Summary:

Cast stone and precast concrete present a wide range of material composition, fabrication techniques, and repair and conservation needs. This session will explore challenges encountered in evaluating and preserving cast stone and precast concrete. The first paper in the session will explore masonry bricolage, a construction technique using whatever material is at hand. This paper will discuss the use of recycled materials and even debris as part of construction; explore the differences between masonry bricolage and more conventional masonry construction; and discuss what research would be most beneficial to preservation of unique historic resources such as Watts Towers in Los Angeles, the Philadelphia Magic Gardens, Wat Pa Maha Chedi Kaew in Thailand, the Labyrinth of Josep Pujiula in Spain, and Nek Chand’s Rock Garden of Chandigarh. The second paper provides a case study of the Coignet Stone Company’s office building in Brooklyn, New York, constructed to serve as an advertisement for the company’s products and to illustrate the possibilities of cast stone. The Coignet Building was constructed in 1873, before portland cement was produced in the United States (although American natural cements were widely available). Investigation revealed that the building may be one of the few surviving examples of the use of European portland cement for concrete in the United States. With this information, repairs could be designed for compatibility and appropriate replacement units fabricated. The third paper explores the restoration of Meridian Hill Park in Washington, D.C., renowned for its exposed aggregate concrete designed by John J. Earley. The presentation will examine how Earley achieved the widely varied aggregates, textures, and finishes used at the park by experimenting with materials, mix designs, and curing and finishing techniques. Earley also developed precasting techniques for highly detailed urns, fountain basins, and balusters, and developed polychrome and patterned paving. The presentation will explore protocols developed for repair and reconstruction of the concrete elements to match the original materials and finishes.

Learning Points:

After attending this session, participants will be able to:

- Understand the composition and character of a variety of cast stone and precast concrete materials
- Learn about several projects involving the repair and conservation of historic cast stone and precast concrete structures
- Understand the challenges faced in repairing, conserving, and replicating cast stone and precast concrete
- Learn about innovative techniques used in the investigation, assessment, and repair of cast stone and precast concrete
Challenges in the Preservation of Masonry Bricolage

Presenter: Brian Cooley, Cornell University

Abstract: Concrete and masonry construction has undergone a tremendous standardization over the past century. The methods and materials employed have seen their specifications set and their manufacture and use regularized; our understanding of these methods and materials has greatly expanded as a result of this. So too has our knowledge of the conservation of these materials expanded due to the pressing need to preserve and restore the constructs in these materials that embody our history, our culture, and our aspirations. There are, however, instances within the built environment where this information may be bent or adapted, but to which it is not directly applicable. Masonry bricolage, a masonry construction technique in which whatever material is at hand or suits the builder’s fancy is laid in a fashion akin to brick or block or tile, is one such instance. Ranging from historical instances of recycled materials from multiple structures being incorporated into new construction, to more modern examples employing bottles, ceramic or cementitious debris, and even refuse, this particular building method warrants further investigation into appropriate conservation methods. Particular challenges are presented by the employment of such atypical materials and the variances in design or building methods necessary for their use. A number of sites and structures already widely recognized as significant, and those yet to gain such regard, would certainly benefit from this. Examples of such sites or structures include Watts Towers in Los Angeles, the Philadelphia Magic Gardens, Wat Pa Maha Chedi Kaew in Thailand, and the Rock Garden of Chandigarh, amongst many others. It is the aim of this presentation to pinpoint the key differences between masonry bricolage and conventional masonry construction, to examine the methods and materials of masonry bricolage more closely, and to suggest where further research may be directed in order to best facilitate the preservation of the structures employing this building method in their construction.

Hidden in Plain Sight – The Cast Stone of the Coignet Building

Presenter: Mary Jablonski, Jablonski Building Conservation, Inc.
Co-Presenter: John Walsh, Highbridge Materials Consulting, Inc.

