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The Water Tower:
A New Image in the Urban Landscape

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by
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Abstract

Infrastructure creates much of the visual urban landscape yet its aesthetic value is overlooked in our society. The water tower is an example of a highly conspicuous object that lacks an apparent aesthetic strategy and is often stigmatized with a negative connotation. This connotation parallels the trend of urban decay as the problems are closely linked. Infrastructure, along with the city, has been abandoned for the increasingly private, domestic, and isolated domain, yet the problems associated with urban environments and infrastructure only get worse with neglect. Urban systems have experienced the beginning of a reversal in this trend and the water tower is identified here as an object that can be utilized to create a scripted aesthetic within the urban environment that contributes to an improved sense of place and a memorable landscape for the city.
To my thesis faculty chairs, Michael McInturf, Gordon Simmons and John Hancock for their guidance

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Abstract

Infrastructure creates much of the visual urban landscape yet its aesthetic value is overlooked in our society. The water tower is an example of a highly conspicuous object that lacks an apparent aesthetic strategy and is often stigmatized with a negative connotation. This connotation parallels the trend of urban decay as the problems are closely linked. Infrastructure, along with the city, has been abandoned for the increasingly private, domestic, and isolated domain, yet the problems associated with urban environments and infrastructure only get worse with neglect. Urban systems have experienced the beginning of a reversal in this trend and the water tower is identified here as an object that can be utilized to create a scripted aesthetic within the urban environment that contributes to an improved sense of place and a memorable landscape for the city.
Our contemporary mind frame might prefer an infrastructural network that operates silently and invisibly, beyond the public view. Because it often does this, it is easy to forget that infrastructure replaces a previously human burden: instead of carrying our water, it is carried to us; instead of finding our own way, we use a cross-walk, a paved road, a scheduled train. Our infrastructural networks are the mechanical/technological representation of the work we do with nature. As Russell says, “Infrastructural networks are constitutive parts of the urban; they are the physical mediators that make the transformation of nature into city.”

We do not have time to be an urban society without the compliment of urban infrastructure. A highly articulated Infrastructural network reflects the articulation of its host community. The orchestration of transportation and communications systems, water and power lines, and public institutions sustain our survival both in the natural environment and as a complex society. We depend upon infrastructure to support the physical and social relationships between society and nature. If public infrastructure is capable of doing the work, is it necessary to remain conscious of the workings? Is it helpful to remember that electricity isn’t generated at the light switch? If it is too expensive to hide our public infrastructure from ourselves, does it have to look pleasant?

Infrastructure imprints the visual landscape to varying degrees and can be classified by the impact it has on the urban setting. It may be hidden from view completely, like underground piping and invisible radio waves. However, the presence of infrastructure may not be immediately apparent. Some systems exist out of sight, in a form such as radio waves, but have large singular structures in their broadcast towers or satellite receiving stations. Other systems are concealed, usually hidden underground, but occasionally emerge as conspicuous protrusions in the urban environment. The water system, with its hydrants and water towers, exemplifies the sporadic appearance of a predominately unseen infrastructural system. According to Graham, “these visual indicators connect the urban consciousness with its subconscious regulating system, the bulk of the material, economic, and geopolitical fabric of contemporary cities. As capital that is literally ‘sunk’ and embedded within and between the fabric of cities, [infrastructure systems] represent long-term accumulations of finance, technology, organizational, and geopolitical

power.”

The monetary, technological, and political values of an urban infrastructure can be measured separately from its aesthetic value as an image. A piece of infrastructure often meets its intended purpose without the consideration of its visual impact. Often, in the absence of adequate foresight, that impact is usually regarded as a blemish on the urban fabric. If financially feasible, governments and community authorities respond with the burial and concealment of urban infrastructure where possible. Nevertheless, the infrastructure necessary in a city affects the urban landscape to a degree that cannot be ignored. Public infrastructure often encroaches the visible environment as the arbitrary result of unplanned necessity. The analysis of its visual role is the primary task of the following research.

When possible, the concealment of infrastructure prevents its distraction from other aspects of the visual environment. In many cases, visual engagement cannot be avoided based on physical requirements, i.e., bridges, overpasses, lampposts, water towers, antenna towers, bus/subway/airport terminals, water treatment facilities, landfills, recycling facilities, etc. When exposed, it should appear as ordered and clean as possible because it represents the functional workings of the community. At the least, it should be a sign of healthy operation.

A hierarchy of visual importance can be applied to the placement and therefore the display of public infrastructure according to its distance from the urban center, the scale of the visible structure, and its public significance. The symbolic impact of the infrastructure declines with its distance from the urban center. A denser environment demands an increased precision in the placement of exposed infrastructure. On the outskirts of the community, the larger spatial expanses buffer its brunt. If its social role is predetermined, as in the case of bus terminals, train stations, and airports, a piece of infrastructure usually exists in the realm of traditional architectural projects which create enclosure, serve as physical shelters, and organize and direct human movement and experience. A hierarchy of visual importance favors these infrastructural types as the most significant because they are most intricately involved in the social mechanism. At the same time, large singular structures that do not occupy the social realm can command a great deal of attention from the visual field. Structures such as bridges, telecommunications towers, and water towers demand proportional attention to their role in the visible/physical environment.
As a product of human labor, Infrastructural networks embody a social ideology dependent upon the cultural framework. Their aesthetics speak consciously or unconsciously for the society or parts of society that create it. The government is usually the medium that communicates social concerns into public infrastructure. The elements of government administration that directly control the installation and upkeep of a community’s infrastructure usually follow financial instead of aesthetic imperatives. These two qualities are often divorced from each other, the monetary as conscious necessity and the aesthetic being the unconscious result of that necessity. Aesthetic and financial concerns often combat each other within the framework of our society. To many, the financial is allied with the practical and pragmatic. As Kathy Allen, a Cincinnati Water Works Administrator said in an interview with the author, “infrastructure is a utility, not a luxury, and the investment should be no more than the absolute minimum to meet the functional requirements.” The intent of this research is not to side against the practical use of public infrastructure, but to suggest that its conscious aesthetic response makes a difference to the individuals that interact within and around it.

3 Kathy Allen, telephone interview with author, February 15, 2005
01. PROCESS
Can Infrastructure be Considered Architecture?

When there is a need for infrastructure, the authority in charge of implementing the system will employ an engineer to the task. The design and implementation of infrastructure falls almost exclusively within the realm of the engineer and due to an often explicitly pragmatic motive, an architect’s aesthetic influence is most often undesirable. Because of this, infrastructure may be thought of as anti-architecture. Of course, it is unfair to both architects as well as engineers, to so narrowly define and generalize their roles. The commonality between the architect and engineer is that they are both designers. To design is to intellectually develop a plan of action that satisfies some given need or functional requirement. The distinction between the architect and the engineer is their specific role in the design process. The engineer is a technician who utilizes training in mathematics and science to achieve a physical solution that meets the functional requirements. The architect’s role is similar, but in addition he or she designs for the whole human while considering the greater social role of the design in terms of aesthetics. This introduces an entirely different set of influencing forces that cannot be calculated in a scientific manner. The architect must be aware of and respond to the social influences of symbols and signs in the context of a greater system of meaning. Quite simply, when engineers are solely responsible for the design of a piece of infrastructure, while they serve as guardians to the physical safety of the public, they do not address the public’s psychological well being nor do they respond to their ideological and social motivations. This critical element is being left out and manifests itself in our society in negative ways.

Quoting Aristotle, ‘A city should be built to give its inhabitants security and happiness.’ ‘The science of the technicians will not suffice to accomplish this. We need, in addition, the talent of the artist…It is only in our mathematical century that the construction and extension of cities has become a purely technical matter.’

Camillio Sitte, writing in the latter half of the 19th century, understood this dilemma, as this was a problem well before the nearly universal application of modern design’s obsession with a functional imperative in the first half of the 20th century.

The architect is the guiding force that organizes and coordinates a design and the engineer is a specialist or consultant within that organization.

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This is the general relationship between the architect and engineer when developing traditional works of architecture, i.e. buildings. But in the case of infrastructure, there is a major shift of scale, as well as a set of different professional roles that guide the process in lieu of an architect, that of the urban planner and urban designer. The piece of the overall design that is delegated to the engineer is of similar scale and scope as traditional works of architecture and often exists, especially in the case of the water tower, as a standalone element apart from buildings. Infrastructure is simply a mechanical system in the larger design project which is the city itself, for which no single architect is or can be the guide to its overall outcome.

While the task of designing and implementing infrastructure is rarely delegated to the architect, even less often we find a building constructed without the services of the engineer. The design of buildings is the core of the architectural profession, but the architect solicits the services of many consultants during the design and construction process. The architect may design the structure, but a structural engineer is consulted to calculate loads and recommend sizes for structural members. The architect may design the mechanical systems, but not without coordinating their implementation with a mechanical engineer, and so on and so forth with all of the systems of the building. Whether that structural or mechanical system is expressed, concealed, or highly integrated with other systems of the building, the architect makes aesthetic decisions while considering the expert advice of the consultants, i.e. engineers, who ensure the proper function of these systems. Designing a building is a very complex process, and the architect is the one that brings it together with a comprehensive aesthetic vision.

It may be true, that after many years of specialization in one building type or style, an architect can design all of these systems with a certain level of confidence without the consultation of an engineer. In this case, the architect assumes a greater responsibility to achieve the functional requirements of the necessary systems within a building and acts as both architect and engineer. The opposite is also true of the engineer. This includes the so called designer engineer, a role that blurs the lines between architect and engineer, because by profession they may be engineers, but their designs are products of much aesthetic consideration. Robert Maillart and Santiago Calatrava are examples of such designers. Their designs are conspicuously sculptural and overtly designed with aesthetics in mind. The products of their work have
significant added meaning and cultural value that gives them more prestige. The increased value as a work of art makes them sought after commodities useful for a greater social purpose than the functional requirement alone. These engineers became known for their sculptural designs of bridges; objects of infrastructure. In the case of Calatrava, his work eventually broadened to become more architectural, producing designs of concert halls and skyscrapers. With a firm grasp on the engineering expertise required to produce such fantastic structural feats, he is more capable of controlling the desired outcome. This hybrid designer seems to be an appropriate approach to designing infrastructure, but the character is not typical in our society, and potentially it is not necessary for the designer to play both roles. More likely, the design of infrastructure should be the same as traditional architecture, as a confluence of talents within an appropriate design team, including both architect and engineer.

If the architect is not the guiding force behind the implementation of infrastructure, then who does fill that role? In some cases it may be a developer planning for a new shopping center, housing development, or new skyscraper. It may be an appointed official given the task of coordinating and planning city services. It may be a director of the water works, electric utility company, municipal roadway system, or sewer system. It may be an urban planning firm in direct employment or hired as an advisor to a municipal. It may be many groups working together, or these same groups functioning individually and not cooperating at all. But is this the job of an architect? Not very often is an architect coordinating and implementing the infrastructural design of a city in a similar manner as he or she does in a building project. One major reason for this is the scale, scope, and duration
of a city design.

Unlike the city, a building project has a very definite scale and scope. There is a start and a finish, a budget, and the team of professionals developing and enacting a plan for its construction. The building has an owner, an individual, a corporation, or other definite group that has a relatively streamlined decision making process in which to direct the course of action. Almost none of these things are true about the design of a city. For one, the design of a city is ongoing and because of the size, complexity, and duration, there is rarely a comprehensive aesthetic vision. “[The city] is the product of many builders who are constantly modifying the structure for reasons of their own. While it may be stable in general outlines for some time, it is ever changing in detail…. There is no final result, only a continuous succession of phases.”

Because of this dramatic shift of scale, the city cannot be thought of in similar terms to a building. The architect’s role, if involved at all, becomes that of a design consultant, and the guiding force is assumed by a different set of professionals, the urban planner and urban designer.

