



Louis Kahn, Trenton Bath House, Ewing, New Jersey, USA, 1955. Mural by Marie Kwo restored by John Canning & Co. © Brian Rose, 2010.

The Trenton Bath House Restoration: Challenges in Sustainability

BY MICHAEL MILLS AND ANNE WEBER

The Trenton Bath House complex holds an important place in Louis I. Kahn's oeuvre. As he stated: "The world discovered me after I designed the Richards Laboratories building, but I discovered myself after designing that little concrete bath house in Trenton"¹. Given its significance, a thoughtful restoration that allowed the buildings to remain in active use was imperative. Because the complex embodies in miniature many of the theoretical and practical considerations that accompany the work of Kahn and other modern-era architects, the process, outcome, and projected future of the restoration effort are instructive.

Project background

Louis I. Kahn was hired by the Trenton Jewish Community Center (JCC) in 1954 to design a new community and recreation complex for the organization, which was relocating from an urban site. The first plans were produced in February 1955. The design and program for the Bath House evolved through the spring of 1955 and included changing rooms for men and women with showers and toilets; a place for patrons to store belongings; and a snack bar. The Bath House and the adjoining pool were the first portions to be built (figure 02), and opened for use on Sunday, July 31, 1955, without their roofs, which were then constructed by October 1955.

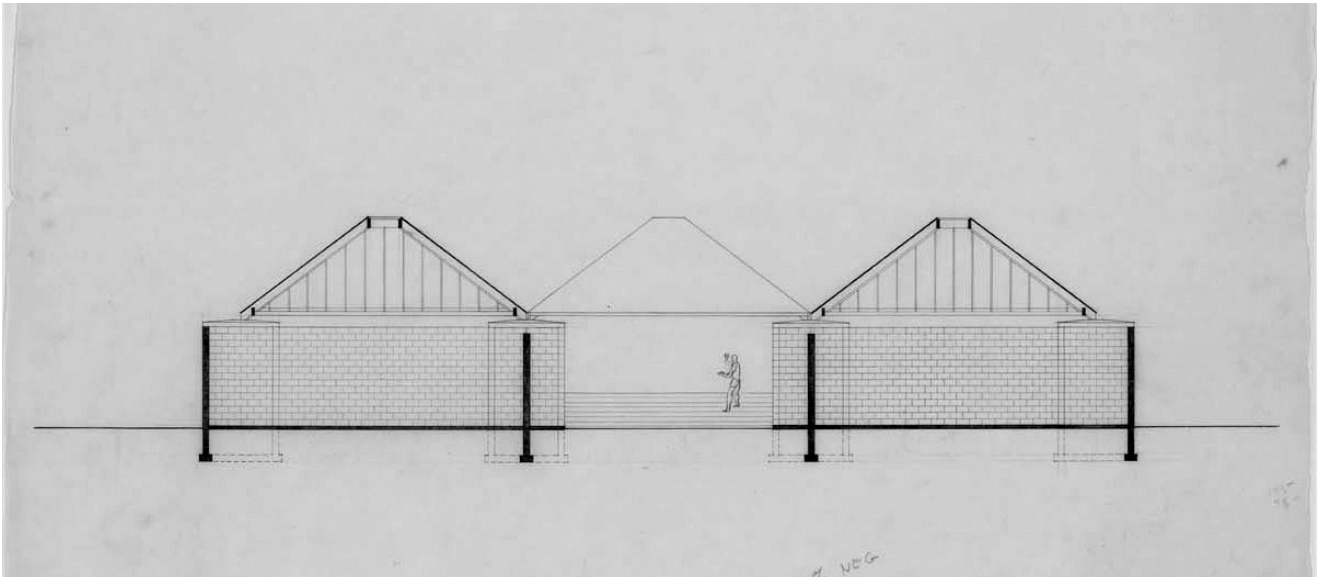
The JCC operated a summer day camp program to provide structured recreational activities for the children of its members as part of its mission. The Day Camp Pavilions were conceived and constructed within an extremely short period of time: an early drawing is dated 1957, and construction was completed by August of the same year. The day camp program continues today under the auspices of the Ewing Township Recreation department, and is extremely popular. Ultimately, the Community Center, the largest component of the complex, was not designed by Kahn, but rather by the firm of Kelly and Gruzen and completed in 1962. This building serves today as a Senior Center for Ewing Township.

