LANDSCAPE ARCHITECTURAL APPROACHES TO POST-INDUSTRIAL SITES: A DESIGN PROPOSAL FOR A MIXED-USE REDEVELOPMENT OF THE ATLANTA FORD ASSEMBLY PLANT

by

JING LIU

(Under the direction of Douglas M. Pardue)

ABSTRACT

This thesis explores design-oriented landscape approaches toward post-industrial sites. The economic, environmental, and social factors cause the rise of post-industrial sites and leave them three issues as challenges for redevelopment. The aesthetic values, including the views on landscape, nature, industrial heritage, and history, have important influence on the design of post-industrial sites. Analysis of case studies provides further insights into programs as landscape solutions to the issues. The final design proposes a mixed-use development of the obsolete Atlanta Ford Assembly Plant with a vision to preserve the industrial heritage of the site, clean up the site, and regenerate the site-centric area.

INDEX WORDS: Post-industrial site, Brownfield, Landscape architecture, Atlanta Ford Assembly Plant, Industrial heritage, Aerotropolis

LANDSCAPE ARCHITECTURAL APPROACHES TO POST-INDUSTRIAL SITES: A DESIGN PROPOSAL FOR A MIXED-USE REDEVELOPMENT OF THE ATLANTA FORD ASSEMBLY PLANT

by

JING LIU

B.S., Yangzhou University, China, 2010

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF LANDSCAPE ARCHITECTURE

ATHENS, GEOGRIA

2013

LANDSCAPE ARCHITECTURAL APPROACHES TO POST-INDUSTRIAL SITES: A DESIGN PROPOSAL FOR A MIXED-USE REDEVELOPMENT OF THE ATLANTA FORD ASSEMBLY PLANT

by

JING LIU

Major Professor: Douglas M. Pardue

Committee: Marianne Cramer
Katherine Melcher
Maureen O'Brien

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
August 2013

ACKNOWLEDGEMENTS

I would like to express my gratitude to everyone who has provided support, insight, encouragement, and critique throughout this thesis process. I wish to thank Professor Douglas Pardue for his direction and motivation during the course of this project. I would like to express my gratitude to all my committee members for their knowledge and insights that enriched my thesis. Especially, I would like to thank my committee member Maureen O'Brien's timely help. I would like to thank my friend Mengtian Zhang for her help with literature. I would like to thank my classmates for their help during the past two years. And most of all, I owe my loving thanks to my parents for all their love, encouragement, and support in my life.

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

CHAPTER ONE

INTRODUCTION

Since the 1970s, the United States has experienced an economic and industrial transformation. Facing the global market and emerging industries, traditional manufacturing sectors such as steel and automobile lost their advantages. Many factories were shut down or moved out of cities, and they left many post-industrial sites. At the same time, a series of the environmental movements began in America. People across the country began to raise concerns about their health and the health of their environment. However, the development of these post-industrial sites is not to simply clean up them; they have an important value of industrial legacy with meaning on history, aesthetics, and society.

1.1 The Problem

Many of the abandoned industrial sites, what this thesis will call "post-industrial sites", are usually toxic and dangerous. These post-industrial landscapes could have once been Gas Works, landfills, or oil industries with solid waste, poisonous chemical substances and gas, heavy metals, or polluted ground water. Even though the factories no longer discharge contaminants, these landscapes still threaten the health of the surrounding communities and the communities downstream the watershed. The

contaminants keep leaking into either the watershed. The pollution in the post-industrial areas makes the sites become restricted areas in cities. Both structurally and functionally, they act as "infections". Post-industrial sites tear urban spaces into pieces.

One of the common methods of reclamation is to cap the on-site waste through engineering work and sometimes grass is planted to hold the soil cap or hide the ugly truth beneath. Another common method is more radical. All the industrial remnants are cleared and the site is bulldozed for a new use such as a super markets, malls, or residential houses. These methods aim to make the industrial remnants invisible and encourage people to forget what happened on these sites, what people did on these lands, or what the age of industry wrought. When they work to erase the industrial history, they embrace a belief that rough erasure could bring fresh life. Both methods are expensive and sometimes new waste is produced during capping or bulldozing. The leakage of toxic substances under the cap tells that their efforts to cover the industrialized surface have never altered the site's industrialized essence buried underneath. They try to erase the industrialized markings but actually they merely hide it temporally, which is like relieving the symptoms of a disease but not actually offering a cure. Pollution is not the only problem of post-industrial sites. Erasure fails to encompass a holistic picture of the site. They overlook the site's context through time and in space. They reconstruct these sites into common places which can be seen everywhere.

Besides pollution, another problem of post-industrial sites is the "rough cover" over industrial history. The post-industrial sites are a legacy of the Industrial Age. They are the result of important social and technological developments. To erase them or to ignore this history is evading the industrialized issue. However, simply keeping everything is not

suitable for post-industrial landscapes because it goes to the other extreme of the rough cap. Post-industrial sites are complex because of the issues of pollution, disuse, and decline. They also have connections with changing space and time. They tell the past of the society and they will have a new life. Since post-industrial sites cannot be dealt with simple engineering work, landscape architecture, particularly with its ability to synthesize and mediate between all the complex needs and issues of ecology, history, function, economics, context, etc., provides new approaches to remediate these sites—not only through cleaning up but also through taking care of the city, people, and nature.

1.2 Research Questions and Methodologies

Based on the problem, the master research question of this thesis is: how can landscape approaches be used to design complex post-industrial sites such as the Atlanta Ford site. A series of further questions are raised to develop the research. The first one is what the drivers of post-industrial landscapes are. This question explores the background to generate post-industrial sites and raises the general issues of post-industrial sites. The second question is what the design-oriented landscape architecture approaches toward post-industrial sites are. The answer to this question starts from the aesthetic values that influence landscape design and analysis of case studies. The third question is what the similarities and differences among these approaches. It attempts to make a summary of the landscape approaches toward post-industrial sites, and apply the findings in the application.

The research questions have a progressive relationship. They go forward one by one and ask “why”, “what”, and “how” about post-industrial designs. The methodologies used in this thesis are interpretive historical research of post-industrial design approaches,

secondary description, and case study research. This is a projective design research thesis.

1.3 Purpose and Significance

The purpose of this thesis is to demonstrate advantages of the design-oriented landscape approaches in the solution of complex problems and issues of post-industrial sites.

Post-industrial sites have been called brownfields, junkspaces, or drosscape by various authors and critics. Since simply capping or roughly erasing is not a suitable way for remediation of complex post-industrial sites, this thesis addresses the ability of landscape architecture to revitalize the heavy-polluted, abandoned, and degraded post-industrial sites through a synthesis of aesthetics, ecology, economics, and society.

But this thesis is not going to find a standard proposal for every post-industrial site. Every site is unique. It has its own characteristics, conditions, and contexts. There couldn't be a universal approach. This thesis attempts to use landscape architectural theory and case of studies to work as inspiration for future post-industrial projects.

The significance of this thesis is to show that even on a site with only building footprints, landscape architecture can be used to preserve and utilize the industrial legacy.

1.4 Delimitations and limitations

There are three major delimitations in this thesis. The first delimitation is about time. In this thesis, all the discussions about post-industrial sites are around or after 1970s. This is because these sites are modern compared to the formers, and more instructive to future sites.

The second delimitation is that all the discussed post-industrial sites are in Europe

and the United States. Because the Age of Machines happened earlier in these areas and they step into post-industrial era earlier than other places, they have the most post-industrial sites. Besides, their ideas and concepts about post-industrial sites are relatively more mature.

Finally, this thesis is only talks about a few aesthetic values of post-industrial sites. Since paying attention to aesthetics is an important feature of landscape architecture, this thesis focuses on the approaches to develop the sites' aesthetic values. It does not discuss about economics or cleanup technologies; instead, it aims to draw a holistic picture through landscape architecture to build bridges with other disciplines.

The major limitation in this thesis is that the author did not have the time or the funds to visit any of the case study sites. Information that was available from books, articles, and web sites may not have provided all the information in order to accurately describe their aesthetic values or their functions in neighborhood or city.

1.5 Thesis Structure

Chapter 2 explores the rise of post-industrial sites from economic, environmental, and urban aspects. The closure or relocation of factories and plants left sites with industrial remains, pollution, and loss of vitality. During the same time, the environmental movement began to advocate for a healthy and ecology-friendly environment. Post-industrial sites caught both the government's and the public's attention. Under the impact of sustainable urbanism, the return to the city also increased people's focus on post-industrial sites.

Chapter 3 focuses on the aesthetic concepts and values that have influenced the design of post-industrial sites. The picturesque, the concepts of dialectical nature, using

time as a design concept, and the industrial sublime are discussed and critiqued.

Chapter 4 analyzes several case studies of post-industrial designs in order to find the answers to the issues of post-industrial sites. The analysis begins with site history and focuses on the design including the motivation for development, site features, master plan, programs, and design languages. These projects have different sizes and different pre-use types and they are done in different years. In the Chapter 5, the projects of case studies were compared to find general concepts that could be used to frame and drive the design.

Chapter 6 is a design proposal for the redevelopment of the Atlanta Ford Assembly Plant. The proposal is a landscape driven design to preserve the industrial legacy on the site, clean the site, and activate the site by introducing programs of commercial, cultural, and office use.

CHAPTER TWO

THE RISE OF POST-INDUSTRIAL SITES

2.1 Economy: Falling of Traditional Manufacturing Sectors

In the aftermath of World War II, the United States experienced a few years of economic prosperity. However, this golden era ended with the rise of globalization in the 1970s. From 1949 to 1973, the annual rate of productivity growth was about 4 percent (Cowie and Joseph, 2003). At that time, the United States produced half of the world's manufacturing products and held half of its reverses. In 1973, the Bretton Woods system, a dollar-centered international monetary system established in 1944, collapsed. The rate fell sharply and continued falling until the early 1990s. In the 1970s, the nation's gross domestic product (GDP) grew by only 2.9 percent per year as compared to severn percent previously (Cowie and Joseph, 2003). This recession was a result of complex factors such as the receding stimulus from World War II, the oil crisis, bad fiscal policies, the Vietnam quagmire, and deficiencies in the Bretton Woods system. One of the most important factors is Global Competition.

With the development of technology, the distance around the world has lessened. The convenient, highly efficient, and low-cost transportation helped the United States to sell large amounts of merchandise to other countries. As other countries like Japan and

Korea enhanced their production efficiency and product quality to compete with the United States, the cheap labor in these countries became a big advantage. Thus the products made in these countries had lower prices and began to dominate the global market. The United States began to import more goods. In 1969, imported merchandise shared 13.9 percent of U.S. GDP. In 1979, foreign-made goods shared 37.8 percent—this number tripled in a single decade (Cowie and Joseph, 2003).

This great change in the market caused manufacturing firms to shrink, relocate, or even close. Most predominant industries were steel and automobiles. After World War II, the United States was the leader of steel production in the world, but it failed to maintain this lead in the 1970s. Subsequently, Japan rose to No.1 in the free global market. The two important factors which made Japanese steel industry competitive were new technologies and lower labor costs. Three new technologies--basic oxygen furnaces, continuous casting of slabs, and electric furnaces—greatly increased the steel production efficiency in Japan. In the 1970s, Japanese steel mills produced 400 tons of crude steel per year per employee on average while the United States produced only 250 tons. Labor costs per ton of crude steel in Japan were 12 percent while in the United States they were 35 percent (Seavoy, 2006). The United States' share of the global market dropped from 50% in the 1960s to 20% in the 1970s. This share dropped to 10% in 2010. Comparatively, steel became the largest export industry in Japan from the late 1960s to the late 1970s.

Facing its decline, the domestic steel industry deferred investments in new technologies and the federal government increased protection from imports. Industry managers refused to use the new technologies which would significantly increase

efficiency and instead chose to use the old equipment until it wore out. Because steel imports from Japan were tariffed, this increased the prices of domestic steel-related products, for example, automobiles. Manufacturers had to use expensive steel made in the United States and this resulted in the decline of the U.S. share in the global automobile market.

The United States lost its leadership role in the steel industry to Japan and other new industrialized countries such as Korea. Besides, the usage of steel was also falling because of substitutions such as plastics and aluminum. This downturn affected many steel producers especially integrated steel mills in the United States. Many bankrupt integrated steel mills were purchased by multinational corporations.

The second example is automotive industry. In 1955, 96 percent of automobiles in the American market were supplied by the U.S. auto manufacturers. However, U.S. domination was broken with the oil shocks of the 1970s. In 1987, foreign made automobiles from Japan and Europe shared 30 percent of the U.S. auto market (Seavoy, 2006). From the 1970s on, the Japanese auto producers were competing with the U.S. ones.

The Japanese automobiles are small or mid-sized and fuel-efficient—very different from the large U.S. automobiles that got very low gas mileage. When the oil crisis occurred from 1973 to 1979, Japanese auto manufacturers had a key advantage. As the price of gasoline went up twelve times, smaller Japanese automobiles with high fuel efficiency were priced so that they took the U.S. market share quickly. The oil crisis was a chance for Japanese automobiles to enter the U.S. market successfully. US automobiles began to lose market share. Besides, Japanese automobiles had improved safety and

performance standards because of new technologies (Seavoy, 2006).

The Japanese auto manufacturers also had better management than the U.S. producers, which enhanced the production efficiency and quality (Seavoy, 2006). Compared to the Fordist assembly line in the United States, Japanese automakers were more flexible. Workers were more active and took more responsibility. Unlike the Fordist assembly line where workers kept standing in the same position, doing the same job, and being guided by the machines, a flexible assembly line was less important than the workers. Thus the workers had a better understanding of the entire manufacturing process. They worked several stations to improve efficiency. The assembly line could be stopped by workers if they found mistakes. Workers provided suggestions to improve the production efficiency and made self-improvements as well. This flexible assembly line usually produced fewer but higher-quality automobiles than the Fordist line. Japanese auto managers' principle "to help people to work smarter, not harder" worked very well in practice. In 1960, the number of automobiles produced per worker per year at Ford was fourteen while at Toyota it was fifteen. In 1970 they were twelve and thirty-eight respectively. In 1980, the numbers were fifteen and fifty-eight (Seavoy, 2006).

Besides, there was another difference on the source of component parts between Japanese and the United States automotive industry. The United States purchased their component parts from many suppliers. The suppliers increased prices in order to gain their own profits. On the other hand, Japanese automakers had fewer suppliers which helped them save costs and keep low auto prices. Thus in the 1970s, Japan became a strong rival with the United States in the U.S. domestic automotive industry. Chrysler lost 1 billion dollars in 1979 and 1.7 billion dollars in 1980. Ford lost 1.5 billion dollars, and

General Motors lost 760 million in 1980. They cut half of their labor force, closed one-third of their factories, and negotiated wage concessions to try to return to profitability (Seavoy, 2006).

The strategies to turn around the auto industry are similar to those in the steel industry—the neglect of innovations and the protection from the imports. U.S. auto manufacturers attached more importance to production than the details of quality products. The protection policy did not really protect the U.S. automotive industry in the end. Although the number of imported Japanese automobiles was reduced when the policy was working, immediately after the policy ended, the number went up to where it was previously. Besides, Japanese automakers built factories in the United States to avoid the import restrictions, and U.S. auto manufacturers lost more ground in the global competition.

Facing the global competition, the traditional manufacturing industries such as steel and automobiles lost their domination both in the domestic and global market. They had to lay off employees, shut down factories, and move to suburbia to reduce costs. Because of the fall of traditional manufacturing sectors such as steel and automobile, the sites that had a glorious industrial history were abandoned and became post-industrial sites. But the industrial remains on the site still keep telling the important story of the Industrial Age.

2.2 The Environmental Movement

While the fall of traditional manufacturing sectors left post-industrial sites, the environmental movement raised people's attention about environmental degradation. Before the environmental movement, heavily polluted post-industrial sites were

transformed into shopping centers or neighborhoods for low-income people without any treatment of the on-site pollution.

In 1962, Rachel Carson's book, *Silent Spring,* was published by Houghton Mifflin. This book argued against the use of pesticides and documented their harm to the environment, which quickly galvanized the public's concerns about the rapid deteriorating environment. This book helped launch the contemporary American environmental movement.

In order to continue raise awareness about environmental issues such as pollution, Earth Day was founded by United States Senator Gaylord Nelson on April 22, 1970. It became international in 1990 and is celebrated by more than 100 countries. The theme of Earth Day focused on environmental issues.

The tragedy of Love Canal raised the public's concerns about the contamination of post-industrial sites. Love Canal was a neighborhood on the eastern edge of Niagara Falls, New York. Its name came from William T. Love, who was supposed to build a power plant there to fuel his "model city" in the beginning of the 20th century. He planned to dig a canal between the upper and lower Niagara Rivers to generate power through height differences. But later, a more economical way of transmitting electricity over great distances had been found. And because of the shortage of funds, the canal project was terminated and left as a partially constructed ditch (http://www.epa.gov/history/topics/lovecanal/01.html).

This abandoned canal was turned into a dumpsite in the 1920s. It was first used for municipal waste by the City of Niagara Falls. In the 1940s, the U.S. Army dumped war wastes. From 1942 to 1953, the Hooker Chemical Company dumped 21,800 tons of

waste in this canal. In 1953, Hooker covered the canal with earth and sold it to the city for one dollar. The Niagara Falls Board of Education built an elementary school on it even though contaminants were known to be underneath. In the late 1950s, about 100 homes were built around the school on this former industrial dumpsite. This was a working-class community.

The Love Canal community was haunted by bad odors and strange ground seepage. Heavy rains accelerated the exposure of toxic substances from underneath the soil cap. In 1978, the pollution problem was reported and exposed to the public. The toxic substances in the capped canal lead to serious heart problems including birth defects, cancers, and leukemia. Finally, all the residents in Love Canal were moved out of the area (http://www.epa.gov/history/topics/lovecanal/01.html).

On August 7, 1978, U.S. President Jimmy Carter approved federal health emergency funds to aid the city to clean up the site. It was the first time in American history that emergency funds were approved for something other than a natural disaster. The disaster of Love Canal raised public concern about neighborhoods built on former industrial or landfill sites. Even though these factories or landfills had been closed down, they continued to harm people's health. These hazardous sites were thought of as "public health time bombs (http://en.wikipedia.org/wiki/Love_Canal)".

In response to the threat of dangerous post-industrial sites, Congress enacted a federal law--the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)--to clean up high-risk sites. The fund established by this law is commonly known as the "Superfund". This law allows the US Environmental Protection Agency (EPA) to clean up the abandoned hazardous waste sites and to compel

responsible parties to reimburse the government for EPA-lead cleanups. This was the first time that there was an emphasis on the recovery of these contaminated landscapes. The EPA assesses sites first and places those that meet the standards on the National Priorities List. Then the EPA establishes and implements cleanup plans (http://www.epa.gov/superfund/).

In the 1990s, the term "brownfields" became important both in urban policies and actual projects. Brownfields were post-industrial sites that were polluted and abandoned. But the definition of brownfield varies around the world. In Europe, the definition of brownfields is ambiguous in that brownfield is usually a term opposite to greenfields. The Americans are the first to officially define the manufactured lands as brownfields. The EPA defines brownfields as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." (http://www.epa.gov/swerosps/bf/overview/glossary.htm) The EPA makes a list of brownfields. Many brownfield sites are superfund projects. In 2002 low-risk sites began to get funds. For instance, in January 2002, Small Business Liability Relief and Brownfields Revitalization Act expanded the original EPA Brownfields Program and included relatively low-risk petroleum sites for grant funding.

Because of the environmental movement, more attention has been placed on post-industrial site cleanup.

2.3 Complexity in Post-industrial Sites

In Julia Czerniak's book *Formerly Urban: Projecting Rust Belt Futures*, she stated that the development of post-industrial sites should be a complex process with input from different disciplines. She cited the words in *Stalking Detroit* (2001) that development is

"'decommissioning, developing, and reconceiving' their use not just as land, but as hybridized landscape and social space." (Czerniak, 2013)

Post-industrial sites share several similar issues: the obsolete industrial legacy, the loss of vitality, and contaminants. First, because of the history of industrial use, post-industrial sites usually have an industrial legacy. The assorted industrial remains are the most significant feature of a post-industrial site and make a post-industrial site different from all other sites. The industrial legacy includes buildings and other structures such as furnaces and chimneys, machinery, stockpiled industrial materials such as steel and iron, and circulation corridors such as railroad tracks. These industrial remains are not valueless waste. They record the forms, functions, and even spirit of the industrial era. The second issue, the loss of vitality, is because the factories closed or moved and left the land blighted. In the industrial age, the factories were the lifeblood of the community. They created productive activity, hired large numbers of local residents, and maintained strong connections with the city. When a factory closes, the city loses its hub. The post-industrial sites become neither a welcoming nor an attractive place. They have few connections with the surrounding communities, the city, or the region. "They matured during the industrial era, when spatial attributes were key," however, since the end of industrial era, "they (post-industrial sites) have lost their former rationale and are looking for new economic niches." (http://sticerd.lse.ac.uk/case/_new/research/weakmarketcities/default.asp) Thus these barren sites have lost vitality. Pollution is the third issue of post-industrial sites. Because of the earlier industrial use, post-industrial sites usually have contaminants such as heavy metals, chemical substances, and poisonous gas. Without appropriate cleanup, these

hazardous toxins keep leaking into soil, water, and air, and threaten the environment and people's health.

These three issues are the most significant challenges to the development of post-industrial sites, and they comprise the complexity of post-industrial sites. Building houses or commercial buildings to raise the land value without site cleanup ignores the environmental risks and could cause the tragedies like Love Canal. But simple site cleanup lacks the aesthetic values. Total erasure of the industrial remnants removes all traces of the site's history, and the author believes it is also a waste of the site's aesthetic potential.

The features of the post-industrial sites are:

- The industrial legacy is part of the industrial history of the community and has special aesthetic potential,
- The connection with the city was lost after the closure or relocation of factories,
- These industrial sites for the most part are contaminated.

