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FORGOTTEN INFRASTRUCTURE: The Future of the Industrial Mundane

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FORGOTTEN INFRASTRUCTURE: The Future of the Industrial Mundane

A Thesis Presented for the
Master of Architecture
Degree
The University of Tennessee, Knoxville

Whitney Ann Manahan
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DEDICATION

I dedicate this to my parents who have supported me in every choice I have made. The curiosity, creativity, and work ethic you instilled in me has made this possible. Thank you for helping me follow my dreams and turn my passions into a career. You inspire me daily to work hard, enjoy life, and make the world a better place. I dedicate this and all of my future work to you.

ACKNOWLEDGEMENTS

I would like to thank all of those who have helped make this possible. To my studio mates who have continued to be a source of inspiration and support, both your friendship and collaboration have helped me become a better designer and a better person. I would also like to thank the professors who have taught me, supported me, and put up with me over the many years I have been at UT. To my non-design friends, thank you for understanding my commitment and allowing me to disappear for the last three years during graduate school. Now that I have time to hang out, I promise to talk about topics other than architecture and design (some of the time).

ABSTRACT

The typical cycle of industrial use, disuse, and abandonment is no longer acceptable or feasible. This thesis investigates phased remediation and conversion of petrochemical structures and their respective sites with the intention of increasing both the socioeconomic vitality and environmental quality of the area.

The oil silo is an intriguing object and industrial artifact. Being close to one of these massive structures is captivating and there is something truly exciting and thought provoking about inhabiting a space that was clearly not meant for humans. These are qualities that provide opportunities to connect people with a site and create a place with substance in a way that is unique, thoughtful and long lasting. Millions of these structures exist throughout the world, creating the opportunity for a new typology of adaptive reuse.

Society is currently operating within a pivotal moment in time. There is a global increase of awareness and understanding when it comes to the limited resources available on this planet. Topics such as renewable resources, peak oil, and climate change continue to be key aspects of the global conversation. Reducing consumption, waste, and pollution are of the utmost importance in considering the future of our world. Petrochemical structures around the world may become obsolete in coming years due to the decline in oil dependence and the reuse of these structures will save tons of material from ending up in landfills.

This thesis posits that the spectacle of industrial infrastructure is a catalyst for repurposing and remediating underutilized lands, and that the process of repurposing and remediation presents powerful opportunities for place-making.

PREFACE

The winter nights seem darker and the lights more vibrant. The humid haze of summer evaporates and everything appears more vivid. The drive home from campus takes me under three bridges: the rusted railroad trestle, the concrete arches of Henley Street and the slender steel trusses of Gay Street. The lights of the city skyline appear on my left and the reflected lights of urbanity ripple on the surface of the river to my right. Across the water, more lights appear as a group of silver tanks reflect the vibrant light onto the water below. The collection of structures resembles the character of a small city; densely packed and lit at night. However, there are no lively occupants enjoying the lights… or the river… or the opposing skyline. What becomes of this place when the tanks are empty? What will be reflected in the waters below?

What a wonderful challenge there is! Rarely before has the citizen had such a chance to reshape the city, and to make it the kind of city that he likes and that others will too. If this means leaving room for the incongruous, or the vulgar or the strange, that is part of the challenge, not the problem.

– Jane Jacobs

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CHAPTER 1 | INTRODUCTION

Why the oil silo?

The silo developed as one of the world's first industrial structures. As ancient civilizations progressed, they developed advanced agricultural methods which produced a need for the storage of surplus grains, thus the silo was born. The silo has had many reincarnations since its origins but its form and function have always revolved around the storage of a source of energy whether it is grain, water, or more commonly today, oil. Unlike the aged, idyllic grain silos dotting the countryside, oil silos have less of an identity and a definite shorter life-span. Petrochemical silos are single-use structures that are torn down when they are no longer needed; after which, the demolished material is sent to a landfill. Technologies are constantly evolving and the world's dependency on oil will likely change significantly in the near future which could result in an excess of these structures which no longer serve a purpose. Instead of abandoning these sites or sending the material to a landfill, these structures could be repurposed for a variety of programs. Through investigating potential future uses I believe this idea of reuse could be applied to most any oil silo in practically any location and would be hugely beneficial as millions of these structures exist around the world.

Industrial infrastructure is often seen as undesirable or lacking value and is typically discarded as sites are decommissioned and redeveloped. The tabula rasa approach is a common method for redeveloping post-industrial sites, including oil tank farms. Such a clean slate mentality often leads to a multitude of missed opportunities. Utilizing the existing infrastructure and considering the history of a site at a contextual level helps to develop parameters which call for creative reimagining of industrial artifacts. This proposal strives to demonstrate the benefits of unconventional repurposing as an

innovative way to create unique spaces and places that give back to an area, potentially, even more so than the previous industrial entity.

The massive scale and simple form of the silo make it a unique industrial artifact in comparison to other industrial archetypes. Just as factories, mills and warehouses have been preserved and repurposed these structures can also be adapted and incorporated into the new urban fabric. Based on quantity alone, the silo has become a new typological structure. The simple shape and construction have created a structure that is simultaneously devoid of vernacular traits while still specifically situated on a contextual and regional basis due to population needs and ease of transport. As industrial artifacts, these pieces tell a story about the history of a particular area. That history should not be wiped away but should continue to be an iconic part of a city's past, present and future.

The experiential qualities of industrial artifacts are what make them intriguing. The uncanny characteristics of industry such as the tremendous scale and atypical forms elicit an almost otherworldly experience. This fascination and this draw create the potential for reuse as an exceptional place which may serve as an economic, social and environmental incubator; bringing activity and people to a site that is usually lacking both, in a way that is uniquely different from typical large scale developments.

FIGURE 1. Silo stair and shadow
Grant, S.(Photographer). (1972). Gas storage tank stairs, East Boston [digital image]. Retrieved October 1, 2014 from www.flickr.com/photos/boston_public_library/6851996935/

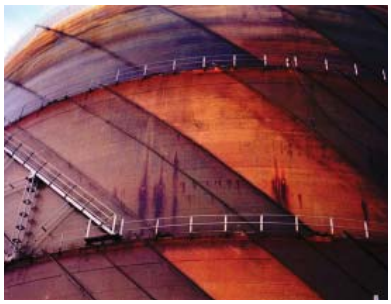

FIGURE 2. Aged exterior of a silo
Kemplen, T. (Photographer). (2011). gasometer [digital image]. Retrieved October 1, 2014 from www.flickr.com/photos/tony_kemplen/5343495339/in/set-72157625604834651

FIGURE 3. View through open silo roof structure to the sky
Stefaan. (Photographer). (2013). oil silos [digital image]. Retrieved October 7, 2014 from www.flickr.com/photos/foantje/9184525255/in/photostream/

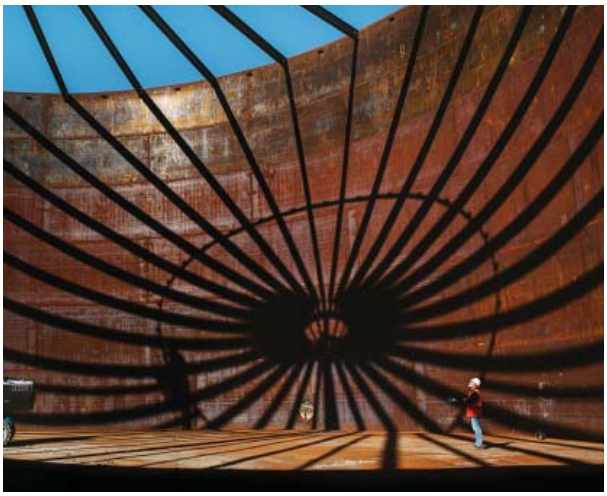

FIGURE 4. Spectacular shadows within a silo
(n.d.). [digital image]. Retrieved October 7, 2014 from http://fortune.com/2014/06/02/kinder-morgan-energy/

FIGURE 5. Interior of an abandoned silo
Rurikssson, B. (Photographer). (2007). Inside a Steel oil tank [digital image]. Retrieved October 1, 2014 from http://trivoxphoto.photoshelter.com/image/I0000oRsS_5dF3kQ

These industrial artifacts are worth saving as a link to the past, an incubator in the present and a long-term repurposing strategy for the future. To support these ideas I will focus through two different lenses: one is a larger view as a general solution and one is a more focused view considering the context of a specific site. The larger perspective will investigate the general benefits of remediating the land and repurposing the existing structures in a way that is applicable to almost any site or geographic location within our vast petrochemical network. The more focused lens will look at the idea of phased redevelopment and its potential cultural, economic, and environmental benefits, while remaining contextually appropriate and site specific to a location on the south riverfront in Knoxville, Tennessee.

To help frame the overall issue I will first define and contextualize the terms “post-industrial” and “place-making” in relation to adaptive reuse and this proposal. I will then begin looking at the broad view by discussing the range of site typologies among the United States’ petrochemical landscape. I will narrow the focus by discussing the concepts behind potential program, benefits, and phasing approaches. Finally, I will transition to the site in Knoxville to discuss how these concepts should be applied in a way that is specific and contextually appropriate for the site, city and region.

CHAPTER 2 | POST-INDUSTRIALISM

The development of Post-Industrialism

What is post-industrial? Why is it historically, culturally, and architecturally important? The typical use of the term "post-industrial" in architectural discourse refers to vacant sites and structures which were once used for industrial purposes. These areas are typically referred to as brownfields or greyfields, meaning they require the clean-up of toxic waste and remediation of soil and water before redevelopment can take place. This added time and expense is often a deterrent for development causing many of these sites to continue to sit barren and vacant. As a profession, architects tend to use "post-industrial" in relation to a physical place or an overall characteristic resulting from industrial land use. However, the term originally developed as a sociological concept spurred by the initial decline of industry seen in the middle of the twentieth century.

Early in the century, a socioeconomic shift began as industrialization led to the development of a larger and more prosperous middleclass. By the 1960s, many factors had coalesced which led the majority of industrial corporations to expand with additional operations outside of the U.S. Around this time, the number of manufacturing jobs began to decline and service jobs increased creating new opportunities for the expanded middle class.

During the 1960s, the idea of an information based society forming in place of a manufacturing based society became a major topic of discussion among sociologists. Daniel Bell, a Harvard Professor and sociologist, was among those who noticed the shift and became interested in the concept. In 1973, Bell published *The Coming of Post-Industrial Society*, a book which effectively

FIGURE 6. Socio-economic idea of Post-Industrial
(n.d.). [digital image]. Retrieved August 6, 2014 from http://worldwide-news-today.blogspot.com/2011_11_01_archive.html

FIGURE 7. Architectural idea of Post-Industrial
Harris, D.L. (Photographer). (n.d.). [digital image]. Retrieved June 20, 2014 from www.dbhms.com/about/articles/2010/CHshaw.html

predicted the rise of consumerism and businesses based on technology, information, and services. According to Bell, this was the next step in the evolution of industrialized areas of the world.[1] The predictions of the 1960s have, for the most part, become our reality.

It is interesting to look at the origin and social definitions of post-industrialism as opposed to the architectural perspective where it has a truly different meaning. Whereas today architects use the expression to describe physical attributes of an area or building, the original use of the term described less tangible aspects of a culture and economy. At the time Bell was writing, the visible shift was not at the physical locations of industry as much as it was in the public realm with the expanding middle class and the rise in technology. Most of the industrial migration was occurring either within the country, out of urban centers and toward suburban developments, or as an international expansion effort. The United States was declining as a manufacturing mecca, but the physical evidence of that decline would not be seen on a large scale until the late twentieth century and early twenty first century.[2] This, decades after the term was coined, was the time when “post-industrial” began to find its way into architectural discourse.

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1 Veysey, 1982, p.49-53.
2 1960- 1990 manufacturing in the United States only grew by 134% “the lowest growth rate of any major industrial nation outside of the communist bloc” as compared to: Canada +137%, Britain +195%, Sweden +200%, Germany +226%. France + 323%, Italy +375%, Japan +666%. Stearns, 2013, p.239-240.

As the prevalence of these sites has continued to increase in the last few decades, the architectural intervention and redevelopment of post-industrial areas has continued to grow as an important topic of discussion. The 1960s and 70s may have been the hotbed of debate for sociologists and economists discussing a post-industrial society but it took the visual manifestation of post-industrialism for the topic to gain traction in architectural discourse during recent decades. In the same way that many other new ideas come into architecture, it took the work of forward thinking individuals and agencies to bring the redevelopment of post-industrial sites into the spotlight.

FIGURE 8. Decommissioned gas works plant
(1966). [digital image]. Retrieved July 6, 2014 from http://colabradio.mit.edu/gasworks-park-seattle-wa/

FIGURE 9. View of Seattle Space Needle from Gas Works Park
Ezra B.(Photographer). (2013). [digital image]. Retrieved July 6, 2014http://www.tripadvisor.com/Attraction_Review-g60878-d141233-Reviews-Gas_Works_Park-Seattle_Washington.html#photos

The Post-Industrial Landscape

Now, at the beginning of the twenty first century, we see a new connection forming between Architecture and Industry within the context of the post-industrial site. One of the earliest examples which set this path in motion was Landscape Architect Richard Haag's Gas Works Park in Seattle in 1975. Ironically, in 1903, The Olmsted Brothers, one of the first and most highly regarded Landscape Architecture firms in the United States, recommended the site be utilized as a public park.[3] Their recommendation was based on the vistas across the lake to downtown Seattle and the waterfront location on Lake Union which was already a popular recreation area. The land was instead purchased by the Seattle Gas Light Company and was turned into a highly industrialized complex

FIGURE 10. Bike event at the park
(n.d.). [digital image]. Retrieved August 8, 2014 from http://fogwp.org/figures/fat_tire3.jpg

3 Friends of Gas Works Park. http://www.fogwp.org/

for the manufacturing and refinement of gas used for lighting, cooking and heating. The Gas Works plant was closed in 1956 and in 1962 the City of Seattle began a plan to purchase and redevelop the site. By 1972, the site had been acquired by the city and a plan was in place for the redevelopment of the site as a city park.[4] Landscape Architect Richard Haag saw a potential for historic preservation when he learned that the structures on the site were part of the only surviving coal-to-gas plant remaining in the United States. He focused on a natural remediation plan and designed the park around the existing structures and of course the views of the city and the lake. The site itself is a continuous area of research, testing the natural methods of remediation used over the years as well as future plans for energy development and education through technologies such as solar and wind power demonstrated on the site.[5]

Another early example, Germany's Emscher Park, began over a decade later in 1989. The Emscher Park system, one of the largest undertakings of post-industrial adaptive reuse, is an ongoing project connecting forty miles of abandoned industrial towns through a large system of parks and greenways. The sites were once home to hundreds of Germany's Industrial steel foundries and coal mines. After decades of technological developments the industry began to leave the area and by the late 1980s most of the land was

FIGURE 11. Courtyard at Landschafts Park
(2011). [digital image]. Retrieved June 24, 2014 from http://www.landezine.com/wp-content/uploads/2011/08/33-Landschaftspark-Duisburg-Nord.jpg

FIGURE 12. Blast furnace turned gateway entrance
(2011). [digital image]. Retrieved June 24, 2014 http://www.landezine.com/wp-content/uploads/2011/08/07-Blast-Furnace-Park-Cowperplatz.jpg

FIGURE 13. Ice skating on canal
Matthias Duschner (n.d.). [digital image]. Retrieved June 24, 2014 from https://www.zollverein.de/uploads/assets/4f21191b6954984550000024/previews/slideshow_image.jpg

4 Friends of Gas Works Park. http://www.fogwp.org/
5 http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/green-city/emscher-park-from-dereliction-to-scenic-landscapes/

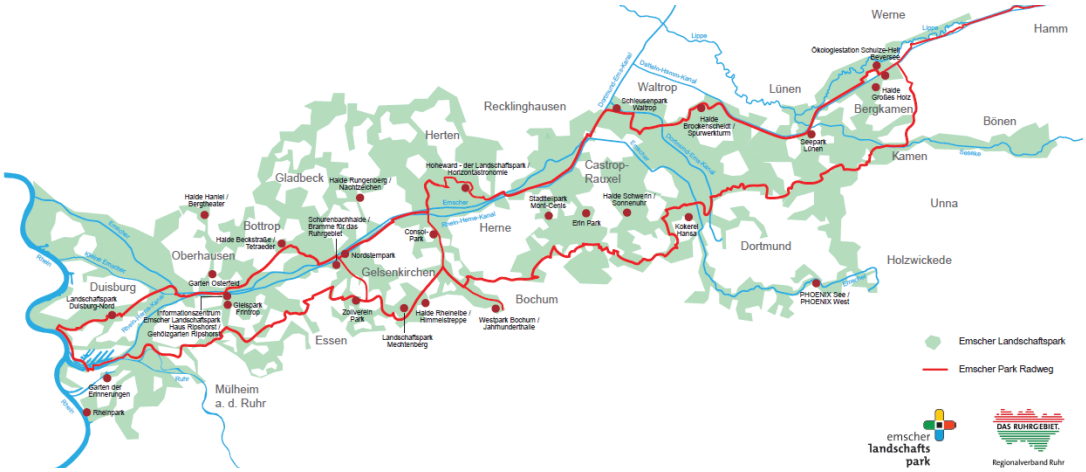

FIGURE 14. Emscher Park System map
(n.d.). [digital image]. Retrieved June 24, 2014 from http://www.phoenixdortmund.de/de/leben/images/elp_karte_bg.gif

abandoned. In 1989 the local government partnered with local and national agencies to prevent the decay and loss of the once bustling area. A ten year plan was installed through the International Building Exhibition (IBA) to create a more natural and sustainable environment for the area which included remediation, renovation and cultural reinstitution. The original ten year plan passed and yet the legacy of the area continues to grow under other developers and agencies. Some of the main goals of the project included creating green connections between the seventeen towns located along the river valley, cleaning and remediating the soil and rivers to help regenerate the brownfield sites, and transforming the abandoned industrial sites into active cultural centers.[6] Landscape Architect Peter Latz designed one of the parks maintaining as much of the industrial infrastructure as possible and now “mountain climbers scale high bunker walls and scuba divers swim in a firty-foot-deep converted gas tank.”[7]

Both of these examples began as landscape oriented revitalization projects focusing on remediating the land and bringing people and activity back to the site while retaining the industrial infrastructure as sculptural monuments of the region’s industrial heritage. Between the late 1990s and the present, the number of post-industrial, adaptive reuse projects has grown rapidly and the involvement of architects has finally increased as well.

6 Rolland, 2005.
7 Emscher Park: From Dereliction to Scenic Landscapes. http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/green-city/emscher-park-from-dereliction-to-scenic-landscapes/

One of the best and earliest examples of renowned architectural involvement in adaptive reuse is the Vienna Gasometers. The Vienna Gasometers were built in 1896 as part of the city's investment in a large scale utility plan. The Gasometers stood as an iconic part of the city's skyline and, in 1981, were listed by Vienna's heritage ministry as exemplary pieces of industrial architecture.[8] They were decommissioned in 1984 but sat partially vacant for only a decade. The Gasometers became best known during this time for hosting rock concerts within the empty shells. In 1995, a competition was released for designs to adaptively reuse the structures and redevelop the surrounding area while celebrating the area's industrial past. Four individual designs were chosen for the gasometers; each one with a notable Austrian architect leading the way. The chosen architects were Jean Nouvel, Coop Himmelblau, Manfred Wehdorn, and Wilhelm Holzbauer. Each architect took a slightly difference approach to the project however they each followed a similar programmatic use and were connected at the pedestrian level. The gasometers have developed a village atmosphere and directly affected the redevelopment of the surrounding area.[9] This kind of project is rare as the industrial structures were lauded from their inception, listed for preservation before they were decommissioned, were never fully neglected or empty.

The Vienna Gasometers project is a great example of a foreword thinking approach by public and private partnerships

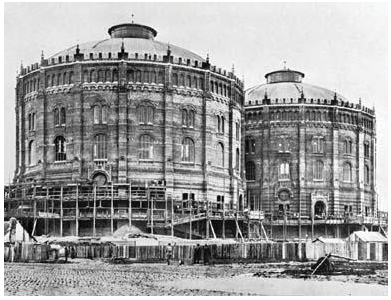

FIGURE 15. Gasometers under construction c.1896
(n.d.). [digital image]. Retrieved June 3, 2014 from http://www.urbanghostsmedia.com/2013/03/vienna-gasometer-four-gas-bells-transformed-indoor-urban-village-complex/

FIGURE 16. Inside Jean Nouvel's Gasometer A
(n.d.). [digital image]. Retrieved June 3, 2014 from http://www.wiener-gasometer.at/en#

FIGURE 17. View into Gasometer C
(n.d.). [digital image]. Retrieved June 3, 2014 from http://inhabitat.com/gigantic-coal-gasometers-transformed-into-thriving-communities/gas-tank-housing-vienna/

8 History of the Gasometers. http://www.wiener-gasometer.at/en/history
9 http://weburbanist.com/2010/07/04/lifes-a-gas-viennas-recycled-repurposed-gasometers/

FIGURE 18. Gasometers after renovation
(n.d.). [digital image]. Retrieved June 3, 2014 from http://21region.org/uploads/posts/2010-09/1284471179_3.jpg

FIGURE 19. Coop Himmelb(l)au's Gasometer B
Frank Stahlberg (Photographer). (October 16, 2007). [digital image]. Retrieved June 4, 2014 from https://www.flickr.com/photos/frengo/2088413953/in/photostream/

to redevelop and preserve part of Vienna's history. The potential of these sites and their industrial artifacts is now being recognized worldwide. Often times these sites are located near city centers, on desirable areas of land, and are already easily accessible considering the need for transportation of products and people. Many cities are now reclaiming these sites along urban edges and areas such as waterfronts as the land is now seen as a valuable untapped resource for urban growth and development. The number of these sites continues to increase as industries continue to vacate the city center, leaving behind the enormous skeletons of industrial infrastructure.

CHAPTER 3 | PLACE-MAKING

What is Place-Making?

The idea of "place" as a concept, as opposed to a physical location, has been part of architectural theory for quite some time. However, the term "place-making" is a relatively new addition to architectural discourse. In the context of this thesis, place-making refers to larger areas of development and redevelopment. These are areas where a local culture does not exist and will be created or where an existing culture must be considered as part of a redevelopment plan.

In comparison, most existing neighborhoods and cities were established over time and their identities were molded through community, growth, leadership, industry etc. Jane Jacobs knew this when she wrote, "a sense of place is built up, in the end, from many little things too, some so small people take them for granted, and yet the lack of them takes the flavor out of the city."[10] When a larger scale project is planned today a sense of identity is important as a starting point as those aspects which typically mold a place over time need a foundation on which to develop.

Beyond the physical design, the main aspects of place-making that must be considered are the cultural implications, the socio-economics of the intended use and users, and an appropriate identity for the specified area. Amos Rapoport, a professor of architecture and urban planning, discussed the importance of analyzing the user as a way to promote the desired character of a development and noted that place-making, "must respond to, and be based on, the wants and needs of the people affected."[11] Rapaport promotes the consideration of place-making "as the organization

10 Jacobs, 1958.
11 Awotona , 1997, p.21.

FIGURE 20. Silo 468 before renovation
(n.d.). [Video Still]. Retrieved May 20, 2014 from www.ldcol.com/286/silo-468

FIGURE 21. Silo 468 after renovation
Harris, D.L. (Photographer). (n.d.). [digital image]. Retrieved May 20, 2014 from http://www.designboom.com/architecture/lighting-design-collective-convert-silo-468-into-public-light-show-11-01-2013/

of space, time, meaning and communication, or as sets of relationships between objects and objects, objects and people and people and people"[12] Regional and urban planning professor, Charles Bohl, approached the idea of place-making from the perspective of regional identity. Bohl stated:

> In planning and designing a town center, urban village or main street development, it is critical to identify at the outset the essential character desired for the place to be created- the total fabric- so that the whole can, in fact, become greater than the sum of its parts.[13]

This is possible when the physical environment is designed to have its own conceptual identity and the user experience builds on the metaphysical environment as well. This sense of identity, experience, and memory in relation to a physical place is exactly why post-industrial adaptive-reuse projects are so widely successful today.

