Garbage On The Wharf

a transfer station for the city of boston

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Submitted to the Department of Architecture in partial fulfillment of the requirements of the degree of Master of Architecture at the Massachusetts Institute of Technology.

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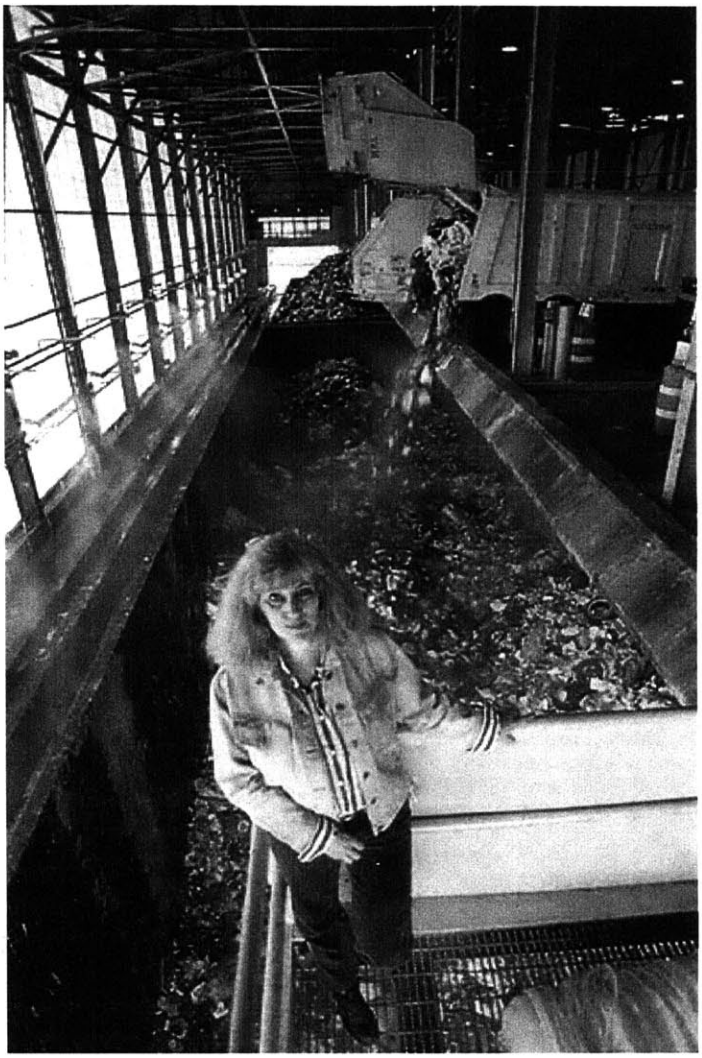

I thank my thesis readers for their willingness to meet with me often and at length; their encouragement and criticism helped form a thesis out of my discursive thoughts:

Niall Kirkwood, Associate Professor of Landscape Architecture,
Harvard University Graduate School of Design

Wellington Reiter, Associate Professor of the Practice of Architecture

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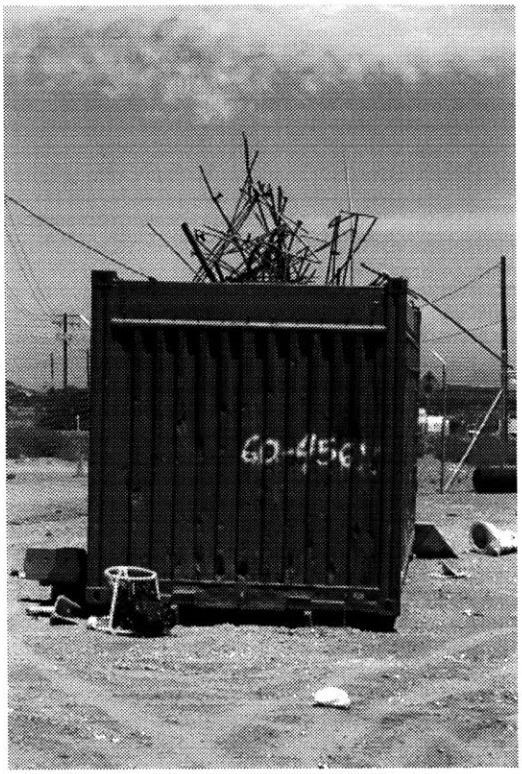
Perhaps because they address processes at the expense of space or have many "conditions" limiting architectural design freedom, infrastructure and particularly the infrastructure of waste, are commonly neglected in architectural discourse. This thesis aims at revealing the invisible nature of the waste infrastructure so that through the "architecture of waste" sociological issues regarding use, consumption and recycling can be physically addressed. By bringing the waste infrastructure to the foreground, I hope to engage the academic world and the general public with this emerging real world structure. Today many recycling plants, water treatment plants, landfills, etc. are being constructed without reference to any architectural or landscape precedent. Waste processes and economies of scale wholly determine the form and size of these projects; most recycling plants are huge to allow for large furnaces to melt as much plastic at one time as possible. Through the design of each stage of the waste process, from disposal to decomposition or recycling, it is hoped that the level of design currently appropriated towards it will be raised. It is a goal of the thesis project to design a component of the infrastructure of waste, an infrastructure that appears to have evolved without direction. This thesis proposes the combination of a solid waste transfer station with a public park. To eliminate the stigma of waste treatment and removal pervasive in contemporary society, the central elements of this process should be visible and prominently located in the city. Proposing my transfer station in a highly public location, I hope to celebrate good design and building through a building type not normally given much thought.

Thesis Supervisor
Ellen Dunham-Jones, Associate Professor of Architecture



Nevertheless, we cannot throw anything away, since there no longer is an "away." As far as we can tell from our experience to date, although materials may change in form, they cannot disappear.

Kevin Lynch, *Wasting Away*

This project was furthered by funds received from the Marvin E. Goody Prize.

acknowledgements

The preliminary concepts for this work arose from discussions of my interests with Ellen Dunham-Jones and Peter Testa and continued through a summer tour of waste infrastructure sites. Special thanks to the other thesis students for their commeraderie during the semester.

None of this thesis would have happened without the love, support, friendship and encouragement of my wife, Dana. Thanks for joining me in my pursuit of this degree.

production assistance

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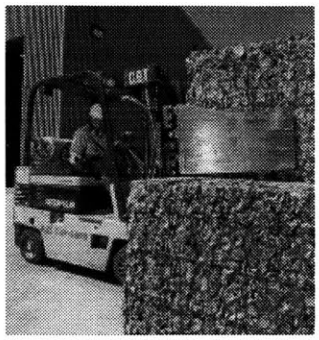
methodology and book making

My thesis design process seemed to be non-linear. One moment researching machines, the next drawing site plans, and the next revisiting ideas that were "solved" a week before. It is very difficult to give an accurate depiction of the design process of a thesis project, and one is not attempted here. I have attempted to represent a design proposal that on first glance seems absurd, the location of a solid waste transfer station in the heart of the City of Boston, *and* in the most sacred of neighborhoods, the North End. To simply present the project as designed might cause one to dismiss it as just a design project and not view it as an example of a rethinking of prevailing contemporary attitudes towards waste.

The ensuing book is organized loosely around a topic, waste infrastructure, that is investigated from the global to the local. Starting with background information on current thoughts on waste nationwide and proceeding through an investigation of the City of Boston's place in relation to those ideas, the contemporary and local condition is defined that the thesis is to react against and work within. Once this condition is identified, the design project is first introduced with the site conditions and attitude. The design of the transfer station itself follows along with a description of some of its components. Finally, a summary is drawn and further background information is related in an appendix.

The resulting book is not intended to display a finished project, but simply to introduce a design proposal that begins to concretize a new attitude towards waste, wasting and infrastructure itself.



baled aluminum cans ready for shipment

contents

the author at the corner of Process Drive and Reclamation Way

glossary

Dump — a site where mixed wastes are indiscriminately deposited without controls or regard to the protection of the environment. dumps are now illegal.

Garbage — solid waste consisting of animal and vegetable waste materials resulting from the handling, preparation, cooking, and consumption of food, including waste materials from markets, storage facilities, handling and sale of produce, and other food products. generally defined as wet food waste.

Incineration — an engineered process involving burning or combustion to thermally degrade waste materials.

Infrastructure — a substructure or underlying foundation; those facilities upon which a system or society depends.