Both Urban Planning and Urban Design are relatively recent professions in our culture. The Urban Planner came into existence in the early 19th century during the industrial revolution as a result of the drastic shifts in economic, demographic, and technological constructions of our cities. As an organized profession it has only been formalized for about 60-70 years. The Urban Designer is an even more recent development. This profession was only just beginning to develop in early 1960’s as a reaction to a pervasive orthodox modern urban planning methodology which was drastically transforming the landscape of our cities into practically uninhabitable machines, rather than livable communities. Pioneers in Urban Design such as Jane Jacobs, Kevin Lynch, and William H. Whyte identified the problems and began to analyze the mechanisms of city life to derive alternate solutions to the socially destructive patterns of the prevalent planning practices.

Of course, architects have not been silent when it comes to determining the form and design of the city. Camillo Sitte was an architect that reacted to the ugly industrial landscapes of the 19th century and criticized the modern city planning practices of his day. He called for the inclusion of the artist in the design of public places and cited many examples from ancient Rome and the renaissance to support this claim. Many modern theorists have been

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influential to our current form of planning practice, most notably the Swiss born architect, Le Corbusier, who has been energetically dismissive of Sitte’s work.

So if we are to consider infrastructure as architecture we need to understand it for its greater role in the design of a city. As mentioned above, architects can become influential in this area, but as a profession they should strive to expand their role and perhaps become more closely aligned with the urban planning and urban design professions. The architect should be involved in coordinating systems of infrastructure beyond a simple functional need and address the larger social implications.

The Qualifier

The word architecture does not only refer to the design and constructions of buildings. One can be the ‘architect’ of a business plan, a group organizational structure, or a criminal plot. In computer design, the structure, organization, and construction of a microchip, is referred to as the chip’s architecture. The word architecture can simply be used to describe the conception, organization, direction, and execution of a plan, not necessarily referring to the design and construction of buildings. What are we talking about when we classify something as a work of architecture? Is there a qualifying element in the design? This distinction is what we sometimes refer to as capital and lower case ‘a’ architecture. This is dangerous territory, because it encroaches into the realm of aesthetics and opinion, trends, etc. What is beautiful to one person is certainly not beautiful to another. Just because a large amount of effort, thought, resources, and expense was sunk into the process of developing a building project doesn’t mean that it is a good building. But when is it architecture? A structure that was built with only the use and cost in mind, and physically constructed only to meet the need of its use and function, may be beautiful in its simplicity and purity. The sensual perception of a built object or building may not be the direct function of the building, but may be a key component of its aesthetic function as an image, i.e the perception of those who must experience it is part of the use. One may also intentionally design for the aesthetic of a non-aesthetic. This consequently becomes an aesthetic image rather than the simple result of designing for pure function.

When we think of infrastructure, it is generally imagined in its generic
form. When we think of architecture, it is something more glamorous, but most of the built world is less glamorous and more ordinary.

As a student of architecture, we study the history of architecture. We move from era to era learning the trends, classifications, technological advances, political influences, stylistic characteristics of periods of architecture. For ancient history we have little specific information about the architect as individual, so we view architecture through the lens of a cultural study. In more recent history, where we have more historical record, we begin to develop the idealized character of the architect as individual. Now we understand architecture less as a cultural or societal expression, but more from the collection of exemplar works of the prolific and sensational architects that have created such masterpieces. This is evident in how we understand architecture today in a type of celebrity, star architect, glamorous, high fashion mode. Architecture is more of a constant competition and architects are highly motivated to approach architectural design with that in mind. This concept certainly has some influence on the qualifying of architectural works.

Let us think of housing as an example. There is, at the high end, the individually commissioned custom house. These houses are designed with a direct relationship between the client and architect. The clients often act as patron to the architect as artist. They are carefully crafted for the individual to satisfy their tastes and preferences. The house not only provides shelter, but communicates status, expression of sophistication and culture, and displays of power, wealth, and class. The house may be considered a work of art or an intellectual exploration in the use of space, light, texture, material, construction technique, or technological innovation. The house is photographed and added to the architect’s portfolio of work to be used as a tool for teaching and promoting the accomplishments and status of the designer. This house is completely unique and there is no doubt that it qualifies as work of architecture.

What about catalogue homes or the Levittowns of the world that include no more than a handful of models repeated en masse with the slightest of variation? Do these not also meet their functional requirement while responding to the needs of the inhabitant as well as communicating culture, status, class, and power. Is there not an aesthetic specifically scripted through their layout, use of material, ornamentation, and position of the site? These homes may be mass produced in a factory and repeated a thousand times in a particular region, but the original must have been composed with some critical thought
and consideration in response to not only cost, but to both the functional requirements as well as the additional aesthetic response, however meager. These buildings are the less significant productions that make up the opposite end of the spectrum when thinking of a hierarchy of architectural forms. Is there a housing type that is purely functional? An emergency shelter perhaps? A barracks? A detention facility? Even these structures must respond to the aesthetic requirements of some audience.

As the aesthetic image is important when considering the systems within a building, are aesthetics not equally or more important in the case of a city? I would argue that the image is important and it lacks attention within our society. Here we can mark a distinction; that which is consciously designed as an aesthetic object and that which is designed purely as a utilitarian object. Whether it be a road, tower, wall, or sign, infrastructure is composed of the utilitarian structures that we as a society have deemed necessary to function. Haven’t we also deemed buildings necessary utilitarian structures? A building is nothing more than an object. Buildings have function and utility, but somehow, they become architecture when they are conceived with a conscious aesthetic. I would argue that there is no real difference between buildings and other objects of infrastructure. The aesthetic distinction can be made for both; i.e. there are buildings that are not architecture, and there is infrastructure that is architecture.

If the object is a building, it is naturally designed for the users of that building, but it also must be designed for those who never use the building in a direct way, but who only perceive it as an object in a contextual landscape. In terms of the house, what is the value of the house to those who see it vs. those who use it? This is the case when we consider infrastructure. While objects of infrastructure are not spaces for humans to dwell within, they do affect the exterior spaces in which we dwell. Presence alone has an impact on the human environment. The presence of an object solicits an emotional response even in a subtle way. To understand the importance of infrastructure, it is necessary to think of it in terms of its impact on the physical environment of the city, as a network of systems both seen and unseen. This thesis will test a design in an individual capacity, but its contextual meaning within the city is paramount. The qualifying character of a piece of architecture is the distinction between use and function within society. Buildings and infrastructure have basic function and use value, in this way they are like tools. The distinguishing
element is when they are placed into use within the perception of society, they must consciously or unconsciously respond the needs of that society, aesthetic, social or otherwise.

Will future archeologists studying our ruins understand this distinction? I am not sure. There is certainly a grey area between that which is designed with a conscious aesthetic and that which is not. Every object inherently takes on an aesthetic quality, whether it is conscious decision or an unintended result. Choosing a material exclusively for functional reasons has unintended aesthetic consequences. Although the engineer is a designer of functional systems, it can’t be accomplished without at least an unconscious consideration for the resulting image.
02. HISTORY
Just as water is essential to support human life, a successful water system is key to the survival of an urban society. Because of this pre-qualification, water infrastructure is one of the oldest systems of infrastructure dating back to the earliest cities. Much has changed technologically in the last several hundred years but urban societies continue to depend upon these systems of water as essential elements to communal human existence. The visual expression of these systems ultimately displays significant ideological symbolism of the host society.

The Ancient

When studying the cultural importance of water infrastructure throughout history, one cannot overlook the ancient Romans. The degree to which they achieved technical virtuosity paired with a consistent aesthetic character in their built works, makes them an idealized society. The prolific system of aqueducts is clearly a tremendous feat of engineering capability and governmental organization. Their achievement is a testament to the advancement of social and political power that has had such a lasting impression on the visual world, continuing even today.

One notable feature of the ancient culture that distinguishes it from other periods in history is their use of water within the public realm, not only for the general service of the urban population, but also as a form of public recreation. The Roman bath is a public expression of infrastructure that allowed the people to indulge in the pleasure of water. These constructions were highly integrated with the social mechanism of the society and is explicitly expressed by their integration and prominence within the urban environment. The baths of Pompeii are among the most well preserved. Located adjacent to the forum, the central public square of a
Roman city, reveals the centrality to public life. These buildings were the meeting of a highly technical feat of engineering as well as great works of architecture and artistic expression. They were often adorned with the ornamentation befitting a temple and populated with the products of many artists and sculptors. While being successful as architecture, these places were also successful pieces of the urban system, and communicated the level of sophistication of the society. It cannot be denied that the ancient Romans had in place a system for implementing functional, aesthetically responsive infrastructure in a way that reflected its social importance within the society.

The Medieval

Much of the ancient water system fell into disuse and disrepair with the fall of the empire. While the systems were not being utilized in their original capacity, “the basic technological trajectory of ancient hydraulic engineering, was retained in the Middle Ages. The physical components of medieval water systems were based on a highly developed range of Roman models.”¹ Since the advanced bureaucratic structure of implementation was no longer in place, “the evolution of Medieval technology [was], rather, the inexpert, experimental, trial-and-error responses of local communities to locally recognized needs.”² “Unlike their Roman predecessors, which were built primarily by secular sponsors to feed luxurious baths, early medieval waterworks were usually built by ecclesiastical patrons to supply baptismal fonts, atrium fountains, monasteries, and much more modest bathing establishments.”³ This signifies a lateral shift in the social use of water, but nonetheless existing for more than purely functional means.

Roman infrastructure was adorned in the classical aesthetic of the empire. While in the middle ages, without a universal imperial presence and standardized system for the subjected societies, local communities attached social importance to their individual technological achievements and cultural expression with their water systems.

George Foster, in an anthropological examination of the motivations that actually do underlie adoptions of technological innovations in traditional societies, isolates two motiva-

¹ Roberta J Magnusson. Water Technology in the Middle Ages. Baltimore: (Johns Hopkins University Press, 2001), 2
² Roberta J Magnusson. Water Technology in the Middle Ages. Baltimore: (Johns Hopkins University Press, 2001), xi
³ Roberta J Magnusson. Water Technology in the Middle Ages. Baltimore: (Johns Hopkins University Press, 2001), 4
tions ‘standing out far above all other’: the desire for economic gain and the desire for high status and prestige....such evidence as there is show that improvements in water quantity and quality, convenience, and fire protection were considered practical advantages associated with complex hydraulic systems. More intangibly, beautiful fountains brought honor and prestige to their cities – hydraulic systems were not merely functional components in the urban infrastructure but also served as expressions of civic pride and identity.4

The Romans had established an aesthetic system that permeated their practice of building, communicating an assertion of power and distributing their cultural export. Cities in the middle ages functioned more autonomously and thus developed their own methods of building as well as expressions of culture.

“The desire for prestige and competition between communities can encourage the adoption of innovations. Civic pride and civic identity could be expressed by the construction of a fountain, and highly decorated fountains, such as Perugia’s Fountain Maggiore, stood in core civic spaces.”5

The initial function of the fountain was simply to provide a distribution point for water, but as a point of contact and social gathering, the aesthetic expression evolved into a symbol of civic accomplishment and celebration. “English fountains were incorporated into civic displays, serving as decorated stages for symbolic pageants and running with wine during celebrations of important events.”6

The image shows an illustration of a medieval water tower. The structure is incorporated into the architecture of the surrounding monastery. The integration of water infrastructure was seamless to the rest of their built world, i.e. the systems were not viewed as separate from or less than the rest of the built world.

The Modern

The modern period can be understood in three distinct stages. The pre-modern, beginning with the period of enlightenment during the renaissance, the early modern, being the Victorian era during the industrial revolution and continuing until the early 20th century, and the late modern, representing the period in the late 19th century until today.

