heritage of T2

Speaker/Conférencier: Gregory MacNeil, NSAA, RAIC, Architect – Vice President, Jerry MacNeil Architects Limited

Abstract

As the concept of cultural landscape has evolved since its formal recognition in the early twentieth-century, it has been adopted and applied as a practical tool to a variety of disciplines, such as cultural geography, architecture, archaeology, environmental design and planning, all of which understand that the appropriate and deferential management of sensitive and significant cultural landscapes can successfully integrate multiple, and at times, competing historical perspectives, promote sustainable land-use practices, enhance natural landscape values and maintain biological diversity.

This paper will present the Thibodeau 2 Site (T2), a multi-component site located within the community of Poplar Grove, Nova Scotia, as a cultural landscape, built heritage and documentation case study, representing a continuing landscape. As such, it is defined as “one that retains an active social role in

contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time, it exhibits significant material evidence of its evolution over time”.

The Thibodeau 2 Site is situated within a large operating dairy farm, the current owner of which is a direct descendent of the original Planter family that was granted the land in 1760. The landowner reported that several large stones visible within a portion of pasture represented the remains of “The Old French House”, a structure, which according to anecdotal evidence, was standing on the property when the Planters arrived in the mid-eighteenth century. Fortunately, several photographs of this structure remain extant and suggest the site contains not only evidence of a Pre-Deportation Acadian settlement, but also the remains of an early Planter occupation that utilized and enhanced the existing Acadian infrastructure.

The process of understanding a landscape ranges from rapid overview using existing maps, photographs, oral history reports, historic data, archeological and architectural interpretation through to the detailed survey and analysis of material using all of the technologies and available know-how. For this project both image and non-image based documentation and testing technology was applied.

The “Metric Survey” and the exploration utilized technologies that included hand survey, REDM total station, close-range photogrammetry, Lidar, EM38 Ground Conductivity, Building Information Modeling, and reflectance transformation imaging. Virtual 3D hyperlinked models were constructed of buildings both formally and presently associated with the site including their time specific landscapes, thus providing a heads-up venue through applications such as BIMx Hyper-model that can be uploaded to Apple and Android smart devices for natural, game-like exploration of archeological and architectural research in real-time.

Technologies from the intersecting professions of archeology and architecture were united thereby adding to Cultural Landscape terms “research related” and “planning related” a new cyber vantage point called “now”.