Silo 468 is the most applicable example to this thesis as it was the first adaptive reuse project involving a modern oil silo. As part of Helsinki's waterfront revitalization project, Lighting Design Collective converted an unused oil silo into a public art installation. In 2012, Silo 468 was the first project to kick off the city's long-term redevelopment plan of the former industrial area. The project is

12 Ibid, p.21.
13 Bohl, 2002, p.227.

situated at a prime location, highly visible from the majority of the city, and was meant to serve as a beacon to attract visitors to the redeveloping area. The waterfront revitalization is a part of a larger redevelopment program for Helsinki's urban center as well as its surrounding suburban centers.

The coastal location of the city led to a great deal of industrial development as a port area after WWII. With most of the industry relocating over the last few decades, the postindustrial sites provide ideal locations for urban redevelopment to increase density for the city.[14] Silo 468 now serves as a public space, gallery and event space. The structure also acts as a reminder of the industrial nature of the area as it turns red at midnight for an hour to signify the silo's original use as a source of energy. The ever-changing light mural was created by cutting a grid of 2,012 perforations into the silo. The perforations are backed with 1,280 LED lights and 450 mirrors. The lighting patterns, seen from both the exterior and the interior of the silo, vary throughout the day with the changing sun angle and with the LED lights which are programmed to react to changing weather conditions such as wind.[15]

This method of place-making is such a simple approach. What was once a barren, abandoned site is now a beacon for change, innovation and growth within an already progressive city.

FIGURE 22. Interior of Silo 468
(n.d.). [digital image]. Retrieved May 20, 2014 from http://www.designboom.com/architecture/lighting-design-collective-convert-silo-468-into-public-light-show-11-01-2013/

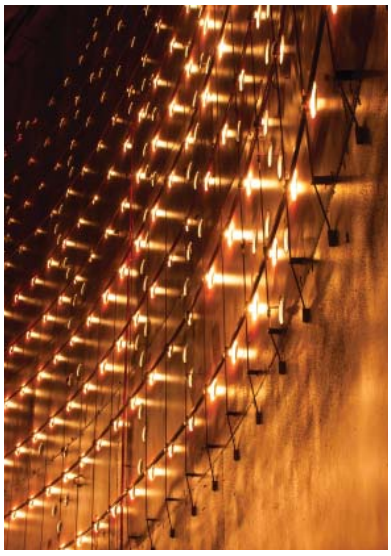

FIGURE 23. Lighting detail
(n.d.). [digital image]. Retrieved May 20, 2014 from http://www.designboom.com/architecture/lighting-design-collective-convert-silo-468-into-public-light-show-11-01-2013/

FIGURE 24. Exterior of Silo 468
(n.d.). [digital image]. Retrieved May 20, 2014 from http://www.designboom.com/architecture/lighting-design-collective-convert-silo-468-into-public-light-show-11-01-2013/

14 Helsinki. http://www.yleiskaava.fi/en/2014/helsinki-residents-identify-thousands-locations-construction-development-city/
15 Uusheimo. http://www.designboom.com/architecture/lighting-design-collective-convert-silo-468-into-public-light-show-11-01-2013/

CHAPTER 4 | A NECESSARY CULTURAL SHIFT

A New Take on Industry & Redevelopment

Most cities developed around these forms of industry and are now growing, paradoxically, by reclaiming these sites. Industry was the backbone of our country's progression and the redevelopment process should take into careful consideration the reuse and preservation of this part of the region's history. The future role of architecture within industry should be a proactive effort to rectify the negative connotation of the post-industrial site. By transforming the industrial artifacts left behind and turning them into centers of activity, we can change the existing perception of an area while maintaining a link to the past.

The next step of the process, which goes beyond this thesis but should still be mentioned, is the consideration of new industrial sites. Most new forms of industry have been separated from the public eye since the middle of the twentieth century. This was due to issues including pollution, public safety and even aesthetics. Thankfully, the industrial sector has seen a great deal of reform regarding these issues and new forms of industry are emerging which combat these problems.

The design and integration of new industrial sites into the existing fabric of cities and towns is an issue that architecture as a profession should be willing and able to take on. A great example of this proactive way of thinking is a planned waste-to-energy plant, Amager Bakke, in Copenhagen designed by Bjarke Ingels Group (BIG). Denmark has many waste-to-energy plants which stems from its small size and lack of available land for landfills. Only 4% of Denmark's trash ends up in landfills, 42% is recycled and 54% is sent to waste-to-energy plants which help generate power for the country.[16]

16 http://www.designboom.com/architecture/big-architects-amagerforbraending-waste-treatment-plant-and-ski-run/

FIGURE 25. Rendering of Amager Bakke Ski Slope
(n.d.). [digital image]. Retrieved October 4, 2014 from http://inhabitat.com/work-begins-on-bigs-waste-to-energy-ski-slope-project-in-copenhagen/big-ski-slope/?extend=1

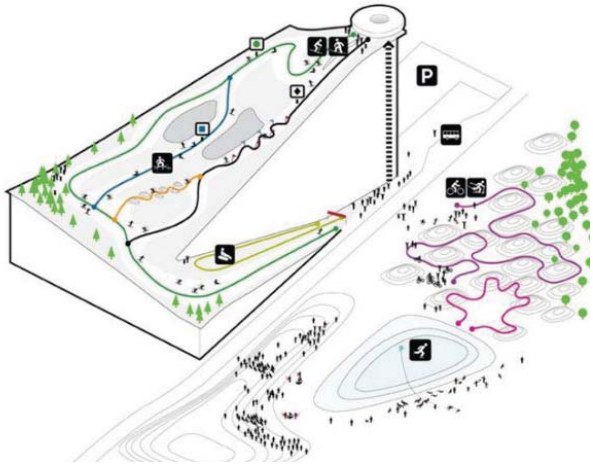

FIGURE 26. Diagram of activities at the slope
(nd). [digital image]. Retrieved October 4, 2014 from http://inhabitat.com/work-begins-on-bigs-waste-to-energy-ski-slope-project-in-copenhagen/big-ski-slope/?extend=1

Compare this to the United States which has almost the opposite outcome for waste, as 54% is sent to landfills, 34% is recycled, and 12% is recovered via waste-to-energy plants.[17]

The firm won the project with a proposal which is not only iconic for the company but also for the city and community. The waste-to-energy plant is located in an area of the city which has very little public activity and no real identity. The design by BIG incorporates a ski slope atop the plant creating a connection from the street level to the top of the factory's smoke stack. Next to the smoke stack, an elevator takes the place of a ski lift and allows views into the factory as the skiers ascend. On the slopes the designers incorporated large skylights which also open up from the factory continuing the visible connection between the areas of leisure activity and those of energy production. The smoke stack also acts as both a functional and an educational tool. Instead of constantly releasing steam, the stack has a special mechanism which releases the steam in the form of a ring and each ring represents one ton of CO^2 emissions as a reminder of the consequences of consumption. The design intent is focused on creating a new center of activity while forming a connection between the community, the factory, and the city's overall sustainability goals.

17 EPA: Municipal Solid Waste (MSW) in the United States: Facts and Figures. http://www.epa.gov/osw/nonhaz/municipal/pubs/2012_msw_fs.pdf

Towards a Post-Petrochemical Culture[18]

Concepts like BIG's ski-slope factory should be the future of industrial design integration. It is important to remember that ideas such as this can also help inform and inspire the necessary intervention of existing infrastructure which is either in use, transitioning out of use, or already decommissioned. The petrochemical sector makes up one of the largest, if not *the* largest, networks of industrial infrastructure in the United States.[19] It is also quickly becoming one of the least efficient forms of fuel even as demand and consumption are increasing. The decline of the petroleum industry is imminent based on the increase of demand and the decrease of supply as it depends upon the exhaustible resource of crude oil.

> While oil production on American soil has decreased, our consumption of oil has increased. The U.S. consumes nearly twenty million barrels per day of petroleum products, roughly 25 percent of the world's total consumption. Ironically, American ideals of independence, mobility, freedom and democracy have been interpreted in the postwar landscape as highways, strip malls, houses, cars, and disposable consumer items, which are now sustained by foreign oil sources.[20]

Predictions of decreased oil production based on the availability of oil reserves began in the 1950s. The peak oil theory was developed by M.K. Hubbert, a geologist, mathematician, and physicist who worked for the Shell Oil Company from the 1940s to the 1960s. With the combined knowledge of statistical principle, the known oil reserves and the predicted discoveries of reserves Hubbert developed, "the concept of 'peak oil' – a finite resource whose production follows a bell shaped curve."[21] Every non-renewable resource follows the same abstract bell curve based on the use and supply of a resource over time. Hubbert's predictions of peak oil occurring between 1970 and 2020 and the subsequent decline following the bell curve have proven to be true up until recent years. New

18 Term "Post-Petrochemical Culture" (Misrach, R., & Orff, K., 2012, p.214)
19 "There are more than 2.6 million miles of oil and natural gas pipelines in the United States that deliver 99.9998 per cent of their products safely and reliably every day." Source: Keystone XL: Environmental Responsibility. http://keystone-xl.com/about/environmental-responsibility/. As a comparison, currently, the Interstate System in the United States is 46,876 miles long. Source: Federal Highway Administration. http://www.fhwa.dot.gov/interstate/faq.htm#question3
20 Misrach, 2012, p. 214.
21 Ibid, p. 119.

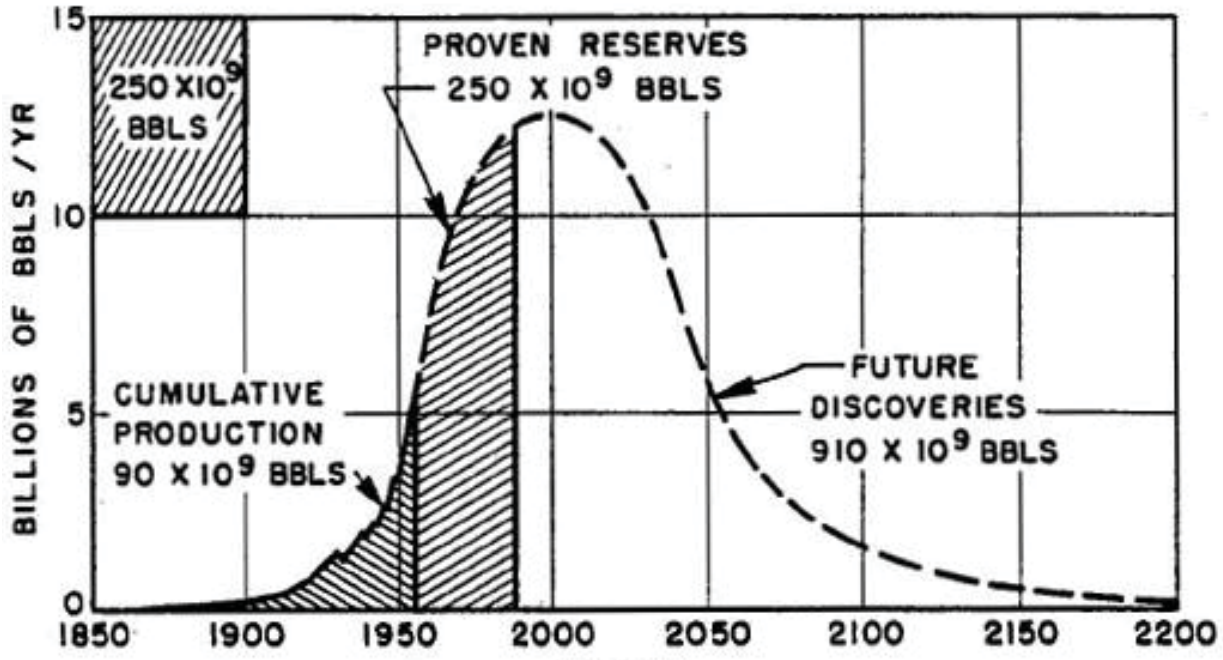

FIGURE 27. Hubbert Curve
(n.d.). [digital image]. Retrieved October 12, 2014, from http://www.hubbertpeak.com/hubbert/1956/1956.pdf

developments in technology such as fracking have caused a spike in the curve as these methods have made previously unreachable reserves available. However, these supplies are even more limited and require more time, energy, and environmental impact than past reserves.

> The basic mathematics of net energy, or 'Energy Return on Investment (EROI), paints a grim picture of our dependency on fossil fuels, and by extension, our whole economy. Experts report that the petroleum sector's EROI in the U.S. was about one hundred to one in 1930, meaning that approximately one barrel's worth of energy was burned to get one hundred barrels out of the ground. By the 1990s the ratio was less than thirty-six to one, and by 2006, it was nineteen to one. The declining trajectory of net energy, which does not even account for localized pollution or long-term environmental damage, is deeply concerning.[22]

The predicted decline of the oil industry makes this thesis a necessary experiment. Unfortunately, a great deal of the petrochemical infrastructure, such as the pipelines, may not be reusable unless they can transition to a use involving biofuels as a part of the "Green Infrastructure" movement.[23] Additionally, there are many proposals for the reuse of decommissioned oil rigs, mostly involving luxury hotels and leisure activities. However, the sheer number of storage tanks around the country (and the world) represents a large percentage of the oil industry's infrastructure which will be obsolete in the not-so-distant future unless potential future uses are explored.

22 Ibid, p.119.
23 Green Infrastructure. http://www.conservationfund.org/our-conservation-strategy/focus-areas/green-infrastructure/

CHAPTER 5 | OBSERVATIONS, BENEFITS AND SOLUTIONS

Typological Models: Urban, Suburban, & Rural

There are few distinguishing characteristics between various petrochemical tanks themselves; however, there are very specific differences between the sites and areas in which they exist. There are three distinct site typologies for petrochemical storage which are: the urban model, the suburban model and the rural model. Each typology has unique assets and constraints when it comes to reuse. Different combinations of program at different scales should be considered for the appropriate uses of each model.

The rural model exists for more remote forms of industry, often agriculturally based, or in locations closer to the source of oil production. I believe these sites are the most likely to stay in continued use even with a decline of oil production; however they are also the most likely to be

FIGURE 28. Rural model
(2015). [digital image]. Modified by author.

FIGURE 29. Suburban model
(2015). [digital image]. Modified by author.

abandoned or neglected if they are decommissioned as they are located in less populated areas and typically not as visible as the other models. One form of reuse which could be considered, especially for agriculturally based areas, is simply transitioning from storing petrochemical products to more sustainable biofuels. The trend among agricultural industries today is shifting toward the use of biofuels largely due to the economic basis of looped production and profit. For example, if a farmer who grows corn switches all of his equipment to corn based biofuel (ethanol) then his new support of bio fuel will in turn support his corn production. This economic balance is a great benefit but more importantly using renewable biofuels will likely have an enormous, positive environmental impact.[24]

The suburban model has similar characteristics to typical suburban developments. Much like suburban housing developments, the availability of land allows for generously spaced tanks with plenty of circulation space between. Suburban model sites are the largest of the three not only in space but also in capacity and number of tanks. These sites are typically serving nearby suburban neighborhoods, commercial centers and industries. Of the three, I believe this model is the most likely to be completely demolished when it is no longer in use which would lead to the largest amount of landfill material. The proximity to both established neighborhoods and commercial centers make these

24 "The greenhouse gas emissions of corn ethanol and cellulosic ethanol are 15-30% and 90% lower than gasoline, respectively. A joint study by the U.S. Department of Energy and Department of Agriculture found that B100 (100% biodiesel) from soybeans can reduce CO2 emissions by 80%, compared to petroleum diesel." Center for Sustainable Systems, University of Michigan. 2014. http://css.snre.umich.edu/css_doc/CSS08-09.pdf

FIGURE 30. Urban model
(2015). [digital image]. Modified by author.

locations ideal areas for added density but at a more comfortable scale. Currently, suburban areas around the country are under scrutiny for their limited walkability, dependence on the automobile, and isolation from urban amenities such as arts and culture. The biggest challenge for reuse with this model would be working with the suburban mindset of aesthetics and tradition. However, I think the sustainability and walkability aspects would be easily understood by all parties and the same sublime spatial qualities would draw people in. The adaptive reuse of complexes such as these could start to form much needed cultural centers for these suburban areas. This application is the perfect opportunity to create mixed-use centers which bring in both commercial and residential activity from surrounding areas.

The urban model is the chosen model for this thesis as these sites tend to possess qualities similar to urban development which is one of my main interests in both design and research. The urban model is relatively small and dense when compared to the other models. The formal qualities of the tanks in the urban model oftentimes resemble a small city with variations in scale and density. These sites typically exist at the edges of cities near transportation routes such as waterways, railways or highways. I believe the urban model has the most potential to be adaptively reused and integrated into the existing fabric of the city. The success of a project such as this could be the catalyst for explorations of reuse in other urban areas and within the suburban and rural models.

Benefits: The Environmental, Cultural, and Economic Basis

Standard development projects are typically based on a capitalist model of expenditures and profit. That model has served us poorly however as it only considers the economic impact of development. The proposed model of phased remediation and adaptive reuse will consider three equally important beneficiaries: the environment, local culture, and local economy.

The environmental benefits begin with the reuse of existing structures and materials. The same bell curve that explains peak oil can be used to explain the world's resources. The more we can utilize existing structures, the more natural resources and energy we can save. This is based on the idea that, "the greenest brick is the one that is already in the wall."[25] This means that less energy is spent demolishing and disposing of building waste, less waste is sent to landfills, and less energy is spent on new building materials and new construction.

This phased process also focuses on long-term bioremediation of the site. The standard methods of site remediation include removing contaminated soil and placing it in a landfill or toxic-waste dump and bringing in new, clean soil to build upon. Another option is to cover the polluted soil completely, typically with pavement or concrete, to prevent human contact with any toxic materials. Both of these solutions are quick fixes that do not consider the long-term issues. These solutions do not reduce the pollutants or keep them from leeching into ground water and affecting surrounding ecosystems, including human habitats. Bioremediation uses the natural metabolic processes of plants and microorganisms to digest and clean contaminated water and soil. This process is eye-opening to the amount of destruction we have caused our environment and yet the tiniest organisms are still able to reclaim and stabilize their surroundings. This is the larger message we should be taking to heart.

The long term environmental impact must be considered as well. Throughout remediation, redevelopment and future use, a site should be utilized as a tool in and of itself. A site is not simply a set of property lines, combination of landforms, or a series of obstacles in which we must fight to build. The landscape should have program and functions which are part of the bigger picture. It should

25 Alter, 2008.

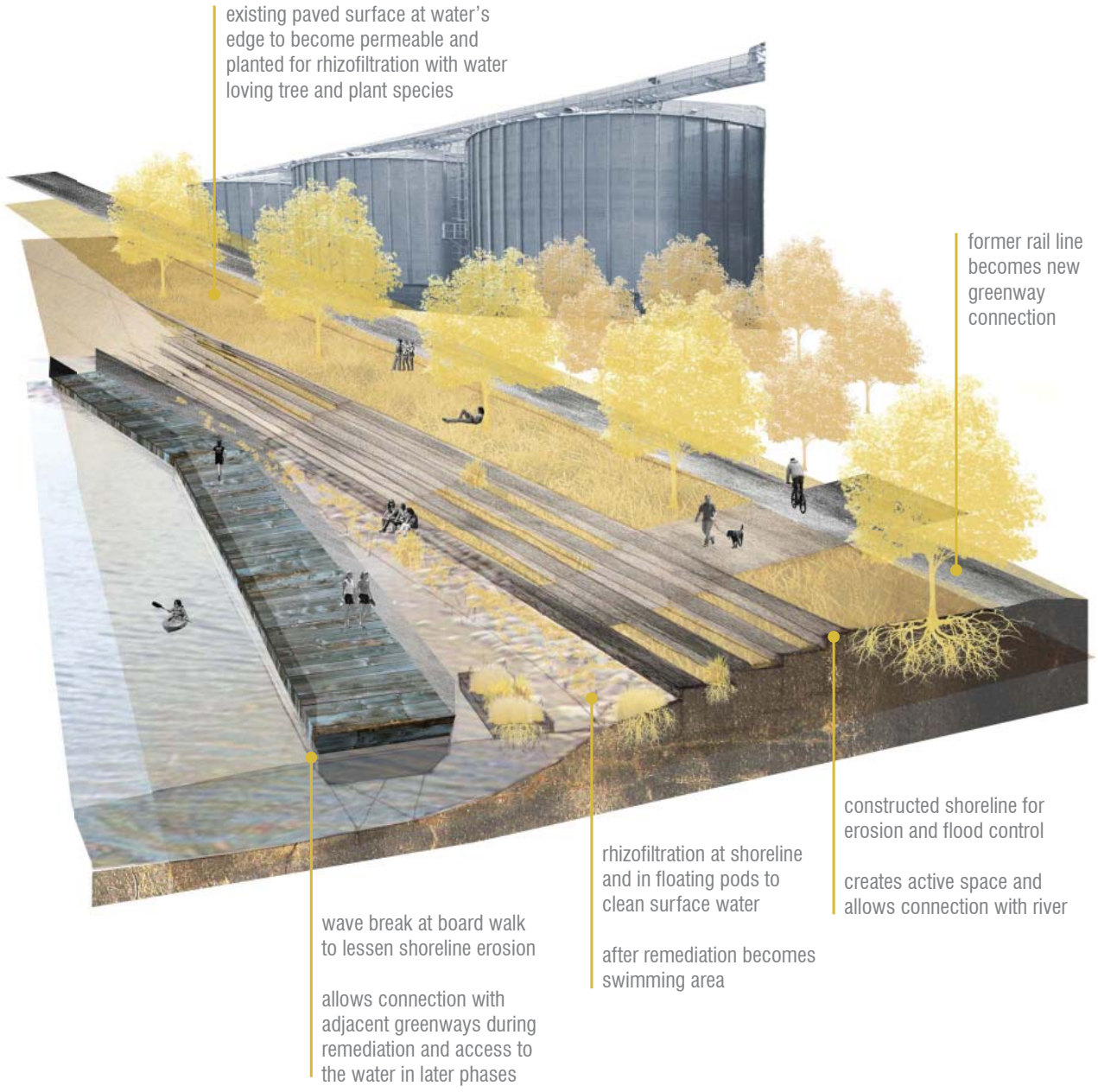

FIGURE 31. Site as multifaceted tool
(2015). [digital image]. By Author.

be used as an instrument for the environmental and social ecosystems within and around it. The site must perform and it will do so at its best when natural processes are employed. Issues including erosion and watershed control, water treatment, and air purification are just some of the many ways which this phased remediation process will address post-industrial sites.

The cultural benefits begin with the improvement of the status quo. The bioremediation process will create usable land in which people can interact. The adaptive reuse of structures creates unique spaces and places where a visible history exists and new memories can be made. This type of project allows a new connectivity to form between people and the natural and built elements of a site over a period of time instead of creating a new falsified environment or "place" with applied meaning.

Now the National Trust for Historic Preservation has delivered empirical data which proves this point further. As part of a collaborative effort the National Trust for Historic Preservation collected data from three major cities in the U.S. which confirmed that areas "with a mix of older, smaller buildings perform better than districts with larger, newer structures when tested against a range of economic, social, and environmental outcome measures."[26] These areas had higher density rates for residents and jobs, higher percentages of small businesses and businesses owned by women and minorities, and more diverse times of activity than larger, newer buildings and districts. Jane Jacobs was the pioneer for retaining the urban character of varying scale, form, and age within a city and today the shift back to downtown revitalization and the abundance of successful adaptive reuse projects are demonstrating the truth of this vision.

Currently petrochemical storage sites are very sparse when it comes to the presence of humans as they require few employees and are typically highly secured areas. The economic benefits of this proposal build largely upon the increase of cultural activity. Improving sites of this nature will undoubtedly help improve the property values of the surrounding areas and the likely increase in business and commercial activity will add to the tax revenue base for any city. The proven interest of small businesses and entrepreneurs in projects such as this provides a framework for more jobs in areas that currently provide very few.

26 Meeks, 2014, p.1.

FIGURE 32. Rendering of De Ceuvel
(n.d.). [digital image]. Retrieved February 4, 2015 from http://worldlandscapearchitect.com/purifying-park-de-ceuvel-amsterdam-netherlands-delva-landscape-architects/

FIGURE 33. Event at De Ceuvel
(nd). [digital image]. Retrieved February 4, 2015 from http://www.yourlittleblackbook.me/nl/cafe-de-ceuvel-amsterdam/

Phasing: The Long-Term Solution

The matter of time is important when considering a project such as this. These sites developed and degraded over time and, as such, it is necessary to understand that there are no quick fixes. Removing contaminates does not solve the larger problem as the current methods of clean up only move the polluted material elsewhere. This is why it is important to look at time based strategies for remediation. This creates opportunities for different uses and activities to take place which will help engage people with the site over a period of time. Allowing this to happen over time will foster the relationship between the community and the post-industrial landscape. It will also help cultivate an identity and a sense of place for a site as it is redeveloped.