In the pre-modern period, the rediscovery of the ancient culture, developments in science, philosophy, and the arts, further refined and improved the technological constructions of water systems. The medieval methodology of individual culture and technological development continued to elaborate and enhance existing methods of implementation and unique aesthetic embellishments. During this period, water towers and fountains remained aligned with strategies for designing and constructing other works of architecture. Not until the influence of industrialization do we begin to see any noticeable shift in aesthetic response to infrastructure.

During the early modern period, the profound affects of industrialization created a major shift in the aesthetic and cultural importance of infrastructure. Significant advances were made in technology and its use within the urban environment.

...Whereas industrialization remained local or regional for many years, new technological innovations were quickly diffused nationally... By the late nineteenth century, many cities in the United States entered a period of dynamic system-building in a number of areas, including energy, communications, transportation, and sanitation.  

Along with the industrialization of the 18th and 19th century were massive shifts in the economic and demographic makeup of cities. Increased production along with larger urban populations called for the construction of new water infrastructure. As Kaika and Swyngedouw point out, during this time “the urban became constructed as agglomerated use values that turned the city into a theatre of accumulation and economic growth, urban networks became the iconic embodiments of and shrines to a technologically scripted image of practice and progress.”

ivism. The existence of these elaborate systems of infrastructure were the representation of man’s complete control over nature in the urban environment. While the real use and image of the water system was messy, the visual expressions of these systems was idealized. “Dams, water towers, sewerage systems and the like were celebrated as glorious icons, carefully designed, ornamented and prominently located in the city, celebrating the modern promise of progress.”

This elevated position would not last forever. “Urban networks became ‘urban fetishes’ during early modernity, ‘compulsively’ admired and marveled at, materially and culturally supporting and enacting an ideology of progress. The subsequent failure of the ‘ideology of progress’ is paralleled by their underground disappearance during late modernity.”

The images show several examples of pumping stations. The first is a station in London, which is literally a temple to the water system. The lower images are two examples from Cincinnati. They were built during the period of early modernity and represent the same proud expressions of public water.

Edward Relph, in his book *The Modern Urban Landscape*, describes the transition of imagery within the urban environment from one of artistic em-

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bellishment to that of stripped down functional mechanism. He references the transition of traffic signals, know as semaphores that were “sometimes housed in structures which were almost as much decorative as functional.” This parallels the idealized expressions of water infrastructure in early modernity. “In 1924 General Electric perfected automatically timed lights, and then it took only a few years for most of the ornamentation to be stripped away, to be mounted vertically on a pole or hung on wires in the utilitarian fashion which has since prevailed.”

This is just a sample of a major shift in strategy for designing the urban environment.

Municipalities took on an even greater role in guiding the character of the urban landscape. The congestion and clutter of the street needed to be eliminated for more efficient use of the automobile.

From the perspective of urban landscape what is striking about all these municipal improvements in the look of streets is how visually unremarkable they were. It is as though the major features of the mechanical street were designed not to attract attention but just to be a grey background of poles, surfaces and innocuous direction signs – a functional context for an efficient city.

In the transition from early to late modernism, the city had transformed from an elaborate public expression of the progress of new technology to the mundane implementation of that technology when it became prevalent. The focus was on order and efficiency, both technological and economic.

In the post-war era, in addition to the influence of modern technologies, the rapid expansion and mass production of housing created an explosion of building construction that required an equally rapid and methodical expansion of the infrastructural networks that serviced these new developments. The urban expansion was not building upward, but out into the undisturbed countryside. A new neighborhood or town had a simple prescription with a predictable exchange value. This mode of development continues today out of sheer inertia and an expectation of continued affordable personal property as well as an overriding social attitude obsessed with continued consumption of increasing amounts of commodities. Relph characterizes the results of this development in what he calls ‘ordinary landscapes.’

An entirely different machine-oriented landscape had already been created along city streets and country roads. It was commercial, messy, filled with poles and wires and signs and ad hoc architectural styles...Probably what distinguishes it most of all is its

lack of aesthetic self-consciousness; the municipally created parts of it, such as street surfaces and road signs, which seem to have been created not to attract attention, while commercial elements like billboards call out to be noticed without regard to their context or their neighbors.\(^\text{13}\)

Appearances can, however, be deceiving. Behind these messy ordinary landscapes there lies an almost obsessive concern for efficiency of operation and for scientific management, a concern that has permeated both business and municipal government during the last 80 years, a concern for making the world function well and not at all for how it looks.\(^\text{14}\)

The original modernist architects celebrated the engineering structures and placed the utility of a building ahead of architectural ornament. Adolf Loos wrote in his essay *Ornament and Crime*, denouncing these unnecessary architectural features with a highly moral connotation. Meis van der Rohe’s popular adage ‘form follows function’ is a core principle of the modernist designer, eliminating everything that has no function. The ‘modernist’ structures of the period were factories and warehouses, some of the more utilitarian of building types. Walter Gropius was particularly influenced by the aesthetic of these purely functional buildings. He photographed the factories and grain elevators, and drew upon them for inspiration and to display evidence in support of his aesthetic theories. The buildings they designed cast off the excessive aesthetic embellishments of the architecture in their day and replaced it with a design of pure function. But as soon as it was conceived, this mode of design did not eliminate aesthetics from architecture, but simply created a new one. Contemporary modern design is fully conscious of its role as an aesthetic and may only marginally address the concept of functional purity. However the affect of the theoretical concepts was much farther reaching in the way municipal governments continue to implement infrastructure.

The planning practices indoctrinated through the modernist philosophy created spaces of hostile sterility. Not until the 1960’s did the grip of this philosophy begin to let go. Urban design began to come together as a profession to address the issues of aesthetics and livability of the urban environment.

Whereas most planning is concerned with two-dimensional abstractions, such as subdivision layout and the segregation of land uses, urban design attends to the coherence of townscape, including heritage districts, the relationships between buildings both new and old, the forms of spaces, and small-scale improvements to streets – for instance, wide sidewalks, benched, attractive street furniture, provisions for outdoor cafes, and trees and landscaping. Much of the emphasis in such improvements is on visual quality, which is


remarkable because this had been almost completely ignored in planning since the days of the City Beautiful movement at the beginning of the century.\textsuperscript{15}

The images on the following page are examples of functioning water towers within the city of Cincinnati, a lasting remnant of the early modern Victorian period when infrastructure was designed as an aesthetic object.
03. PROBLEM
The Negative Image of Infrastructure

There is a pervasive negative connotation associated with infrastructure. It is constantly subject to the NIMBY (not in my back yard) phenomenon. This is a result of the post war emphasis on the utopia of the home, where any visible connection between the urban and the domestic environment has been eliminated. With no room in this domestic environment for a public object of infrastructure, any existence within this realm is generally thought to be unattractive and undesirable. While the need for these structures continues to exist, they are often massively out of scale for a pedestrian environment or implemented in a cluttered and unsightly manner. Proper planning and design of a project could mitigate some of these problems, but it is often at an additional public expense which usually trumps any minor objection from the affected local community. This situation is at the core of the negative connotation and it is caused at least in part by the aesthetic of the object.

Infrastructure is a publicly funded necessity that provides us with the access to the networked systems. Because of this arrangement as a shared commodity, the applicability of use is highly scrutinized but the aesthetic considerations are largely ignored. Our contemporary conception of the image of infrastructure has been developed by our strategy of environmental development over the last century with emphasis on an increasingly private domain. The public domain is either the bland ordinary environments described by Relph, or the remaining urban core, where we find a negative image of infrastructure in parallel with a universal negative perception of the urban core. This separation of public and private domains has allowed the public sector to deteriorate.

Relph refers to a negative social perception of the city based on poor visual characteristics, but the aesthetic quality is a symptom of an overall negative perception and ultimate deterioration of the urban core. Development patterns addressing problems of the congested industrialized urban areas enabled a large scale shift in the demographic makeup and primary use of the urban center. The foundation for these practices was debated at a theoretical level in the 1920’s. The major schools of thought were the regionalists and the communitarians. The product of these debates, if implemented in their original form, would have produced urban environments that achieved a healthy balance of proper and efficient function and the appropriate attention.

to aesthetic concerns. Unfortunately, the institutionalization of these theoretical outlines severely eroded their original intent.

What appears to have happened is that these ideals were turned into models, simplified for the purpose of textbooks or classrooms or developers, adjusted to the less radical planning tools of zoning and neighborhood units, modified by bureaucracies, adapted to political exigencies, and otherwise thoroughly watered down for ease of application and administration. Once entrenched as habits of thought these were not easy to displace or transcend, and it was in these simplified forms that they were incorporated into official planning practices after World War II. With the benefit of hindsight, and from the perspective of landscapes, it does indeed seem that urban planning has turned out to be less of a movement for social reform than a means for trying to make cities function as efficiently as factories.²

These changes, favoring the efficiency of city functions, led to the massive development of the perimeter of cities and expansion outward. This allowed the affluent residents to escape the congestion, crime, filth and stress of the dense urban core for the isolated suburban areas. The loss of affluent population along with their tax contributions to the functional upkeep of the city left behind an under serviced lower class population. Tensions within the cities mounted until a fall out in the cultural revolutions of the 1960 which included war protests, labor strikes, and race riots in many of our urban centers. These disturbances further alienated many remaining within the urban centers and further drove residents out of the city center to the safe and isolated suburban areas. With the decline of our industrial economy paired with an epidemic of destructive illegal drugs use, the remaining urban population continued to decline and the existing culture deteriorate.

While the affluent population, and associated tax base, was able to move to clean, safe, more spacious, affordable, newer infrastructure designed to accommodate newer transportation modes, i.e. automobiles, the urban centers were left with an existing municipal infrastructural system that was no less expensive to maintain.

...the traditional emphasis on permanent, centralized systems ultimately exposed limitations in their functions. Since all technologies of sanitation were capital-intensive, they required continual maintenance and repair. The publicly acknowledged infrastructure crisis in the 1970’s and 1980’s demonstrated a lack of commitment to maintaining existing systems adequately. Other priorities in city budgets strongly influenced the fate of these sanitary systems, as did a variety of fiscal constraints, brought on by economic depression or a change in political leadership and ideology. Sanitary services, like other infrastructure issues, also were caught between the choice of investing in existing systems or expanding to meet new demand. The connection between these services and the nature

and rate of urban growth also was closely linked.\textsuperscript{3}

The construction of infrastructural systems followed the middle class flight to the suburbs and urban infrastructure was neglected. City governments have been combating the issues of urban decline since this time and have made significant progress in reviving the urban cores, but it continues to be an uphill battle.

\textit{Continuity and Process}

The process of implementing infrastructure is often very lengthy and lacks continuity. From the identification of a need to the implementation of a solution the forces guiding the process often change hands and the attention of the public drifts in and out of focus. Without an existing strategy for dealing with these issues, the implementation of infrastructure often drifts aimlessly in a sea of debate.

Take Cincinnati as an example. Cincinnati is centered on the Ohio river, which also divides Ohio from Kentucky. There are two major highways that come together at the city center and they converge to cross the river over one bridge. The bridge has been operating at a level well above its designed limit and there is persistent traffic congestion in both directions traveling over this bridge. There has been talk of bridge construction for years. There are plans and strategies presented at public meetings and in the newspaper. There are public opinion polls and informal votes and so on and so forth. The press on the subject ebbs and flows. It seems that someday we will get a new bridge and the hype surrounding the project alludes to its great social importance. While that access is important for public convenience of mobility, why does it draw so much attention from the media? This particular bridge is packed with much more social importance than simply serving its functional purpose as a bridge. There would not be nearly as much attention paid to the construction of a new bridge outside of the city. Because the bridge is located at the city center, it is a visual symbol for the city. It affects the image of the skyline, and the experiential quality of being in the city. The aesthetic rather than the functional aspect of this structure becomes primary in this case, which is atypical of most works of infrastructure built today.

\textsuperscript{3} Martin V Melosi. \textit{The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present}. (Baltimore: Johns Hopkins University Press., 2000), 425
The Misplaced Value of Image

The post-structuralist Jean Baudrillard’s summary of value, from his *For a Critique of the Political Economy of the Sign, and The Consumer Society* as follows.

