THE DEVELOPMENT OF BATHS AND POOLS IN AMERICA, 1800-1940, WITH EMPHASIS ON STANDARDS AND PRACTICES FOR INDOOR POOLS, 1910-1940

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ABSTRACT

This study reviewed the historical development of the modern American swimming pool, tracing its roots back to the Greco-Roman Era, advancing through the European Middle Ages and into the young American republic. Early American aquatic structures used primarily for bathing and often leveraging natural water sources, evolved into recreational and sporting facilities which took advantage of developments in both building methods and technology, as well as improvements in water disinfection and filtration. By 1940, the American swimming pool was not only ubiquitous, but utilized designs, methods and materials which remain familiar today.

The survey begins by tracing the early origins of pools as baths in several ancient cultures through to the Enlightenment. Next, it traces the evolution of the of the public health and hygiene movement in the United States and Britain, a movement which resulted in the first widespread construction of public baths and pools in the United States. The review then shows the transition from baths as a hygienic aide to pools for sport and recreational purposes. This transition from baths to pools brought substantial standardization in design with it, though there continued to be a variety of standard in play for several decades as different governing bodies of aquatic sports were founded and refined their requirements. Finally, construction and equipment standards of the day are reviewed.

The final analysis shows that indoor pools in the United States during the early part of the 20th century, while tracing their origins back several millennia, came to represent the result of political and health movements, as well as a succession of design and construction standards. In many ways, pools from this era are a microcosm of both building technology and social movements, each of which underscore the value in their

preservation. Pools – their design, construction, standards and use - represent many of the technical and social challenges and opportunities of the early 20th century.

BIOGRAPHICAL SKETCH

Robert Pick was born in raised in Montgomery County, Maryland, where he graduated from Wheaton High School in 1989. He went on to Western Maryland College, Westminster, Maryland, where he completed a Bachelor of Arts degree, *summa cum laude*, in History and Political Science after just three years of study. Following a one year hiatus, Mr. Pick enrolled in the Master of Arts program in Historic Preservation Planning at Cornell University in Ithaca, New York, in 1993. After completing the coursework for his Master's degree in the Spring of 1995, Mr. Pick continued on in the Doctor of Philosophy program in the Department of City and Regional Planning at Cornell, completing his coursework in 1996.

In addition to his academic work, Mr. Pick worked as a pool management professional for nearly ten years in Maryland. During his Cornell years, he also began Preserve/Net, a comprehensive World Wide Web site for preservationists and planners, which he continues to maintain. Mr. Pick has also done planning and marketing work for several golf and country club management companies in North Carolina. Mr. Pick was a Senior Manager with PricewaterhouseCoopers LLP, from 1997 – 2002, and has been an Executive Director with Conde Nast Publications, Inc. since 2002.

To Mom, Dad and Chris for providing me with a warm and supportive environment which provided me the encouragement necessary to take a chance and continue my education, despite the insane costs in time and money. To Dr. Michael Tomlan for providing guidance and support during and after my years in residence at Cornell, and thereafter. And to my wife, Heather, for putting up with seven years of school, so many six-hour drives and outrageous phone bills

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

There are more swimming pools in the United States than in any other nation on Earth. For nearly two hundred years, Americans have held a fascination with water as a curative, hygienic aid and recreational medium. The establishment of the swimming pool as an element of daily life in America is the result of nineteenth century social reform and health movements. Finding its roots in the cultures of Classical Antiquity, the modern American pool has changed relatively little since its introduction into popular life and the standardization of health and sanitation codes affecting pools during the first few decades of the twentieth century. The pools of the early twentieth century represent not only these social reform and public health movements, but also demonstrate the technological progress that occurred in many areas of industry—construction and sanitation among them—beginning in the nineteenth century and continuing through to the years just prior to World War II. Understanding how the sport-recreation pool evolved out of the hydropathy and public health movements of the nineteenth century, the intent of the facilities' design and the composition of their structure is key toward preserving this significant piece of American identity.

Americans often view pools and their auxiliary structures as impermanent pieces of engineering—appliances—to be discarded or "overhauled" when the pool has exceeded its life span, without regard to the historical or community significance it may embody. In spite of the prominent placement of pools within hotels and schools, on university campuses and in YMCAs, and in spite of the literally millions of Americans who have learned to swim in these pools, little regard is paid to what pools represent to a community, what they reflect in that community and what they tell of American history. Literature regarding pools for a hundred years has been written

only in the present tense. There has been little effort made to analyze changes and developments over time. The result is a largely disjointed and episodic corpus of literature which offers little help to individuals seeking to restore an aquatic facility or, at least, understand its history in a larger context.

This work seeks to offer to the reader an analysis of the changes to and development of pools over time. The goal is not only to provide what is essentially a "statement of significance" for early twentieth century indoor pools, but also to present enough information regarding design, construction, and outfitting standards and practices that a serious individual might use this work as a reference in the restoration of one of these facilities. At the very least, the reader will have an idea of what to expect when examining one of these structures, an advantage heretofore unavailable.

Toward these ends, comprehensive historical research has been undertaken, investigating the evolution of baths, pools and related technology over time, as well as the social movements that spurred the evolution along. Along with this literature-based research, a significant amount of fieldwork has been done, building upon the author's ten years in the pool management and construction business.

Chapter One provides an overview of the history of baths and pools, from the early Aegean civilizations through the Fall of Rome and up to medieval European times. During this time many of the technological developments and advances occurred. Additionally, historical health and recreational water uses are addressed to set the stage for later discussions on the changing uses of water and views regarding bathing. Finally, an initial typology and nomenclature is introduced for different baths intended for different uses.

Chapter Two chronicles the great impact of the public health and hygiene movements of nineteenth century Europe and America. These movements brought the

notion of hydropathy, or the use of water to cure and prevent disease, from the water-cures to the urban poor. Toward these results, several types of baths and pools were evolved in both Europe and in America, each for a different set of reasons. By the end of the nineteenth century, the facilities created through the efforts of these reformers were popular enough to spark a change of focus from the hygienic attributes of bathing to the recreational nature of swimming.

Chapter Three relates this change in focus to a more general rise in American leisure and sporting activities. The rise of recreation coupled with the growth in popularity of formal aquatic sport solidified the notion that bathing and swimming were not just activities for the maintenance of personal hygiene. These new foci resulted, again, in different types of facilities being designed. In addition, the functions of existing facilities were revised.

The effect of the popularity of recreational swimming and organized aquatic competition on the standardization of the design of pools is examined in Chapter Four. Included is an explanation of the standards with regard to each of the above mentioned considerations. Even within the brief time between 1910 and 1940, the standards, which were largely based upon the rules and regulation of the governing bodies of aquatic sport, changed drastically.

These ever-changing "standards" make the discussion of design and construction practices in Chapter Five all the more important. In this chapter, the fundamental elements of design, construction and equipment are considered with regard to actual practice in the field. The information provided will allow the reader to understand the early pools of the twentieth century, not only in terms of the technology and the rationale behind the standard, but in terms of their overarching historical context.

For too long, pools have been deemed disposable. Often pools are demolished in the name of "not meeting code." Like the structures that house them, they can be appropriately refitted with equipment meeting today's sanitation and safety standards, and maintain their essential character and functionality. When a pool is destroyed, what is lost is not just a tank of water, but the evolutionary result of the ol' swimmin' hole, the water-cure, the municipal bath, and the college pool. The period of focus herein, 1910-1940, was a time of tremendous building in both the public and private sector, and pools were part of this construction. So many pools from this era are gone. With them has gone the memory of what brought them to being. This work is to aid in the understanding and restoration of these cultural resources, and to help them to continue to represent the cultural and societal forces which gave rise to them.

CHAPTER 1

BRIEF HISTORY OF ANCIENT AND MEDIEVAL EUROPEAN BATHS AND SWIMMING POOLS

The development of the modern swimming pool finds its roots in the ancient world. The very names by which modern society still refers to some types of pools and baths demonstrates a direct line from these past cultures with regard to their use and enjoyment for hygiene and recreation. Many of the building techniques used during the first half of the twentieth century were developed by the ancients for the same purposes for which they are still used. In fact, in few places since ancient Rome has the use of artificial bodies of water become such a part of daily life as it has been in the modern United States.

The notion of a dedicated swimming or bathing area certainly transcends the idea of cities or civilization on a large scale. As many animal groups are known to congregate for the purposes of drinking water and bathing at the same location over time, humans have also followed this pattern. The banks of rivers and the shores of lakes have been used regularly by people for thousands of years for both private and public bathing. The location of settlements near flowing water leads to this nearly as an inevitability.

As human society and interaction grew more complex and, to some extent, more crowded, concerns of hygiene came to the fore, often coupled with organized religion. Ritualized bathing, in the form of ceremonial baptism or public bathing, became part of the religions of many early civilizations, including the Egyptians,[1]

[1] Marilyn Thornton Williams, *Washing "The Great Unwashed:" Public Baths in Urban America, 1840-1920,* Columbus, OH: The Ohio State University Press, 1991, 6. Notes religious bathing associated with the Egyptians; Frederick W. Luehring, *Swimming Pool Standards*, New York: A.S. Barnes and Comapny, 1939, 13-15.

Indians,[2] and Hebrews.[3] Both state laws and religious doctrine[4] prescribed bathing for cleansing, ceremonial and therapeutic uses.[5]

This bathing originally took place in natural water formations—lakes, rivers, streams and, especially, natural springs.[6] As the rituals became more formalized and bathing became more regular, areas of these natural bodies of water were partitioned in various ways to separate the holy water from that intended for mundane purposes, such as cooking and washing clothes[7]. Over time, these structures were elaborated upon and enhanced, thus creating the first bathing enclosures.

As the foundations of Western civilization were developing in the Aegean, the use of water for ritual and hygienic purposes continued. Excavations at proto-Greek sites like Knossos reveal enclosed areas of natural bodies of water as well as artificial structures that are believed to have been constructed for the purpose of ritual bathing.[8] Generally, however, the earliest civilizations of the Aegean, at Knossos and Mycenae, practiced river and stream bathing more often than bathing in artificial pools.[9]

As Classical Greek civilization rose, this tradition of bathing continued and began to take on different forms. Moving beyond the notion of bathing solely for

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[2] M. Alexander Gabrielson, ed., *Swimming Pools: A Guide to Their Planning, Design and Operation,* Fort Lauderdale, FL: Hoffman Publications, 1972, 11. According to Luehring, 14-15, quoting Sir John Marshall, *et al, Mohenjo-Daro and the Indus Civilization*, London: Probsthain, 1931, the public baths at Mohenjo-Daro are the oldest known at 5,000 years. These baths used an elaborate multi-layer brick, plaster and bitumen structure to maintain water tightness. Also present are inlet and waste grates for a well-water to public sewer circulation system and the remains of a hypocaustic heating system for the baths. See also Williams, 6.

[3] Gabrielson, 11; Luehring, 13-15

[4] Horatio Mahomed, *The Bath: A Concise History of Bathing as Practised by Nations of the Ancient and Modern World,* London: Smith, Elder, & Co., 1843, 1.

[5] Luehring, 15.

[6] Mahomed, 1.

[7] Although each one of these activities may, at times, take on religious ceremony and significance.

[8] Philip H. Perkins, *Swimming Pools: A Treatise on the Planning, Layout, Design and Construction, Water Treatment and Other Services, Maintenance and Repairs*, 2nd ed., London: Applied Science Publishers Ltd., 1978, xi.

[9] Mahomed, 3-4; Perkins, xi. Perkins writes that "bathing rooms" found among the early palaces of the Aegean civilization "are notable for high standard of design and layout as well as their system of water supply and drainage."

religious, ceremonial or therapeutic purposes,[10] the Greeks pushed ahead to begin forging a relationship between physical exercise, sport and swimming. Perhaps the earliest known descriptive term for a type of swimming pool is the Greek *kolymbethra,* a collective term referring to baths of many temperatures that were built associated with Grecian gymnasia or *palaestra.*[11] Over the course of Greek civilization's development

> . . .we know the establishment of baths, private and public, [among the Greeks] became very general, and on the most magnificent scale. They were usually annexed to the Palœstra [sic], of which, indeed, they formed a part, and consisted of seven divisions—1, cold bath, called by the Romans "*frigida lavatio*;" 2, *elæothesium*, or annointing; 3, *frigidarium*, or cooling room; 4, *prassigneum*, or entrance of the *hypocaustium*, or stove; 5, the vaulted room for sweating in; 6, *sudatio*, or *tepidarium*; 7, the hot bath, or *calida lunatio*.[12]

The Greek gymnasium was "uniquely conceived as an institution for the military and athletic training of young citizens as well as for their intellectual and artistic development."[13] This combination of pools with other physical education equipment created a situation whereby military training cum sports would eventually come to include aquatic activities, evolving into a unique, well-defined sport of competitive swimming under the Romans. The Greeks began to incorporate swimming into the military training regiment. In addition to linking swimming and sport, the Greeks were also the first to make large-scale use of natural warm water springs when

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[10] John Dawes, *Design and Planning of Swimming Pools,* London: The Architectural Press, 1979, 2. Hippocrates himself founded "water therapy."
[11] Dawes, 8; Luehring, 15.
[12] Mahomed, 4; see also Fikret Yegul, *Baths and Bathing in Classical Antiquity*, New York: The Architectural History Foundation, 1992, 20-21.
[13] Yegul, 7.

building pools. The first known was at Thermopylae and is from whence the Latin term *thermae* derives.[14]

Swimming as sport reached its first pinnacle when it was included among the activities at the quadrennial Olympic Games. The plan of Olympia contains Greek swimming baths dating back to 500 BC[15] and Roman baths from the early Christian period. (Figure 1.1)

Differentiation of function type became even more specific during Roman times. The Romans borrowed the idea of baths for hygiene, healing and physical fitness directly from the Greeks. The notion of associating several bodies of water together, and with auxilliary service facilities was brought to its highest form of expression during Caesarian Rome. The development of the use of pools and baths in Rome is instructive with regard to the evolution of that society in general.

The early Roman pool, used for everything from swimming and bathing to fishing and drinking was known as the *piscina.*[16] The Piscina Publica in Rome, for example, was a large public bath, pool and fish pond supplied with water via the Appian Aqueduct. Later, as more elaborate swimming and bathing facilities developed, the complex would be called *thermae*, referring most directly to the heated shallow pools, with the swimming area of the *thermae* referred to as *natatio*.[17] Unlike earlier types of warm baths, those of the Greeks, in particular, which were supplied with heat by means of a natural warm spring, the Romans evolved methods for artificially heating their baths and pools. (Figure 1.2)

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[14] Mahomed, 4-5; indicates that the Romans borrowed the idea of baths as associated with gymnasia directly from the Greeks.
[15] M.I. Finley and H.W. Pleket, *The Olympic Games: The First Thousand Years*, New York: The Viking Press, 1976, 47-50.
[16] Luehring, 16-17.

[17] Dawes, 2; Luehring, 16-17.

The Romans used any of several methods to heat their baths, these heating systems being not unlike the methods used to heat pools today.[18] The Roman use of pipes to direct water to artificial pools allowed them to heat the pipes through which the water flowed as a means of warming the water. Another method, described by Vitruvius, involved the use of "three copper vessels, so disposed that the water flowed from one into another, frigidarium, tepidarium, and calidarium," growing warmer with each.[19] Other authors indicate the construction of pools directly over furnaces designed to produce varying degrees of heat, the whole system being called a hypocaust floor-heating sytsem.[20] Whatever the method, the Romans were the first to make widespread use of both artificial baths and artificial heating.

Further evidence of Roman vituosity in bath and pool design can be found in the elaboration of functions contained within the bath complex.[21] Roman *thermae* contained every manner of aquatic facility including *thermae* or warm baths, Turkish and sauna baths, and basin, plunge and *piscina* pools. Unlike the Greeks and their *palaestra*, the Romans tended to include more than aquatic and bathing areas in their *thermae*. They also installed libraries, theaters and, of course, *tavernae.*[22] While it may be said that "Greeks had baths in their gymnasia, the Romans had gymnasia in their baths."[23] Romans often constructed gymnasia with a series of pools at their

[18] Yegul, 25-26, also discusses early Greek methods for heating, although knowledge of these methods was apparently not widespread in the ancient world.
[19] Mahomed, 5.
[20] Yegul, 356-395, provides a brilliant discussion of Roman heating methods.
[21] Yegul, 31-33.
[22] Dawes, 3.
[23] Dawes, 2-3.

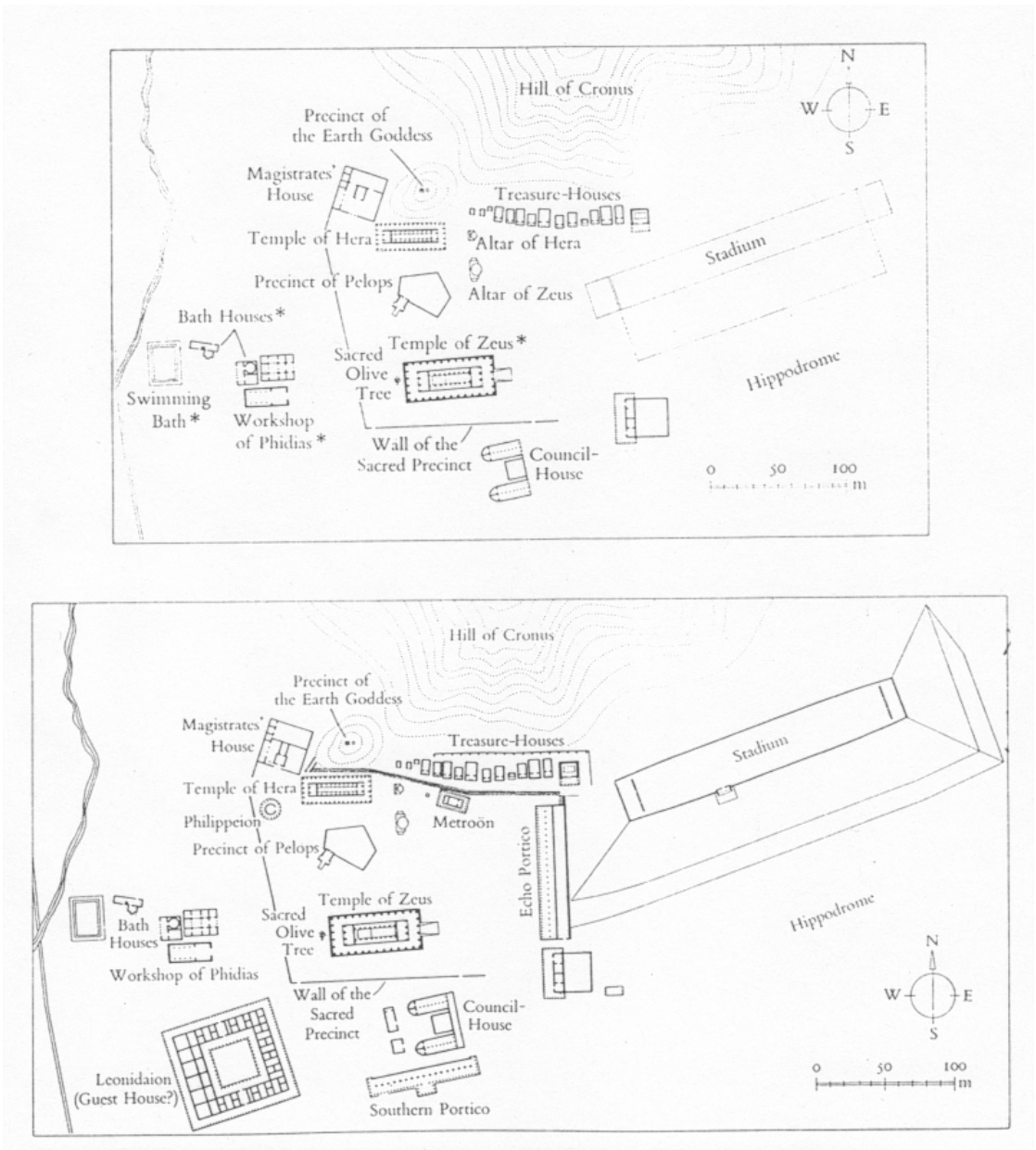

Figure 1.1: Plans of Olympia showing the architectural history of the site

Top: Sixth and Fifth Centuries BC Asterisks indicate those buildings constructed after 500BC

Bottom: Fourth Century BC Note the introduction of "bath houses" during the interim 100 year period, indicating extended use of the facility.

Source: M.I. Finley and H.W. Pleket, *The Olympic Games: The First Thousand Years*, New York: The Viking Press, 1976, 48.