A great example of the cultural, environmental, and economic benefits of phased remediation is the De Ceuvel Shipyard. De Ceuvel was an abandoned shipyard and industrial site that was purchased by the city of Amsterdam. Seeking an innovative and cost-effective remediation and redevelopment plan the city turned to a group of sustainability-oriented designers and thinkers. The project designers proposed a phased redevelopment of the site with a temporary installation and park which would remove toxins from the site through bioremediation and phytoremediation. The installation brought in ships and boathouses as the temporary structures for the site. These structures were meant to make

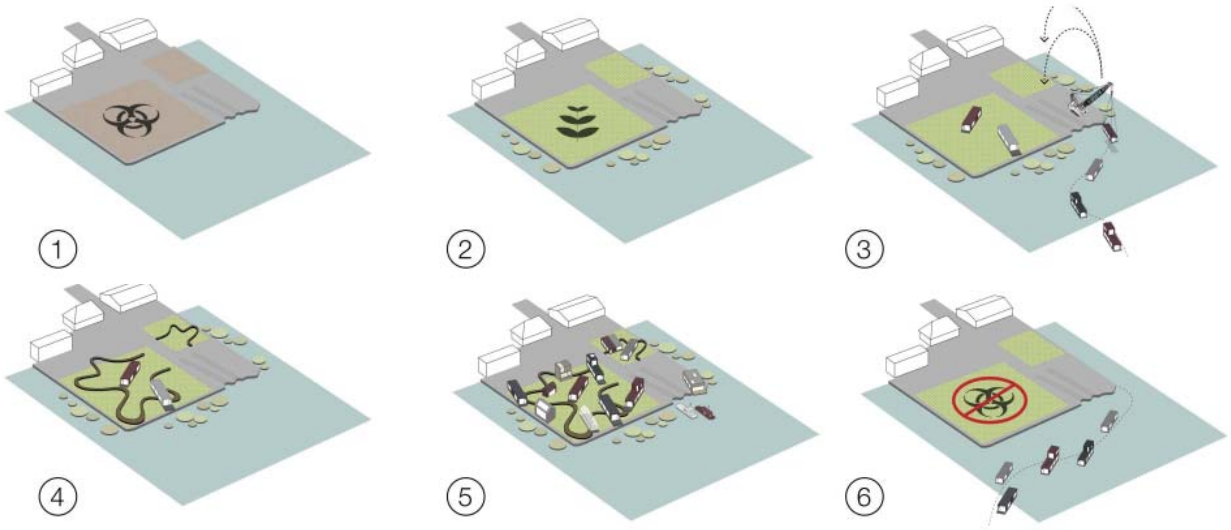

FIGURE 34. Phasing diagram for site remediation
(n.d.). [digital image]. Retrieved February 4, 2015 from http://worldlandscapearchitect.com/purifying-park-de-ceuvel-amsterdam-netherlands-delva-landscape-architects/

little impact on the earth and be easily placed and removed. The boats were all second-hand and most of them were headed toward the junk yard when they were salvaged for De Ceuvel. Areas of the site contained toxins that would have to be mechanically removed and relocated in typical development schemes. The phased redevelopment of the shipyard allowed the areas of containing toxins to be heavily planted and cleaned naturally over a longer period of time. This site is also serving as a research opportunity for students at University of Ghent in Belgium. The areas that need remediation hold most of the boats which are accessed by a raised boardwalk allowing the users to walk amongst the plants without making direct contact with the soil. Other areas that were paved or contained no toxic materials have become park space and patio space for the cafe, shops and events that take place at the now picturesque site on the water's edge.[27]

The once abandoned site has now become a creative incubator and cultural center. Each boat contains offices, artist workshops, designer studios, boutiques, cafes and event spaces. It will be interesting to see what happens when the ten year lease is up for the current use. The temporary solution has become such a spectacular place with unmatched character. It almost seems too unique to remove and redevelop in any typical way.

27 Zimmer, L. (2014, September 9). Inhabitat. Rehabilitated Shipyard Reuses Old Boats as Shops and Offices in Amsterdam. Retrieved November 5, 2014, from http://inhabitat.com/rehabilitated-shipyard-reuses-old-boats-as-shops-and-offices-in-amsterdam/

CHAPTER 6 | SITUATING

Site Specific: A Missing Piece

The chosen site is situated on the south riverfront in Knoxville, Tennessee directly across the water from the (re)bourgeoning city center of downtown. This area was historically home to the majority of Knoxville's river industry. In the mid to late 20th century most of the industrial properties along north riverfront were taken over by the expansion of the University of Tennessee campus and the urban renewal plans in the downtown area. The south riverfront has also seen a great deal of change as industries are moving and evolving; however, the redevelopment of the south riverfront has been a much slower process. In recent decades the focus has been on revitalizing the downtown core but as the city center is flourishing once again, the attention is now able to shift. Fringe areas are getting new attention through small scale redevelopment and the city has big plans for the south riverfront.

The site is directly adjacent to the Gay Street Bridge, downtown Knoxville's oldest vehicular bridge, built in 1898. Gay Street is the main street of downtown connecting north Knoxville, downtown and south Knoxville. The original Gay Street trestle bridge was the main connection between downtown Knoxville and south Knoxville during the time of the Civil War. Today, the Gay Street Bridge is one of four bridges connecting downtown and south Knoxville. It is the most direct connection yet it has become the least traveled.[28]

The south river front revitalization project is the largest civic planning project the city has taken on in downtown Knoxville, covering more area than the urban renewal projects and world's fair sites combined. The scope covers over three miles of riverfront property excluding a half-mile long gap

28 KGIS Maps- Traffic Counts. KGIS Maps. (n.d.). Retrieved November 15, 2014, from http://www.kgis.org/KGISMaps/Map.htm

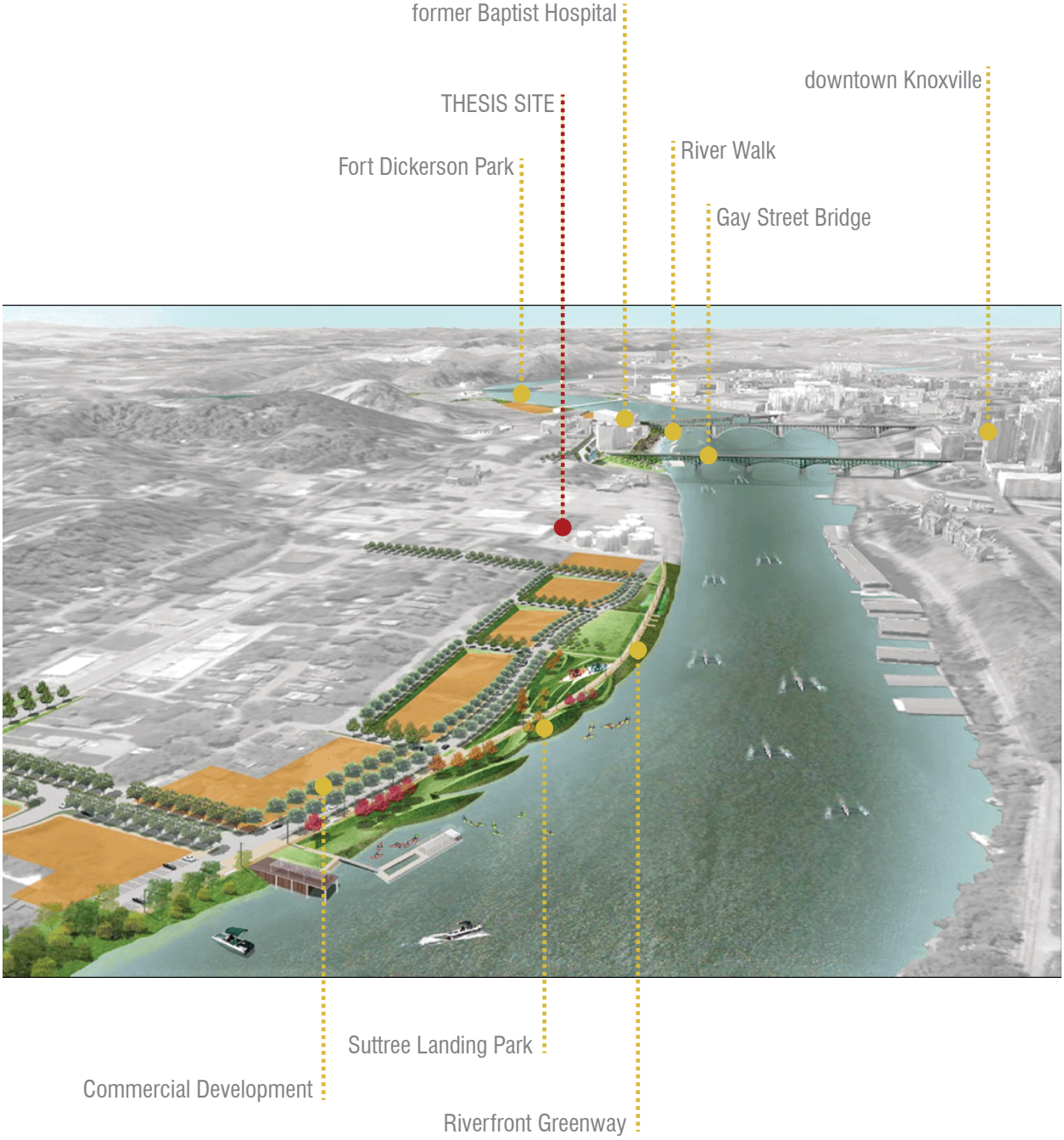

FIGURE 35. City of Knoxville's South Waterfront Redevelopment Plan (with labels)
(n.d.). [digital image]. Retrieved October 4, 2014 from http://www.cityofknoxville.org/Press_Releases/Content/2007/1211.asp
Labels by author.

occurring right in the middle. The “missing piece” is the site I chose to explore this thesis. The site contains active industry and has curiously been left out of the redevelopment plans. Without this site as part of the overall scheme, the south riverfront will continue to have a major disconnect within its own boundaries and also with downtown. By proposing a long term remediation and redevelopment plan I believe this site will be able to serve a key piece within the overall plan. The distinct attributes of the site also offer great opportunities for innovation within adaptive reuse and redevelopment strategies that are more appropriate and unique to the character of Knoxville than other developments nearby.

The site has been home to multiple forms of industry over the years and currently the site is occupied by two different petrochemical storage companies. Holston Gases is located on the west portion of the site and works with small scale natural gas tanks for residential and small commercial use. The company operates in a conglomeration of buildings, some of which are original to the D. M. Rose Lumber Mill that occupied the site from 1885 to 1955. Holston Gases has moved most of their business to another location and is presumably preparing to sell the riverfront location as part of the revitalization process.

The east side of the site contains large oil silos owned by Marathon Petroleum. The site contains seven large silos that are 80 feet tall and vary from 140 feet to 170 feet in circumference; as well as, sixteen smaller silos that are 24 feet in circumference and range in height from 18 feet to 54 feet. The silos sit on what was once the East Tennessee Packing Company which packaged beef and pork for delivery to stores around the region. The first silos were built in the early 1980’s and the most recent silo was added around 2001. Both the lumber mill and the oil silos will play major roles in the site specific investigation of this thesis and proposed revitalization of the site.

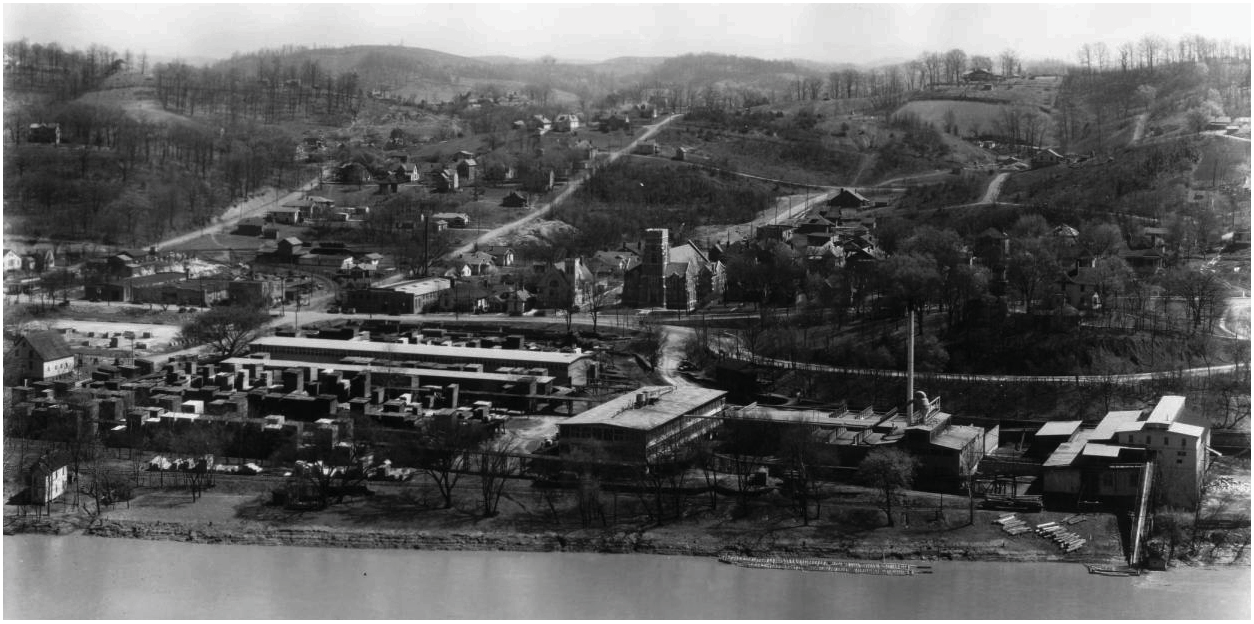

FIGURE 36. D.M. Rose Lumber Company
(c.1931). [digital image]. Retrieved September 7, 2014 from http://cmdc.knoxlib.org/cdm/singleitem/collection/p265301coll7/id/5732/rec/15

FIGURE 37. Holston Gases
(2014). [digital image]. By author.

FIGURE 38. East Tennessee Packing Company
(1934, July 2). [digital image of drawing]. Retrieved September 7, 2014 from http://cmdc.knoxlib.org/cdm/singleitem/collection/p265301coll7/id/4688/rec/4

FIGURE 39. Marathon Petrolium
(2014). [digital image]. By author.

Assets

In addition to the water front location, direct connection to downtown, and existing structures, the site has many assets in the form of nearby established neighborhoods and community centers. Within a block of the site there is an elementary school and a church which are both anchors for nearby neighborhoods. The adjacent Sevier Avenue is a mostly commercial strip with a variety of buildings, many of which are empty or underutilized. This may not seem like a positive resource; however, most of these buildings originally served as industrial warehouses, offices, or tenements and are now prime real estate for adaptive reuse to help reinvigorate the area. Sevier Avenue also allows access to the main arterial roads and surrounding destinations of downtown such as Island Home Park, Ijams Nature Center, and the Great Smoky Mountains.

Two other major assets are the site's central location within the south riverfront revitalization as well as the planned redevelopments on either side of the site. To the west, the former Baptist Hospital is being razed to make way for a mixed-use development focusing largely on new, market-rate residential and student apartments. To the east, a large, cleared post-industrial site will become Suttree Landing Park, a large public park named after the protagonist and namesake of Cormac McCarthy's novel Suttree.

The novel paints a romantically dark and grimy view of Knoxville in the 1950s with a special focus on the river and surrounding industries. The story may be fictitious but it is set within very real locations around the city. The buildings of the lumber mill are the backdrop for the iron arches of the Gay Street Bridge on the book's cover and the lumber mill and packaging company are mentioned various times within the story as they lay across the river from Suttree's ramshackle houseboat. Today, the history of this site not only exists within the soil and the structures it contains, or even its relationship with the surrounding community, but it is also written in a piece of literature and therefore embedded even further in time.

FIGURE 40. Land Use and Assets
(2015). [digital image]. By Author.

> He awoke in the logy heat of full summer noon with the sun beating on the tin roof above him and raising the sour smell out of the old wood of the cabin. He could hear the howl of the saws in the lumber mill across the river and he could hear the intermittent scream of swine come under the knacker's hand at the packing company. He turned his face to the wall and opened one eye. Watched through a split in the sunriven boards the slow brown neap of the passing river… He could hear everywhere in the hot summer air the drone of machinery, the lonely industry of the city.[29]

Constraints

The main constraint of this location is that it is overlooked. The current incarnation of the site holds few memories and very little nostalgia for the surrounding communities. The existing industry is considered a road block for the revitalization of the site and consequently no solutions have been proposed assuming there is no definite time frame in which the industry will vacate the area. The active industry is seen as a deterrent for redevelopment, however, I believe the process of remediation and revitalization can begin while the site is still in use. This is a necessary step due to the current disconnect between the neighborhood and the site. It is likely that there would be little dispute from the nearby residents if the silos were demolished tomorrow. Bringing people closer to the site while it is still active will help form memorable relationships and an appreciation that ties together both the natural and industrial qualities of the area.

As with most post-industrial sites the cost of remediation may also be a hindrance for the existing property owners as well as future interested parties. However the extended time frame and public-private cooperation will help alleviate the typical cost prohibitive aspects. The city of Knoxville has been allotted funds from the EPA for site remediation as part of the south waterfront revitalization project so this is a possible resource for existing or future property owners. A major benefit of natural remediation is that it is actually less costly than typical removal methods but the process does take

29 McCarthy, p. 63.

more time. In this case, however, time is a luxury instead of a restraint.

Another issue to consider is that this type of project is unprecedented for the city of Knoxville. Undoubtedly, issues with policies such as zoning and building codes will arise and once again public-private cooperation will be necessary to resolve these matters. Fortunately, the city is already working to make the south waterfront revitalization project as successful as possible, making this site a perfect choice for testing this thesis.

Finally, programmatic limitations may be made clear throughout the process based on the timeline for remediating residual toxic materials as well as the formal and spatial limitations and demand for certain types of program based on future economic variables. These qualities are not just obstacles but also design challenges which have the ability to foster innovation within the realms of design and public policy. Each of these assets and constraints will be explored throughout the planning process.

CHAPTER 7 | PHASING

One of the main aspects driving this thesis is the concept of phasing. The pragmatic function of this method allows a site to transition from being industrially active to culturally active through a process of remediation and cultural activation. This will help to remove the issue of neglect and abandonment which is the fate of many post-industrial sites. It also allows for greater connections to be made between these forgotten sites and future patrons. This aspect of forming relationships with an area over time is a major piece which is missing from many "place-making" efforts in development today. However, this is a common, albeit subconscious, characteristic in the more organic process of development which has been occurring in cities and neighborhoods for thousands of years.

Although the development of the city works organically, it is also develops through a series of organized strategies. This balance of planned and unplanned or predicated and unpredictable is necessary when considering the past, present and future of a city. Even within a phased solution there must be an openness to divergence and fluidity in the system. There may be signifiers of change or definitive elements which begin and end but phases may overlap and interweave in a way that is not discernable to the everyday passerby.

> What if buildings were seen as pre-carious, contingent pieces in a larger preexistent order? What if the artifact and its environment were instead considered as a morphologically continuous, temporally fluid system undergoing a larger metamorphosis of which the 'designed' changes are only a small part?[30]

All this is to say that the outline of phases is a necessary system of organization which is only

30 Hewitt, 1994, p. 200.

FIGURE 41. Identify
(2014). [digital image]. By author.

a “small part” of the larger process. That being said, the major phases are defined by four concepts: identify, acclimate, activate and adapt. These concepts investigate ways to use the past and present to inform the future possibilities of the site. Each phase brings people closer and closer to the site creating a new perspective of the area and proximity to its elements such as the lumber mill and silos. This will allow patrons to form new relationships and associations with what is currently a forgotten aspect of the city.

Identify

The first phase is to “identify.” Functionally this is the time where major issues would be identified such as remediation needs, zoning restrictions, structural capabilities, etc. Also, this phase works to help identify the site as a “place.” The pragmatics of this phase include overall planning strategies for analysis, remediation, and design. Goals and obstacles are outlined prior to the exodus of the industries and incorporate collaboration between the current land and business owners, the

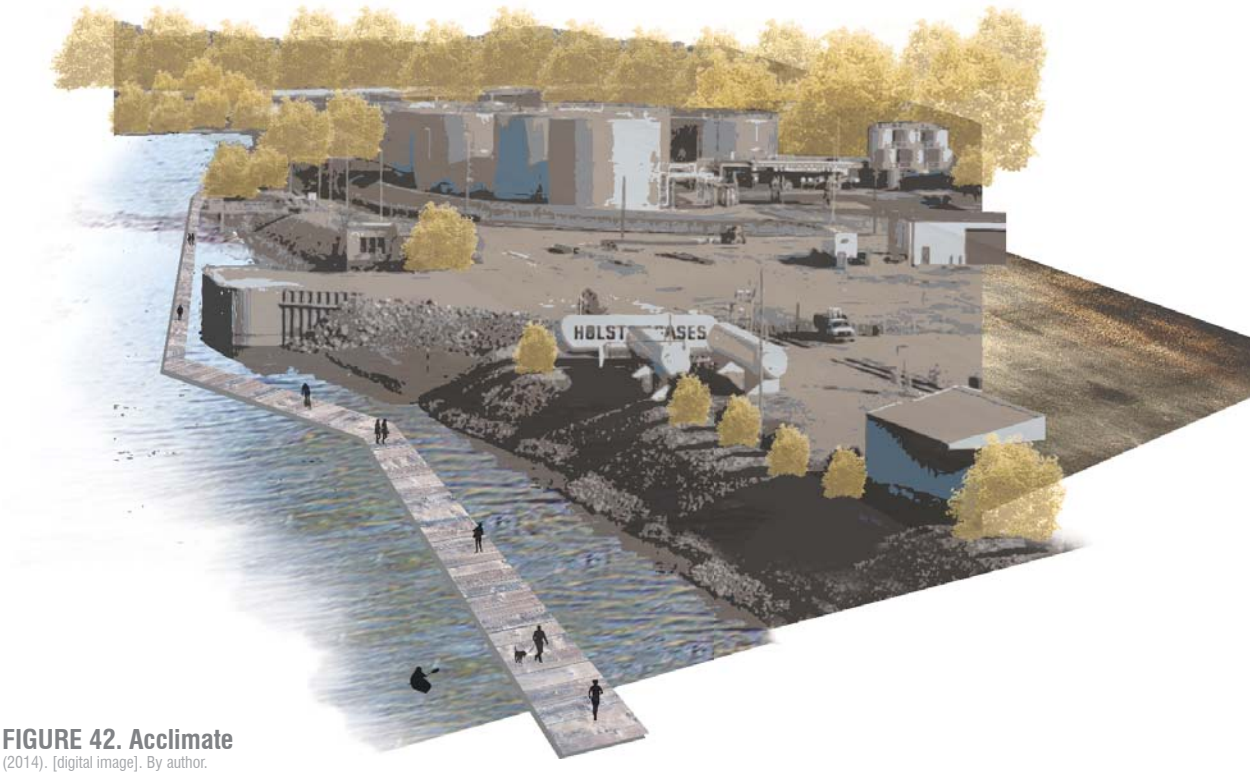

FIGURE 42. Acclimate
(2014). [digital image]. By author.

city, the local community and other private agencies interested in the future of the site. This beginning phase is meant to work around the site functioning as an active industrial area and resolve the issue of the missing piece of the waterfront revitalization efforts. The first phase also begins to form visual and memory based connections between users and the local community through short term interventions. These interventions are meant to be thought provoking and memorable short-term events and installations. For example, a periodic light show utilizing the reflective quality of the tanks, highly visible to the downtown center across the river, will bring attention to the silos and symbolize the new activity forming at the site.[31]

Acclimate

The second phase is to "acclimate." This begins the major process of site remediation as some of the industry has left and parts of the site become available. Activities and installations bring users closer to the site for longer periods. Installations become permanent or semi-permanent which

31 The inspiration for this event is a highly successful art piece and light show called "Lighting Giants" at an active shipyard in Croatia. http://www.dezeen.com/2014/05/31/croatian-designer-creates-giant-light-show-by-illuminating-shipyard-cranes/

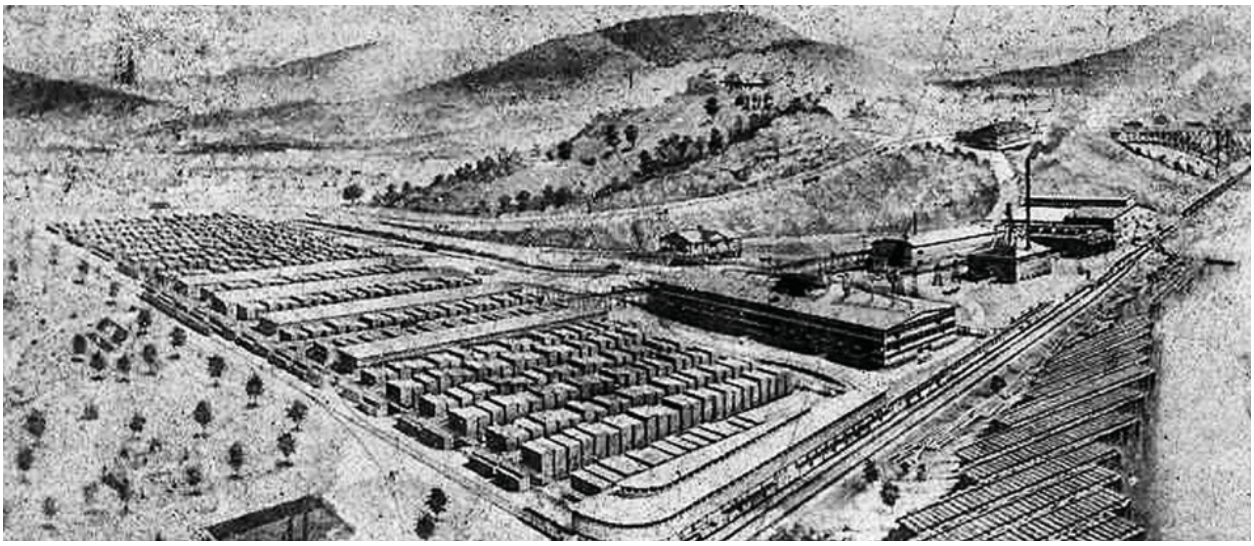

FIGURE 43. Illustration showing the lumber yard and wood rafts along the river
(c.1910). [digital image of drawing]. Retrieved September 7, 2014 http://cmdc.knoxlib.org/cdm/singleitem/collection/p16311coll1/id/296/rec/2

allows people get closer to the site while parts of it still remain active. The main feature which denotes this phase is a river walk which acts as the connection between the adjacent sites. The riverwalk also references the pre-existing lumber mill and the rafts of logs that once floated down the river.