1. The first is the functional value of an object; its instrumental purpose. A pen, for instance, writes; and a refrigerator cools. Marx’s “use-value” is very similar to this first type of value.
2. The second is the exchange value of an object; its economic value. One pen may be worth three pencils; and one refrigerator may be worth the salary earned by three months of work.
3. The third is the symbolic value of an object; a value that a subject assigns to an object in relation to another subject. A pen might symbolize a student’s school graduation gift or a commencement speaker’s gift; or a diamond may be a symbol of publicly declared marital love.
4. The last is the sign value of an object; its value within a system of objects. A particular pen may, whilst having no added functional benefit, signify prestige relative to another pen; a diamond.4

The construction of infrastructure has been valued disproportionately in terms of the functional value. Also, because the commodities of our utilities networks are understood as a necessity within the domestic environment and not a luxury, thus diminishing the exchange value of both the commodity and the infrastructure system that provides access to the network. While the symbolic value of infrastructure was prominently portrayed as an expression of the progress of man, this is no longer a positive symbolic association with the image of infrastructure. Finally and also because of the prerequisite of access to urban infrastructure, the sign value of the image of infrastructure is not taken into consideration when implementing visible public infrastructure.

Designed objects are not limited by scale. The designed object can be very small like a piece of furniture, handheld device, or a piece of jewelry. Traditional works of architecture have a great range of sizes from a kiosk to an Olympic stadium. When designing a work of architecture, it is composed of thousands of smaller designed features. A building, at times, is nothing more than a composition of many other objects of design. Larger works of design include landscapes and the design of cities. This shift of scale can be thought of in similar terms as the composition of a building, where the building itself becomes just a piece in the larger composition. In the context of city design,

an object of infrastructure is no different than a building.

From fashion design, to architecture, to urban design, the creation of an aesthetic follows the same basic principles; the variable is that which is embellished. The functionality of the object is a given, it is always the base requirement, but the coordination of physical material is a tool for human communication. In fashion it is the human body. We wear the clothes to protect our bodies from the elements, but what is communicated? The same is true for a building. Functionally, it provides shelter, places to live and conduct business, but there is a sign value separate from the functional value that communicates to the social mechanism on the behalf of the owners and occupants of that building. One scale farther and we come to the design of cities. The same value system is in place but the communication is on the behalf of a much larger audience.

When an object is placed anywhere within the realm of human sensory experience, whether it be a landscape or a city, building, personal vehicle, or article of clothing, regardless of its scale, it effects not only the functional value, but all of the values listed above. It is the social constructs of society that are interpreted by the designer and utilized in design. Sitte makes the comparison, “For just as there are furnished and unfurnished rooms, we could speak of complete and incomplete [public] squares. The essential thing of both room and square is the quality of enclosed space. It is the most essential condition of any artistic effect, although it is ignored by those who are now elaborating on city plans.”

The images on the following page are some examples of recently constructed water towers. There is a broad range of imagery here which highlights a spectrum of strategies for addressing the aesthetic. For many of these examples, the resulting aesthetic seems to be very much an after thought.

The early modern period was dominated by a faith in scientific positivism. The water infrastructure produced during that period was conspicuous and idealized images that disguised the true nature of the infrastructural system and elevated it to a monumental expression of technological and cultural progress. The late modern period reversed that expression to the purely

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functional aesthetic, eliminating everything that could be considered an embellishment. After a thorough proliferation of this methodology throughout the early 20th century, modernism and its obsession with a functional imperative was thoroughly reconsidered if not outright rejected in terms of an overall strategy for design. This primarily occurred in traditional works of architecture and design, but infrastructure remained some distance apart from the explorations in the post modern period. While studies in urban design developed and become incorporated into the municipal strategies for the image making of our urban environments, primarily dealing with the pedestrian scale visual quality of the street, infrastructure has not been properly addressed. In the mean time, new water towers are constructed without an overriding aesthetic on which to rely. While the need for new infrastructure continues, it cannot be ignored that the overtly conspicuous nature of the water tower has an impact on the visual quality in the vicinity of its location. Towers are conspicuous pieces of infrastructure which either add to or subtract from the aesthetic value of our environment.
04. SOLUTION
Landscape and Memory

Every landscape, natural or urban, sensational or serene, has the inherent ability to imprint an image upon our memory. Whether it be the streetscape canyons of lower Manhattan, or the natural gorge cut by the Colombia river, the image creates opportunity for awe, wonder, excitement, or anxiety. The natural landscape is created by thousands upon thousands of years of Earth’s cyclical processes, carving and sculpting, mixing and washing, growing and dying. Every stone that sits upon the earth creates a pixel in the experiential image of the landscape. The urban landscape is simply the natural landscape plus the human adaptations that support our existence. Every construct has a purpose to serve a human need and so every object placed into an order that supports the functions of our human activities could be thought of as infrastructure. Every building project is an opportunity to modify the natural image, infrastructure is certainly not exempt. Just like the stone in the natural landscape, infrastructure contributes to the total image of the urban landscape. The sight, sound, smell, and feel of each object make sensual contributions to the cumulative experience. Over time, these memories become mixed with symbolic meaning, emotions, and aspirations. The combination of these creates a much richer understanding of the city than any singular perception. This understanding is then expressed in individual actions, attitudes, motivations, and feelings about the city and consequently this understanding becomes self-conscious. These associations of meaning are internalized and held by the those who dwell within the city, each with their own personal perspective and understanding, but containing many common threads of mutual understanding and often with deep emotional bonds. In the same way that the city is always changing, so is the understanding of the city. Each object is a symbol, whose significance is constantly evolving.

Infrastructure is, first and foremost, a technological system fulfilling a supportive role to the daily activities of human society. The physical constructs of each system are made manifest in accordance with their functional requirements. Infrastructure primarily intends to be imperceptible to all of the senses, but in order to function properly; it cannot always be so, thus forcing itself into the experiential realm of the city. With an understanding that the functional workings of infrastructure cannot be kept completely hidden from our perception, the expression of that infrastructure contributes to the narrative of the city, whether that expression is intentional or unintentional.

How it Works

This thesis addresses the general question of the aesthetic image of infrastructure. Since this is a very broad set of imagery, this thesis is narrowed to focus
on the more specific set of imagery associated with the water system, and the image of the water tower in particular. The water tower is, by the means of its function, a very conspicuous object.

The water that we drink, bathe in, wash with, and use to discard waste is all the same system of potable water. This water is gathered from a supply source, such as a freshwater river, lake or underground aquifer. From the source, the water is filtered for physical and chemical contaminants and treated with chemicals such as chlorine to remove bacteria. After treatment, the water is then pumped to a reservoir. This reservoir is a large storage area that is set on the ground. In a city with a hilly landscape like Cincinnati, these reservoirs are located on top of hills, rather than in the low lands. The next step in the water system is the water tower which is our daily storage of water. During the usage day, the level of water in the water tower goes down and the supply is replenished at night. The daily supply of water, elevated above the distribution system, utilizes the potential energy to pressurize the network of pipes for the delivery to each of our homes, businesses, offices, restaurants, etc. The distribution system runs under the roads and sidewalks and is delivered to every building underground. The visible objects of this system are the pumping stations, the treatment plants, the water reservoirs, and the water towers. Other objects of the system within the public realm include fountains and fire hydrants. The final stage of the distribution system often occurs in the private domestic setting at the fixtures, faucets, and showers and toilets. This is the point of human contact with the fresh potable water, and these fixtures are the elements of design that we typically associate with the water system. These objects exist primarily within our dwellings and are part of our homes and other buildings. They add functional, tactile, and aesthetic value to our buildings and can be thought of as primarily private property that reflects the values of the owner of each building and facility. Like the fixtures in our home, the public objects of water are the ‘fixtures’ of
the city.

In My Backyard Please, the Infrastructure Beautiful Movement is the title of an article published in the New York Times, February 7th, 2005, that describes several infrastructural projects designed and constructed in direct response to the aesthetic dilemmas in placing infrastructure. The article indicates a cultural shift toward understanding the value of design, despite increased construction costs resulting from the aesthetic response. Professor of Architecture at Yale, Alan Plattus, suggested this trend is a movement in the direction toward infrastructure design like the historic W.P.A. projects. The Works Progress Administration is the federal agency that commissioned architecturally significant public works during the Great Depression.

The first project is a water treatment plant, designed by the architect Steven Holl. The South Central Connecticut Regional Water Authority wanted Holl to create a plant that ‘looked like no other building in the world.’ The result is a slick shiny pipe like structure, clad in stainless steel shingles that encloses acres of treatment equipment.

Holl is not the only prominent architect receiving infrastructure projects. Also included in the list of the aesthetically pleasing sculpturally inspired structures are a chilled water plant at the University of Pennsylvania, designed by Weinzapfel and Leers and the Newtown Creek Wastewater Treatment Plant, designed by Richard Olcott of Polshek Partnership Architects. Yoshio Taniguchi designer of the MOMA expansion was commissioned to design an incinerator plant in Hiroshima.

While many of these projects are still considered buildings in a traditional sense, they are created in response to awareness that design can serve a functional role of easing the implementation of these otherwise undesirable facilities while at the same time commissioning a public work of art. The article also echoes the historic outline provided by Relph, Kaika and Swygendrou that the aesthetic treatment of infrastructure has been absent since the postwar period, and their designs during this time were ‘functional at best.’

Image and City

The clarity and legibility of a city is important in creating a lasting and meaningful memory. The writings of Kevin Lynch and Roland Barthes speak of this concept. Lynch, as a pioneer in the urban design movement, began looking at the city as an element of design. In his work, The Image of the City, he is concerned with distinguishing a set of elements within the urban environment that contribute to its ability to imprint a lasting memory upon the dweller, which then in turn engenders strongly

held emotional bonds with the place.

Like a piece of architecture, the city is a construction in space, but one of vast scale, a thing perceived only in the course of long spans of time.... Every citizen has had long associations with some part of his city, and his image is soaked in memories and meanings.2

His five elements of an imaginable city are, paths, edges, districts, nodes and landmarks. These elements once understood and recognized can be utilized and manipulated in order to orchestrate a desired image. The water tower creates an obvious landmark in the urban environment and could be directed toward the aim of sculpting a legible urban landscape.

Similar to Lynch’s writings on imagability are the writings of Roland Barthes. He describes the Eiffel Tower as a deeply meaningful object within the landscape of Paris. The tower is omnipresent in the mind and inseparable from any contemplation of the city. The important element is the ability to visit the tower and ascend to its viewing platform. The object as a landmark within the city and at the same time provides a panorama of the city. The panorama is far more meaningful than the ability to view. The understanding of the city in this way engages memory and familiarity. This act of engaging the city in this way solidifies the experience within the mind of the dweller.

*The City Center and Iconography*

Something is important about being in the city center, and as a consequence creates an increased importance on aesthetics, the meaning of an image, the symbolism of an object, the brand image, etc. But a building or other structure is not built for its image alone; this becomes part of the entire package when preparing to construct a large and expensive object. Just because the city center heightens the role of an aesthetic image, doesn’t mean that all buildings are designed and built in response to that role. Perhaps the developers, financiers, owner, builder, engineer, or architect simply did not grasp a full understanding of the larger cultural context. Perhaps, the city center does not demand that every building be an outstanding work. There are some buildings that function perfectly well as background buildings because their use is not terribly important. They do not have a particular motive to be designed in an iconic, aesthetically scripted fashion. For example, the speculative office tower is a structure that does not need to have a brand image. This tower is rented out to any number of smaller commercial tenants. The reason for its construction is to house the business offices that have a functional requirement to be located in the central business district. It is not a corporate head quarter, so it does not need to fit the brand of the company, unlike the Proctor and Gamble Headquarters.