The Bath House and Pavilions reflect an important advancement in the way modern principles were infused with lessons from the past. The Bath House comprises five square, concrete block "rooms" arranged in a Greek cross plan (figure 06). Four of the rooms are covered by wood-framed roofs with black asphalt shingles; the fifth is an open courtyard. The roofs, which appear to float, are pyramidal in shape and rest lightly on large concrete block "columns" with concrete caps. These columns generate the narrow servant zones for the primary served zones, a device that Kahn developed further in the Richards Labs and other ma-

ior works. The four Day Camp Pavilions are centered on a small courtyard and each is set at a slight angle to the next, their arrangement recalling Kahn's sketches of the classical temples at Corinth (figure 07). The Bath House and Pavilions were listed on the New Jersey and National Registers of Historic Places in 1984, prior to reaching 50 years of age, reflecting their high level of significance.

In 1997, the Bath House and Day Camp were included on Preservation New Jersey's 10 Most Endangered list when the JCC applied for a demolition permit for two of the Day Camp Pavilions. There was international outcry about the possible destruction of any of Kahn's design which led to a series of meetings between the JCC, AIA Historic Resources Committee, the New Jersey Historic Preservation Office, the Ewing Township Historic Preservation Commission, and Preservation New Jersey. The JCC was advised about the availability of capital grants from the New Jersey Historic Trust and the need to prepare a Historic Preservation Plan as a prerequisite.

Although the JCC had long performed routine maintenance, and little physical change had occurred, there was not a full understanding of the vulnerability and ongoing needs of the historic fabric. Both the Bath House and the Day Camp had suffered from continual exposure to the elements, magnified by the temporality of the materials and original design features, including: freestanding block walls with no copings, no gutters at the roof edge, and inadequate drainage of both the building and site. When asked if Kahn had ever considered gutters, project architect Anne Tyng said they had not. She reported that they liked the poetic effect of water running over the masonry as if it were a ruin and did not want to interrupt that pattern. Unfortunately, the materiality of the complex was not resilient enough to resist deterioration in the freeze/thaw weather cycles of New Jersey. And with the lack of resiliency, this monumental complex based on classical design principles fell into extreme disrepair.



01 Louis Kahn, Trenton Bath House, Ewing, New Jersey, USA, 1955. © Louis I. Kahn Collection, University of Pennsylvania and the Pennsylvania Historical and Museum Commission.

02 Louis Kahn, Trenton Bath House, Ewing, New Jersey, USA 1955. © Marshall D. Meyers Collection, The Architectural Archives, University of Pennsylvania.



03 Louis Kahn, Trenton Bath House, Ewing, New Jersey, USA 1955. © Marshall D. Meyers Collection, The Architectural Archives, University of Pennsylvania.



04 Louis Kahn, Trenton Bath House, Ewing, New Jersey, USA, 1955. View of Bath House during construction with removed demising walls. © Mills + Schnoering Architects, LLC, Michael J. Mills, FAIA, 2010.



05 Louis Kahn, Trenton Bath House, Ewing, New Jersey, USA, 1955. Restored Bath House courtyard with paved circular element. © Brian Rose, 2010.

In 2000, Susan G. Solomon published a monograph on the Trenton Jewish Community Center and established a website: *Friends of the Trenton Bath House*. The book and website drew attention to the buildings' significance and vulnerability. In response, the JCC sought and received a grant from the New Jersey Historic Trust for a Preservation Plan. Mills + Schnoering Architects' predecessor firm, Farewell Mills Gatsch Architects, was retained by the JCC and completed the plan in early 2001. More international attention was focused on the Bath House in 2003 with the release of the film *My Architect* by Nathaniel Kahn, Kahn's son, in which he highlighted its declining condition and its precarious future.

In 2005, prior to any restoration work, the JCC announced their relocation to another site and sale of the property. Newspaper articles contemplated the demise of the buildings and underscored the difficulty of rescuing a building of the modern era. The site did not appear sustainable as a recreational resource and was likely to be subdivided into numerous small lots for development. At this critical juncture, the County of Mercer intervened with interest in maintaining the pool and community center as a County and Ewing Township resource.