CHAPTER THREE

AESTHETIC VALUES AND THEIR INFLUENCE ON THE DESIGN OF POST-INDUSTRIAL SITES

This thesis argues that aesthetic values can have an important influence on the design of post-industrial sites. Aesthetic values are a broad topic, but within the view of this research, aesthetics opens new doors to deal with the industrial legacy.

Total erasure of the industrial remnants removes all traces of the site's history and the author believes it is also a waste of the site's aesthetic potential. The author also agrees with Czerniak that "design—and its interface with multiple disciplines and professions—plays a central role in the revitalization of shrinking cities (rust belt cities after deindustrialization) (Czerniak, 2013, 11)". This chapter three will argue that the development of post-industrial sites should be based not only on a comprehensive consideration of economic, social, and ecological issues but also aesthetic values. Design using aesthetic values can then be used as a tool to brighten the future of post-industrial sites.

3.1 The Influence of Picturesque Landscape

Frederick Law Olmsted opened a new era of American landscape architecture in 1857 with the design of Central Park in New York City (Fig. 1). The picturesque design

aesthetic expressed in Central Park had a deep influence on the later landscape architecture projects across the country. Olmsted believed that it was essential for a public park to provide mental, physical, and spiritual recreation to counter the noisy and chaotic city of the industrial age. In order to transform the heavily contaminated post-industrial sites, the verdant image of Olmsted's picturesque landscape was envisioned. The picturesque is a method to heal the post-industrial sites by green vegetation.

Figure 1: aerial view of New York Central Park, New York City
Source: Photograph from http://images.travelpod.com/

Unlike the classic patterned gardens, for example the French Garden Jardin du Chateau de Versailles, Central Park was influenced by the Britain Romantic Landscape movement in the 18th century. Trees, lawns, rocks, lakes, and even the paths inside Central Park were imitations of what the British called the landscape. Central Park reproduced the natural landscape and created a picturesque beauty which matched

people's imagination of the rural landscape—nature gently tamed.

Today covered with luxuriant vegetation and surrounded by skyscrapers, Central Park not only looks like but functions as an oasis in New York City. Looking at the rectangular site of New York's Central Park, it seems that the park and city demonstrate two extremes—the man-made and the natural. In fact, Central Park is not natural. It was designed and constructed on land that had already been developed. The designers "erased" industrial sites, farms, rural homesteads, roads, and even villages in order to create a picturesque landscape on the 843-acre site.

Central Park has become the archetype for the "picturesque". It is considered by most people to be the standard for "beautiful nature landscape". However, there continues to be a debate about whether or not post-industrial sites should be converted into picturesque urban parks.

For example, in 1962, it was proposed that the derelict Seattle Gas Works site be reconstructed into a traditional Victorian-style, landscaped urban park, which was a return to the pre-1906 landscape before the plant was erected (Cowie and Heathcott, 2003). Prior to 1906, the site, which was called Brown's Point, was usually used for leisure activities such as picnicking.

Richard Haag submitted a proposal that preserved the industrial structures which was controversial at that time. However, the open lawn and the grassy-sloped mount still remind people of the picturesque landscape. Haag promoted a concept of a new kind of people's park that paid homage to the rich Olmsted legacy, complementing it through contrast. He thought the concept of crafting a park featuring "forgotten works" would greatly appeal to the younger generation while older generations would lobby for the

stereotypical image of an English pastoral "park" (Cowie and Heathcott, 2003). In such an unprecedented design that included a large industrial relic, the picturesque still made its influence.

Similarly, in the post-industrial project of Duisburg Landscape Park, Peter Latz criticized the picturesque. He considered it pseudo-nature to create a picturesque landscape in a site previously used as steelworks with so many industrial remnants (Weilacher, 2008). Peter Latz, who was called "the anti-Olmsted" by American journalist Arthur Lubow in *The New York Times Magazine*, rebelled against the traditional landscape park.

3.2 The Dialectical Landscape

Today the traditional perspective of the picturesque landscape is doubted for its one-sidedness. The dialectical view of landscape helps to form a relatively complete picture of nature. The dialectical view places values not only on the beautiful and gentle side of nature, but also on the ugly and chaotic side. The former is an ideal landscape which is the projection of a viewer's subjective expectation of nature, while the latter is the face of real nature including natural disasters and what most people might consider ugly and disorganized landscapes.

American artist Robert Smithson is one who opposed pastoral landscapes. Smithson's focus on mud, earth, corrosion, crystallization, and decomposition embodies his disagreement with the pictorial ideal of nature. He argued against the pastoral style (what this thesis is calling the picturesque aesthetic) and pointed out that it gives an illusory, anthropomorphic image of nature, which is not the real nature. Smithson emphasized "the dialectic" in nature involving movement, interaction, and displacement.

He said, “I am talking about a dialectics of nature that interacts with the physical contradictions inherent in natural forces as they are—nature as both sunny and stormy (Smithson, 1979, 87).” Smithson preferred to use the word “earth” in talking about nature. “The earth is built on sediment and disruption,” Smithson wrote in an essay (Smithson, 1979, 87). It is an assemblage of different interrelated forces and has a chaotic diversity, which means it cannot be reduced to a rational or pictorial ideal of nature.

Smithson’s view of nature is evident in his artwork, Asphalt Rundown. Gentleness and delicacy are not the theme in Asphalt Rundown. Instead, terror, solitude, disorder, and even ugliness comprise audience’s feeling of this artwork. What is interesting is that he is using bare ungraded earth which would never be considered a part of the picturesque landscape. Furthermore, he introduces a manmade material – asphalt – and cultural practices – dumping asphalt on a site (Fig. 2).

Figure 2: Robert Smithson's artwork of Asphalt Rundown
Source: photograph from radicalhorizon.wordpress.com

This dialectical thinking was also a part of his view of the relationship between humans and nature. He criticized the anthropomorphic attitude of "Mother Earth" because it created a "sacred-ness" that refused to acknowledge any interaction between humans and nature like the activity of digging. Nature was removed from the city that had a lot of activities like heavy construction and destruction. This created a view that isolated nature from human-made city. Smithson used "man and nature" to emphasize the interaction between people and earth, and desacralized nature into its dialectical truth. (Shapiro and Smithson, 1995)

3.3 Post-industrial Sublime

Like the picturesque, the "beauty" and the "sublime" are two important ideas included in the history of landscape aesthetics. (See Uvedale Price's *Essay on the Picturesque, As Compared With The Sublime and The Beautiful* published in 1794 for more information.) Industrial sublime and post-modern art have greatly influenced the landscape designs of post-industrial sites.

The awe of industrial sublime has a long history which can date back to the emergence of industry. In the U.S., the first industrial sublime landscapes integrated very well with people's ideas of beauty. The countryside landscape consisted of mills at watersides dispersed over the prairie, which was the first image of industrial landscapes (Nye, 1994). However, with the development of industry, steam and electricity took the place of water and became the main power resources. The raise of these productive forces led to the gigantic machines and factories. A unique sublime aesthetic came into being along with the rise of heavy industry.

Compared to the picturesque which was tame by comparison, industrial structures including colossal machinery, large factories, vast production, and even towering chimneys created astonishment (Fig. 3). Furthermore, the manufacturing processes such as smelting and forging expressed tremendous power (Nye, 1994). Industrial sublime usually equates with awe, terror, and danger. "Cavernous factories draped in smoke became sublime. Their size, obscurity, and danger were converted into assets (Nye, 1994, 124)." Sometimes it equated with mathematical beauty. "Such statistical claims were a corollary of the mathematical sublime (Nye, 1994, 115)."

Figure 3: The Beauty of Heavy Industry at SOCAR Oil Fields #6, Baku, Azerbaijan, 2006 (Photographer: Edward Burtynsky)
Source: photography from http://pdnphotooftheday.com

The industrial sublime aesthetics underlines the power of humans. Industrial structures are created by humans and work for humans. Machines are human's achievement and they are always under the control of humans. One example is the Niagara Falls Hydroelectric Power Station (Fig. 4). The huge structure comprises a landmark of human's power and pride that conquers nature. While Niagara Falls is often thought to represent a natural sublime aesthetic, the hydroelectric power stations represent the industrial sublime that overrides the natured one. Peter Conrad notes that "the interest of Niagara lies not in the sublime frothing of the waters but in the 'human accumulations' which mark a scientific victory over the cacophonous waste (Nye, 1994)." The natural sublime aesthetic such as expressed in a hurricane is generated from human's

feeling of weakness in the face of natural forces, but the industrial sublime as expressed by a factory is generated from human mastery. Maybe this is why the industrial sublime is attractive.

Figure 4: The Robert Moses Niagara Hydroelectric Power Station - An Example of the Industrial Sublime Aesthetic

Source: Photograph from http://en.wikipedia.org

Among the words of praise for machines, the idea of human omnipotence is usually included: “a sense of awe and pride in man’s skill in bending the forces of nature to his purpose”. Joseph Stevens continues, “We have in our grasp the power to achieve anything if we can but summon the will (Nye, 1994).” The Industrial sublime continues to be an influence into the post-industrial era. The remaining industrial structures remind

people of the industrial era and although the blinding lights, blasts of heat, and overwhelming noise of the production process is absent, the overwhelming size of the factories architecture is still reminiscent of the industrial sublime. The industrial sublime, as one of the most important aesthetic values on post-industrial sites, creates a landscape different from the picturesque. When his plan of Seattle Gas Works Park was criticized, Haag argued that "timeless grandeur" of the industrial equipment was of aesthetic importance (Cowie and Heathcott, 2003).

The acceptance of industrial sublime as a type of beauty in an urban park has had the assistance of contemporary arts (Cowie and Heathcott, 2003). Being different from the classical aesthetic principles consisting of order, harmony, balance, and rhythm, contemporary arts contains the move from feeling or sense of an aesthetic subject to the attention of an aesthetic object itself. With the boost of contemporary arts, landscape has begun to be sensed as a scene rather than to be viewed as a picture. Contemporary arts have helped people accept the essence of post-industrial sites and helped them to view the industrial sublime as a new language of beauty. In Haag's presentations for the Gas Works plan, he used slides of modernist art and sculpture to demonstrate the modern aesthetic values of the industrial structures. He also attached his sketches of children playing on the obsolete machinery. It shows that a post-industrial site can be converted into a modern art work.

The industrial sublime creates a special type of aesthetic value of the post-industrial sites, which is distinct from the beauty of a pastoral landscape. The industrial remains are accepted as modern art works to reveal the site's essence and recall the site's history.

3.4 Concepts about Time

An important factor of post-industrial landscapes is preservation of the industrial past. There are two different ways to treat historic architecture and landscapes: one is to create a static monument to the past and the other is to focus on dynamic processes and focus on the time passing.

In the design of post-industrial sites, the first way is expressed by a return to the pre-industrial era when industry did not intervene with nature like the 1962 design proposal of a Victorian-style landscape urban park for the Seattle Gas Works, or "off-limit" monuments of the industrial structures like Haag's way to preserve the Gas Works structures.

A well-known project embodying time accumulation is Robert Smithson's earthwork, Spiral Jetty (Fig. 5). In April 1970, Smithson built the Spiral Jetty, a coil 1500 feet long and approximately 15 feet wide, in the Great Salt Lake (Tsai and Smithson, 2004). The Spiral Jetty was built with black rocks. They were covered with white salt crystals over time, and formed a strong contrast to the red lake water colored by algae.

Figure 5: Robert Smithson's artwork, Spiral Jetty, Great Salt Lake, Utah
Source: Photography from http://www.westminstercollege.edu/

Smithson was inspired by the description of salt lakes in *The Useless Land* written by John Aarons and Claudio Vita-Finzi: "The basalt (at the shores) is black, the volcanos purple, and their exposed interiors yellow and red. The beach is grey and the lake pink, topped with the icing of iceberg-like masses of slats." He found such a site in the Great Salt Lake, Utah. The chosen site was about one mile north of a derelict oil drilling operation. People had tried to get oil out of this natural tar pool for over forty years. A series of heavy black oil seeps looked like asphalt. The site had irregular beds of limestone, and the massive deposits of black basalt gave the site a shattered appearance. Water came right up to the mainland on this site. Under the pinkish water were the mud cracks that composed the salt flats. The landscape of the site suggested the artist "an immobile cyclone." Smithson said: "This site was a rotary that enclosed itself in an immense roundness. From that gyrating space emerged the possibility of the Spiral Jetty (Smithson, 1979, 137)." Smithson let the site determine what he would build. In April 1970, Smithson began building the jetty using heavy machinery and 6,650 tons of basalt and earth.

Salt, as a motivating factor for the entire project, was an appendix, instead of an original quality of the jetty. Salt crystals were formed later along the jetty's surface because of the high salinity of the lake water. The salt was "a species of patina (Roberts, 2004, 97)." In the design, Smithson insisted that salt crystals be listed in the four Spiral Jetty's primary media, along with mud, rocks, and water. This light-footed natural production covered the heavy earth material and formed a unique landscape—ambiguities of contradictions. Smithson said: "Ambiguities are admitted rather than rejected, contradictions are increased rather than decreased—the alogos undermines the logos

(Smithson, 1979, 147)."

Smithson was interested in crystallography. The spiral form was partially from the crystal structure. Smithson said that "each cubic salt crystal echoes the Spiral Jetty in terms of the crystal's molecular lattice. Growth in a crystal advances around a dislocation point, in the manner of a screw (Smithson, 1979, 147)." There is a screw dislocation in crystal structures which causes a pattern of growth that spirals around the initial dislocation. This pattern of crystallization was called "the crystalline structure of time" by Smithson. Smithson utilized this "crystalline structure of time" to reveal his views on history and time.

First, Smithson disagreed with the model that embraced the view that history was retrospective. He highlighted the time itself from its accumulative and changing aspects. Salt crystals accumulated on the surface of the Spiral Jetty and Smithson made this process under the action of time visible. Retrospection is a looking back at a static and separate time point. Differently, Smithson supports the idea that time elapses continuously. Thus salt crystallization on the rocks and gravel would develop over a period of time. A principle of his artworks, as he concluded in his writings, is an exploration of the pre- and post-historic mind—the art "must go into the places where remote futures meet remote pasts (Smithson, 1979, 91)." His opposition to retrospection is not a denial of history. In such a highly salty lake, the natural process of crystallization had long exited in the site's history. What Smithson did was to introduce "development" into history.

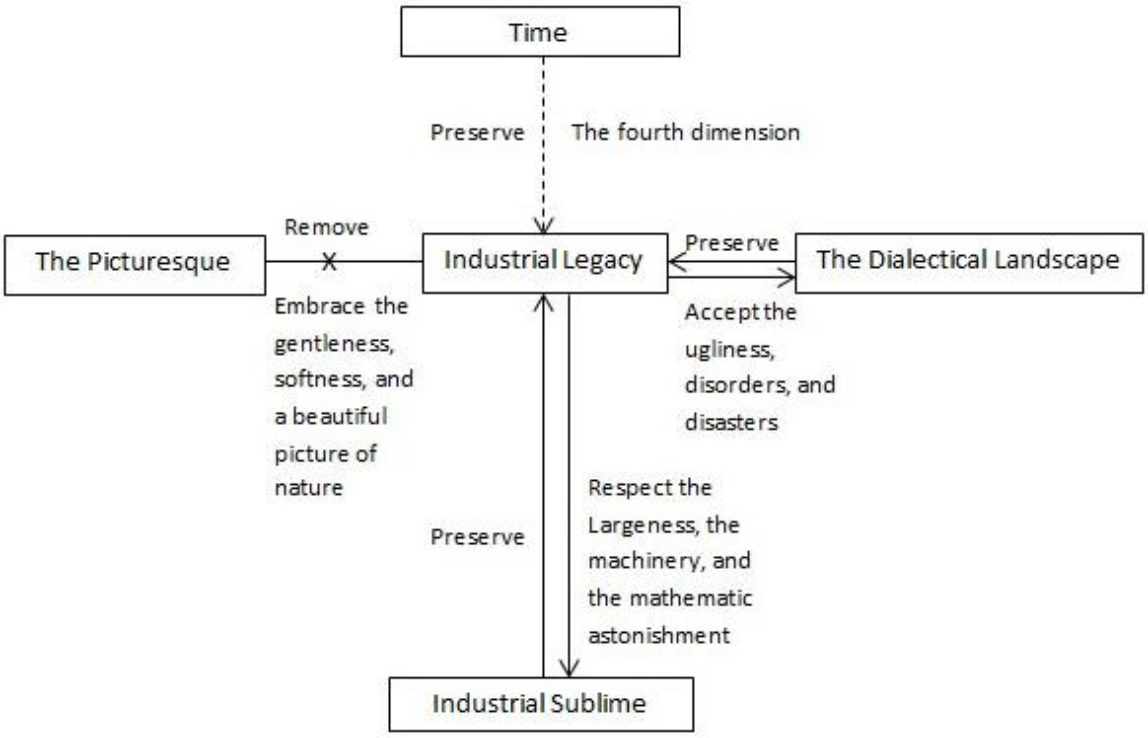
Contrary to the retrospective view of a static time point or a period of time in the past, this method of visualizing the accumulation of time reflects the continuance of time

and connects past and future.

Peter Latz agrees with this idea of time accumulation as shown in his project, Duisburg Nord Landscape Park. In Piazza Metallica, iron plates are exposed in the air and rain to rust. This corrosion process makes the change of time visible. It also connects the past and future. In the past manufacturing process of fire and cold water, these iron plates were getting rusty. In the post-industrial park, the original corrosion process continues. Similar to the salt crystallization, the iron rusting is also a "patina" of time. The idea to involve time in design enhances the three-dimensional aesthetic values that focus on the appearance and space into a four-dimensional thinking. With the concepts about time, aesthetic values about post-industrial landscapes deal with the industrial legacy better—considering not only the physical structures but also the past and future.

In the design of post-industrial sites, the first method is to reproduce a disappeared time in history through reestablishing a pre-industrialized landscape or preserving the industrial remains as a monument. The former wipes out the industrial history and the latter denies change over time and development in the future. The second method to let the industrial remains develop connects pasts and futures. It reveals the passage and the continuousness of time, and also gives new life to the images of pasts—let the "dead" industrial legacy live in a new way.

3.5 The Relationship between the Four Aesthetic Values



CHAPTER FOUR

CASE STUDIES

The projects selected in this chapter provide diverse solutions to the three issues of post-industrial sites—industrial legacy, loss of vitality, and contamination. They also show the range of aesthetic values discussed in Chapter Three. Seattle Gas Works Park is the first project which preserves the industrial legacy as monument of the industrial era. It is a combination of industrial sublime and picturesque landscape. Duisburg Nord Landscape Park is a project which emphasizes the industrial values by utilizing the industrial remains and creating a unique language correlating industry and landscape. It reveals the aesthetic values of the dialectical landscape and industrial sublime. The designer criticized the picturesque landscape, emphasized the industrial language, and included a concept of time to connect the past with the future. Revival Field and Fresh Kills Park share a theme of cleaning up the contaminated post-industrial sites. Revival Field is a project for phytoremediation experiment in a small scope, while Fresh Kills Park is a project showing the possibility of landscape architecture approaches to clean up a large scope. Both of them combined design and cleanup technology together. Compared to other selected projects, the artwork of Revival Field is abnormal. It was chosen because it has the most advanced treatment for contamination. Evergreen Brick Works is a project that conserves industrial remains as heritage. All the case studies have a vision

to activate the area by redeveloping the post-industrial sites.

4.1 Seattle Gas Works Park: the Monument of the Industrial Era

Project Data

Location: Seattle, Washington, USA

Overall Area: 20.5 acres (83,000 m^2)

Planning and construction time: 1971-1988

Open time: 1975

Designer: Richard Haag (Landscape Architect)

Figure 6: Panoramic View from Seattle Gas Works Park
Source: Photograph from http://en.m.wikipedia.org

Seattle Gas Works Park (Fig. 6 & 8) set an important precedent for the design of post-industrial sites in the following decades. The designer Richard Haag preserved the industrial remnants on the site as monuments of the Seattle city's history.

In 1906, the Seattle Gas Light Company purchased the site located on the north shore of Lake Union at the south end of the Wallingford neighborhood. The company

built a gasification plant (Fig. 7) there to manufacture gas to supply the gas lamps and heaters through the carbonization of coal and later crude oil (Cowie and Heathcott, 2003). At first, the plant was on the outskirts of the city, but with urban sprawl in the middle of 20th century, residential neighborhoods grew to the edge of the plant. Although the Gas Light Company was forced to install pollution treatment devices, the area was still replete with noise, smells, and smoke. Houses in Wallingford had to be built facing north to minimize contamination from the plant. Over time the lake was turned into a "working lake" with industries along its shores. In 1956, expensive and odious manufacturing gas was replaced by cheap and less odious natural gas, and the Gas Works closed down. However, the industrial structures still stood there with contaminated soil underneath. When the Seattle city received the site from the Gas Light Company in 1973, the primary contaminants were the oil and chemicals saturating the soil and presenting the ground water. The industrial waste littered on the site. The industrial remnants became a topic of complaints since they were viewed as a symbol of "urban blight."