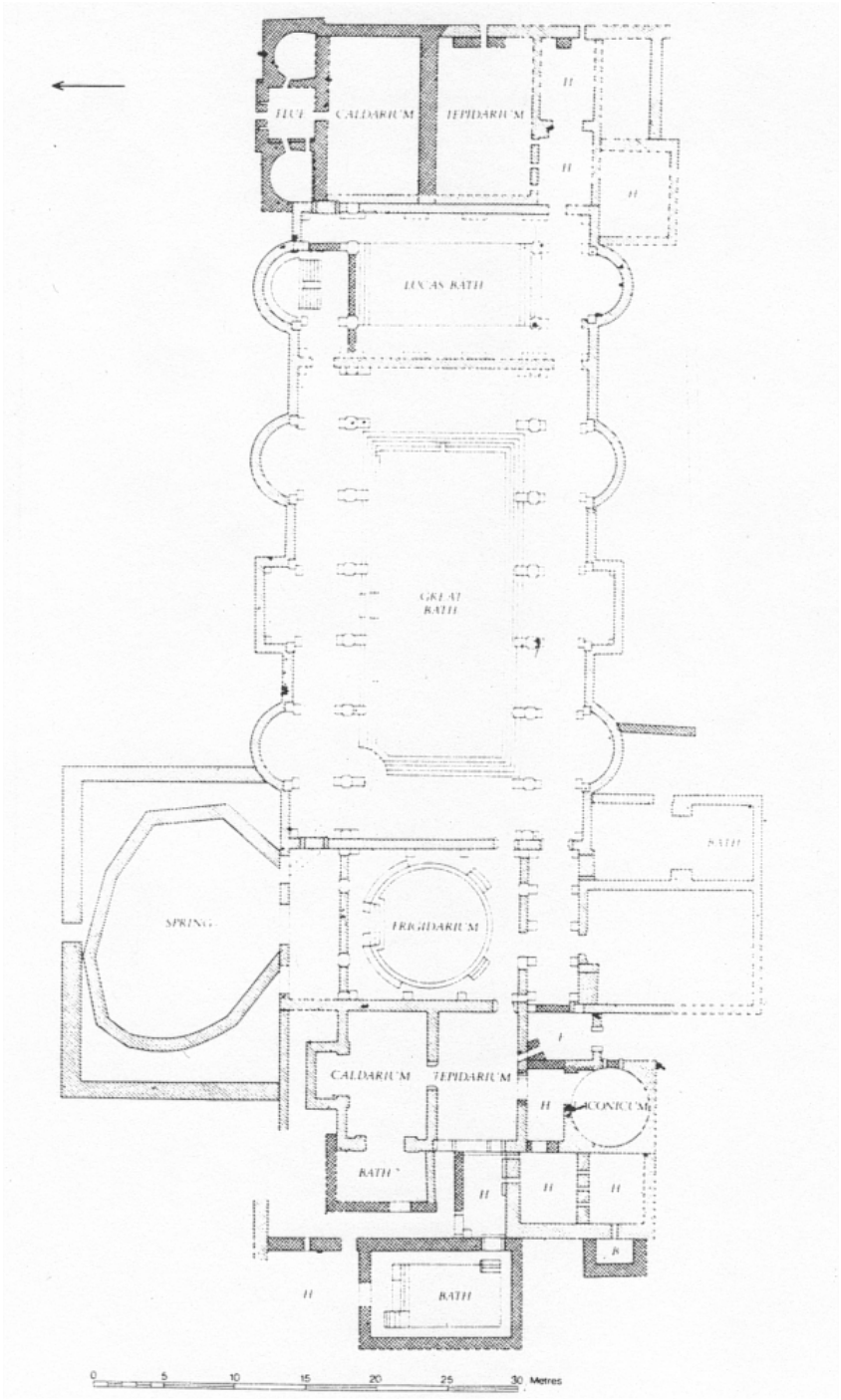

Figure 1.2: Plan of the Roman Bath at Bath, England

Source: Cunliff, Barry, *Roman Bath Discovered*, London: Routledge & Kegan Paul, 1971, 140.

heart, around which every other activity was centered. One such complex, the Baths at Caracalla, covered thirty-three acres and contained *thermae* capable of holding 3,000 people at a time.[24] (Figure 1.3 and Figure 1.4) The Thermae Diocletian could handle up to 18,000 individuals at one time.[25]

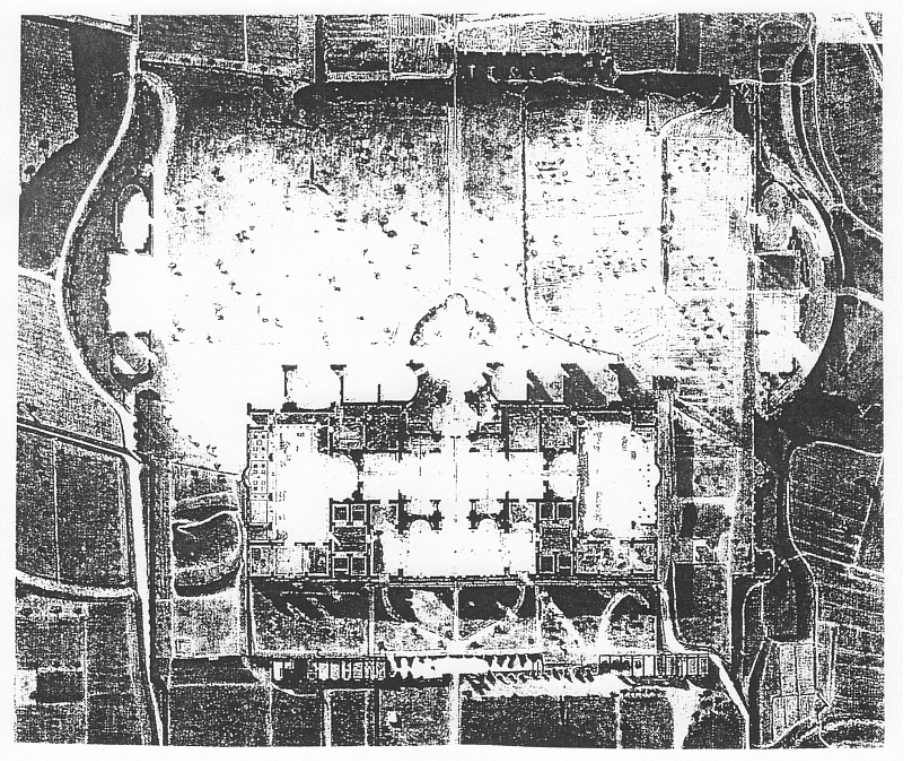

Figure 1.3: Plan of the Thermae of Caracalla, Rome

Source: Leonardo Lombardi and Angelo Corazza, *Le Terme di Caracalla*, Rome: Fratelli Palombi srl, 1995, 42.

As the Roman Empire expanded, so did the number and breadth of location of baths and pools. As far north as Bath in Great Britain, northeast as Trier in Germany, east in Constantanople, and south into North Africa, the Roman *thermae* model was copied time and time again. These baths were generally masonry lined with lead creating water tight basin. The main bath at Bath, for example, was "coated with lead,

[24] Dawes, 2; Luehring, 16.
[25] Dawes, 3; Mahomed, 5.

30 pounds to the foot" to ensure water-tightness.[26] They were fed by river or spring via lead or clay pipe and, depending on the purpose, were heated by water passed through an underground furnace or by natural hot spring as available. In some cases used bath

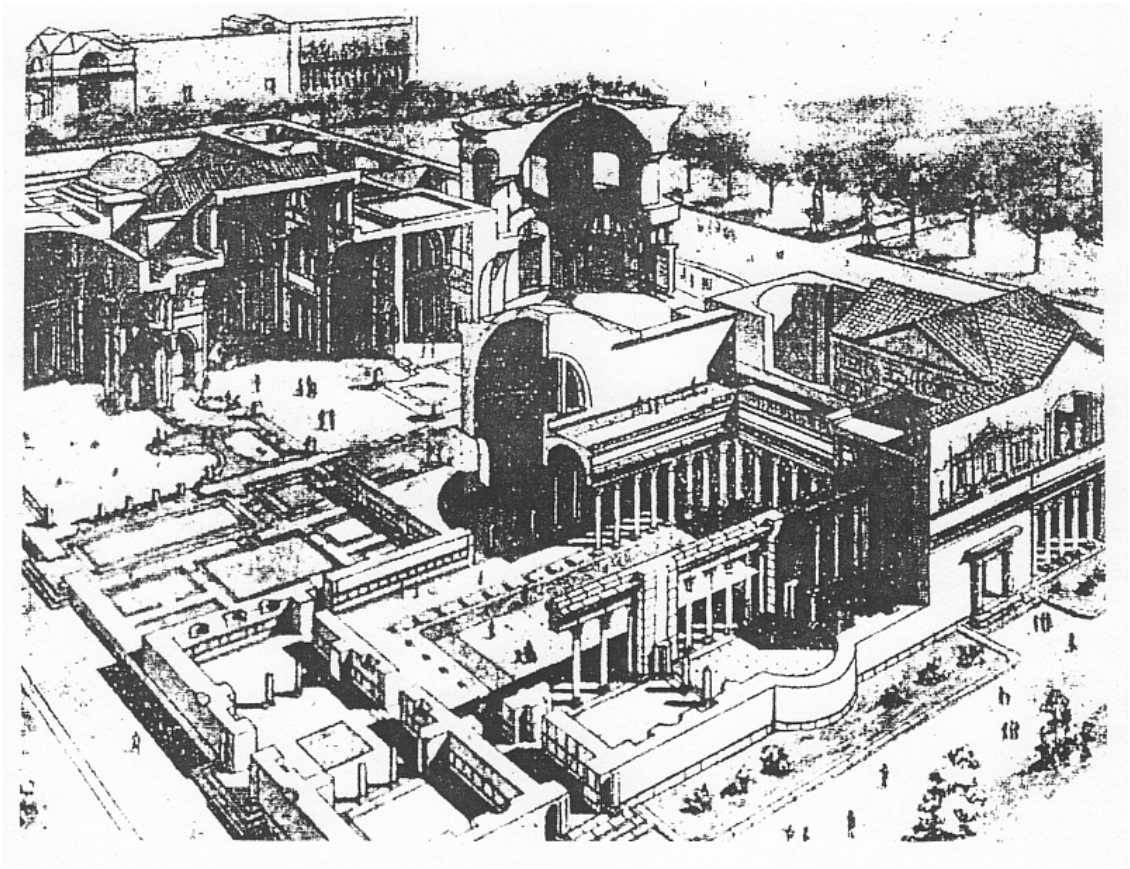

Figure 1.4: Reconstruction View of the Thermae of Caracalla, Rome

Source: Leonardo Lombardi and Angelo Corazza, *Le Terme di Caracalla*, Rome: Fratelli Palombi srl, 1995, 43.

water was circulated to waste and fresh water introduced, in others simple evaporation with subsequent fill sufficed. Unlike modern baths and pools, the nature of the water and the lead lining created a murky depth in which to swim. Cleanliness or lack

[26] Walter Atherton, "Development in Swimming Pool Construction," *Beach and Pool*, Vol. I, No. 4, April, 1927, 12.

thereof as revealed by water clarity and color was not necessarily apparent. Marcus Aurelius wrote, "what is bathing when you think of it—oil, filth, greasy water, everything revolting. . ."[27]

The elaboration of the Roman bath created a highly theatrical social environment in which citizens would participate. Attending a bath included a series of sauna baths, skin scrapings, massages with oils, then hot, warm and finally cold plunges.[28] Often activities at a bath were coordinated with other social events—theater, gambling or parties. Under the Romans, the use (though not design and construction) of baths-cum-pools reached its most developed and socially important point. So popular were the public *thermae* complexes that some 850 were in daily operation in Rome at the height of the Empire.[29]

With the dissolution of the western Roman Empire, and the subsequent rise of Christianity, a new morality began to replace the different and often more permissive virtues of Roman life. Baths degenerated as the more prudish, less openly communal morals of Christian society replaced the permissiveness of the Romans. Moreover, the maintenance required to insure a water supply to the myriad artificial pools constructed all over Europe and North Africa could not be provided without the corps of workers (sometimes slaves) and engineers that the Empire had provided. As the aqueducts and drainage systems fell into disrepair, so did the baths and pools.[30]

From the time of the Fall in 476AD through the Crusades, bathing among the European populace, even the wealthy and noble, continued to decline.[31] This was as much the result of the loss of medical and hygienic knowledge as it was difficulties with religious morality and infrastructure. Although there was a decline in

[27] Yegul, 40.
[28] Yegul, 33-34.
[29] Mahomed, 6.
[30] Perkins, xi; Williams, 6-7.
[31] Perkins, xi.

bathing throughout much of Europe, this was not the case among the Islamic peoples of Spain and the East.[32] The continuation of the Eastern Roman Empire for a thousand years beyond the fall of the west resulted in a continuity in bathing practices among Islamic peoples. After a loss of contact with the East during the half-millennium following the fall of the western Roman empire, the Crusaders during the twelfth and thirteenth centuries, encountered the bathing practices still alive in the Byzantine and Muslim empires of the East, and brought back to Western Europe an awareness of the hygienic benefits and recreational opportunities afforded by bathing.[33]

For the three hundred years following the Crusades, the knowledge and awareness brought back by its participants led to a return to some bathing practices among Western Europeans, although on a much smaller and less widespread scale than previously. During this time, larger towns and cities often provided modest communal bathing pools and steam baths.[34] These unisex bath houses also offered music, drink, gambling and, quite often, prostitutes. By the sixteenth century, religious upheaval and the Reformation's aftermath forced separate bath houses for men and women in order to prevent the debauchery and immodesty that had become a part of the unisex baths during the previous three hundred years.[35]

As the use of bathing facilities for immoral purposes became common, their popularity waned due in part to the new Protestant religious fervor in northern Europe and renewed Church interest in morality in the south. Henry VIII of England—no stranger to infidelity himself—termed these brothel baths "stews" and had them closed.[36] The view was that the baths were primarily aqueous brothels which, aside

[32] Gabrielson, 12; Mahomed, 15; Perkins, xi; Williams, 6-7.
[33] Atherton, 11; Williams, 7.
[34] Williams, 7.
[35] Williams, 7.
[36] Dawes, 3.

from the moral issues, fostered the rise of syphilis (from which Henry himself suffered) and caused great concern among the populace.[37] The series of attacks by infectious diseases during the Middle Ages as well as the influence of the various monumental changes in Christianity at the time lead to the end of most forms of communal bathing and, by extension, much private bathing. Water was seen as a disease carrier rather than as a cleanser. These issues resulted in the virtual abandonment of public baths by the end of the seventeenth century.[38]

With the creation of dedicated (and often sacred) natural bathing areas in pre-urban situations, humans began making use of water for health, sanitation, ritual and ceremony. The Greeks first made use of artificial baths for military training and aquatic sport, though it was the Romans who created elaborate complexes centered around several types of baths which provided bathing for health, sport and recreation. With the fall of the Western Roman empire, bathing virtually disappeared in the west until practices were reintroduced to Western Europe following the Crusades. After a three hundred year revival, the notion that water could spread disease, coupled with religious objections to communal bathing, led to a decline in bathing, both private and communal by the seventeenth century. Indeed, bathing was viewed as unhealthy, something to be avoided. Not until the advent of bacteriology and the rise of medicine toward the end of the Enlightenment would this view of bathing—for health, recreation or fitness—change.

[37] Williams, 7.
[38] Williams, 7.

CHAPTER 2

BATHS IN NINETEENTH CENTURY AMERICA: THE PUBLIC HEALTH AND HYGIENE MOVEMENT

After several centuries of decline in the area of European bathing following the sixteenth century, scientific investigation of the causes of and treatments for disease during the period known as the Enlightenment, the seventeenth and eighteenth centuries, began the slow return to bathing for medicinal and hygienic purposes. The first interest sparked was in the area of hydropathy, or cold-water bathing as a curative measure. Later, in both Europe and the United States, came the evolution of this medical use into a more generalized view that bathing and the promotion of personal hygiene had a positive impact on individuals and society. This was a concerted and relatively organized effort on the part of the upper and middle classes, to assist the poor in improving their health and hygiene through bathing. This movement led to the construction of several types of facilities designed to address these public health and public hygiene needs. As the public health and bathing movement began to achieve its goals and, more importantly, as indoor plumbing and bathing facilities became more readily available to the average American, the focus would begin to shift from health and hygiene to recreation and sport toward the end of the nineteenth century.

The fall of the Western Roman Empire lead to a general decline in the speed of European technological and social advancement during these "Middle Ages." As agricultural production began to rise in the sixteenth and seventeenth centuries, coupled with increased trade and the initial opening of the Near and Far East, individuals with the time and wealth examined nature and humanity, and historical texts relating to these subjects. The rediscovery of ancient medical wisdom, as well as the rise of the scientific method resulted in a greater concern with the cause of disease

as well as knowledge regarding it. As Linnaeus was classifying every available biological specimen, other scholars were working to pull apart the specimen in order to identify its organs and other biological components. Through these exploratory ventures, cells were first identified and the investigation began into the building blocks of life.

The concern with hygiene, spurred by germ theory, began to resurface in the use of water for medical treatment. The use of water for medical treatment was based upon revision of the previous belief that water was the cause of disease. Developments in the treatment of disease would lead to a new view of hygiene which, coupled with quasi-religious movements outlined below, would lead to a sustained revival of bathing.

Increased knowledge in the area of medicine and hygiene led to the renewed use of spas for therapeutic purposes. During the seventeenth century, a variety of English publications began to address prevailing thinking at the time. The first widely-read work on the subject, *Psychrolusia, or History of Cold-Bathing,* was written by Sir John Folyer and published in 1702. By 1722 it had gone through some five editions.[39] In 1750, Dr. Richard Russell published *Dissertation of the Use of Seawater in Disease of the Glands*, which revealed and discussed the "detergent action" of seawater.[40] The popularity of this book, coupled with rising interest in hydropathy—the use of water to cure disease—lead to a resurgence in regular bathing as a means to avoid or cure infection. It also opened the door for a return to public baths.

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[39] Susan E. Cayleff, *Wash and Be Healed: The Water-Cure Movement and Women's Health*, Philadelphia: Temple University Press, 1987, 20; Harry B. Weiss and Howard R. Kemble, *The Great American Water-Cure Craze: A History of Hydropathy in the United States*, Trenton, NJ: The Past Time Press, 1967, 2.

[40] John Dawes, *Design and Planning of Swimming* Pools, London: The Architectural Press, 1972, 3.

In addition to Dr. Russell's work, Tobias George Smollett, a British novelist and physician, published "An Essay on the External Use of Water," in 1752 which focused not only on hydropathy—the use of cold-water baths—but also warm baths and mineral springs.[41] James Currie, who had studied medicine at the University of Edinburgh published his work, *Medical Reports on the Effects of Water, Cold or Warm, as a Remedy in Fever and Febrile Diseases*, in 1797.[42] It was these works that made a direct link between the use of water and the cure of disease or at least symptoms of disease. Removal of bacteria from the body through washing became an increasing concern to the members of the middle class in both Europe and America.

Along with the medical issues, simple social bathing for pleasure during the summer months was an increasing popular activity among the English middle class. During the mid-eighteenth century, the first commercial baths and pools began to appear in England. In addition, the discovery and restoration of the ancient Roman baths at Bath, England, during the latter part of the eighteenth century added to the fad of bathing and popularized it among the common people.[43]

Americans became enamored of water as a hygienic tool during the "water cure craze" of the 1840s and 1850s The works of Vincent Priessnitz regarding hydropathy[44] piqued interest in water as a curative agent.[45] Hydropathy was "based on the concept that water was the sustainer of life; treatments consisted of a variety of baths, wet compresses, steam, water massage, copious drinking of cold water, exercise and a simple diet."[46] Water cure centers, housing the appropriate facilities for bathing, massage and exercise, spread throughout the United States between 1840 and the

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[41] Weiss, 2.
[42] Cayleff, 20; Weiss, 2. It was Currie who established that fever should be treated with cold water in the early stages, tepid water towards the end, a and plenty of cold water throughout.
[43] Williams, 7.
[44] See Weiss, pages 3-7, for an excellent review of Preissnitz's life.
[45] Williams, 12.
[46] Williams, 12.

1880s. Many other social and health reformers of the time, including Catherine Beecher and Dr. Simon Baruch, included a course of bathing and water massage in their own recommendations.[47]

Hydropathy in America was introduced in the 1840's largely through the writings of Drs. R. T. Trall and Joel Shew. Both men were university-trained medical doctors, operated their own water cures, and were highly visible public advocates of their methods. Dr. Shew along with David Campbell, another water-cure operator, began *The Water-Cure Journal* in New York in November of 1844.[48] After the publication failed to garner enough subscribers, it was sold to publishers Fowlers and Wells[49] in April of 1848 and produced as a monthly. The *Water-Cure Journal* included information geared toward hydropathists and their patients, as well as a more general readership.[50]

The parade of titles under which the journal was published is instructive as to the changing nature of water-cure as medicine. The publication was known under the following series of titles for the years listed: *The Water-Cure Journal* (1844-47); *The Water-Cure Journal and Herald of Reforms* (1847-1861); *The Hygienic Teacher and Water-Cure Journal* (1862-1863); *Herald of Health* (1863-1865); *The Herald of Health and Journal of Physical Culture* (1865-1892); *Journal of Hygiene and Herald of Health* (1893-97); and *Health* (1897-1913).[51] In the beginning the focus of the journal is largely hygienic and therapeutic. Over the course of its sixty-odd years of publication, however, its focus shifts to general health and fitness. This is a

[47] Father of Bernard Baruch, the noted economist and business analyst.
[48] Weiss, 25.
[49] Weiss writes on page 27, that during the course of the mid-nineteenth century "the firm of Fowlers and Wells became extensive publishers and advertisers of inexpensive books on phrenology, etiquette, agriculture, horticulture, temperance, mesmerism, physiology, architecture, water-cure, health, health reforms of all sorts, writings of Walt Whitman, Ralph Waldo Emerson, Robert Dale Owen, shorthand. . .including "The Water-Cure Journal," the "American Phrenological Journal" and even a weekly newspaper, "Life Illustrated," which they started in 1855."
[50] Weiss, 27.
[51] Cayleff, 26-27; Weiss, 26.

microcosm of the direction the entire hydropathy and hygiene reform movements took with regard to bathing and swimming recreation. Under all the various titles, the journal was published from 1848 to 1913.

The hydropathy movement required a wide variety of facilities for successful treatment. The water-cures themselves were often quite large and built in the manner of a hotel. In different rooms were made available the curative treatments. Dr. Shew's 1847 work, *The Water-Cure Manual,* which had sold over ten thousand copies by 1850, described among the various baths available,

> . . .rubbing wet-sheet; the wet-towel bath, which needed only a quart of water; the sponge bath; the shower bath; the affusion bath, administered by standing in a wash tub and pouring cold water upon the neck and shoulders; the plunge bath; the douche bath, a stream of water an inch or two in diameter from a fall of 10, 15 or 20 feet; the wave bath, where one holds fast to a secured rope and lays himself at length in swiftly running water; the half bath; head bath; nasal bath; mouth bath; sitz or hip bath; leg bath; hand bath; and the foot bath.[52] (Figure 2.1)

The popularity of bathing for health purposes was bolstered by the on-going religious revivalism of the middle nineteenth century. Especially among Protestants,[53] particularly Methodists, whose founder, John Wesley, had written that "cleanliness is next to godliness," it became apparent that cleanliness was a physical and spiritual issue.[54] Wesley also wrote, in 1747, a pamphlet entitled *Primitive Physic or an Essay and Natural Method of Curing Most Diseases* "in which he gave his opinion that almost every disease could be cured by water properly applied."[55] Just as "one could not be dirty and healthy at the same time,"[56] one could not be dirty and holy at the same time, either. The writings of John Wesley, creating the myth of the necessity of

[52] Weiss, 22.
[53] Williams, 133.
[54] Cayleff, 20.
[55] Weiss, 2.
[56] Williams, 13.

physical cleanliness in order to achieve spiritual cleanliness, affected people far beyond his intended Methodist audience.[57]

Medical support for bathing, bolstered in many cases by religious doctrine, created among the upper and middle classes a new, higher standard for personal cleanliness. This standard resulted in a distinction in habits between those classes and the lower class and immigrant populations which so overwhelmed urban areas at the time. "Among the middle class anyway, personal cleanliness ranked as a mark of moral superiority and dirtiness as a sign of degradation. Cleanliness indicated control, spiritual refinement, breeding; the unclean were vulgar, coarse, animalistic."[58] These new informal standards of cleanliness were used for the basis of the health assessment of slum areas and for the creation of certain reform programs regarding both residential and work environments.

The widespread nature of these norms for American personal hygiene led to concern by the middle and upper classes over the health of those lower on the socio-economic scale, particularly immigrants in urban slums. Whereas the hydropathy movement had come from within upper and upper-middle classes and was designed for those same classes, the public health and bathing movement, though begun within the upper classes,[59] targeted the lower classes. Though only a fraction of the upper

[57] Williams, 135.
[58] Williams, 14.

[59] Williams, 133-34.