In 2008, using State and County Greenacres funds, Mercer County purchased the entire property, and began planning its restoration and future use with assistance from the National Trust for Historic Preservation. The County ultimately conveyed the site with preservation easements to Ewing Township, but shepherded the buildings through a comprehensive planning and restoration program using funds from the New Jersey Historic and County Open Space Trust Funds. The transition was smooth and the facility remained open each summer. By 2010, the facility was fully renovated and functioning, with a new snack bar designed so as not to compete with the original structures (figure 8).

In 2011, the County began the effort to re-plan the site with Mills + Schnoering Architects (M+sa) assisted by landscape architects Heritage Landscapes and civil engineers The RBA Group. The landscape design and parking areas derive from a sustainable interpretation of Kahn's 1957 Master Plan, and feature a community green as originally intended with perimeter parking that is permeable and groves of trees that create outdoor rooms (figures 09–11).

Restoration process

The mission of the project was threefold: to implement repair and restoration of the Bath House for ongoing use; to reconstruct, based upon Historic American Buildings Survey documentation, two Day Camp Pavilions; and to interpret the site and improve access with a new snack bar and new landscape features intended by Kahn but never completed. The design approach was rooted in the initial Preservation Plan, the Preservation Plan update prepared in 2007, and a Cultural Landscape Assessment.

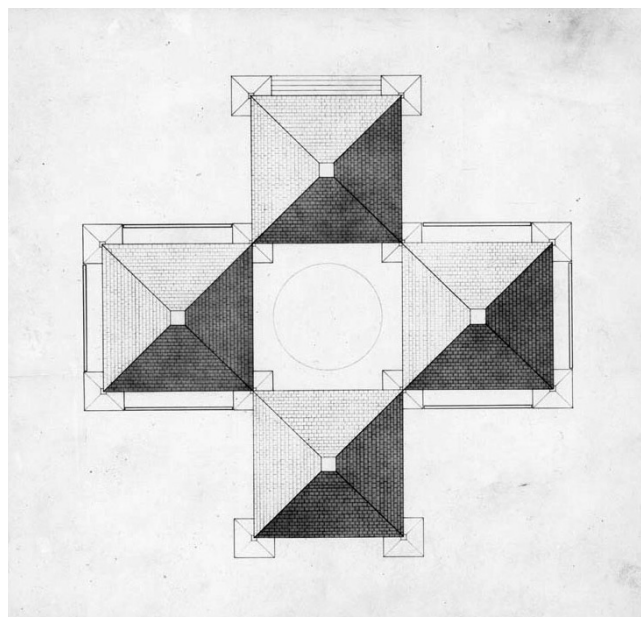
In updating the Preservation Plan for the Bath House, M+sa personnel undertook additional research in the Architectural Archives of the University of Pennsylvania, reviewing design drawings for the complex and original

completion photographs by John Ebstel. This yielded information regarding the evolution of the design of the roofs, the original fencing and gates, the entry mural, and the landscape plan. The team also had the opportunity to meet with Anne Tyng to talk about the original project, and to obtain her thoughts about the restoration and new features. One of the original engineers for the project, Nick Gianopoulos of Keast & Hood Company, provided guidance to the project, and met with the design team, Anne Tyng, and William Whitaker, Director of the Architectural Archives at the University of Pennsylvania.

At the Bath House, several significant original features were restored, including the entrance mural (essay cover figure) and the central, circular atrium floor detail (figures 09–10). Within the Bath House, structural repairs were made to concrete slabs and Concrete Masonry Unit (CMU) walls to improve site and building drainage; severely deteriorated slate toilet partitions were replaced with black granite; and exterior and interior materials were restored.

A mural marking the entrance to the Bath House was a part of the original construction, designed and painted by Kahn and members of his staff. The design highlighted the module of the concrete block in white, black, gray, and peach. For many years it had been painted over with gray paint. As part of this project, it was recreated through careful exposures, analysis, and study of original drawings and photographs².