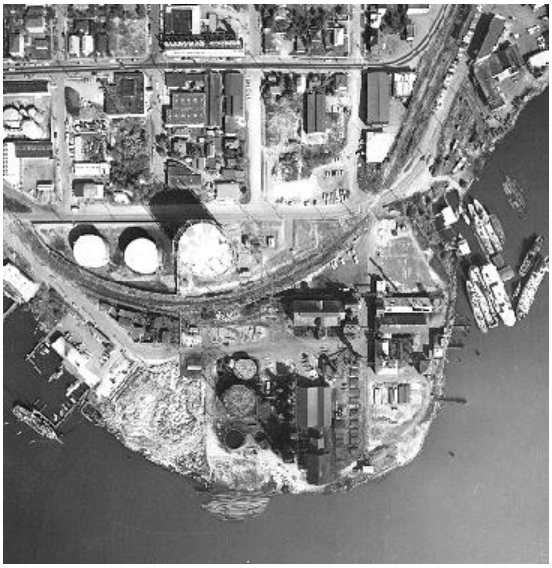


Figure 7: Seattle Gas Works in 1965

Source: Photo from www.seattle.gov

Figure 8: aerial View of the Seattle Gas Works Park

Source: Photograph from http://www.fogwp.org

In 1970, the Seattle Department of Parks hired the local landscape architect, Richard Haag, to design an urban park on the Gas Works site. In 1971, Haag submitted a master plan which was unexpected by the Committee and the public because of its unprecedented preservation of most of the industrial structures (Fig. 9). The towers, previously used as generators, coolers, and oil absorbers, became the landmark of the park. Although there were fences surrounding them, the 50-80 feet tall towers still comprised the main focus of both within the park and from the city (Fig. 10). The old boiler house was used as the picnic shelter and the pump house was used as the play barn (Fig. 11). Machines in the play barn were kept in place. The smoke arrestor hood outside

of the play barn was refurbished as a play structure for climbing. The entrance of the park was a row of concrete train trestles in the north side. (http://en.wikipedia.org/wiki/Gas_Works_Park)

The oil-soaked soil was capped by an 18" thick sewage sludge and sawdust mix to decontaminate the surface. Low maintenance field grass was then grown on the cap. Great open lawns accounted for a large area in the park. In the southwest, there was an earth mound, known as the "Great Mound" or "Kite Hill" (Fig. 12), which was molded out of thousands of cubic yards of rubble from other buildings that were demolished and covered with fresh topsoil. At the top of the mound was a sundial created by two local artists (Fig. 13). The "Great Mound" was the highest point in the site where users could have a view of both the park and the city.

Figure 9: Master Plan of Seattle Gas Works Park

Source: Image from ENVIRO200GAS WORKS.PPT

Figure 10: The Preserved Industrial Structures of Gas Works

Source: Image from ENVIRO200GAS WORKS.PPT

Figure 11: Play Barn in the Seattle Gas Works Park

Source: Image from ENVIRO200GAS WORKS.PPT

Figure 12: Kite Hill in the Seattle Gas Works Park

Source: Image from http://ww4.hdnux.com

Figure 13: Sundial on the top of the Kite Hill

Source: Image from ENVIRO200GAS WORKS.PPT

Figure 14: An Event in Seattle Gas Works Park

Source: Image from ENVIRO200GAS WORKS.PPT

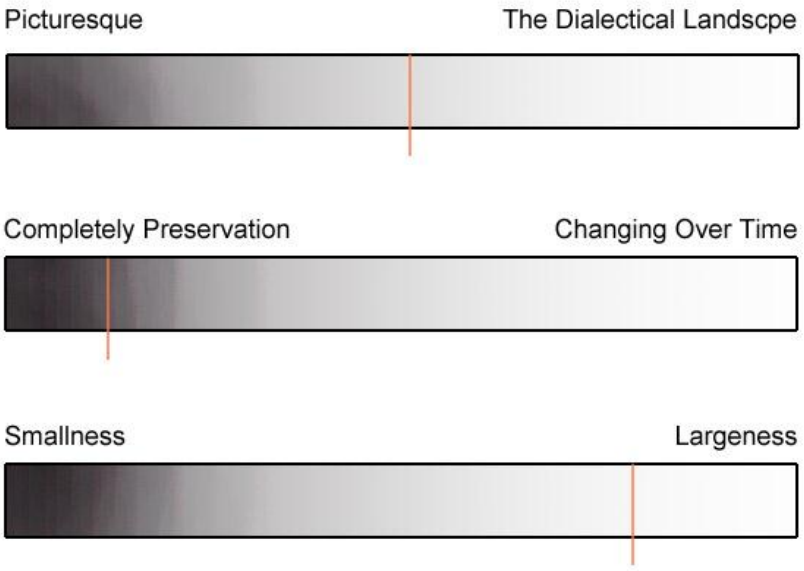
The Gas Works Park was finally opened to the public in 1975 (Fig. 14). In 1984, the Environmental Protection Agency (EPA) tested the soil and ground water. A small amount of toxins were found in the park itself which were leaking into Lake Union. EPA declared the park "safe" because of the low levels, but warning signs were still put up in some places to avoid users' direct contact (Cowie and Heathcott, 2003).

The Gas Works Park represented an innovative step in the design of post-industrial sites. First, it integrates the site's industrial history into a landscape park. The industrial monuments are memories of the site's past. When people see the towers, they are reminded of the glorious industrial age of the past and get a glimpse of the city's

development path. But Seattle Gas Works Park is still more for looking at the preserved industrial remains rather than contacting or participating.

Haag was awarded the American Society of Landscape Architects Award for design excellence for this design. It was praised as “the successful conversion of a gas utility station into a fascinating exhibition of obsolete industrial hardware” by the awards jury (Cowie and Heathcott, 2003).

Aesthetic Criteria



4.2 Landschaftspark Duisburg-Nord: the Metamorphosis

Project Data

Location: Duisburg Nord, Germany

Overall Area: 570 acres (2,300,000 m^2)

Planning and construction time: 1990-1999

Open time: 1994

Project Team: Latz + Partner (planning and general direction), Latz – Riehl (site management), G. Lipkowsky (architectural sub-projects)

Lead Designer: Peter Latz

The site of Duisburg Nord Landscape Park was previously used by Thyssen Meiderich Steelworks (Fig. 16). In 1901, at the peak of the Second Industrial Revolution, The German Industrialist, August Thyssen, founded his ironworks company in Meiderich, which was adjacent to his coal mining company "Gewerkschaft Deutscher Kaiser" in Hamborn (now part of Duisburg) acquired in 1891. He built the first 500-ton blast furnace in Germany, the first 100-ton Martin furnace, and the first large tube works. In April of 1985, because of the overcapacity of steelworks, the European Union decreed new steel production quotas, and the production of pig iron ceased for good in the Meiderich quarter. Thyssen had already reduced production before. But in the same year, Thyssen decided to close the plant rather than to continue with a reduced production plan. This decision left about 8000 steelworkers dismissed and 570 acres of post-industrial polluted land behind (Weilacher, 2008).

Figure 16: Thyssen Meiderich Steelworks

Source: Photograph from http://en.landschaftspark.de

In 1988, a ten-year (1990-1999) project "International Building Exhibition (IBA) Emscher Park" was initiated by the state of North Rhine-Westphalia, the Federal Government and the local authorities. The primary goal was the ecological, economic, and social regeneration of the old industrial Ruhr District of Germany. The state of North Rhine-Westphalia acquired the site and made Duisburg Nord Landscape Park one of the 120 separate projects of the IBA. The German landscape architect Peter Latz and his team's design proposal, Metamorphosis, for the Duisburg-Meiderich Steelworks (Fig. 16), which conformed to IBA's advanced vision, won the first prize in the international Landscape Architect's competition in 1991.

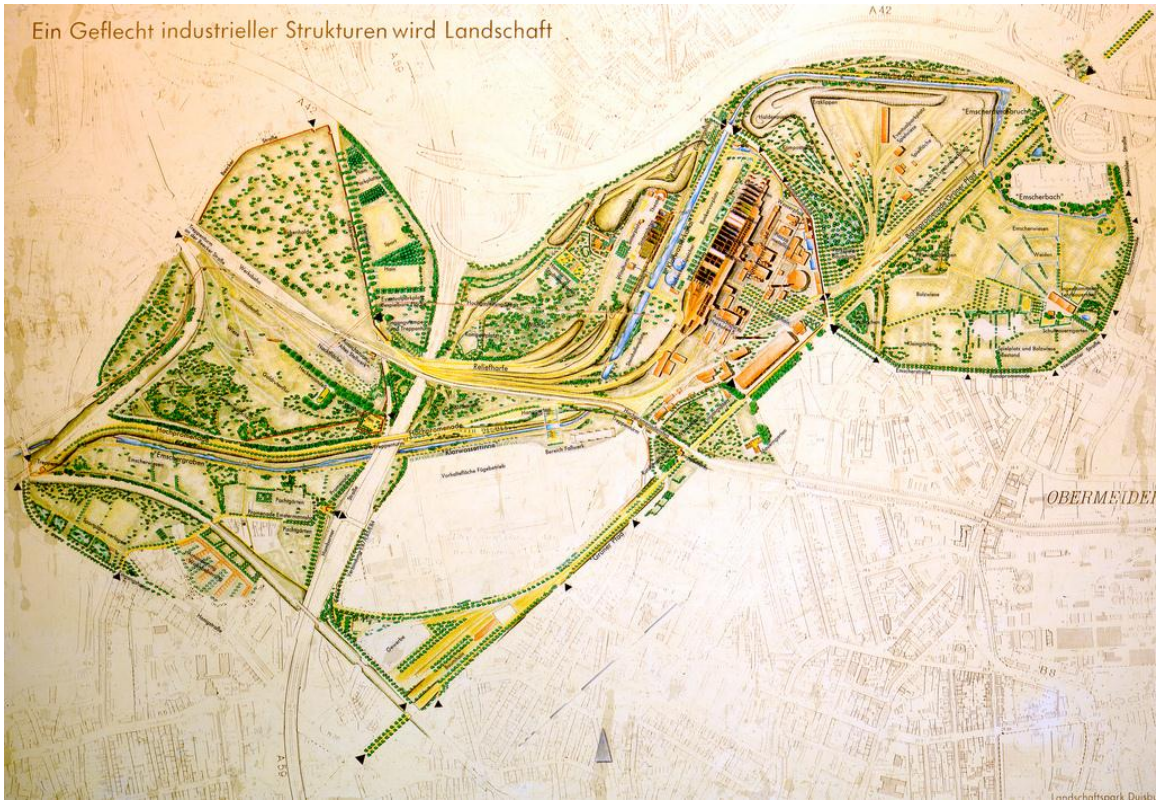


Figure 16: Master Plan of Landschaftpark Duisburg Nord

Source: Image from http://co-tain.com

The two themes in the Metamorphosis solution are "physical nature" and "utilization." Piazza Metallica is a symbol of "physical nature." Piazza Metallica consists of forty-nine cast iron plates seven pieces by seven pieces. They were removed from the pig-iron casting works mechanically. In the iron manufacturing process, these plates were molten and hardened by water flowing or settling on the surfaces. The plates were used to cover casting molds and had to withstand temperatures of 1600 degrees Fahrenheit. This process caused the plates to corrode. In Piazza Metallica, the water used in the casting process is replaced by rainfall. And the corrosion process continues naturally in a new place. Latz preserved the physical nature of the industrial remnants as well as gave them new functions (Fig. 17).

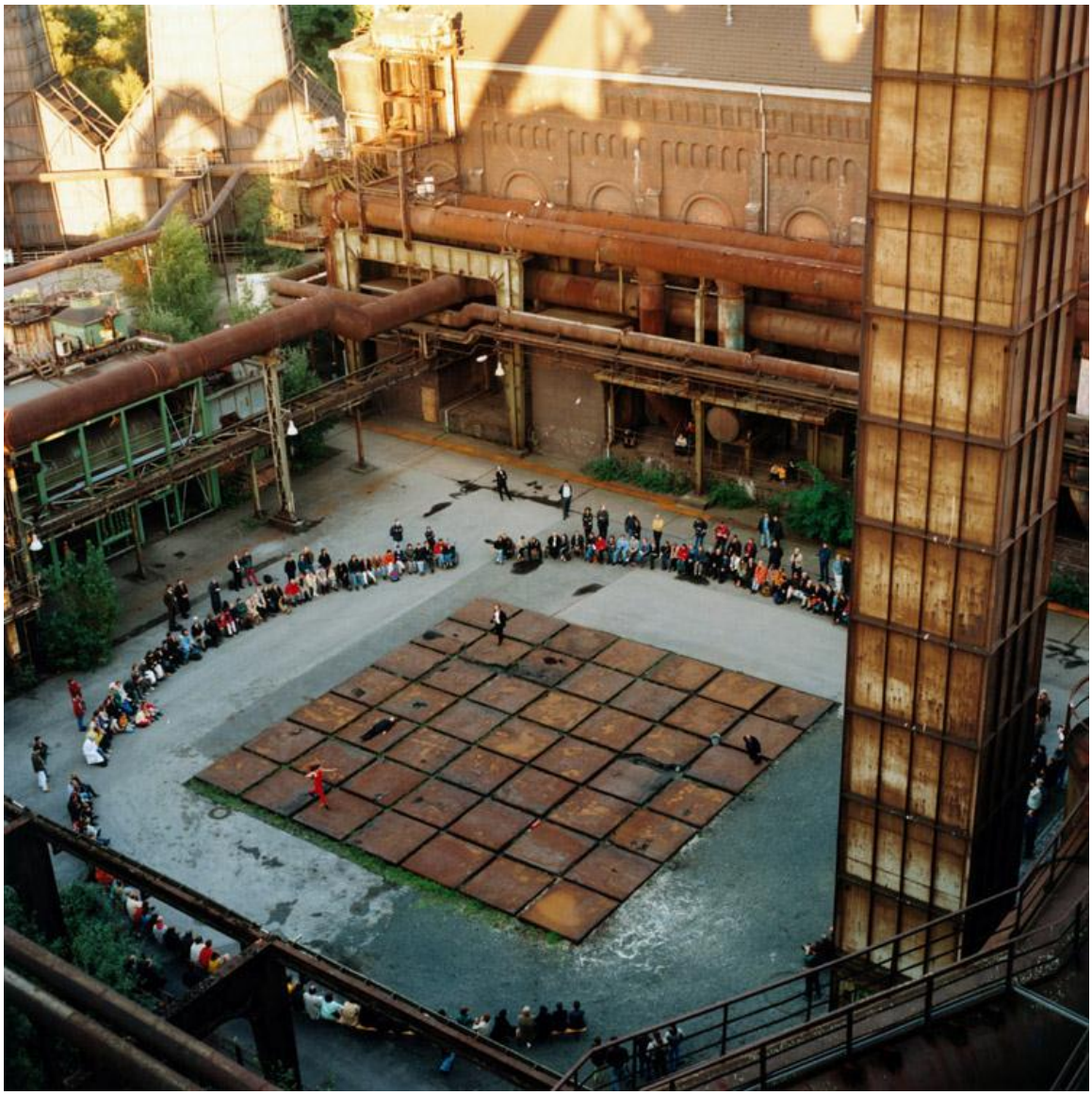


Figure 17: Public Performance on Piazza Metallica in the Duisburg Nord Park
Source: Image from http://www.landezine.com

The second theme "utilization" is expressed through utilizing industrial remnants for fun and play (Kirkwood, 2001). The Blast Furnace 5 (Fig 18) which was used to melt ores is accessible now and has a visitors' platform for viewing scenery. The former huge ore bunker walls are now used for climbing. Old industrial buildings became places for art, culture, and services. The gas meter, with a diameter of 147 feet (45 meters) and a

depth of 43 feet (13 meters), was carefully cleaned and became the largest indoor diving basin in Europe. The power plant, 558 feet (170 metres) long and 115 feet (35 metres) wide, has a big capacity and is used for large scale events now. The various halls in the blower house complex are used for conventions, operas, and concerts (Fig. 19). A variety of events and cultural projects, such as theater performances, courses, and film screenings, are held in the former casting houses. The main switching house, which was the steelworks' control center, is today's park management offices and service center, and includes restaurants, a visitors' center, and a souvenir shop. Besides, some industrial structures are used in the park's rainwater management system. The settling, clarifying and cooling tanks left by the steelworks are playing their roles in rainwater treatment. Considering the pollution on the site, the accessible structures were painted with bright colors to distinguish from the grey and rusty "off-limits" areas.

Figure 18: Blast Furnace 5 in the Duisburg Nord Park

Source: Photograph from http://en.landschaftspark.de

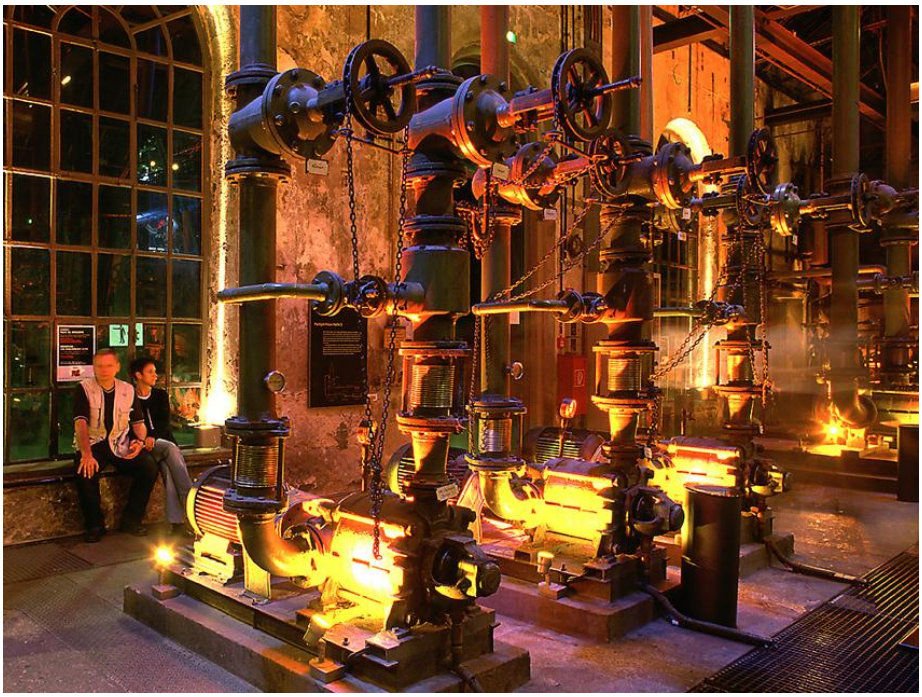


Figure 19: The Event Space in the Blower House Complex

Source: Photograph from http://en.landschaftspark.de

Another approach in the theme of "utilization" is "recycling." The materials left by the industrial processes are now used in assorted ways. The non-polluting black cinders of the coal-washing process became the ground for vegetation. A part of the stump of the smoke stack that remained after blasting was filled into sealed bags of the sinter bunkers and became the substrate of "roof gardens." Essential parts of the high level catwalk are constructed with recycle material of former overhead railway (Kirkwood, 2001).

Figure 20: the Garden Converted from Sinter Bunker
Source: http://www.staedte-fotos.de

Because of financial constraints, the Duisburg Nord Landscape Park was required to reconstruct under the smallest possible intervention. In the metamorphosis of the steelworks site, Latz minimized the intervention but maximized the utilization of the industrial remnants.

When tackling site contamination, Latz's method is to slowly heal the site using plants. For example, in the former coke plant contaminated by polyaromatic hydrocarbons, instead of the traditional method of clay capping, Latz decided to cover the plant with coal-mine spoil and plant groups of birches to reduce the contamination through the long term phytoremediation. The former method of capping would totally enclose the chemicals but with a total loss of vegetation. Latz called the layers of clay an "eternal grave (Weilacher, 2008, 110)." In the choice Latz preferred, the decontamination course by birch trees will take several generations and allows long-standing slight gas diffusion. Plants need to be mowed regularly. Use of this part is limited to just cycling or walking.

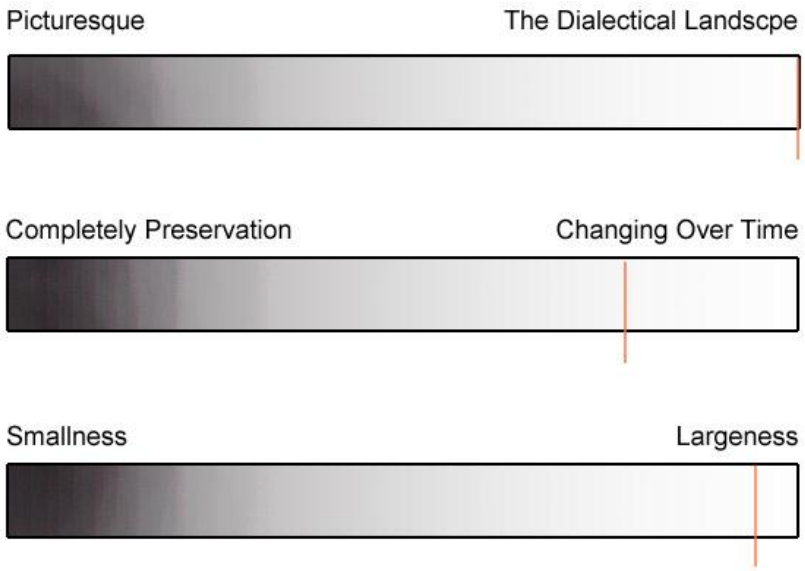
When dealing with the heavily contaminated sewage channel, Latz created an open clean water channel on the top of the sewage channel and transformed some existing industrial structures into rainwater collection, cooling, and purifying systems. A wind power plant was installed in the former sintering tower to enrich the water with oxygen. All of these modifications make the natural water process visible to visitors.

In such a large park, Latz used layers to make the existing site information legible. The uppermost layer is the railway park with high level promenades and the lowest layer is the water park. Vegetation is a middle layer that comprises a series of designed gardens and grids of trees. Street level connecting promenades are the fourth layer. Linking elements are ramps, stairs, terraces, and etc.

Duisburg Nord Landscape Park project makes full use of the industrial remains on the site. It does not only preserve the industrial history as silent monuments but also gives them new functions. In Latz's design of metamorphosis, industrial structures, process,

and language are involved in the development of the urban park. The transformed industrial remains such as iron cast plates and blast furnaces that become recreational or cultural spaces connect the industrial past with today and future.

Aesthetic Criteria



4.3 Revival Field: Sculpt A Site's Ecology

Project Data

Location: St. Paul, Minnesota, US

Overall Area: 60 square foot (5.6 m^2)

Design, Construction, and Maintaining Time: 1990-1993

Designer: Mel Chin

Figure 21: Overlook of Revival Field
Source: Photograph from http://melchin.org/

Revival Field (Fig. 21) was created on the Pig's Eye Landfill outside of St. Paul, Minnesota. The Pig's Eye Landfill was an unofficial dump site beginning in the 1950s. More than a half- million tons of household junk, city garbage, and industrial waste are dumped on this site. In the seventies, highly loaded cadmium ash mix was dumped here and from then this landfill was closed down. Now the Pig's Eye Landfill is on the Minnesota Pollution Control Agency's (MPCA) Permanent List of Priorities, as one of the state's Superfund sites (Finkelpearl and Acconci, 2000).

