What Might a Polluted Creek Teach Us about Architecture?

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Let us begin with two images of refrigerators. One shows a refrigerator in a creek; the other shows the Kenmore in my kitchen. The **frame** around each fridge is different. Most of us, I think, would agree that a refrigerator does not belong **in** a creek. It is in the wrong place. And it is ugly in that place. Yet someone put the fridge in the creek. My refrigerator is not beautiful, but it is in the context for which it was designed and it works. Often one can view Green Street in Champaign under several feet of water when the Boneyard rises. Buildings do not belong in the water either, with a few exceptions. Construction in the path of a water course has occurred for many years, for many reasons. The consequences have become increasingly costly in human and economic terms as the population swells. It is past time that we recognize that the frame in which we humans think is too small. Just as the people who put the fridge in the creek had a too-narrow frame of reference--they ignored the common good for their own convenience, I assume--so too I think that builders, designers, and users often have a frame of reference that is too narrow. We rarely have considered the life of a creek, for example, in our planning. After a time, after water damage, smelly mud, and wet garbage in buildings, we start to blame the creek. The creek is an eyesore, it is filthy, it stinks, and so on. One would think the creek had violated human territory instead of the other way around.

No one is going to suggest paving over major rivers of course. While river floods affect many lives and cost a fortune in damages, the Mississippi rolls on. But here in Champaign- Urbana, the Boneyard HAS been paved over, in places, and various ways of living with the creek have been explored, with mixed success, for over one hundred years. While some towns along the Mississippi have moved to higher ground, people in our towns seem to hope the creek will just go away.

The issues are complex and I will not address many here. But I did want to back up to the beginning of this century and investigate the career of one man, Arthur Newell Talbot (1857-1942), and his role in the School of Engineering, as well as parts of the physical plant that arose as the engineering school grew. I would like to use this history to identify some lessons that we might learn from earlier campus growth along the Boneyard, and offer one example of how these lessons seem to have been applied in the siting and design of the Grainger Engineering Library of 1992-93 by Woollen Molzan and Associates.

In the course of his career, Talbot thought and wrote about, among other things, sewage treatment, management of storm run-off, and the teaching and practice of engineering. He studied problems that literally were under his nose, in the School of Engineering, built near the Boneyard in the 1890s. Talbot's work provides a framework, albeit limited to a few considerations here, to explore links among buildings, natural water courses, and human activity.

Ironically, the Boneyard was not much of a creek until white folks began settling in Urbana and west Urbana in the 1850s. When the first railroad was built in 1853 and fields began to be drained, the swale became a channelized creek that has gone by several names; the Boneyard refers to animal bones left by Native American hunters just north of here. By 1893 when construction began on the first sanitary sewer, the stream itself was an open sewer and filled with trash. An anonymous poem, "The Boneyard," was published in **The Illio** in 1896; the last verse reads: "But the gentle evening zephyrs/Bear its incense through the mists,/And we're forcibly reminded/That the Boneyard still exists." Retired Professor Marcus Goldman recalled when he arrived in town in 1916: "[W]hen the smell from the Boneyard happened to be especially unpleasant, the citizens...denounced the stream as if it were self-polluting...." (Goldman). While the slow flow of the stream across this flat countryside does make it a candidate for muck, much of the murk is due to human activities, especially those situated on or near its banks.

Just as the Boneyard at times divides the towns of Champaign and Urbana, so has opinion been divided on how to co-exist with the water course. In 1893, for example, the University of Illinois planned and built its new Engineering Hall right along the creek ("The New Engineering Building"). Architect George W. Bullard (1855-1935) was an 1882 graduate of Illinois ("Bullard Obituary"). While he was working in Tacoma, he won the limited competition for the Champaign building, but only after a disagreement among the Trustees about the siting of Engineering Hall. Since its founding just after the Civil War as the Illinois Industrial University, the UI had grown from a single building, University Hall, south of Green Street, to include the Natural History Building by Nathan Ricker and the Law Building. This grouping formed an informal U-shape facing north (Tilton, 21-22). Seemingly, the ambitions of University planners aimed to imitate quadrangular campus plans that were proliferating across the East and Midwest in the later 19th century. To "answer" the buildings south of Green Street then, some believed the new Engineering Hall should face them, across the street and next to the Boneyard.