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where a complex of buildings is designed and constructed with a coherent aesthetic. For P&G the design reflects the values of the company and supports the image of the corporation as a brand.

The intended use of the tower often determines the aesthetic of the building and its visual treatment, both interior and exterior, is based on its use and occupancy. What types of towers exist in business districts? We find office towers, multi-tenant and corporate headquarters, hotel towers, rental apartment and condominium towers, hospital towers. We may find mixed use towers incorporating a combination all the above. Whenever a tower goes up within a city there are two primary recipients of that image. First, there are those that use, occupy, own the tower. This tower represents the identity of those directly associated with the tower and communicates that relationship to the city where it is located. It also creates a dialogue with the community to which it belongs. Second, there is another point of communication that is not only with the immediate community, but also to a much larger community, that of the tourist, spectator, and broader national and even international community, depending on the public exposure of the city’s brand image. This image is the skyline, the postcard image, the popular iconic image of the city, which is often the distant landscape “city mountain” image. The individual tower plays a role in this panorama and depending on the vantage point can become individually significant. The use identity of the tower will influence the design to communicate the intended image to the varying levels of observers, from the immediate users, to the city community, to a larger national or international community.

Another example of tower that I would like to highlight now is the condominium tower. Many of our central business districts have gone though a use transformation from multi-use city center, to limited use as commuter office district, and transition back to a mixed use of live/work/play. With this latest transition there has been a significant upswing in the market for condominium residential spaces within our central commercial districts, also including a revival in the restaurants, shops, parks, and transportation. Many of the historic buildings have been renovated and converted to condominiums. Some of the old hotels and office spaces have been converted to residential spaces. There has also been an increase in the number of new construction high-rise towers that have been constructed to accommodate high end luxury condominiums within the urban core. Like most real estate ventures, when a new tower is constructed, the intent is to make money for the developer. A speculative office tower markets a location and a useful space. These buildings are often occupied by multiple tenants, that change from time to time, and there is no real need to create an attractive identifiable image. Therefore the expense of creating such an aesthetic is foregone and the resulting building is built with a heavier focus on cost ef-
fective construction techniques and building materials, floor layouts, etc. In the high end condominium building, there seems to be a great need to create an attractive identifiable image out of the building as a whole. This creates a sense of prestige, of notoriety, of importance out of the building. These buildings are marketed to sell.

The example that I would like to focus on is the Ascent, in Covington Kentucky, just across the river from downtown Cincinnati. This is an example of a building that has a very striking contextually contrasting image with its surrounding buildings. This is a luxury condominium building that is designed with an aesthetic that communicates directly to the three audiences identified above; the immediate user, the surrounding community, and a larger regional, national, and international community. In this case, I would mostly limit the larger community to a regional level, but there is another element that might tap into a larger audience. The building’s “designer” is the internationally renowned architect Daniel Lebieskind. The design is unconventional for the Cincinnati region, and even more so for the competing city of Covington, Kentucky, home to only a few high-rise buildings of insignificant aesthetic quality and ambition. This was a self-conscious move by the creators of this building to bring a higher level of attention, prestige, culture, etc., and is expressed in the decision to make a bold statement with this building. The result of this expression is a marketing point for three major players: the users/owners of the condo units, the city of Covington in its regional competition to become more metropolitan/cosmopolitan, and the city of Cincinnati’s image on a regional/national level. Because the design has been accredited to the star architect, it is included in his body of work as well as published in journals, magazines, etc. outside of the immediate community of the city.

Similar to the move made by the city of Covington Kentucky, the 1992 Olympics of Barcelona also served to address the image of the city and region at a larger national and international level. The Olympics are probably one of the best tools that a city/nation can use to address issues of public image and make a concerted effort to change public opinion. The leaders of Spain, in particular the leaders of the Catalan region, perceived a negative public opinion. In a world of rapidly advancing technologies and a changing global marketplace, Spain sought to become a more important player in the world. This region was generally thought to be made up primarily of people who were lazy, unproductive, and unsophisticated; somewhat of a cultural backwater. The leadership took proactive steps to remedy this public view in a 10 year long initiative to update the infrastructure of the region, to develop technology based business, and to bring the region to the forefront as a major player in the technologically advanced world. This plan was the groundwork for the shift that culminated in the grand display and presentation to the world through the venue of
the Olympic games.

**City Branding**

Just as the designed object can become an object of commodity fetishism, so too can the city. The city is packed with symbolic meaning that contributes to an emotional relationship with its inhabitants. “The image [of the city] originates only as part from a physical reality and is based primarily on well worn prejudices, desires, and memories… these emotions take shape in the collective memory.” The city is a product of human labor and is a commodity in our current day capitalist society. Just as the social mechanisms of capitalism have blurred the connection of the commodities to their means of production and their use value, thus creating a disconnect between the use value and the exchange value. “City branding: putting the city on the market as a product… just as advertising is also used to uncouple the intrinsic value of the self-image, so too can the image be detached from the physical city in order to express its potential to the full.” The exchange value of cities is not the sum of the labor embodied in its physical form, but there is a disconnect that creates a fantasized value, thus inflating a perception of importance by the tourist and the inhabitant. “The marketing tool of the future is self-expression! But this also applies to a city like Amsterdam. The better Amsterdam is able to create a unique experiential value, the greater the likelihood that it will be recognized and appreciated for this in the future.” This capitalist mode of masking the connection to the means of production and marketing the city as a commodity/object of desire is an important aspect of our cities economic vitality within a globalized world with a large affluent population and inexpensive means of transportation. And now, with such an increased level of connectivity via internet communication and networking communities, our information, images, and cultural exports can be easily transmitted to the world.

“Globalization has shrunk the world. Borders have disappeared, both physically and culturally. One taste, one language, one art, one entertainment and—who knows- later perhaps global mind.” In a world with such abundant access to information, it becomes more and more important for an individual place to proactively distinguish itself as an attractive and unique place in order to retain and increase the population of valuable transient population of upwardly mobile, intelligent, creative professionals. “It is a strategy to provide cities with an image, a cultural significance, which will, ideally, function as a source of added symbolic and thus economic value. The city’s brand serves largely to increase its status or prestige as a tourist destina-

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3 Berci Florian, *City Branding* (Rotterdam: NAI, 2002), 12
4 Berci Florian, *City Branding* (Rotterdam: NAI, 2002), 16
5 Berci Florian, *City Branding* (Rotterdam: NAI, 2002), 22
6 Berci Florian, *City Branding* (Rotterdam: NAI, 2002), 20
tion or as a residential or business location.”

The city brand is not only for the benefit of the outsider. The local community can benefit as well. “Brands give products, services, places and events an added symbolic value which, as it were, elevates them above themselves, and makes them more than they are in a material or functional sense an expression of an ideal or a lifestyle, and thereby gives them an extra value in an economic sense too.”

There is no doubt that cities have undergone economic hardship in the latter 20th century. While branding may be a tool utilized to increase tourism, the city must also guard against the loss of their desired population in order to guard necessary taxes to provide their necessary city services. “…for the time being, city brands serve a primarily economic and not a social, cultural goal through which, under ideal circumstances, derived social and cultural effects, such as an increased ‘pride’ in one’s city, increased identification and a feeling of cohesion, an enhancement of the public sphere and an improved and more versatile infrastructure, they are in the first place directed towards the urban affinities of external cash-rich groups.”

Cities can take proactive steps to create a brand image. “In order to create new, branded identities that will attract the right type of people, who in turn will enrich the new city identity with their behavior, the city brander must ‘orchestrate an image experience.’ In the same way that a specific image is created in the design of condominium tower, the city can also make physical changes augment the design of a brand image. “The city can be treated as a product that can be physically transformed, as long as its image remains strong -thus stimulation built of new initiative. On the ‘product’ can remain as it is, but the way it is perceived is changed. - thus increasing the self-confidence of the existing population. As far as the feasibility is concerned, the building of towers or monuments, for example, is an old tradition to give a city a new ‘face’.

The Weehawken Water Tower, designed in the early 1880’s by eminent architect of the Gothic Revival, Frederic Clarke Withers. This water tower lies squarely within the parameters of the urban dowry concept outlined by Kaika and Swyngedouw. Built in the era of industrialization in the United States the tower was contracted by a private utility company as a capitalistic enterprise to expand the water system and encourage new urban development and settlement in the area of Wee-

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7 Hans Mommaas, *City Branding*. (Rotterdam: NAI, 2002), 34
9 Hans Mommaas, *City Branding*. (Rotterdam: NAI, 2002), 34
10 Hans Mommaas, *City Branding*. (Rotterdam: NAI, 2002), 42
11 Michael Speaks, *City Branding*. (Rotterdam: NAI, 2002), 58
12 Kown van Synghel, *City Branding*. (Rotterdam: NAI, 2002) 76
hawken. Unlike many water towers today, which serve as strict objects of utility, this tower had a traditionally architectural programmatic element. Underneath the water tank, within the column structure of the tower, housed the central offices of the Hackensack Water Company, the corporation responsible for the construction of this tower. The tower and offices opened in 1883 and was cited for its innovation and design by professional journals and magazines. Unlike the municipally run water companies of today, “the Hackensack Water Company seized the opportunity, however costly, to dramatize its success by constructing a monument befitting the image of a private utility that would soon grow to be the largest in the country.” Influenced by John Ruskin, Withers adopted his design ideals of truth, honesty, and reality in building. This reflected Ruskin’s belief that decoration should be consistent with the structural realities of architecture, not merely applied to its surface and that the design of a building must declare its purpose, the logic of its plan, the nature of its construction, and the qualities of its materials. The tower still stands today and was declared a national landmark in 1980.

The Eiffel Tower is an excellent historical example of the artistic expression of industry and technology. Second, it is the formal expression of innovative strategies and marks a fundamental turning point in architectural imagery as a result of advanced industrial and technological changes. Third, the image of the Eiffel Tower has proven to be a lasting international cultural icon that creates a recognizable image of place even for those who have never physically visited the city. And finally, the tower’s lack of public function provides some interesting insight on the relationship between public use, image, and value.

Gustave Eiffel was a champion of the industrial machine aesthetic. He embraced the technological changes to create a prominent representative image. Architecture in the late 1800’s looked to the past for inspiration, to the Classical, Romanesque, Gothic or some over-elaborate combination of these. Gustav Eiffel was inspired by bridges and other industrial structures and he built with iron, the industrial
age material. The form was governed by rules, not of historical proportion or spiritual harmony, but the rational laws of science and the application of industrial technology. This was the changing face of architecture as well as a cultural shift of society toward a future of the machine.

Although the tower was designed with an engineer’s calculated efficiencies, it does not lack sculptural form. The structure is expressed throughout but is meticulously integrated as one composition. The legs that form the base are massive box trusses that span the intersection at the Champs de Mars with grand arches. They gently merge to form the rectangular podium for the rest of the tower and spring upward again from this point slowly tapering to a second podium where the four separate elements merge to become one rectangular shaft. This shaft tapers to the top where it is crowned with a jewel shaped observation deck, communications equipment, and scientific research facility. With almost no orthogonal lines or right angles, the curvature of the form expresses the flexibility of material. A strong visual movement is created by the curving profile that is gently broken up into three proportional sections by crowning horizontal platforms. An obvious was made effort to create a balanced and expressive composition.

The tower did house a restaurant on the first platform and as the tallest structure in the world at the time, provided a view for the spectators of any event. The height of the tower was also used as a communication device during the world wars as well as a laboratory for conducting scientific and meteorological experiments.

Although it does have these few functions, the design was certainly not intended to serve these purposes and continues to serve the historical function as a monument to industry and Paris.