Process — any method, system, or other means designated to change the physical form or chemical content of solid wastes.

Recycle — to separate a given material from waste and process it so that it can be used again in a form similar to its original use.

Sanitary Landfill — an engineered method of disposing of solid wastes on land in a manner that protects health and the environment. waste is spread in thin layers, compacted to the smallest practical volume, and covered with soil or other suitable material.

Solid wastes — any of a wide variety of solid materials, as well as some liquids in containers, which are discarded or rejected as being spent, useless, worthless, or in excess.

Transfer station — a place or facility where wastes are transferred from smaller collection vehicles (e.g. compactor trucks) into large transport vehicles (e.g. over-the-road and off-road tractor trailers, railroad gondola cars, or barges) for movement to disposal areas, usually landfills.

Trash — wastes that usually do not include food wastes but may include other organic materials, such as plant trimmings. generally defined as dry waste material.

for a more comprehensive glossary of pertinent terms please consult the glossary in Appendix A.
from terms defined in Handbook of Solid Waste Management

stigma

Wasting is a necessary life condition. "Blocking [an] organism's elimination of waste will destroy life as effectively as cutting off the waster's food, air, or water; and accumulated wastes can destroy a community."[1] Why then do we know so little about our waste infrastructure and processes. It is only when the toilet backs up or the trash pickup does not occur that we pay heed to our waste infrastructure. We rarely know where the transfer station, landfill, incinerator or sewage treatment plant that handles our waste is located unless we unfortunately live near it. Waste is a word with a stigma attached to it. Burdened with the stigma that accompanies all waste, the garbage truck and sanitation worker are seen as little more than necessary elements of an out-of sight, out-of-mind industry. One need look no further than a web search of the phrase "garbage truck" to see how pervasive and perpetual this stigma is. (Of the top sixty matches to the phrase, ten dealt with newspaper headlines dealing with accidents involving *negligent* garbage trucks with pedestrians or other *normal, upstanding* people.)

Santa look-alike killed in collision with garbage truck

http://lubbockonline.com/news/122196/santa.htm
located via web search for "garbage truck"

built-in obsolescence

Surprisingly, the stigma associated with waste has not caused Americans to waste less. If anything, we waste more because we do not want to handle anything that could be dirty or unclean; we want the packaging of newness, even if the contents inside cannot be spoiled. (e.g. software, CD's, toys, etc.) Postmodern late capitalism thrives on packaging and newness. Designing for prolonged use and/or multiple use is inconsistent with consumerist society. For example, Gillette recently introduced new disposable blades that contained an "indicator strip" to let the shaver know when a blade becomes dull because marketing studies showed that users kept their blades for too long. Even products that will last for years are given the illusion of a short lifespan by being labeled "upgradable" or given a lease time. The three-year old computer that I am using to write and layout this thesis is already obsolete, slow by today's standards and worth one quarter its selling price. Even though it functions, I am told I need to upgrade some of the parts in order to run the latest software. Keeping and creating demand is important in today's society, and that is difficult to do with long lasting products or products that have multiple uses or lifespans.

People never want to look at the present; people live in the rearview mirror because it's safer, they've been there before, they feel comfort. ...The present is an area that people have always avoided throughout human history - the utopias of mankind are all rearview-mirror images of the preceding age.

Marshall McLuhan

[1] Kevin Lynch, **Wasting Away,** p. 43.

the problem

A problem arises because society's attitude towards waste as undesirable conflicts with its wasteful practices based on consumption. No one wants a waste infrastructure facility in their backyard, yet no one wants to change their buying/wasting habits either. The consequences of this impasse lead to the siting of landfills further out in the wilderness, and having them filling up at record rates. The problem of waste infrastructure has to do with conflict between individual habits versus the collective attitude regarding waste. To address this multifaceted problem it is necessary to know the components of the current waste infrastructure before one can begin to critique and evaluate how to proceed.

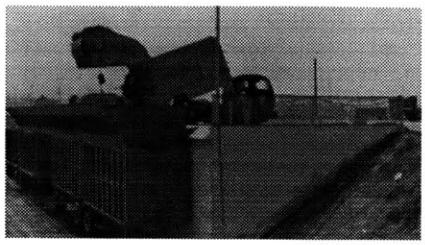
Waste infrastructure can be loosely divided into two groups: one dealing with wastewater (e.g. effluent from a toilet) and the other dealing with solid wastes (items put in a garbage can). The first group contains sewage treatment plants, bio-solid conversion facilities and millions of miles of sewer pipes. Among the solid waste infrastructure are garbage collection trucks, transfer stations, recycling plants, incinerators and landfills. This thesis focuses on solid waste infrastructure, specifically the design and urban impact of a transfer station. (An overview of some other elements of the two groups of waste infrastructure can be found in Appendix A)

In a society where essential food, shelter, and clothing are assured for most, and where the volume or material consumption is high, much of the anxiety that once focused on eating or keeping warm is transferred to moving the waste along. Garbage and trash removal become "difficult" public functions, apparently always on the edge of breakdown. What to do when the garbage trucks stop is a greater conscious worry than the cutting off of water, food, or electric power, even though the first two would have much more serious consequences, and the last in fact fails more often.

Kevin Lynch, **Wasting Away**

transfer station

A solid waste transfer station is, at minimum, a place (perhaps even an open lot) where undesirables are delivered and placed in another container for shipping to a final disposal site. Many self-haul or "U-dump it" lots are in essence transfer stations as citizens bring their garbage and items for disposal to a centralized collection point and place them in large dumpsters or directly in a transfer vehicle itself. These types of transfer stations have replaced the dumps of yesteryear where locals would go to drink coffee and discuss politics while getting rid of their garbage. Often, such residents might return home with a used set of golf clubs or a TV that did not work but only needed a new fuse. The old dump was more akin to a salvage yard than the rotting heap of refuse that we associate with dumps today.



transfer station

sanitary landfill

Today's dump, now designated a sanitary landfill, encompasses the realm of machines and the science of garbage. Landfills are usually located far from large residential areas and occupy great expanses of land. Here mounds of trash are dumped from garbage collection and transfer trucks, graded by bulldozers and other heavy equipment and then capped with a plastic liner to ensure that the decomposing garbage does not leach into the groundwater. As the garbage decomposes it produces methane gas, which can cause contamination of the site if it is not removed. Often, flares are placed along the rim of a landfill to burn off the gas on-site. Methane gas is one of the leading causes of ozone depletion but can be burned to generate electricity.

These landfills, devoid from most vegetation other than erosion controlling grasses, are not pleasant to see, smell, touch or hear. Yet they are the cheapest way to dispose of waste, and if operated correctly, one of the safest. Sanitary landfills are a necessary part of the waste infrastructure as a portion of all solid waste will eventually end up in a landfill, from incinerator ash to commingled municipal solid waste. What then is the relation of the transfer station to the landfill and why are transfer stations necessary if the trash ends up at the landfill whether or not a transfer station is used?