Concrete buildings can have stories hidden within the cement products used to construct them. When research is carefully undertaken and people are willing to ask questions, interesting stories unfold. In 1873 the New York and Long Island Coignet Stone Company built offices in Brooklyn, New York, to serve as an advertisement for the company’s cast stone products. Rusticated, smooth, beveled, and ornamented surfaces decorated the masonry blocks displaying the possibilities of the new cast stone material. Another characteristic was the enormous size of the cast stone blocks made possible using the Béton Agglomère or Coignet-Béton process, a dry damp method of casting units. One hundred and forty years later, the Coignet Building remained standing, barely, although the company was long gone. The building itself represents one of the earliest uses of the company’s products at a time when concrete buildings were almost unheard of. What also made it so important was that it represented so much about the industrialization of building products and the growing importance of concrete. When work began on the restoration of the Coignet Building in 2014, little was known about the cast stone and its composition. The first step was to understand the materials and how they were deteriorating in order to
know how to best repair the cast stone. As part of the materials study, petrographic and chemical examinations were performed on cast stone samples. The findings were illuminating. The construction date of the building, 1873, places it just before the production of portland cement in the United States. However, it was discovered that the binder in the Coignet Building was a portland cement. The microstructure of the clinker was consistent with a pre-rotary kiln product and the chemical composition was consistent with some European cements of the time period. This suggests that the company was importing European portland cements for use during the time period that that Coignet Building was constructed, even though American natural cements were widely available. Therefore, the Coignet-Beton on the building may be one of the few surviving examples of the use of European portland cement for concrete in the United States. Revealed as a portland cement cast stone, repairs could then be designed for compatibility. This paper will not only discuss the cement used but also how that knowledge drove decisions about how to repair the cast stone and what to use for replicating blocks that were damaged beyond repair.

**Meridian Hill Park, Masterwork in Exposed Aggregate Concrete**

Presenter: Judith Capen, architrave p.c., architects

Meridian Hill Park, National Historic Landmark, was described with superlatives in its nomination—“outstanding,” “ambitious,” “masterful”—all well-deserved for its exposed aggregate concrete. Today, some of its hundred-year-old exposed aggregate concrete is in better shape than much newer modern concrete. The crispness in detail, sharp edges, complex curves, and consistency is unparalleled in the country. The park’s designers wanted to build in stone, like the Italian hill gardens on which the park was modeled. But budget intervened. They brought in John Joseph Earley, pioneer in exposed aggregate concrete, who developed the concrete techniques used at the park. Earley developed methods to create different textures from different aggregates in single pours. He experimented with cement and sand colors, mixes with careful manipulations of water, cure times, early removal of forms, “scrubbing” to expose aggregate, and hand tooling to bring fine aggregate to the surface. Earley’s projects at the park became the standard for subsequent contractors. Performance specifications required new work “to match existing,” providing only general guidance on materials and virtually none on methods. Earley developed pre-casting techniques for urns, fountain basins, and balusters of extraordinary detail. Rapid removal of water was key: he used newspaper to pull the water from wet mixes designed to allow the concrete to flow into corners and edges. He also developed richly polychrome and patterned paving using crushed terra cotta, black “trap,” and other aggregates. Eighty tumultuous years have taken their inevitable toll on the concrete. One ten-foot-diameter fountain basin’s lip was missing a very big chunk. Poorly matched replacement paving was disintegrating. The surfaces of a thirty-foot-tall retaining wall were in good condition, but the entire wall leaned. The park’s vertical and horizontal surfaces all had cracks. The concrete had cases of spalling and a few of severe deterioration. Our office was tasked to develop processes for repair and replication of the 12-acre site’s concrete, including its amazingly varied walls, fountains, walks, stairs, benches, and ornamental balusters, urns, pilasters, and piers. We surveyed the concrete and created a catalog of concrete types and failures, identifying every crack. We developed repair strategies for each failure type and built a stitch-in-time repair philosophy using flexible sealant. We developed protocols for cementitious repair, element rebuilding, and reconstruction of parts too deteriorated for repair. Reconstruction techniques
used Earley’s methods and materials, including his “step-grading,” early form stripping, and “scrubbing” to expose aggregates. We identified an astonishing range of aggregate color and type, sometimes searching remote sources, to match them, and tested all proposed repair techniques. Working with a restoration contractor, we reconstructed a pier, proving it could be done well. We developed contract documents for repairs. Today, much of park’s early glory is restored.