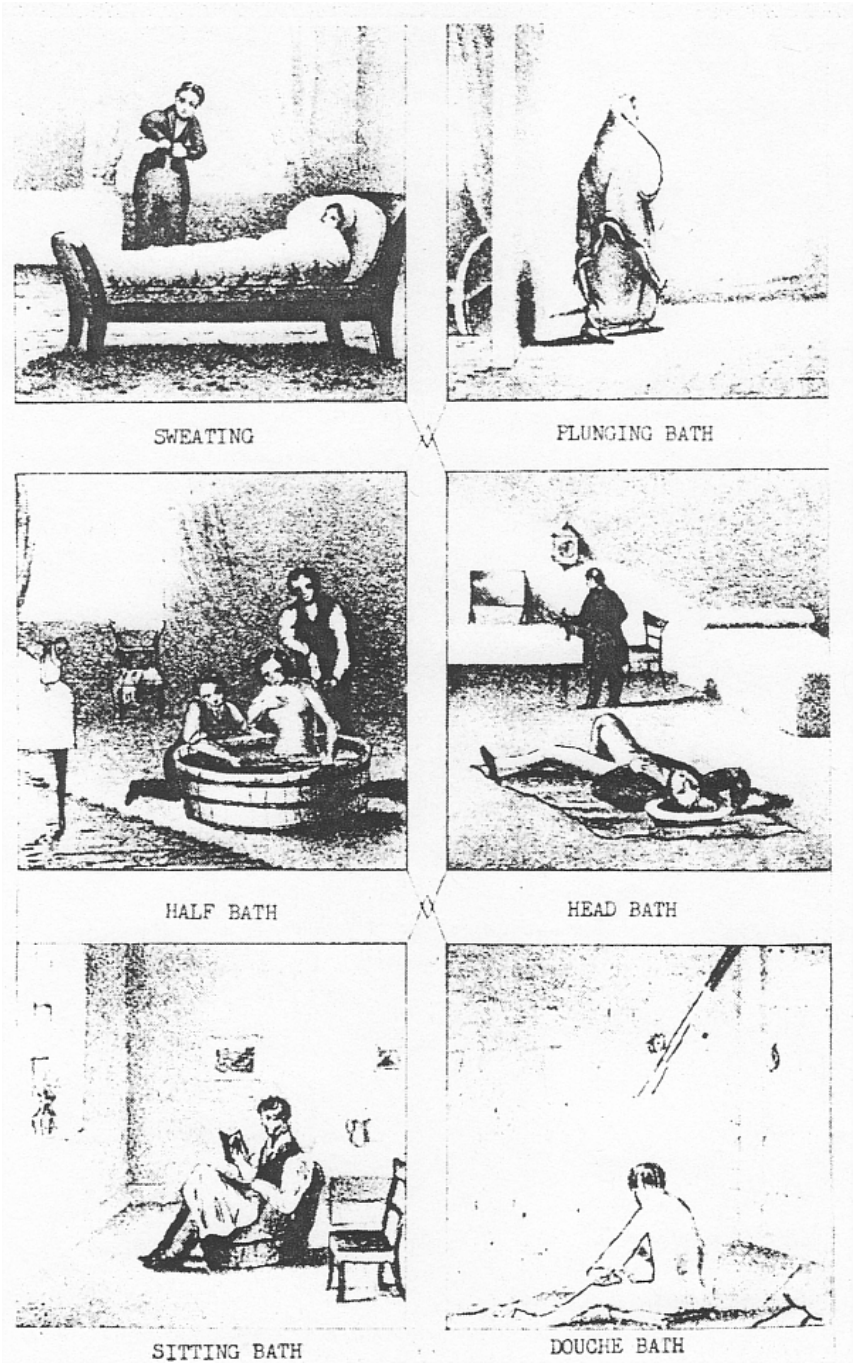

Figure 2.1: Various Types of Baths

Source: Harry B. Weiss and Howard R. Kemble, *The Great American Water-Cure Craze: A History of Hydropathy in the United States*, Trenton, NJ: The Past Times Press, 1967, 23.

class population had actually made use of water-cures, the knowledge of the beneficial effects of bathing diffused throughout educated society.

Even as the water-cure craze in America was at its peak, concerns over sanitary conditions in cities and the hygiene of "slum dwellers" had already come to the fore. By the last quarter of the nineteenth century, though the water-cure craze had largely died down, it had directly fed the public health and bathing movement which in a sense took the water-cure's place among water-advocates. More particularly, the quick expansion of immigrant populations in urban centers led to a fear that a degradation of hygienic standards would wind up in moral decay.[60] Indeed, cleanliness would come to be viewed as a sign of moral and spiritual enlightenment.[61] Hence, the advancement of the public health movement took on a religious fervor. They were saving society and saving souls.

The public health and bathing movement was based upon the upper class's desire to see its standards of cleanliness reflected in the lower classes. It was also an issue of maintenance of social order. The growing squalor in the cities, especially as associated with immigrants, was believed to be causing a breakdown in social order. There was also a perceived loss of decorum and civility which led to major issues like increased crime, as well as minor ones like the use of obscenities in everyday speech. Advocates sought hygienic conformity and believed that it would bring with it a return to middle class Protestant morals.[62]

John Griscom, a medical doctor and New York City inspector, wrote one of the earliest volumes to really shed light on these problems. Titled *The Sanitary Condition of the Laboring Population of New York With Suggestions for its Improvement* and published in 1845, this work provided a view for the upper classes of the squalid

[60] Williams 134.
[61] Williams, 134, 136.
[62] Williams, 134.

conditions found in tenements in the city.[63] This heightened awareness on the part of the upper classes would eventually lead to the formation of charitable groups to deal with issues of public health and hygiene.

In 1849, a cholera epidemic swept through several American cities, among them New York and Chicago, focusing concern on the problems of immigrant urbanity.[64] Between the eyewitness accounts of squalor and filth in the inner cities and proof of poor conditions through epidemic, the position of the public health and hygiene reformers was solidified and given urgency.

In that same year, 1849, the newly formed American Medical Association created its Committee of Public Hygiene. The Committee quickly recommended the establishment in major urban centers of "cheap public baths on the European model in the parts of the cities inhabited by the lower classes."[65] Its survey of several cities found private bathing facilities for the lower classes non-existent and public facilities either too few or too expensive. Though the Committee asserted that public facilities were in no way an adequate replacement for private in-home baths, they believed it to be most urgent to provide bathing facilities to as many people as possible to quell the spread of disease in cities.[66]

Despite the calls for municipalities to provide public facilities, no significant number were made available by the municipalities before the Civil War, in part due to legal technicalities as well as political indifference.[67] During this time, private

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[63] John Griscom, *The Sanitary Condition of the Laboring Population of New York with Suggestions for its Improvement,* New York: Arno, 1970, 7. Originally published in 1845 by Harper & Brothers, NY, NY. Griscom concerns himself not just with the physical environment of the individuals, but with the lack of personal hygiene (p. 10) and the effect of the poor health and environment on the morals of individuals and families (p. 24). See also Williams, 14.

[64] Williams, 14.

[65] Williams, 14.

[66] Williams, 15.

[67] Many cities did not have the appropriate authority in the form of enabling legislation or state charters to allow them to build bathing facilities. Other cities simply did not have the money or the political will to undertake such projects.

charitable organizations were created or modified their charters to fill the need that the city governments were not yet willing or able to address.[68] The first publicly accessible bath for the poor was provided by the New York Association for Improving the Condition of the Poor (NYAICP) in 1852. Founded in 1843 as a reaction to the disastrous effects of the Panic of 1837 upon the city's poor, the NYAICP sought to minimize the "moral degradation" caused by living in slum conditions, especially for children. Within a few years of its founding, the NYAICP began to view public bathing as a method to mitigate more degradation and improve hygiene. Toward these ends, NYAICP constructed the People's Bathing and Washing Establishment at 141 Mott Street on the Lower East Side at a cost of $42,000.[69] Though this experiment had failed by 1861 due to a lack of use, caused largely because of a relatively steep admission fee, it served as a prototype for the municipal baths that were to come.

The Civil War bolstered the public health and bathing movement. The struggle to maintain sanitary conditions in hospitals during the War led to a greater understanding of the usefulness of water in preventing disease.[70] Daily rituals of bathing were used as a low-cost method of prevention by both Union and Confederate hospitals during the War. As soldiers returned home, they brought with them these reinforced ideas of bathing for hygienic purposes.

Shortly after the Civil War came the first boom in public and municipal bath construction with the erection of numerous "floating baths" in most major cities.[71] Floating baths were structures anchored in rivers that contained perforated walls or floors allowing for the continuous flow of water through the bathing tank. The ease

[68] It is important to note that during the pre-Civil War period, few municipalities owned water supplies which would have been necessary to service these facilities. This lack of public water definitely plays a role in the reluctance/inability of cities to provide public baths.
[69] Williams, 16. The facility included laundry facilities, a swimming pool and tub baths for men and women.
[70] The investigations of the United States Sanitary Commission were also very influential.
[71] Luehring, 18-20; Williams, 17-21.

of construction, relative low-cost and simple, if never ending, maintenance routines made these types of baths the most popular choice among cities wishing to provide quick and easy access to facilities. One major drawback of this type of facility is that they are, by their nature, seasonal. Since there was no precedent on which to base usage and revenue projections (in those cases where an entrance fee was charged at all) cities were unwilling to make the political and financial commitment to year-round indoor facilities or even more permanent outdoor land pools. Public financing of the construction of these simpler bathing facilities did, however, pave the way for the justification of later expenditures for the construction of more expensive year-round facilities.[72]

With this renewed popularity in bathing for hygiene and hydropathy, and as leisure activity, several types of bathing facilities arise to meet specific needs. Between the end of the eighteenth century and the present, there have been three main types of pools constructed: floating pools, river and beachside pools, and so-called land pools. Though it is the land pool which is to be dealt primarily in later chapters because of its pervasiveness and commonality in the twentieth century, the other types represent earlier stages of pool technology and contribute important features to what becomes the model for modern pools. Obviously a significant overlap exists in both the time frame and technology of each class, but there is generally a progression toward the modern land pool. It is also during the late eighteenth century and, more particularly, the nineteenth century, that the line between "bath" and "pool" begins to blur as the result of mixing traditional uses. So often were pools included at baths, and bathing facilities included at pools, that distinguishing between them can only be

[72] Williams, 17.

successful when the intention of the builders to create a hygienic, a therapeutic bath, or a recreational swimming pool is known.

The first type of bathing facility used widely for public baths, the floating bath, was certainly not a new solution to the problem of public health and hygiene. Floating baths were the first to appear following the renewed interest in balneotherapy and social bathing in the early 1700's. A plunge bath (similar to a pool, except that its purpose is primarily hygienic, not recreational) was usually the centerpiece of the floating bath complex which included the bath, changing areas, showers and other hygiene-related amenities.

Simple shallow baths and saunas had been installed on ferries serving Paris as early as 1736.[73] The first true floating bath was established on the River Seine in 1760, with another on the same river in 1780. These early "floaters" were unanchored structures, often old barges, either self-supporting or steadied by pontoons. They featured submerged bottoms constructed most often of wood, and sides that were also of wood and perforated so that water from the river or lake could circulate through the swimming area, thus creating basic continuous circulation to prevent the water from stagnating.[74] Some floating baths became quite elaborate with stacked decks rising around the central pool, multiple bathrooms and game parlors. Some of the Seine floaters existed well into the twentieth century, having been modified over time to include more permanent materials (iron, preserved wood) in their construction. Many large cities in Germany, Norway, Sweden, Switzerland and Austria had either public or commercially operated floating pools by the beginning of the nineteenth century.[75]

England received its first floating bath, the *Waterloo,* on the Thames in 1819. The *Waterloo* was a "floating bath barque [sic]" moored on the river.[76] Problems with

[73] Luehring, 18.
[74] Luehring, 18.
[75] Luehring, 19.
[76] Dawes, 3.

low patronage and pollution in the Thames made its existence brief. Although its success was short-lived, it did reinforce in the mind of the British public the need for proper bathing facilities for both hygiene and recreation.

Despite difficulties with pollution, the largely coastal population of England continued to make use of floating baths during the nineteenth century. Perhaps the most elaborate floating bath ever constructed was built on the Thames near Charing Cross in 1875. (see Figure 2.2) The intention of its builder, a stock company, was to create a commercial chain of floating baths on the Thames, but pollution and the establishment during the mid-nineteenth century of municipal land baths and pools proved too much competition for this bath.[77]

Floating baths began to appear in the United States shortly after the War of 1812.[61] Several appeared in Philadelphia on the Delaware and Schuylkill Rivers during the early 1800's. In addition to the commercial floating baths, after the Civil War municipalities began constructing public floating baths *di novo*, or converting old privately owned pools to public use. These pools were used for bathing, recreational swimming and swimming instruction.[78] Boston's' first public floater, known as Braman's Swimming Bath, appeared in 1866.[79] It included "numerous dressing

[77] Luehring, 19, Dawes, 3-4.
[78] Luehring, 20.
[79] George W.W. Hangar, "Public Baths in the United States," *Bulletin,* United States Department of Labor, No. 54, Sept. 1904, 1254.

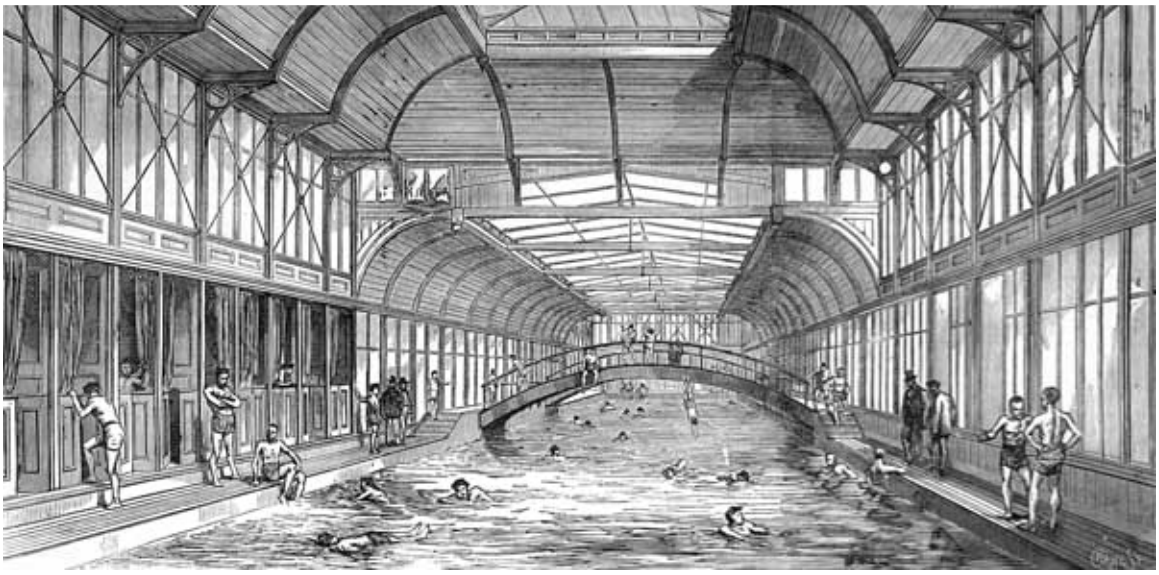

Figure 2.2: The Floating Swimming-Bath in the Thames at Charing Cross.

Source: Dawes, John. *Design and Planning of Swimming Pools*. London: The Architectural Press, 1979, 3.

rooms, a shallow tank for general swimming purposes, and a smaller tank in an enclosed apartment for private bathing. . ."[80] Four other floaters were opened in Boston that same year.[81] During that first summer, 433,690 bathers made use of the new facilities, as a time when Boston's population was only about 200,000. Though the public perceived these facilities as affording mainly recreational opportunities, the civic leaders viewed them as promoting public cleanliness, a difference that would continue through the end of the century.[82]

New York City committed itself to improving hygiene by constructing twenty-seven floating baths beginning in 1870.[83] The public baths of New York City were available free of charge to both males and females. New York officials, following the Boston precedent, viewed the pools as a hygienic solution, not a recreational amenity, and therefore imposed a twenty minute bathing limit. This caused conflict with the

[80] "Report on Free Bathing Facilities," *City Document,* City of Boston, No. 102, 1866, 6 in Luehring, 20.
[81] Williams, 18.
[82] Williams, 18.
[83] Luehring, 20. Fifteen were still operating in 1904.

patrons who, viewing it as a recreational passtime, demanded more time. This resulted in patrons, often young boys, leaving one bath only to head to another, dirtying themselves along the way so as to be assured of admittance. Brooklyn, Philadelphia, Washington, Hartford, Newark and Hoboken each had at least one floating bath by 1900.[84] As the designs progressed, the emphasis for the cities remained on the health benefits of showering both before and after taking a plunge.

As the popularity of the floaters increased, the lower classes became familiar with notions of personal cleanliness that had previously been found primarily only among the middle and upper classes. As early as the 1880s in Philadelphia, however, water pollution became such a problem that the river baths had to be shut down. By 1899, Philadelphia closed all of its river baths due to pollution. In their place, the city constructed eight outdoor land pools. The same scenario is generally true in the other major cities at the time.

Even with these difficulties, a significant number of floating baths lasted into the twentieth century. Many were adapted or renovated so extensively that they ware no longer true floating baths. Often the first major improvement to the facility was to anchor it to ensure stability. Secondly, the baths were made dependent of cleaner sources of water. By 1914, New York City and several other municipalities had introduced treated water supplies and requirements that the tanks of floating baths be made water-tight and that they filter and, in some cases, disinfect the water used in the bath.[85] In these cases, the municipal water supply was employed to create a "draw and fill" type circulation[86] which was much more hygienically sound than depending

[84] Williams, 19-20, 36.
[85] Luehring, 20; Perkins, xii; Williams, 20.
[86] Draw and fill circulation is not filtration. For each swimmer over a usage period, water is drawn from the pool. At (usually) the opposite end, an equal amount of new water is added to the pool to replace that volume removed. The result is, in the best of cases, a near constant flow of new water into the pool. The problem is that there is little sanitary control over the condition of the water added.

on the polluted river water to wash bacteria away.[87] As late as the 1940's, converted floating baths were still in use in New York City, but they were few in number as most had been shut down during the first two decades of the twentieth century.

The mobile nature of some floating baths, coupled with the widespread use of wood in their construction, rendered them in constant need of maintenance and repair. A contemporary variation on the same construction and operation principles were those immobile baths built along rivers and beaches next to their "floating counterparts." The distinction between "floating" and "stationary" baths seems more of preference in nomenclature than technological or architectural substance. Both types used the free water provided by the river, lake or ocean in which they were moored or constructed. Both were relatively inexpensive and simple to operate as water circulation resulted from the natural ebb and flow of the water passing through the perforated sides of the pools. The main distinction between the two was that rather than being free floating, beach and river pools rested on the bottom of the water body in which they were constructed, forming a protected area for swimming and bathing. These "swimming cribs" as they were termed, often had bath houses adjacent to them and, in some cases, were attached to barges that provided the facilities of a bath house.[88] Further, they were also often associated with land activities such as lawn bowling.[89] In some cases, where the swimming areas were constructed somewhat inland or in areas of poor tides, special canals were constructed to ensure adequate water flow to the complex.

A related type of was the stationary river or beach bath. These were built on the same principles as the floating baths, but were constructed in-place and often had related amenities on land. River baths appeared in Europe as early as the 1780's. The

[87] Luehring, 20-21.
[88] Gabrielson, 12.
[89] Luehring, 23.

first known American river bath was constructed in 1791 on the banks of the Schuylkill River in Philadelphia at the foot of Race Street. It included bowling greens, showers, and a "plunge bath."[90] Like the floating baths, most river and beach baths were constructed of wood and were used primarily during the summer months, when demand for swimming facilities was at its peak.

By virtue of their dependence on natural bodies of water, river and beach baths were also subject to pollution difficulties. In addition, the maintenance issues were never-ending by virtue of the constantly moving water and, in the case of beach baths, the presence of salt water created a corrosive environment that lead to expensive and time-consuming repairs. For these reasons, and the fact that their permanent structure made them more expensive to build than the floaters, river and beach baths were not as widespread or as long-lived as floating baths, having all but disappeared by the 1880's.

By the end of the nineteenth century, individuals and reform groups demanded higher quality swimming facilities, located more conveniently to the majority of the population. While demand was rising, the ability of municipalities to provide treated water had also dramatically improved. The result of these two factors, coupled with the Progressive spirit during this time, was enormous growth in the number of pools built independent of the rivers, beaches and lakes of the country. From a civic standpoint, the growth in in-land pools was tantamount to bringing hygiene to the masses.[91]

At the same time, the distinction between the terms "bath" and "pool" becomes more apparent in the United States. Baths were to be indoor or covered complexes and cater primarily to hygienic needs, while pools were outdoor or uncovered

[90] Luehring, 23.
[91] Dawes, 3.

facilities, and provided for recreational purposes. This distinction is rather short-lived, as some of the larger facilities of one type take on characteristics of the other. As indoor bathing facilities were first constructed for the purpose of hygiene, plunge pools were added for recreation.

In Europe, land baths and pools had been advocated for several decades before they became widely familiar in the United States. To advance public hygiene and provide a modicum of recreation, especially for people who were not in immediate proximity to river or floating baths, the British Parliament passed in 1846 the British Baths and Wash House Act, which gave local authorities the power to provide indoor baths, showers and changing rooms (wash houses).[92] This act spurred the building of several types of facilities, including floating baths, river baths, wash houses, and land baths. France followed with a similar act in 1850, Belgium, Austria, Germany, Switzerland and Italy following in short order.[93]

In the United States, this progression toward the development and use of land facilities resulted largely from the increasing pollution found in the rivers and lakes upon which alternative facilities, floating and river baths, depended for their water.[94] These land facilities, then as now, are designed and built depending on municipal or aquifer water supplies and are, therefore, not mandated to be on or adjacent to a river, lake, ocean or other body of water. They also were freed of having to deal with the pollution of these water bodies, as the municipal water upon which many land facilities depended was filtered and treated.

The problem remained that both floating baths and outdoor land facilities could not provide bathing in the colder months, which might amount to more than half the year in many areas. The provision for year-round bathing facilities was urged by

[92] Dawes, 3; Luehring, 24.
[93] Atherton, 11.
[94] Dawes, 3.

several groups the American Medical Association, Massachusetts Sanitary Board, and the New York City Board of Health.[95] These calls, coupled other on the editorial pages of several newspapers as well as reports and subsequent reports of the New York City Tenement House Committee of 1884, eventually led to the erection of numerous new indoor land baths and pools. For the immediate future, however, they had little effect because the legal and funding apparatus necessary to provide these facilities was not yet in place, and the philanthropic community and the upper class's social attention was focused on this and other matters at the time, including temperance and abolition.

Among the middle and lower classes, the attitude was largely one of indifference until the advent of the Progressive Era toward the end of the nineteenth century.[96] The Progressives, a largely upper class group who would attract the middle class to its values and priorities, had picked up the cause from these earlier urban health and sanitation reformers and reform-minded groups, and would win the argument that improved hygiene was necessary and should be fostered by municipalities though financial investment in facilities.