Spectacle Island, Boston's former landfill, in the Boston Harbor

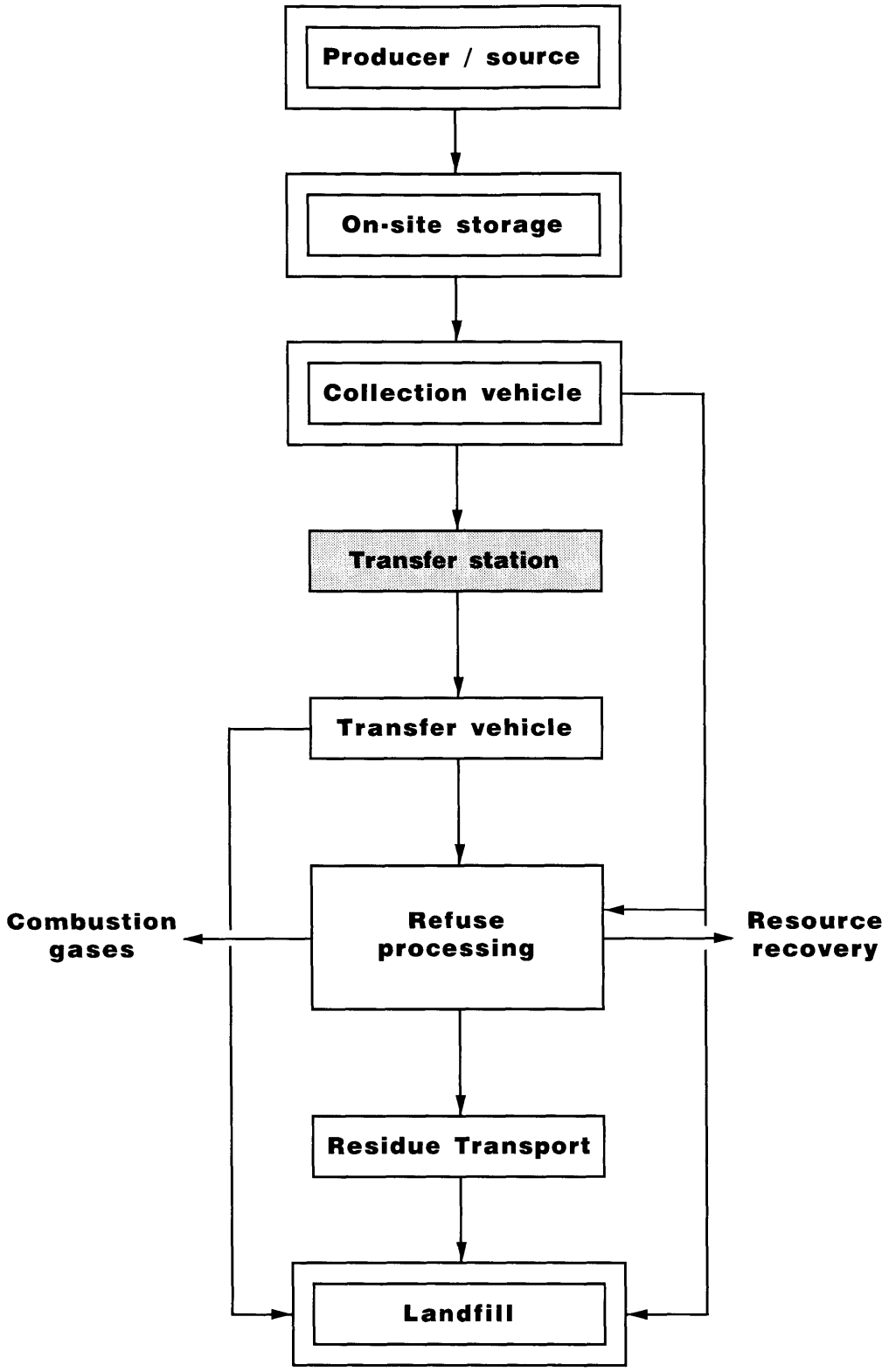


Figure 1 *Functional elements of a solid waste management system* - *from Solid WasteManagement Engineering*

economics

Transfer stations as places where household or commercial waste is transferred from garbage collection or personal vehicles to larger vehicles for transport to the sanitary landfill exist today because of the economics of the waste industry. Landfills although cheap are not easy to build; no one wants to live or work too close to one with the traffic, smell and eyesore they cause. Consequently, landfills are located on the periphery of towns, on undeveloped or undesirable lands. (Some of the trash generated in Massachusetts is landfilled in Virginia or Ohio; all of the Cambridge, Massachusetts residential trash is landfilled in New Hampshire.) Without a transfer station, garbage collection vehicles with a work crew of two to three people would have to travel to a landfill, which might be located out-of-state, to dump their 20 ton load. However, a typical transfer vehicle has a 100 ton capacity and requires a work crew of a driver only. For landfills that are located far from the source of the waste, it makes more financial sense to transfer the load of five collection vehicles to one transfer vehicle for the trip to the landfill. Basically, the farther the landfill from the waste source, the more likely a transfer station is part of the waste infrastructure.

history

Transfer stations came into being during the time when garbage was collected by horse and wagon, but were rendered obsolete when the motorized garbage truck was invented. At that time, landfills and dumps were located on the outskirts of a town, and each collection truck could make multiple trips to the dump in one day. But with the closing of these first generation landfills and the opening of new ones much further away (where land is cheaper), the transfer station came back into existence. In fact, many transfer stations are located at or adjacent to closed landfills. The transfer station is located in the middle of the waste infrastructure cycle, between collection and final disposal (FIG. 1). In this part of the cycle, the transfer station is well suited to recycling or landfill preprocessing, which may include removing items such as batteries and white goods (appliances) not appropriate for the landfill or reducing the size of the garbage. Size reduction of garbage is important because the garbage industry is ordered by volume, not by weight. Shredding and compaction machines are often used at transfer stations because garbage trucks and transfer trailers are limited by their carrying volume. The components of a standard transfer station consist of the following: tipping floor, drive lane, administration area, weigh scale, self-haul lot, truck wash area, machinery for recycling or size reduction of garbage, and services such as restrooms and a lunchroom for the work crews. (A detailed description of the components and machinery that may be housed in a transfer station is discussed at length in Appendix B.)

attitude

The components of a transfer station and its location are determined by the attitude of the citizens whose garbage is transferred by the facility. For instance, a municipality with a low recycling rate or low recycling awareness would not offer recycling at the local transfer station. Rural transfer stations will undoubtedly have significant provisions for yard waste, whereas urban transfer stations may have none. More significantly, the siting of transfer stations is related to the attitude of the public towards waste. Much has been written about Americans and how much waste they generate. It seems standard practice for any author writing about waste, the environment or the waste industry to begin his/her treatise with a series of facts meant to astound the reader and seemingly overwhelm him/her with the problem. Factoids like, "Americans generate over 4 pounds of trash per person each day," and "50% of all landfill space will be used up by the year 2000 with no alternative space as yet planned" are examples of such tactics. These "shocking" figures lead to little real change in the attitudes toward waste or one's thoughts on waste. For most people the waste industry is still an "out-of-sight, out-of-mind" industry. Most individuals have no idea where their garbage goes after it has been placed at the curb or in the recycle bin. The problem according to Robert Bruegmann is that the trash engineers have done too good a job. "By the 1970s, most Americans knew less about basic city services than they ever had, since in many cities the engineers had done such a good job controlling floods, delivering water, and removing waste that citizens could take these services for granted."[2] To achieve real change in Americans' consumption and waste practices, their attitudes toward the design of the waste infrastructure must change.

80 percent of Americans and over two-thirds of Europeans consider themselves environmentalists

Approximately 80 percent of our products are thrown away within six to eight weeks

The U.S. represents merely 5 percent of the world population but produces half of the planet's solid waste

70 percent of our municipal solid waste can be recycled

Americans throw away enough aluminum every three months to rebuild our entire commercial air fleet

waste location

Americans discard enough glass bottles and jars every two weeks to fill the 1350 foot tall World Trade Center

First, the location of the waste infrastructure should be rethought. Currently, the main design decision for waste infrastructure is how to best hide it from the public, either below ground in the case of sewers or as far from the public as possible in the case of sanitary landfills. Even more disturbing is the trend to locate major waste infrastructure in areas predominantly inhabited by minority residents. This type of racism is clearly seen in Boston, Massachusetts as 40% of the city's trash infrastructure (transfer stations, junkyards, recycling facilities and trash bin lots) are located in Roxbury, an area populated primarily by minorities. The old and wealthy parts of Boston, the Back Bay, the North End and all of "downtown", have no trash infrastructure.[3] (FIG. 2) A trend of siting undesirable facilities in the communities that are the least empowered to fight them has been set for at least the past fifty years. In Houston, Texas, 21 of 25 incinerators and landfills are located in minority neighborhoods.

Some 12 million computers are trashed each year

By 2005, 150 million personal computers are expected to wind up in U.S. landfills

Since 1960 we have about doubled the tonnage of municipal garbage we generate each year

According to the EPA, nearly half of the nation's six thousand municipal landfills were capped by the early 1990s and thousands more will close by the end of the decade.

By the year 2000 Americans will throw away more than 220 million tons of garbage annually.

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[2] Robert Bruegmann, **Infrastructure Reconsidered**, p. 10.

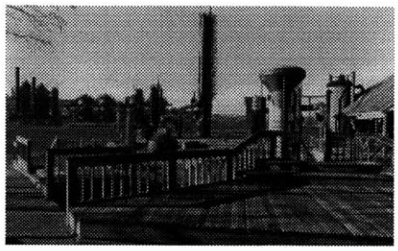
[3] Cindy Rodriquez, **Panel eyes plan on trash in Roxbury,** p. B6.