> The lumber business was highly successful and the mill moved to Knoxville in 1885 to a location on the south bank of the Tennessee River and across the river from Knoxville where it remained for 70 years. Now they did not have to haul the finished lumber to market but floated the logs to Knoxville in large rafts where they were sawn. At times in the spring a person could walk more than a mile from one end of the collected rafts to the other.[32]

As Brian MacKay-Lyons wrote, "building the site, as a cultivation of the land, whether rural or urban, involves looking both forward and backward, using the traces of the history of agricultural or architectural inhabitation of the site."[33] References to the past add to the overall experience of a place whether they are subliminal as in the case of the river walk or physical reminders such as the oil silos.

32 A biography of Daniel M. Rose via http://wc.rootsweb.ancestry.com/cgi-bin/igm.cgi?op=GET&db=:3037323&id=I589027189
33 Lyons, p.203.

FIGURE 44. Activate
(2014). [digital image]. By author.

Activate

The next phase is coined “activate.” This phase continues the remediation process for the overall site and begins to focus on the remediation of structures as well. Areas deemed “clean” can be inhabited for longer periods of time and construction can occur. During this time the main goal is to create destination points which bring more people to the site for both work and play. At this point the industries would be gone but new forms of production and activities would be able to come to the site. Here I focused on a community aspect that would help draw people to the site, activate the space, and have performance qualities that helped solve local issues.[34] This solution and intervention is an urban orchard. This is the central piece of the site which has no major structures and has had less petrochemical activity. The center plot of land will be the first area where remediation can occur and will likely be the first area to yield clean soil. The orchard also represents the lumber yard which was once located in this area of the site. So what was first rows of lumber is now rows of trees; and what was once an active, productive lumber yard is now an active, crop yielding orchard.

34 Benefits from the urban orchard, beyond increased community involvement, include helping locals learn about crop production as well as providing produce and needed nutrition to the adjacent neighborhood which has the 2nd highest poverty rate in the city of Knoxville. Also, crop production in the county has fallen 77% since 2009 and small scale crop production has played a large part in grass roots efforts to revitalize and reconnect the city which can be seen through the ever-growing Market Square Farmer’s Market. Statistics via: http://www.etindex.org/

FIGURE 45. Adapt
(2014). [digital image]. By author.

Adapt

The final phasing concept is to “adapt.” This phase begins the final stages of remediation as well as the adaptive reuse of structures on the site. Installations from previous phases also adapt and evolve allowing time based memories as the different methods of interaction with the site change or remain. Here the structures on the site are reused including both the lumber mill and the oil tanks. The lumber mill is a historic structure which will likely pique the interest of local historical societies and adaptive reuse focused developers. These historic adaptive reuse projects are common in the downtown area and tend to be very well publicized and highly successful. Attention such as this will only help grow support of the overall project. The reuse of the oil silos may be the most controversial part of the project but this form of experimentation has been lauded in other adaptive reuse projects within the city. Also, at this point in time, through the phased approach of bringing people closer to the site, the number of people who have experienced the massive scale and sublime qualities of the silos will be much higher. Therefore there will likely be an increase in the appreciation for the project and the tanks themselves.

Programming

As a theoretical prototype any program is possible but some uses are more plausible or more appropriate when considering a specific site. In the same vein, there are many formal possibilities in adding, subtracting, cutting into, etc. These decisions should be based on what is appropriate to a certain site or program and the architectural intentions that support those choices.

The chosen program for this site works with the concept of phasing. Here, the reuse of the tanks can occur over time and the overall experience is heightened by the process of witnessing this change. During the initial phases the tanks may be experienced from afar and seen as giant sculptural

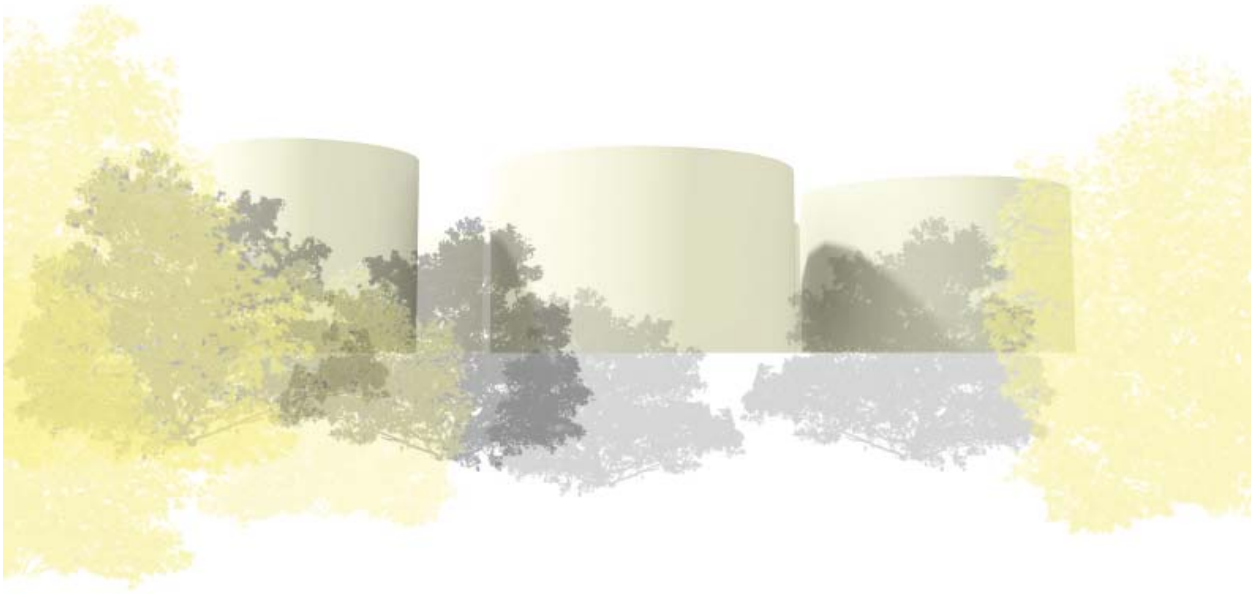

FIGURE 46. View from park
(2015). [digital image]. By author.

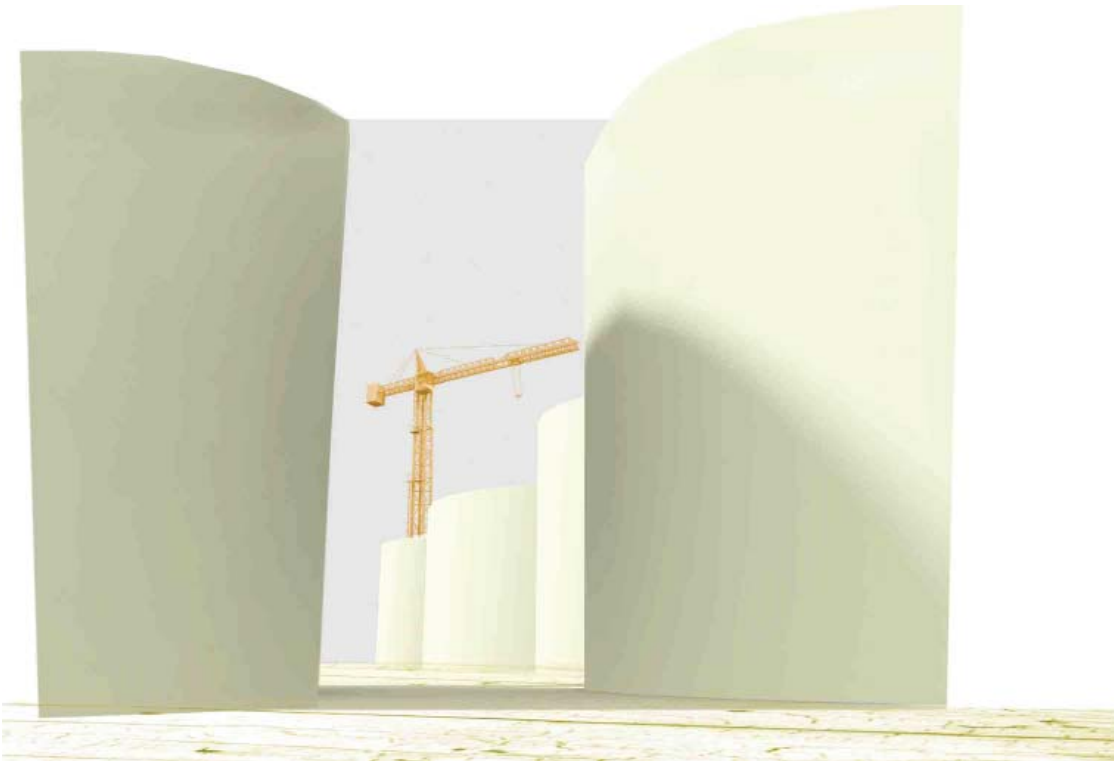

FIGURE 47. View between the silos
(2015). [digital image]. By author.

FIGURE 48. Volume of a silo
(2015). [digital image]. By author.

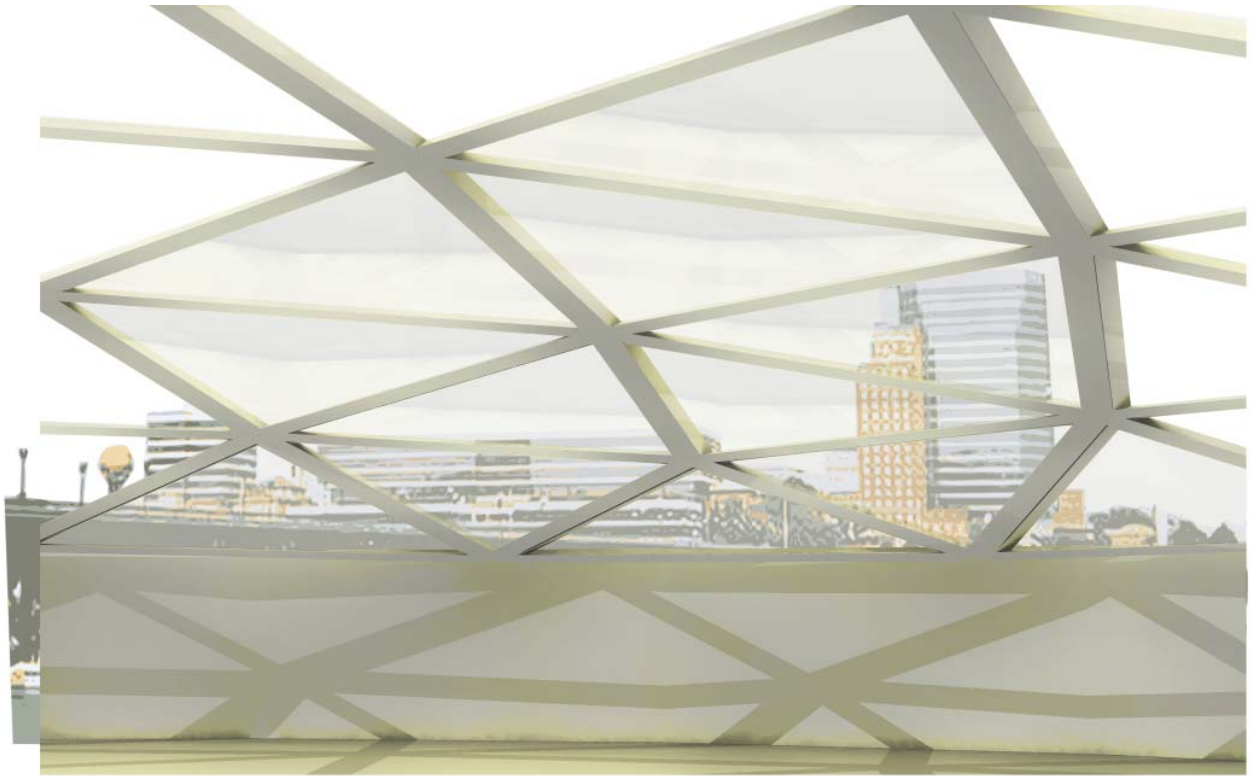

FIGURE 49. View to city from roof of silo
(2015). [digital image]. By author.

artifacts. This distance leads to a feeling of intrigue and a desire to explore the area further however this is not possible until later in time.

As visitors are allowed closer to the silos the encounter becomes more about the sheer scale of the objects and experiencing the feeling of being near or between the enormous structures. The next level of intrigue is wondering what is on the other side, separated by only a thin sheet of metal.

Once the tanks are occupiable, patrons are finally allowed to go inside and see the raw space and experience the awesome volume of the tanks. The interiors of the silos possess unique qualities such as the interesting roof structures and beautiful shadows which they cast throughout the day. The combination of the cylindrical shape, volume and metal structure create amazing acoustical opportunities. These qualities may be experienced through the simple act of occupying the raw tanks as a destination within the greater greenway and park system along the river. Additionally, during this time the tanks can be used for short term programs such as galleries or performance spaces,

workshops, rappelling lessons, or if filled with water, scuba lessons such as the tanks at Emscher Park.

Finally the last phases see the silos adapted in ways which create unique moments both within the tanks and outside of them. A multi-use program was chosen for the site as an appropriate and necessary resource for the city and adjacent neighborhoods. The program west to east moves from more public civic spaces to more private residential spaces. The program includes a combination of two tanks into civic performance and event spaces, two silos become mixed-use commercial buildings, three are mixed-use multi-family residential, and the small tanks are converted into single family and live/work residences.

The site around the silos becomes a park in and of itself where the tanks act as sculptures and continue to be an attraction and destination within the area. The space between the tanks is as important as the space inside. Varying levels of connections allow for different experiences. Utilizing and expanding the existing landforms, such as the berm required in case of an oil spill, promote movement within the site and help retain these unique elements. A path along the berm is the highpoint of the low lying site and acts as a direct connection between the adjacent park and the urban orchard. A meandering path converges with the berm path to create various points of connection with the silos as well as an opportunity for a slower, more reflective stroll amongst the tanks.

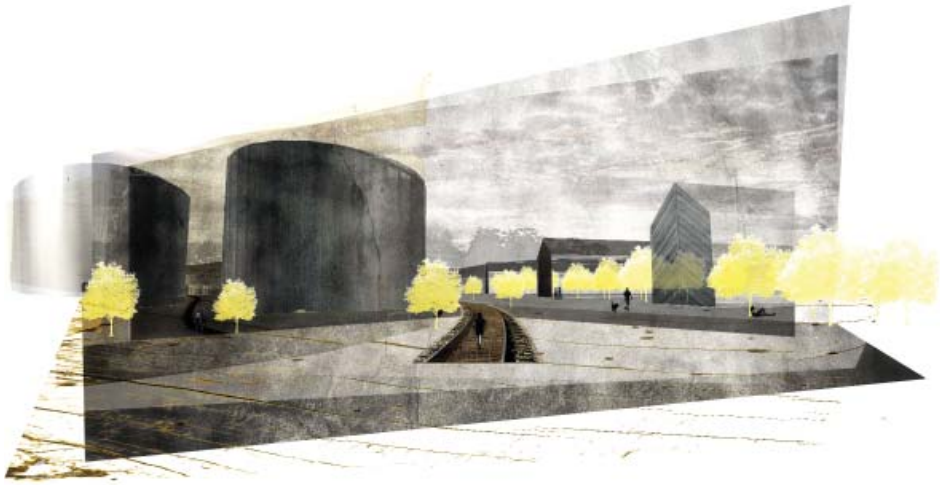

FIGURE 50. Railroad tracks converted to greenway between tanks and orchard
(2015). [digital image]. By author.

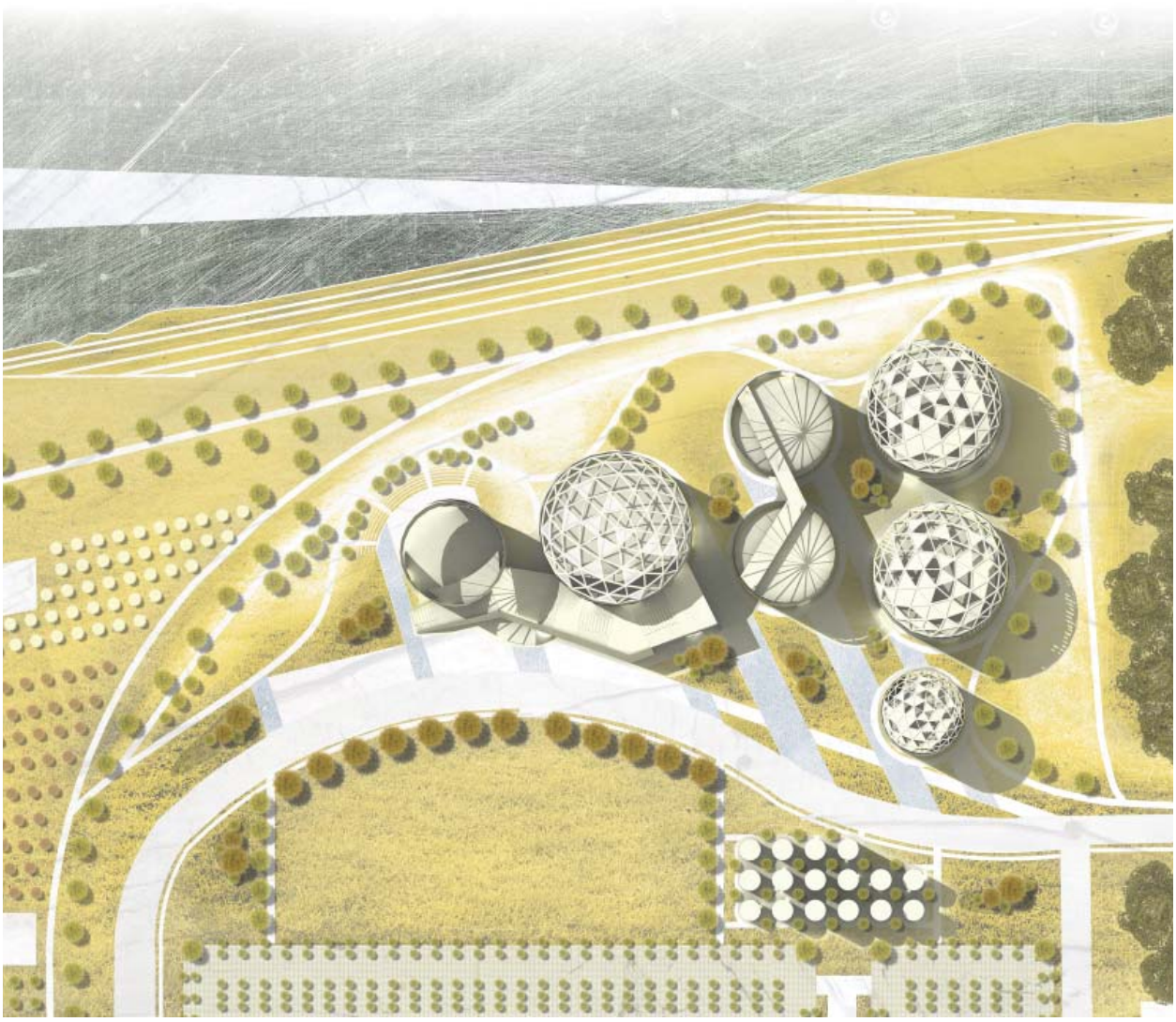

FIGURE 51. Site plan
(2015). [digital image]. By author.

Forming

As part of the final process I chose to focus on designing the civic aspect. This part of the program combines two of the tanks and creates an indoor theatre in the largest tank and an outdoor theatre in a smaller tank. The indoor theatre is a completely finished space whereas the outdoor theatre is essentially the raw space of the tank. Leaving one tank as raw as possible allows any new patron to experience the simple and original form of the silo. This also reminds returning users of their first experiences visiting the tanks.

For this site and program I chose to preserve and accentuate the form of the tanks as much as possible. As an homage to the former use of the tanks, the north elevation (which is the most visible to downtown) was altered in the most minimal ways so the view from the river remained as a pure and original as possible. To do this a limited number of apertures were made in the larger tank, only where circulation was required. This worked will with the program of an auditorium which requires only artificial light. For the outdoor theatre large pieces of the tank were strategically sliced "away."

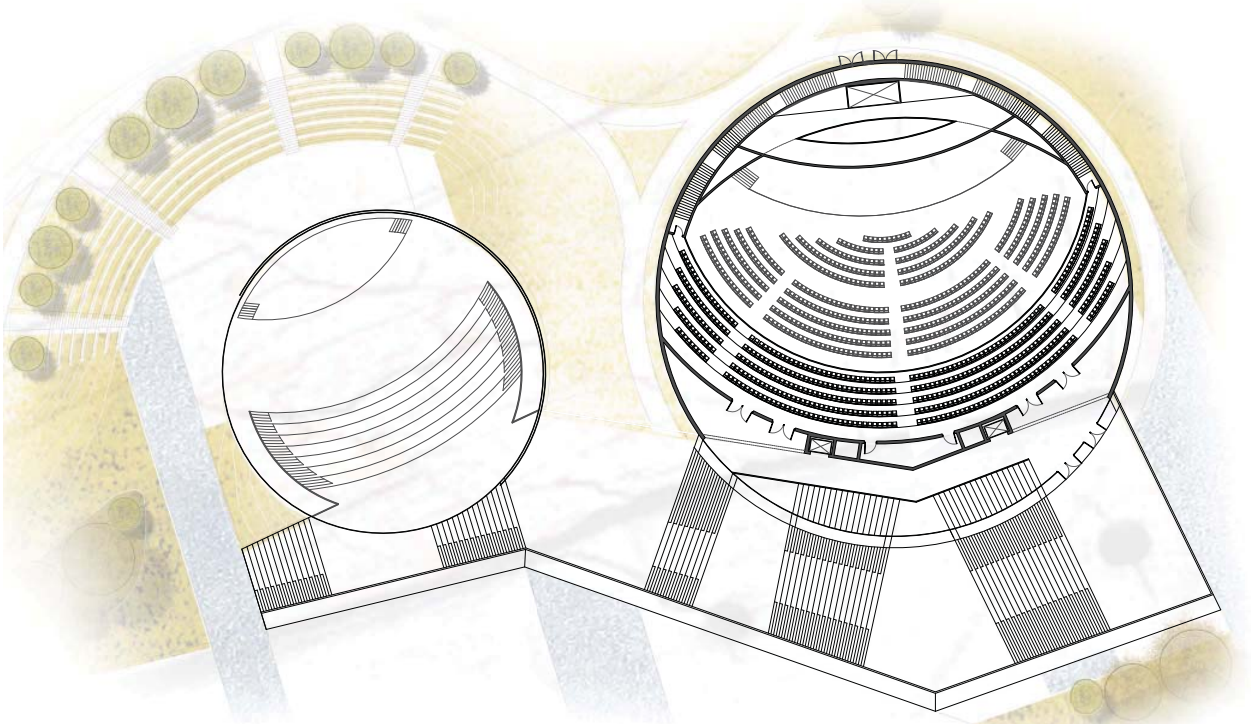

FIGURE 52. Balcony level plan
(2015). [digital image]. By author.