Aside from municipalities, businesses and private charities were making bathing and swimming facilities available to their employees and to the lower class public around the turn of the twentieth century. For example, in the late 1800s, the Fifth Avenue Bank of New York and the United Shoe Machinery Company of Boston provided basic bathing and even swimming pool facilities for their workers.[97] At the same time, railroad magnet and philanthropist Henry Walters contributed tens of thousands of dollars to construct the Walters Baths for the poor of Baltimore. Others benefactors were making similar contributions in other cities. In both the case of

[95]Williams, 20; American Medical Association founded in 1849, the Massachusetts Sanitary Board founded in 1850, and the New York City Board of Health founded in 1866.
[96] Williams, 34; See also Griscom.
[97] Williams, 34.

business and philanthropy, the resultant facilities, coupled with existing municipal baths, fueled interest in aquatic activities and raised the expectations with regard to facility design and programming.

Despite the call by most public health and bathing reformers for relatively plain and inexpensive bath facilities (simple showers, or "rain baths" were often their focus), municipal governments began elaborating on these ideas, constructing showpieces designed to be visible signs of the civic accomplishment.[98] Cities also wished to design structures that were in keeping with the architecture and scale of their European counterparts who had significantly more experience designing, building and maintaining public baths and pools. Beyond these rationales, there was the believe on the part of the Progressives and, slightly later, City Beautiful advocates, that great architecture (by this, they meant classical architecture for the most part) had the ability to uplift the populace, garner civic pride and create elements of social cohesiveness.[99]

Milwaukee's West Side Natatorium of 1890 was the first municipally financed public land bath in the United States. Chicago opened its first year-round public bath, displaying a simple, hygiene-oriented design, in 1894. The New York State legislature passed in 1895[100] an ordinance that required all "first- and second-class cities to build municipal baths."[101] The result was baths in Yonkers (1896), Buffalo (1897), Rochester (1899), Syracuse (1900) and Albany, Troy and New York City

[98] Williams, 35.
[99] Williams, 35.
[100] The first Act, New York State Public Bath Law of 1892 Chapter 473 states, "Section 1. It shall be lawful for any city, village or town to establish free public baths. Any city, village or town may load its credit or make appropriations of its fund for the purpose of establishing free public baths." baths were not herein defined. This act has a similar effect to the British Act of 1846, simply creating the legal mechanism by which money could be spent on such projects.
[101] Williams, 37; the language in New York State Public Bath Law of 1895 Chapter 351 states, "Section1. All cities of the first and second class *shall* establish and maintain such number of public baths as the local Board of Health may determine to be necessary...Any city, village or town having less than 50,000 inhabitants *may* establish and maintain free public baths..." [italics added].

(1901). Brookline, Massachusetts constructed an elaborate public bath in 1897. It contained the obligatory showers and stalls as well as a large swimming pool. By 1900, all of the top ten most populous cities in the United States, save St. Louis and Cincinnati, as well as many smaller municipalities operated public baths.

Public hygiene gradually became less of an issue due to the success of hygiene education, and the installation of indoor plumbing in an increasing number of dwellings. Just after the turn of the twentieth century, good hygiene was firmly linked to public bathing. In 1912, several of the more prominent advocates of public baths founded the American Association for Promoting Hygiene and Public Baths.[102] The title indicates the relationship between those concerned with the healthful and curative aspects of bathing and those more interested in bringing these aspects to the masses in the form of public and recreational bathing. So does the fact that its first president was Dr. Simon Baruch, a medical doctor and professor of hydrotherapy (as hydropathy come to be known by this time) at Columbia University. Baruch's advocacy for municipal baths and public bathing is logical given the importance hydropathy practitioners placed on regular bathing to prevent disease and improve the constitution.[103]

Beginning as a personalized experiment in disease prevention during the eighteenth century, bathing winds up at the end of the nineteenth century as a public imperative, with several type of facilities financed for a variety or reasons and by a range of groups. Floating baths, both publicly and privately financed, began appearing in Europe during the mid-eighteenth century. Largely for hydropathic purposes, these facilities were the most common form of bathing structures in both Europe and American during most of the nineteenth century. Analogous to these were the river

[102] Williams, 130.
[103] Williams, 43; Baruch wrote, "I consider that I have done more to save life and prevent the spread of disease in my work for public baths than in all my work as a physician."

and beach baths which shared the design and intention characteristics of their floating counterparts, but which were permanently mounted and far less common. Finally, the availability of municipal water and both public and charitable financing led to the land bath and pool notion which freed aquatic facilities from being on or adjacent to a water body and allowed both indoor and outdoor baths to be constructed inland, wherever there was need or financing. The public health and bathing movement had brought bathing to the masses.

CHAPTER 3

THE RISE OF AQUATIC RECREATION AND SPORT AS PRIMARY CONSIDERATIONS IN DESIGN

The imposition of larger Progressive ideas and goals onto municipal bath building campaigns had the effect of eclipsing the issues of hygiene, sanitation and personal cleanliness. Recreation, first used as a "carrot" to draw the unclean into a hygienic environment, had shifted to become an equal concern in the design of many public baths. As the availability of leisure time increased, and the rise of collegiate and community athletics tool hold, recreation would become the primary design issue and motivator.[104]

An example of this changing current moving from hygiene to recreation can be found as early as the mid-nineteenth century in British antecedents. British Parliament passed in 1846 the British Baths and Wash House Act, as mentioned in Chapter Two, which gave local authorities the power to provide indoor baths, showers and changing rooms (wash houses).[105] In addition to providing the legal framework necessary for local governments to build baths it also specifically mentioned approval for "open air swimming pools."[106] The distinction here is that the baths and wash houses were for hygienic purposes, the outdoor pools for recreation.[107]

An 1878 amendment to the British Bath Act empowered local organizations to build "covered swimming pools."[108] Two important elements are made clear by the amendments to this Act. First, the Act specifically empowers local organizations

[104] Atherton , 1.
[105] Dawes, 3.
[106] Luehring, 24.
[107] Atherton, 11.
[108] Luehring, 24.

rather than local or municipal governments to build covered pools. This reflects the formation and importance of recreational swimming clubs.[109] These clubs were outgrowths of swimming schools, often housed in municipal baths. The amendments to the Act freed these and other groups to build pools and baths on private land without regard to proximity to natural water bodies, so much as municipal water would allow.

Second, the amendments to the Act provide for the construction of covered swimming pools instead of baths. This legislation makes it clear that covered swimming pools and baths were not to be considered one and the same. In fact, baths continued (and do to this day is modern spa settings) to be associated with hydrotherapies of various sorts, whereas pools (whether covered or open) were clearly differentiated as being for recreational purposes. It is at this point that the construction and purposes of baths begin to be separated from the construction and purposes of pools.

This distinction between baths and pools is also apparent in the United States, although it takes hold over a decade later. The name of the very first year-round public "bath" built in the United States, Milwaukee's West Side Natatorium, constructed in 1890, reveals, by the use of the term "natatorium" (see Glossary) that the primary concern in the design and construction of this facility was "swimming" not "bathing." The distinction being that one "swims" primarily for fitness or recreation, whereas one "bathes" primarily for health and hygiene. This is not to imply that the two terms were mutually exclusive, but their use does indicate the emphasis of particular projects.

The public hygiene and municipal bath movement, coupled with the increasing frequency with which bathing facilities were found in American homes these public

[109] Charles Newman, *Swimmers and Swimming,* London: The Pictorial Press, Ltd., 1898, 29.

bathing establishments and pools became predominately places of recreation, while in a secondary role providing hygienic training. This evolution is the result of two concurrent trends, one a general societal happening, the other more limited in scope: the rise of recreation and the formalization of aquatic sport, respectively. These two trends coupled with new-found comfortability in water created the foundations for modern competitive and recreational aquatic activities, to this day the most popular exercise and recreation in the United States.

With increasing affluence in the United States during the second half of the nineteenth century, the necessity of working every waking hour of the day waned and people in the middle class began taking vacations and spending increased leisure time outdoors. The effect of labor unions and Progressive reforms was to provide shorter work days and higher pay for skilled and, in many cases, unskilled labor. This, in turn, set the stage for unprecedented amounts of leisure time available to the American worker.[110] The increased number of people with free time also brought with it a burgeoning diversity in recreational interest.

The growing number of individuals with substantive leisure time increased demands on existing recreational and sport facilities--the few that there were. Through most of the nineteenth century, recreation had been primarily passive, strolling, picnicking, and the like, rather than active in the form of organized sport. Recreation during this time, which amounted more often to group leisure than sport, took place in country homes, on estates, in private clubs, and institutions (universities, colleges, literary societies, cemeteries). With the rise of the middle class in the late nineteenth century, stemming from the new skilled factory worker and burgeoning retail

[110] Clarence Stein, *Toward New Towns for America,* Cambridge, MA: M.I.T. Press, 1971, 217-218.

enterprises, and the commensurate rise in disposable income, more people gained access to these available facilities and activities.[111]

Recreation began to take on new and often more sport-oriented forms. Picnics in the cemetery were replaced by croquet, roller skating, bicycling, baseball, and golf.[112] Though family outings continued for the middle class, single-sex and age group-specific activities became more popular. Sport recreation, like bicycling, baseball and golf, by their nature required vast amounts of open space. The demand for these activities and appropriately sized and constructed facilities meant they were moved from the private realm into public spaces, especially in urban areas. Local government representatives, thinking of re-election and considering the public's need for open space, began to construct facilities to meet the demand that the private sector could no longer fill. Parks, for strolling and cycling, and fields, for baseball, football, and rugby, began to appear outside of the university or club in America's urban and suburban areas.

Recognition of the importance and utility of park space was not new to American society. Major urban parks had been around for decades, beginning with New York City's Central Park, designed by Frederick law Olmsted and Calvert Vaux in the 1850's. Boston, too, had attempted to found a city parks system around the same time, but was unable to make headway in actual construction until the legislative framework was laid in 1892.[113] These later nineteenth century parks also often included play equipment for children, a result of the "Play Movement," which dated back to the 1820's, but really took hold in the 1880's and 1890's.

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[111] Arnold W. Green, *Recreation, Leisure, and Politics,* New York: McGraw-Hill, 1964, 75.
[112] Dino Taraporevala, *Leisure Time Expenditures: The Demand for Participant Sports in the United States*, Bombay: D.B. Taraporevala Sons & Co., 1968, 4.
[113] Ellis Armstrong, ed., *History of Public Works in the United States, 1776-1976,* Chicago: American Public Works Association, 1976, 556-57.

Growing public awareness of the use of and need for organized recreation in cities went beyond teaching children how to swim or play ball, and attempted to keep them occupied and ingrain in them discipline, teamwork and a competitive spirit. This amounts to at least a base level of social engineering which continues to the present day. This introduction to "middle class," otherwise stated as the indoctrination into the work ethic that was allegedly so basic to American society, became part of the political socialization especially of immigrant and lower class children.[114] Recreation was a natural place to institute this form of socialization of children.

The chief drive to organize sports was among adolescents and young adults in large degree due to the advent of professional and amateur sport. By the end of the nineteenth century, professional baseball was well-established as a popular spectator sport. Beyond this, though, there was tremendous amateur playership. On the collegiate side, football, boxing, and baseball had become highly popular team sports by 1900. Again, their popularity as spectator sports was echoed in amateur and children's leagues throughout the United States.

By the beginning of the twentieth century, organized competitive sports had been firmly established as a part of societal activity. This was solidified largely through interest generated by the reintroduction of the quadrennial Olympic Games in 1896 and the establishment of the National Collegiate Athletic Association in 1906. Further, with unprecedented numbers of Americans attending colleges and universities where sport and recreational facilities were readily available, the expectation of organized participation in sport grew.

Competitive swimming has its roots in Britain roughly twenty years before being effectively transplanted to American shores. Swim clubs and societies began

[118] This political socialization was also furthered by groups like the YMCA, YWCA and the Boy Scouts of America, each of which was gaining great popularity and influence during the early years of this century.

forming in Britain as early as 1839.[115] By 1855, the Cambridge University Swimming Club had been formed, marking the entrance of the established educational institution into swimming for both sport recreation and safety education. In 1875, a highly publicized swim across the English Channel by a Captain Webb created great interest in swimming, resulting in increased attention to the British swimming clubs.[116]

British inter- and intra-club activities became more formalized during the mid-nineteenth century. To bring a sense of organization to the various meets occurring, a group of British swimming clubs formed the Amateur Swimming Association of England which, in a very short time, came to be the governing body of the new sport of competitive swimming. In addition, official rules for water polo were drafted by the Association in 1880.[117]

The United States would follow this same general progression about fifteen years behind England. However, collegiate swimming would play a much more important role in the evolution of design and use in aquatic facilities. In the United States, Girard College in Philadelphia was the first to provide dedicated recreational swimming facilities for its students. Founded in 1848, the writer of Girard's constitution, Francis Leiber, also founded a swimming school in Boston in 1827.[118] Gallaudet College in Washington, DC, was the second to offer swimming facilities for students in 1881.

Formal intercollegiate competitive swimming began in the United States in 1897, with meets between the University of Pennsylvania, Columbia and Yale.[119] These meets consisted of swimming, diving and other water sports. Following several

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[115] Luehring, 24.
[116] Peter Moss, *Sports and Pastimes Through the Ages*, New York: Arco Publishing Company, Inc.,1963, 152.
[117] Moss, 152.
[118] Luehring, 26. According to Luehring, these pools were used for "daily bathing" for over half a century. Whether he means bathing to be a synonym for swimming or hygienic cleansing is unclear.
[119] Luehring, 32.

years of these competitions, the Intercollegiate Swimming Association was organized in 1905 to coordinating competitions between participating schools in the eastern United States. Its counterpart in the Midwest, also founded in 1905 was the Intercollegiate Conference Swimming Association. These organizations as well as other local groups, were largely responsible for developing rules for competition and coordinating meets between schools.[120]

National status was accorded swimming when, in 1913, the National Collegiate Athletic Association, the national governing body for collegiate athletics, appointed its first committee to create rules for swimming, diving and other water sports. Going far beyond general guidelines for the types of facilities to be constructed that had been proposed by the hydropathy and public health movements, the NCAA developed and maintained a national code of guidelines and regulations which specified the requirements for the length of pools that were used for racing, as well as the water depth and equipment for diving and water games. This standardization of pool requirements led to a flourishing of the sport in colleges and universities nationwide.

John L. Griffith, commissioner of the Big Ten Conference, commented in 1927:

> While the schools and colleges are very rapidly constructing swimming pools, the demand for these is way ahead of the building program. . .The example of the University of Iowa that has built a swimming pool about which may be accommodated three or four thousand spectators, will undoubtedly be followed by others.[121]

[120] Luehring, 32.
[121] "Swimming is Popular Sport in American Colleges," *Beach and Pool*, Vol. I, No. 5, May, 1927, 20.

Colleges throughout the country were beginning to provide new or enlarge old swimming pools for the purposes of racing, diving and water polo. Often, like at the University of Iowa, these new facilities took the form of natatoria, wherein spectator seating, usually in the form of permanent bleachers, was constructed around a central pool or pools. Some of the top architecture firms of the day were asked to design pools for schools, such as that by McKim, Meade and White at Bowdoin College in Brunswick, Maine.[122]

In addition to the establishment of collegiate programs in competitive swimming, its popularity as an Olympic sport came to a peak in the 1920's. Swimming had been included in the modern Olympics since their revival in 1896, but in 1924, America produced its first (of many) swimming stars: Johnny Weismuller. One account of the 1924 Olympics reads:

> The 1924 Paris Olympics produced a star and hero of the magnitude of Jim Thorpe in the 1912 Stockholm games. Faced with strong opposition, Johnny Weismuller, then nineteen years old, won the 100- and 400-meter freestyle events, anchored the 800-meter relay team, and played on the bronze metal winning water polo team. Driven by his coach . . . the young swimmer shattered Olympic records, even knocking a full 20 seconds off the existing 400-meter freestyle record. Weismuller swam equally well in sprints or distance races, and his spectacular wins at Paris made swimming a popular sport in America. Swimmers were now viewed as genuine athletes, the equal of track and field competitors.[123]

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[122] "Swimming is Popular Sport in American Colleges," 20; See Appendix I for a listing of college pools and their dimensions as of 1927.

[123] Douglas A. Noverr and Lawrence E. Ziewacz, *The Games They Played: Sports in American History, 1865-1980,* Chicago: Nelson-Hall, 1983, 92.

The popularity of swimming as sport recreation in the United States results not only from the nation's interest in competitive swimming, diving and water games, but also from educational efforts made in the early nineteenth century by private swimming schools and later by the YMCA and the Red Cross to teach children to swim for their own safety.[124] The early commercial effort was available to those who could pay the price for lessons, while the latter effort was aimed primarily at the poor and the middle class.

Commercial swimming schools were often associated with both floating and beach baths during the nineteenth century. Francis Lieber, later of Girard College, established the first swimming school in the United States at Boston on July 18, 1827, on the "north side of the mill dam."[125] He managed to operate the school for about five years believing it to be a "great service to the sick...[and] beneficial for the sound and healthy. . ."[126] Floating pools were used for instruction in Worcester, MA, Hoboken, NJ and Washington, DC[127]

Instruction in swimming remained largely in the hands of private teachers and educational institutions for most of the nineteenth century. These schools and their facilities were often owned or operated by the same individuals. Swimming "masters" or teachers were among the first to produce literature detailing how pools are best built for instruction. The difficulty in creating greater access to swimming instruction was finding water space in which to teach. Later in the century, both the YMCA (and, later, the YWCA) and the American Red Cross would have the financial wherewithal to provide not only the teachers but the facilities for instruction.

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[124] Clapp, 2.
[125] Luehring, 22.
[126] Francis Lieber, *Boston Medical Intelligencer,* Boston: John Cotton, Vol. V, 1827, 168.
[127] Luehring, 22-23.

The Young Men's Christian Association was founded in London, England by a dry goods clerk named George Williams. Only 23 years old at the time, Williams wished to extend his interest in social welfare activities into those of religious welfare. The YMCA's first American office was opened in Boston in 1851. The YMCA's swimming program, originally formulated to teach boys proper hygiene, shifted toward swimming education as the general tide in aquatics changed from health to recreation. The YMCA bridged the gap between the swimming schools of old and the municipal pools of the early twentieth century.

The contribution to swimming made by the YMCA was unequaled to this time.[128] Beginning with the first "swimming bath" in 1885 and continuing on to 1937, the YMCA built and operated nearly 700 swimming pools in the United States, taught swimming to more than 2000 persons per day, and certified nearly 7000 officially credited lifesaving examiners. Between 1910 and 1927, the YMCA taught some 2,000,000 men and boys to swim and provided lifesaving instruction to over 200,000 individuals.

Nearly all of the YMCA's pools were built after 1900 at a mean cost of $26,510 each, with the approximate total allocation for all the YMCA pools being $18,132,840.[129] By the late 1920's, the YMCA had settled upon a standardized design

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[128] Luehring, 266. He notes this report as *Minimum Sanitary Requirements for Swimming Pools and Bathing Places.* Illinois Department of Health. Adopted July 15, 1935. Revised May 1, 1938. 59pp.

[129] Luehring, 34; "Two Million Men and Boys Have Learned to Swim at 'Y'," *Beach and Pool*, Vol. I, No. 3, March 1927, 15-16. The March 1927 article in *Beach and Pool* reports, "The pools now being built are the standard size—20 by 60 feet, and the cost of the pool and equipment range from $25,000 to $30,000. Following is a list of YMCA buildings under construction with pools: Benton Harbor, Mich., $190,000; Buffalo, Southside Branch, N.Y., $140,000; Detroit, Mich., North branch, $525,000; Hoboken, N.J., $450,000; Honolulu, H.I., $600,000; Kansas City, Kans., $178,000; Pittsburgh, Pa., Allegheny Branch, $262,000; Portland, Me., $400,000; St. Petersburg, Fla., $350,000; Schenectady, N.Y., $350,000; Springfield, Mass., Mittineague Branch, $200,000; Southern College, Nashville, Tenn., $400,000; and Winston Salem, N.C., $350,000. The figures represent the cost of the entire building." Between 1910 and 1927, "the Young Men's Christian Associations of North America have successfully taught nearly two million men and boys to swim and over 200,000 have taken the YMCA life saving course. During 1926, a total of 134,122 men and boys were taught swimming in the United States and Canada, 128,202 of the number being in this country. A total of 29,868 were taught life saving."

for its pools, with minor variations allowed for individual circumstances. Each pool was to be 20 feet by 60 feet and cost between $25,000 and $30,000. (Figure 3.1)

Whereas the YMCA owned and operated its own facilities, the American Red Cross certified instructors to go out to facilities and teach their courses. The Red Cross had been founded as a humanitarian organization in Sweden in 1863. Its primary purpose was to alleviate wartime suffering and promote public health. Its American branch, the American Red Cross, was organized in 1881 by nurse Clara Barton. During peacetime, the American Red Cross became by the turn of the twentieth century, one of the premiere public health organizations in the United States. The Red Cross offered a broad range of swimming classes aimed at children and adults. Beyond swimming instruction, the Red Cross remained true to its founder's goals and concentrated on creating a corps of individuals across the country trained

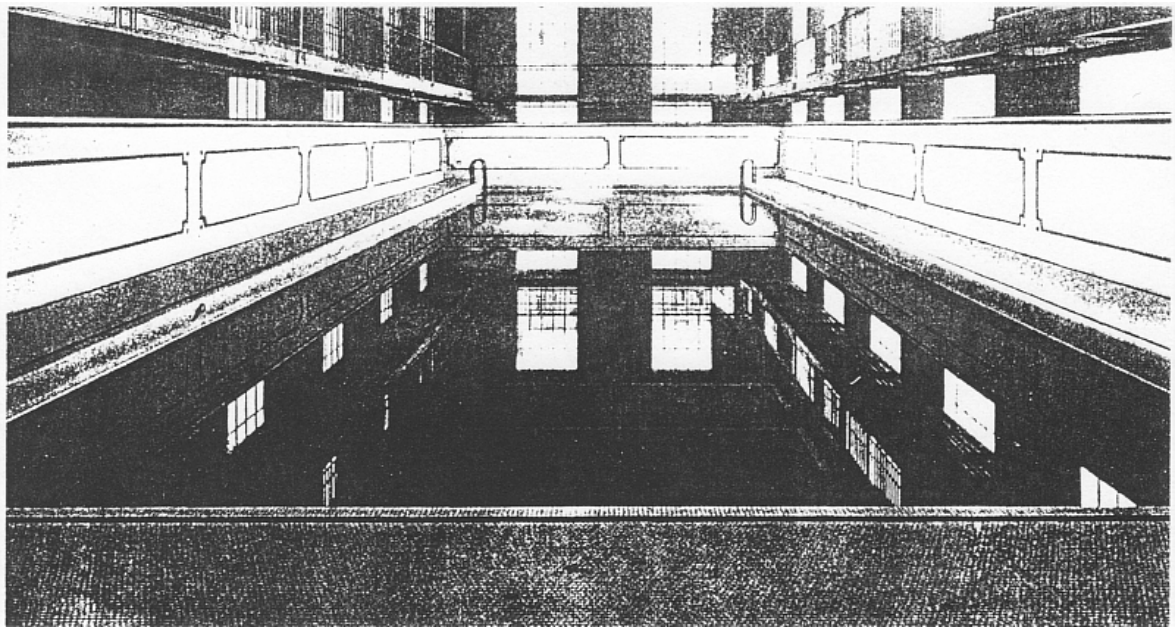

Figure 3.1: YMCA Standard Pool Configuration as Demonstrated by the pool at the Germantown YMCA, Philadelphia, PA.