The solution to the problem is not as simple as siting new facilities in wealthier, more multi-cultural populations though. Studies performed by Vicki Been, a law professor at New York University School of Law, showed that only half on Houston's waste infrastructure was originally sited in African-American areas of the city. Instead of siting discrimination, Been concluded that market dynamics caused the shift in demographics. The story played out as the following: waste facility is sited, property values decline, the rich move away, and the poor (mostly minorities) move in. Been says, "My theory is that even if you could site everything fairly tomorrow, we will still see, ten years from now, that the people who live next to the facilities will be poor and minorities."[4] Changing siting parameters is not the only answer to the waste problem.

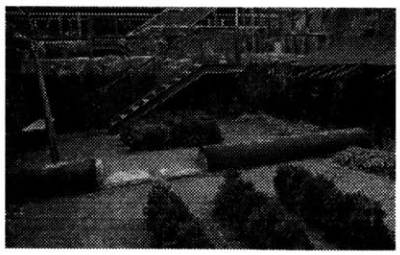
aesthetics

If the siting is the most politically charged decision regarding waste infrastructure, decisions regarding aesthetics are often the most neglected. Incinerators and sanitary landfills are often so large that there is relatively no sense of human scale in their design. Economies of scale govern all the decisions regarding these facilities; basically the more garbage each can process, the more money that can be made. To simply build an incinerator at half the scale of a conventional incinerator in order to make it more aesthetically pleasing makes no financial sense. Much of an incinerator's costs are operational, such as making sure the smoke and ash are EPA certified non-toxic. So, limiting the size of the incinerator also limits its profitability.

Notions of aesthetics most often emerge when waste facilities become obsolete or are closed. Much has been written on how to reuse landfills for recreation purposes and on how closed incinerators and industrial mills are being made into public parks (e.g. Haag's Gas Works Park, and Latz's Duisberg Park). Aesthetics *ex post facto* is better than never at all, but the appearance of an operational landfill or incinerator is often severely neglected. Yet, the appearance of the working facility is a critical influence on how people view the operation; public perception is inextricably linked to property values. *This thesis proposes that by locating a waste transfer station on a highly desirable site and designing the facility to encourage public access as well as to handle waste, this infrastructure can become an integral part of an urban fabric, no longer an eyesore attracting or inflicted upon the poor and minorities.*



Gas Works Park



Duisberg Park

[4] Robert Braille, **Is Racism a Factor in Siting Undesirable Facilities?,** p. 14.

design

"Infrastructure" is a relatively new synonym for what was formerly referred to as public works, but the shift in terminology is significant. Public works included schools and libraries in addition to roads, train stations, etc. Some of the most scenic roads and bridges were designed while such projects were labeled public works. Rarely today do landscape architects and road designers have a significant influence on the design and routing of major roadways. The design of infrastructure seems to be located in the realm of engineers; its components are designed to be efficient, serving, and hidden if at all possible. (Not many people go for a drive along interstates solely for the joy of driving.) "The triumph of the interstate highway system, perhaps the most ambitious single public-works project in our history, was achieved in part through the adoption by government agencies of rigorous engineering standards for the layout and design of roadways."[5] *This thesis proposes designing the infrastructure of a solid waste transfer station to be more pleasing to the public without compromising the productivity of a conventional transfer station and without disguising the fact that the building is indeed a solid waste transfer station.*

infrastructure

There is a confluence of infrastructures as built in contemporary America. Railroad tracks have telephone and electrical cables as their constant companions. Sewer and water main lines run adjacent to one another in cities. One transfer station's neighbors in Fairfax County, Virginia include a sanitary landfill, school bus repair lot, dog pound, prison, firefighter's training facility, and salt, sand, truck and plow storage for the department of transportation. The city of Boston, Massachusetts is currently sinking the elevated highway that cuts through the middle of the city. Affectionately known as "The Big Dig", this project is replacing the elevated highway with surface roads and parklands. *This thesis proposes siting a solid waste transfer station along this submerged infrastructure integrated into the proposed new surface road and parkland system.* Occupying a prominent place in the heart of the city, the transfer station will be readily accessible from the areas it serves. In addition to being near the waste, the downtown site offers the opportunity to make the transfer station more than just an infrastructure serving the city; it will become a destination place.

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[5] Robert Bruegmann, **Infrastructure Reconsidered**, p. 10.

attitude

Does Boston need a new transfer station? No. Yet rerouting garbage collection from one of the Roxbury transfer stations to a centrally located one would allow the Roxbury site to be redeveloped for a use other than waste infrastructure and would shift the waste infrastructure closer to the waste generators. Boston, however, does need another landfill or incinerator; Spectacle Island, an island in the Boston Harbor that was a sanitary landfill, has recently been capped and is being converted into a park. A new, centrally located transfer station with water access could serve a new landfill in the Boston Harbor or a new incinerator located in the Harbor or along the coast. This thesis neither proposes a new site for a landfill or incinerator nor proposes alternative methods of solid waste disposal which are more considerate to the environment than landfilling or incineration. *The scope of the thesis is limited to the design and siting of a viable transfer station infused with additional public programs, primarily a park. Although it is hoped that the issues raised and provoked in the design and implementation of the thesis foster discussion of the larger issues of waste and wasting.*

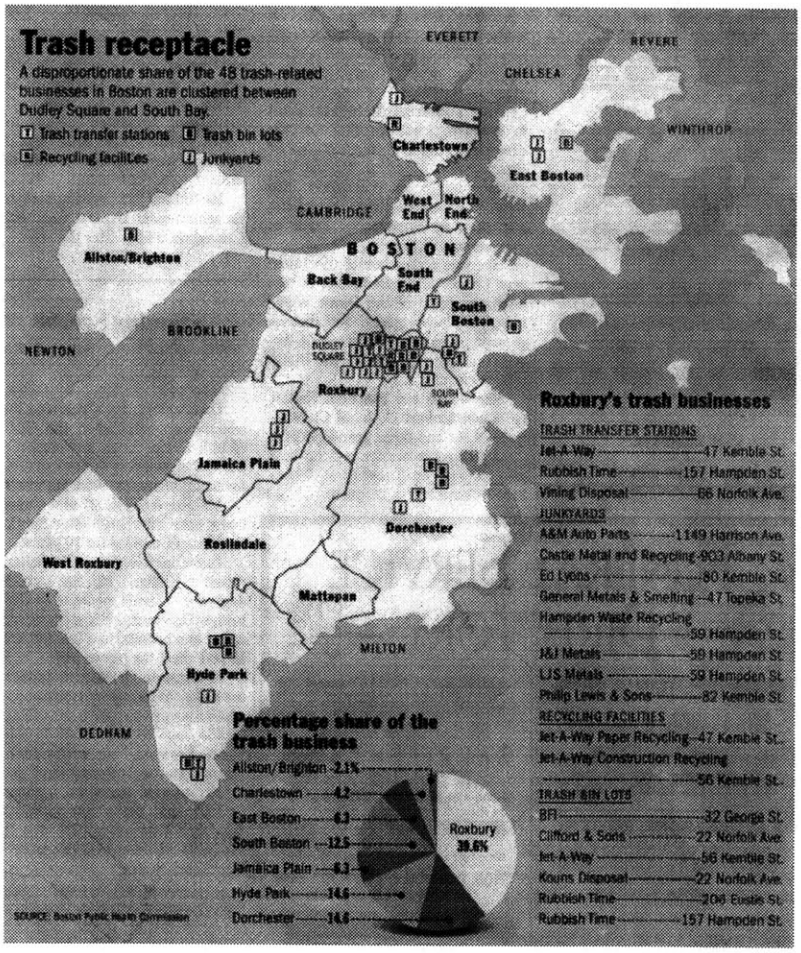


Figure 2 *Boston waste infrastructure distribution - from Boston Globe*

Figure 3 *Figure ground of Boston, (light grey represents buildings destroyed since 1947)*

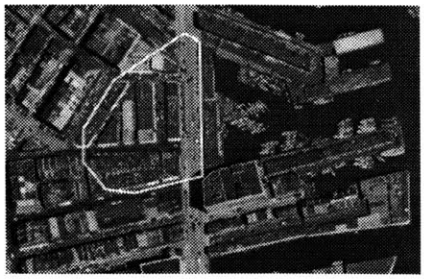
history

The site chosen for the proposed solid waste transfer station is the existing Christopher Columbus Park in the North End section of Boston. This park is on a waterfront site between Long Wharf and Commercial Wharf and is ringed by Atlantic Avenue. Today, the elevated highway isolates the park from downtown Boston despite its proximity to Fanueil Hall and the Quincy Market area. Once the highway is removed, however, the site will be linked to the heaviest Boston tourist traffic. The park is the terminus for Boston's "Walk-to-the-Sea", a path from the Quincy Market area leading to Long Wharf and the Boston Harbor. Before this site was converted to a park, it contained some of the light industry associated with Boston's waterfront; among the site's previous tenants was the United Fruit Company, located at Long Wharf from 1899 to 1958. Warehouses and wharf buildings dominated the morphology of this area during that period and a few still remain today including the Chart and Customs Houses on Long Wharf and the Commercial Wharf warehouse.