The Mujeik Telecommunications Tower, designed by Santiago Calatrava, is a contemporary precedent example of a tower that, like the Eiffel Tower, successfully creates an iconic image. Commissioned for the 1992 Barcelona Olympics, it served as an international telecommunications broadcasting point for that event. Also similar to the Eiffel tower, it was created for a major international exposition and purposefully used to express the technological advancement and artistic culture of an advanced society. It is an example of bold sculptural form in the design of a highly visible piece of urban infrastructure and like many of Calatrava’s designs; it is inspired by an initial conceptual sketch that estab-
lishes a thematic image which is highly influential on the final form.

Prior to the Olympics, the city of Barcelona had been implementing an aggressive technological initiative to place the regions government and businesses at the forefront of internet technologies with an extensive infrastructural system. The Olympic event was a part of the plan and a benchmark in the development process. The tower was a key part of that infrastructure and was a perfect opportunity to make a public expression of a system that is largely hidden underground, within walls and floors of buildings, or completely transparent with wireless technologies. There was also a strong desire to dispel negative stereotypes about the country and present a more active and innovative society.

The anthropomorphic form, materials, and composition make it a unique and interesting tower. It was inspired by the initial concept sketch of a person kneeling with outstretched arms toward the sky presenting an offering or gesturing praise. The final form is a very definite abstraction of that idea that can also be interpreted as a runner carrying the Olympic flame. There is a dynamic expression of structure in the non-vertical and asymmetrical balance of the tower. This shape as well as the very clean white material creates a focal point and landmark in contrast with the hills of the natural landscape.

There are a few elements that also make it a proper representation of the region and local traditions. The base is given a rigid pattern like a sea shell showing the Mediterranean coastal location. That base is also clad in glazed tiles which are a common technique of the Catalonian region. Also, the city can be proud of not only their commission of a prominent work of public art, but also the fact that the designer is local to the region.

The Water Tower of Kuwait comprise the most similar precedent to this thesis project because they all serve as water towers. This is an example of functional utility that is also a monument, public art, and expression of civic pride. These towers were erected in commemoration of Kuwait’s freedom and independence as a nation.
The three towers are positioned in an asymmetrically balanced composition. They retain the typological shape of the water tower, but their articulation, material treatment, and thoughtful composition add to the visual integrity of the landmark. The towers are located on a small peninsula that extends into the Persian Gulf at the edge of Kuwait city. Their form sets them apart from the surrounding urban landscape and when viewed from the city against the sea beyond, their color and textural similarities blend into a singular expression within the landscape. This self-conscious expression of artistic imagery shows the desire to express cultural depth and also is indicative of the valuable role of fresh water within the arid climate of the Middle East. The unique form also makes a powerful symbol of place. The importance of this monument is made apparent by their conspicuous nature especially at night. The smallest tower is used to hold light that illuminate the other two towers.

These towers have additional functions in addition to their role as utilitarian infrastructure. The lower tower on the right houses a revolving restaurant and the upper bulb contains an observation deck. These features add a human quality of interaction and public place to the structures.

The Cincinnati Gateway Project is a public initiative to make a positive expression of highway infrastructure. The highway system is the life of the city economy and is a part of the daily visual experience. Highway infrastructure, like most public infrastructure, has been designed for a specific functional purpose with little regard for a public imagery. This is an example of an effort to create a more aesthetically desirable expression. The gateway project also sets up boundaries on the highly traveled corridor. This gives a sense of location to the city and promotes the imagery of place to not only the local commuters but also those passing through.

This overpass gateway has four large concrete piers that are composed in a stepping pattern similar to those found in art deco architecture. The era of art deco represents a period of artistic and cultural prosperity as well as very solid and formal expressions of design. The recreation of this past style may be an attempt to revive those positive attributes of a more successful and prosperous time in the city’s history. Between the piers is a fence that appears to be wrought iron, also a material that can be associated with
an industrial era. The composition is balanced and symmetrical with evenly spaced vertical metal plates incorporated into the iron fence. Each plate holds a backlit letter that displays the title of the city, Cincinnati. This gateway is not excessively elaborate but the additional design features are purely decoration and certainly more expensive than a common overpass. This is proof of the general attitude that the imagery of a public place is important to the quality of visual environment.

As such a conspicuous image, water towers can find positive uses for this visual opportunity within the urban environment. The object can be an attractive feature augmenting the experience and thus creating a memorable landscape as a basis for constructing an urban brand image. As a landmark, the water tower can facilitate the legibility of the city to better define a sense of place and reinforce a positive self-conscious within the mind of a local resident. Water towers have served this purpose in the past and can be used to achieve these ends.
05. IMPLEMENTATION
Why the Water Tower?

Infrastructure is everywhere and takes on many different forms, varying from the roads and sidewalks that are ever present within the public realm, human scale objects like waste bins, lamp posts, and fire hydrants, and colossal structures like water towers, radio antenna, and bridges. Many things are buried under ground like the sewer systems, gas and water distribution, sometimes electricity, and subway tunnels. Other forms are invisible like communication and television broadcasts. Because infrastructure comes in so many forms, generalizing an appropriate strategy to address an aesthetic directive would be unproductive. Therefore, for the purposes of this thesis, one system in particular, in fact only one part of one system, will be studied in detail - the water tower.

Site

The panoramic images on the following pages were taken from the viewing platform on top of the Carew Tower, the tallest skyscraper in Cincinnati. This building is located at the physical, historical, and symbolic center of the greater metropolitan region within the heart of the Central Business District. The top photograph is a 360 degree panoramic image from that key...
vantage point. This represents just one perspective image of the city, but a very important and symbolic image. This image is the “panorama” that Roland Barthes, the urban sociologist, describes in his writings about the Eiffel Tower and Paris. The lower image is an enlarged portion taken from the upper image, focusing on the specific site location for the design project. The perception and understanding of the project site from this point is the key to the understanding of the project’s role in the greater physical and symbolic city of Cincinnati.

The 360 degree panorama represents the landscape image of Cincinnati. The city itself extends far beyond the perceptible limits of this image, but the panorama is the symbolic image of the center. This image is not able to depict all of city within the municipal boundary of Cincinnati and also includes a view of other municipalities, counties, and states. The cities of Northern Kentucky are nearly as prominent within this image as the city of Cincinnati. The image construct boundaries in the mind that connect an understanding of visual place. The arbitrary lines on a map are not important. For purposes of this project we will ignore the municipal boundaries and focus on the image of the region, which we will understand as Cincinnati.

In the image, one can see that the natural landscape is encrusted with the constructions of a human society. The natural environment contributes the hills, the valleys, the rivers and the trees. Even the sky with clouds and sun are important parts of this image because it is unique to this location on the Earth at this particular at the present time. A familiar atmospheric character is presented to those who dwell here. Even without the city, this place has geologic and topographic characteristics that make it an impressive landscape image. These characteristics may have been a contributing factor in the choice of this site to create the original settlement years ago.

The constructs of the city drastically alter the image of this landscape. Even this particular perspective, is a product of the city. The blanket of urban fabric draped over the hills and mounded up in the core creates an image that compliments and contrasts with the natural foundation. Set upon the natural landscape we see buildings of all kinds: public buildings, schools, churches, and hospitals. A cluster of high-rise office buildings surround the Carew Tower’s summit to create a mountainous urban landscape with deep caverns and sheer cliffs. These buildings include hotels and office buildings, city hall, the courthouse and jail, train terminals, warehouses and factories, stadiums,
arenas, and, of course, many residential buildings. Each one provides a formal architectural contribution to the image of the city. Even the atmosphere with its urban haze is an alteration to the natural landscape image and a by-product of the city. The heat island and the changing reflectivity of the surface make subtle alterations to the image of the atmosphere and affect local weather patterns. And finally, we see the infrastructure. The highways and bridges, parking lots, parks, antenna towers, water towers, storage containers, docks, levies, train yards, and all of the vehicles that use these systems. We cannot deny that infrastructure makes up a large part of this image and is integral to the city. Within this landscape many water towers can also be seen. The historic water towers located on Mt. Adams and Mt. Airy can be seen to the east and north, while in the south there are several steel tank water
towers perched on the tops of the hilly landscape.

The implementation of this thesis is not necessarily about the aesthetic of infrastructure in general, but the meaning of the image of infrastructure within the context of a particular urban culture. If infrastructure is not at first functional, then it becomes something else; an historic artifact, like the abandoned subway tunnels underneath the streets of Cincinnati. These ruins are objects of archeological history meaningful to what it tells us about the past, but they are no longer infrastructure.

This thesis addresses the image of infrastructure within the urban environment. It has identified an infrastructure that, due to its functional requirements, cannot be concealed from view or tucked away underground. This infrastructure is that of the water system. In order to have flowing potable
water to meet our needs throughout the city, we use a system of water towers. These towers hold a supply of water as a reservoir to draw down during the day and refill at night. The reason for the tower is to provide the pressure to the water system for purposes of delivery and flow.

From the writings of Kevin Lynch, we can draw upon his ‘image of the city’ to understand the features of the urban that create an imagable landscape. From the theories of brand marketing we can think of a city as a status commodity that fulfills an image of the self. That brand image of the city can be manipulated in ways that lay the psychological foundation for the perception of the city as an aspirational commodity. From the writings of Barthes we gain an understanding of the ‘panorama’, the broad understanding of a city within the mind of the citizen. This is not only an image of simple visual memory, but an embodiment of the cumulative understanding of that urban place with deep unconscious levels of meaning. These sources give us a basis to create a general vocabulary for producing an image that is deeply evocative. With these tools at our disposal, this thesis has chosen the city of Cincinnati to be its test subject.

As established in previous chapters, the design of infrastructure is the equivalent to the design of a mechanical system to a building, but at the scale of a city. It can also be compared to industrial design at a large scale. In this sense, the water tower is like a bathtub or sink in your home, but instead, in your city. As designer, the author will be fulfilling both roles to a certain degree, as designer of the system, taking on some of the responsibilities of the urban designer and urban planner, and as designer of the tower, like the role of the industrial designer who designs a product to be installed into your home. The designer is taking on the role of architect of the city by proposing a design that affects the overall character of the city, while also designing the individual object customized to a particular location.

The site at the larger city scale is not necessarily restricted by municipal boundaries, but is better defined by that which can be seen from the panorama at the city center. The ‘legibility of the city’ according to Lynch and the ‘mind’s eye perspective’ described by Barthes are also important. We also have the element of City Branding. Granted, several municipalities within this panorama are often in competition with each other to capture a larger share of
the local economic system. We also know that the panorama is not capable of viewing the entirety of the Cincinnati municipality, as well as the many surrounding municipalities that identify with the Greater Cincinnati Region. The panorama is chosen as the boundary because it represents the symbolic center of the Cincinnati Region and is intended for two audiences. The first is the much broader national and international community, for which the resulting image experienced as a tourist in a physical sense or as a cyber tourist, is intended to create a unique experiential memory as a tool in a public relations effort to brand an improved identity for the city. The second audience is the regional and local audience. This audience is the one that experiences the city and creates strong emotional bonds that tie to memories of dwelling. The new system is intended to serve as a system of landmarks to increase the legibility of the city in order to strengthen and deepen those emotional bonds and engender a sense of local pride.

So at a large scale, the site is that which can be seen in the near distance from the panorama at the summit of the city center. This large city area will be analyzed and a system of new water towers will be derived from this analysis. The designer will propose a system of new water towers. Then the project will focus on the smaller scale and single out the site of two individual tower locations. The design of these towers will be developed in detail.

The “Downtown” of Cincinnati is the anchor of the city. This anchor rests in the river valley and is wrapped on three sides by steep hills and the river to the south. Like ancient Rome, Cincinnati is thought to be built on seven hills, although there are many more than 7 hills in Cincinnati. Cincinnati has 15 “Hill” communities (Bond Hill, College Hill, Crestview Hills, Greenhills, Indian Hill, North College Hill,
Oak Hills, Paddock Hills, Park Hills, Price Hill, Seven Hills, Villa Hills, Walnut Hills, Western Hills and Winton Hills) and nine “Mount” communities (Mount Adams, Mount Airy, Mount Auburn, Mount Carmel, Mount Healthy, Mount Lookout, Mount Repose, Mount Washington and Mount Zion). Many of the hills and mounts make for wonderful vistas of the city. Because the city is located in a large central valley surrounded by many geographically identifiable hill communities (with their unique view of the center and the other communities), this is a natural construction that supports a strong mental image and legibility of the city. This creates strong connections to the unconscious understanding of place and a well established sense of local community within the greater urban area.