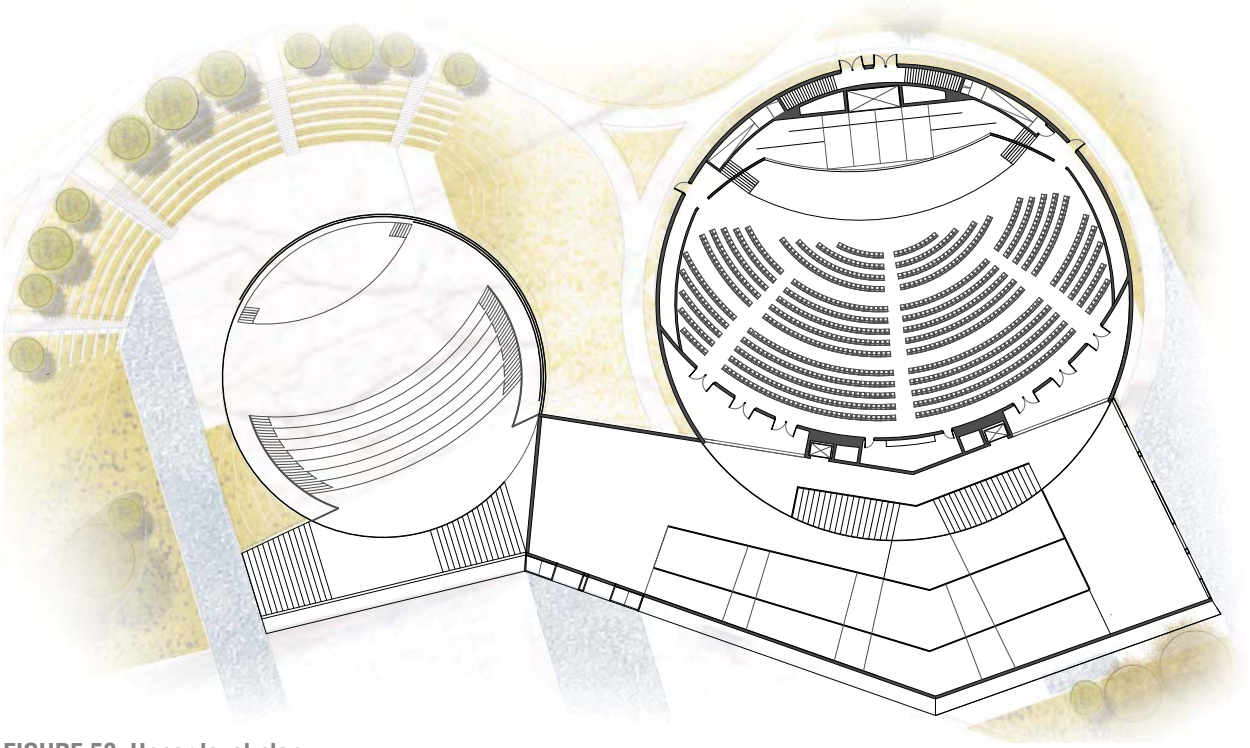

FIGURE 53. Upper level plan
(2015). [digital image]. By author.

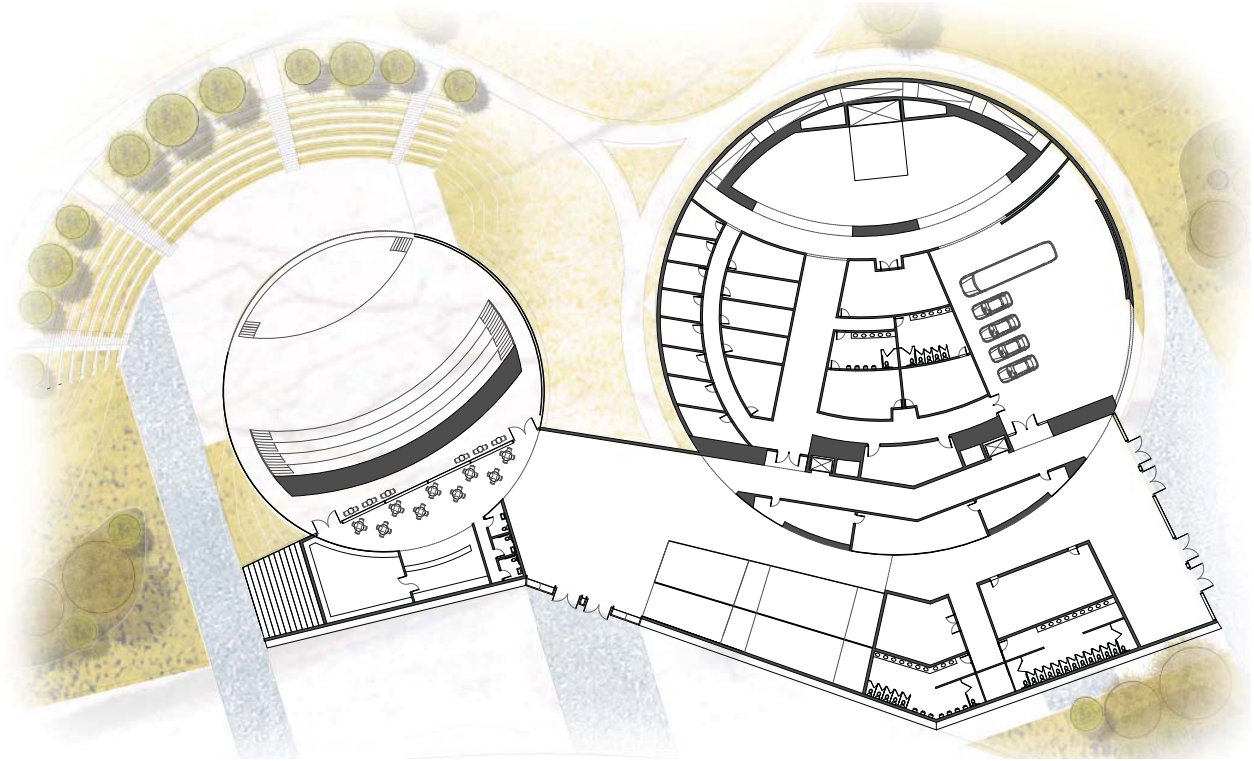

FIGURE 54. Lobby level plan
(2015). [digital image]. By author.

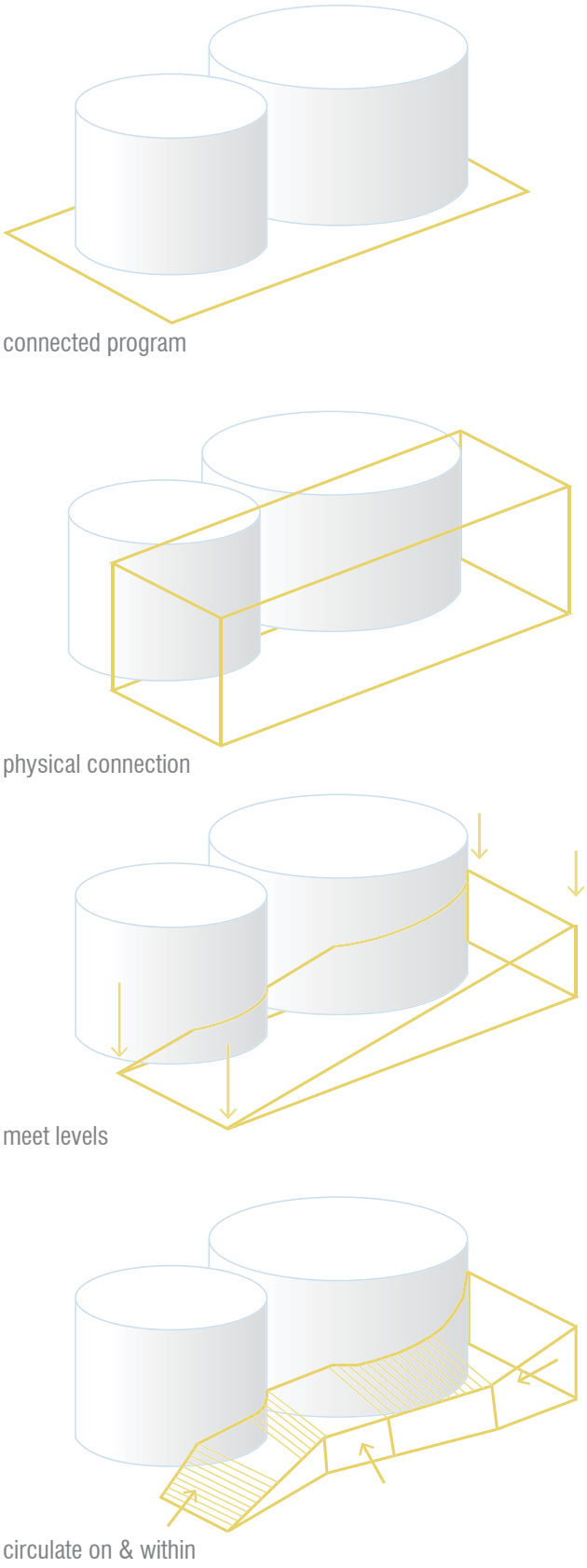

FIGURE 55. Formal moves
(2015). [digital image]. By author.

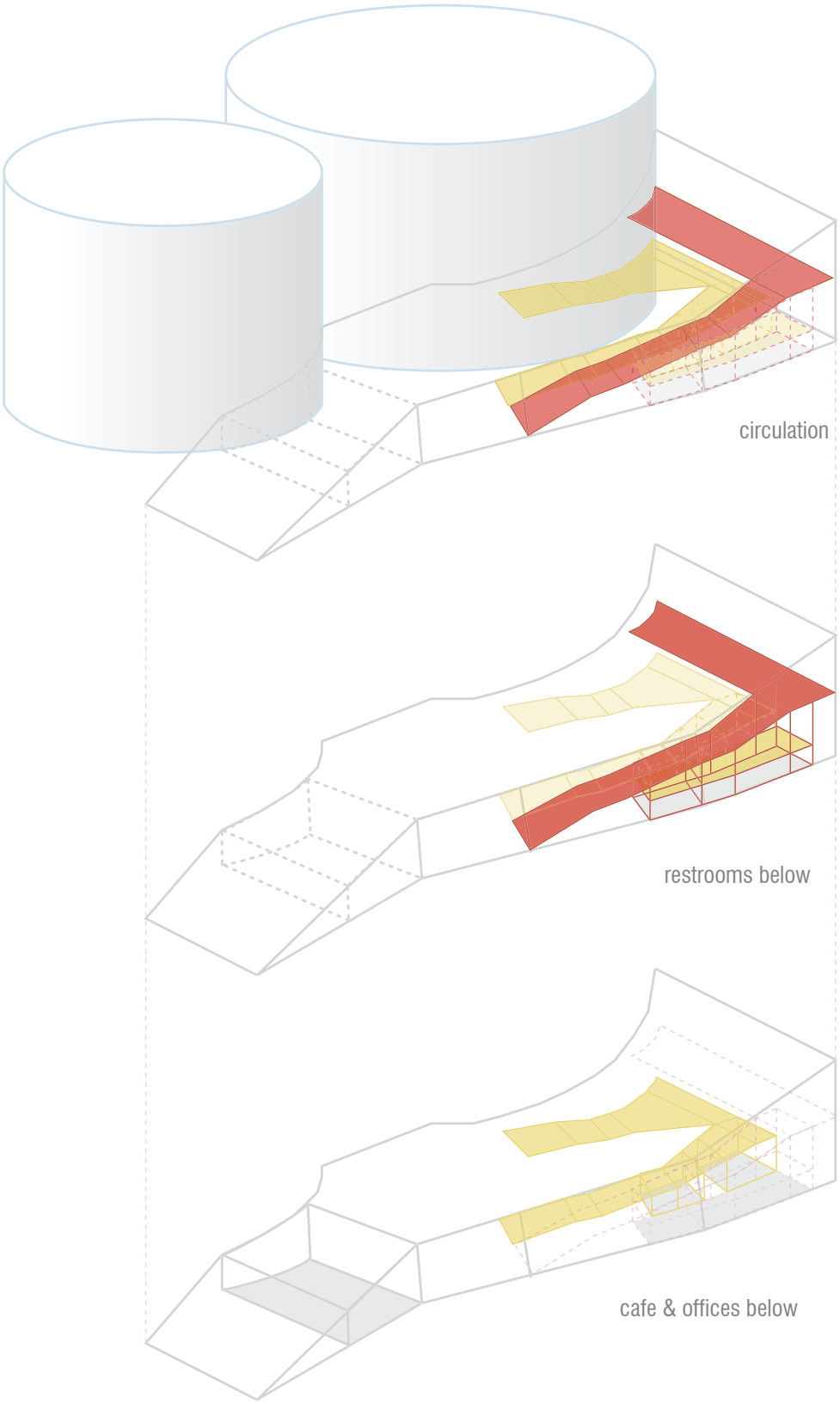

FIGURE 56. Circulation
(2015). [digital image]. By author.

These slices became sliding doors which allow large openings into the tank. However, when the doors are closed the modifications to the silo are undiscernible. The circular form is reinforced through a new structural ring which allows the doors to slide and rotate around the tank.

To allow these programs to occur within the tanks while keeping the form as complete as possible, a connection piece was designed which acts as the main area of entry and circulation. This entrance plays a major role as part of the procession of accessing the tanks. The original conceptual

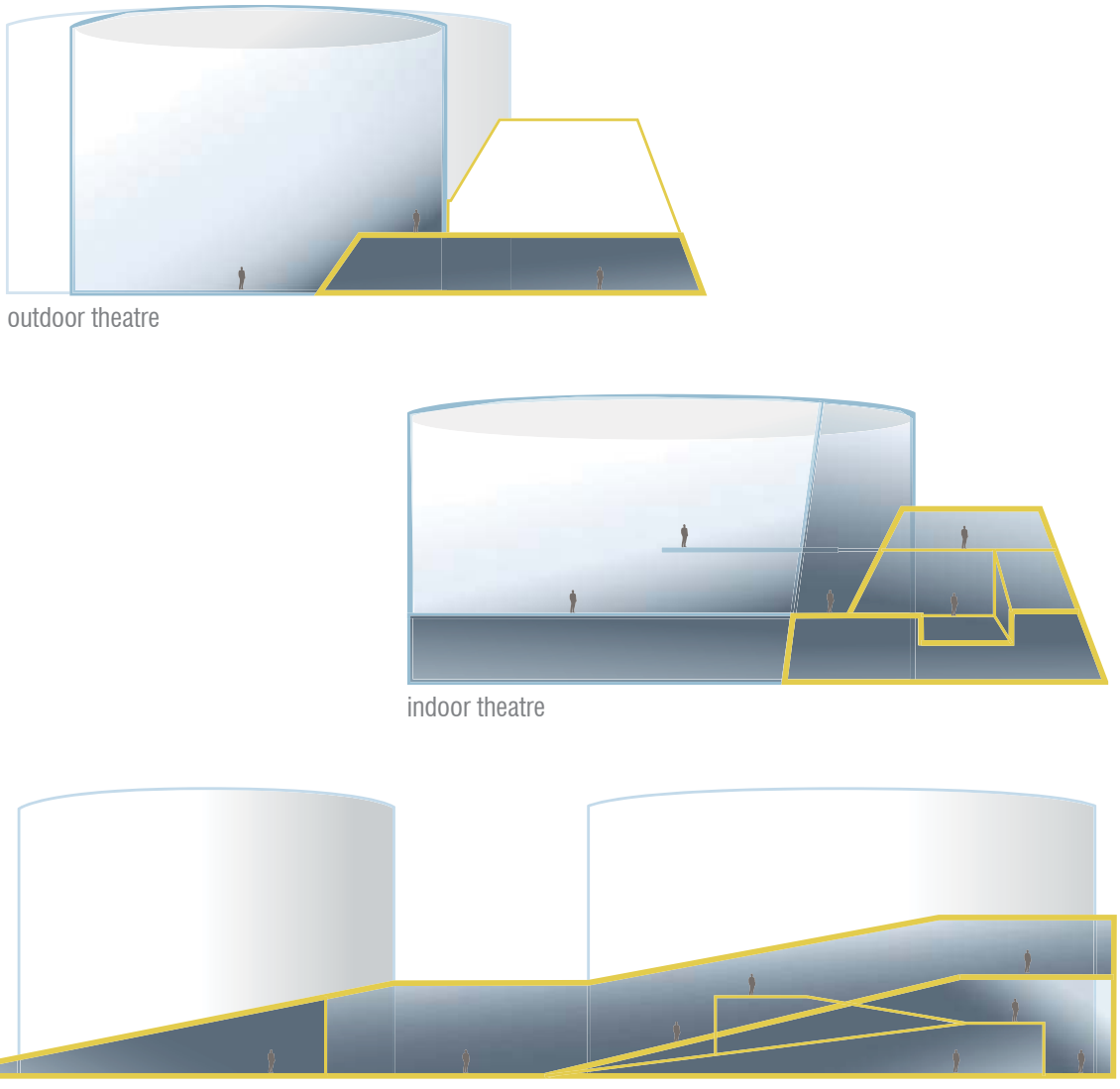

FIGURE 57. Spaces of compression and release
(2015). [digital image]. By author.

FIGURE 58. Theatre entry
(2015). [digital image]. By author.

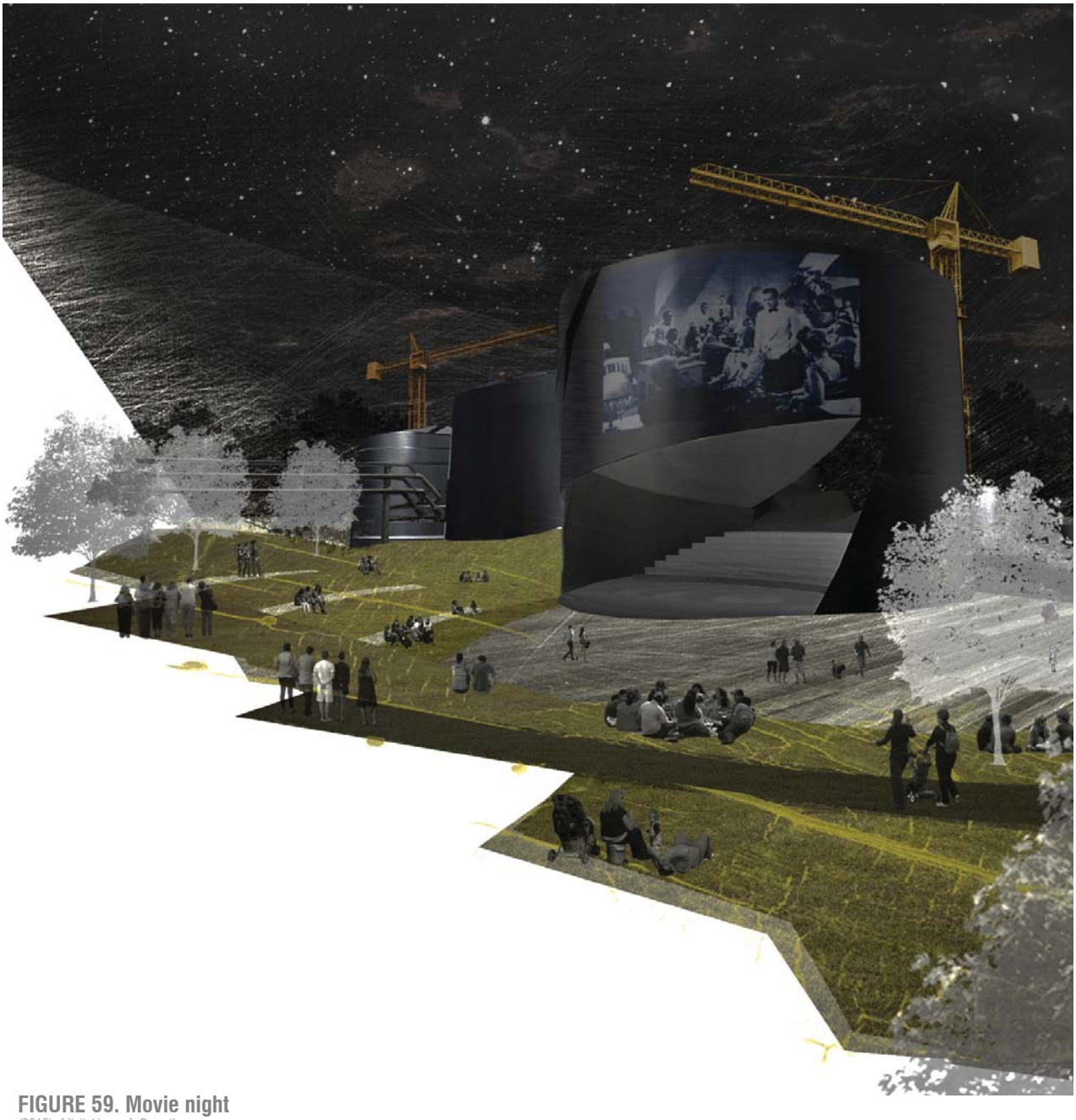

FIGURE 59. Movie night
(2015). [digital image]. By author.

phasing of access and experience, which plays out at various scales throughout the project, manifests itself once again in this piece. Approaching the theatres a visitor will see the tanks beyond this connection piece but must enter or ascend through it before experiencing the tanks. Within it, a series of spaces work to create a sense of compression and release. Each of these compressed spaces open slightly in a sequence which ends in the experience of release into the large volumes of the tanks. This is expressed through the material as well. Everything which has been added is massive and heavy and all that is existing is thin, light and expansive.

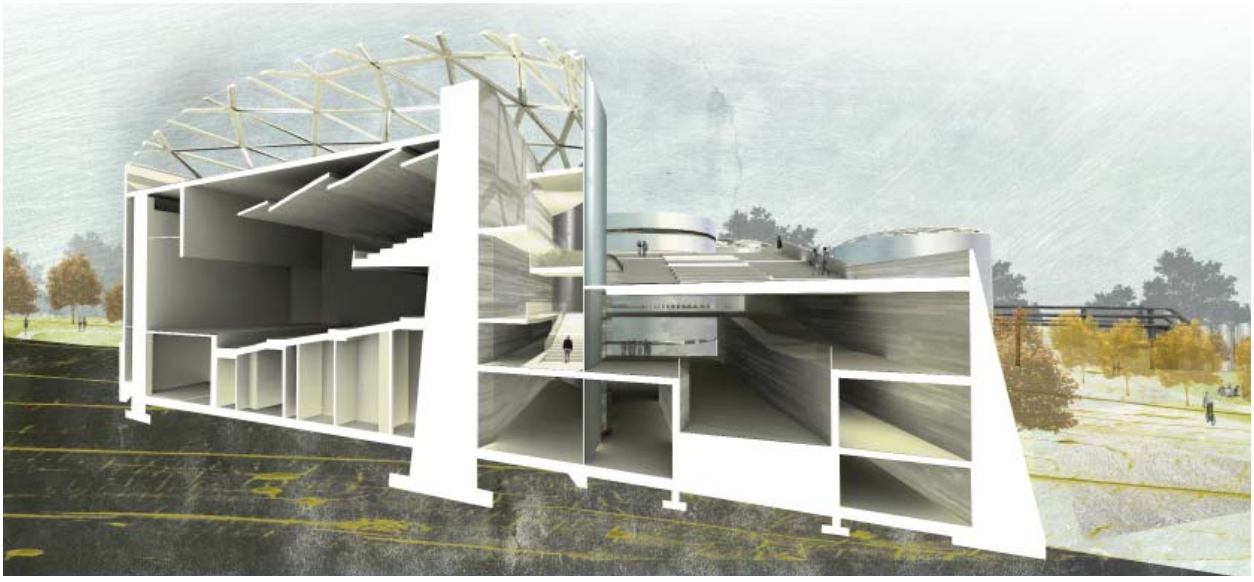

FIGURE 60. Sectional perspective of theatre and entry sequence
(2015). [digital image]. By author.