Although some buildings at the site date back to since the early 1800s, the area has undergone extensive renovation since 1946. The Marriot Hotel at Long Wharf is the most recent addition, taking over the site of a parking lot in the mid 1980s. The park itself is populated by numerous trees and grass parterres arranged in a quasi-Renaissance geometricized order. An area adjacent to the water is cobblestoned with granite steps about five feet lower in elevation than the green areas in order to control any harbor flooding. The Rose Kennedy Garden occupies the northernmost edge of the park, an area originally slated for commercial development. Existing neighbors include the Marriot Hotel, Joe's American Bar and Grill, offices in the Chart and Customs Houses, residences in the Commercial Wharf building, a small marina, Harbor cruise ship and Commuter boat berths and apartments immediately adjacent to the site on the western side. Also, a MBTA stop and the New England Aquarium are in the vicinity.

There has always been a parallel between the fortunes of this city and the well-being of its waterfront. For more than 200 years, Boston's vital waterfront reflected our city's emergence as a center of shipping and international commerce, just as rotting piers and empty warehouses represented Boston's economic decline after the Depression and through the period following World War II.

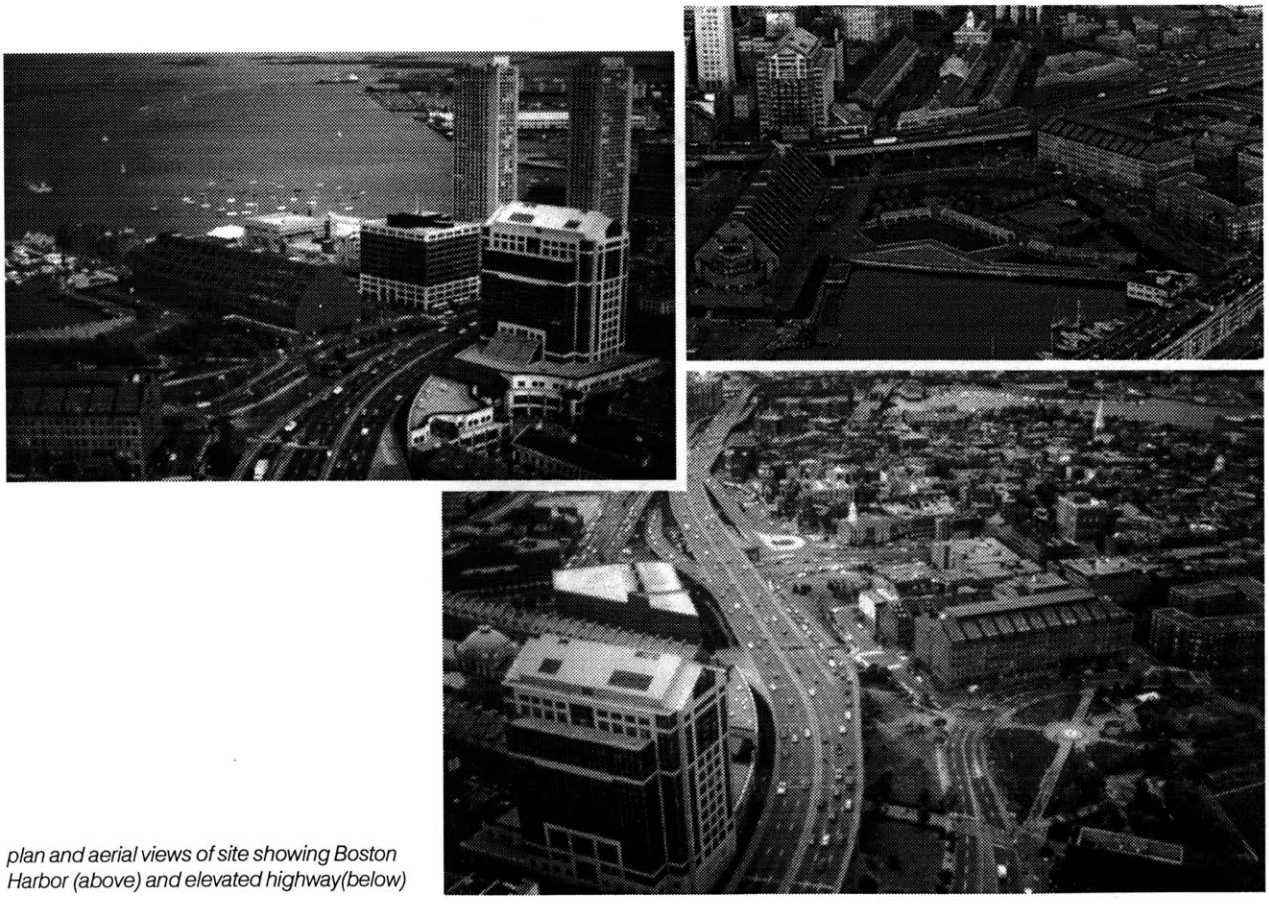
former Boston Mayor, Raymond L. Flynn



aerial views of site from 1947
(boundary of existing site approximated by white outline)

prominence

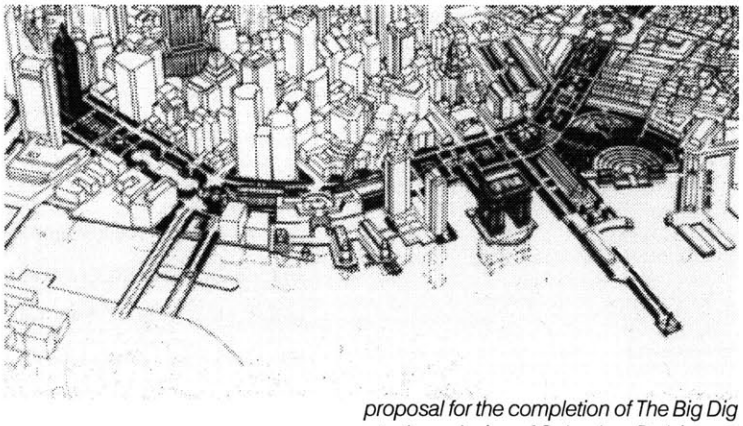
This site is very prominent within the city of Boston and, with the submerging of the elevated highway, the area will become even more populated and more integrated with the city as a whole. Presently, the park is used primarily by North End and Marriot Hotel residents although others come to the park to wait for the water taxi or Harbor cruise boats. This type of public setting is not usually considered as a candidate for a waste infrastructure project: too valuable to the city in terms of open space and the real estate market and too public to *give* up to become a waste infrastructure site. To refute this method of thinking, the goal became to design the transfer station to allow for maximum public access. However, this required a total overlap of the waste and public components of the design. Could a transfer station coexist and even enhance the features of a public park in a site cherished by so many? Just plopping a conventional transfer station into the middle of the existing park was not the answer. The result would have been a ruined park and a dysfunctional transfer station. The park needed to change with the introduction of the transfer station and vice versa.



plan and aerial views of site showing Boston Harbor (above) and elevated highway(below)