An opponent of this plan, Napoleon B. Morrison (1824-1911), had been elected to the University of Illinois Board of Trustees in the early 1890s. From Odin, Illinois, Morrison had studied civil engineering and been involved in railroad work in five states in the East and Midwest. By the time he served as trustee, he was president of the Odin Coal Company (Scott). He served on the Farm Committee as well as the Building and Grounds Committee of the Trustees. In the Fall of 1893 Morrison submitted a minority report regarding the site of the proposed Engineering Hall. He objected to the site along Green Street near the creek because the ground was too low and too uneven. He noted "that the rear or heaviest wall will have to be erected upon a foundation of quicksand, which underlies all that portion of the site selected near Boneyard Creek. The site selected involves the destruction of our elegant park that is now clothed with beautiful shade trees...." He further objected to the lack of visibility afforded to an important building due to its siting on low ground and that "the building will be on the line of the proposed sewer....[W]e can ill afford to place any obstruction in the way of that enterprise" ("Minority Report," 181-82). For reasons that I have yet to pin down, Morrison's report was voted down 6 to 3 on 12 September 1893 and the Green Street site was approved ("Minutes," 187).

In the 1890s the UI School of Engineering was one of the largest in the nation (about 500 students), despite the relative youth of the institution. Included in the School were architecture, civil, electrical and mechanical engineering, and municipal engineering. The site of the Engineering Hall then became the anchor for hundreds of people whose activities spread out along the creek's banks over the next several decades, to the detriment of the creek and trees as well as to the subsequent buildings. While much attention in the press was given to the interior and exterior of Engineering Hall, the real story seems to me to be the site. Morrison was apparently one of the few people to perceive the damage the site selection could do, in terms of the building itself, the trees, and the proposed sewer line.

The sewer line was a result of some far-sighted thinking on the part of local planners. Between 1895 to 1898, 24 miles of sanitary sewers were constructed for the town of Champaign, then with a population of about 10,000. While this construction was progress, there were still a number of places where sewage ran (illegally) into the Boneyard, directly or indirectly; only in 1949 did the Urbana-Champaign Sanitary District remove the remaining outlets that drained into the creek (Smetana). Arthur Talbot was exploring ways to treat raw sewage once it was diverted into sewer lines. Together with heading the department of theoretical and applied mechanics in the 1890s, Talbot began to teach municipal and sanitary engineering in the 1890s ("Instructors").

Arthur Newell Talbot was born in Cortland Illinois--about 55 miles west of Chicago--in 1857 (Phillips). Twenty years later, in 1877, he entered what became the University of Illinois, then known as the Illinois Industrial University. During his first year in Urbana he kept a journal that details his activities, the weather and University goings-on (**Diary**). Talbot often noted the high water of the Boneyard, the mud and the smell. After graduation in civil engineering in 1881, Talbot worked for railroads in the West for several years, before returning the University of Illinois in 1885. He continued to teach municipal and sanitary engineering and theoretical and applied mechanics until his retirement in 1927. Talbot died in 1942, but not before the Talbot Laboratories were renamed in his honor in 1938. Also there is a plaque honoring Talbot at the Urbana Sanitary District headquarters.

Let's take a closer look at Talbot's work on sewage treatment. Talbot reported on his septic tank in Champaign in 1899, designed in 1895 and built in 1897. He built Urbana's septic tank in 1894. "The Urbana tank may be said to be the first distinctively septic tank put in for such, in the world" (Talbot, "Women's Club"). Housed in a brick and wood structure, the sewage treatment was relatively inexpensive and basic: the nearly forty-foot long masonry septic tank excluded light and air as much as possible so that when the sewage flowed through the tank, "matters in suspension," as Talbot called them, fell and decomposed while the effluent flows out the further end of the tank. Anaerobic bacteria continuously worked on the sewage, needing little attendance except for occasional sludge removal. By 1899, 400 buildings were connected to sewer lines, which included hotels, boarding houses, restaurants and public buildings. While Talbot estimated that under a third of the town was served by sewer lines, the connections did make for a healthier atmosphere and the sewage was treated partially in the septic tanks (Talbot, "Septic Tank"). The effluent from the septic tank was discharged into the Salt Fork Creek. Talbot reported:

For disposal ground, the city of Champaign purchased twelve acres adjoining the east city limits of Urbana. The creek runs through this tract for about one-fourth mile, and the tract is available for construction of artificial filter beds, there being a large sand bank within a half mile ("Septic Tank," 111).