Source: Associated Tile Manufacturers, *Swimming Pools*, Beaver Falls, PA: Associated Tile Manufacturers, 1917, 19.

in water safety techniques--lifeguards. The Red Cross took up the public safety aspect of swimming whereas the YMCA concentrated its efforts on swimming instruction.[130] Between the two, the YMCA and the American Red Cross were responsible for teaching much of America how to swim as well as for keeping them safe while they were doing it.

In addition to the YMCA and the Red Cross, many fraternal organizations and community service groups also began constructing pools and offering classes (usually Red Cross certified) at their facilities. The Lions Club, American Legion and the Knights of Columbus all constructed and operated pools in the early twentieth century to provide for both hygiene and recreation.[131] The Knights of Columbus pools were standardized, for the most part, to 75 feet by 25 feet and often used the most advanced technology of the day.[132] Far from being utilitarian structures in many cases, The Knights of Columbus Hotel-Club at Eighth Avenue and Fifty-First Street in New York sported the highest regulation sized pool in the world in 1927. It extended through the depth of the fourteenth and fifteenth stories on the south side of the building. It had four racing lanes, a regulation diving board (see Chapter Five) and a capacity of 60,000 gallons of water which was disinfected with chlorine and heated to a temperature of 74 degrees year-round.[133]

These fraternal and civic organizations augmented the programs presented by the YMCA and American Red Cross. The combined efforts of these programs

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[130] Fred H. Clapp, *Practical Problems in Swimming Pool Construction and Supervision,* Masters Thesis, University of Southern California, 1928, 2.
According to Clapp, the Red Cross was involved in, "staging swimming programs; organizing Life-SavingCorps; and offering service awards--Honorary Service Medals, Rescue Bars, and Cash Prizes, for life-saving or incidents of special worth."

[131] "Lions Clubs Sponsoring Many Swimming Pool Projects," *Beach and Pool*, Vol. I, No. 6, June, 1927, 14-15.

[132] "Knights of Columbus Build Pools," *Beach and Pool Magazine*, Vol. II, No. 10, October, 1928, 24-26. This disinfection technology included ultra-violet rays and ozone.

[133] "Knights of Columbus Build Pools," 24.

produced a swimming population that represented a majority of Americans by the 1930's. It was this widespread ability to swim that, combined with the availability of venues for aquatic competition, led to the continued demand for more high quality, standardized swimming facilities.

Americans, by the end of the nineteenth century, were privileged with more leisure time and a greater number and breadth of recreational opportunities than ever before. These opportunities coupled with a rise in spectatorship and playership of organized sports resulted in the formation of governing bodies for many sports, swimming included. These governing bodies provided rules and guidelines for the game and the facilities in which the games were to be played. This resulted in the standardization of requirements for sport, which along with new sanitation codes to be discussed later, leads directly to the development of the modern swimming pool, its design, uses and construction. The rising popularity of the sport, combined with the efforts of the YMCA and American Red Cross to teach Americans how to swim, represents the end of the first cycle of development in the modern swimming pool's development. The process of bringing bathing, and as a corollary swimming, into the mainstream had begun with hydropathy, moved through the public bath movement and into popular recreation and sport. As hygiene became less of an issue, the recreational and athletic aspects of swimming came to the fore, where they would remain to the present day in the United States.

CHAPTER 4

STANDARDIZATION OF SWIMMING POOL DESIGN, 1910 - 1940

By the beginning of the twentieth century, the convergence of the hydropathy and public hygiene movements, coupled with rising interest in aquatic recreation and sport, placed new demands on pool designers and operators. No longer was the bath model serviceable. Most pools built after the turn of the century were constructed expressly for sport and recreational purposes. The new sports recreation-based paradigm lead to the standardization of both pool dimensions and construction techniques. Further, a variety of modern materials were introduced into pool construction either for the first time or in new ways. In a sense, the pool became both modern, standard, and commonplace at the same time.

The main precursor to twentieth century standardization efforts was the Committee on Public Hygiene of the American Medical Association, first appointed in 1849. This group, mentioned in Chapter Three, spelled out the necessity for aquatic facilities as a solution to hygiene and cleanliness problems among the lower classes. Its calls often specified the types of facilities believed to be the most useful to achieve its hygiene goals.

With the precedent in place for some amount of informal standardization, two other contributing factors led directly to the evolution of specific design guidelines. The first, and most obvious, is the rise of competitive aquatic sport. By their nature, racing, diving and water polo require consistent environments from place to place in order to insure comparable competitive settings. This was especially important for racing where a lack of common dimensions had become, by the early 1900's, a tremendous problem with regard to the establishment of best-time records for given

events. Indeed, standardizing the events themselves was a difficult task given the wide disparity in dimensions.[134]

The second force contributing to the necessity for standardization was the wide range of technology available to the pool builder and operator in the areas of structure, cladding, filtration, disinfection, lighting and accessories. With such a range of technologies available (candles to neon for lighting, chlorine to ultra-violet rays for disinfection, etc.), some of these more effective or less dangerous than others, it became important for the purposes of competition and ease of management for standards to arise. In the case of sport, water clarity, temperature and visibility through proper lighting had to be consistent among venues.

Despite their common sense nature, many of the regulations were not accepted until the 1920s and 1930s. Though the designs for indoor swimming pools were not nearly as irregular as those for outdoor facilities, there was still a significant amount of variation especially with regard to the tank dimensions. Filtration, disinfection, lighting and accessory equipment was somewhat standardized simply by the limited numbers of manufacturers of these items. Not until the codification of specifications for competitive and sanitary designs was there any real semblance of consistency in the mechanical outfitting of the facilities. And even with these specifications and regulations, pools with odd dimensions and utilizing non-standard equipment continued to be built because many of these regulations did not have the force of law.

By the second and third decades of the twentieth century, both the National Collegiate Athletic Association (NCAA) and the Amateur Athletic Union (AAU) had

[134] "Swimming Pool Dimensions for Officially Recognized Competitions: Proportions for Pools based on Regulations of AAU," *Municipal News and Water Works*, August, 1928, 89. This article reports that three records had to be kept for each event. The first was for swims made in 20 yard pools. The second was a shortcourse record for those races swum in pools between 25 yards and 50 meters (55 yards) long. The third record was a longcourse record for any swim in a pool longer than 50 meters. Records were kept for the following events: freestyle--50, 100, 150, 220, 300, 440, 500, 880, 1000 yards and one mile (1650yards); backstroke--100 and 150 yards; breaststroke--100 and 220 yards. Butterfly was, of course, not yet a sanctioned stroke.

promulgated regulations that set the proper sizes and dimensions of pools used in competition. Despite the existence of these regulations, pools continued to be constructed with odd dimensions because of spotty enforcement and inconsistencies between the specifications provided by the groups. Most often, the cause of these length and width disparities was not ignorance of aquatic sport requirements, but a desire for an economy of scale which demanded, especially of municipal pools, that a maximum number of bathers be squeezed into the most efficient space possible, regardless of competition requirements. [135]

Odd dimensions were found more frequently in outdoor facilities as they allowed for greater flexibility of design by virtue not having to make design allowances for a roof structure. Indoor pools, on the other hand, had always been less susceptible to the use of unusual geometry (circular or elliptical construction) because it made enclosure more difficult and expensive to construct. To be sure, by the twentieth century, architects and builders were experimenting with different roofing systems, including domes,[136] which allowed tremendous flexibility in design and dimensions, but the limitations of the pool's dimensions remained a governing factor. Though the rectangular plan for the pool was common, length and width were another matter. Meets were being swum in pools of 60, 75, 90 or 100 feet in length, with some outdoor pools reaching 200 or as much as 1,000 feet long. [137]

The result of the standards issued by both the NCAA and the AAU beginning in 1913, with revisions periodically made to accommodate event and technological advancements, was a greater awareness on the part of architects, engineers and operators of the design requirements necessary for regulation competition and play. With these ideas in mind, the AAU and other organizations began advocating the idea

[135] C.H. Brennan, "Standardizing the Pool," *Beach and Pool*, Vol. II, No. 4, April, 1928, 1.
[136] Clapp, 52a.
[137] Brennan, "Standardizing the Pool," 9.

of "unit pool construction."[138] Unit construction involves the use of multiple tanks in close proximity, each designed to accommodate general swimming as well as specific activities. (Figure 4.1)

Unit construction allows easy expansion as demands increase, as well as multiple simultaneous use of a facility by creating separate, partitioned environments wherein different activities can take place at the same time. Maintenance questions are eased by the partitioning as one pool area can be cleaned while the others operate, mitigating scheduling hassles and revenue loss. There is also an economy of scale as the duplication of filtration and disinfection equipment can be minimized. Though this notion had a much greater effect on outdoor pool design, it did lead builders of indoor pools to consider expansion in regular units, resulting in a greater standardization of dimensions and design.

In addition to the NCAA and the AAU, groups such as the Young Men's Christian Association (YMCA), the International Olympic Committee (IOC), and the International Swimming Federation (ISF) each maintained their own standards for record keeping, which forced participating pools to adopt their dimensions if they wished to qualify for record contention and championship meets.[139] As the result of these requirements, the improvement in adherence to dimensional standards between 1917 and 1937 was substantial. The percentage of non-standard pools in colleges, universities and high schools dropped from 34% in 1917 to 13% in 1937. Even within the standards, there was a range of acceptability: 60, 75 and 150 feet, and 50 meters were all considered standard lengths.[140] This variety of acceptable dimensions led to the construction of many pools which, though "standard" at the time, would quickly

[138] Brennan, "Standardizing the Pool," 10.
[139] Leuhring, 32-33.
[140] Jack Hinman, Jr.,"The Care and Design of Modern Swimming Pools," *Beach and Pool,* Vol. I, No. 6, June, 1927, 11; Luehring, 33.

become unusable for specific competitions due to changes in required dimensions. (Table 4.1)

Table 4.1: College, University and High School Pools by Dimension

	Colleges and Universities					High Schools				
Date	Odd Sizes	60 Ft	75 Ft	150 Ft	50M	Odd Sizes	60 Ft	75 Ft	150 Ft	50M
1917	11	14	11	0	0	13	15	6	0	0
1927	14	39	26	2	0	14	38	24	0	0
1935	06	56	60	2	1	14	71	47	1	0
1937	21	56	65	3	1	19	84	54	0	0

Source: Frederick William Luehring, *Swimming Pool Standards,* New York: A.S. Barnes and Co., 1939, 33.

During the 1930's there was increased interest on the part of American swimmers in Olympic competitions in swimming, diving and water polo. The difficulty was that Olympic distances and records of international sports governing bodies are expressed in metric terms. By the late 1930's there was a growing trend toward the adoption of the Olympic metric standard, particularly within the AAU.[141] The pressure forced the modification at great expense of many non-metric pools as well as the introduction of the moveable bulkhead to allow regulation metric and standard swims.[142]

Even more than the official effort being made by these various governing bodies, it was the general rise in the popularity of competitive swimming and water sports that resulted in adherence to these guidelines. If a community wished to participate, their facility had to be of the appropriate size and shape. It was not until

[141] Luehring, 106.
[142] Luehring, 107.

the 1960's, however, that the dimensional standards had been refined to include only the 25 yard indoor and 25 meter and 50 meter outdoor specifications.[143]

Aside from the standards put forth by the various sports organizations, professionals involved in public health promulgated regulations designed to ensure solid, useful design and construction, and healthful operation. These health regulations, coupled with the dimensional requirements for sport, directly resulted in the modern swimming pool standards present through to the late twentieth century.

Beginning in 1912, a number of regional and national groups and committees arose to take the lead in furthering public health regulations for swimming pools, independent from baths. By this time, most of the major construction methods, mechanical systems and pieces of equipment that are in use to the current day were already available. These regulations were intended to aide pool builders and operators in making use of new technologies and understanding the growing corpus of bacteriological and chemical studies.

Among the most prominent of these groups was the American Association for Promoting Hygiene and Public Baths (AAPHBA), founded in 1912. As the municipal bath movement had matured and the nature of public hygiene as a pressing

[143] The 25 yard standard is also called American shortcourse. The 25 meter is Olympic shortcourse, while the 50 meter standard is Olympic longcourse.

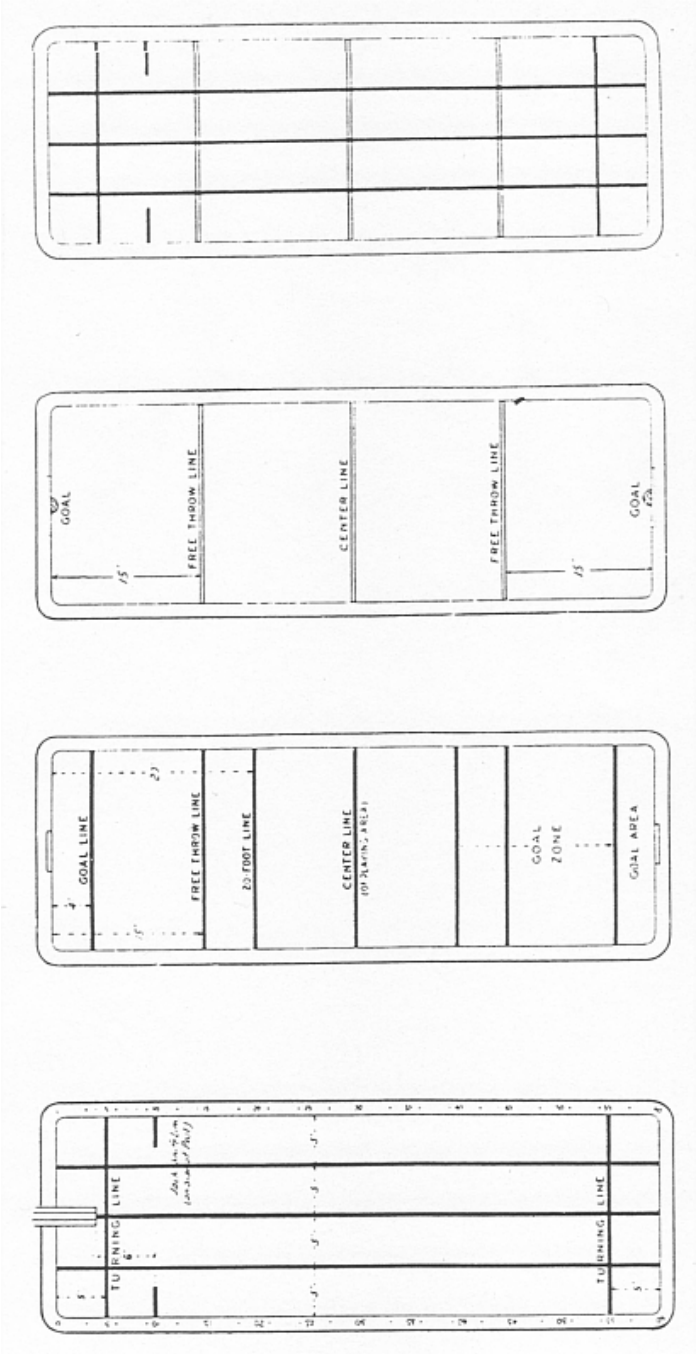

Figure 4.1: Official Bottom Markings for Water Sports: Swimming, Water Polo, Water Basketball, Composite.

Source: Associated Tile Manufacturers, *Swimming Pools*, Beaver Falls, PA: Associated Tile Manufacturers, 1917, 27.

political issue had subsided, the association grew to encompass more recreational or pool aspects. During the 1920s, its membership came to include not only public baths personnel and public health officers (sanitary engineers, bacteriologists and chemists), but architects and public recreation personnel.[144] The content of the association's journal also changed accordingly.

From the AAPHPB's founding through to the 1920's, its publications had focused largely on municipal baths and bathing facility design. Gradually, the publications evolved to include a broader cross-section of interests. An emphasis on municipal swimming pools arose, with many articles written on all aspects of pool design and management, but particularly on various methods and aspects of water filtration and disinfection. The publications also began to include records of state health and hygiene codes for baths and swimming pools. Beyond pools and state regulations, public recreation became an important topic of discourse within the AAPHPB.[145]

In 1912, the same year the AAPHPB was founded, the Royal Sanitary Institute of Great Britain issued an immensely influential report on swimming pools.[146] One manifestation of the impact of this report was the issuance, three years after this report reached America, of the AAPHPB's first swimming pool standards by its Committee on Promoting Pool Standards.[147] This statement contained little that was new at the time, but was the first articulation of a set of standard guidelines for the sanitation and management of a swimming pool in one document. A summary of these standards follows:

1. The pool should be well-lighted for safety.

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[144] Williams, 127.
[145] Clapp, 1; Williams, 129.
[146] Luehring, 29.
[147] Clapp, 1; Arthur M. Crane, "What Should A code of Swimming Pool Standards Embody?" *Beach and Pool*, Vol. I, No. I, January, 1927, 13; Luehring, 29-30.

2. The interior of the tank should have a perfectly smooth surface without cracks, crevices, sharp corners or pockets to shelter dirt and disease germs.
3. The tank should have a perimetric scum gutter.
4. The deck and runways surfaces surrounding the pool should be sloped so that they drain away from the pool.
5. The pool, decks and runways should be free from obstruction.
6. The water in a pool should be clear, pure, and colorless. Fresh water should be introduced through a constantly inflowing stream, filtration, or refiltration, and disinfection.
7. Filtration of pool water is alone insufficient. Disinfection should occur by one of the following methods:
    A. chlorine of lime [calcium hypochlorite]
    B. chlorine gas
    C. ultra violet rays
    D. ozone.
8. Bathers should be strictly supervised and monitored via the following:
    A. medical examination
    B. inspection before entry
    C. pre-cleansing bath with soap.
9. Street clothing should be prohibited or limited to sterilized, white, lintless material.
10. Attendants proficient in swimming and life saving should always be on duty when swimmers are in the water.
11. The pool area must be locked when not in use.[148]

[148] Luehring, 29-30; See also *The Journal of the American Association for Hygiene and Baths*, Vol. II, No. III, 1921.

Though these standards were modified and amplified, especially in the area of filtration, they were essentially still in use through the 1920's[149] These standards formed the foundation for regulations prepared by various authorities and were adopted almost in their entirety by some.[150]

In addition to the AAPHPB, two other groups were pivotal in the development of pool standards. In 1918, the American Public Health Association was appointed a Committee of the Public Health Engineering Section to investigate sanitary problems at swimming facilities and issue. The Conference of State Sanitary Engineers appointed, in 1920, a similar committee. Recognizing the duplication of effort, the APHA and the CSSE joined their swimming pool committees in 1925, forming the Joint Committee on Bathing Places of the American Public Health Association and the Conference of State Sanitary Engineers.[151] Their reports, the first one issued in October of 1926,[152] built upon the sanitation and management guidelines produced by the AAPHPB in 1915, and consolidated swimming pool design, construction, sanitation, and operation standards into one document. Revised and expanded over the years, this code would become the basis for nearly all government regulations relating to pool operation.[153] Very often, the Joint Committee's recommendations were adopted by sports governing bodies in their design guidelines.

Following the creation of guidelines for construction and sanitation, many states began regulating the construction and operation of swimming pools using codes

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[149] Luehring, 30.
[150] Crane, "What Should a Code of Swimming Pool Standards Embody?" 13.
[151] Clapp, 2.
[152] Joint Committee on Bathing Places, "Swimming Pools and Other Public bathing Places: Standards for Design, Construction, Equipment and Operation," *American Journal of Public Health,* December, 1926, 1186-1201.
[153] Luehring, 30-31. Luehring writes, "Their reports are still regarded as the most valuable guiding information on the health and sanitary aspects of pool planning, construction and administration."; Clapp, 4-5.

which evolved from the Joint Committee's recommendations. So popular had pools become, some states created entire regulatory departments to supervise them.[154] In some states, the "Suggested Minimum Standards for Swimming Pool Waters," prepared by the Conference of State Sanitary Engineers, was given a trial as a sanitation code for swimming pools and in others advisory supervision was exercised via health departments.[155]

Even before the first report of the Joint Committee was issued, however, several states had developed their own swimming pool legislation and regulation. The first state legislation passed in California in 1917. In subsequent years, several states would follow California's model, adopting nearly verbatim its act. By 1935, seven additional states had adopted legislation regulating swimming pools. These states were: Florida (1919), Utah (1921), Rhode Island (1928), Illinois (1931), Oregon (1931), Pennsylvania (1931) and Nevada (1935). Both California and Rhode Island revised their initial legislation in 1931.[156] The revised California law contained only seven sentences.[157] The law places the regulatory responsibility for supervising the sanitation, healthfulness, cleanliness, and safety of publicly accessible swimming pools on the State Board of Health.[158] Through 1940, only these eight states had enacted specific legislation dealing with swimming pools. In other states, regulation

[154] Clapp, 7.
[155] Clapp, 4-5.
[156] Leuhring, 36-37.
[157] Luehring, 37.
[158] Luehring, 37-39.

of swimming pools was founded under the general rubric of public health with no specific enabling legislation. In fact, some states regulated without the specific authority to do so. (Table 4.2) All in all, some forty states adopted or investigated the

Table 4.2: State Boards of Health Rules and Regulations

State	*Date Iss.*	*Revisions*	*State*	*Date Iss.*	*Revisions*
Founded upon authority of specific state laws dealing with swimming pools:					
CA	1919	1920;1923;19261929;1932	OR	1925	1931
FL	1921		PA	1931	
IL	1935		RI	1928	
NV	1937		UT	1921	1923
Founded upon authority of general laws or statutes, or part of the state sanitary code:					
CO	1926	1935	NH	1922	1925;1932
CT	1925	1930	NM	1925	
DE	1932		NY	1928	1923;1934;1935
KS	1925	1935	SD	1929	
LA	1913	1923	WV	1919	1931
ME	1925		WI	1931	1932
MD	1929				
Issued under the auspices of State Boards of Health with no specific statutory or legislative foundation:					
AR	pre-1922	1922	MT	1934	
IN	1925	1929;1931;1935	NE	1919	1928
IA	1927		ND	1935	
KY	1927		OK	1923	
MI	1930	1931;1932;1933	SC	1934	
MN	1932	1936	TN	1921	1928
MS	1925		WA	1921	
MO	1928		WY	1921	
Recommendations only:					
AL	1929		NC	n.d.	
AZ	n.d.		OH	1937	
GA	n.d.		TX	1923	
ID	n.d.		VA	n.d.	
MA	n.d.				