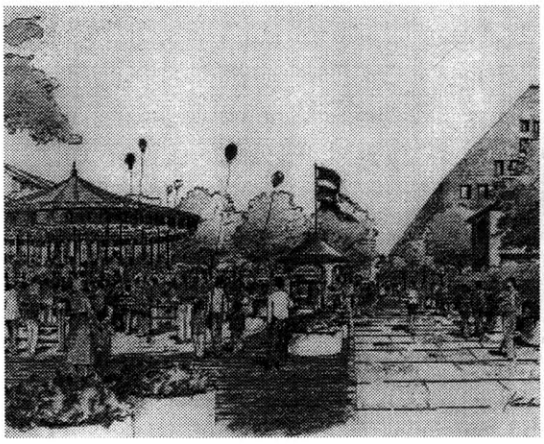
the big dig

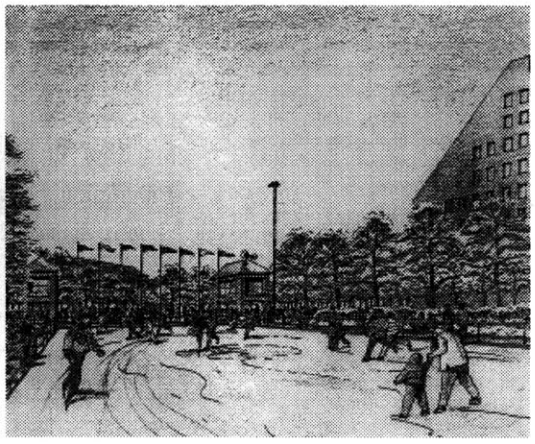
The submergence of the elevated highway, "The Big Dig", represents a commitment by the city of Boston to repair the urban fabric that was demolished by the introduction of the arterial expressway in the late 1950s. By sinking the artery, the city will gain a two mile long by one city block wide stretch of land. The linear path in its place is to be developed to "stitch" back the urban fabric. The land is primarily planned as a linear park, providing much needed green space to many areas of Boston, notably Chinatown and the North End. Presently, the central artery divides the North End as well as the waterfront from Downtown Boston. Besides parklands, the linear site is to house a new conservatory, winter garden, community centers, hotel, open-air market, ice skating rink and carousel. Almost all of the proposed development is to consist of public amenities. Opening up the middle of an established city to public parks is unprecedented in American city planning. The introduction of parklands will offer new spaces for collective activities in the city. Perhaps the collective activities associated with parks could be new too. Should a park introduced into Boston in the year 2004 be designed for the same activities as an open space such as the Boston Common was intended for in 1634?



proposal for the completion of The Big Dig note the redesign of Columbus Park into an ampitheater

the site connecting the Waterfront with the Fanueil Hall area created by The Big Dig has proposals calling for a old-fashioned carousel and an ice skating rink to help the area become an all season tourist attraction. The Marriot Hotel at Long Wharf is in the background. No connection is made between the new linear park and its varied uses to the existing Columbus Park.





characteristics of an Olmsted landscape, from "Art of the Olmsted landscape"

man-made works of art

roots in the english romantic style

reflect a victorian influence

provide a strong contrast with the city

characterized by the use of bold land forms

provide a balance between the spatial elements of turf, wood, and water

use vistas as an aesthetic organizing element

contain a series of planned sequential experiences

provide for the separation of traffic

provide visitor services

contain artistically composed plantings

integrtate architecture into the landscape

each has provision for a formal element

characterized by variety

built to provide for recreation

olmsted

Most Americans' ideas about parks and what they provide are shaped by their experiences in parks designed or influenced by landscape architect, Frederick Law Olmsted. Olmsted, the designer of Central Park, the Back Bay Fens, et.al., created naturalistic landscapes that were in sharp contrast to the city they abutted. The underlying theme of these original parks was to provide healing to the overcrowded city. It was believed that open green spaces within a city could bring restoration and health to the people and the city. The Back Bay Fens in Boston also were designed as flood control for the Charles River banks which had narrowed considerably with the landfilling and occupation of the Back Bay and Cambridge. Olmsted's parks provided an "other" to the city, which was in contrast to the pressures and development of the urban life. An Olmsted park was not subservient to the city surrounding it, but rather a destination as much as any other address in the city. The parks had their roots in the English Romantic style, organized around aesthetic vistas of built follies (carousels, bandstands, etc.) and planned sequential experiences between the vistas. A large open space for recreation was provided as well as smaller areas for walking or sitting which were integrated into the landscape. The use of parks as places to stroll, sit, observe the landscape and play come from Olmsted's tradition.

view of the Back Bay Fens, Boston, designed by Frederick Law Olmsted

limitations

This tradition of park design and use is so pervasive in American society that some have begun to question whether the Olmstedian model as practiced today is still appropriate:

> *Most American parks have been perceived through the nineteenth-century Olmstedian model of pastoral landscape set in an urban context – a model still followed by the majority of park designers – with its elements, in post-World War II years, increasingly reduced to trivial size and cut up by recreational facilities. Such parks are fine individually and hardly need to be done away with. But, overall, parks have failed to keep up with our increasingly complex cultural needs. ...Further complicating the picture is the fact that our expectations for public life have also changed greatly since the prototypical American parks were created. While some park users stroll along the paths and sit quietly among the manicured gardens – the image of bourgeois leisure to which nineteenth-century reformers hoped everyone would aspire – others feel just as comfortable using parks as places to fix their cars, dance to music, or just hang out. That some feel such behavior is misbehavior reflects a deficiency in the variety of parks we have today and in the ways park designers have thought about them.*[6]

[6] Deborah Karasov, **Introduction,** in The Once and Future Park, 7-8.

criticism

The area around and including the Christopher Columbus Park site has undergone extensive construction, demolition, and renovation since its creation in the late 17th century. The park itself did not exist until the early 1980s. Given this, it hardly seemed that any physical part of the site was considered "sacred" so that it should be left unadulterated. The fact that the site was a park was more important than the actual design of the park.

My criticism of the existing Christopher Columbus Park is that it offers a limited experience of what an urban park could be. People inhabit the park to look at the water and wait for the water taxi or walk through the park under the existing pergola. Sometimes kids play on the generic mini-jungle gym that appears to have been included as an afterthought. Other than these uses, the park seems to offer only the clean air that the myriad of trees process from the traffic and nearby construction. These experiences are important; however, they appeal to a select few residents and at select few times of the day and year. The park seems to be a finished design, demonstrated in the rigid geometric plan layout. One must stay on the path here. Robert Smithson said the reasons that Central Park in New York City is still a good park after 130 years is that it has complex and ever changing relationships between man, nature, culture and policy. "A park can no longer be seen as 'a thing-in-itself', but rather as a process of ongoing relationships existing in a physical region – the park becomes 'a thing-for-us.'"[7] An urban park should appeal to many people carrying out a variety of activities at all times of the year. I wanted to redesign the park so that it would reference some of the area's light industrial past and history as a wharf. By siting it with a transfer station, the park would be dynamic and public, yet still tied to the waste industry. It would become a productive park.