In other words, Talbot recognized that a greater volume of sewage could require further treatment of the effluent. Indeed, by 1914, the same year that Talbot created the Sanitary Engineering Laboratory near the Boneyard to explore other methods, the settling tanks were inadequate for the increased volume (Robinson). In celebration of the septic tank system though, Talbot marvelled:

Here in this little building, without attention and without expense, Nature is working away day and night reducing the wastes of civilization to harmless forms and preventing the unsanitary condition which would result from a direct discharge of the sewage into so small a stream ("Women's Club," 23).

As a sanitary engineer, Talbot was uniquely situated to view the interconnections in the city. Often urban dwellers forget the sources of basic necessities--clean water and air, food from the soil, and shelter, to name a few. In his 1899 address to the Women's Club, Talbot noted:

It may thus be seen that sanitary science must take into consideration the water supply, the disposition of all human and other organic wastes, the drainage of ground and soil, the ventilation of buildings, the disinfection and destruction of disease-infected articles, the isolation of and quarantine against contagious diseases, together with various forms of preventive medicine ("Women's Club," 1).

In designing his septic tank, Talbot made use of his knowledge of water flow and bacterial decomposition to create, in effect, an artificial stream that would cleanse itself before joining the creeks that wound through the prairie.

Unfortunately, Talbot's system was not adopted all over the cities and the prairie stream known as the Boneyard continued to be an open sewer. As the visiting city planner, Charles Mulford Robinson, noted in 1915:

The "Boneyard" stream is a serious offender against pure air. During much of the year the flow of water is not large enough to flush the stream bed properly, and, as a result, deposits are left which decompose and create a stifling, almost nauseating, odor. This stream is not intended to carry sanitary sewerage, yet...sewerage was found flowing into it. For a number of years there has been an attempt on the part of some citizens to secure a conduit down the length of the stream and then to cover it over (8).

Sanitary sewers were one area of Talbot's expertise; storm sewers were another. In a chapter on the hydraulics of sewers, written for a correspondence school, Talbot recognized the challenges of a rapidly growing city:

In cities, there is a much larger proportion of impermeable surface....Paved streets, walks, the large area covered by the roofs of buildings and sheds, paved yards and courts, all go to increase the proportion of rainfall which is carried off as storm water. An additional cause lies in the more perfect [sic] surface drainage, rain-water conduction and house drains, gutters, catchbasins and inlets, all combining to carry off the floodwater in the smallest possible time (7).

To make a long story short, when the prairie gets paved and roofed over, during a heavy rainfall, the storms sewers may get swamped, the sluggish streams surge, and the sanitary sewers overflow. Water runs everywhere and often carries "the wastes of civilizations" with it.

While not losing sight of Talbot and his contributions, my goal is to integrate him and his work into a larger story of the built environment along the Boneyard. Trustee Morrison seemed to have a large vision, but often the complexity of our environment is reduced to fit within narrow frames of one building, one architect, and/or one time. Along with Stewart Brand, whose recent book **How Buildings Learn** I have found to be refreshing and useful, I would like to examine what the Boneyard has taught a few of the buildings on the north campus of the U of I, if you will. Amos Rapoport has described the relationships that I want to explore:

[T]he environment is best conceptualized as the organization of space, time, meaning, and communication....It follows that the domain must include human behavior, the relation between behavior and the built environment, and the relationships among the components...of the built environment. Moreover, the latter must go beyond the buildings--they need to include systems of settings of which buildings form only a part... (11).