Artist Mel Chin selected this site to create his conceptual artwork "Revival Field" intending to sculpt a site's ecology. Unlike the traditional sculpture, the material used is the toxic earth and the tools are the technology of hyperaccumulation. He said in an interview that "If you can take a place that is basically dead or has a single species

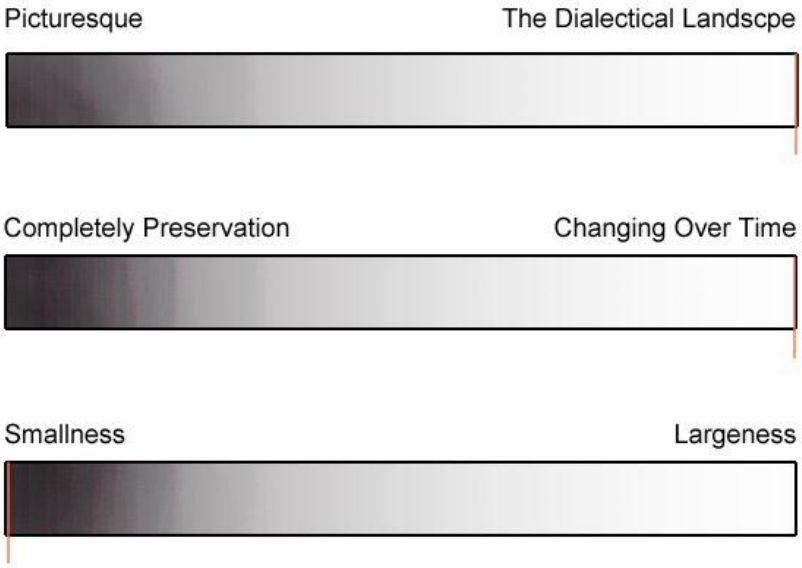
growing on it, and make it active or living again, that is a finished sculpture. It's a post-Robert Smithson idea (Finkelpearl and Acconci, 2000)." Mel Chin, coordinating with scientist Dr. Rufus Chaney, attempted to help spawn dialogue on the topic of "green remediation" within the scientific field of toxic waste treatment through this project (http://en.wikipedia.org/wiki/Mel_Chin).

Revival Field is a 60 square foot phytoremediation test plot. Inside the fencing on the edges, plants that can extract heavy metals from contaminated soil were grown for three years. At the Pig's Eye Landfill, the primary contaminants in the soil are zinc, lead, cadmium, and copper. These hyperaccumulator plants can survive on this hazardous site, take up metals from the soil and store them in tissues. Then these plants were harvested for study. Mel Chin had the bold idea to gain metal from these plants, which he called a "real alchemy," and convert these plants into fuel energy (Finkelpearl and Acconci, 2000).

The plants worked well. They were planted in the spring and harvested in the fall. Then these samples were sent to Dr. Chaney for analysis. An original indicator of soil health is the presence of earthworm. Initially, there were very few worms in the earth. In the second year, the number of worms was greatly increased, which proved that the phytoremediation process was successful.

The Revival Field project is a proposal of using "green remediation" technology to revive a post-industrial site. Industrial activities had affected the environment of the site and made the site a barren dead place. But through phytoremediation, Mel Chin proposed a possibility for regrowth of the industrial past.

Aesthetic Criteria



4.4 Fresh Kills Park: Vastness and Long-term

Project Data

Location: Staten Island, New York, USA

Overall Area: 2,300 acres (9,300,000 m^2)

Planning and construction time: design process is 2001-2006; construction began in 2008, and might last for at least 30 years

Open time: 2009 (partially)

Design Team: Field Operations

As the largest park project in New York City in the past 100 years and with a size nearly two times bigger than the Central Park, Fresh Kills Park is an example to suggest the landscape architecture's framework in large-scale remediation and district regeneration.

Fresh Kills was the largest landfill in the world. This landfill, which located on the Staten Island, began to receive the trash of New York City in April, 1948. It worked as the principle landfill of New York City receiving nearly 90 percent of the solid waste in the city for half a century and closed in March, 2001. Several months later, it reopened temporarily to accept the wreckage of the September 11 attacks.

In 2001, the NYC Department of City Planning held an international design competition to find a landscape architecture proposal to transform the landfill into an urban park. "The landscape, stuffed and swollen from a fifty year diet of American industrial detritus, was being primed for a new life (Field Operations, 2006)." In 2003, Field Operations was selected as the winner of the competition and was hired prepare a master plan to guide long-term development. In 2006, the Draft Master Plan *Fresh Kills Park: Lifescape* was submitted and released. The Draft Master Plan is the first major milestone in the process of this landfill reclamation. Construction began in 2008.

Fresh Kills Landfill has several characteristics. The first is vastness. In the master plan, the park's huge scale is mentioned several times for its ecological advantage. Long-term development is also inevitable because of its size. The second characteristic is the tons of waste releasing poisonous chemicals, which raises issues about remediation. The final characteristic is a strong connection with communities. In this project, public engagement was taken seriously. In The Draft Master Plan (2006), it states, "The transformation of Fresh Kills should be a model of continued public engagement." The public plays an important role in the design process, and the Fresh Kills Park is not totally a product of the designer.

Its former use as a large landfill was the major design challenge. The design team

found that in addition to the large area of actual landfill, natural resources such as wetlands, creeks and tidal flats, open meadows and woodland comprised an important part of this site. They proposed two remediation methodologies—detoxification and reclamation of natural resources. Both technical and ecological remediation approaches were proposed in The Draft Master Plan.

Four landfill mounds are utilized as large-scale topographic features on the site. A clay cap overlays these landfill mounds. New soils are installed on the cap. Renovated techniques of "root penetration" and "agriculture strip cropping" are practiced in this landfill engineering (Field Operations, 2006).

Root penetration is a strategy to grow a prairie on the thin soil first, then planting various woody plants to invade the prairie, and tree root penetration comes in the next step. It is assumed that tree roots could cause ruptures to the clay cap and the root network could break down through the entire capping in time. Root penetration is used to improve soil and reduce the poison chemicals in the landfill beneath the soil layer through settling, degrading, or absorbing. Agriculture strip cropping is farming the landfill mound slopes strip by strip and then establishing new meadow cover. Fast-growing plants will grow on the slopes following the contours of the mounds. They are anticipated to create a green manure, add organic matter and depth to the soil over time, and control weeds over a large area. Compared to engineering work such as capping, strip cropping is an economical way to use plants for remediation. Besides, strip cropping would provide visual scenery in a large scale. Large strips of different colors will comprise a beautiful landscape for viewers from a distance or a car window.

Methane gas is a primary pollutant on the site. Proposals for methane gas control,

leachate collection, and treatment are provided in The Draft Master Plan (2006). The original method was flaring methane gas at three flare stations built on the site. It was replaced with a gas collection system which aims to convert the methane gas into an energy resource. The original flare stations remain for temporary use when the gas collection system closes and for the future when the methane gas amount decreases to a low level that cannot financially support producing energy. Besides methane gas flare stations and the collection system, there is a gas monitoring infrastructure. Tiny lights for signals are installed in a grid layout linking to the gas extraction system below the surface. In each landfill mound area, there is a sophisticated network of the methane gas control systems. Around the edge of each landfill area, there is a leachate collection and containment system with groundwater monitoring wells (Fig. 22).

Figure 22: The Plan of Environmental Health & Safety

Source: Image from Fresh Kills Park Draft Master Plan

In dealing with the reality of heavy pollution, one significant point in The Draft Master Plan is "closure for safety." Duisburg Nord Landscape Park in Germany is allowed to have small leakages on the site. Those dangerous areas are not closed entirely but restricted to low-risk activities (Kirkwood, 2001). However, Fresh Kills Park is subject to numerous local, state, and federal regulations that ensure public health and safety. It stated in The Draft Master Plan (2006) that "no areas of Fresh Kills Park will be opened to the public until regulatory standards for health and safety are demonstrably met (Field Operations, 2006, 16)." In addition to the groundwater monitoring wells previously mentioned, surface water sampling locations are set along the river. Closure and treatment facility operations at Fresh Kills are implemented by the Department of Sanitation of New York. Treatment will take a long time. Even after the park opens to the public, there will be continual monitoring of the water and air to protect public health. During the closure, a berm outlook is proposed in the Plan to allow people to look into the site and view its transformation.

Natural resources are emphasized in The Draft Master Plan. It says, "Only 45% of Fresh Kills' four square miles is actually landfill; the other 55% is made up of wetland, creeks and tidal flats, open meadows and woodland." Although these numbers are contested by some (Ballesteros, 2008), natural restoration is the other theme following pollution treatment. Natural settings and natural-field-based activities are the main programs in Fresh Kills Park. Among all the five areas, the 233-acre North Park is characterized by vast meadows, wetlands, and creeks; the 100-acre Confluence sited in the confluence of two main creeks and connecting the north and the south is a recreation core; the 425-acre South Park is characterized by large natural settings and field-based

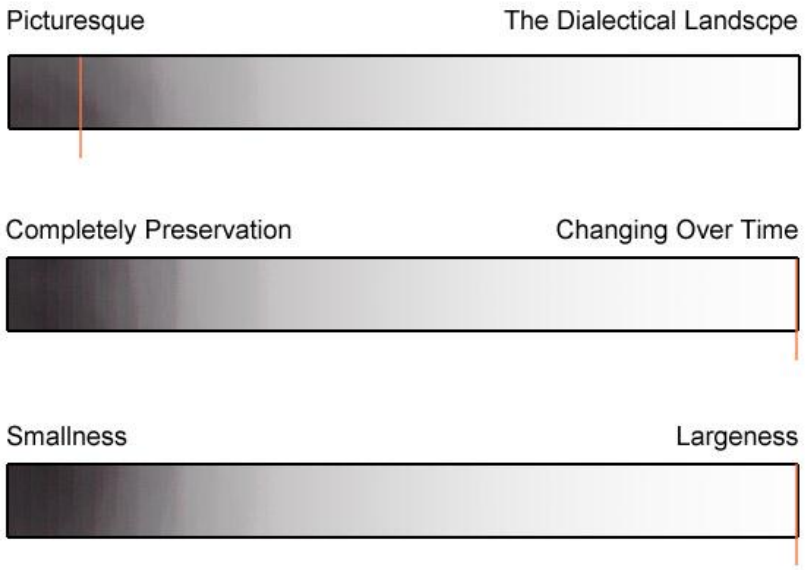
activities; the 482-acre East Park is characterized by large, vegetated landscape; and the 545-acre West Park has the site's largest mound with an enormous earthwork monument in remembrance of September 11 upon a vast hilltop wildflower meadow. Over 40 miles of bikeways, trails, and paths are designed for users to enjoy the natural resources. Wetlands are reserved for wildlife, while the waterways are used for boating and fishing besides habitats. The concept of "lifescape" is embodied in natural restoration.

Ecological restoration is an important theme in the project of Fresh Kills Park (Fig. 23). This project is an attempt to use landscape architecture to solve large area post-industrial contamination problems.

Figure 23: Landscape and Habitat Plan

Source: Image from Fresh Kills Park Draft Master Plan

Aesthetic Criteria



4.5 Evergreen at the Brick Works: Preserve the Industrial Heritage

Project Data

Location: Toronto, Canada

Overall Area: 12 acres (49000 m^2)

Design and construction time: 2006-2007

Open time: 2008

Design Team: Evergreen

The Don Valley Pressed Brick Works located in downtown Toronto was founded by the Taylor Brothers in 1889. After the Toronto's Great Fire of 1904, a large amount of bricks produced by The Don Valley Brick Works were used to rebuild the city, including numerous Toronto's landmark buildings. By the early 1980s, the quarry was almost exhausted and brick production essentially ceased. In 1989, the Brick Works closed

permanently. TRCA expropriated this property in 1990 to protect its unique geological, historical and environmental features. In 2002, this property was designated under the Ontario Heritage Act (Evergreen, 2006).

The Don Valley Brick Works encompassed a total area of 40.7 acres. At the northern end of the property is today's Brick Works Park, which is a 28.7-acre natural landscape park. At the southern end is the Industrial Pad, which consists of various heritage resources from the Brick Works including 16 buildings, 1 chimney stack, kilns, and historic brick-making machinery. In the fall of 2005, Evergreen, a national charitable organization with a mandate to bring nature back to the cities, launched a master planning process to redevelop the Industrial Pad into a mixed-use center for experiencing the relationship between nature, culture, and community. This center is Evergreen at the Brick Works.

The master plan of Evergreen at the Brick Works (Fig. 24) showed a great respect for the industrial heritage. The vision of this project was stated in the master plan. "The rehabilitation and adaptive re-use of the heritage buildings breathes new life into this industrial facility and restores its place as a Toronto landmark (Evergreen, 2006)." The Brick Works history was embodied in different aspects.

Figure 24: the Master Plan of Evergreen Brick Works

Source: Image from EBW Master Plan (2007 Updated)

A main concept in the preservation of industrial heritage was the reuse of the old buildings. In the master plan, there were tables of heritage assessment of all sixteen buildings in the Industrial Pad, including items of description date, preliminary summary of artifacts and gross floor area. (In the master plan, "artifacts" are defined as: kilns, machinery, landscape features, infrastructure, and structures that were used for brick-making, all of which have significant heritage value.) Among them, a few are occupied today. Building 1 is used occasionally for meetings, site tours, workshops, educational events, and a base for a day-camp program. Building 5 contains a wood-working shop. Buildings 6, 7, 8 are large open-air sheds, and sometimes they are used for special events

such as markets. All the other buildings are vacant. The master plan attempts to maximize the reuse of the Brick Works remnants. For instance, building 9 was transformed into the Discovery Centre for children's play. Building 10 and the part of building 11 with large pieces of machinery were preserved as the most significant heritage artifacts. Visitors cannot enter into the two buildings but they are able to look into them through windows to learn the brick-making process. Building 12 houses administration offices, but the existing three brick walls were retained and altered into a changeable exterior skin allowing moveable screens, window boxes, and art installations. Buildings 15 and 16 were rehabilitated for evergreen gardens. All of the other obsolete buildings were demolished, including building 11 which had been ruined and building 12 which was structurally unsound. Building 13 was dismantled and recycled. Corresponding to the table of heritage assessment, there was another table showing the summary of detailed heritage impacts in the master plan with changes in program function and conservation strategies (Fig. 26).

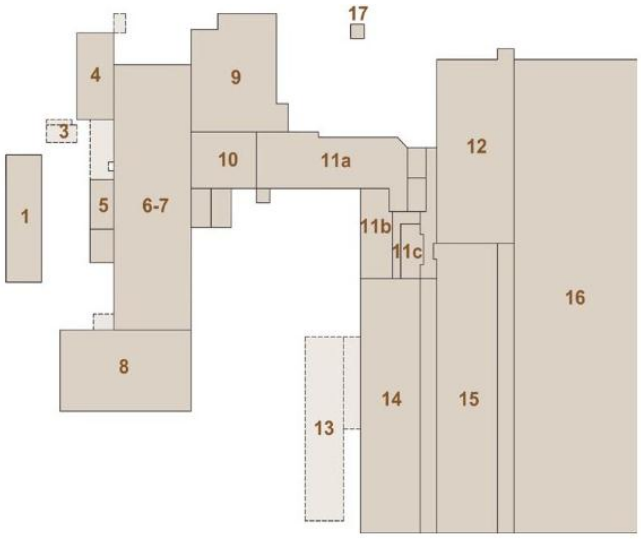


Figure 25a

BUILDING #	DESCRIPTION DATE	PRELIMINARY SUMMARY OF ARTIFACTS, NOTES	GROSS FLOOR AREA (SF)
1	Office, c. 1910		8,314
3	Welding Shop (originally water treatment plant), c. 1926		473
4	Sand-Lime Storage Building (originally Shale Grinding and Dust Collection Building), 1912 - 1913	Contains four large storage and mixing hoppers	3,240
5	Lunchroom (originally Brick Enamelling Plant), c. 1910		1,816
6+7	Sand-Lime Brick Production Plant, 1961	Contains tracks on the floor and the foundations of three brick presses	17,047
8	Sand-Lime Brick Storage Building, 1961 - 1962		10,434
9	Clay-Shale Storage Building (originally Clay Grinding and Dust Collection Building), 1925	Contains hoppers used for clay and shale storage, along with related machinery and ductwork	8,704
10	Clay Grinding Building (originally Dry-Press Brick Production Plant), 1891	Contains three large clay and shale grinders and two hoppers	5,194
11a+ 11b+ 11c	Screening and Dust Collection Building (formerly part of the Dry-Press Brick Production Plant), 1910	Contains many artifacts, including sieves, dust collectors, ground clay dust bins, shale bins, surge bins, additives machinery, and a unique circular track and distributor machine	14,247
12	Holding Room, 1960-61	Contains tracks imbedded in the concrete floor	13,601
13	Brick Storage Shed, 1972	Building is a one-storey open air shed	6,550
14	Wire-Cut Brick Production Plant, 1960-61	Contains brick extruder machine and other machine parts	18,726
15	Dry-Press Brick Production Plant, 1956-57	Contains John Price Machine (relocated from another brick works), an elevated interior structure, tracks imbedded in the floor, and brick signage of the former company name "Toronto Brick"	22,402
16	Tunnel Kiln and Dryer Building, 1956-57	Contains three long, tunnel kilns and six single-track tunnel dryers	52,744
17	Valley Chimney, 1906	Chimney is the only remaining of four which once stood at the complex: they were named "Don," "Valley," "Brick" and "Works."	
TOTAL			183,492

Figure 25b

Figure 25a and 25b: Building Numbers and Table of Heritage Assessment in EBW

Source: EBW Master Plan (2006)

Figure 26: Aerial View of the EBW project in the 2006 Master Plan

Source: Image from EBW Master Plan (2006)

Besides buildings, the existing kilns were retained in-situ. They were used for educational and interpretive purposes (Fig. 27). Number of kilns retained was increased in a 2007 updated master plan. The two long tunnel kilns will create an east-west walkway connecting the Welcome Center to the east wall of building 16.

Figure 27: Rendering of the Kiln and Interpretive Path in the 2006 Master Plan
Source: Image from EBW Master Plan (2006)

Another post-industrial program was the two courts in the 2006 EBW Master Plan. One was the existing Chimney Court in the north, which contains the remains of a Brick Works chimney (Fig. 28). The other court was the new Brick Works Court in the south which contained a new chimney-like monument which functioned to welcome visitors. This monument was made by the historic beacon chimney in building 13. The monument was a physical memory of the historic "Works" chimney that was once located there. These two large, open-air courtyards were places for a variety of cultural events such as theatre, art exhibitions, film screenings, conferences, performances, and weddings.

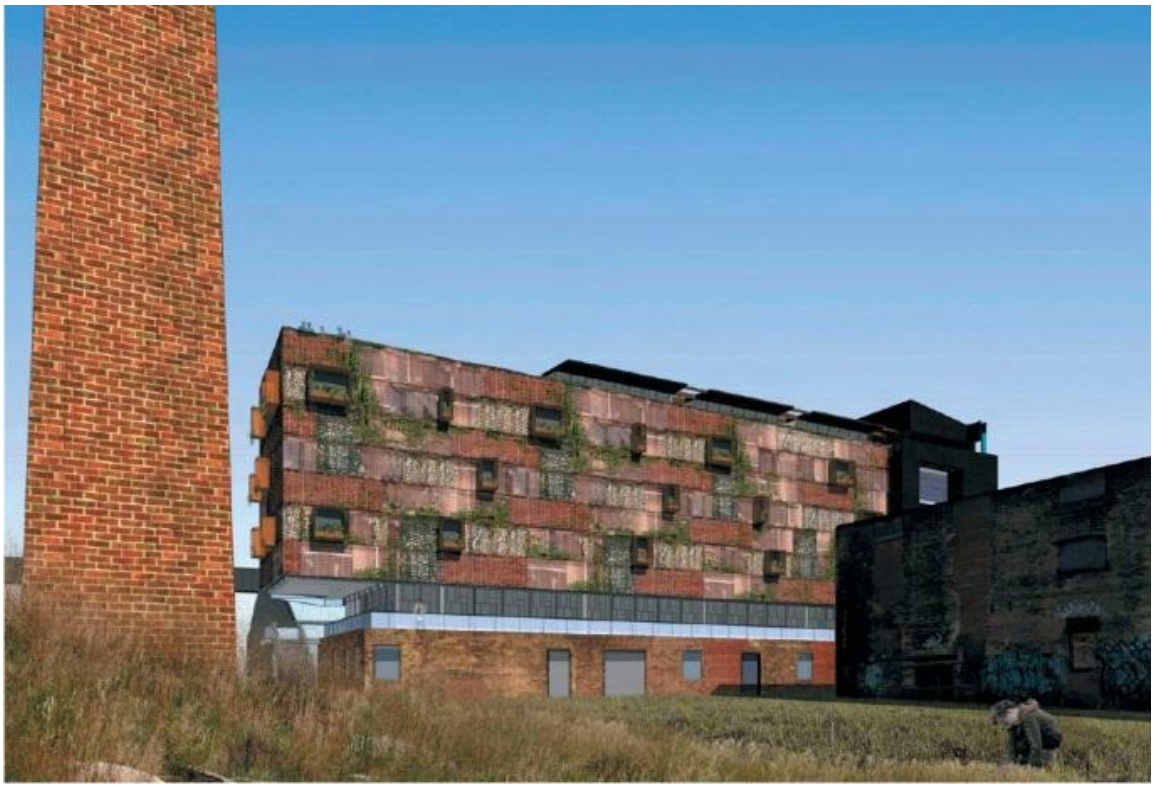


Figure 28: Rendering of the Chimney and Building 12 in the 2007 Master Plan
Source: Image from EBW Master Plan (2007 Updated)

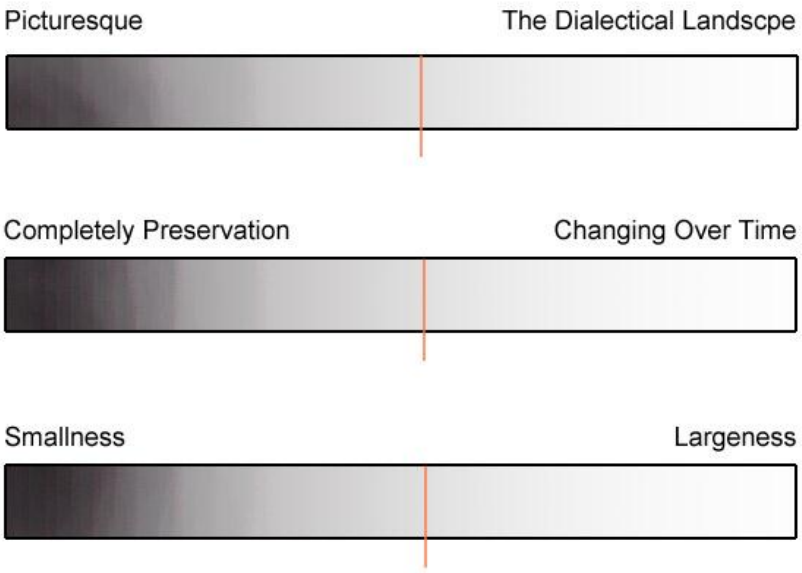
In the 2006 Master Plan, three brick-pattern paths were proposed for visitors to interpret this post-industrial site (Fig. 27). As an important component of the interpretive system, these paths told stories about nature, culture, and community, ranging from animals of the Don Valley to a timeline of the Brick Works and the future of Toronto. Industrial history was a primary theme for these stories. These paths traced the brick-making process, from large brick bolder to brick dust, to emphasize the memory of the site. They guided visitors to the heritage artifacts on site such as the John Price Brick Press and the Tunnel Kilns.