Source: Frederick W. Luehring, *Swimming Pool Standards*, New York: A.S. Barnes and Comapny, 1939, 41.

regulation of swimming pool sanitation by 1939. Only Arizona, Georgia, Idaho, Massachusetts, North Carolina and Virginia lacked even officially adopted "recommendations" by 1939.[159]

The effect of these regulations, regardless of their basis in law, was to codify to a great extend those recommendations and standards developed by the public health committees and sports governing bodies. State regulation, while it varied widely from state to state, might include only a simple licensing process or, in a number of cases, regular inspections to insure healthful and sanitary conditions on site.[160]

The development of swimming pool standards, by public interest, sport and professional organizations, and their subsequent adoption by state regulatory agencies, resulted in a more uniform quality of construction and operation. As the increased popularity of swimming forced the construction and operation of more pools, their regulation and standardization, resulting in increased safety, quality of environment, and recreational opportunity, furthered their popularity to an even greater extent. As standards continued to be refined, regulations became more stringent and technology continued to improve especially following World War II, America's fascination with aquatics continued to grow.

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[159] Luehring, 41.

[160] In addition to codes promulgated by professional groups, governing bodies, or states, there are several manufacturers publications which seem to have had significant impact. Two of particular interest because other their wide influence are *Swimming Pools*, published in 1917 by the Associated Tile Manufacturers, Beaver Falls, PA, and *Concrete Swimming and Wading Pools*, published by the Portland Cement Association. Both of these publications, along with many other less influential works, made use of existing regulations and made recommendations based upon the installation experience of the authors, prevailing standards and, of course, a desire to sell a product.

CHAPTER 5

DESIGN AND CONSTRUCTION PRACTICES FOR INDOOR POOLS, 1910 - 1940

An overview of pool design, written by Boston Architect William Atherton for *Beach and Pool* magazine in April of 1927, introduces the necessary components of effective pool design.[161] Three competing and overlapping concerns drive these considerations. They are function, construction engineering and equipment.

With regard to the first consideration, a facility's function, the pool must have the size, shape and dimensions that will allow it to serve its intended purposes. The main issues here are usage type (indoor/outdoor), location and dimensions. Unless the design functions properly, the pool is useless and all other concerns unimportant.

The second consideration is construction engineering, both for design purposes and sanitation. A pool of proper composition must be constructed in such a way as to be watertight and fully functional despite internal and external pressures and climatic changes. Poor engineering practice on these fronts can result, again, in a worthless pool.

The final consideration is the mechanical equipment that will enhance the utility or safety of the facility above the minimums required by standards and codes, discussed above. These features generally include recirculation, filtration and disinfection systems. These features are absolutely necessary to the proper and healthy operation of a facility and impact the appearance and utility of the pool itself.

The intended purpose or function of a pool makes certain demands upon the structure. The most basic question is whether the facility is to be indoor or outdoor. Indoor pools were generally considered when year-round swimming was desired. As

[161] Atherton, 11-12, 26-27. See Appendix II.

most of the United States is not within climatic regions that provide year-round warmth, indoor pools are found throughout the nation. It was also generally understood that swimming pools for educational institutions should be of the indoor type,[162] to facilitate "a systematic program of instruction" year-round.[163] Consequently, most schools in the United States that have pools, whether at the primary, secondary or collegiate level, make use of indoor pools. The same is the case for hotels, private clubs, and public organizations in all but the most temperate of climates. The YMCA, for example, built indoor pools almost exclusively so that year-round programs could be offered.

Outdoor pools, on the other hand, were installed where the climate was temperate year-round. Outdoor pools were also built in cases were cost was of extreme concern, due to the lesser overhead costs (no roof to build or building to heat). In pools designed exclusively for recreation (as opposed to competition and instruction) outdoor facilities are more common.

Along with usage type, the location of the facility is of great importance. The Joint Committee on Bathing Places indicates in Section IV of its 1926 report, that careful study must be made of the site's context, as well as the ease of engineering on the proposed landscape.[164] In most settings, a separate building to house the pool was deemed desirable, as long as that building is in some proximity to other athletic facilities for convenience and ease of supervision.[165] Where a free-standing separate building was not practicable, the first floor of the building was the next most desirable location for the pool.[166] When the expense of real estate or building congestion

[162] Luehring, 81.
[163] Luehring, 82.
[164] Joint Committee on Bathing Places, "Standards for Pool Design, Construction and Operation," *Beach and Pool*, Vol. I, No. 8, August, 1927, 24.
[165] "Suggestions for Swimming Pools, Beaches and Showers," *Beach and Pool*, Vol. I, No. 1, Jan., 1927, 1.
[166] Associated Tile Manufacturers, *Swimming Pools*, Beaver Falls, PA: Associated Tile Manufacturers, 1917, 13; Atherton, 1, 12; Clapp, 9.

precluded the building of a separate structure for the pool and where the first floor is unavailable, as in the high rise apartment buildings of New York and Chicago, use of the roof was often suggested as preferable to any other location on the middle floors.[167]

In the construction of an in-ground pool tank, locating the pool in an area where there was good soil drainage was also particularly important to avoid the corrosion of materials. Proper soil drainage also prevents the occurrence of unequal soil pressure on the floor of the tank (due to hydrostatic pressure, or heaving, due to ice).[168] Drainage, whether artificial or natural, must be in place to keep the groundwater level below the foundations of the pool during the entire year. Where this was not possible, relocation of the pool site was desirable.[169]

Another important consideration was the proximity to a water source and sewerage discharge.[170] At educational institutions, it was desirable to have the pool installed as an integral part of the gymnasium complex or at least in the same building so as to avoid the necessity of duplicating locker room and shower facilities.[171] Moreover, the site and structure for the swimming pool at educational institutions was to conform to the architectural context created by the other buildings around it.[172]

Unlike the rather common sense guidelines for the selection of the location, issues regarding the size and dimension of a pool have many more variables. The variety of activities which can take place in a pool place different demands on the facility. Most standards and guidelines recommended a rectangular shape with deep

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[167] Luehring, 80.
[168] J.E. Foster, "The Construction of Rectangular Concrete Swimming Pools," *Beach and Pool*, Vol. I, No. 5, May, 1927, 1.
[169] Louis J. Day and C.W. Stedman, *An Elementary Treatise on the Construction, Sanitation and Operation of Swimming Pools*, Cleveland: Josam Manufacturing Company, 1937, 13.
[170] Luehring, 78-79.
[171] Luehring, 80.
[172] Luehring, 78.

water at or near one end, and shallow water at the other.[173] A rectangular shape was found to provide the greatest flexibility of use and ease of construction.[174] In fact, the Associated Tile Manufacturers, which also recommended rectangular indoor pools,[175] cited a study that found that of 250 indoor pools surveyed, 236 (or 94.4%) were rectangular in shape. For facilities designed to be used as athletic natatoria, the rectangular shape was most useful as it could accommodate all the major aquatic sports.[176]

Settling on a generally rectangular shape would seemingly reduce the variety of length and width dimensions. This is true to some extent, but there is still a wide variance in dimensions between pools. The guidelines available from sanitation, competitive and manufacturing groups mentioned previously are general and represent only a starting point.

In 1913, the Intercollegiate Swimming Rules were produced by the NCAA. These rules advocated a 60x20 dimension, but accepted variations out of necessity, because so many collegiate pools were at variance. By 1917, Associated Tile Manufacturers report that typical dimensions are 20, 25 and 30 feet by either 60 or 75 feet, or four, five or six lanes by twenty or twenty-five yards, with the 60 x 20-foot pool predominating.[177] The 1926 Joint Committee report indicated that competitive swimming required a straight with a length of not less than 60 feet and with a width of five feet per lane.[178]

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[173] Joint Committee on Bathing Places, 25.
[174] Associated Tile Manufacturers, *Swimming Pools*, 13.
[175] Associated Tile Manufacturers, *Swimming Pools*, 13; see also Day and Stedman, 7.
[176] Clapp, 22.
[177] Associated Tile Manufacturers, 15; see also "Swimming Pool Dimensions for Officially Recognized Competitions: Proportions for Pools based on Regulations of AAU" *Municipal News and Water Works*, August, 1928, 89-90.
[178] Joint Committee, 25; Associated Tile Manufacturers, 14-15; Clapp, 22. Other sources are in general agreement that the length should always be a multiple of fifteen feet, while the width should be a multiple of five feet

By the late 1920's, the lengths of 60, 75 and 90 feet were found to be most useful though a competition pool need not have been any larger than 75 x 40 feet.[179] The 60 x 20 dimension which had predominated was falling out of use in competitive swimming, except in the YMCAs and athletic clubs where space is a great factor and where the number of individuals using the pool at any one time was limited.[180]

The addition of metric measurements came about because the Amateur Athletic Union adopted of the metric standard fostered by the International Olympic Committee.[181] With standard or metric, it was common that "widths are usually about 1/3 of the length, but should always be a multiple of 5', or better 7'. . ." in order to accommodate swimmers' arm span for racing.[182] In fact, the AAU suggested that the lane widths should vary by stroke.[183] In 1929, the National Swimming Committee of the AAU recommended that indoor pools standardize to 25 meters in length and thirty feet (or six, five foot lanes) in width.[184] (Table 5.1)[185]

Table 5.1: Usual Dimensions for Indoor Pools, 1937

Length	**Width**
60' (minimum)	20'
75'	25'-35'

[179] Clapp, 22-23; "Suggestions for Swimming Pools, Beaches and Showers," 8.
[180] Associated Tile Manufacturers, 15; Clapp, 23; Luehring, 105, writes: "Although pools sixty feet in length have been and still are approved for intercollegiate and interscholastic and AAU records, this distance is not generally accepted or recommended, and the trend is distinctly toward the seventy-five foot length. No world's record is accepted if made in a sixty foot pool. This is due to the advantage gained in pushing off from the end of the pool following a turn, and obviously this occurs more frequently in a shorter pool than in a longer one..." See also.
[181] Brennan, 9.
[182] Day and Stedman, 7.
[183] "Swimming Pool Dimensions for Officially Recognized Competitions: Proportions for Pools based on Regulations of AAU," 89-90.
[184] C.H. Brennan, "Standardizing the Pool: Unit Construction Tends to Greater Uniformity, Availability for Competition and Ease in Financing," *Beach and Pool*, Vol. Ii, No. 4, April, 1928, 1-2.
[185] Day and Stedman, 7; Brennan, 9. "Swimming Pool Construction," *American Architect*, Vol. 131, No. 2520, May 5, 1927, 621. See also Appendix I.

90’	30’-40’
105’	35’-40’
120’	40’-45’
150’	40’-60’
82’-6” (25 meters)	35’
165’6” (50 meters)	60’-75’

Source: Louis J. Day and C.W. Stedman, *An Elementary Treatise on the Construction, Sanitation and Operation of Swimming Pools*, Cleveland: Josam Manufacturing Company, 1937, 7.

The result of so many different and changing standards for pool dimensions resulted in a majority of pools during this time being accurately termed “standard.” The standards to which they adhered, though, were clearly not consistent, however, because of the conflicts between the different sport, sanitation and manufacturers committees.[186]

In addition to the length and width, the depth of a pool or specific portions thereof was at issue. Pools of uniform depth were still quite common at the turn of the twentieth century. (Figure 5.1a) These pools were very closely related to baths, in which no change in grade was necessary or desirable given the relatively sedentary nature of the activities that occurred within them. A uniform depth in a pool, however, relegates the pool to limited activities. For example, a pool which is uniformly three feet deep is unusable for diving or water polo competition, whereas a pool of 12 feet uniform depth may be useful for diving, water polo and racing, but is not suitable for instruction. In addition, pools of uniform depth are difficult to drain quickly because their level grade at bottom does not encourage water to move toward bottom drains.

[186] Luehring, 105.

The simplest and oldest form of bottom contour for varying depth is a gradual slope from one end of the pool to the other. (Figure 5.1b) This slope is very basic and does not generally allow great changes in depth over a short distance because a very severe slope would be required which might pose a safety threat for swimmers. Where the slope was at least three feet for the length of the pool, this bottom slope also acted as a drainage aide.

A more sophisticated variation on the above is a pool of uniform depth for one-third the length at either end, with a sloping center portion. (Figure 5.1c) This contour allowed a separation of activities between shallow and deep, and was used most often in pools which were designed to accommodate simultaneous activity that included both children and adults. The level surface at each third closest to the ends did raise some difficulty with drainage, but this configuration was considered acceptable for a wide variety of uses including competitive swimming and instruction.

The "spoon-shaped" bottom was recognized by the late 1910's as being the most serviceable for all purposes. (Figure 5.1d) It provides the greatest depth about twelve or fifteen feet from the end wall, where the depth is most needed for safe diving. The shape also aided in the drainage process, allowing the draining to occur in

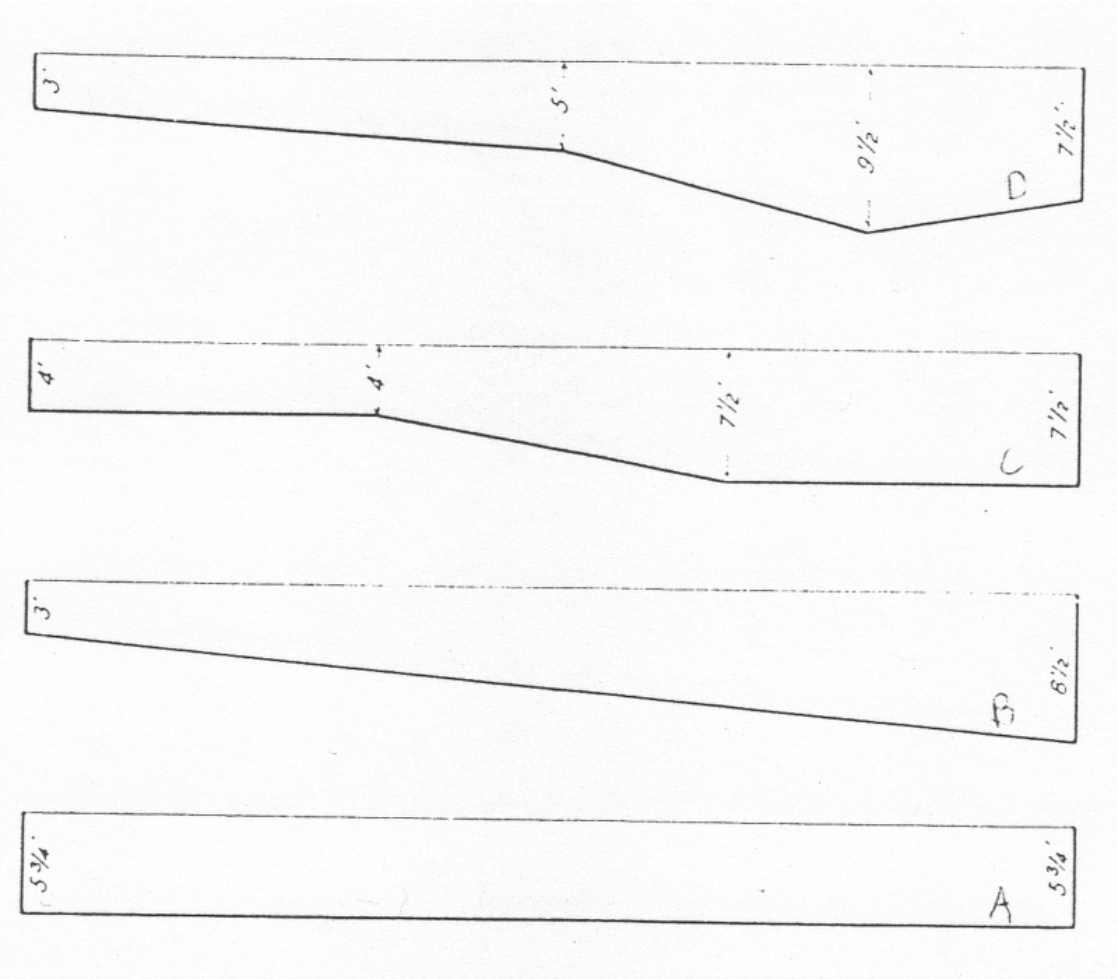

Figure 5.1: Four Different Types of Bottom Slope and Contour

Source: Associated Tile Manufacturers, *Swimming Pools*, Beaver Falls, PA: The Associated Tile Manufacturers, 1917, 16.

a very short time. Finally, this shape conserves water because its angular or, in many cases rounded, contours provide deep water only where it is needed and not at the edges.[187]

The 1926 Joint Committee report says only that "the minimum depth of water in the deep portion of any public pool should not be less than five feet."[188] Since most of the indoor pools were used for a combination of swimming and diving activities, generally there is a shallow end (less than five feet) and a deep end in rectangular

[187] "Suggestions for Swimming Pools, Beaches and Showers," 8.
[188] Joint Committee on Bathing Places, 1927, 25.

pools. The Intercollegiate Swimming Rules, recommending a depth of not less than three feet in shallow areas and at least seven feet at the deepest point.[189]

Most pools had a depth of over seven and one-half feet, with a maximum of ten feet. Eight feet was the least depth where diving contests were to be held. This also facilitated the playing of water polo which require a playing area over six feet deep for a majority of the pool length so that players cannot touch the bottom.[190]

The drainage assistance that the contour of the pool bottom could give was exceedingly important to pools, particularly those which used fill and draw type circulation systems rather than recirculating filtration. Bottoms which were sloped toward drains assisted in the draining of the tank for cleaning and sanitation. In some pools a single drain is located in the center, while in others it is near one of the sides. Larger pools are generally provided with two outlets at varying points.[191] Regardless of the number of drains, if the bottom was sloped improperly, draining could be a difficult process.

Even as early as 1919, the California State Board of Health publications began advocating the "spoon shaped" bottom as both a health and utility measure. In addition to providing areas suitable for springboard diving, the gentle contour of the shape was recommended in order to provide "protection against inexperienced swimmers slipping if they chance to walk off the flat slope."[192]

By the late 1930's, indoor competition pools generally varied in the 'spoon' shape.' The depth could vary from three to three and a half feet at the shallow end to at least eight feet at the deep point for a one meter springboard, and nine to ten feet

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[189] Associated Tile Manufacturers, 16.

[190] Associated Tile Manufacturers, 16.
[191] Associated Tile Manufacturers, 15-16.
[192] Clapp, 26-27 quoting from California State Board of Health, "Sanitation of Swimming Pools, " *Bulletin No. 32*, May 1, 1919, 6.

deep for a for a three meter board.[193] By 1939, these standards had been changed to recommend a depth of ten feet for one meter board and twelve feet for a three meter board. The maximum depth was to be carried from the end of the pool inward to a length of twenty-five to thirty-six feet.[194] As for the wading or shallow end, a slope of not more than one foot over fifteen feet[195] was advocated, though there was some belief that a one to twenty ratio was safer. [196]

Following the planning and design of the pool basin, which includes other architectural and engineering factors, are those elements comprising the actual construction of the pool tank. As noted in Chapters One and Two, a number of different materials have been used to erect a swimming pool "tank" or basin. These materials include earth and wood, brick and stone, concrete and steel. During the study period, 1910-1940, the latter two materials, concrete and steel, were used almost exclusively in the construction of indoor pools.[197]

The typical type of swimming pool tank found in widespread use is the simple in-ground concrete basin.[198] These tanks, though heavily reinforced with steel, relied upon the surrounding earth for much of their structural support. These structures could be monolithic or sectional, the latter ones often displaying elaborate schemes for expansion joints. Often the surrounding decks were cantilevered from the wall structure, with contiguous reinforcing extending from the wall to the deck. The result was a tank designed to handle the considerable compression problems inherent in pool building while providing a water-tight structure which could be finished in any one of a number of ways to provide a smooth, hygienic swimming pool.

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[193] Day and Stedman, 7-8.
[194] Luehring, 103.
[195] Luehring, 95.
[196] Day and Stedman, 7.
[197] Atherton, 12.
[198] "Swimming Pool Construction," 622.

The poured concrete was often formed using custom-built wood or steel forms. The principal concern during construction was to avoid faults arising from the sectional nature of the forms and the need to place of concrete within these forms sequentially, leading to the potential for future leaks. Elaborate measures were sometimes taken to insure that there would be no air pockets in the concrete. These pockets, when found, had to be filled properly or there would be the risk structural failure or leakage.

The concrete used in the construction of in-ground concrete pools consisted of one part standard or white Portland cement, two parts clean sand ,[199] and between three and four parts crushed gravel aggregate, sized from ¾ inch to 1¼ inches.[200] Water "pure enough to drink" was added to the dry ingredients and machine mixed only until it was workable,[201] as established through on-site slump tests.[202] Despite the satisfactory performance of the above mixture in terms of its waterproof capabilities, 2½% to 5%, by volume, of hydrated lime was often added as an additional safeguard.[203] By the 1920's the use of so-called "waterproof Portland cement" was widespread as an added measure.[204]

Poured concrete tanks contain several major components: footings, walls, bottom (or "floor"), different seams and seam materials, and overflow troughs. The footers, which supported only the walls and not the floor, were generally 12 to 18 inches thick and were placed at the perimeter of the area that was to be the pool

[199] Foster, 1; This is confirmed in R.E. Withrow, "Look To The Concrete in Your Pool! Highest Grade Materials, Correct Mixing, Proper Design of Reinforcing and Adequate Footings Essential to Good Construction," *Beach and Pool*, Vol. II, No. 7, July, 1928, 10, who adds that the sand should be of 3.00 Fineness Modulus. The proper proportions are contradicted in Day and Stedman, 15, which states that 2½ parts sand is the appropriate amount.
[200] Foster, 1, says three; Day and Stedman, 15, suggests 3½; and Winthrow advocates 4 parts gravel or stone aggregate of 5.50 Fineness Modulus; Associated Tile Manufacturers, 18, suggests a 1 to 2 to 4 ratio of Portland cement, clean sharp grit sand, and gravel, hard trap-rock or granite.
[201] Foster, 1.
[202] Day and Stedman, 15.
[203] Day and Stedman, 15.
[204] Withrow, 1, 10.

floor.[205] The walls were generally about ten inches thick from the bottom to a point about 16 inches from the top. This top sixteen inches was widened toward the exterior to provide enough area for an overflow trough. The walls often were formed using one inch smooth lumber supported by 2 by 4's or through the use of steel sheets bolted together. After World War I, the use of plywood in forms was advocated because of the smooth finish that resulted.[206] The floor of the pool was to be between five and eight inches thick,[207] with six inches being the optimum thickness.[208] The use of a steel reinforcing mesh or ¼ inch steel rods was suggested to provide the floor with protection against temperature stress and minor settlement.