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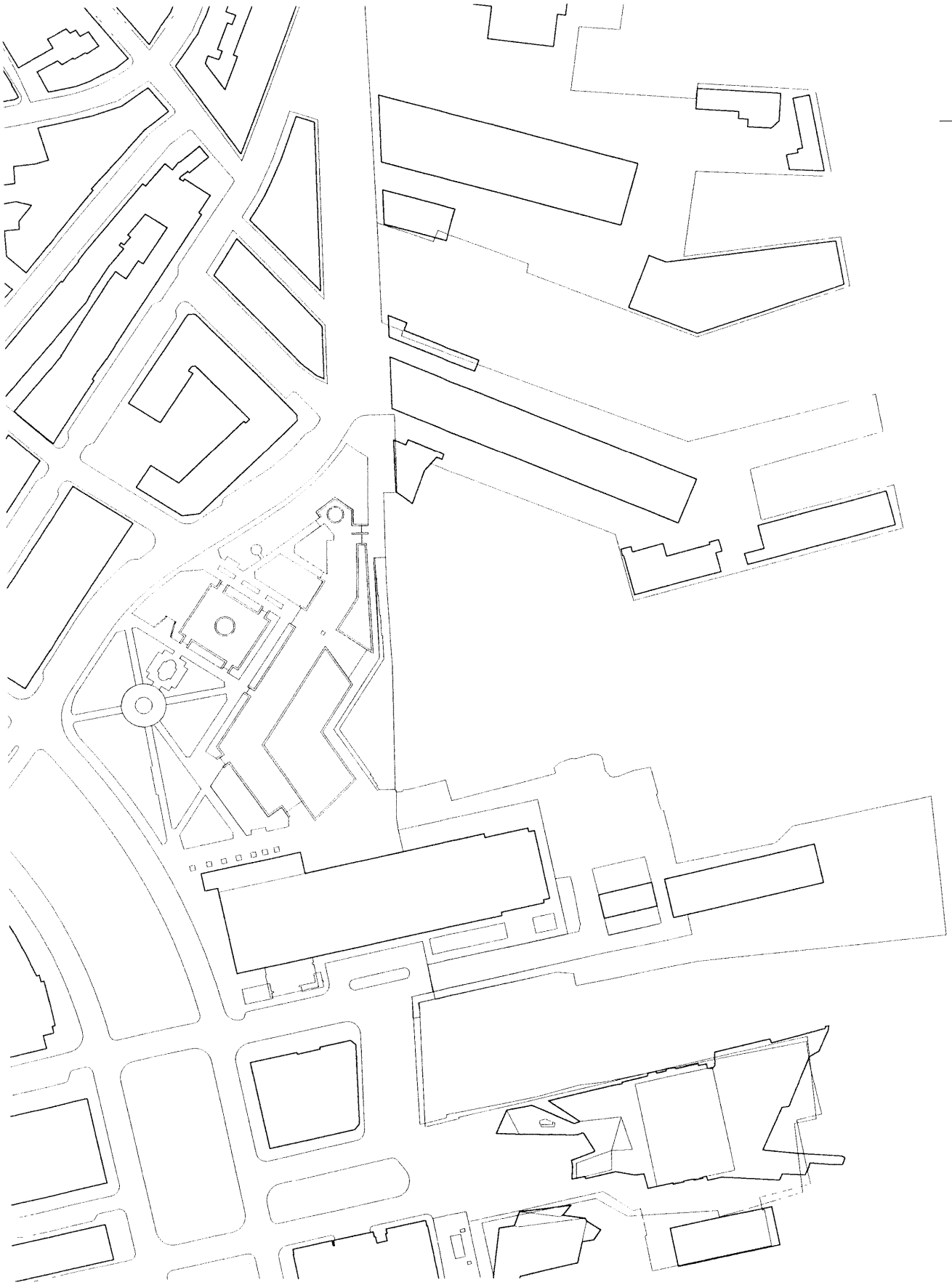
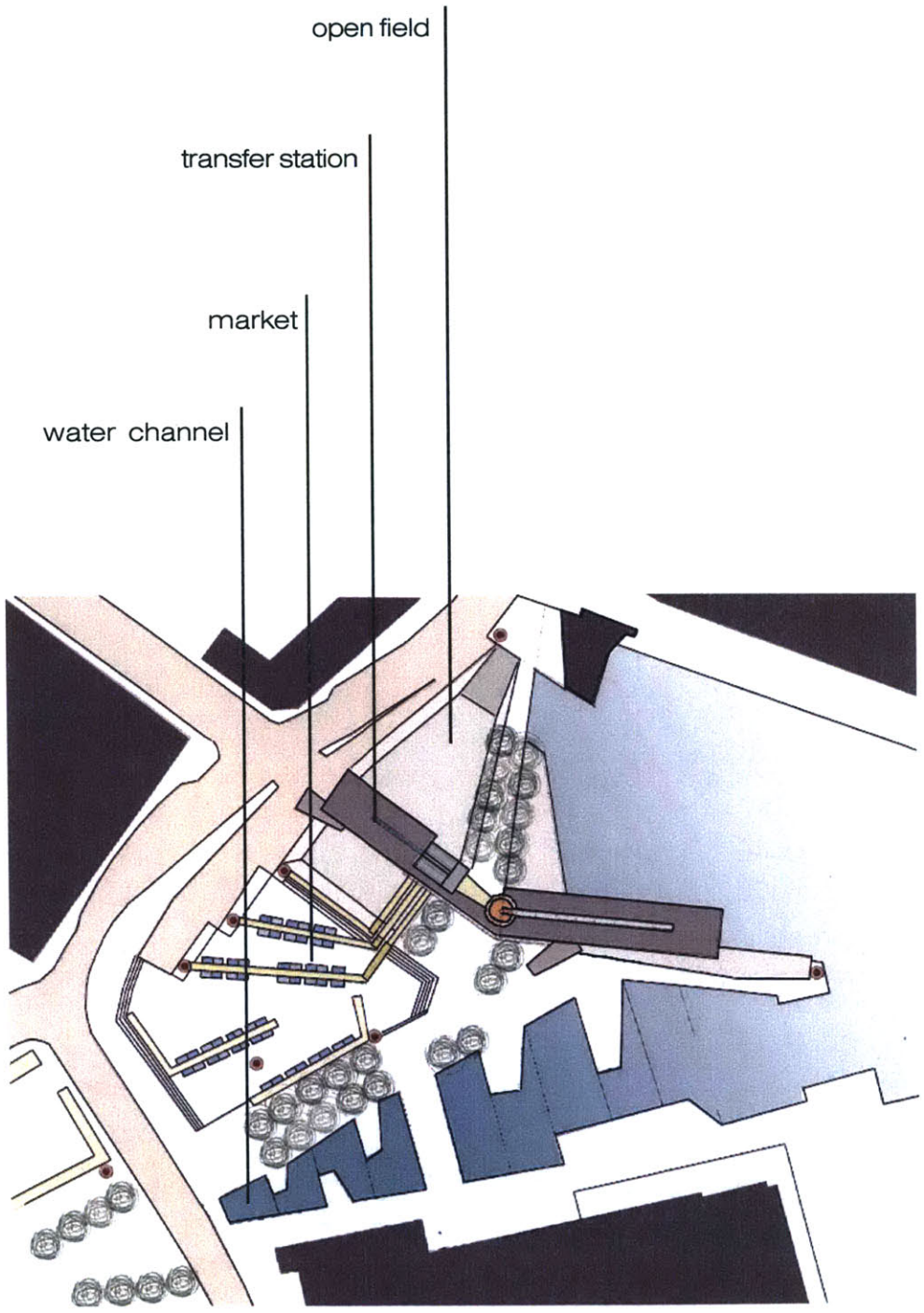
[7] Patricia Phillips, **Present Tensions: The Nature of Public Space,** in The Once and Future Park, p 25.

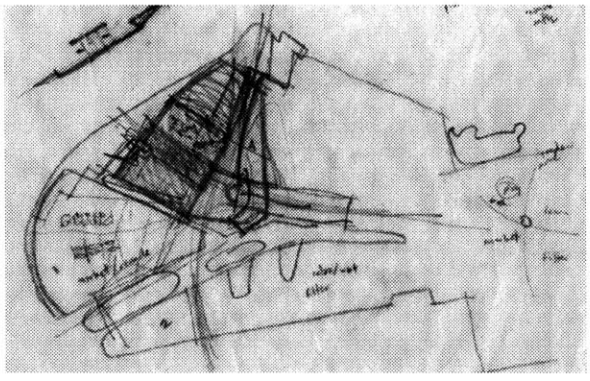



open field
transfer station
market
water channel

approach

The approach toward the urban design of the site was that for the park and transfer station to coexist, the distinct programs and experiences of the two dissimilar uses needed to overlap as much as possible. These overlapping programs then would be mitigated and enhanced by site constraints and site observations. The resulting design would have to work both as a park and a transfer station in order to be successful. *This thesis proposes that a new type of urban park, a productive park, and new attitudes toward waste overlap and coexist at the same place, Christopher Columbus Park in the City of Boston.*

To achieve this, I designated three overall areas of overlap between the intended public's use of the park and the elements of the solid waste transfer station, or more generically, waste infrastructure. The first was a place to sit at the water where the water is filtered as it returns to the harbor. The second area was designed for a market that would sell fresh produce and also provide a place to view items being sorted from the transfer station. A large open area was to allow for a place of recreation where people could also observe the movement of the garbage.