CHAPTER 9 | CONCLUSION

The program of the theatres is a great opportunity for this site considering the variations of people that would utilize them. The program is site specific and considers that many people from the adjacent neighborhoods may not be able to afford tickets to see the Knoxville Symphony Orchestra play at the auditorium but everyone is able to attend and enjoy an event such as a movie projected on the side of the tank. The overall mixed-use program for the site, community and public oriented elements and, most importantly, the feature of reused oil silos would undoubtedly lead to one of the most unique places within the city. Overall I think that is the beauty of this thesis. Reimagining something like the future use of an oil silo can create both a highly unique experience that is site specific, as expressed with this project in Knoxville, but it is also a prototype for more reuse and experimentation as so many of these structures exist around the world. Overall the goal of this thesis is that it is proactive and solves a problem before that problem exists.

As I pass these impressive objects each day, I am reminded of their fleeting lifespan. Architects are taught to value the longevity in buildings in terms of physical characteristics and cultural importance. The development of industrial infrastructure has occurred as a reaction not as an intention. There is little thought given to the longevity of an oil silo for sustainable or cultural reasons. The silo is designed to serve one purpose for one period of time. No matter what their function, structures should be built to consider the future. This is essential as change is inevitable and a single purpose undoubtedly means an expiration date. This is the way we must approach the future of building. However, to remedy past practices and anticipate the future of these “mundane” forms of infrastructure, the intervention proposed in this thesis is both an exciting and necessary solution.

FIGURE 61. Oil silos reflecting the sunset on the Tennessee River
Allison M. Jones (Photographer). (2014). [digital image]. Retrieved December 12, 2014 https://nwnl.files.wordpress.com/2014/01/4jones_130930_tn_1409.jpg

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APPENDICES

A. GLOSSARY

-Adaptive Reuse: Adaptive Reuse preserves and encourages memory and innovation through the reclamation of underused structures and urban landscapes (Misrach, R., & Orff, K. p.216).

-Biofuel: A biofuel is a hydrocarbon that is made BY or FROM a living organism that we humans can use to power something. This definition of a biofuel is rather formal. In practical consideration, any hydrocarbon fuel that is produced from organic matter (living or once living material) in a short period of time (days, weeks, or even months) is considered a biofuel. This contrasts with fossil fuels, which take millions of years to form and with other types of fuel which are not based on hydrocarbons (nuclear fission, for instance). What makes biofuels tricky to understand is that they need not be made by a living organism, though they can be. Biofuels can also be made through chemical reactions, carried out in a laboratory or industrial setting, that use organic matter (called biomass) to make fuel. The only real requirements for a biofuel are that the starting material must be CO2 that was fixed (turned into another molecule) by a living organism and the final fuel product must be produced quickly and not over millions of years (http://biofuel.org.uk/).

-Bioremediation: Bioremediation refers to metabolic processes by which microorganisms, plants, fungi, or algae degrade pollutants (usually in soil) or reduce their ecological availability. As an example, the thread-like vegetative parts of a fungus called myceliae have been shown to degrade diesel oil in soil. In contrast to conventional methods of containing toxins, namely excavation or capping, bioremediation practices involve minimal disruption of a site, executed over a period of months or years. Such horticultural remediation could be helpful both in resource-poor fenceline communities and on industrial sites still in use along the corridor. As an alternative to conventional cleanup, BASF, located in Geismar, Lousiana, installed black willow in 1996 to degrade the herbicide bentazon present in an old impoundment pond. Black Willow, Salix nigra, is nature to stream banks and lowlands of the eastern United States partly because of its heavy water uptake, the willow is a preferred tree for remediation of contaminated ground water (Misrach, R., & Orff, K. p.216).

-Closed Loop Production: Closed Loop Production describes a manufacturing process in which any waste of auxiliary material is reused or recycled. The production process is intended to mimic nutrient cycles found in nature where waste from one source is food for another organism or system. This may develop into a sort of material ecosystem of complex by-product synergies or be instituted in a single plant or company (Misrach, R., & Orff, K. p.219).

-Cultural recycling: Like Pastiche or sampling, cultural recycling is the creation of new value from undervalued or abandoned social behaviors and material activities. Cultural recycling implies the adaptation and updating of traditions: what's old is new again (Misrach, R., & Orff, K. p.221).

-Green Infrastructure: A strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserves ecosystem values and functions and provides associated benefits to human populations. (Source: Benedict & McMahon 2006)

-Living Closer: According to the 2011 Community Preference Survey conducted for the National Association of Realtors, Americans' "ideal communities" include a mix of amenities and land uses. Also found in the study, Americans are willing to live closer to one another if that translates to a significantly reduced commute. Convenience, intimacy, diversity, and total open

space all further increase the willingness of people to live in closer proximity. When the many places where we work, shop, worship, learn and play are near the places where we live, all of those same quality-of-life indicators increase again (Misrach, R., & Orff, K. p.227).

-Peak Oil: Predictions of decreased oil production based on the availability of oil reserves began in the 1950s. The peak oil theory was developed by M.K. Hubbert, a geologist, mathematician, and physicist who worked for the Shell Oil Company from the 1940s to the 1960s. With the combined knowledge of statistical principle, the known oil reserves, and the predicted discoveries of reserves Hubbert developed, "the concept of 'peak oil' – a finite resource whose production follows a bell shaped curve" (Misrach, R., & Orff, K. p. 119).

-Phytoremediation: the use of green plants to remove pollutants from the environment or render them harmless. Current engineering-based technologies used to clean up soils like the removal of contaminated topsoil for storage in landfills are very costly, Kochian says, and dramatically disturb the landscape. Kochian's cost-effective green technology uses plants to vacuum heavy metals from the soil through their roots. He says, Certain plant species known as metal hyperaccumulators have the ability to extract elements from the soil and concentrate them in the easily harvested plant stems, shoots, and leaves. These plant tissues can be collected, reduced in volume, and stored for later use. -plant physiologist Leon V. Kochian (http://www.ars.usda.gov/is/ar/archive/jun00/soil0600.htm)

-Resource Conservation and Recovery Act: Passed in 1976, the Resource Conservation and Recovery Act (RCRA) is the federal law that determines how solid and hazardous wastes are disposed of and how hazardous wastes are generated, stored, and transported. In 1980, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) added regulations that created a legal framework for determining liability of, financing mechanisms for, and clean-up procedures for inactive hazardous sites (Misrach, R., & Orff, K. p.231).

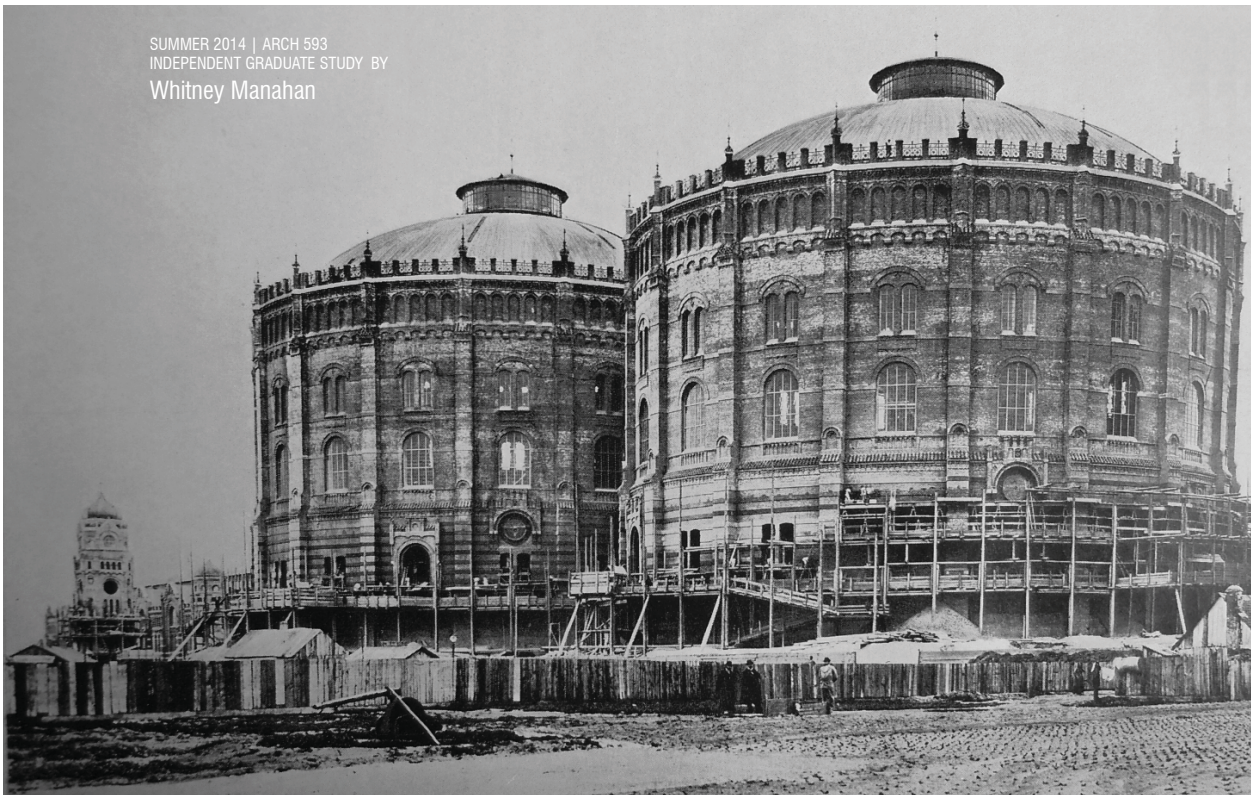
-Smart Growth: Smart Growth is the idea that not all development improves society of is an intelligent use of resources. The suburban model of forever building more roads and utilities for housing developments on former greenfields- undeveloped areas- while urban cores with existing utilities and amenities area vacated isn't smart. On the most scientific level, there is an inherent loss of electricity and water pressure correlated to the distance over which those commodities are delivered. The longer the distance traveled, the more opportunities there are for failure. Smart growth is the antidote to other problems of sprawl: long commutes, environmental degradation, socioeconomic segregation and alienation, disinvestment in historic centers. Concentrating development in existing urban cores around public transit hubs, schools, and other amenities, creates attractive and more equitable neighborhoods. Smart growth includes zoning that allows for a mix of residential and commercial uses and an emphasis on housing affordability (Misrach, R., & Orff, K. p.233).

-Transition Timeline: One of the tools of any planning process is the scenario framework that provides those involved with different predicted outcomes based on current-day decisions. The transition timeline offers just such a tool to towns and communities to respond to peak oil and climate change with several different options- and outcomes- to create local resilience (Misrach, R., & Orff, K. p.235).

B. CASE STUDIES

Case Study Research on:

THE ADAPTIVE REUSE OF POST-INDUSTRIAL SITES AND STRUCTURES



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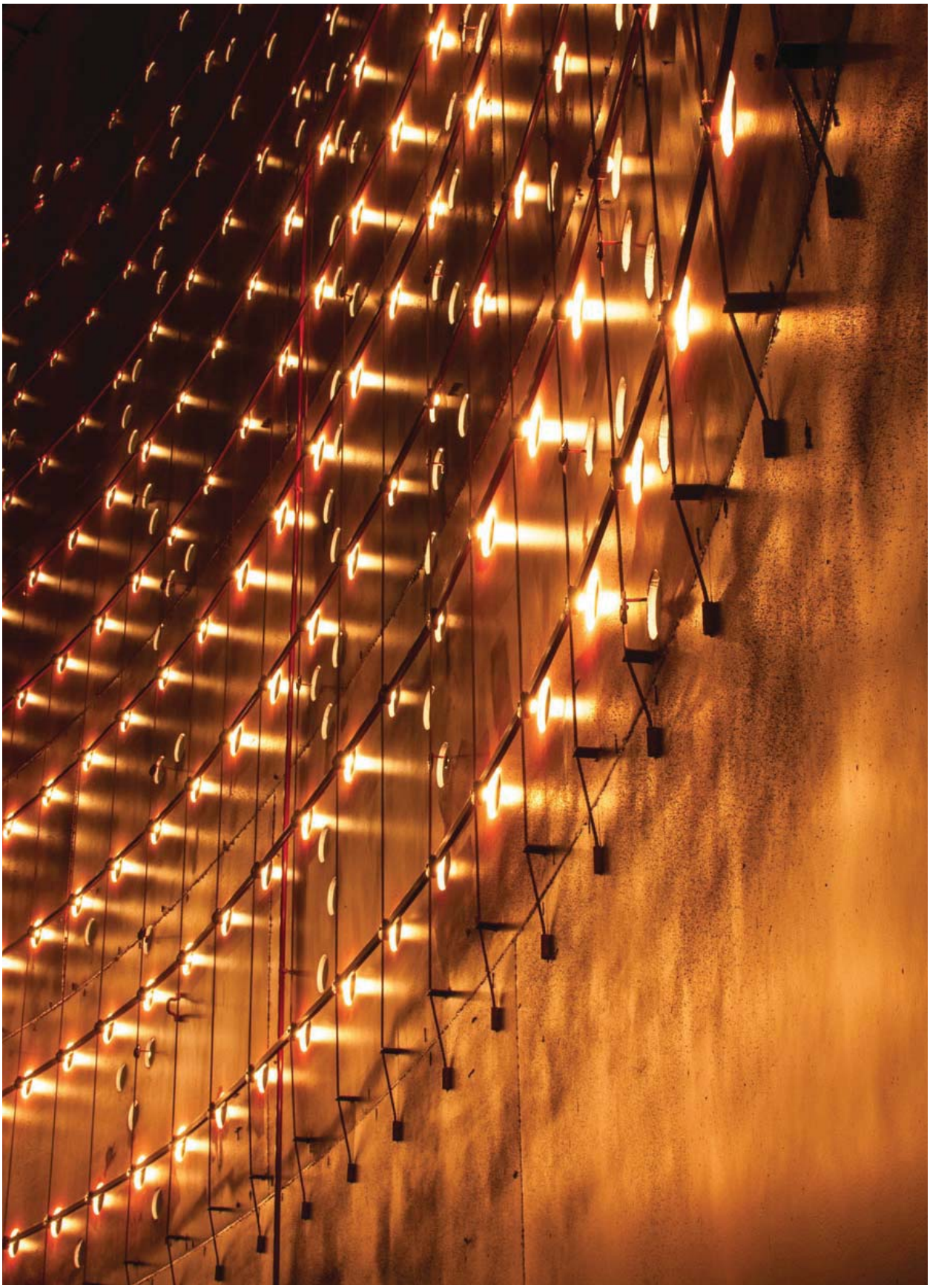
INDEPENDENT GRADUATE STUDY BY
Whitney Manahan



CONTENTS

SILO 468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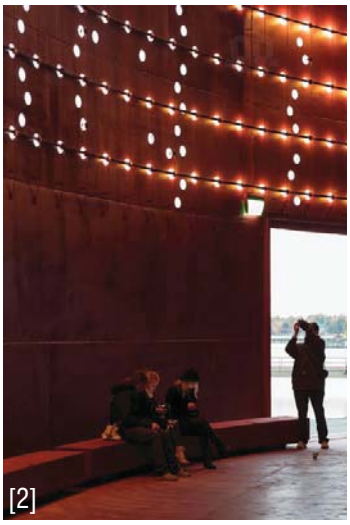
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STATISTICS

Location: Helsinki, Finland

Original Use: Oil storage
Current Use: Art installation & public space

Year Built: c. 1960
Year Renovated: 2012

Client: City of Helsinki
Designer: Lighting Design Collective [LDC]

Project Cost: $2.6 million
Project Size: 10,946.9 sq ft

DESCRIPTION

As part of Helsinki's waterfront revitalization project, Lighting Design Collective converted an unused oil silo into a public art installation. Silo 468 was the first project to kick off the city's long-term redevelopment plan of the area.

The project is situated at a prime location, highly visible from the majority of the city, and was meant to serve as a beacon to attract visitors to the redeveloping area. The waterfront revitalization is a part of a larger redevelopment program for Helsinki's urban center as well as its surrounding suburban centers.

The coastal location of the city led to a great deal of industrial development as a port area after WWII. With most of the industry relocating over the last few decades, the postindustrial sites provide ideal locations for urban redevelopment to increase density for the city.

Silo 468 now serves as a public space, gallery and event space. The structure also


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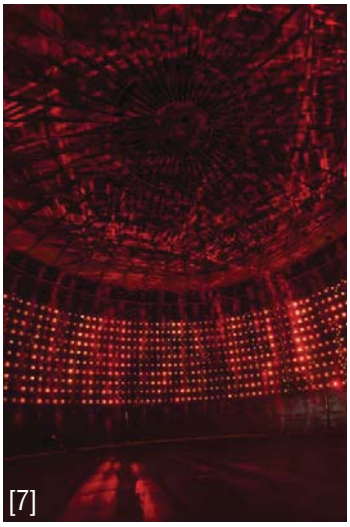
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acts as a reminder of the industrial nature of the area as it turns red at midnight for an hour to signify the silo's original use as a source of energy.

The ever-changing light mural was created by cutting a grid of 2,012 perforations into the silo. The perforations are backed with 1,280 LED lights and 450 mirrors. The lighting patterns, seen from both the exterior and the interior of the silo, vary throughout the day with the changing sun angle and with the LED lights which are programmed to react to changing weather conditions.

The 2,012 perforations are also significant as they represent the year 2012 when Helsinki was named the year's World Design Capital by the International Council of Societies of Industrial Design.

IMAGE [1] Silo before renovation [2] Interior of Silo [3] Interior of Silo [4] Exterior of Silo at dusk [5] Exterior of Silo at dusk [6] Detail of LED system [7] Interior of Silo [8] Interior of Silo

IMAGE SOURCES[1] Video Still www.ldcol.com/286/silo-468 IMAGES [2-8] www.designboom.com

VIENNA GASOMETERS


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STATISTICS

Location: Vienna, Austria

Original Use: Oil storage
Current Use: Mixed Use
Year Built: 1896
Year Renovated: 1995-2001

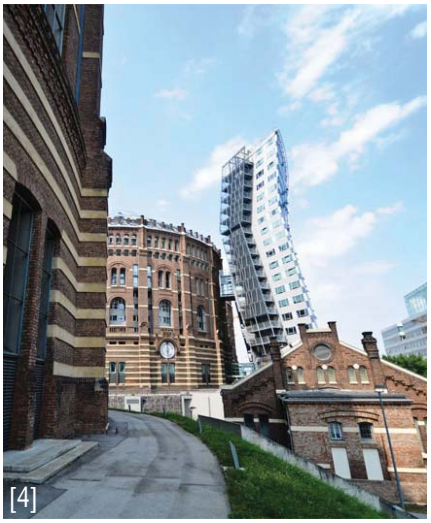
Client: City of Vienna & WBV-GPA
Architects: Jean Nouvel, Coop Himmelblau, Manfred Wehdorn, Wilhelm Holzbauer

Project Cost: ~ $238 million
Project Size: ~ 1million sq. ft.

DESCRIPTION

The Vienna Gasometers were built in 1896 as part of the city's investment in a large scale utility plan. The Gasometers stood as an iconic part of the city's skyline and, in 1981, were "listed by the country's heritage ministry as outstanding examples of industrial architecture." They were decommissioned in 1984 but sat vacant for only a decade. In 1995, a competition was released for designs to adaptively reuse the structures and redevelop the surrounding area while celebrating the area's industrial past.

Four individual designs were chosen for the gasometers; each one with a notable Austrian architect leading the way. Each architect took a slightly difference approach to the project however they each followed a similar programmatic use and were connected at the pedestrian level. The interiors of the structures were gutted for renovation while the brick facades and parts of the roof structure were kept intact and preserved.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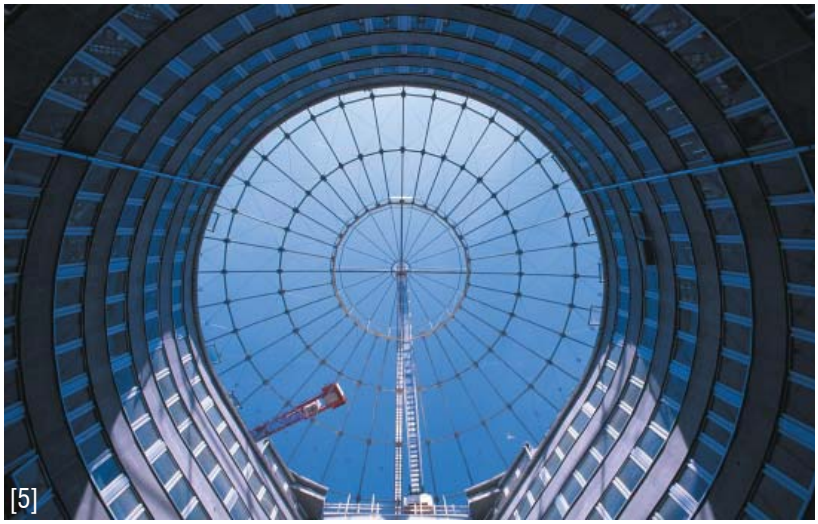
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The gasometers have developed a village atmosphere and directly affected the redevelopment of the surrounding area. The complex holds about 800 apartments and a student dormitory that accommodates 250 students. In total there are about 1,500 residential tenants. Each structure has a similar programmatic diagram with residential on the top floors, office in the middle and retail or event space on the lower levels. The complex has almost 120,000 sq. feet of office space, over 70 shops, restaurants and bars, an event space for 4,000 people, and a day care. One of the gasometers is also home to the Vienna National Archive.

This kind of project is rare as the industrial structures were lauded from their inception, listed for preservation before they were decommissioned, were never neglected and only sat unused for a decade. The Vienna Gasometers project is a great example of foreword thinking by public and private partnerships to redevelop and preserve part of Vienna's history.

IMAGE [1] Gasometers in use c. 1920's [2] Gasometers A and B after renovation [3] Gasometers during renovation [4] Gasometer B and complex [5] Gasometer B Interior [6] Gallery inside Gasometer [7] Gasometer A Interior

IMAGE SOURCES [1,3,7]twistedsifter.com [2]www.odditycentral.com [4,6]fraktal-design.com [5]www.coop-himmelblau.at

FORD ASSEMBLY BUILDING


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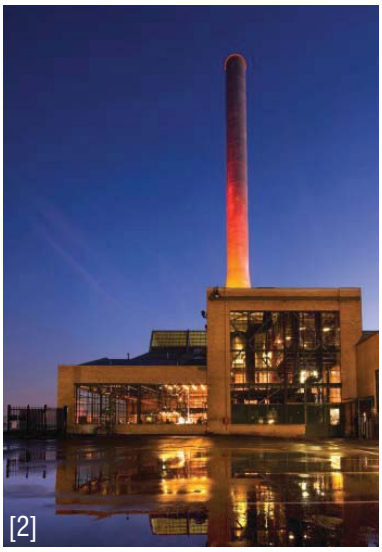
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STATISTICS

Location: Richmond, California

Original Use: Auto Manufacturing
Current Use: Mixed Use
Year Built: 1930
Year Renovated: 2008

Client: Orton Development Inc
Architects: Albert Kahn (Original)
Marcy Wong Donn Logan Architects (Renovation)

Project Cost: Multi-million
Project Size: 525,000 sq. ft. + site

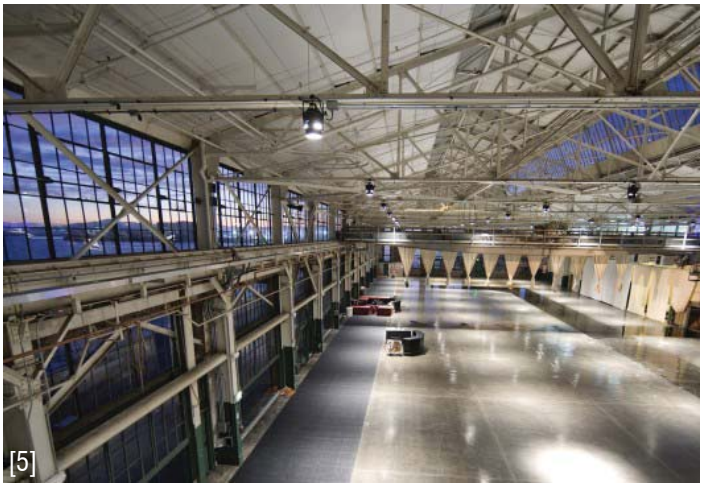
DESCRIPTION

The Ford Assembly building was commissioned by Ford Motor Company as a west coast production facility and was originally designed by the industrial architect, Albert Kahn. Kahn was renowned at the time for his innovative use of material, structure and natural light in facilitating the process of production.