"The domain must include human behavior"--that phrase of Rapoport's is so obvious yet so easy to overlook. Human behavior, of course, is predictable only in its unpredictability. Still, since we cannot start over with new settlements, we must go forward with incremental changes that can accumulate and lead toward improved environmental conditions. Large-scale, public works sometimes point toward sensible solutions: since the financial and political hurdles are substantial, however, we need to continue to focus on local, small-scale actions too. One recent project shows a kind of leadership that supports a shift to responsible creek management, as well as being successful in design respects. The Grainger Engineering Library, completed in 1993 on the northern edge of the University of Illinois campus, is sited well, relating to the creek and the Engineering Quad. When I talked with its architect, Evans Woollen, in May of 1995, he noted that the site was a given, and the library had to hold its own on the new quadrangle. The building could have been moved eastward a bit, but it would have opened the quad to spatial "leakage," he said. In terms of actual leakage, the southwest corner of the building was the closest to the flood plain; standard waterproofing practice was used in its construction.The three-part geometry of the Grainger facade enlarges upon the central pavilion with wings of Engineering Hall, built one hundred years before, in 1893.

The site for Grainger is instructive in several ways. First it helps to create a public space that acknowledges the creek. This in itself raises awareness of positive aspects of the Boneyard, particularly since the grassy area is broad and can help absorb overflow rather than contribute to flooding downstream. Second, the presence of the field enhances the possibility that the banks in this area might be revegetated, thus further slowing the flow during heavy rains, and helping to convince others that opening up the banks is an optimum solution. Third, the site of the Grainger parking lot is the former location of the Stephen A. Forbes house. (The historically interesting Wood Shop and the Aeronautical Lab B were demolished.) The 1885 Italianate Forbes house was moved, but, in a way, Forbes' work is affirmed by the creek's pleasant presence at the site.

Stephen A. Forbes (1844-1930) was a contemporary of Talbot's and in fact collaborated with him on some water pollution control projects at the century's turn. Forbes founded the Illinois State Laboratory of Natural History in 1877 (which became the Illinois Natural History Survey in 1917), served as Dean of the College of Science from 1885 to 1906, and was an innovative naturalist and entomologist in addition to his administrative duties. Ecology, or the study of the **relationships** among organisms and their environment, was an approach that Forbes developed and promulgated. His ecological research at least deserves recognition at the site of his home for so many years ("Endangered Buildings"). Perhaps the recognition can come in the form of reasonable creek management up and down stream.

Watershed hydrology is drastically different after a town or city is built. In the Boneyard's case, it has been channelized in places, paved over in others. With impermeable paving and structures, the rainwater ceases to drain through the soil over a broad area into the water table. Instead costly storm drains concentrate the flow and often overflow. So beyond the large-scale public acknowledgement of the Boneyard, seen in the quad framed by Grainger Library, we must foster small, varied but widespread tactics to improve water absorption as well. To mention a few in passing, offered by David Katz: perforate compacted lawns and open areas; plant vegetation on all possible sites; practice mulching and terracing where appropriate; and use permeable drain channels and cobble drains when feasible (162).

I would like to end by urging the continued collaboration across disciplines that architecture and engineering must involve. I think these linkages can be pushed further to include more people, more of the time. So let me share with you some images by the multi-media environmental artist, Betsy Damon. Damon has been community-oriented throughout her career, but her current focus is on water quality. She works collaboratively and internationally as a "Keeper of the Waters," bringing together artists, scientists, businesspeople and politicians in works where water is the central theme (Laszewski). Her mixed media series, "Your Body is Water," only hints at the provocative and healing possibilities of her art. Amidst all the confusion and disagreement about the most effective and efficient ways to live with the Boneyard in our midst, I would like to use Betsy Damon's work to amplify the wisdom of those people at the century's turn who worked right next to the creek: Napoleon Morrison, Arthur Talbot, and Stephen Forbes, each in their own way, contributed knowledge that we can use to improve the natural and built environment. They were very much aware of the systems of settings in which we live.

Endnotes

This draft is a preliminary version of the paper to be presented in October 1995. It is not for quotation; for complete references and the revised version with illustrations, contact the author.

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