Layers of limestone and shale make up the bedrock of the Cincinnati region. This bedrock, about 450 million years old, started out as layers of bottom sediment in a sea that covered the area during the Cincinnatian Epoch of the Ordovician Period. Since that time, the sea has retreated and the landscape has been carved out by hundreds of millions of years of weathering.1

1 Hedee, Stad., *The Geology of Cincinnati*, 01
The City of Cincinnati has a very prominent natural topography. The city center is located at the south bend of the Ohio River as it snakes through the hills from east to west. Two other rivers systems drain into the Ohio in the area of the urban center; the Mill Creek from the north and the Licking River from the south. Over the years, the flooding cycles and natural shifting of the river bed has carved out a wide valley on the north and south sides of the urban center. The tributary river systems create valleys of their own that spread open upon their approach to create a crescent shaped hillside boundary that embraces the urban core. The natural boundaries that contain the city center on both sides of the river create numerous vantage points of the city. These boundaries have the effect of enclosing the city and provide a perceptible space to gauge distance, scale, and solidify a sense of place. The surrounding hills are populated and the many hillside neighborhoods identify with a particular panoramic image of the city.

The image is a birds eye perspective looking toward the southeast. The lower image shows the individual tower sites which will be located on top of the two hills farthest to the North of the crescent shaped valley. These hills punctuate the ridge lines on the east and west side of the valley and create a compression point before the mill creek valley widens again and extends to the north. Between these two hills is an important piece of infrastructure, the Western Hills Viaduct. This viaduct spans the industrial corridor of the city and makes a symbolic connection between east and west, which are distinct cultural regions in the population of the city. Several major transportation corridors travel within the valley and pass between these hills: Interstate High-
way I-75 is a major north south connector between Detroit, Michigan and the southern tip of Florida. The path of this highway will demarcate the symbolic entry point to the urban center, just before the central business district of high-rise towers is revealed to the traveler. The city center has three major local connections: Spring Grove Avenue, Central Parkway, and State Street. Two of these, Spring Grove and Central Parkway, are major routes of travel into the downtown area. Central Parkway is a tree lined boulevard that is primary a civilian commuter road and Spring Grove is a primary service route that connects to the train yards and industrial corridor. State Street connects the low lying neighborhoods on the West side of the industrial corridor. Expansive train yards exist to the north and south of this site.

The Western Hills Viaduct is Cincinnati’s largest viaduct and one of the city’s most distinctive structures. It crosses the Mill Creek Valley in a complex double-deck arrangement connecting Spring Grove Avenue and Central Parkway to the east with Queen City and Harrison Avenues to the west. The Mill Creek Expressway extension at the east end of the viaduct provides ac-
cess to interstate 75. This was built in 1930-32 as part of the Union Terminal project. The Art Deco structure features square, integral lighting posts and two arches, the larger one over Spring Grove Avenue and the smaller one over the Mill Creek.

Knob Hill is the site on the western side of the industrial corridor which is located within the Mill Creek Valley. The most distinguishing topographical feature of Knob Hill is its spiraled plateau. During the construction of Union Terminal, this hill was quarried for its limestone which was used for the foundation of the massive building. The shape remains today. An access road spirals around the hill to the top center. Several warehouse buildings exist on this hill as well as the offices of the regional Department of Homeland Security. We also find the location of a television broadcast antenna tower for WXIX and several cell phone towers. The specific site for the water tower here is the pinnacle plateau of this hill.

Fairview is the site located to the east of the industrial corridor and Mill Creek Valley. Central Parkway hugs the bottom of this hill as it jogs to the east toward the center of the city. McMicken Avenue parallels Central farther up

2 www.cincinnati-transit.net/westernhills
The map highlights the hill areas in green. The pink ovals represent the general geometric structure of the valley. Potential water tower sites are marked with a red dot. The major axis of the ovals are highlighted and their points of convergence represent a site location of increased visual importance.

The individual sites are show here in more detail. The site on the left is known as Knob Hill and the site on the right is Fairview.
the hill and there are several other residential streets nested into the topography of the hillside. McMillan Avenue snakes up the side of the hill to make the connection between the viaduct and central parkway to the University of Cincinnati campus district at the top of the hill. The neighborhood of Fairview occupies the top of the hill while Fairview Park provides a green belt of vegetation for recreation and some excellent views of the City. A one way road connects McMillan Street to the north of the park to Ravine Street to the East of the Park. The specific site for the water tower is at the south western most point of the park at the sharp bend in the road and an overlook location.

Program

The following is an idealized narrative based on current realities within the recent political and development history of the city. The city has struggled with its identity from within and from without. The urban core, the primary identifiable contributor to the city image in the mind of its citizens as well as visitors, had been for a long time, little more than a business hours white collar commuter working house and a marginalized ghetto. Efforts by the city leadership have made great progress to change the fundamental demographic of the urban core, to make it habitable for a broader spectrum of the city’s population and to be an attractive place to, as their slogan goes, “to live, work, and play”. Much building has taken place, the ghetto is developing into an attractive historic urban neighborhood and the business district is no longer a place for business alone. The new population of city center inhabitants are hip, sophisticated, socially engaged, intelligent professionals that are making the place a 24/7 lively and active community. New restaurants, bars, and retail locations are opening up every day. The first wave of condominium renovations is complete and several new residential towers have been erected. Available spaces are running out and new developments are under way. The cities art community has found new patronage in the new professional population and there is a vibrant arts scene. The population of the city center is rising and is expected to rise even more, but the rapid growth presents a problem.

The infrastructural systems that have serviced the city are for one, antiquated and deteriorating, and secondly, were not designed for the population density and daily service requirement that the city engineers now predict. The city has found it necessary to update the existing water system and increase the service capacity with new water infrastructure including a series of new
05. IMPLEMENTATION
water towers. The expected increase in tax revenue justifies the new system elements. The questions now becomes where will they be located and what will look like. Initial attempts to design a traditional system have been met by much resistance from the city’s residents. The leadership, in an inspired moment, realizes that the implementation of this system will need a new strategy. They have identified that the problem is one of aesthetics and typical towers will not do. Instead of approaching it as a problem that needs to be circumvented to achieve its functional ends, they see it as an opportunity to draw upon the artistic talents of the professional design community and produce a system that better represents the new developments of the city with a forward looking and optimistic attitude. They call for a design competition open to the public for the creation of an aesthetic image of the new water system.

The basic driving concept behind the design is to create a water tower like no other, a completely unique structure, and a monumental work of sculpture. The towers are to be conspicuously visible and consciously aesthetic. The towers will be a network of landmarks to improve the legibility of the city as well as create symbols that contribute to the cities new brand image and distinguish it from other cities around the globe. This new image will not be derived from an existing set of symbols, imagery, cultural references, or local folklore. This will not represent the city in such a direct way. It will be a new symbol that sets into motion a new path of progression and represents a shifting self-conscious image.

Design

The initial design concept, given that the structure is the prominent im-


age representing the water system, is to try to create a formal image of water. While being fully aware of the tired and potentially bogus concept, I pursued this approach initially with some reluctance. My thoughts on a design were labored over in sketchbooks, on scraps of paper and trace. These efforts produced geometric formalism, structural expressions, and fluid sculptural forms. I was ultimately unhappy and a little embarrassed with the results and I felt compelled to separate myself from the direct conception of the form and to remove my hand from the process, thus segregating an area of my subconscious from the production of form.

I enrolled in a sculpture foundry class through the fine arts department to complement my study of form. The primary medium for creating metal sculpture is to create a wax sculpture, encase it in a plaster mold and using the lost wax process, fire the mold to produce a replica void space in which the molten metal is poured. The use of wax as a sculpting medium would prove to be very influential on the design process because of its unique properties, particularly its relatively low melting point. This allowed me to work directly with liquid to continue the initial design concept of exploring fluid form.
while keeping the derivation of an image separate from my own subconscious imagination. Working in this mode, I did not attempt to sculpt by hand and create some sort of naive simplistic shape.

Wax melts at a relatively low temperature and becomes a thin liquid. I began to experiment with the phase transition from liquid to solid in order to ‘capture’ a fluid form. The first piece I produced was a three part sculpture in bronze that was created by pouring liquid wax onto an armature and letting it drip off and solidify. This was done repeatedly until the wax built up a substantial mass of stalactite drip shape. The cast form was finished flat on the bottom intending to rest in the inverted position so that the drips extend upward. The image of this piece was reminiscent of eerie gothic influenced art. This form seemed to gesture with irksome psychological prods, which I found to be interesting. The piece does not attempt to directly represent a model of a water tower design idea, but I did like the thought of using these drip shape tapered forms as the basis of a support structure. I sketched out a few conceptual drawings but I was having trouble with the relationship between the container and the support system. This relationship needed to be more connected; a singular gesture.

There was one concept that I would have liked to pursue, which was that of pouring the wax over a sphere, letting it drip off all around and the stalactite legs would become the supporting structure. I would have continued this concept but I was having trouble deriving a system of construction. There was also a relationship to imagery that I found did not properly represent fluid form. The drip formed structures looked like stalactites and stalagmites found in caves or a sand drip castle. While these shapes were created through a liquid process, they ultimately represented a solid form within our vocabulary of visual imagery. I was also thoroughly distracted by the results produced in further experimentation.

At this point, I was also trying to develop an argument regarding the concept of the container. I was searching for the
form of liquid, but as liquid it takes on the form of the container. It did not make sense to me to capture a formal expression of liquid form in the phase transition and then try to recreate basically a shell of the same form to contain the liquid. The container as shell that mimicked the liquid form did not seem to work.

Liquid as we know it, or more specifically water, since we are land dwelling creatures, is like many things. In most cases, we understand it to be a flat plain. Other times, when it flows, it follows a snakelike procession. This flow can have texture of waves, ripples, eddies, etc. Most commonly though it flows down to the lowest point and sits. The seas and oceans are expansive. Looking out over water to the horizon we experience pure and uniform shape. This contrasts greatly from most of the earthen environment. The form of the sea is a diametric opposite, perfectly geometrically uniform on one side and then filling and concealing the great mountain ranges, vast and fantastic landscapes of the earth under the sea. When we see it, it conceals its true form and becomes something serene.

The next experiment created forms that were very far from serene. These forms were downright revolting, violent, and destructive. This was a form of liquid that I had never seen. The first sculpture was created through a slow phase transition from liquid to solid. This new experiment made that transition instantaneously. Instead of pouring the wax into the air, I poured the wax into cold water. The first attempts used the brown casting wax, the typical sculpting medium in the sculpture foundry. The forms produced were truly wild and were reminiscent of the creatures from the Alien movie series. The images produced here were so complex that I simply had to see more.

These forms were generally agreed to be ugly. This reminded me of the work of Hernan Diaz Alonzo; whose experimental digital architectural forms have many similar characteristics to the forms created in these wax experiments. He also intentionally produces forms that are ‘ugly’ in order to question the aesthetic concept of beauty. Also similar to Alonzo’s work, I had trouble finding a way to recreate or adapt these forms into something that could possibly be built.

The forms were too complex to recreate directly, and also they were so pitted with cavernous voids, flakes, shells, etc., that it would not be very useful in the programmatic requirements of a water tower. The tank will need at least a marginally contiguous volume to contain the water. At somewhat of a
loss, I began to simply sketch the forms directly and then create slight abstractions that may be translated into formal elements of the water tower structure in a piecemeal fashion. In a sense, deriving a kit of parts out of which I could recompose and assemble a tower. This produced interesting sketches, and potentially a conceptual strategy that I would explore again in the future, but not in this project. I also wanted to remain persistent in the methodology of not drawing. These results were ultimately discarded. Without a solid solution to these problems, I continued to experiment with the wax in the hopes that a suitable form would emerge or one of the forms would inspire a new structural or construction concept on which I could move forward.