During World War II the factory was converted to assemble tanks and other military vehicles. The building has a notable history considering its architectural significance, its use in aiding the war efforts and the fact that the factory was largely run by female employees who are now known as “Rosie-the-Riveters.”

After the war, the factory was used for various purposes but, in 1989, an earthquake destroyed parts of the factory and it was shut down as the structure was considered unstable.

In 2004, after multiple attempts at finding a way to preserve and renovate the building,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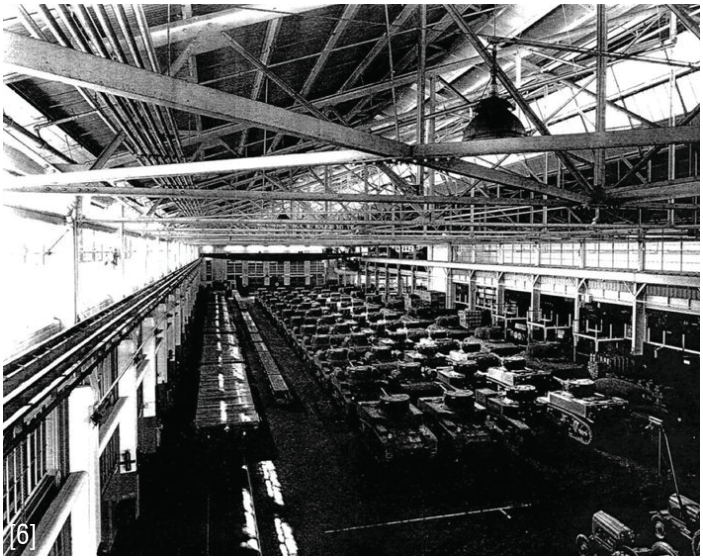
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both financially and programmatically, a development company successfully purchased the building and surrounding land and began working with the National Park Service and the State of California Historic Preservation Office to renovate the building.

The complex is now home to multiple corporate headquarters and includes a museum, office space, retail space, a restaurant and a large event space which is often used for art exhibits or performance space. The renovation followed along the lines of the original architect's intent with simplicity, function and innovation in mind. The spaces were designed to reflect the original character with as little changed or added as possible. The complex is also 100% solar powered and has won multiple awards for excellence in preservation, design and sustainability.

IMAGE [1] Exterior of building [2] Exterior of building [3] Interior- Restaurant Kitchen [4] Interior of main building now used as an art space [5] Interior of main building [6] Main building in use as tank factory c. WWII [7] Renovated Office Space [8] Kitchen dining area [9] Aerial view of building and site

IMAGE SOURCES [1-9] www.archdaily.com

MILL CITY MUSEUM & MILL RUINS PARK

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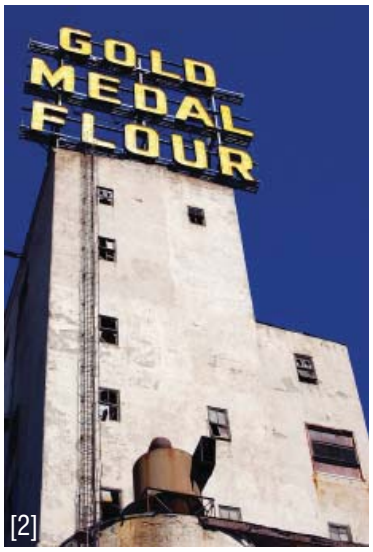

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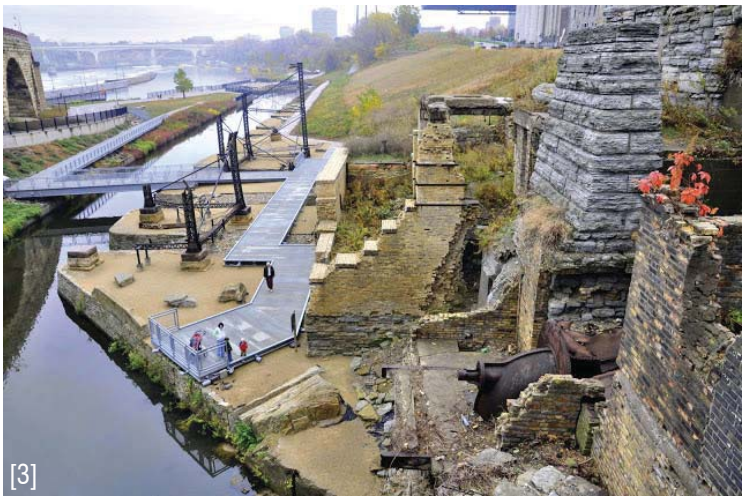
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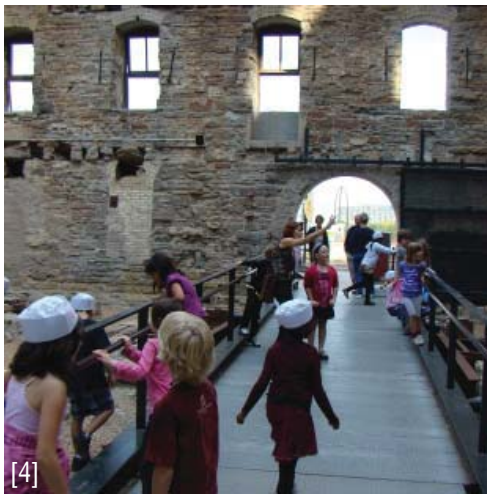
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STATISTICS

Location: Minneapolis, MN

Original Use: Flour Mill
Current Use: Museum+Mixed Use
Year Built: 1870's-1880's
Year Renovated: 2003

Client: City of Minneapolis
Architects: Meyer, Scherer & Rockcastle

Project Cost: $60 million
Project Size: 125,000 sq. ft. + park site

DESCRIPTION

What is now the Mill City Museum was originally built as the Washburn Mill in 1874. The Mill has a marked history of both progress and disaster. The original mill was destroyed by a flour dust explosion and rebuilt in 1880 with better safety technology in place including ventilation systems to combat the flour dust issue.

At the time it was the largest, most technologically advanced flour mill in the world. The mill worked on a water powered system powered by the Mississippi River and St. Anthony Falls. The Washburn company later became known as General Mills. The mill stood as a significant symbol of industry as flour production was a leading industry in Minnesota and led to much of the development of the area.

By 1965, the mill had been surpassed many times over by technological advances and was decommissioned and ultimately abandoned. In 1991, another disaster struck the neglected structure when a fire broke out and destroyed part of the mill. Most of the mill was saved from the fire and within a few years the city of Minneapolis started

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working toward salvaging and stabilizing the mill for redevelopment. In 2001, construction began on the mill to convert it into a museum. The renovation was led by the local architecture firm Meyer, Scherer & Rockcastle who incorporated the stabilized ruins into the new design and use.

The complex now includes both old and new construction housing the museum, office space, event space and an exterior courtyard surrounded by the ruins of the 1991 fire. The land between the mill and the river was also revitalized and is now known as Mill Ruins Park. The site is listed on the National Register of Historic Places and its industrial history is a celebrated aspect of the site.

IMAGE [1] Mill City Museum complex [2] Salvaged Gold Medal Flour sign [3] Mill Ruins Park on the Mississippi River [4] Children visiting the Museum [5] Mill City Museum complex [6] Mill City Museum complex with modern addition [7] Interior renovation of office space [8] Mill Ruins Park at night [9] 1991 fire at Washburn “A” Mill

IMAGE SOURCES [1,2]www.panoramio.com/user/1741216 [3,6]luvtoexplore.blogspot.com [4]barton.mpls.k12.mn.us [5]commons.wikimedia.org [7]www.millcitymuseum.org [8]en.wikipedia.org/wiki/Mill_Ruins_Park [9]collections.mnhs.org

INUJIMA ART PROJECT


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STATISTICS

Location: Inujima Island, Japan

Original Use: Copper Refinery
Current Use: Art Institution
Year Built: 1909
Year Renovated: 2008

Client: Soichiro Fukutake
Architects: Sambuichi Architects

Project Size: .21 sq. mile

DESCRIPTION

Inujima is a Japanese island that was most known due to its use as a copper refinery. The site was developed in 1909 and the refinery was a successful addition to Japan's growing industrial portfolio. Even with its success, the refinery was only in production for 10 years. After the refinery was shut down in 1919, the site was unused and neglected. Much of the site fell into ruin and was ignored by the small population on the island.

Almost a century after its conception, the site was purchased by Soichiro Fukutake, a Japanese philanthropist and entrepreneur, for the purpose of preserving the site and creating an art institution. Before Fukutake's purchase, the refinery site was set to become a medical waste dump.

In 2007, the site was designated as protected site with historical significance to Japan's Industrial history. A year later, the Inujima Art Project campus opened its doors. The redesign of the site and buildings utilizes the original passive technology


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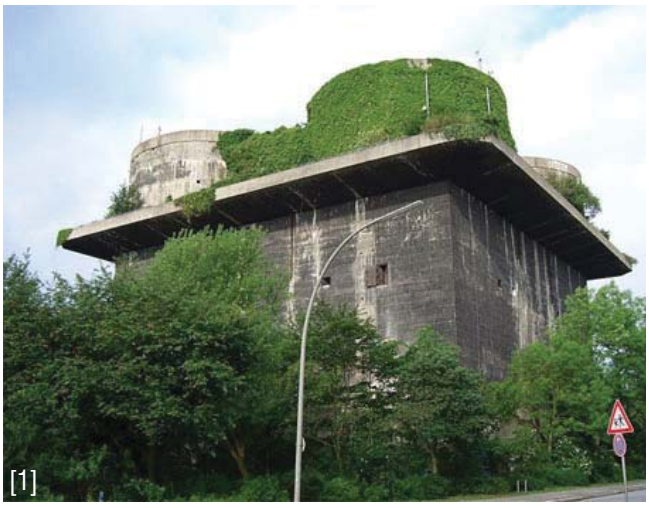
of the factory for heating and cooling as well as natural water filtration systems through vegetation. All of the usable structures on the site were salvaged and others were saved as stabilized ruins. Preservation is taken very seriously and only 50 visitors a day are allowed on the site.

The main use of the site is for the art institution which has also expanded to other parts of the island. For example, in the residential areas of the island where homes are built in traditional Japanese architectural styles, modern art “pavilions” have been built as a project to connect the residents and the Inujima Art Project. [See image 9]

IMAGE [1]Ruins of the refinery before renovation [2]Vaulted gallery with art installation [3] Renovated structure now used as the complex’s visitor’s center [4] View of the complex from above [5] Detail of the original textured brick used in many of the structures [6] Renovated courtyard gallery [7] View of the complex from above [8] Complex after renovation [9] Art installation on the island

IMAGE SOURCES [1] gaijingav.blogspot.com [2,4,6,7,8] openbuildings.com [3] www.panoramio.com [5] www.arcspace.com [9]www.designboom.com

WILHELMSBURG ENERGY BUNKER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STATISTICS

Location: Wilhelmsburg, Germany

Original Use: Anti-Air Craft Tower & Air Raid Bunker
Current Use: Energy Plant

Year Built: 1943
Year Renovated: 2010-2013

Client: IBA Hamburg GmbH
Architects: HHS Planer + Architekten

Project Cost: ~ $36.6 million
Project Size: ~ 1million sq. ft.

DESCRIPTION

Wilhelmsburg's above ground bunker was completed during World War II as an offensive anti-air craft tower and a defensive civilian air raid bunker. The bunker held as many as 30,000 people during air strikes. The structure was practically indestructible. After the war British forces filled the bunker with dynamite to demolish it but were only successful at destroying the interior floors of the building. The exterior of the structure stayed intact overall but the interior demolition led to the building being unused for 60 years.

In 2006, as part of the "Renewable Wilhelmsburg" Climate Protection Concept spearheaded by the urban development and betterment group Internationale Bauausstellung, or IBA, conceptual plans began for a reuse of the bunker. The structure was considered a monument and a symbol of the country's history and an adaptive reuse with a positive purpose was sought.

Focusing on climate change, the project was conceived as a renewable energy plant


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that would serve the surrounding neighborhoods. The bunker is equipped with solar panels for generating electricity and various forms of low-to-no carbon emission based heating such as biogas, wood combustion and waste heat from one of the cities industrial plants. The heating capacity created by the bunker can serve around 3,000 homes and the solar electricity meets the needs of about 1,000 homes.

The renovated bunker also serves as an attraction as it houses a cafe which utilizes the 100 foot high observation deck as its patio offering spectacular views of the entire city. It also includes an exhibition on the history of the bunker and guided tours of the Bunker's reincarnation as a source of renewable energy.

IMAGE [1] Bunker before renovation [2] Bunker before renovation [3] Bunker after renovation [4] Restaurant Patio [5] Restaurant Interior [6] Bunker after renovation lit at night [7] View into Restaurant [8] View of Bunker from neighborhood [9] View of neighborhood from Bunker [10] Bunker after renovation lit at night

IMAGE SOURCES [1,5,8] weburbanist.com [2,7] stephenhoang.tumblr.com [3] www.iba-hamburg.de [4] www.dezeen.com [6,9] bashfuladventurer.com [10] www.erco.com

CHARLES H. SHAW CENTER


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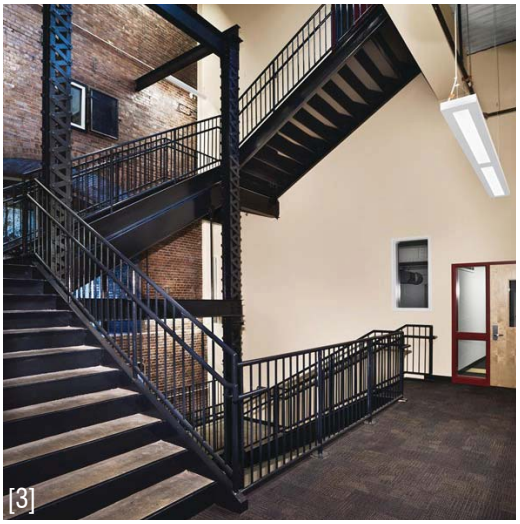
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STATISTICS

Location: Chicago, Illinois

Original Use: Power House
Current Use: High School
Year Built: 1905
Year Renovated: 2005-2009

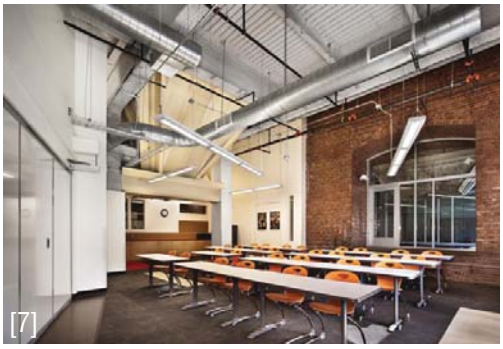
Client: Homan Arthington Foundation, Chicago Public Schools, Henry Ford Learning Institute
Architects: Farr Associates

Project Cost: $40 million
Project Size: 90,000 sq. ft.

DESCRIPTION

The Charles H. Shaw Technology and Learning Center was originally a powerhouse which provided heat and electricity for the Sears, Roebuck and Company's Lawndale campus. The building was built in 1905 and originally used coal and steam to produce electricity. The campus later switched to gas and interestingly, the new equipment for conversion to gas was housed along side the old coal equipment as it was deemed more efficient to keep the old equipment in place rather than removing it. This decision unknowingly led to the creation of a historic time line of energy production within the powerhouse.

The campus was placed on the National Register of Historic Places in 1978 and the powerhouse was utilized until 2002. The powerhouse did not sit idle for long as the surrounding neighborhood was already being redeveloped by Charles Shaw. In the years between being decommissioned and renovated, many ideas were discussed for the buildings reuse and the issues that would arise when renovating the industrial building. However, by 2005 plans were underway to reinvent the Sears powerhouse



into a Charter High School to help the re-burgeoning neighborhood and serve as a symbol of continued progress in the area.

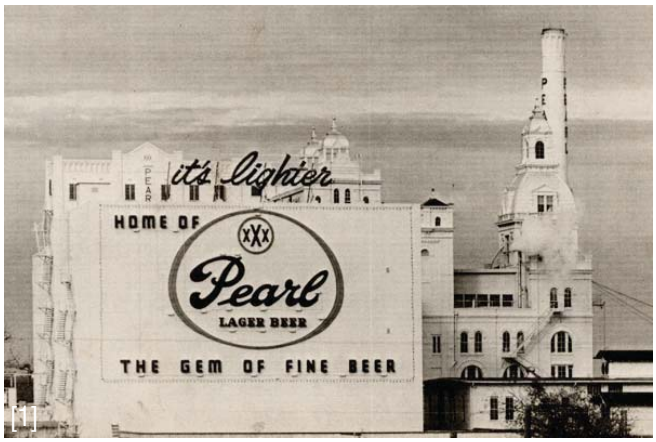
The most difficult task in the renovation was the removal of thousands of pieces of equipment and an endless amount of supply lines and piping. Some of the equipment was kept for an aesthetic reminder of the original purpose of the building and other pieces were left in place as they proved too large or difficult to be removed.

The building has progressed from a power generator to a power saver. The complex now has a geothermal heating and cooling system and extensive water and energy conservation systems. The building was renovated to LEED standards and has applied for LEED Platinum certification.

IMAGE [1] Shaw Center exterior after renovation [2] Interior before renovation [3] Interior renovation [4] Interior Renovation of main factory space [5] Shaw Center exterior after renovation [6] Interior renovation [7] Interior renovation [8] Exterior Renovation

IMAGE SOURCES [1,2,3,4,6,7] www.architectmagazine.com [5] www.homansquare.org [8] www.flickr.com/photos/metroblossom

PEARL BREWERY



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STATISTICS

Location: San Antonio, Texas

Original Use: Brewery
Current Use: Mixed Use
Year Built: 1881
Year Renovated: 2002-2014

Client: Silver Ventures
Architects: Lake Flato Architects, Durand-Hollis Rupe Architects [master plan + renovations]

Project Cost: $multi million
Project Size: 23 acres

DESCRIPTION

The original buildings of the Pearl Brewery complex date back to 1881. The brewery had a long history and was in service for 118 years with only a brief disruption in beer making during prohibition when the company had to switch to making carbonated beverages to stay in business. In 2001, the brewery shut its doors and moved its manufacturing to newer, contracted facilities.

The campus was sold in 2002 and a master plan was developed that included renovating the existing buildings, creating an “urban” center with new construction and revitalizing the riverfront to connect it with the famous San Antonio Riverwalk. The waterfront revitalization included a new park with amphitheater and stage overlooking the river. The property originally included about 400,000 square feet of building space and the new construction doubled the amount of built space on the site. In addition to the adjacent riverfront park the master plan also took advantage of the large site with ample outdoor space in the way of pedestrian malls and courtyards.


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The Pearl Brewery complex is now a vibrant destination and is home to a weekly farmers market, restaurants, educational facilities, retail, office, residential and event spaces. The main historic brew house is being transformed into a hotel and is set to open in 2014. Some of the big name tenants at the Brewery include the San Antonio chapter of the American Institute of Architects, the San Antonio Hispanic Chamber, the Culinary Institute of America and the Aveda Institute of San Antonio.

Besides the sustainability advantages of repurposing the existing buildings the development boasts many other environmentally friendly qualities. The campus has the largest solar installation in the state of Texas and is built to LEED standards and two of the buildings have received LEED Gold certification. As water and drought are major issues in the area, all non-potable water at the complex is recycled or collected rainwater and the hardscape and landscape are both designed with drought resistant qualities.

IMAGE [1]Historic Pearl Brewery [2]New Pearl Brewery Campus [3]Full Goods Warehouse after renovation [4]Restaurant at Pearl Brewery [5]Pearl Park on the San Antonio River Walk [6]Welcome Center [7]Gas tanks reused as planters [8]Full goods interior renovation [9]Condo renovation [10]Brewery tanks reused as signage and rainwater collection

IMAGE SOURCES [1] atpearl.com/about/history [2] www.lakeflato.com [3,4,7,8,9,10] inhabitat.com [5] mjmmg.com/pearl-brewery-case-study [6] http://dailycoffeenews.com

798 ART DISTRICT


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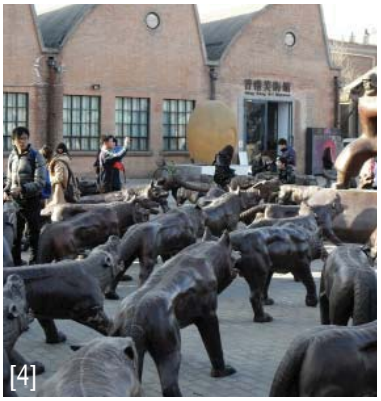
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STATISTICS

Location: Beijing, China

Original Use: Electronics Factory
Current Use: Art Institution
Year Built: 1957
Year Renovated: 1995-2003

Client: Various Artists & Art Groups
Architects: -

Project Cost: -
Project Size: -

DESCRIPTION

Now known as the 798 Art District or “Art Zone,” the Beijing Factory has a unique history as a collaboration between China and the Soviet Union. China the ideal location and workforce but lacked the funds and connections to build the much needed Electronics factory. The Soviet Union stepped in and provided funding as a joint venture and brought in East German architects to design the buildings.

The Bauhaus educated architects brought in a very different building style than the surrounding Chinese architecture which makes the factory one of the most distinct buildings in the district.

The factory was only in use for about forty years and by the late 1990’s the main industry had vacated and the spaces were being rented as smaller workshops with some of the buildings abandoned and neglected. At the time, the modern art movement was looked down upon in China. Modern artists, looking for a support community and affordable rent, discovered the complex and slowly began moving in.


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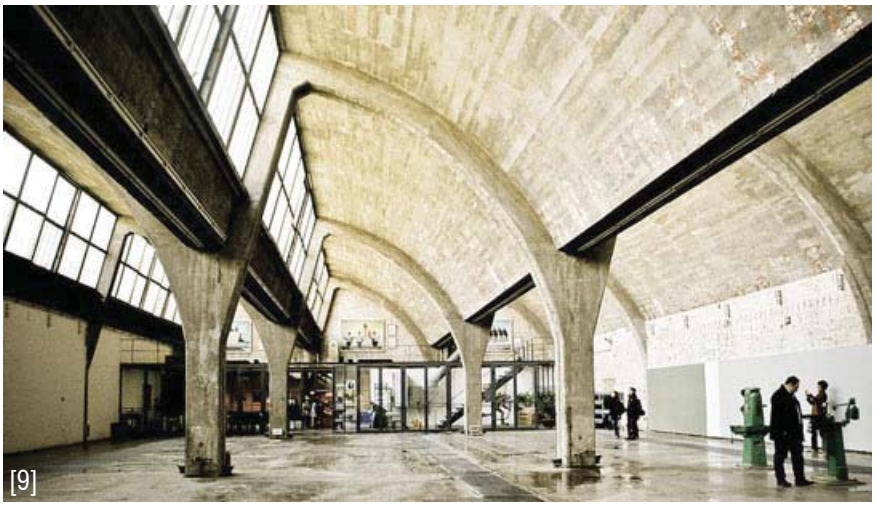
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After a brief threat of destruction in 2004, the art district was saved due to the art culture that had begun to thrive in the area. The idea of keeping and expanding the art district as a culturally significant area saved the buildings. Ten years later the 798 Art District holds the prestige of being 3rd in line of the most popular destinations in China only after the Forbidden City and the Great Wall.

The complex has been home to internationally renowned artists such as Ai Weiwei and has served as the headquarters for various art institutions such as Beijing's Central Academy of Fine Arts (CAFA). The district now holds permanent and traveling exhibits in its many galleries and hosts multiple festivals each year.