The open center court of the Bath House had an original circular feature, believed to have been intended to be a spray or wading pool. Photographic evidence shows it filled with river stone at the time of the opening, and as a lawn panel with paver edges within a year or so. By the 1990s, all the concrete had been replaced, obliterating the feature (figure 04). Functionally, a spray or wading pool was not acceptable, and the lawn panel had been worn to dirt due



06 Louis Kahn, Trenton Bath House, Ewing, New Jersey, USA, 1955.
© Louis I. Kahn Collection, University of Pennsylvania and the Pennsylvania Historical and Museum Commission.

07 Louis Kahn, Day Camp Pavilions, Ewing, New Jersey, USA, 1957. Day Camp Pavilions after restoration. © Brian Rose, 2010.



08 Louis Kahn, Trenton Bath House, Ewing, New Jersey, USA, 1955. Snack Bar and restored plaza. © Mills + Schnoering Architects, LLC, Andrew Burian, 2011.



to foot traffic when it existed, so that was not an option either. The design team instead used exposed aggregate concrete to create the circular element as part of the concrete paving, recalling the original temporary stone treatment while maintaining full access for the disabled (figure 05).

All the concrete floor slabs at the Bath House were highly deteriorated, with significant cracking, heaving, and subsidence. The original design included carefully placed drains with scored patterns outlining the drainage areas. These areas echoed the roof patterns, with central drains below the oculi and trench drains along the outer walls. After years of movement, many drains had been left at high points in the slabs, or cut off from the flow of drainage by heaved sections of concrete. Areas of standing water accelerated the deterioration and created an unpleasant atmosphere in the changing rooms. After the removal of the slabs to install new drainage, clay soil layers and perched water pockets were discovered. These were likely the cause of the extreme deterioration. A plan to punch holes in the clay layers and install dry wells to drain the perched water was implemented, and new slabs installed to reinstate the original drainage and scoring patterns.

The CMU walls are a character-defining feature of the Bath House. These walls weathered very differently depending on their placement with respect to the roof edges. Walls set at the interior faces of the hollow columns were well protected, and in a very good state of preservation. Walls set at the outer faces of the hollow columns, such as those around the changing rooms, were in fair condition because their top surfaces were exposed. The walls set directly below the edge of the roof, between the central court and the changing rooms, were in very poor condition. At these locations, water poured off the pyramidal roof directly onto the top of the wall. This constant water infiltration led to disaggregation of the CMU, extreme moss and other biological growth, serious cracking, and overall staining. These walls were removed and reconstructed with new footings. To mitigate the water infiltration situation, a stainless steel gutter was recessed into the top of the wall, and downspouts concealed at each end. These alterations are invisible from the ground. To address ponding at the top surfaces of the outboard walls and hollow columns, a liquid-applied

membrane system was installed, which is also not visible from the ground, but which waterproofs the surfaces.

The success of reconstructing the walls at the center court depended in large part on matching the original CMU, and having it blend with the existing weathered units. Because of the run-off patterns, many of the blocks were significantly eroded and permanently stained. Finding an appropriate material for the replicated block at the Bath House required a multi-faceted effort. The original specifications were consulted during the design phase, and the initial approach was to find a modern block that matched those specifications in texture and color. Conservation analysis of the existing block provided additional information, revealing that the aggregate was a local crushed Delaware River stone with sands indigenous to southern New Jersey.

To mimic the texture required, several trials were conducted, including sand blasting and power washing. After two rounds of trials, it became clear that the process did not provide an approximation of the weathered block. The appearance that resulted was not granular enough and yielded a surface that was too uniform.

Kahn's specifications called out Waylite block, an early type of lightweight block. With additional research, the team discovered that a manufacturer of Waylite block was still in operation in southern New Jersey. They provided a sample that showed the standard texture and color. The texture was a close match to the existing and was accepted with only a minor adjustment. The next round of submittals focused on achieving the correct amount of aggregate and color pigments; approximately 12 samples were produced before a block with the rich tan color accented with speckles of blue and light orange aggregate was selected.

While the new block was a close match for the original, it was used primarily for reconstruction of larger areas, with salvaged block used for scattered infill.