After the first form was created, I immediately began to proceed in a loosely structured scientific method in order to learn the techniques that would produce a form with particular characteristics. The first session used a measured amount of liquid wax, poured from various heights; from inches, to a few feet, to over 30 feet. The later atomized the pour into droplets which then rained down on the water surface. This produces basically a thin sheet of half exploded bubbles, an interesting texture, but not useful. In later sessions, I created a formal lab setting and photography setup in order to better record the technique and results. In this session I continued the scientific
method approach and added several variables to the test group. I used 3
different kinds of wax. I varied the height of the pour. I varied the amount of
the pour. I attempted to pour the wax into cold oil instead of water. I added
oil to the wax mixture to create softer waxes. I attempted a wax pour under
water, by uncorking a container of wax under water and letting it flow upward.
The wax solidified instantly and capped the container. I purchased a mag-
netic solution mixer to create a whirlpool in which to pour the wax. During all
of these experiments, I collected, dried, and placed them on a background of
1 inch grid and photographed the results. I particularly liked this collection of
images; unfortunately it did little to move me forward in the design process.

I was enjoying the experimentation. The chance combination of physi-
cal phenomena coming together through the combination of a thousand in-
stantaneous conflicting forces to create such a varied and completely unique
shape was enlightening. Unfortunately, I was not able to translate the objects
into a usable project. I did not have a volume to hold the water, and I con-
tinued to struggle with the concept of the container. Fortunately, something
happened, by complete accident, which set the design toward its final form.

I was accumulating a large amount of wax objects. I had taken the
photographs which are a form of preservation, but I wanted to preserve the
physical objects because I thought they were really interesting. Some were
already starting to break because the thin and spindly wax forms were very
delicate. I would have attempted to cast some in bronze, but unfortunately, I
no longer had access to the sculpture foundry. This approach would not have
been the best preservation method. Due to the size and intricacy of the forms,
it would have proven to be a poor foundry reproduction. I decided to utilize
another material that I had recently been experimenting with, casting resin.

I had produced a few resin sculptures that were basically rectangular
panels approximately one half inch thick that encased hundreds of the 17
year Cicada’s that had plagued the region during the previous summer. I
encased the cicadas for the same reason, to preserve them so I could look at
them, remember them, and have them when the living Cicadas were no lon-
ger around. I knew that if I didn’t preserve these wax sculptures, they would
deteriorate, collect dust, melt, break apart, etc. I decided to choose a handful
of wax objects that I found particularly interesting and encase them in resin.

Like I had done before with the Cicadas, I poured a thin layer in the
form, let it set up, I then poured another thin layer, set the wax objects in place
and let it set up to hold the object, then I filled the form to encase the entire object. This pour was thicker than any I had attempted before and I had only just begun to work with this medium. I had also not properly adjusted the amount of catalyst for the third pour. I made one batch, and put it in the freezer to slow the reaction while the first two layers set up. The third layer was considerably thicker than the first two, and you are supposed to reduce the amount of catalyst for thicker pours. The mistake proved to be catastrophic for the purpose of physical preservation, but invaluable to the design concept and the preservation and expression of formal shape without that physical object.

The resin produces heat as the catalytic reaction occurs. Heat also speeds up the catalytic reaction. Because the ratio of catalyst was too high in the third pour, the catalytic reaction occurred much too quickly and produced a lot of heat. I was not aware of my mistake right away. Everything was proceeding as usual until I noticed that the surface of the wax shape had turned silvery and reflective in some areas. I thought the wax had entrapped an air bubble that was releasing after the initial solidification. Then I noticed that the wax was actually melting. Fortunately, the solidification of the resin had occurred so quickly, that it preserved the shape of the wax before the heat began to melt the wax. The wax continued to melt, and then it began to bubble. The bubbles grew faster until it produced a steady boil. The form was enclosed at this point creating a solid airtight chamber and the pressure increased within the void to the point that it cracked the resin. The cracks multiplied as the wax continued to boil, and then a fissure reached the surface of the form and it erupted with boiling hot wax. Almost all of the wax was ejected during the eruption. In the aftermath, I surveyed the damage. I
was pleased to find that the form of the object was preserved in intricate and easily viewable detail, but the original object was completely destroyed. The object no longer mattered; the form was what I found interesting. The medium was not important. This happenstance also helped my troubled concept of container. I wanted a container that revealed the form, not one that simply created a shell or wrapper. Like the ocean that conceals the vast mountain ranges of the deep in a perfectly flat surface, I wanted to see those mountains and preserve the purity and serenity of the flat ocean.

At this time, a friend directed me to the work of Andreii Molodkin. He had stumbled across his art in a Chelsea gallery during his last work term in New York. This work turned out to be very similar to the concept I had literally created by accident. Also in resin and uses the lost wax process, he produce sculptures in the void. His sculptures are formally classical, very well detailed, but the form is rendered by the void in the resin block. This is the very antithesis of the production method utilized in casting metal sculpture. He also pumped crude oil through the sculptures, I think as some sort of anti-oil political gesture, but for me it was a useful parallel to my project; the liquid container. The crude oil added a layer of color and thickness as well as changing the surface characteristics of the form as it filled and drained with the oil. The conceptual design planets were aligning and I had no choice but to proceed.

From here I made the decision to recreate in some way the product of the failed encasement of wax object in a size large enough to be a water tower. The problems were many but I now had a concept that I could develop into the final product. I chose one of the wax forms to use as a base
for the final formal product. This object was a relatively compact form with fewer projections, layered shells, flakes, or pits. I thought it would make a decent container to hold water without too much complication. At this point I needed to convert this shape into a digital form so that I could manipulate it with 3d modeling software. I lost a little formal purity in this translation, but the approximation simplified the form a little, which increased its usefulness as a container. I did not have a 3d scanner at my disposal, so I invented a crude technique that achieved a workable result.

The method that I decided to use to translate the object into 3d was to create a series of cross sections and then to stretch a nurbs skin over these cross sections. I decided upon this method after an experience I had recently with a friend who was a PhD research scientist on the medical campus. He was researching the olfactory gland in mice. Each mouse was tested and then the gland was removed. He would freeze the gland with dry ice and slice it into super thin sheets to mount onto slides for viewing under a microscope. He recently procured a rabbit brain from another researcher who was working on rabbits. I convinced him to let me slice the brain into cross sections. He showed me the technique and I sliced the brain into thin sections and arranged them on a sheet of Plexiglas in order after slicing through from front to back. I then displayed the entire brain in a series of 2d cross sections, from which, if I wanted, I could study the interior structures of the brain and recreate that which was previously concealed.

Like the brain, in order to access the cross sections of the physical wax object, I needed to destroy it by physically slicing it into sections. I could have done this directly, but the cross sections at some points produce separate pieces. Orienting the object for consistent uniform cutting as well as maintaining that orienta-
tion for later processes would also have been difficult. I therefore encased the object, which was made of red and brown wax, into a block of white wax. Then I cut the wax block with a chop saw to produce the cross sections. I then traced the cross sections by hand onto tracing paper and then scanned these tracings for import into the modeling software. I retraced the images in the modeling software to produce the cross sections. Once I had the cross sections, I arranged them in the 3d environment at their previously physical locations relative to each other when the object was whole and stretched a skin over the object. This object would form the basis for manipulation within the 3d environment and for all products of physical models in the remaining design project.

Once the object was complete within the 3d environment, I began to manipulate it with various deformations. The final object that would become the form of the water chamber was a simple elongation of the original. This was chosen because I wanted to achieve a certain height level for visibility as an icon and landmark as well as for the programmatic reasons of adequate elevation as a water tower. To satisfy these criteria, I could have simply elevated a squatter block up onto a separate support structure, but this was the
tower/base relationship that I had disliked throughout the process. I wanted
to create a more singular sculptural object. I also wanted to avoid the lollipop
or golf ball on a tee tank in the sky configuration that is typical of many water
towers.

After the form was decided I also chose to use a resin substance as
the physical material for the structure and container. I researched the physical
characteristics of many plastics and resins. I decided that an epoxy resin was
the best choice. This resin is chemically inert and UV resistant. It will not fade,
lose clarity, discolor, or deteriorate when exposed to UV light or acids. Resin
is capable of withstanding water erosion and is often used as marine coating
on ships and other sea craft. Also used in food processing as a can liner, it is
safe to be used to contain potable water. It is durable with high psi strength,
is easily cleaned, and is non conductive. Epoxy resin also has a relatively low
catalytic temperature and ratio of expansion during the curing process, this
will be essential in controlling the dimensional stability of a large pour. Epoxy
resin is also inexpensive and available in large quantities.

The next development was the construction strategy which would influ-
ence the detail of the form. The tower would be made
of 20'x20' cubes of resin. There would be 4 cubes
per level and 7 levels making the tower a rectangular
prism that is 40' across and 140' tall. Each resin block
would be constructed in an enclosed warehouse manufacturing facility lo-
cated on the site. The resin pouring procedure would have to be carried out un-
der tightly controlled environmental conditions. This step would also produce
harmful vapors which would have to be collected and not allowed to escape into the local atmosphere.

Each block would have a negative space that would create ¼ of the cross section and interior wall of the container. Perimeter scaffolding would be erected to create the outer support structure. The information from the digital model would be used to determine the location of an inner scaffolding structure that would approximate the location of the void space within the block. The scaffolding structure would then be fitted with brackets and shelves as supports for the rigid foam blocks that would replicate the surface. These foam blocks will have been CNC milled to be precise large scale replicas of a section of the digital model. The assembly of these blocks will create the continuous surface of the fluid form digital model. A field of 6” diameter stainless steel tubes, spaced at approximately 3’, will be secured to the foam surface protruding outward from the surface 2’-3’. 1” steel cable will be strung between the ends of the protruding steel tubes creating a web of steel reinforcing around the fluid surface. The cables will bundle together and extend through the steel tubes, through the foam, and into the inner scaffolding with extra length to be secured to a central core in final construction. The penetration created by the steel tube and cable bundle will be sealed before the pour begins. The foam block will be coated with a liquid latex rubber to provide a continuous and impervious surface. The exterior scaffolding structure will be lined with ½” thick sheets of steel. The seams will be welded and ground to
a continuous smooth surface. The entire interior of the mould will be sealed for water tightness. The entire surface will be coated with release agent. The epoxy resin will be poured slowly and continuously to create a resin transparency without horizontal reflective striations. When the pour is complete and enough time has elapsed to allow significant curing of the block, the exterior scaffolding will be dismantled. The steel form-work will be removed. The inner scaffolding structure will be dismantled. The foam blocks will be removed. The entire surface of the block will be polished and buffed to a transparent finish.

The finished block will be rolled out of the warehouse on steel tracks to
the tower site. The tower site will have a scaffolding structure housing an elevator/crane mechanism that will hoist the block from the ground and position it on the tower. The block will be set on a large gasket pad to be made of 6” thick transparent silicon. This pad will also be located on the vertical meeting surfaces between the blocks and will provide a water tight seal as well as the necessary structural flexibility.

There will be a central structural steel core to anchor the blocks in place. The geometry of this core will be cylindrical overall and will be composed of a pair of double helical spirals revolving in opposite directions. The core will be prefabricated in 10’ sections. The steel cross sections will be T shaped. At every 10’ of elevation there will be a steel ring band that meets at the intersections of the helixes. It is at these joints that the bundled cables protruding from the inner surface of the cavity form will be attached.
The cables will be tightened in small increments until the necessary tension is achieved to create the water seal at the vertical joint locations as well as the structural stability of the tower against lateral forces.
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