The objectives of heritage conservation in this project can be concluded as to (1) retain as much heritage fabric in place as possible; (2) preserve the industrial and

architectural character of the site; (3) allow for new construction and the adaptive reuse of heritage buildings (EBW, 2006).

One thing that makes Evergreen at the Brick Works different from other case studies is that from the beginning the industrial legacy of the site is deemed to be an important historical heritage instead of waste. This project is based on the affirmation of the Brick Works' contribution to the City of Toronto. In the design, the industrial history is preserved and shown in diverse ways to encourage people's involvement.

Aesthetic Criteria



4.6 Summary

The Gas Works Park is the first project which preserved the industrial legacy on the site. The towers gave people a feeling of the industrial sublime. The open lawn and soft-slope mount in Gas Works Park combines traditional pastoral landscape with the industrial sublime.

Duisburg Nord Landscape Park not only preserved the industrial legacy not also utilize them. The industrial legacy were combined into design and created a unique industrial language. It criticized picturesque landscape but embraced the dialectical landscape not to create an illusory image on such a post-industrial site.

Revival Field is an artwork to show the phytoremediation process. But it is not just a simple cleanup project, but also makes the site's landfill past covered under weeds "grow".

Fresh Kills Park is a project that uses landscape architecture approach to deal with large scale post-industrial site. The most important point in this project is to combine cleanup methods with design.

Evergreen in the Brick Works is a project that preserved the industry legacy on the site as historical heritage. It did not only preserve the industrial buildings but also let visitors know the manufacturing process and the Brick Works' history.

Summary of Case Studies

		Seattle Gas Works Park	Landschaftspark Duisburg-Nord	Revival Field	Fresh Kills Park	Evergreen at the Brick Works
Design and Construction Time		1971-1988	1990-1999	1990-1993	2001-2040(?)	2006-2007
Location		Seattle, Washington, US	Duisburg Nord, Germany	St. Paul, Minnesota, US	Staten Island, New York, US	Toronto, Canada
Area		20.5 acres (83,000 m^2)	570 acres (2,300,000 m^2)	60 square foot (5.6 m^2)	2,300 acres (9,300,000 m^2)	12 acres (49000 m^2)
Previously Use		Seattle Gas Works	Thyssen Meiderich Steelworks	Pig's Eye Landfill	New York City's largest landfill	Don Valley Pressed Brick Works
Site Issues	Industrial Legacy Kept	Facilities: generator towers, cooler towers, oil absorbers, smoke arrestor hood, machines; Buildings: the boiler house, the pump house; Transportation: concrete train trestles.	Facilities: blast Furnaces, tanks, gas meter, machines and etc; Buildings: the power plant, the blower house complex, casting house, huge walls and etc; Materials: cast iron plates, coal cinders, stump of smoke stack and etc; Transportation: overhead railway.	NA	NA	Facilities: kiln, chimney, machinery Buildings: sixteen old buildings
	Loss of Vitality	The Gas Light Company closed the Gas Works in 1956. This site was abandoned until it was received by the Seattle city in 1973. A symbol of "urban blight".	The Steelworks closed down in 1985, and left 8000 workers dismissed and 570 acres abandoned.	NA	NA	The Brick Works made significant contribution to the construction of the city, but the production ceased in the end of 1980s.
	Contamination	Oil-soaked soil, chemicals in the soil and ground water, and industrial waste.	Soil contaminated by chemicals such as polyaromatic hydrocarbons, gas diffusion, sewage channel.	Waste. Zinc, lead, cadmium, and copper in soil. A Superfund site.	Waste. Methane gas. Chemicals in the soil and water.	NA

		Seattle Gas Works Park	Landschaftspark Duisburg-Nord	Revival Field	Fresh Kills Park	Evergreen at the Brick Works
Program	Preserve the Industrial Remains	The tall towers were preserved as industrial monuments and landmark of the city in the off-limits.The old boiler house, pump house, smoke arrestor hood, and machines were kept for recreation.Concrete train trestles were preserved to mark the entrance of the park.	Replace the manufacturing process by nature process to create the "physical nature". Utilize the buildings for various new functions.Recycle the materials but keep their industrial essence.Keep the industrial language in the park.	NA	NA	The industrial remains were valued as heritage.Maximize the preservation.Reuse the old buildings for offices, workshops, play, education, events, and market. Preserve the brick making process.Interpret the industiral history.
	Activate the Site	This site was transformed into an urban park to provide a rest and recreation space for people in the Seattle city.	This site is a place for diverse art, cultural, social, education, and sports activities.	NA	Natural-field based activities, An enormous earthwork monument in remembrance of September 11, Visible transformation process	This industrial heritage was transformed into a place to encourage people's use. Provide event space such as special market.
	Clean up	The oil-soaked soil was capped by 18” thick sewage sludge and sawdust for decontamination. Low maintenance field grass was then grown on the capping.	Separate heavily contaminated area from the lightly. Slowly heal the site by plants. Slight gas diffusion is allowed but activities are limited. Seal the heavily contaminated area.	Phytoremediation: plant hyperaccumulator plants on the site to take up metals from the soil. Sculpt the ecological process.	Closure for safety Root penetration Agriculture strip cropping Methane gas treatment system Lifescape: natural restoration	NA

		Seattle Gas Works Park	Landschaftspark Duisburg-Nord	Revival Field	Fresh Kills Park	Evergreen at the Brick Works
Lessons on Aesthetic Values	Picturesque Landscape	A combination of picturesque landscape to placate the public	Anti-Picturesque	NA	Aimed not to create a picturesque landscape but a healthy ecological system	NA
	Dialectical Landscape	Celebrated the industrial legacy, which was thought as "ugliness"	Celebrated the "ugly" industrial legacy, and even the rusting process	Make the ecological process visible and let people know the site's dirty and ugly past	Hide the ugly past and restore natural resources on the site	Preserved the "ugly" industrial buildings
	Industrial Sublime	Preserved the huge towers and contrasted them with big lawns	Preserved and utilized the huge industrial facilities and even the heavy industrial materials; Design was in an industrial language.	This was a small experiment.	The huge landfill mounts made the topography of the entire site.	Preserved the huge brick-made buildings and long kiln.
	Concepts of Time	A static monument of the industrial past in off-limits	Connect the past and future; Let the process happened in the past happen again in a new environment; Give new functions to the old facilities	Grow the past; Emphasize changes over time	Hide the industrial past	Preserved the past as heritage: some industrial legacy are like exhibits in museums, and some have new functions.

CHAPTER FIVE

FINDINGS FROM CASE STUDIES

The case studies reveal diverse solutions to the three issues of post-industrial sites—the industrial legacy, the loss of vitality, and the contamination. The development from waste to assets, from a monument criticized by the public to a heritage of industrial history states the change of aesthetic values. Complex methods synthesizing aesthetics, history, economy, ecology, and social provide a comprehensive consideration of how to vitalize the post-industrial sites. Cleanup technologies are solutions to the pollution issue. However, neither these issues nor these solutions are separated from each other. Every case placed different emphasis on different ideas. This chapter attempts to find the connections and the differences among different solutions.

5.1 From Waste to Assets

Haag was one of the first landscape architects who challenged the traditional thinking of an urban park. For an urban park built on a post-industrial site, instead of erasing the industrial remnants, he preserved them as urban monuments. He looked at the industrial structures not as waste but as something with aesthetic value. The designers even reused a few of the industrial buildings in the later projects of Duisburg Nord Landscape Park and Evergreen at Brick Works, the idea of creating assets of the

industrial infrastructure was even stronger.

When Haag submitted his master plan of Seattle Gas Works Park in 1971, he confounded a lot of doubts. At that time, his plan was evaluated as "hideously ugly" and "an environmental intrusion" by the public hearings (Herald-tribune, 1971). Many critics thought the industrial remnants had nothing about aesthetics and nothing about memorable values. The common voice was like what Craig Campbell said, "The new 'Iron Gothic' park will remind Seattle of a noxious chapter in its past" (Campbell, 1973). In most critics' opinions, since the Gas Works was closed, Seattle should get over this "noxious chapter." But Haag's design preserved the "noxious chapter." It was argued that his design was for his own "Iron Gothic" monuments, which placed the site "in a previous era that has virtually disappeared in the course of Seattle's march into the future" (Heyman, 1999).

As a monument of the industrial era, the Gas Works Park was neither nostalgia nor denouncement. The Gas Works Park sat quietly in the city's march to the future but people could see the preserved industrial remnants and connect to the city's past. Haag's creative use of industrial remnants is a milestone in the history of post-industrial site designs. The post-industrial site established a complex landscape of awe and terror, delight and pain, beauty and horror. He persuaded the critics by giving presentations to demonstrate the assets of the post-industrial site including geographic advantages, historic significance, aesthetic values, and technological feasibility.

Haag preserved the industrial remnants as a symbol and spirit of the place, and welcomed people's contact under restrictions. His definition of the Gas Works Park was "a highly active urban park" which was a part of the city experience instead of seclusion.

In his campaign for the master plan, he said "the traditional escape from the city into the sylvan setting of remote areas has changed for many people into a seeking of a more active encounter". Haag also underlined the aesthetic values of the industrial structures. He submitted a drawing about children playing with machines to show his idea of the small children's play barn in the park. Being different from the traditional aesthetic views about forms and orders, these new aesthetic values had a spirit of modernist art. The Gas Works Park was "a reversal from a period when industrial monuments were regarded, even by preservationists, as ugly intrusions on the landscape, to a time when such structures as the gas works are recognized for their potential ability to enhance the urban experience" (Herald-Tribune, 1971).

The Gas Works Park was a pioneer in landscape architecture approaches toward disturbed places. Prior to the Gas Works Park, the picturesque aesthetic dominated the public's perception of beauty. But the Gas Works Park celebrates an industrial sublime of awe, terror, and danger.

Haag's plan is to preserve the industrial structures on-situ with limited use. Even though he had a pioneering idea of converting industrial waste into urban monuments, he compromised to the picturesque landscape by creating pastoral-style meadows and mounts. But Latz's plan for Duisburg Nord Landscape Park after two decades is one step further—he emphasized utilization of industrial remnants and embraced an anti-Olmsted landscape on post-industrial sites. Latz gave the obsolete industrial buildings, equipment, and materials new functions. For example, work plants are used as event halls, old furnace are used for climbing, and iron plates are used to make a plaza.

The idea of utilization of industrial remnants is also embodied in Toronto Brick

Works Park. Similar to the use of industrial buildings in the Duisburg Nord Landscape Park, obsolete buildings in the Brick Works are also transformed into offices, markets, cultural center, and etc.

Compared to the earlier post-industrial projects, the Don Valley Brick Works was viewed at as an important heritage of the City of Toronto from the beginning. This project has a unique vision of "Post-industrial Nature." It viewed the industrial heritage as a special nature. This broad idea of nature eliminates the antithesis of nature and industry. It states that "the Don Valley Brick Works presents an unparalleled opportunity for learning about how Nature shapes our cities, and how we in turn shape our natural world. By looking to and learning from the past, Evergreen at the Brick Works transforms the way we think about Nature in our cities and communities. Its bold message is that when you restore the past in a fundamentally different way, you can invent a new kind of future." (EBW, 2006)

The most important idea of the Brick Works case study is the attention to educate the public the industrial history. Visitors are informed the brick making process and functions of different machines. The industrial heritage is not only for utilization here, but it also encourages people to know and understand. From the Gas Works Park and Duisburg Nord Landscape Park, to Toronto Brick Works Park, thinking and ideas about post-industrial designs become more and more open.

One thing to point out is that the design principle in Fresh Kills Park is partially different from the post-industrial landscapes of Seattle Gas Works Park, Duisburg Nord Landscape Park, and Toronto Brick Works Park: Fresh Kills Park are not mainly about emphasizing the industrial past, but about imagining the ecological future.

The primary approaches to transform industrial waste into assets are:

- To preserve the physical industrial structures as monuments,
- To utilize the industrial structures,
- To preserve the memory of the industrial process,
- To educate the public about the industrial history.

5.2 Complex Methods for Complex Sites

Post-industrial sites are the complex of issues on history, culture, environment, society, economics and etc. Designs of post-industrial sites are not a simple creation of the picturesque or romantic landscape but a multi-consideration of aesthetics, history, social, economy, and ecology.

Site interpretation is a first priority for a design proposal of a post-industrial site. Before Haag began to design Seattle Gas Works Park, he did a careful survey on the site. He built an office on the site and thoroughly studied conditions and processes of the site. His master plan was based on site interpretation.

Haag read the park's horizontal surface as background. He described the values of the gas works in three aspects: geographic location, historic significance, and aesthetic resources. Haag thought that the site had a view asset because its location could reflect a panorama of Seattle's skyline. He emphasized the historic significance of Seattle's industrial past in the city experience. The industrial remnants were characteristics of this place and had a connection to the settlement around. As the idea mentioned in phenomenology of architecture, genius loci was formed by architecture, environment, and human behavior together. Haag's design was a move from a creation of a landscape to an exploring of the site conditions and meanings. A place could not be successful after

detaching from its context. The park could not be successful after detaching from the working lake, the industries lining the shore, or even the oil-contaminated ground on the site. In addition, the oil and chemical saturated soil was not suitable for establishing an elaborated Victorian-style park. Haag reduced the designer's intervention to a disturbed place. His simple design language of turf covering and industrial structure preserving softened the opposition between nature and industry. In order to solve assorted issues of the post-industrial site, the Gas Works Park was not a simple visually beautiful landscape but also a project of remediation and regeneration. Instead of creating a sanctuary on the end of Seattle like what the Victorian urban park intended to do, the Gas Works Park drew people's vision to the city—not only the spatial panorama but also the industrial history.

For the Duisburg Nord Landscape Park, the multi-function of a post-industrial landscape is clear. At first, IBA had already set a goal of city regeneration with environmental remediation. This ambitious regeneration program was different from former building exhibitions. First, it moved from the narrow focus on architecture, housing and building technologies, and urban renewal to a holistic vision of urban regeneration through a complexly interconnected system. The landscape park Duisburg was neither an isolated haven nor a post-industrial museum; it was an active point participating in urban development. Karl Ganser, managing director of the IBA Emscher Park pointed the role of landscape in this great program: "Reconstructing landscape is by no means an isolated problem for old industrial areas. All Europe's major conurbations are happily building tomorrow's discussed industrial areas in their extensive suburban zones. For this reason the idea is beginning to dawn of starting to construct landscape in

urban space today, not just to protect the remains of what exits now, but to increase and enrich it (Ganser, 1991, 15)."

For utilization of the industrial remnants, some were given new meanings while some kept their original functions in a new narrative. Haag's Seattle Gas Works Park was an industrial monument while Latz's Duisburg-Nord Park was an industrial metamorphosis. Latz anticipated converting "the fear of historical contamination" to "a calm acceptance of the structures." Latz's design showed a consideration of fusing industry and nature, industry and culture. His metamorphosis was established on the understanding of the post-industrial site.

A principle of keeping physical qualities instead of "re-cultivation" was set in Latz's design on two aspects. First, Latz disagreed with replacing historical properties with totally unrelated things. The "recycling" in Duisburg-Nord was more like "cultural recycling," which emphasized the original functions. Latz explained, "It is more about taking items over in their totality and understanding their original functions. That is why I find it so important not to put everything into the rubble crusher and use it as road-building material, even though that is often described as perfect recycling." That's why some part of a stump of a factory chimney was kept instead of filling the bunkers or building roads, and why the catwalk was built with the remaining railway. Latz wanted to "keep them in their role and in their historical function, and sometimes invest the surviving building components with new meaning that can stimulate new readings of existing material." Secondly, Latz disagreed with a "re-cultivation" of this post-industrial site into a nature-like park, which was unsuited to the site's language. His design principle in Duisburg-Nord project was a combination of the highly artificial and the

highly ecological. He did not think traditionally-understood nature fit in a post-industrial park. He wanted to develop an artificial nature to accord with industrial technology. For example, instead of clumps of trees in the English style, he planted a grid of fruit trees in the blast furnace area, which represented "the same language" as the surroundings. In Latz's opinion, the "Olmsted"-style landscape meant that "nature is triumphing over technology," which "lost society as a whole."

The goal of the project Fresh Kills Park was to transform the former world's largest landfill into "an ecologically innovative urban public park" for all New Yorkers (Fields Operation, 2006). As a response, the design team proposed a concept "lifescape", which was a systematical and phasing thinking of environmental remediation. It was explained as "lifescape is an ecological process of environmental reclamation and renewal on a vast scale" (Field Operations, 2006). The word "lifescape" underlined concepts of space and time. "Lifescape is both a place and a process (Field Operations, 2006)." Lifescape was a method for landscape to establish on complete ecosystems and develop in a self-sustained way.

Latz's design was also an integration of nature and technology. He refused to transform the existing open sewage channel into a meandering river because under the reality of heavy pollution, the latter was just a pseudo-natural imagination. "The water canal is an artifact aiming to introduce natural processes in a devastated and perverted situation." He explained, "Man uses this artifact as a symbol of nature, but is still responsible for the process." Latz's nature view in such a post-industrial site was more about the internal natural process rather than the natural-like exterior.

While Seattle Gas Works Park and Duisburg Nord Landscape Park showed the

designers' comprehensive consideration of complex site conditions, Fresh Kills Park showed the suitability of using landscape architecture to provide a solution to a complex site. Transforming into a landscape park is the beginning step of this great landfill recovery project. The work of landscape is like an introduction of the subsequent projects. Landscape architecture has its own advantage in such a vast and complex project. It provides an economical and sustainable way in the long term. As a new oasis in New York City, during almost 100 years, Fresh Kills Park has sometimes been reminiscent of Olmsted's Central Park. Both of them celebrate "nature." The differences are that Olmsted inserted nature inside architecture, while Fresh Kills Park discovers nature on site. If landscape architecture can be looked as an active performer in the former cases, in Fresh Kills Park, it is more like the stage background—it restores the basic natural settings and leaves the "stage" to future development. The language of forms has been weakened in Fresh Kills Park. Landscape works like an infrastructure reconnecting the manufactured city to the ecological system of nature.

Landscape architecture, because of its unique focus between urban planning and architecture—neither too broad to pay attention to the details of a site nor too narrow to synthesize the context around the site, fits well to design complex post-industrial sites. It can discover a site's specifics as well as connect history, aesthetics, society, and ecology together. For the complexity of post-industrial sites that have assorted issues on history, environment, society, economic, and aesthetics, landscape architecture provides an approach to grasp the overall.

The primary approaches to deal with complex sites are:

- To interpret the site's complexity,

- To use landscape architecture as a framework to integrate multi-disciplines or different aspects such as industry, nature, technology, and culture,
- To give landscapes multi-functions,
- To keep the industrial essence.

5.3 Cleanup Technologies

Cleanup technologies are developing over time. In the 1970s post-industrial project of Seattle Gas Works Park, the primary cleanup technology was capping the oil-saturated ground and planting turf on the topsoil. Heavily contaminated areas were off-limits.

In the Duisburg Nord Park, cleanup technologies were a little bit positive but were still primarily about control and restriction. Latz's minimal intervention was also embodied in the remediation process. In tackling the pollution on the site, Latz distinguished less contaminated areas and heavily contaminated areas. For the less contaminated areas, instead of intensive treatment, the approach of slowly healing the site itself was adopted. Plants helped to reduce contamination. The heavily contaminated areas were shut down and poisonous substances were deeply buried to guarantee safety.

In the Revival Field, phytoremediation cleaned the site successfully. The designer chose phytoremediator plants to uptake heavy metals in the soil. Compared to the former capping or burying, this technology of phytoremediation was more aggressive. Its function was amelioration rather than just control or restriction. The technologies of root penetration and agriculture strip cropping used in Fresh Kills Park belong to phytoremediation. This was an innovative idea to heal a disturbed site through developing.

Techniques like phytoremediation are main characteristics in the landscape

architecture approach. They propose a style of healing through growing, developing, and maintaining, and most importantly, anticipating an improvement from the internal—not just capping the ugly sites, but restoring the original natural settings and reestablishing ecological functions as well. However, innovative ideas need support of application, and compared to the traditional engineering approaches, the landscape architecture approach is still immature and needs further research and practice.