The original slate partitions in the women's changing room also did not stand up to extreme exposure. The edges of these large slabs, up to 4' x 6', were exposed and subject to continual moisture and freeze-thaw damage. The panels delaminated and fractured, and no panel was intact at the start of the restoration project. A fine-grained black granite with a honed finish was selected as a replacement material

for shower and toilet partitions, retaining the appearance of the slate but with greater durability.

The Day Camp Pavilions are a very important part of the Community Center operations and were included in the restoration project. Two of the pavilions were restored and two rebuilt following a program of Historic American Building Survey documentation. The circle of gravel paving that contained the pavilions, long gone, was recreated by using a composite material that is a resilient, accessible, and maintainable surface resembling the original and contained within a new circular concrete curb.

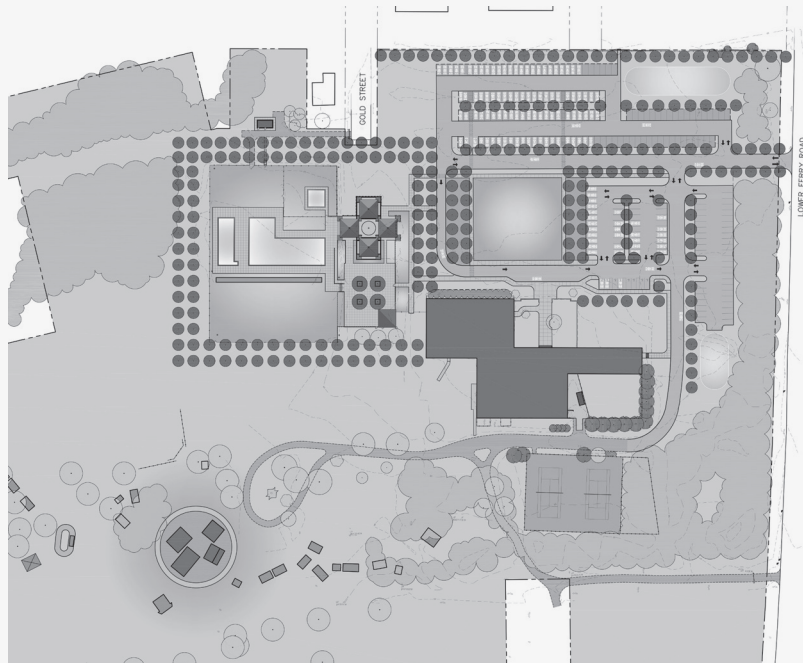
The Day Camp Pavilions were designed with readily available local materials, including clay chimney tiles and locally manufactured concrete plank, and may have been partially constructed with JCC volunteer labor. The two largest pavilions were designed as open structures, one comprising four bays and the other five. The two smaller pavilions were partially enclosed and contained restrooms and storage. As early as the 1960s, the solid concrete fill began to cause the clay tile to exfoliate. Eventually, the clay tile was removed, and the remaining concrete columns were stuccoed and painted. Remnants of the clay tile remained at the partially enclosed structures, providing a color to match for the new material.

The roofs were formed of precast concrete plank spanning between beams above the uprights at the perimeter. At the two larger pavilions, if there had ever been any roof membrane, it was gone by the early 2000s. This allowed water to enter the plank, attacking the concrete and reinforcing steel. Because of the configuration and nature of the reinforcing, the plank could not be repaired without a substantial change to the appearance of the structure, and

it was subject to brittle failure. The team advised the JCC that the pavilions should be closed to the public because the roofs could fail without warning. Because of the extent of the failure of these original systems, reconstruction with new systems was recommended, and this approach was approved by the NJ Historic Sites Council and the Ewing Historic Preservation Committee.