For pools of unusual size or length, the concrete was poured in sections. If a wall was more than 100 feet long, it was usually separated into sections of equal lengths which were then connected by a copper sheet which covered the joints between the sections from the bottom of the wall to the top, and was placed in the joint between the two slabs. The copper between the slabs was bent to form bellows or "V" so that as the concrete expanded and contracted, the bellows would open or shut to form a seal. Asphaltic or bituminous compounds were frequently employed instead of copper do due the latter's expense. Painted sheet steel and galvanized iron were also used in place of the copper, but the results were often highly unsatisfactory.[209]

The wall forms remained in place for at least three days after the concrete had been poured. After their removal, all cavities in the wall are filled with a mortar mixture consisting of one part Portland cement, two parts sand and enough water to make a stiff, but workable mix. In some cases, a brick backing was used inside the

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[205] "Swimming Pool Construction," 622; Withrow, 1, 10.
[206] Day and Stedman, 15.
[207] Day and Stedman, 14.
[208] Foster, 1.
[209] Karl B. Weber, "Design, Cost, Equipment and Other Details of Pennsylvania's Most Modern Pool,—North Park Pool, County of Allegheny," *Swimming Pool Data and Reference Annual*. New York: Hoffman-Harris, Inc., 1938, 27; Winthrow, 11.

shell to provide an additional waterproofing course. When this occurred, a layer of waterproof cement plaster is placed over the brick surface to at least an inch in thickness to provide a proper surface for finishing.[210]

The floor of the pool was divided into areas of not more than 30 x 50 feet through the use of expansion joints. The joints consisted of copper filled with bitumen[211] or of bitumen, tar or asphalt only to prevent leakage. The same material used for these joints is used to seal the joint between the floor and the walls and footings. In this case, a beveled, oiled board was placed between the wall on top of the footing and the floor area before the floor was poured. After the floor had cured, the boards were removed and the asphaltic or bituminous compound poured into the void.[212] In addition, the compound was also usually painted on the tops of the footings the floor concrete is placed.[213]

Overflow troughs were formed as an integral part of the walls during this time, extending around the entire perimeter of the pool.[214] There were two basic types: the wall or deep type and the broad or roll-out type. The wall gutter had been in use longer, since the early twentieth century, but by the late 1930's the "roll-out" gutter had been standardized for use in YMCA's and was very frequently used in pool construction. (see Figure 5.2) The shallower profile of the roll-out allowed for a higher water level relative to the deck surface and, therefore, made it easier for swimmers to exit the pool. On the other hand, the wide surface of the roll-out made it a significant trip and slip hazard.

Scum gutters were designed to serve five functions. They were to evacuate floating substances and debris from the water surface via drains installed in the

[210] Associated Tile Manufacturers, 17-18; "Swimming Pool Construction," 623.
[211] Day and Stedman, 14.
[212] Winthrow, 11.
[213] Foster, 1-2.
[214] Associated Tile Manufacturers, 22; Joint Committee on Bathing Places, 1927, 26; "Suggestions for Swimming Pools, Beaches and Showers," 8.

gutters. When a swimmer caused splash-over into the gutter, the water was removed from the tank. Secondly, they regulate the depth of the water. Thirdly, they acted as cuspidors, providing a place for expectoration that would not return to the pool tank. Fourthly, the front or "dam" portion of the gutter forms or supports the ubiquitous "life rail," a hand hold provided around the entire perimeter of the pool to assist tired swimmers in maintaining a grasp on the wall. Finally, the top surface of the gutter structure usually protruded above the surface of the adjacent deck, forming a curb which prevented the introduction of deck dirt and debris into the pool tank.[215]

Regardless of the type of integral gutter, the formwork to create them had to be precise. In order to ensure equal functioning of the drains within the gutters, the water lip of the gutter had to be absolutely level. For this, a water level consisting of a piece of hose and two glass tubes was often used. Also, it was important to place the gutter drains and pipes properly, about every ten feet, before the wall concrete was poured, as they were to be formed in the wall. The gutter bottom was to pitch slightly toward

[215] Atherton, 27; Associated Tile Manufacturers, 22.

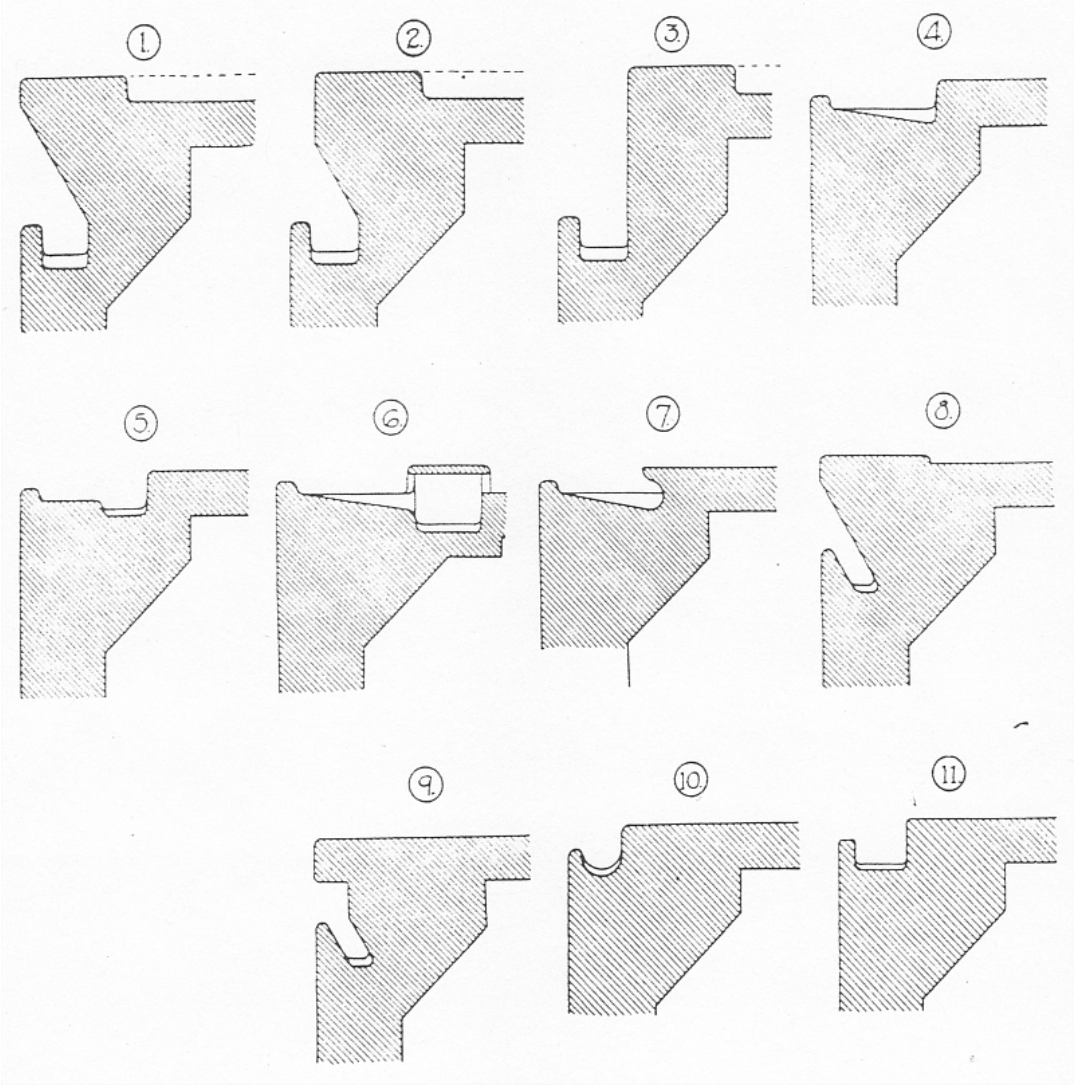

Figure 5.2: Different Types of Perimeter Scum Gutters. Numbers 4 and 7 are of the roll-out type.

Source: Eichelman, William H. "Designs, Contours, Survey." *Notable Pools and Guide to Equipment and Supplies*. New York: Hoffman-Harris, Inc., 1933, 84-87.

each of these drains to aide the evacuation of waste water.[216] The gutters were either rubbed with carborundum stone to produce a dense and rough surface (necessary for

[216] Day and Stedman, 15, 17.

avoiding slippage while swimmers climb in and out of the pool), or they were clad with one of several finish materials, most often tile.

Concrete tanks were sometimes given additional surface waterproofing to supplement that afforded by integral methods.[217] This usually involved applying to the walls and floor alternating layers of hot pitch, tar or asphalt, and felt, to at least a four-ply thickness. Alternate layers of burlap and asphalt to about an inch thickness were also used with some success. Over this was spread a coat of waterproof cement, then a two or three inch layer of reinforced concrete (also called a leveling coat). On top of this were placed the chosen finish materials.[218]

Though the poured concrete tank was the most common, another method of building pool shells was used during the 1930's. This method was called gunite[219] and, when applied properly, had few of the leakage problems associated with poured tanks. Gunite, first introduced around 1912, found its earliest use in the construction of damns, canals and reservoirs.[220] The application of gunite involved the mixing of aggregate and cement together under pressure. The sand-cement mix was carried through a series of cylinders to ensure adequate distribution of the material constituents. Only as the sand-cement was leaving the spray nozzle was water—in spray form—added. In this way, gunite could be applied directly on to surfaces without the need of forms.[221] Not until the 1930's did gunite become widely used in

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[217] Day and Stedman, 15, recommend that any pool that was to be lined with tile or other non-cementitious materials should be water proofed. They recommend further that the iron oxide method for waterproofing be used in place of the membrane method, but they are not specific as to what this iron oxide method consists of.

[218] Associated Tile Manufacturers, 17-18.

[219] Anne T. Sullivan, "Shotcrete," *Twentieth Century Building Materials.* New York: McGraw-Hill, 1995, 102 – 107. Gunite is a common name which applies to various forms of wet and dry-mix application techniques for monolithic concrete. See Anne Sullivan's article "Shotcrete"

[220] Earl K. Collins, "Construction and Repair of Swimming Pools by the Pneumatic Pressure Method. Accompanied by Detailed Construction Costs and Subsequent Operating Expenses.," *Swimming Pool Data and Reference Annual*. New York: Hoffman-Harris, Inc., 1938, 14.

[221] Collins, 14; He writes, "The machine which is utilized is operated by compressed air and is equipped with two chambers,—upper and lower. Preparatory to application, the sand and cement are mixed dry. And in this dry condition the intermingled materials are introduced into the upper chamber, which is

pool construction, due in part to the lack of knowledgeable application technicians. Gunite had several advantages over poured, formed concrete. There were no forms to construct or disassemble because the concrete mix is applied onto the surrounding earth, which acts as a form , and no expansion joints were necessary.[222] Monolithic gunite also required lesser thickness than did poured concrete and avoided the complication of air pockets. As a result of these advantages, gunite gradually came to replace poured concrete as the material of choice for concrete swimming pools.

The other major type of pool shell during the 1910's to 1940 was the steel tank.[223] This type of tank was used most often in above ground facilities, particularly those which were on the upper levels of high rise buildings, although they were occasionally used in in-ground situations to prevent water infiltration and damage from settling. The purpose of the steel tank was to provide the structural support for a reinforced concrete shell which lined the inside of the tank.[224] The steel tank is, then, regarded as the container in which a more or less standard pool is constructed.[225] (see Figure 5.3)

The concrete inside the tank was reinforced and mixed in the same proportions as those for in-ground installations. The concrete inner shell was necessary to resist the pressure of the water. The steel acts in tension, supporting the concrete which is in

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alternately under pressure and free from pressure. From this upper position, the mix flows into the lower chamber. Then the motor drives the feed wheel, and this brings the material to the outlet point. At this point air is introduced through the 'goose neck,' and the air carries the mixed material through the outlet valve and hose to the nozzle. Here, at the nozzle, water (in spray form, rather than stream) is added, and results in hydration coincident with deposit."

[222] Collins, 14.

[223] Other types of shells were in use, but to a very minor degree. See, for example, C.T. Bridgeman, "Highlights of American's First All-Brick Pool," *Swimming Pool Data and Reference Annual*. New York: Hoffman-Harris, Inc., 1938, 34-35.

[224] Atherton, 12.

[225] Associated Tile Manufacturers, 17; William R. Shirley, "Underlying Principles of Design, Construction and Sanitation," *Swimming Pool Data and Reference Annual*, New York: Hoffman-Harris, Inc., 1937, 32; "Swimming Pool Construction," 622.

a compressive state. Over top of the concrete shell was placed the usual waterproof and finish linings, to be described below.

The steel tanks usually consisted of approximately 3/8 to 1/2 inch thick steel plates. At joints, the plates are lapped three inches over one another and riveted. Joints between the sides and the floor were covered with angle iron which was riveted to both the sides and floor. On the outside of the tank all seams were caulked. On the inside, all seams were electrically welded, forming a watertight tank. [226]

Reinforced concrete was installed on the interior walls and floor of the tank. The concrete was attached to the steel tank by virtue of its reinforcing bars having been wired to bent clips tack welded to the steel surface. (see Figure 5.4) The reinforcing rods also may have carried a reinforcing mesh over them to further stabilize the concrete. The reinforcing rods were extended up to the top of the tank and turned out toward the deck, so as to form the reinforcing for the scum gutter. The pipes and fittings for the gutters were formed into the concrete and extended through the steel side to the main drain line.[227]

In some cases, lead was placed over the concrete inner shell as a waterproofing measure. Over top of this lead lining, a multipart (usually four or six-ply) waterproofing membrane consisting of fabric in asphaltum was applied. Over this was applied either four inch common brick or a three inch layer of reinforced waterproof concrete, to prevent puncture of the membrane. Following the installation of the concrete and waterproofing, the surface of the concrete was finished in similar fashion to that of a standard reinforced concrete in-ground pool.[228]

Pool finishes involved the use of numerous different kinds of materials. Plaster, paint, brick and stone were all used to provide non-skid durable finishes inside

[226] Day and Stedman, 12; "The New Union League Club Swimming Pool," *American Architect*. Vol. 129, No. 2492, March 5, 1926, 373.
[227] Day and Stedman, 12; "The New Urban League Club Swimming Pool," 373-77.
[228] Associated Tile Manufacturers, 17; "Swimming Pool Construction," 623.

in the pool, as well as on the surrounding decks and service buildings.[229] These finishes were designed to provide a watertight, waterproof inner lining for the pool. This waterproofing was to aide the concrete (itself often waterproofed through the use of "waterproof Portland" cement in the concrete mixture, or through the addition of hydrated lime to the mix). The finishes, or linings, as they were often called, also included various markings necessary for the safe and useful operation of the pool, including depths, lengths, and lane or boundary markings.[230]

The most common finishes for indoor pools were tile (which was nearly identical in usage and availability as glazed brick, except in the area of mosaic design) and cement plaster.[231] Each of these are commonly found in pools built during the first decades of the twentieth century. Some pools were not provided with a finish

[229] Shirley, 32.
[230] Day and Stedman, 17.
[231] Day and Stedman, 17, mention the use of the following materials in lining concrete pools, both indoor and out: granite, marble, terra cotta, glazed brick, art marble, glass and tile. Cement paint was also in use by the 1920's following its introduction by Portland cement manufacturers. It was used primarily in outdoor pools, at rarely at best. See Frederick A. Bohling, "The Painting of Swimming Pools," *Beach and Pool Magazine*. Vol. IV, No. 3, March 1930, 42, 47, for more information.

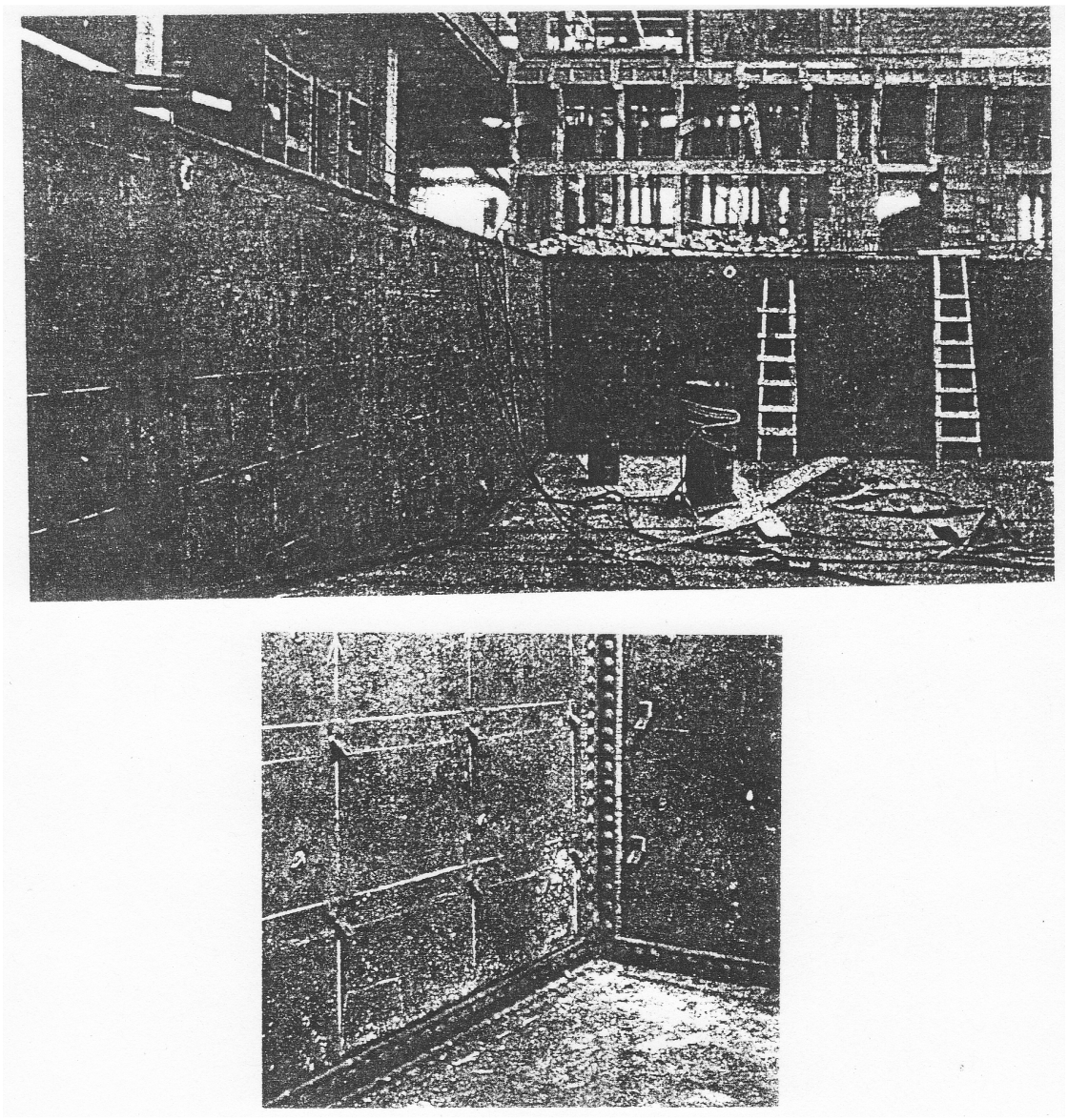

Figure 5.3: Steel Tank Used in the Construction of an Above Ground Swimming Pool and Detail of Corner.

Source: "The New Union League Club Swimming Pool." *American Architect*. Vol. 129, No. 2492, March 5, 1926, 373.

lining at all, but simply had the surface of their concrete shell rubbed to a dense, rough surface as a final finish. Decisions regarding the particular finish to be used were usually based upon a consideration of aesthetics and expense. Tile provided the

greatest range of choices in color, shape and patter, but was also the most expensive. A painted finish, on the other hand, offered little choice in color, but also added little cost to construction.

Tile was often mentioned as the preferred finish material because of the range of colors, choice of shape and length of durability.[232] By 1937, some 90% of pools that were lined made use of faience or ceramic tile.[233] Tile provided a solid, durable finish for the pool interior. Tile also offered a surface which is easily kept free of algae and dirt. The most commonly used tiles were two inch by four inch rectangular and one inch hexagonal. The hexagonal tiles were especially popular when patterns or designs in tile were desired. These hexagonal tiles were more expensive to install owing to their smaller size and the increased labor necessary to lay them. It was not unusual to find a combination of the two types.[234] In addition to the above mentioned tiles, many sizes and shapes were available and in use during this time.[235]

The colors of tile and enameled brick that were chosen were usually light (white, cream or light blue) not only to provide contrast with marker lines which were normally dark, but because it was believed that the lighter tile's reflection of light aided in disinfecting the water.[236] These colors were also billed as non-fading, and impervious to the effects of light and chemicals, by virtue of the inorganic nature of their coloring. The use of color grew rapidly following the introduction of Ceramic Mosaic tile into pool use in 1908 with the construction of the pool in the Hotel Chamberlain in Old Port Comfort, VA.[237] In addition, different types of finishes were

[232] Joint Committee on Bathing Places, 1927, 25. The Joint Committee specifically recommends tile and glazed brick for indoor pools and white cement plaster for outdoor pools. Paint and asphalt surfaces are considered by them to be not satisfactory. See also Jack Hinman, Jr., "Problems in Swimming Pool Sanitation and Care," *Beach and Pool*. Vol. I, No. 7, July, 1927, 24-31.
[233] Day and Stedman, 17.
[234] Clapp, 20-22.
[235] Associated Tile Manufacturers, 6-14; ATM notes the following shapes and dimensions as being in use as of 1917: one inch squares, four inch squares, six inch by 3 inch rectangles.
[236] Associated Tile Manufacturers, 7.
[237] Associated Tile Manufacturers, 8.

available for the tiles, each creating a different reflection effect: bright glazed, satin, dull, and unglazed.[238]

Tiles are installed on top of several layers of cement plaster which are applied directly over concrete shell. The shell was usually roughened through the use of a mason's chipping hammer, cleaned using water under pressure and a wire brush, and wetted in preparation for the application of a 3/8 inch scratch coat consisting of one part waterproofed Portland cement and two parts clean sand. Before the scratch coat was dry, a 3/8 inch float coat was applied, providing the proper surface for the application of tile, which was to be set in a mortar bed of no more than one inch in thickness.[239] Following the installation of the tile, grout consisting of light gray or white waterproofed cement was applied to fill in the gaps between the tiles. Following the curing of the grout, the entire surface was washed and cleaned.[240]

Another common finish, and one which was much less costly than tile, is cement plaster, commonly known as a white coat. The materials used, a mixture of waterproof white Portland cement, marble dust and white sand, were designed to form a continuous waterproof surface over the entirety of the pool surface.[241]

Installation of the cement plaster was much the same as the preparation for the application of tile. The concrete shell was roughened, cleaned and wetted. A slurry of Portland cement and water was applied to the walls. The first or scratch coat was applied to a 3/8 inch thickness over the walls. This coat was then scratched to provide a key for the second or white coat, which was applied in the same thickness just after the scratch coat had hardened. After the walls were plastered, the floor was roughened, cleaned and wetted, and a slurry of Portland cement and water was

[238] Associated Tile Manufacturers, 10-12.
[239] Day and Stedman, 15.
[240] Associated Tile Manufacturers, 19.
[241] "Swimming Pool Construction," 622, also suggests adding 10% by volume of hydrated lime to make the cement plaster waterproof. This presumes that a waterproof cement is not being used in the first place.

applied. Following this preparation, a thick coat (up to two inches)[242] of the cement plaster was placed over the floor and extending up the walls several inches so as to overlap with the previously installed finish. The surface was then to be kept moist for at least a week while the plaster cured. This was usually accomplished by laying wet burlap over the entire pool surface and sprinkling water on it from time to time. Other types of cloth, as well as straw were also used for this task.[243]

Elements of construction engineering, when executed properly and conscientiously, resulted in well-built, watertight pools that were capable of lasting for decades in many cases. The pallet of materials used in tank construction was (and is) relatively limited in actual practice. While there were some developments—the introduction of gunite, for example—those technologies that existed in 1910 were basically the same as those found in 1940. In contrast to this limited pallet, there was a wide variety of materials available for use in the lining or finishing of the pools. Together, both construction and finish elements combine to form the public perception of a pool.