For instance, the actual effect of root penetration was doubted. It was argued that root penetration would be stopped by the clay cap. Roots conform to the environment rather than to genetic predisposition. When a tap-rooted tree encounters a clay cap, it will divide into many different roots and spread laterally in order to avoid direct breakthrough. Bulk density is the key factor to decide how roots develop. At 1.2 gm/cm, roots grow fairly unrestricted throughout the soil, while at 1.8 gm/cm roots become completely distorted and are unable to penetrate the soil even of a shallow depth (Dobson and Moffat, 1993). A well-engineered clay cap commonly has a bulk density of 1.8-1.9 gm/cm. And for the idea of strip cropping, there was no detailed discussion about species selected in the Draft Master Plan. But what was mentioned is that all the innovative techniques are "still undergoing further research and study (Field Operations, 2006)."

Besides, the methane gas cleanup system seemed to be a perfect proposal for resolving the pollutant methane on the site of Fresh Kills Park. This cleanup system included parts of monitoring and controlling contaminants, and converting them into energy. However, due to a lack of practical methods, this idea's effectiveness has been questioned. A major worry was about leakage. It is said that pollutants have kept leaking into soil and water and the gas cleanup system has not stopped the leakage as much as

was expected.

Cleanup technologies on post-industrial sites have progressed over time. From the soil capping in the Gas Works Park Project to the ideas provided in the Fresh Kills Park such as methane cleanup system, root penetration, and agriculture strip cropping, landscape architects are seeking innovative ways to combine technology with design. The soil capping with turf in the Gas Works Park makes both the existence of pollution and the cleanup method go under the surface. The bright-color alert in the Duisburg Nord Landscape Park makes people know the contamination on the site. Latz's choice of birch trees rather than eternal clay capping is an attempt to use landscape language to solve pollution problem. And the open channel hides the heavily contaminated sewage underneath. Revival Field connects art with the technology of phytoremediation. It makes possible that pure cleanup technology can be transformed into artwork. The cleanup processes in Fresh Kills Park are connected with landscape infrastructures and included in the vision of "lifescape". In the combination of cleanup technology and design, a variety of methods are provided according to various site conditions. An evolving, self-sustaining and ecological cleanup technology with suitable design language is an ideal fit for landscape architecture.

The primary cleanup principles are:

- To combine cleanup technology with landscape design,
- To choose phyto-materials if suitable,
- To have a long-term plan,
- To restore the ecological systems.

CHAPTER SIX

APPLICATION

Landscape architecture approaches synthesize aesthetics, history, economy, ecology, and society to solve the complex issues of the post-industrial sites. This chapter is an application of the landscape architecture approach to deal with the industrial legacy, loss of vitality, and contamination on the project site.

6.1 Design Statement

This design proposal is an application of former findings about the case studies, and it also has a connection to the aesthetic values discussed in Chapter Three. Like the findings in the case studies, this proposal attempts to maximize the preservation of industrial legacy on the site, revitalize the site by diverse programs, and connect the cleanup technology with design. Instead of creating an illusory picturesque landscape, this design will embrace the straight lines, irregular-box shaped buildings, and the trees installed in grids to demonstrate a strong industrial language. In this design proposal, both the physical industrial legacy and invisible industrial legacy are preserved. The power of the Ford Assembly Plant is expressed in new design ideas to create a feeling of the industrial sublime by embracing “hugeness”. The concept of time to connect the past with the future is applied in the idea of creating a “green” assembly line. Site cleanup is

combined with landscape design to have multi-functions. This projective design will be site specific not only to its past history but also to its context. Landscape architecture serves as a framework to revitalize the site.

6.2 Site Inventory

Context and History

The project site is located on the southeast corner of the City of Hapeville, approximately eight miles south of downtown Atlanta, directly adjacent to Hartsfield-Jackson Atlanta International Airport. On the east of the site are the barrier of highways---US 401 and interstate 75. On the south of the site are Old Dixie Highway, a set of railroad tracks, and North Central Avenue. On the northwest is the Airport Loop Road (Fig. 29).

This site was previously included in an industrial zone with few residential uses in the vicinity. After the sale of the Ford Plant, there will be a mixed-use residential development to the west of the site—Asbury Park, a live-work place which would contain 58 townhouses, 1357 condominiums, 689 multi-family housing units, and 70,000 square feet of ground-floor retail space. In the 2006 Future Land Use Map as part of the Hapeville Plan 2025, this area is identified as a mixed-use development area (Fig. 30).

Figure 29: Context of the Site

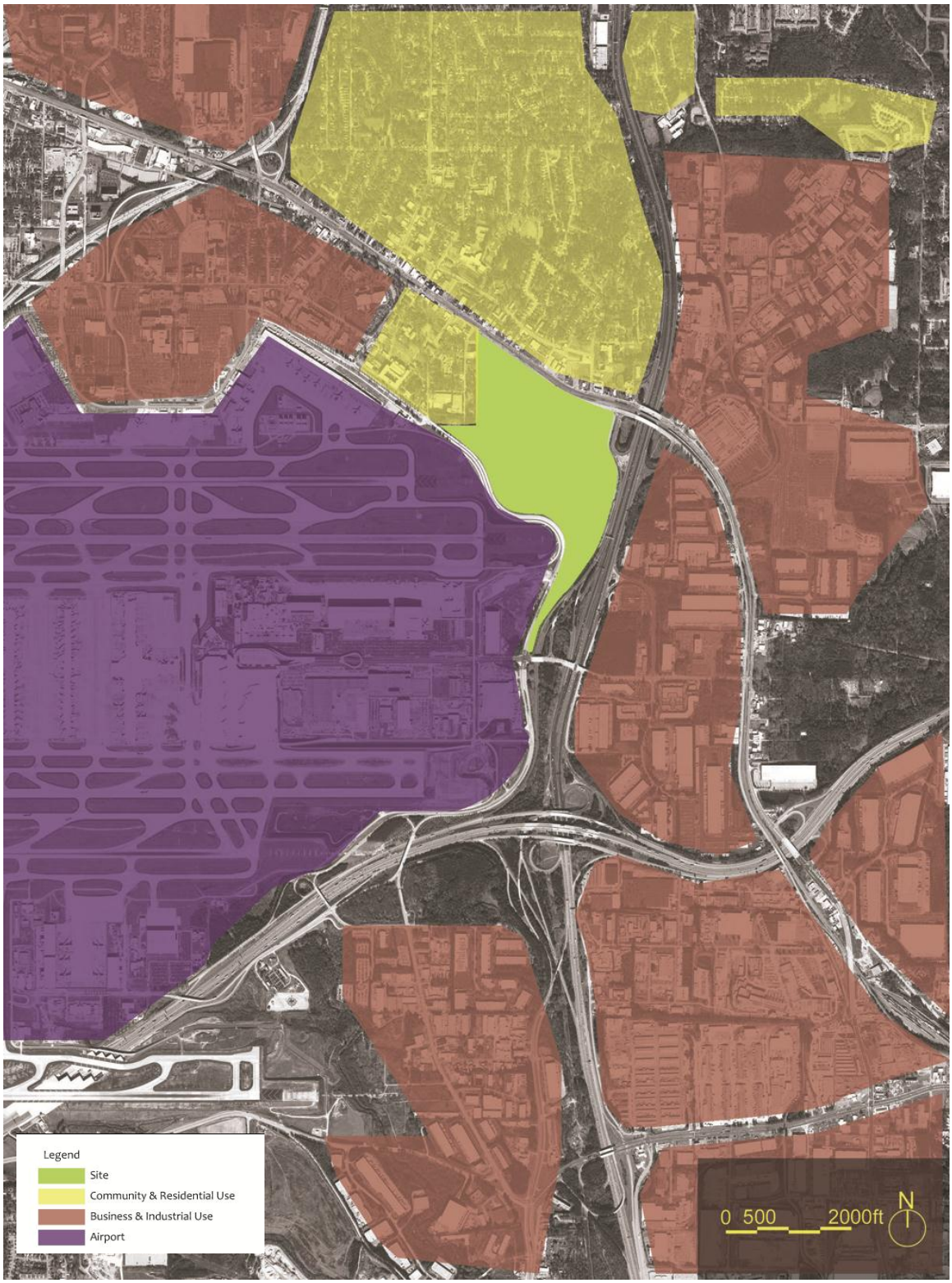


Figure 30: Land Use of the Area Around the Site

Site

This 122-acre site was previously owned by Ford Motor Company to build its first post-war modern assembly plant in the City of Hapeville. The assembly plant opened in 1947 and lasted for about 60 years. Ford announced that this assembly plant would be closed in October 2006. In June 2008, this site was sold to Jacoby Development, Inc. for redevelopment (Fig. 34, 35, 36). Jacoby bought this 122-acre site for 40.3 million dollars, about 330,300 per acre. The Jacoby's vision of this site is a mixed-use aerotropolis for work and play—a complex of offices, retail, and entertainment (Fig. 31).

Jacoby's aerotroplis plan is a good idea to activate this site, but it ignores the industrial legacy and contamination problem on the site that makes this post-industrial site unique from all the other places.

Figure 31: Aerotropolis Development at Atlanta Hartsfield

Source: Image from http://www.skyscrapercity.com

On May 12, 2012, German auto maker Porsche announced it would build its new $100 million American Headquarter in this aerotropolis (Fig. 32). Its North America headquarters had been located in Sandy Springs, GA for 13 years. The new American headquarters will be mostly for sales and financials rather than manufacturing. It will include a technical service, a training center, a leading-edge customer experience center, and a 1.6 mile test driving circuit (Fig. 33). The Porsche American headquarters are thought of as the keystone of the development of this aerotropolis.

Figure 32: Rendering Image of Porsche New HQ Building

Source: Image from http://www.youtube.com

Figure 33: Porsche's Testing Drive Circuit Plan

Source: Image from http://www.autoweek.com

Figure 34: Atlanta Ford Assembly Plant in 2006
Source: Photograph from Google Earth

Figure 35: Atlanta Ford Assembly Plant in 2008
Source: Photograph from Google Earth

Figure 36: Atlanta Ford Assembly Plant in 2013
Source: Photograph from Google Earth

6.3 Analysis

Industrial Legacy

The Ford Assembly Plant was almost completely dismantled. The only physical industrial remains on the site are the footprints of plant buildings and abandoned railroad tracks. As the only two physical industrial remains, they are represented in the design. Another important industrial remnant is the assembly line (Fig. 37). Ford is not only an auto manufacturer but also promotes its own industrial history. Ford created the method of mass production—the assembly line—which is a significant symbol of Fordism. On such a site previously used as Ford Assembly Plant, the conceptual assembly line could be an industrial heritage.

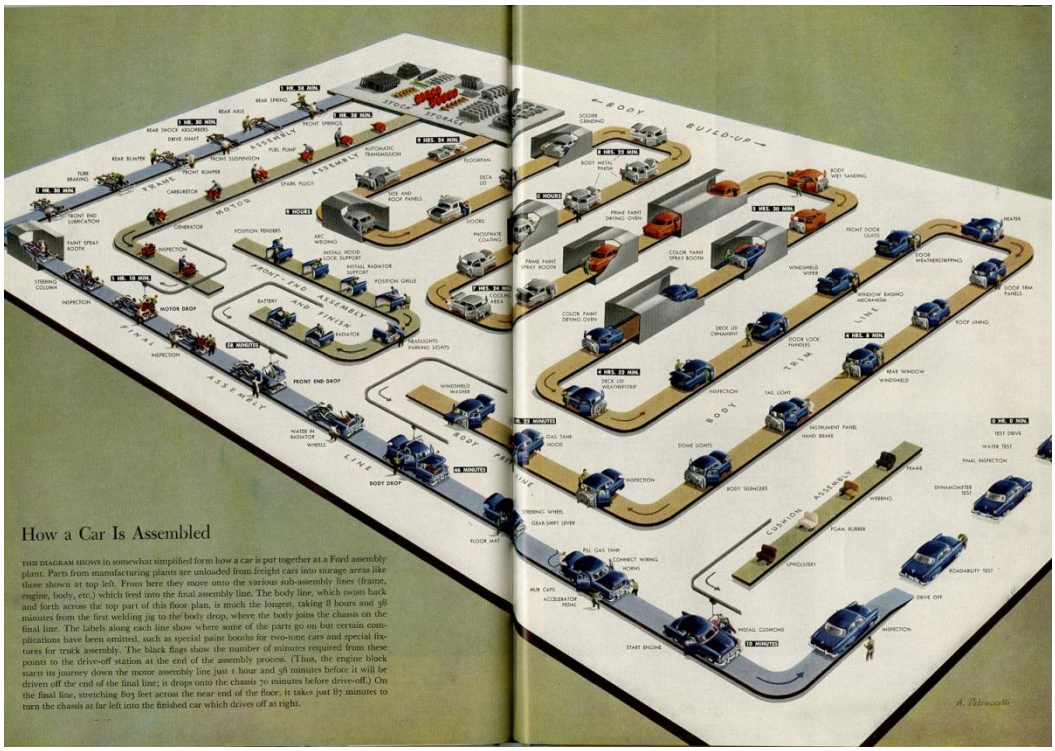


Figure 37: A Conceptual Diagram Showing the Car Assembly Process

Source: Image from http://iloverivolta.tumblr.com

Vitality

For the reason that it was previously included in the industrial zone with few residential uses, this site lacks strong connections with the city and the society after the close of the Ford Assembly Plant. In order to revitalize this site, it is important to build new connections.

The airport's adjacency is a chance for the design to build international connections. Being minutes from one of the world's busiest airports gives the site a global focus. The target group of the site can stretch not only into the Atlanta area, but also from Seattle to Shanghai. The aerotropolis plan attempts to develop this area into an airport-centric prosperous district in the south side of Atlanta. The Porsche HQ is a keystone in this plan to absorb global capital.

The adjacent airport also provides a unique landscape to the site. It will be possible to experience airplanes' taking-off and landing from the site. As the only place in Atlanta where people can have a close look at the airport landscape, this site will also create a strong connection with the city.

Besides, this site is also the only urban park in this old industrial zone which means it can also establish a relationship with the surrounding neighborhoods. The neighborhoods can use this park for rest, recreation, and sports in their daily life. Providing connections from the neighborhoods to the site will be a critical part of the design.

The most important thing is this site is not a simply urban park but a mixed-use area with a lot of work-play facilities such as restaurants, shops, and markets. This will attract not only neighborhoods and people in Atlanta, but also people from nearby cities and

even tourists from the airport.

Soil Contamination and Noise Pollution

A big issue of the airport is noise. Above 65 decibel average day-night level (DNL), uses are limited. Residences, lodging, and schools are not allowed, and hospitals and churches must have sound proofing. Agriculture, manufacturing, sales of machinery and building materials, and parking are permitted up to 85 dB DNL. The noise level on the site is between 65 DNL to 75 DNL (Fig. 38, 39). Two choices are available to solve this issue. One is to reduce the noise by building infrastructure or using sound proofing materials; the other one is to limit land use.

This site has been deemed a brownfield (CQGRD, 2011). But there has been no study showing contaminants on the site explicitly. It is probable that benzene, a carcinogen, may be present in soils due to previous underground motor fuel storage (CQGRD, 2011). In order to maintain health safety and welfare standards direct contact with potentially contaminated soil will be forbidden in this design solution.

A mixed-use development conceptual master plan is proposed to solve the problems on the site (Fig. 40, 41).

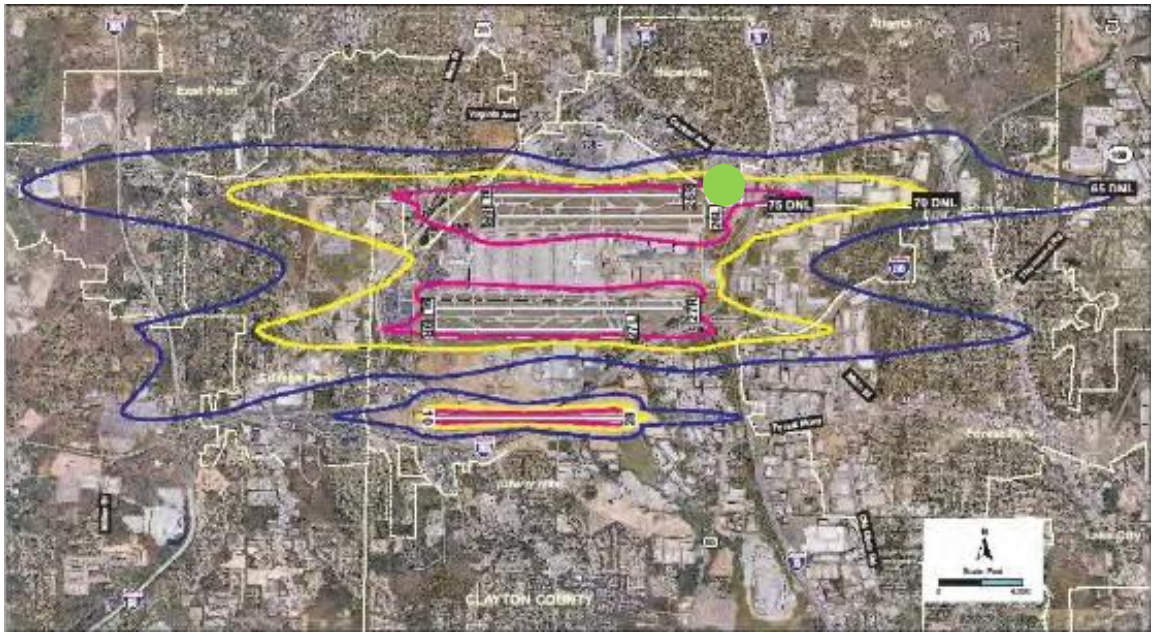


Figure 38: 2007 Noise Contours

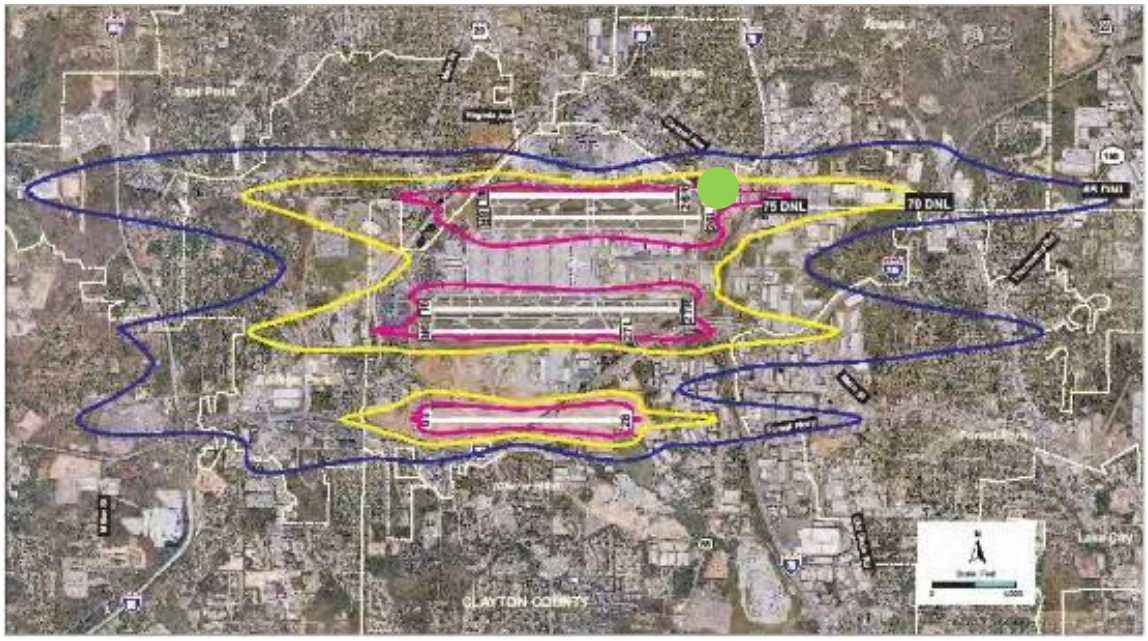


Figure 39: 2012 Noise Contours

Source: Figure 38, 39 from Aerotropolis Atlanta Brownfield Redevelopment Health Impact Assessment Report