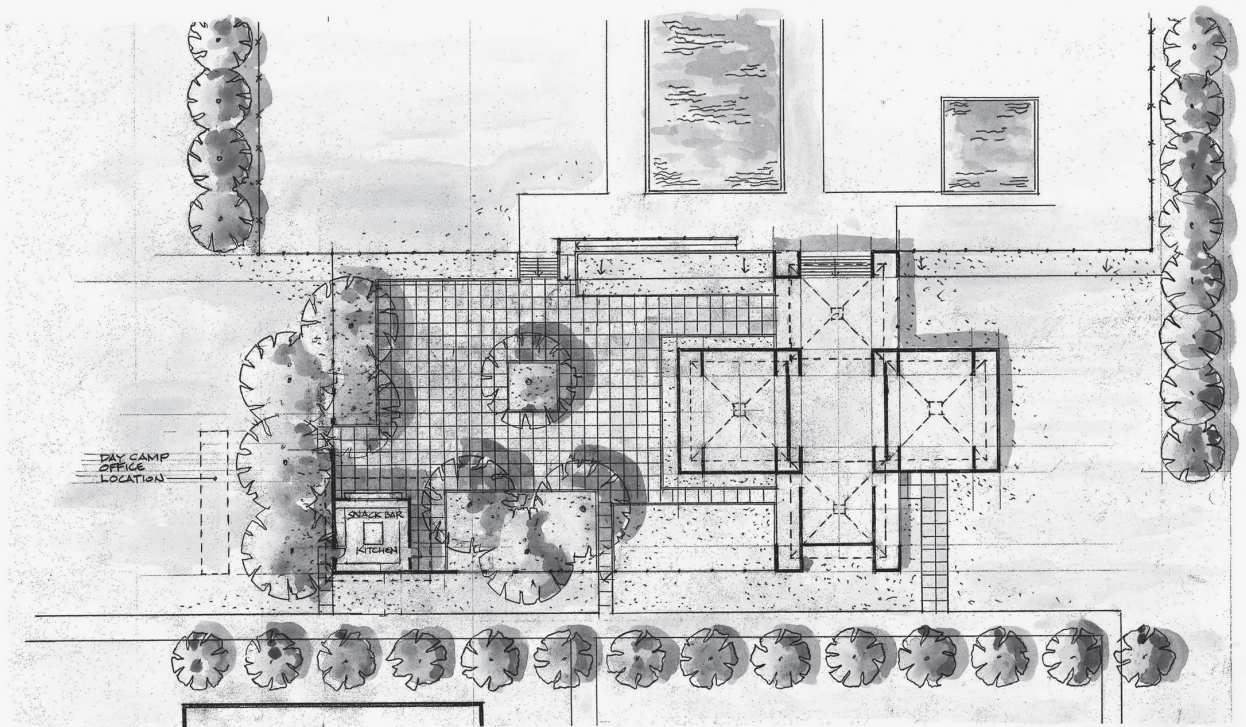
For the columns, a system of terra cotta over steel columns without solid fill was selected. The *terra cotta* could be colored and molded to match the appearance of the original chimney tile. Selecting a system for the roof was more difficult. Current concrete plank is not made to match the 16" wide dimension of the original plank. The planks have rounded corners, so this system of joints was highly visible from the interior of the pavilion. Modern planks are generally made to a 24" width, which would create a 50% increase in the joint spacing. This was an unacceptable impact. The team turned to a proprietary floor system used for mid-rise commercial construction called Filigree. It consists of a precast base panel with concrete poured on top, interconnected by reinforcing. The module is 48" in width, so false joints could be created at 16" centers to match the appearance of the original plank while providing a more monolithic slab and eliminating two thirds of the opportunities for leakage between panels. A roof membrane was installed at both new pavilions with no visible change to the edge conditions from the ground. The new pavilions are very close in appearance to the originals.

A new, free-standing Snack Bar, which grew from an intra-office design competition, was one of several site improvements envisioned by Louis Kahn but never realized



09 Mills + Schnoering Architects, LLC and Heritage Landscapes, Trenton Bath House Site, 2012. Louis Kahn-inspired landscape improvements. © Aislinn Weidele, 2016.

10 Louis Kahn, Trenton Bath House Ewing, New Jersey, USA, 1955. Site Plan, with the new Snack Bar location. © Mills + Schoeering Architects, LLC, 2011.