Moving beyond those elements which are visible to the average user, the types of mechanical equipment which service the pool can have a great impact on the usefulness of a facility and its appearance. These important pieces of the aquatic puzzle are often overlooked in the as having any real impact on the public perception of pools.

One of the age-old problems in bath and swimming pool management is the maintenance of water quality. Before the twentieth century, water quality was maintained—when it was attended to at all—through the constant introduction of fresh water from a spring or municipal water source. This method, called fill and draw,

[242] Clapp, 18-20, recommends two inches, but Day and Stedman, 15, clearly state that one-half to one inch is the appropriate amount.
[243] Clapp, 18-20; "Swimming Pool Construction," 622.

required that a certain amount of water be removed from the pool in proportion to the number of swimmers that had used it in a given day, this water being replaced by the fresh water. This system attempted to approximate artificially the still older form of flow-through circulation, which was part and parcel of floating and river baths by virtue of their placement in a natural body of water, with sides that were perforated to allow water to continuously circulate through the basin.

The difficulties with the fill and draw system lies were several. First, water quality in the pool was wholly dependent on the quality of the water source. If the water body or well from which water was draw became polluted, or the municipal water supply was at all unreliable in terms of quality, the effect on the pool was immediate and unavoidable. Second, by its nature a fill and draw pool required moderate use. These systems simply could not withstand a sudden jump in swimmers without a commensurate immediate decline in water quality. Thirdly, pools using this system required significant amounts of downtime for cleaning daily, and needed to be completely drained and cleaned several times a year. This would not only interrupt use, but, in the case of commercial pools, would result in a loss of revenue. Finally, the costs associated with the constant addition of water to a pool could make its maintenance unaffordable.[244]

By the late nineteenth century, the application of germ theory and study of bacteriological conditions in pool water demonstrated that the fill and draw system and its older cousin, flow-through circulation, were inadequate to the task of maintaining good, clear and clean water quality.[245] In their place was developed a system of implements which created a largely self-contained environment for the pool, recirculating and disinfecting the water through a series of apparati, allowing a

[244] Hinman, "Problems in Swimming Pool Sanitation and Care," 30-31.
[245] Luehring, 144.

previously unheard of consistency in water quality and remove the pools dependence on the quality of its water supply. By the turn of the twentieth century, the components of recirculation, filtration and disinfection systems were largely already in place, though use of fill and draw circulation did persist throughout the study period, particularly in YMCA's and private residences.[246]

The basic recirculating process was generally as follows:

1. Fill the Pool.
2. Draw water from the pool through outlets at the deep end.
3. Draw the water through a strainer/hair catcher to remove any large debris.
4. Expose the water to a coagulant so as to remove through precipitation any organ or other materials in suspension.
5. Send the water through a filter to remove the coagulant floc.
6. Disinfect the water.
7. Return the water to the pool through the inlets.

In addition to these steps, arrangements had to be made for the introduction of additional fresh water to compensate for splashout, cleaning of the filter units and draining of the entire pool and recirculation system.[247]

In order to produce the necessary functions within a recircultion system, a series of equipment was necessary. The basic components of a system were: an electric centrifugal pump, strainer, coagulant and water balancing apparatus, filters and a disinfection unit. In addition, water heaters (gas, oil or electric) and water softeners were also often provided.[248]

While beyond the scope of this work to address all of these components and their various complexities, it is important at the very least to understand the options

[246] Charles A. Scott, *The Essentials of Swimming Pool Sanitation.* Rev. Ed. Chicago: Follett Publishing Co., 1933, 4.
[247] Luehring, 144-45.
[248] Luehring, 145.

available at the time with regard to filtration and disinfection. These two elements, more than anything else with the exception of the introduction of the electric centrifugal pump, were responsible for the success of the recirculation scheme.

Between 1910 and 1940, there were two basic types of filters in widespread use in the United States: gravity sand and pressure sand. While the pressue system was a newer evolution of sand filtration technology, each of these was based upon the notion that moving water through course and fine sand could remove debris and impurities coagulated in a floc.[249] Both of them contained the three necessary components of a filter: a shell so equipped as to distribute influent and collect effluent, filter media, and the means to clean the filter media.[250] The essential difference was that whereas gravity sand depended on the action of gravity in moving water through the sand in a large settling tank at a relatively slow rate (.03 to .16 gallons per square foot per minute), pressure sand pushed water through the sand at a high rate (3 gallons per square foot per minute) and under pressure.[251] By the late 1930's, gravity sand filters were specifically recommended against by various industry groups because of their inability to provide rapid enough turnover of pool water to maintain reasonable water quality in terms of clarity and cleanliness.

Pressure sand filters, which comprised some 80% of filters in use by the late 1930's,[252] were tanks which contained a filter media (usually sand and gravel), a method for the introduction of water at the top of the media. The tanks were usually of steel plate with riveted and welded joints.[253] There was generally at least thirty-six inches of filtering media: twenty-four inches of sand and twelve inches of crushed

[249] Actually, as would be revealed following World War II, the coagulating had less to do with cleaning the water than did the actual mechanical filtration.
[250] Frank Wilkinson and F.J. Forty, *Swimming Bath Water Purification From the Public Health Standpoint.* 2nd. Ed., London: Contractors' Record, Ltd., 1934, 45.
[251] Hinman, "Problems in Swimming Pool Sanitation and Care," 31.
[252] Luehring, 153.
[253] Wilkinson, 46.

gravel or quartz. Water was introduced at the top of the media and forced, under pressure, through it. The debris and floc was, therefore, trapped toward the top of the media, with filtered water pushed out the bottom. Pressure sand filters were installed in batteries of at least two complete units which could be cleaned independently through process called backwashing.[254] Pressure sand filters took up considerably less space than did the large pits necessary for gravity sand, which, by virtue of the slow progression of the water through the media needed a large surface area to provide reasonable flow.[255]

In addition to filtration, disinfection was also highly important in the maintenance of water quality and, therefore, the usefulness of a facility. Of the several types of disinfection available, those involving chlorine were by far the most widely used. There were two types of chlorine-based disinfection: chlorine gas or chlorine in solution with water, and chloramine. Chlorine gas had been used in the United States since at least 1897 in the maintenance of municipal water supplies and was well-proven as a sterilizing agent.[256] Most commonly used in indoor pools, the chlorine was introduced as a pure gas directly to the water, or was mixed in solution with water which was then added to the pool. A liquid form of chlorine was also available, which combined sodium and chlorine together to form a more stable and safe, if less potent mixture.[257] Chlorine was also used in a powder form which was created by combining it with calcium to create calcium hypochlorite, a potent yet manageable form of chlorine.[258] Chloramine was a slightly less irritating mixture of chlorine and ammonia

[254] Backwashing is the process whereby the flow of water within the tank is reversed, so as to remove the debris and floc caught toward the top of the filter media and discharge it to a waste line. See Scott, 40.
[255] Luehring, 145-53; Scott; 38-41.
[256] Scott, 73.
[257] Luehring, 169.
[258] Also called hypochlorite of lime and bleaching powder. Trade names such as "HTH" began appear at this time for calcium-based products.

that was used in large, outdoor swimming facilities. It had a slower disinfecting action and was apparently not widely used in indoor facilities.[259]

In addition to chlorine, there were a number of other methods of disinfection which were in use to one extent or another during this time. The silver method, which depended on the katadyn or "oligodynamic" action of ionized silver had come into use as early as 1893, but its claims for germicidal action were never clearly demonstrated. The introduction of ozone gas also gained some popularity as a sterilizing agent but it, too, had dubious effect on water-borne bacteria.[260] Ultra violet rays had been in use since the 1910's, and were effective, but there effect would not be widely proved until after World War II.[261]

These methods of keeping the water clean, whether through circulation or recirculation, and with filtering and disinfection, had the effect of keeping water cleaner and the incidents of swimmer infection down. This opened pools up to even further use by quelling fears that members of the public may have had regarding the cleanliness of swimming pools. These sanitation elements, together with the proper design and construction of an indoor aquatic facility were responsible for creating the environment which, by 1940, contained all the elements of the modern swimming pool one might see in 1996 when viewing a new pool, as well as when looking to restore an old one.

The proliferation of pool building by educational institutions, municipalities and private clubs coupled with the rise in the popularity and standardization surrounding competitive swimming, resulted in improvements to the design, construction and hygienic maintenance of pools in the United States. In-ground land

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[259] Luehring, 168-69.
[260] A.F. Hinrichsen, "Water Purification by Ozonation," *Swimming Pool Data and Reference Annual*. New York: Hoffman-Harris, Inc., 1934, 28-29.Scott, 66-68.
[261] Luehring, 175-77; Scott, 62-63.

pools required different structural considerations than previous forms of pools, and also had to contend with hygienic and maintenance needs resulting from reliance on aquifer or municipal water supplies versus natural bodies of water. All these needs combined drove experimentation with then-new materials and methods, such as gunite, and the improvement of equipment resulting in, for example, the evolution of gravity sand systems into much more efficient and contained pressure sand systems. While the typical land pool being constructed in 1910 would likely have been pour concrete with either a draw-and-fill system or gravity sand, within just 30 years, the typical pool built in1940 was likely to be steel-reinforced gunite with pressure sand and a chlorination system for reliable disinfection. The reliability of the 1940 pool in terms of leak and structural problem avoidance and hygiene was substantially better than the 1910 pool, only furthering the interest in pool construction throughout the United States. From a building technology perspective, the 1940 is highly similar to pools being built even today, making the surviving older pools even more interesting from a historical perspective and revealing their potential compatibility with modern systems, making them ripe for restoration and reuse.

CONCLUSION

The twentieth century swimming pool, its functions, standardization, design and construction, are the result of a centuries-long evolution of medical knowledge, social movements and technology. Pools in the United States are reflections of a history limited not to the political boundaries of the American nation, but extending over tremendous geography to include Europe, Africa and civilizations of the East. More particularly, though, they represent the end result of over a century of effort on the part of social reformers concerned with hygiene and public health. They are in many ways presentations of historical battles, won and lost, over medicine, hygiene, health, recreation, standardization and technology.

Interest in segregating portions of natural bodies of water specifically for the purpose of bathing began thousands of years ago, often for religious reasons. As populations increased and the influence of religion made bathing a routine part of living, artificial basins and baths were constructed in population centers to provide for bathing needs that had heretofore been centered on natural bodies of water. The Greeks introduced the bath to their military training complexes for hygiene and exercise and training purposes. The Roman *piscina* is an example of the early class of public bath which was used for all manner of mundane and ceremonial activities. Over time, the functions of bathing facilities became more specialized, with entire complexes, like that at Caracalla, being built to provide amenities to the baths. Despite their popularity, the fall of the Western Roman Empire led to the eventual demise of bathing as a regular occurrence due to the loss of the necessary government personnel and financing to maintain the infrastructure that supported the baths.

By the tenth century AD, bathing had all but disappeared from Western Europe and would remain largely absent until the hygienic properties of water were

reintroduced through contact with Islamic peoples just before the Renaissance.. The seventeenth and eighteenth centuries saw renewed interest in the use of water as a curative agent in both Europe and the United States. This knowledge blossomed into hydropathy, a form of "medicine by water," by the late eighteenth century. In America, interest in hydropathy caused a "water-cure craze" wherein middle and upper class Americans began attending hotel-like water-cures in droves to care for any ailment they had. This almost comical obsession on the part of the wealthy with baths of all types provided the basis for the very positive public health and hygiene movements of the second half of the nineteenth century. The public health and hygiene movement was single-handedly responsible for the institution of bathing among the working class and poor in the United States.

At the turn of the twentieth century, with the goals of public health and hygiene reformers well on their way to fulfillment, sights turned toward bathing as recreation, or swimming. This change was very much in concert with the rising amounts of leisure time available to Americans during this period. Also, the creation of swimming clubs at educational institutions and clubs in England and the United States, coupled with the beginning of the modern Olympic Games in 1896, founded an interest in swimming not just as hygiene or recreation, but as sport. The interest in competitive swimming and diving, and water games caused the rethinking of what a bath was, what a pool was and how they should be designed to accommodate their functions. It is at this point, about 1900, that the bath begins to decline as a function type and the pool begins to come to the fore. The availability of indoor plumbing and the rise in interest for recreation led to a decline in the need for baths and a rise in the need for pools.

The first few decades of the twentieth century were a period of rapid growth in swimming as a sport and as a recreational activity.

Practices in design, construction and equipment demonstrate the wide variations that can be found even when dealing with a relatively limited corpus of functions and materials. Despite the variety of designs and materials that could be used—steel, concrete, brick, stone, plaster cement, paint, etc.--indoor pools were almost always rectangular, constructed using a reinforced concrete shell and lined with tile or glazed brick, filtered with pressure sand filters, and disinfected with chlorine. The perimetrical scum gutter was ubiquitous. This consistency in general design (though not specific dimensions) is the very real result of the sport and Joint Committee recommendations that occur during the first half of the study period. The introduction of disinfecting agents may be viewed as the final step in a process whereby baths brought hygiene to the masses, their popularity caused a rise in recreational swimming and, therefore, pools, and finally hygiene was brought to the water of the pools in the form of chlorine and other chemicals and methods.

The pools of 1910-1940 were baths revised and revised again, each time to incorporate a new or additional set of functions and technologies. These pools were the result of social activism, prosperity giving rise to leisure, technology and sport. They represent so much of what society in the United States was and still may be. Above all, these pools should be treated as cultural artifacts, preserved and sensitively modernized only when necessary. That said, the essential modernity of the construction techniques and materials in use during 1910 – 1940 makes it possible, even practical, to properly renovate and use or reuse these pools for their intended purpose. The materials, methods and equipment in use then are so similar to the present-day, that the level of understanding and skill necessary to preserve them should be available.

This study has been limited to the understanding of the development of pools as a function of elements of western culture, hygiene, political and sports movements.

Limited time prevented the more thorough investigation of baths and pools in non-Western cultures and non-Western influences on the development of bath and hygiene movements in the United States. Further, this study lacks substantial field work, which would enhance information taken from the historical literature with the point of view of individuals who built or used noted facilities, and even provide updated evidence of current conditions for these sites. And while focus was placed on competitive swimming as a primary design driver, considerations for patron safety were certainly a major force which deserves further study. Additionally, thus study as focused on typical construction methods and equipment found during the early 20th century. There are ample examples of atypical methods and approaches being used, many of which warrant further study.

Future analysis of this subject needs to include preservation methods for these structures. Their unique situation, often involving complete ground contact coupled with submersion for decades on end, creates preservation challenges which, while related to the general subject of concrete stabilization and preservation, pose specific challenges. Analysis of the relationship between hygiene movements and Protestantism would be another interesting vein of exploration. Finally, much more work can be done on the impact of military training and experience on the burgeoning interest in swimming, especially post World War II.

This study aims to set the stage for greater understanding of bath and pool facilities in the United States as technological and cultural microcosms. Their direct descent from early hygiene and religious movements unpins their importance as targets for documentation, preservation and reuse. The surprising continuity in building and sanitation methods through to the present day makes their preservation in-reach.

APPENDIX I

Dimensions of College and University Pools in 1927[262]

Allegheny College	60x22	Notre Dame University	60x40
Amherst College	75x25	Ohio Weslyan University	48x20
Boston University	-	Oklahoma A&M College	60x20
Brigham Young University	60x25	Oregon Ag College	100x50
Brown University	75x25	Pacific University	60x30
Carnegie Technical College	75x35	Peabody College	60x24
Case School	60x20	Princeton University	75x25
Catholic University	60x20	Purdue University	60x30
Clemson College	60x21	Rensselaer Poly Tech	75x30
College of Detroit	60x20	Rollins College	330x40
College of the City of NY	75x28	Rutgers University	75x24
Columbia University	75x35	Springfield College	60x20
Dartmouth College	75x30	Stanford University	100x40
Denison University	50x20	Stevens Tech	60x20
DePauw University	60x25	Swarthmore College	75x25
Drake University	60x20	Syracuse University	90x30
Fordham University	75x25	The Citadel	60x20
Georgia Tech	60x20	Thiel College	75x25
Gonzaga University	60x20	Union College	75x28
Grinnell College	60x20	U.S. Military Academy	80x40
Hamline University	60x20	U.S. Naval Academy	150x60
Indiana University	88x30	University of Buffalo	60x20
Iowa State College	60x30	University of California	300x60
Johns Hopkins University	60x30	University of Chicago	60x30
Kansas State Ag. College	62x30	University of Cincinnati	60x25
Kansas University	50x20	University of Florida	150x32
Lafayette College	75x25	University of Georgia	70x23
Lehigh University	75x25	University of Illinois	75x25
Loyola College	75x25	University of Iowa	150x60
MIT	60x20	University of Michigan	75x30
Michigan State College	90x30	University of Minnesota	60x25
Michigan State Normal	60x20	University of Nebraska	60x20
Monmouth College	80x20	University of Oregon	60x30
New York University	75x25	University of Pennsylvania	75x30
Niagara University	60x30	University of Pittsburgh	60x30

[262] "Swimming is Popular Sport in American Colleges," *Beach and Pool*, Vol. I, No. 5, May, 1927, 20-21.

APPENDIX 1 (CONTINUED)

University of SC	60x20	Washington and Lee University	70x25
University of Utah	60x30	Washington University	75x36
University of Virginia	75x30	Williams College	64x20
University of Wisconsin	75x20	William and Mary College	-
Utah Ag College	60x40	Wooster College	50x20
Vanderbilt University	60x40	Yale University	75x30

APPENDIX II

Excerpts from Walter Atherton's "Development in Swimming Pool Construction" in *Beach and Pool*, Vol. I, No. 4, April, 1927, 11-12, 26-27.

Artificial swimming pools may be divided into two classes: Large open-air pools, principally used in warm weather; and indoor pools located within covered structures moderately warmed during the cold season to provide continuous use. These pools are not intended for cleansing purposes, but for the healthful exercise of the body, also affording amusement and recreation . . . .

The indoor pools, in construction and operation, have shown in recent years very interesting developments.

They are usually built in the basements or first stories of buildings, with the floor of the pool resting on the ground, generally the most convenient locations. Swimming pools are sometimes located in the upper stories of buildings; these offer no engineering problem of unusual difficulty.

The early pools in this country were usually built with walls and floors of concrete or masonry—the waterproofing dependent upon the thickness of the concrete or upon an inner lining or membrane of waterproof material.

Some pools are constructed by building a large steel tank, lined with waterproof material, concrete and brick, this receiving a surface of enameled brick or ceramic mosaic. Marble and glazed tile are also used. Where pools are constructed in an upper floor of buildings, the use of the steel tank is often adopted . . .

In the construction of swimming pools, modern methods have exerted their influence. The use of reinforced concrete has strengthened the walls as a saving in space and material. The waterproofing of the interior by means of tar, asphalt and layers of felt laid in asphalt, tar or similar product, is called the Membrane System . . . .

The floors of our earlier pools had a straight incline from the shallow to the deep end, steps of marble or other material leading from the edge to the bottom of the pool; and for the protection of bathers, a metal pipe or life rail was fastened just below the edge of the pool.

The water was introduced into the pool usually at one end and remained in the pool a short time (one, two or more days depending on condition) when, owing to its impurities, it was discharged to the sewer. In cold weather, this water had to be heated: either by introducing steam through pipe coils laid along the side or bottom of the pool; or by introducing live steam blown directly into the water through the side walls; or by introducing live steam into the supply pipes, which allowed the water to enter the pool warmed; or by heating water in large tanks prior to its introduction into the pool or again by passing through a generator with the same result . . . .

. . .The introduction of the filter brought about a marked improvement. The water from the pool, instead of passing to the sewer, could be forced through a filter which removed all impurities, permitting this water to be returned to the swimming pool. . . A pump, preferably of the rotary type, circulating the water from the pool through the filter and back to the pool, made the introduction of new water unnecessary. In this operation, there is opportunity for the introduction of alum, soda ash and hypo-chloride of lime, which has effect of bleaching or removing the coloring matter and at the same time sterilizing the water. . . . The water, in its circulation also passes through heating tanks or generators, thus entering the pool properly warmed for the bathers. .

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GLOSSARY

Aquae: water areas

Bains vigier: an early type of French floating bath

Balnae: warm baths

Balneal: pertaining to bathing

Balneary: bathing place; balneation is bathing

Basin: a moderate-depth pool for swimming

Bath: a body of water or a moist environment (sauna, etc.) used for hygienic, therapeutic or ceremonial purposes. Until the mid-nineteenth century this term was often used as a synonym for pool.

Bather: one who makes use of a bath. According to Luehring, 234, "[t]his term is much misused in the literature on the swimming pool. The term bather is derived from the word bathe, which means to wash or immerse. The term bather is functionally inappropriate for a swimmer or pool user. Bathing for the purpose of cleansing of the body of for the purpose of cooling off the body after vigorous muscular activity should be thoroughly accomplished before entry into the pool in order that the utmost of cleansing may precede swimming, and the contamination of the pool water thus be reduced to a minimum."

Caldarium: hot bath room

Calida lavatio: hot water bath

Circulation: an open system wherein fresh water is introduce and waste water is evacuated not to be recovered.

Clepsydra: water flow measuring device

Cupola: spherical or domes roof developed for thermae fill and draw, a type of circulation system wherein dirty water is drawn out (by gravitational or mechanical means) of the pool and fresh water introduced.

GLOSSARY (CONTINUED)

Floating pool or bath: a barge or boat containing a center section that is below water level and containing water using either natural or mechanical means to create circulation in the tank.

Frigida lavatio: cold water bath

Frigidarium: cold plunge bath room

Heliocaminus: open-roofed sunbathing pavilion

hydropathy: treatment of disease with water

Hygeia: Roman goddess of Health

Kolymbethra: baths associated with Greek gymnasia or palaestra

Labrum: warm water bath or shower

Laconicon: sauna

Lavatorium: wash room

Natatio: swimming bath

Natatorium: a swimming pool with accommodations for spectators

Palaestra: gymnasium or wrestling school

Piscinae: shallow bathing ponds or pools

Plunge: a deep pool of varying dimensions designed for diving

Pool: an artificial body of water wherein the water is periodically filtered and disinfected. Usually used for sport or recreation.

Recirculation: a closed system wherein waste water is withdrawn from the pool, filtered, (usually) disinfected and (sometimes) aerated, then returned to the pool.

Solarium: sunbathing parlor

Sudatorium: Turkish sweat chamber

Thalassotherapy: medical seawater pool treatment