IMAGE [1] Exterior of main building and sculpture courtyard [2] Street front of complex [3] Sculpture Courtyard [4] Sculpture Courtyard [5] Main Gallery [6] 789 sign at entrance [7] Photo shoot in sculpture [8] Exterior of main building [9] Main Gallery

IMAGE SOURCES [1] uptochina.org [2,3,4,6,7] 798-art-district.com [5] www.meiguoxing.com [8] yourenotfromaroundhere.com [9] www.theworldofchinese.com

MILL JUNCTION SILO


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STATISTICS

Location: Johannesburg, South Africa

Original Use: Grain Silos
Current Use: Student Housing
Year Built: 1960's
Year Renovated: 2014

Client: Citiq
Architects: -

Project Cost: $300 Million
Project Size: -

DESCRIPTION

The Mill Junction Silo Project solved two problems the city of Johannesburg was facing, a shortage of housing for students due to the multiple colleges and universities in the area and salvaging the industrial landmarks which had become threatened after years of disuse.

The developers took a colorful approach to the project turning it into a competition for local architecture students. The winning design incorporated the addition of stacked shipping containers which almost doubled the amount of usable space in the silos. The shipping containers have the benefit of being structurally self-sufficient and were able to stack neatly on the existing structure of the silos.

The history of the structure is not well documented but is considered to be at least 50 years old and it is located in a post-industrial area of the city. The renovation has had its share of criticism but the overall reaction seems to be hopeful that the project will help spark other forward thinking redevelopment ideas in the area.


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The project includes 375 student apartments as well as common spaces such as kitchens, bathrooms, study areas, libraries, digital libraries and lounges. The 40 meter tall structure offers views of nearly all of downtown Johannesburg through new openings cut into the silos, balconies at the container levels and at the very top, a roof patio.

The development boasts 100% occupancy year round and has nothing but positive reviews posted online for current and former tenants.

IMAGE [1] Silos before renovation with Johannesburg skyline [2] Mill Junction Silos after renovation [3] Shipping container addition to the silos [4] Silos after renovation [5] Shipping Container Balconies [6] Typical student room [7] Silos after renovation [8] New Mill Junction entrance [9] Typical kitchen and bathroom area

IMAGE SOURCES [1] www.basa.co.za [2-9]www.citiqstudents.co.za

LA-FABRICA 1975


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STATISTICS

Location: Barcelona, Spain

Original Use: Cement Factory
Current Use: Mixed Use
Year Built: “Turn of the Century”
Year Renovated: 1975

Client: Ricardo Bofill
Architect: Ricardo Bofill

Project Cost: $ million
Project Size:

DESCRIPTION

Architect Ricardo Bofill discovered an unused cement factory in 1973 and immediately saw beauty in the partially ruined building. He set out to give the complex a new life. Part of the process of renovation was extensive demolition. Of the original 30 silos only 8 were salvaged.

As pieces of the factory were demolished many unseen features and spaces were discovered. The complex was made up of not only silos but also underground galleries, machine rooms and hidden courtyards. Beyond the initial impact of the various structures, the architect noted the surreal elements which emerged from the ruins. There were stairs leading to nowhere, hidden rooms, monolithic concrete pours and massively scaled spaces.

Through the renovation it was determined that the factory would become the new home of Ricardo’s firm, Taller de Arquitectura. The abundant space allowed for open offices, private meeting spaces, a models lab, archival space, library space,


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a projection room, and a large exhibit space called “The Cathedral.” The remaining space became the architect’s private residence. The renovation of the buildings took about two years to complete.

The site itself was a large part of the project as the cement factory had little use for on-site vegetation and often excess cement to discard. Most of the concrete on site was broken up to make way for soil and vegetation. An in-depth planting plan was instilled and over the years the vegetation has grown up to surround the factory in such a way that the salvaged structure now looks as if it is once again being taken back by nature.

IMAGE [1] Factory during renovation [2] Factory after renovation [3] Coutyard [4] Courtyard [5] Courtyard [6] Offices in the Silos [7] Office Spaces within the factory [8] Office Spaces within the factory

IMAGE SOURCES [1-8] www.ricardobofill.es

EMSCHER PARK


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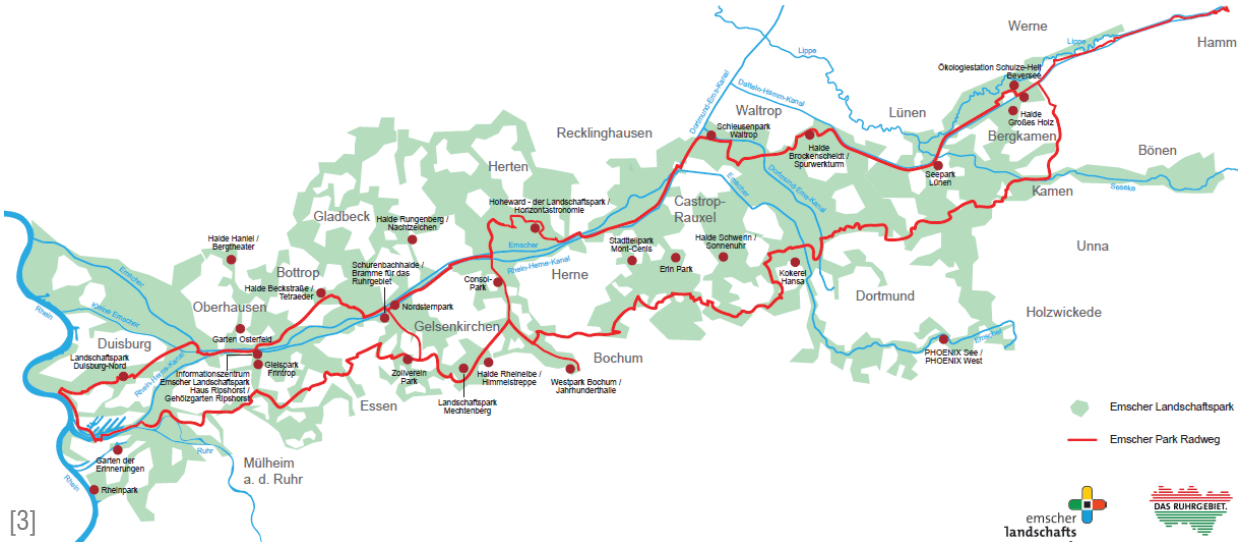

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STATISTICS

Location: Ruhr District, Germany

Original Use: Steel & Coal Industry
Current Use: Public Parks
Year Built: Late 1800's-Mid 1900's
Year Renovated: 1989-Present

Client: Public Private Partnerships with the International Building Exhibition (IBA)
Architects: Varies

Project Cost: $8 billion+
Project Size: 115,000 Acres

DESCRIPTION

Emscher Park is a 43 mile long network of postindustrial sites that have been turned into public parks. The sites were once home to hundreds of Germany's Industrial steel foundries and coal mines. After decades of technological developments the industry began to leave the area and by the late 1980's most of the land was abandoned.

In 1989 the local government partnered with local and national agencies to prevent the decay and loss of the once bustling area. A ten year plan was installed through the International Building Exhibition (IBA) to create a more natural and sustainable environment for the area which included remediation, renovation and cultural reinstitution. The ten year plan has passed and yet the area continues to grow under other developers and agencies.

Some of the main goals of the project included creating green connections between the 17 towns located along the river valley, cleaning and remediating the soil and rivers to help regenerate the brownfield sites, and transforming the abandoned industrial sites into active cultural centers. Many of the structures have been converted into


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residences, offices, retail, and galleries. The project itself is credited with directly creating 5,000 jobs in the area and the amount of jobs created indirectly through the various uses of the sites has yet to be determined.

Landschaftspark is one of the most well documented parks in the network. The park was part of a competition and the winning entry was designed was by Landscape Architect Peter Latz. Every part of the site was considered including the salvage and reuse of all structures, which in the end was the reason Latz's design was chosen. Latz's unique outlook created spaces such as the climbing wall which was once a canal and the ice skating rink amongst the catwalks and pipelines of a former refinery.

IMAGE [1] Landschaftspark [2] Landschaftspark [3]Map of parks in the Ruhr District [4] Landschaftspark [5] Emscher Park ruin turned climbing wall [6] Ice skating rink amid the industrial buildings [7] Landschaftspark [8] Revitalized buildings and landscape at Landschaftspark

IMAGE SOURCES [1,2,4,8] www.landezine.com [3] www.emscherkunst.de [5] recyclark.tumblr.com [6] www.europan.no [7] en.wikipedia.org

BROOKLYN BRIDGE PARK


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STATISTICS

Location: Brooklyn, New York

Original Use: Ferry & Trade Port
Current Use: Urban park
Year Built: 1642-1958
Year Renovated: 2008 – present

Client: Brooklyn Bridge Park Conservancy
Designer: Michael Van Valkenburgh Associates, Inc.

Project Cost: $350 million (public)
Project Size: 85 acres

DESCRIPTION

The area now known as Brooklyn Bridge Park has a long history dating back to the mid-seventeenth century as a ferry landing which quickly developed into an important port for trade. The port developed as an important industrial transit and trading area over its three hundred years of operation. Land transit developments such as the Brooklyn and Manhattan bridges at the turn of the twentieth century and highway expansion during the mid-twentieth century wiped out the ferry business from Manhattan to Brooklyn.

From the 1950's to the 1980's much of the area was demolished as cargo routes changed and much of the trade industry relocated. In 1983 the Port Authority ended cargo operations along the Brooklyn piers.

Only one year later, in 1984, the land was made available for commercial redevelopment. Various agencies came together to form the early stages of Brooklyn Bridge Park. Not-for-profit groups including the Brooklyn Bridge Park Conservancy,


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the Brooklyn Waterfront Local Development Corporation, and the Brooklyn Bridge Park Development Corporation formed together to oversee the development process, take part in public outreach within the community and ensure the financial sustainability of the park.

Funding for the project came from various fund-raising efforts and public contributions from New York State, New York City, and the Port Authority of New York and New Jersey for the initial design and construction of the parks; as well as private funding for commercial development projects which coincide with the overall design. The development and funding process took over 20 years from about 1984-2005 and the construction process for the parks began in 2008 with an expected completion for the public amenities in late 2015.

IMAGE [1] Piers before renovation [2] Piers before renovation [3] Masterplan for Parks [4] Masterplan Diagram [5] Pier 5 soccer fields [6] Pier 1 ampitheater [7] Pier 1 plan [8] Peir 1 as concert venue [9] Wooden piles remain at the water's edge

IMAGE SOURCES [1-9] www.mvvainc.com

GAS WORKS PARK


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STATISTICS

Location: Seattle, Washington

Original Use: Gasification Plant
Current Use: Urban Park
Year Built: 1906
Year Renovated: 1978

Client: City of Seattle Department of Parks and Recreation
Designer: Richard Haag Associates

Project Cost: multi-million
Project Size: 20 acres

DESCRIPTION

Gas Works Park in Seattle was one of the first instances of the adaptive reuse and remediation of a postindustrial site as a public park in the United States in 1978. Quite ironically, in 1903 The Olmsted Brothers, one of the first and most highly regarded Landscape Architecture firms in the United States, recommended the site be utilized as a public park. This recommendation was based on the waterfront location on Lake Union which was already a popular recreation area, as well as the vistas across the lake to downtown Seattle.

The land was instead purchased by the Seattle Gas Light Company and with the support of the Municipal Plans Commission the area was turned into a highly industrialized complex for the manufacturing and refinement of gas used for lighting, cooking and heating.

The Gas Works plant was closed in 1956 and in 1962 the City of Seattle began a plan to purchase and redevelop the site. The purchasing cost came to $1.34 million.


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By 1972, the site had been acquired by the city and a plan was in place for the redevelopment of the site as a city park. Landscape Architect Richard Haag saw a potential for historic preservation when he learned that the structures on the site were part of the only surviving coal-to-gas plant remaining in the United States. He focused the design of the park around the existing structures, the views of the city and the lake, and a natural remediation of the polluted soil from the plant. The final outcome is what Haag considers “underdesigned” which allows for the appreciation of these elements.

The site itself is a continuous area of research, testing the natural methods of remediation used over the years as well as future plans for energy development and education through technologies such as solar and wind power.

IMAGE [1] Aerial of Gas works in 1966 [2] Aerial of Gas works in 2009 [3] Plan view of Gas works in 1965 [4] Aerial of Gas works in 2009 [5] Freight pier structures remain as part of the park [6] Silhouette of Gas Works Towers set against the glowing Seattle skyline [7] Event at Gas Works Park [8] Play barn and structures [9] Seattle Space Needle as seen in the distance from Gas Works Park

IMAGE SOURCES [1] en.wikipedia.org [2,4,6,7] www.fogwp.org [3] www.seattle.gov [5] www.mygola.com [8] commons.wikimedia.org [9] www.tripadvisor.com

LIGHTING GIANTS - ULJANIK SHIPYARD


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STATISTICS

Location: Pula, Croatia

Original Use: Shipyard
Current Use: Shipyard

Year Built: 1856
Project Concept: 2000-2014

Client: Dean Skira & Croatian Ministry of Tourism
Designer: Dean Skira

Project Cost: $270,000
Project Size: N/A

DESCRIPTION

"Lighting Giants" was the brain-child of architectural lighting designer Dean Skira. As a young boy Skira took part in a rowing club across the bay from the Uljanik shipyard. He watched as the cranes built ships on a massive scale and became enamored with their movements. As Skira put it, "The industrial revolution in the early nineteenth-century has brought us some new monuments, which still stand and move every day in the gentle dance of steel. This dance has gone on for almost 200 years and I wanted to create a colourful stage in which they perform."

The shipyard is still active so when the township began to consider relocating the cranes due to the increased value of waterfront property on the bay, Skira proposed "highlighting" them as an attribute instead of moving them. The still viable industry combined with the creative viewpoint of one artist has created a new attraction in Pula.

The lighting installation includes around 80 large LED lights that alternate colors


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creating a possible 16,000 colors. Many considerations were taken into account as the installation could not affect the daily use of the cranes. Skira worked with the shipyard engineers to ensure the installation could work alongside the functioning shipyard. Other considerations such as light pollution were considered by the designer so that the surrounding area was not affected by the light show.

The show occurs four times each evening from 9:00pm to 12:00pm for 15 minutes. The lights are controlled by a wireless system and are programmed to music. Lighting Giants now draws a crowd every evening and has become a popular tourist attraction. The Croatian Ministry of Tourism saw the potential of the project and helped by funding 1/5 of the project with the rest of the project privately funded. This project is rare as it was the vision of one person who convinced civic leaders that the industrial heritage of their city could be an attraction instead of a deterrent.

IMAGE [1] Shipyard at dusk [2] Entrance to the shipyard [3] Lighting project in progress [4] Cranes lit at night [5] Crowds gather to watch the lighting spectacle [6] Cranes lit at night [7,8,9] Cranes at night as colors change and reflect on the bay

IMAGE SOURCES [1] www.slate.com [2,4,6,7,8,9] www.skira.hr [3] www.dezeen.com [5]laughingsquid.com

DE CEUVEL


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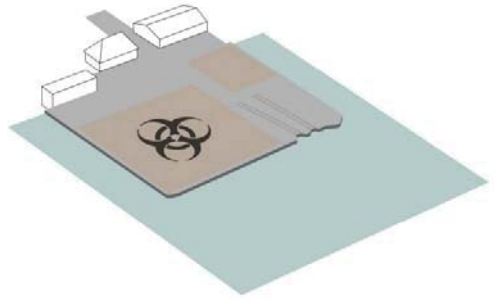

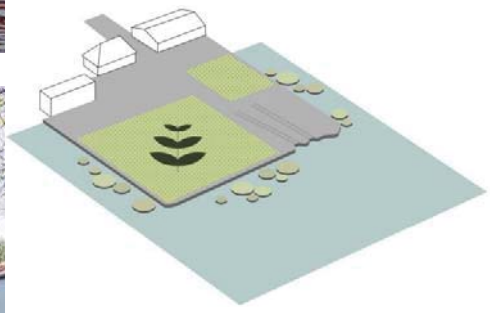

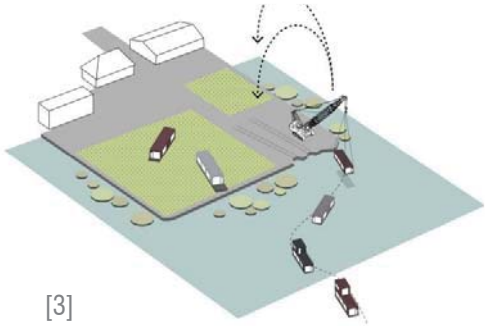
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STATISTICS

Location: Amsterdam, Netherlands

Original Use: Shipyard
Current Use: Bioremedation Site & Cultural Center

Yea Renovated: 2010-Present

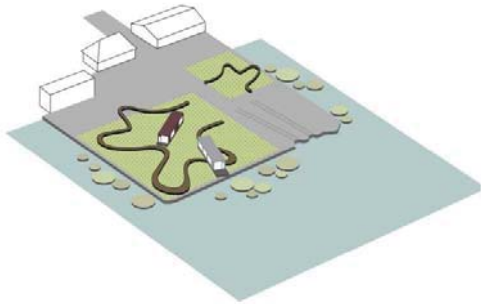
Client: Municipality of Amsterdam
Architect: space&matter
Landscape Architect: Delva Landscape Architects
Sustainabilty Consultants: Metabolic

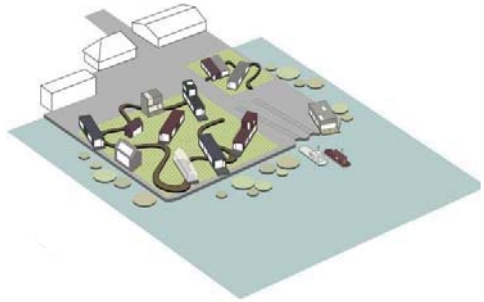
DESCRIPTION

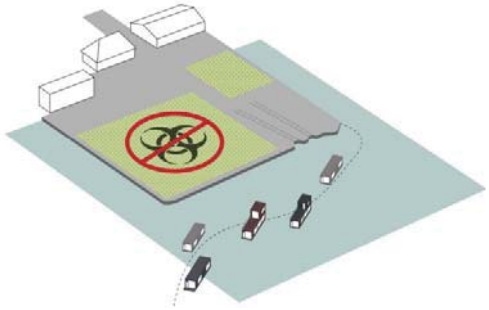
De Ceuvel was an abandoned shipyard and industrial site that was purchased by the city of Amsterdam. Seeking an innovative and cost-effective remediation and redevelopment plan the city turned to a group of sustainabilty-oriented designers and thinkers.

The project designers proposed a phased redevelopment of the site with a temporary installation and park which would remove toxins from the site through bioremediation and phytoremediation. The installation brought in ships and boathouses as the temporary structures for the site. These structures were meant to make little impact on the earth and be easily placed and removed. The boats were all second-hand and most of them were headed toward the junk yard when they were salvaged for De Ceuvel.

Areas of the site contained toxins that would have to be mechanically removed and relocated in typical development schemes. The phased redevelopment of the shipyard





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allowed the areas of containing toxins to be heavily planted and cleaned naturally over a longer period of time. This site is also serving as a research opportunity for students at University of Ghent in Belgium. The areas that need remediation hold most of the boats which are accessed by a raised boardwalk allowing the users to walk amongst the plants without making direct contact with the soil. Other areas that were paved or contained no toxic materials have become park space and patio space for the cafe, shops and events that take place at the now picturesque site on the water's edge.

The once abandoned site has now become a creative incubator and cultural center. Each boat contains offices, artist workshops, designer studios, boutiques, cafes and event spaces. It will be interesting to see what happens when the ten year lease is up for the current use. The temporary solution has become such a spectacular place with unmatched character. It almost seems to unique to remove and redevelop in any typical way.

IMAGE [1] De Ceuvel during an event [2] Boardwalk between studios [3] Phasing Diagram [4] Concept rendering [5] Cafe De Ceuvel

IMAGE SOURCES [1,2,4] inhabitat.com [3] www.archello.com [5] www.cafedeceuvel.nl

ANALYSIS

These case studies represent a wide range of examples of postindustrial sites and structures which have been reimagined in a variety of ways. From a nineteenth century concrete plant abandoned for half a century to a two-hundred year old ship-building crane yard that is still in use, these projects help explain the vital, yet controversial, relationship between today's society and the Industrial Revolution. Beyond being postindustrial in nature, most of these case studies share common aspects such as their redevelopment as centers for art and culture, their iconic industrial qualities which led to their preservation, and the fact that many were mostly funded by public entities or public-private partnerships.

Each of these case studies has a similar, overall background story. Many of the sites were decommissioned and abandoned as technologies changed and industries moved to new facilities or geographic locations. No longer constrained to certain locations based on power, transit or proximity to raw materials, many industries followed the trend of suburban development after the transportation infrastructure boom and moved away from city centers. Later with industrial globalization, the leading industrial areas moved their facilities to lesser industrialized areas based on cheaper labor and less governmental regulations. At the same time the transition to more technology and service based industries began providing jobs for the newly expanded middle class.

One of the biggest similarities amongst this group of case studies is the end use after redevelopment. Interestingly, most of the projects have an arts and culture emphasis. Lighting Giants is a rare project as the site is still a functioning ship yard but the project has a pure art emphasis. Silo 468, 798 Art District, Inujima Art Project, and the Mill City Museum now serve as art and cultural institutions and the Charles H. Shaw Center serves as both a school and a community center. The other common outcome for large projects is a mixed use development, which have, in the end, become art and cultural centers as well. The Vienna Gasometers, Ford Assembly Building, Pearl Brewery, Emscher Park and Brooklyn Bridge Park contain an immense variety of uses and as such have become bustling centers both economically and culturally.

Many of these projects stood as such iconic figures of architecture, manufacturing and development for the areas in which they served that forward thinking agencies stepped in prior to or soon after the sites were decommissioned to save the structures and their attributed historic value. This was the case for the Vienna Gasometers, Gasworks Park, Brooklyn Bridge Park, the Shaw Center, Emscher Park, and Pearl Brewery. Each of these projects was either listed by a governmental agency as a historic site while still in use or purchased with intentions of redevelopment shortly after the original use was discontinued. Other projects became iconic only after years of neglect and subsequent renovation. The Mill City Museum, La-Fabrica, Wilhelmsburg Energy Bunker, Mill Junction Silo and the Inujima Art Project site were all abandoned and over time many fell into ruin but were not destroyed. These projects also had iconic qualities and through the process of redevelopment those became clear. The unique qualities of the sites and structures created places and spaces which could only be described as surreal or sublime. At the same time the idea of an area's industrial heritage was cited as an important aspect in the salvage and reuse of each of these case studies.

The most common aspect of these case studies as that the majority of the projects were publicly funded or public-private partnerships. It is interesting that these sites originated, thrived and were ultimately abandoned through capitalist ventures. Now these once private developments are in the hands of public agencies that are preserving aspects of the industrial past and at the same time having to undo some of the negative effects of industry. Site remediation, water cleanup, and building repair or demolition are now being paid for by public funding which is commendable in many ways. However, it does seem that the private groups which caused these issues in the first place should be held responsible in some way.

The unique qualities of postindustrial sites have created many opportunities for creative reuse of the sites and structures. These case studies show how the structures, used by various industries, can be transformed to suit new uses today. Interestingly enough, these structures all exist due to the rise of capitalism yet most of the redevelopments involve an art and culture emphasis, which is more of a non-capitalist agenda. On that same note, a great deal of public money has been invested in these redevelopments and many are completely funded through public agencies or are public-private partnerships, whereas the original developments were largely the opposite. Lastly, one of the most important aspects that these projects share is their industrial quality and historic significance which set them apart and allowed them to be identified as worth saving and rehabilitating.

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VITA

Whitney Manahan grew up in Southwest Minnesota and Northeast Tennessee. From a young age she was interested in art, design and the craft of making. At the age of 9 she came across a library book called “Recycled as Restaurants,” which cataloged a series of well-known restaurants in adaptively re-used structures. Inspired by the creative reinvention of an underground brick kiln (and likely her family’s renovation of a late 1800s farm house, her parent’s creativity, do-it-yourself attitudes and overall ingenuity) she knew her future would lead to a career in design. Whitney attended the University of Tennessee where she earned a Bachelor of Science in Interior Design in 2009. In 2012, Whitney returned to take part in the Master of Architecture program at UT. Through architectural history classes and working with a local developer restoring Knoxville’s downtown buildings, Whitney has developed an even greater appreciation for adaptive reuse, historic architecture, and civic involvement.