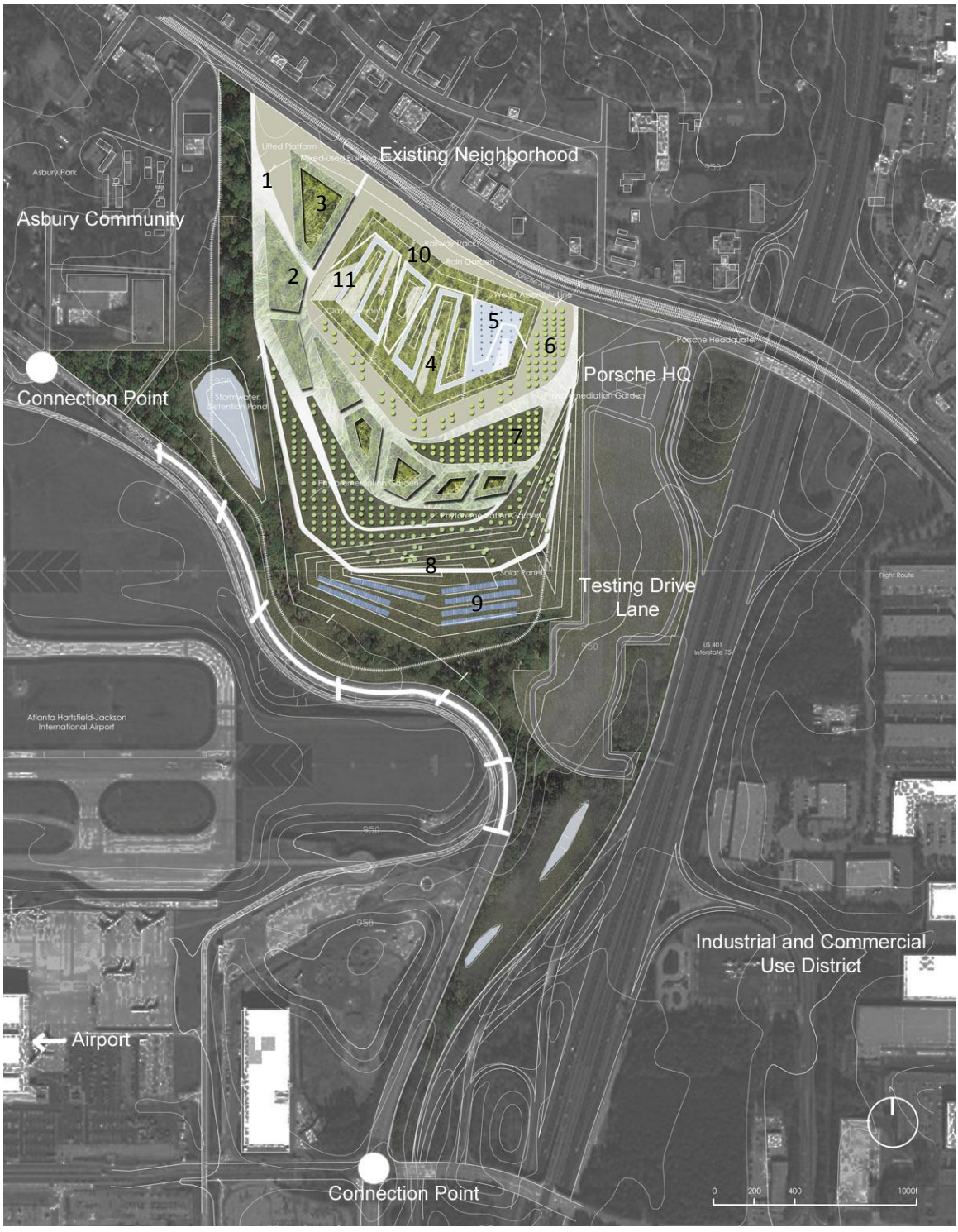


Figure 40: Master Plan

1. Shadow Platform 2. Mixed-Use Building 3. Building Yard 4. Green Assembly Line 5. Big Pond 6. Tree Plaza 7. Phytoremediation Garden 8. Mount 9. Solar Energy Panel 10. Railway Track Bridge 11. Playground

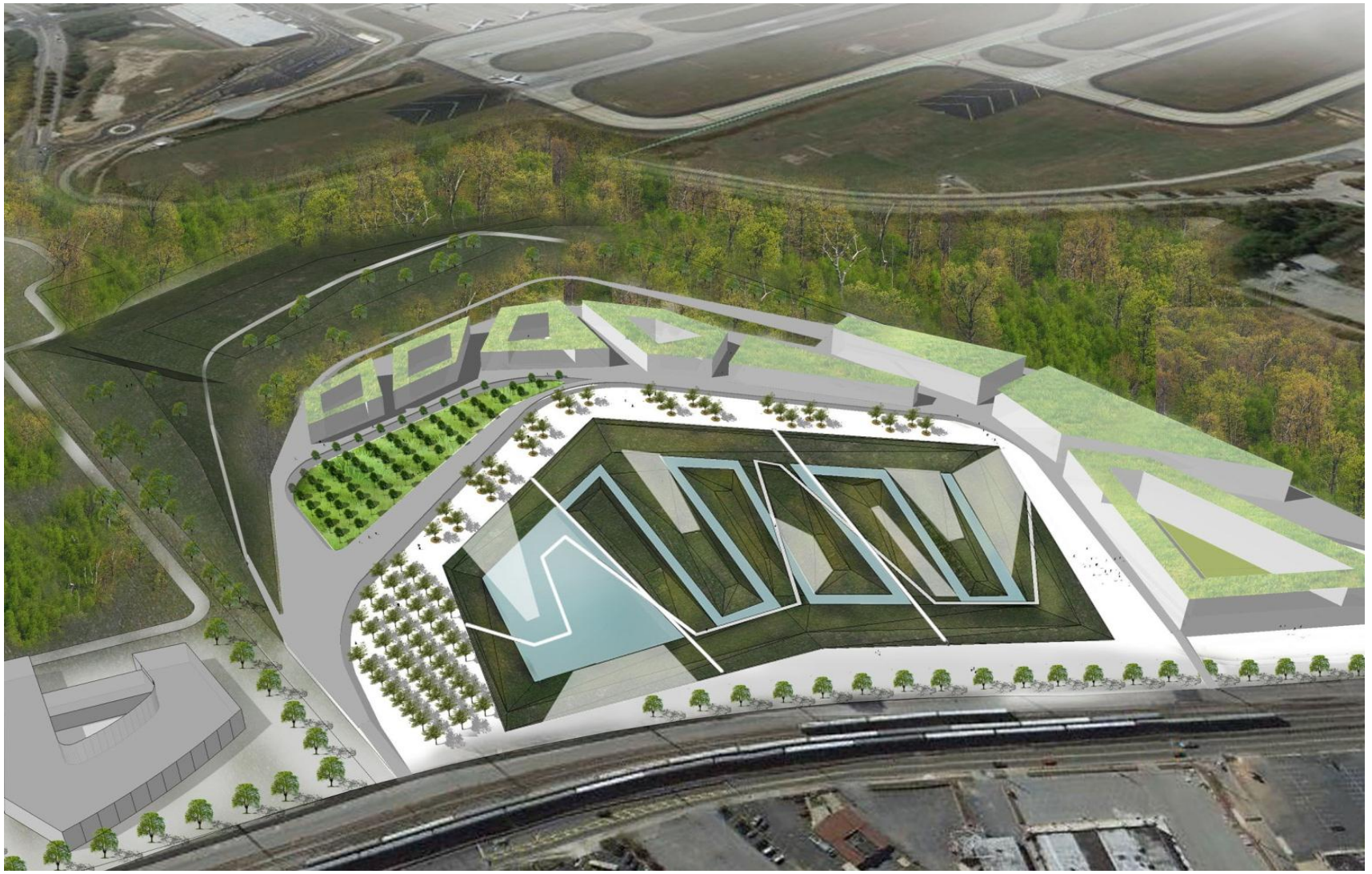


Figure 41: Bird’s Eye View

6.4 Program

Site Amenities for the Public: Green Assembly Line

The Ford Assembly Line, which was an important symbol of the industrial history, is metamorphosed into an earthwork, a swale with landform, which is called a "Green Assembly Line." The form of this swale comes from the form of the Ford Assembly Line (Fig. 42). In the industrial era, automobiles went on the assembly line and had parts put together. In this Green Assembly Line, rainwater will collect from the vegetated landform, flow along the slope, and converge in the swale. Rainwater flows in the channel from north to south, and it goes into a big pond at the end. Fountains are installed in the pond based on the footprint grid. This rainwater collection process is a metaphor of the industrial assembly process—coming together and finally comprising a big product. The length of the water swale reminds people of the long assembly line existed on the site before (Fig. 43, 44, 45). Similar to Plaza Metallica in Duisburg Nord Landscape Park, this green assembly line makes the disappeared automobile assembly line continue to live in a new way. It is a connection of the past and future. The bridges on the green assembly line make this area accessible, and the activity platforms provide spaces for recreations in this meadow area. The playgrounds provide spaces for activities and also make the water accessible (Fig. 46).

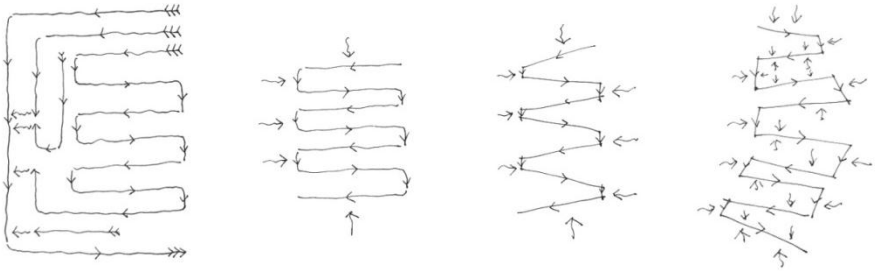


Figure 42: the Form of Green Assembly Line Changing from the Auto Assembly Line

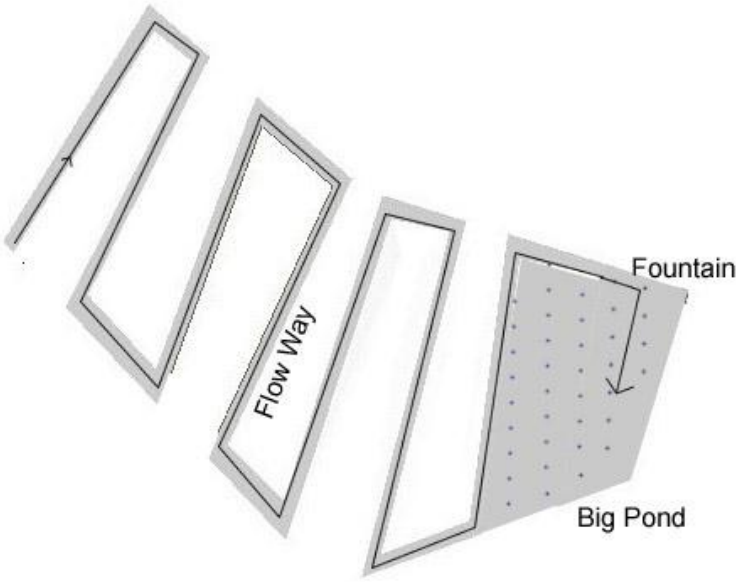


Figure 43: Form of the Green Assembly Line Swale

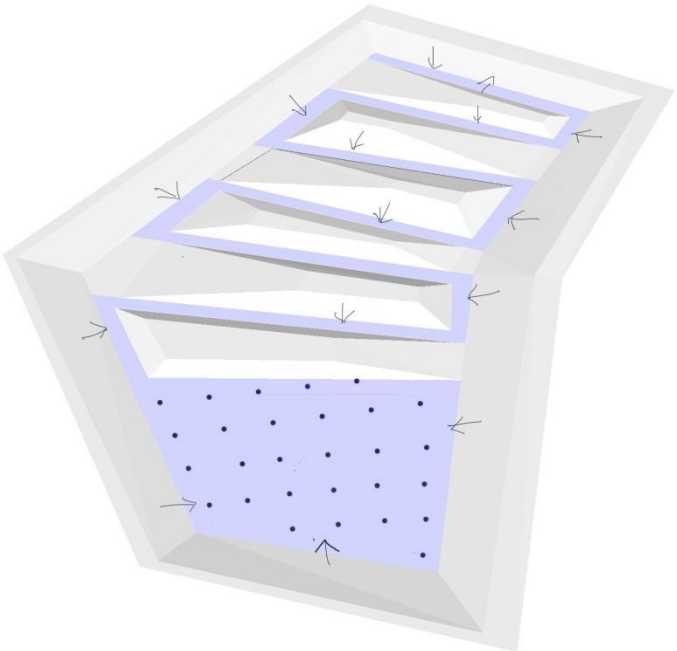
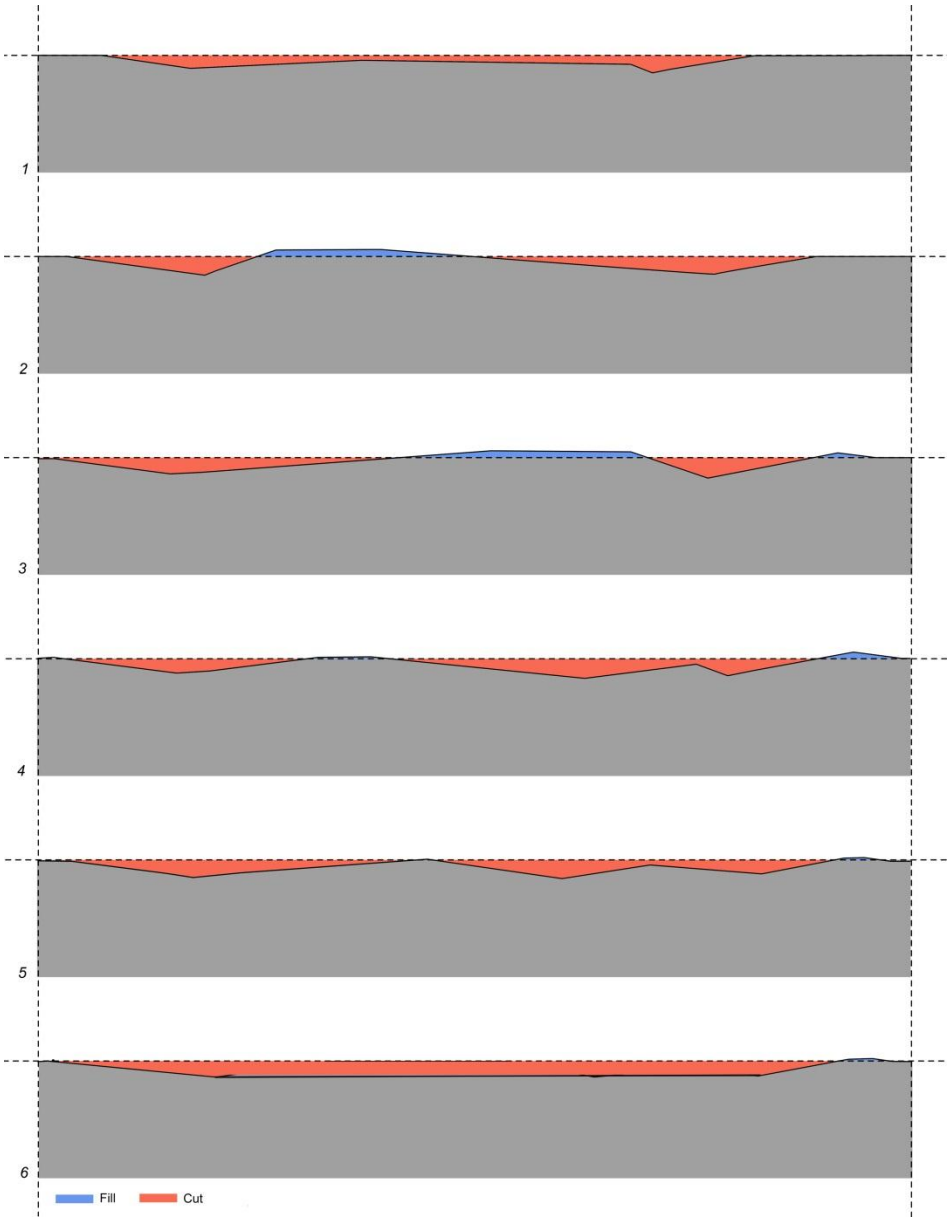


Figure 44: Model of the Green Assembly Line



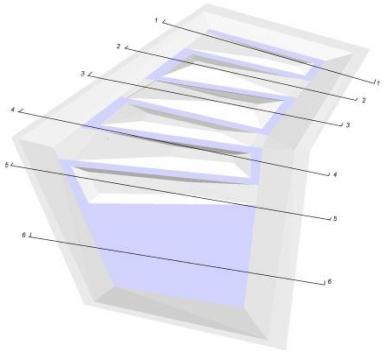


Figure 45: Cut and Fill in the Green Assembly Line Area

Figure 46: View of the Railway Track Bridges in the Green Assembly Line Area

Railway Tracks and Footprints

The only two physical industrial remains railway tracks and footprints are integrated in the design. The obsolete railway tracks are dismantled to build the bridges on the Green Assembly Line (Fig. 47). The form of railways inspired the form of the shadow platform. The footprints of the demolished buildings are left on the site (Fig. 48). Hundreds of trees are installed in the footprints according to the old grids (Fig. 49, 50). They are a description of the order of the machine past.

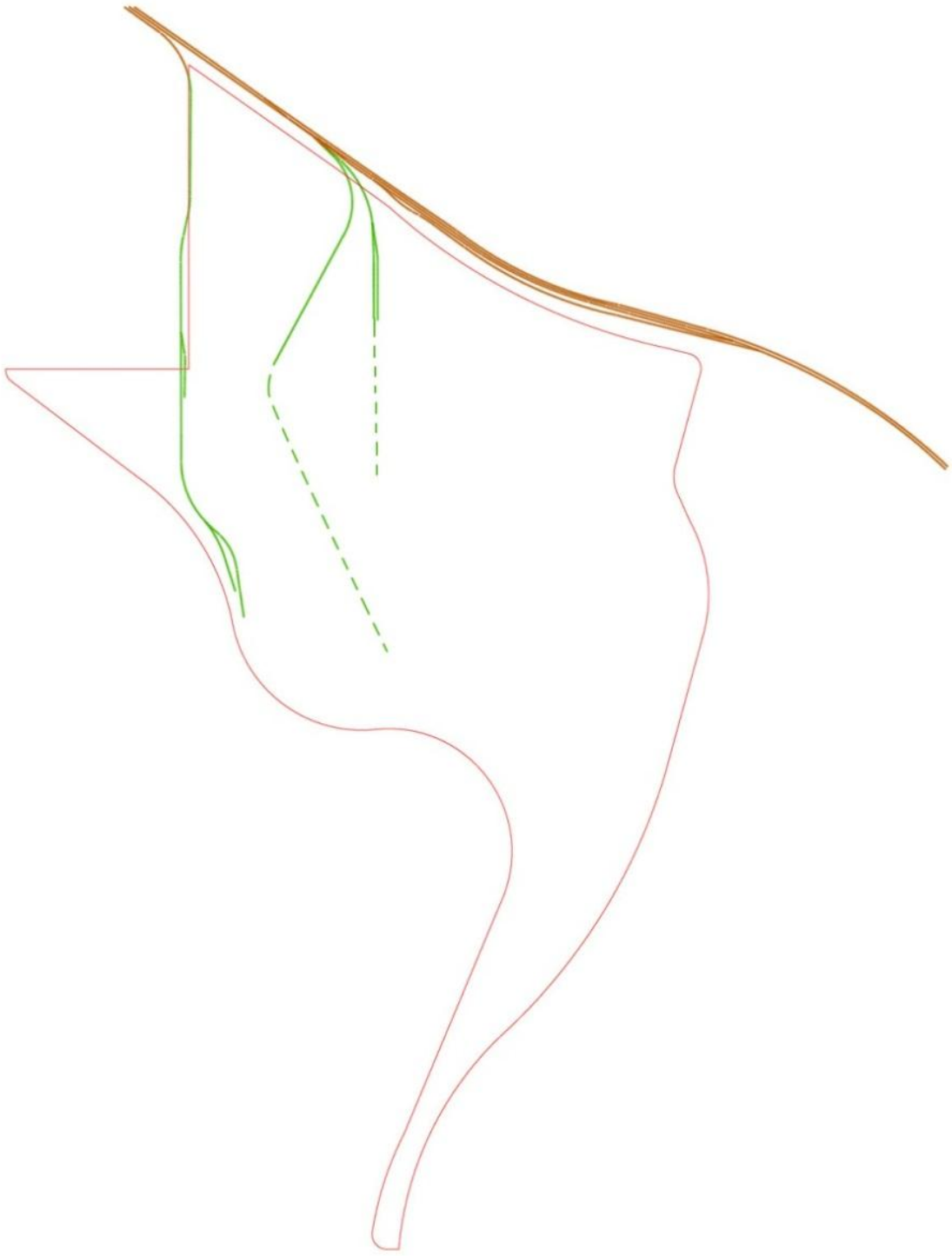


Figure 47: Railway Tracks (Green solid lines are the remained railways that connected to the city railway system shown in red lines. Dot lines are the disappeared railways.)

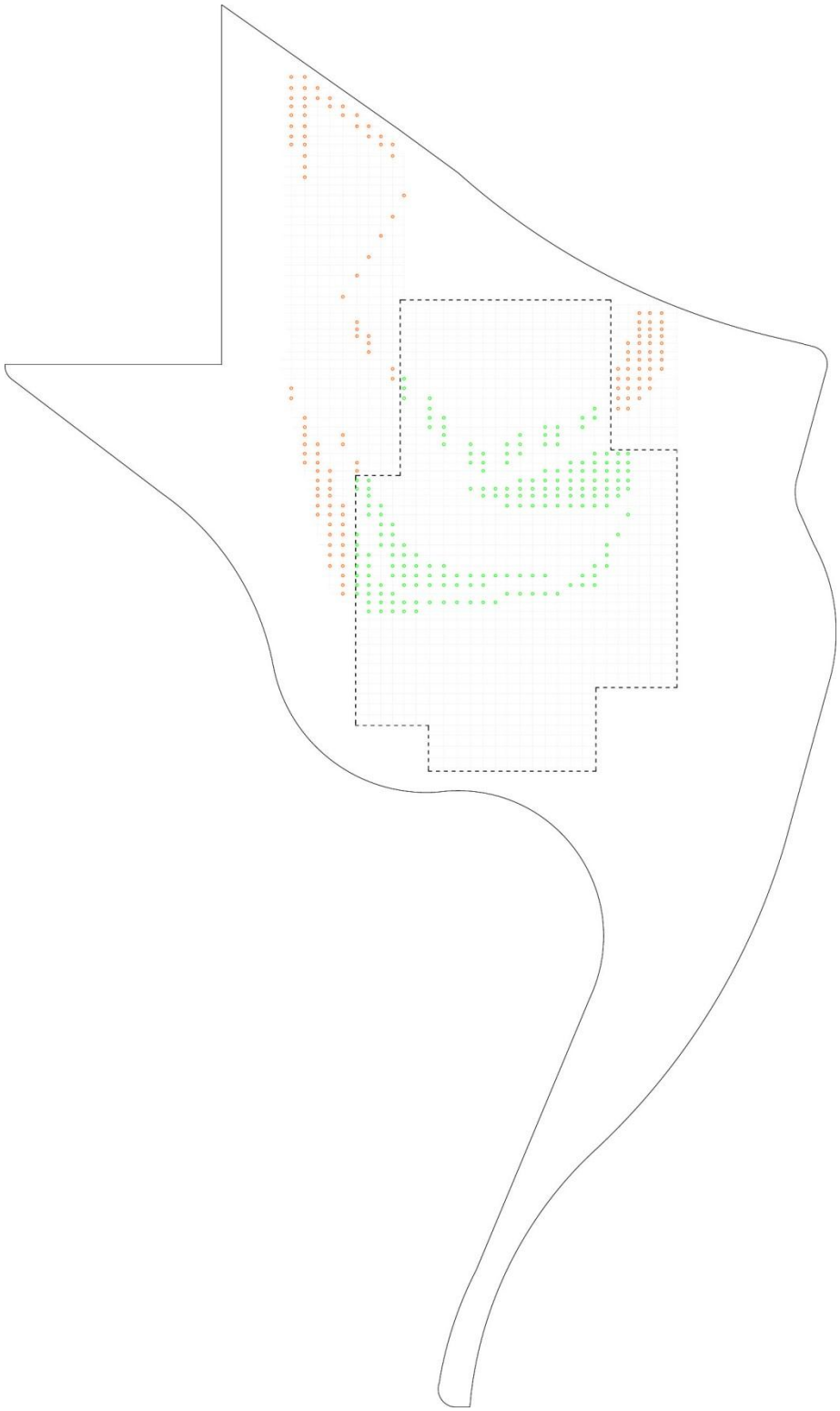


Figure 48: Footprint (Dots are trees installed according to the expanded footprint grids left by the Ford Plant. The dismantled plant is in the area edged by black dot lines. The species of trees inside the footprint and outside are different.)