BI FLOOR PLAN / PARTIAL SITE PLAN
SCALE: 1" = 20'-0"

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Essays



11 Louis Kahn, Trenton Bath House Ewing, New Jersey, USA, 1955. Mills + Schoeering Architects, LLC and Heritage Landscapes, 2012. Kahn-inspired landscape improvements. © Aislinn Weidele, 2016.

and had been addressed through temporary structures over the years. The new Snack Bar was built in one of several locations shown in Kahn's drawings, another square module to the west of the Bath House. The location mediates between the Bath House and the Day Camp Pavilions, a functional advantage for the site. The intent of the design was to honor Kahn's work but not mimic it. It incorporates a butterfly roof that hovers over the concrete masonry walls much like Kahn's pyramidal roofs do at the Bath House. The concrete block walls intentionally do not match the color and texture of the original, so that the Snack Bar will not be mistaken as part of the original fabric. As sited, the Snack Bar forms the corner of the fenced plaza and the larger pool enclosure.

Other site improvements included removing foundation plantings installed by the JCC and replacing them with bosques of trees in keeping with Kahn's master plan (figure 11); and installing open-mesh fence at the perimeter (figure 08).

Barrier-free access was an important consideration in making the Bath House a functional public recreational complex. The site is extremely flat, which in general facilitates access. However, the procession through the center court up the stairs to the pool is key to the design (figure 05). A new concrete ramp leading from Bath House level to pool level now facilitates access both for visitors with disabilities and families with strollers or wagons.

Within the structure, accessible toilet and shower stalls were added. The baffled entrances to the changing rooms had an inch to spare on clearance for wheelchairs, so no alteration to those features was needed. Throughout the site, paving materials were selected to be accessible, as well as to be slip-resistant in wet conditions. Fortunately, the original concrete finishes generally met these criteria and were replicated in kind.

Conclusion

One of the most important questions considered during design and construction was how best to preserve the monumental and spiritual character of Kahn's Trenton Bath House in the future. The approach was to confront directly the challenges of sustaining the materiality of the complex despite the ephemeral nature of its components. Wherever possible, the design team took measures to strengthen the resiliency of the complex to ongoing aging, weathering, and daily use while conserving historic features. These measures included:

- Adding a weather resistant surface to the top of the exposed concrete block walls.
- Hiding built-in gutters in the top course of two walls where the drip line of the roof coincided with the wall location.
- Adding a liquid-applied, water shedding membrane to the top slabs of the concrete masonry "columns."
- Replacing and upgrading the piped drainage system for the buildings.

- Replacing the concrete floor slabs on a new drainable substrate to restore the function of the original design.

Mercer County's purchase, in 2008, brought with it an opportunity for the Bath House and Day Camp to be more fully integrated into the wider community, and renovated with important but unobtrusive design improvements to make the complex more sustainable. County officials were tireless in determining how best to preserve the site with creative programming in support of Ewing Township's community needs. As a project, this effort perfectly dovetailed with the County's focus on open space and Ewing Township's growing desire for a new senior center. In addition, the County sought to educate the public by developing an award-winning website³ that emphasized the site's history and significance. Donna Lewis, Mercer County Planning Director, noted, "The eyes of the world were on us. It was about teaching a wider audience that history comes in all shapes and sizes, and about preserving our own modern legacy".

Finally, a maintenance plan was prepared by the design team to guide Township officials and staff in implementing appropriate preservation and maintenance procedures. The intent is to slow down the deterioration of the historic material and provide guidance on its repair and conservation.

Both the summer pool program and day camp continue in popular use. With the educational programs offered by the Township and County, including periodic showings of *My Architect*, more people understand and appreciate the complex.

In the Bath House complex, Kahn created very simple structures using commonplace materials – and yet the result is an incredibly moving, vibrant work that is at once thoroughly functional and responsive to the changing effects of light and weather (essay cover figure). The restoration project sought to address the challenges in sustaining the site. The buildings are a lesson to us all that even the most modest of commissions can have a profound effect on the history of architecture and design.

Notes

- 1 Susan Braudy, "The Architectural Metaphysic of Louis Kahn", *New York Times Magazine*, 15 November 1970, 86.
- 2 John Canning, the decorative painter who directed the work, found it so handsome that he created a full size version for a Louis Kahn exhibit at the Vitra Museum and another for his own modern-era home in Connecticut.
- 3 <http://www.kahntrentonbathhouse.org>

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