Figure 49: View of the Tree Plaza

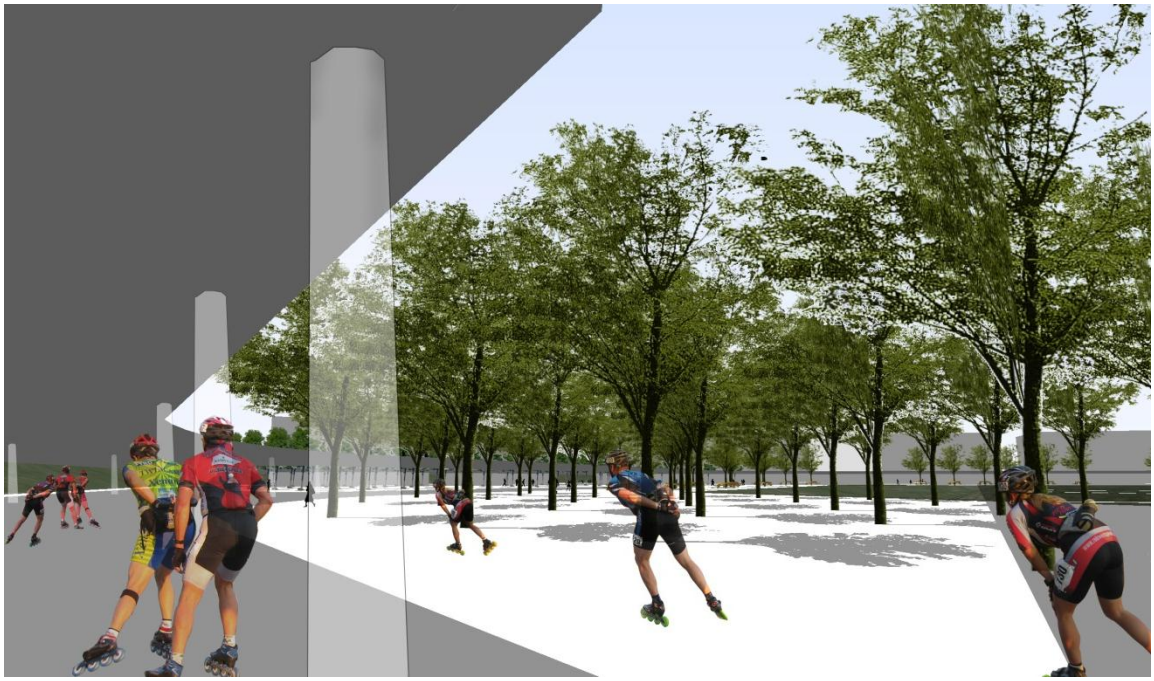


Figure 50: View of the Hardscape Area

Mixed-use Buildings

Mixed-use buildings are built on the site to revitalize this area. These buildings are proposed to be a complex of offices, retail, entertainment, and cultural centers like concerts and art shows. The target population is not only the adjacent communities, but also the international visitors. The design attempts to utilize the adjacency of Hartsfield Atlanta International Airport to bring opportunities to the site. The site works as a center to attract investment for future development around the site and transforms this blighted south end of the City of Atlanta into a vibrant area of residential, education, cultural, and business uses. Simple shapes, straight lines, and white color of these buildings are a part of the post-industrial language of this site.

Take-off Mountain

The adjacent airport is a special landscape resource for the site. Standing on the mount on the south of the site, visitors can have an overlook of the airport. A flight lane goes above the site. This lane is projected onto the mount as a path. On this path, visitors can have a view of planes taking off or landing overhead. Solar Energy Panels are installed on the south slope of the mount (Fig. 51). Take-off Mountain exhibits "hugeness".

Figure 51: View of the Mount Area

Shadow Platform

The huge shadow platform is elevated one story above the ground plane. Its duel purposes are for circulation and to create a new outdoor space. Buildings for offices, entertainment, commercial, and cultural uses are surrounded by and connected to the platform. The form of this platform comes from the lines of railways to create a type of industrial language. This shadow platform enriches visitors' experience about space by providing both protected and exposed spaces. The spaces on the platform are sunny while those under the platform are shaded. These different and interesting spaces are for different uses, and they also provide different landscape views. Some are big spaces suitable for gathering, while some are linear spaces for transportation. The spaces above the platform are full of sunshine, while the spaces under the platform are of shadow (Fig.

52, 53). Ramps connect the platform and ground. It is easy to go up and down the platform by the outside ramps or building elevators. The simple form and straight lines are part of the industrial language, and its large size celebrates the industrial sublime (Fig. 54).

Figure 52: View of a Concert under the Shadow platform

Figure 53: View of the Path on the Platform

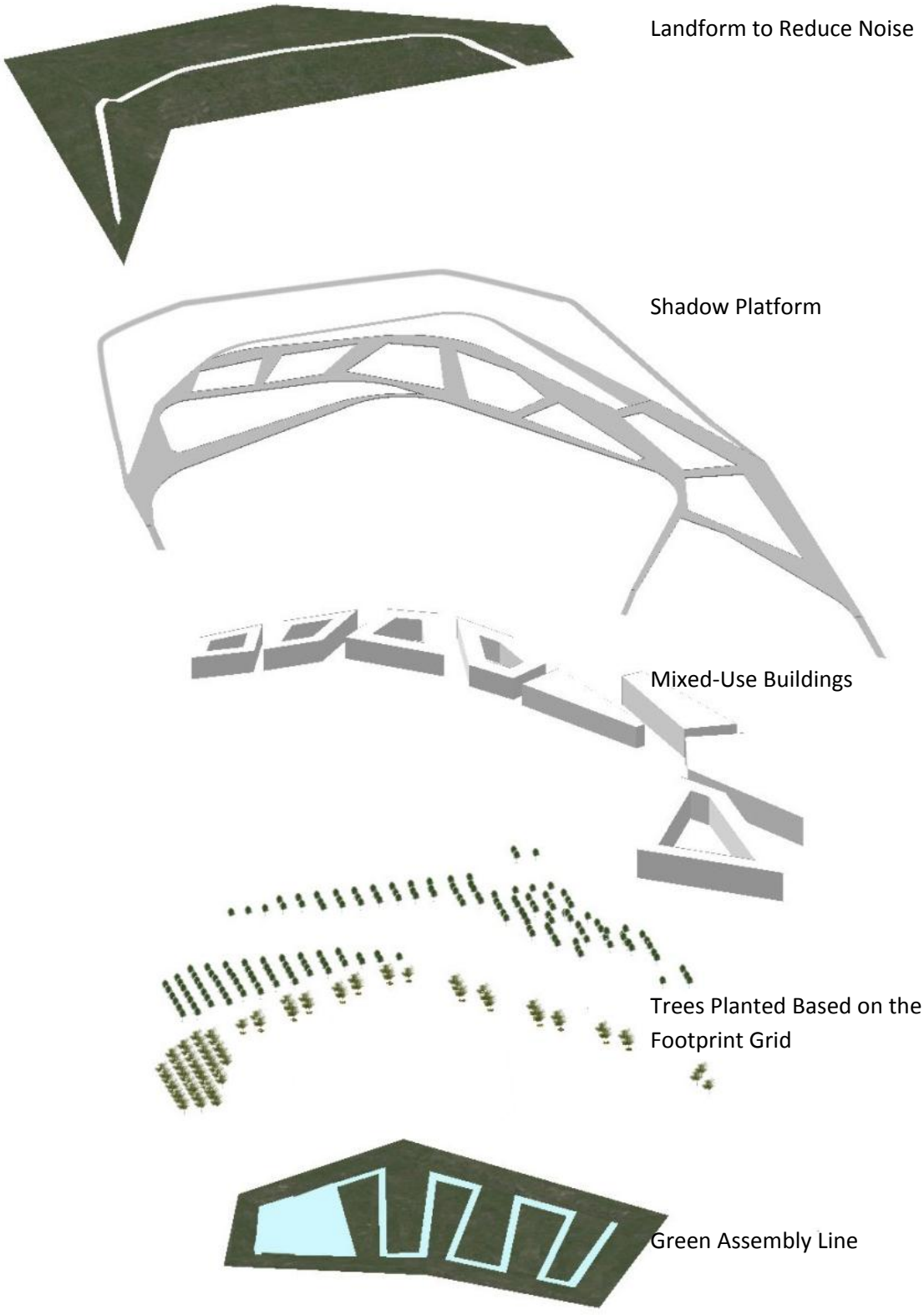


Figure 54: Layers of the Design

6.5 Environmental Treatment

Two main environmental threats are noise and the industrial contaminated soil. Noise comes from the airport and highways; the Porsche race driving track will also produce noise. In order to solve this problem, a mount is piled on the southeast to serve as a barrier wall to reduce noise. Considering the flight safety, buildings are 40 to 80 feet high. In order to reduce noise efficiently, the highest point of the mount is about 70 feet above the ground. For several buildings that require a quiet environment, for instance, offices, soundproofing materials would be used in the construction of the buildings.

Because there is no study showing specific contaminants in the soil, for this design the only safe way is to seal the contaminated soil. The contaminated soil on the site would be removed to build the landform of the take-off mount. The mount would be capped with clean soil on the surface. Vegetation would be grown on the top. Some would be phytoremediation plants to test their cleanup ability. People's use on the mount would be limited. The main activity is hiking or bicycling, but people would not be encouraged to stop for a long period of time. The best way to decide suitable phytoremediators is to analyze the soil sample first to see the types of contaminants in the soil. After the removal of contaminated soil, except the mount, this design assumes that the rest of the site is safe for daily use. The Green Assembly Line would be covered with clean soil and groundcover plants to harvest rainwater. Bridges built with the obsolete railway tracks make this area accessible. The rainwater management system is visible and open to the public (Fig. 55).

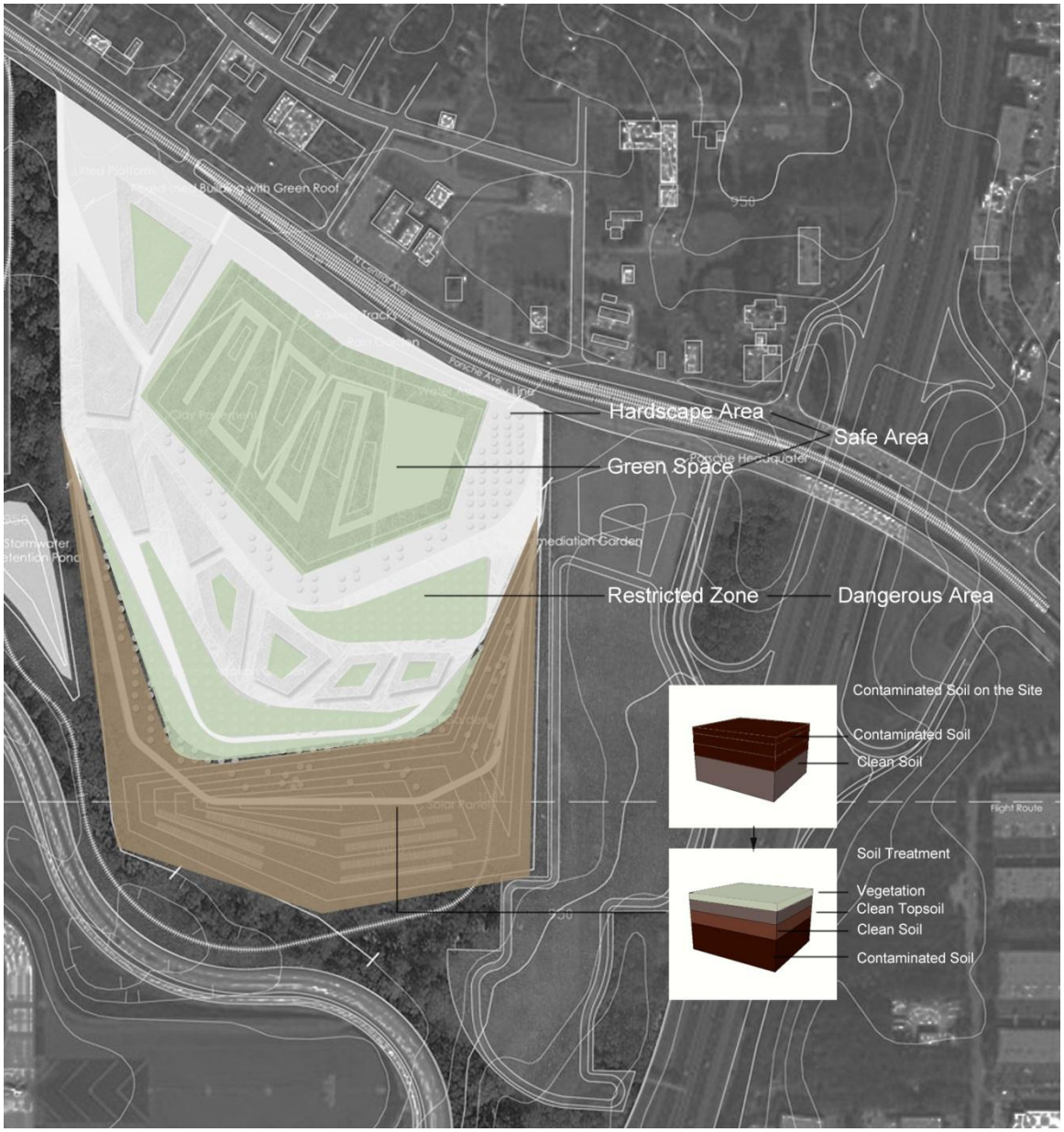


Figure 55: Contaminated Soil Treatment

CHAPTER SEVEN

CONCLUSION

This thesis was an exploration of the landscape architecture approaches toward the redevelopment of post-industrial sites. The objective was to understand the causes of post-industrial sites, find out their issues, and demonstrate the ability of landscape architecture to create a holistic approach in the design of post-industrial sites.

This thesis demonstrated the significance of landscape architecture approaches to solve the complex issues of post-industrial sites—it provides a framework to preserve the industrial legacy, vitalize the abandoned site, and clean up the contamination. However, landscape architecture cannot provide all the answers.

The biggest challenge in this thesis is that nearly all the assembly buildings and industrial structures are removed from the project site. The first step is to find out the industrial legacy left on the site. So instead of the physical structures and buildings, industrial process, that is the assembly line, is preserved in the design proposal. Besides, trees are installed in the footprint grids to recall people's memory of a big assembly plant.

Post-industrial sites generated from reindustrialization and social change. The main issues on the post-industrial sites are the industrial remains, the loss of vitality, and pollution. Landscape architecture is an approach that can connect economics, ecology, society, and aesthetics together and put a unique insight into the redevelopment of post-

industrial sites. The design-oriented landscape architecture influenced by assorted aesthetic values provides distinctive views of the industrial remains on the post-industrial sites and creates a special language to integrate nature and industry for post-industrial sites.

The future research opportunities are listed below:

- To survey the types of contaminants on the site and select specific clean-up technologies,
- To make thorough inventory and analysis of the site in order to understand the real social, economic, ecological, and aesthetic requirements,
- To study the projects which have similar conditions to the Ford site—without physical industrial remains, large area, on the edge of a city, adjacent to an busy airport,
- To absorb the ideas about historical preservation and apply them in the development of post-industrial sites.

REFERENCES

Anne Power. “Learning from Innovations in Weak Market Cities in Europe and the United States.” sticerd.lse.ac.uk. http://sticerd.lse.ac.uk/case/_new/research/weakmarketcities/default.asp (accessed July 1st, 2013)

Ballesteros, Mario. *Verb Crisis*. Verb. Barcelona ; New York: Actar, 2008.

Bélanger, Pierre. "Landscape as Infrastructure." *Landscape journal* 28, no. 1 (2009): 79-95.

Bennett, Michael, and David W. Teague. *The Nature of Cities : Ecocriticism and Urban Environments*. Tucson: University of Arizona Press, 1999.

Berger, Alan. *Drosscape : Wasting Land in Urban America*. 1st ed. New York: Princeton Architectural Press, 2006.

Center for Quality Growth and Regional Development at the Georgia Institute of Technology. “Aerotropolis Atlanta Brownfield Redevelopment: Health Impact Assessment.” cqgrd.gatech.edu. http://www.cqgrd.gatech.edu/sites/files/cqgrd/files/_AerotropolisHIA_Report_Final_Web.pdf (accessed March 1, 2013)

Cowie, Jefferson, and Joseph Heathcott. *Beyond the Ruins : The Meanings of Deindustrialization*. Ithaca: ILR Press, 2003.

Czerniak, Julia. Formerly Urban : Projecting Rust Belt Futures. New City Books. First edition. ed. Syracuse, New York: Syracuse University School of Architecture and Princeton Architectural Press, 2013.

Eckardt C. Beck. "The Love Canal Tragedy." epa.gov. http://www.epa.gov/history/topics/lovecanal/01.html (accessed March 1, 2013).

Evergreen. "Evergreen at the Brick Works: Final Master Plan." evergreen.ca. http://ebw.evergreen.ca/files/EBW-Master-Plan.pdf (accessed March 1, 2013).

Evergreen. "Master Plan Updated: Evergreen Brick Works." evergreen.ca. http://ebw.evergreen.ca/files/EBW-Master-Plan-Update.pdf (accessed March 1, 2013).

Field Operations. "Fresh Kills: Lifescape." nyc.gov. http://www.nyc.gov/html/dcp/pdf/fkl/dmp.pdf (accessed March 1, 2013).

Finkelpearl, Tom, and Vito Acconci. "Interview: Mel Chin on Revival Field." *Dialogues in Public Art : Interviews with Vito Acconci, John Ahearn*. Cambridge, Mass: MIT Press, 2000.

Haas, Tigran. *New Urbanism and Beyond : Designing Cities for the Future*. New York: Rizzoli, 2008.

Hemmings, Sarah, and Martin Kagel. "Memory Gardens: Aesthetic Education and Political Emancipation in the Landschaftspark Duisburg-Nord." *German Studies Review* 33, no. 2 (2010): 243-61.

Kirkwood, Niall. *Manufactured Sites : Rethinking the Post-Industrial Landscape*. London ; New York: Spon Press, 2001.

Landscraftpark Duisburg-Nord, http://www.landschaftspark.de/startseite

Latz + Partners. " Landschaftspark Duisburg Nord—Duisburg, Germany." designobserver.com. http://designobserver.com/media/pdf/Landschaftspar_405.pdf (accessed March 1, 2013).

Lerup, Lars. *After the City*. Cambridge, Mass.: MIT Press, 2000.

N.Y. Times News Service. "Seattle Turns Gas Works into Park with Still Life of Past." *Sarasota Herald-Tribune*, September 1, 1975.

Nye, David E. *American Technological Sublime*. Cambridge, Mass.: MIT Press, 1994.

Saunders, William S., Patrick M. Condon, Gary R. Hilderbrand, and Elizabeth K. Meyer. *Richard Haag : Bloedel Reserve and Gas Works Park*. Landscape Views. New York: Princeton Architectural Press, with the Harvard University Graduate School of Design, 1998.

Seavoy, Ronald E. *An Economic History of the United States : From 1607 to the Present*. New York: Routledge, 2006.

Shapiro, Gary, and Robert Smithson. *Earthwards : Robert Smithson and Art after Babel*. Berkeley: University of California Press, 1995.

Short, John R. *Urban Theory : A Critical Assessment*. Basingstoke England ; New York: Palgrave Macmillan, 2006.

Smithson, Robert, and Nancy Holt. *The Writings of Robert Smithson : Essays with Illustrations*. New York: New York University Press, 1979.

Swaffield, Simon R. *Theory in Landscape Architecture : A Reader*. Penn Studies in Landscape Architecture. Philadelphia: University of Pennsylvania Press, 2002.

Tsai, E., R. Smithson, C.H. Butler, T.E. Crow, A. Alberro, Museum of Contemporary Art, Dallas Museum of Art, M. Roth, and Whitney Museum of American Art. *Robert Smithson*. University of California Press, 2004.

U.S. Environmental Protection Agency. "Basic Information." epa.gov. http://www.epa.gov/superfund/about.htm (accessed March 1, 2013).

U.S. Environmental Protection Agency. "Brownfields Definition." epa.gov. http://www.epa.gov/swerosps/bf/overview/glossary.htm (accessed March 1, 2013).

Weilacher, Udo. *Between Landscape Architecture and Land Art*. Basel ; Boston: Birkhäuser, 1999.

Weilacher, Udo. *Syntax of Landscape : The Landscape Architecture of Peter Latz and Partners*. English ed. Basel ; Boston, 2008.