sketch of three areas of waste park

at the water's edge

water hyacinth

duckweed

indian mustard

sunflower

corn

small hybrid willows

birches

bermuda grass

rye grass

hemp

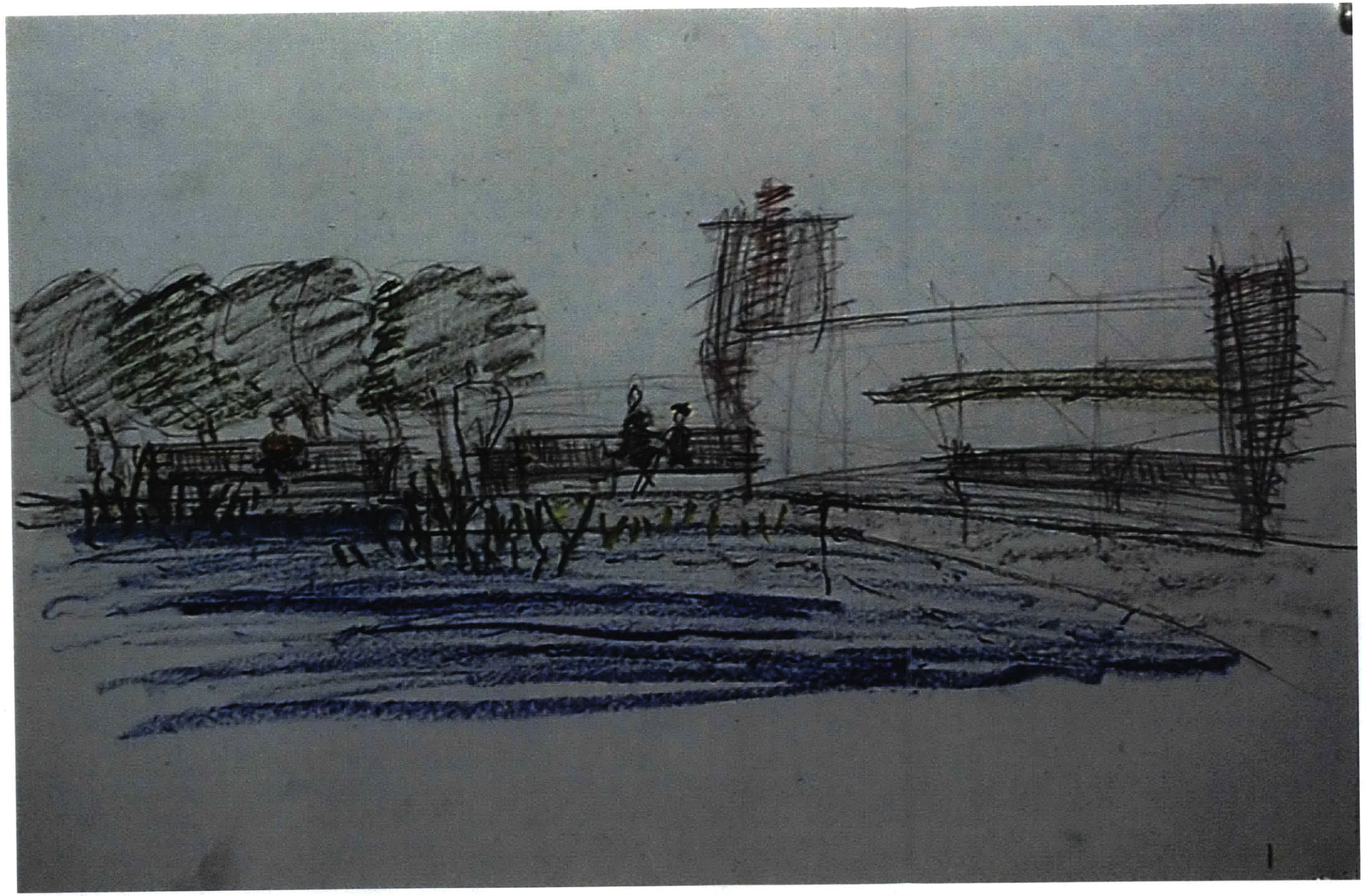
canary grass

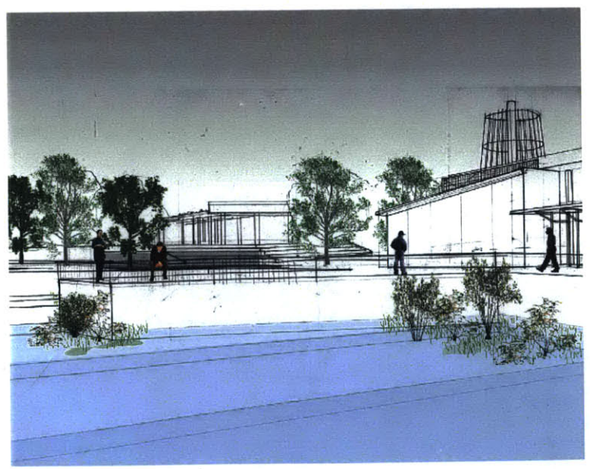
remediating plants that may be found growing at the water channel

filter

Creating a scenic space for sitting by the waterside, this area of the park also provides access to and a waiting place for the water taxis. The major design move for this area of the waste park was cutting a channel all the way to Atlantic Avenue from the harbor. This was meant to be a continuation of the ideas regarding flood control from the existing park. Whereas a small area for seating is found on the cobblestoned surface at the edge of the existing park, the proposed park accentuates the water's edge by bringing the water further into the park It also separates the park from Long Wharf and provides physical definition to that land as a wharf. In addition to providing flood control, the water channel also showcases Boston's ten-foot tidal swings as it steps in a series of one-foot terraces up to ground level. All rainwater runoff and water used on site is directed to the topmost terrace and cascaded back down to the harbor. The tidal ponds (terraces) sustain vegetation that filters the water as it flows back to the harbor; this cleansing process physically represents the Victorian ideal of an urban park healing and purifying the city. This is an area for relaxing by the water, feeling the breezes off the Harbor and conversing with small groups of people in an intimate setting.

leaf conceptual drawing and rendered perspective showing design studies of water channel area with remediating grasses and plants





overlap

This overlap between a public and a waste (or cleansing) function is demonstrated at the dock for the water taxi and excursion boats. Currently, the boats use a temporary floating dock off Long Wharf. The proposed dock, which provides a pemanent place to catch the water taxi, commuter ferries and excursion boats that service Boston, is shared by the transfer barge that takes the trash to the landfill at one of the Harbor islands. Incorporating the boats into the park will integrate the park into many people's daily commute to the city and also bring visitors to the park everyday year-round. Creating a permanent place for the marine traffic will identify the park with this use and create tenants for the park. Given that the commuters using the park most likely work within walking distance from the boat or a T station, a direct path is designed under an allee of deciduous trees connecting the boat dock to the Fanueil Hall/Quincy Market area. This path serves as the main entrance to the park from the tourist areas of Boston as well. Incorporating the transfer station and the commuter boats into the park will bring back some waterfront and water dependent business to the site that was booming in the 19th century.

This area of the park is meant to also show the passing of time and the seasons. The harbor tide changes every six hours; commuters change directions every nine; the allee of trees change every season; even the composition and amount of garbage on the barge varies from season to season.

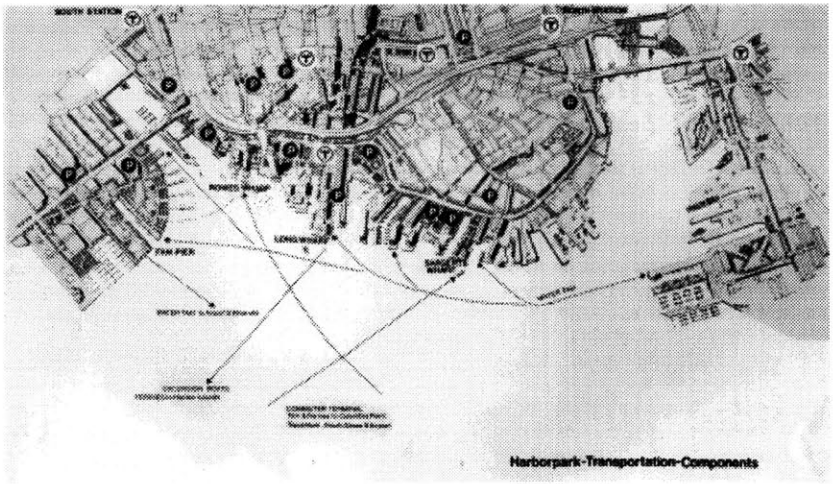


Diagram of water taxi and commuter boat routes, present and planned, for Boston Harbor. Long Wharf and Columbus Park are in the center of the diagram.

from Harborpark

the market

aluminum cans

brochures

computer forms paper

copier paper

envelopes -no plastic windows

glass beverage containers

index cards

laser printed computer paper

magazines and newspapers

plain paper faxes

plastic bottles

scratch paper

stationery

typing paper

tracing paper

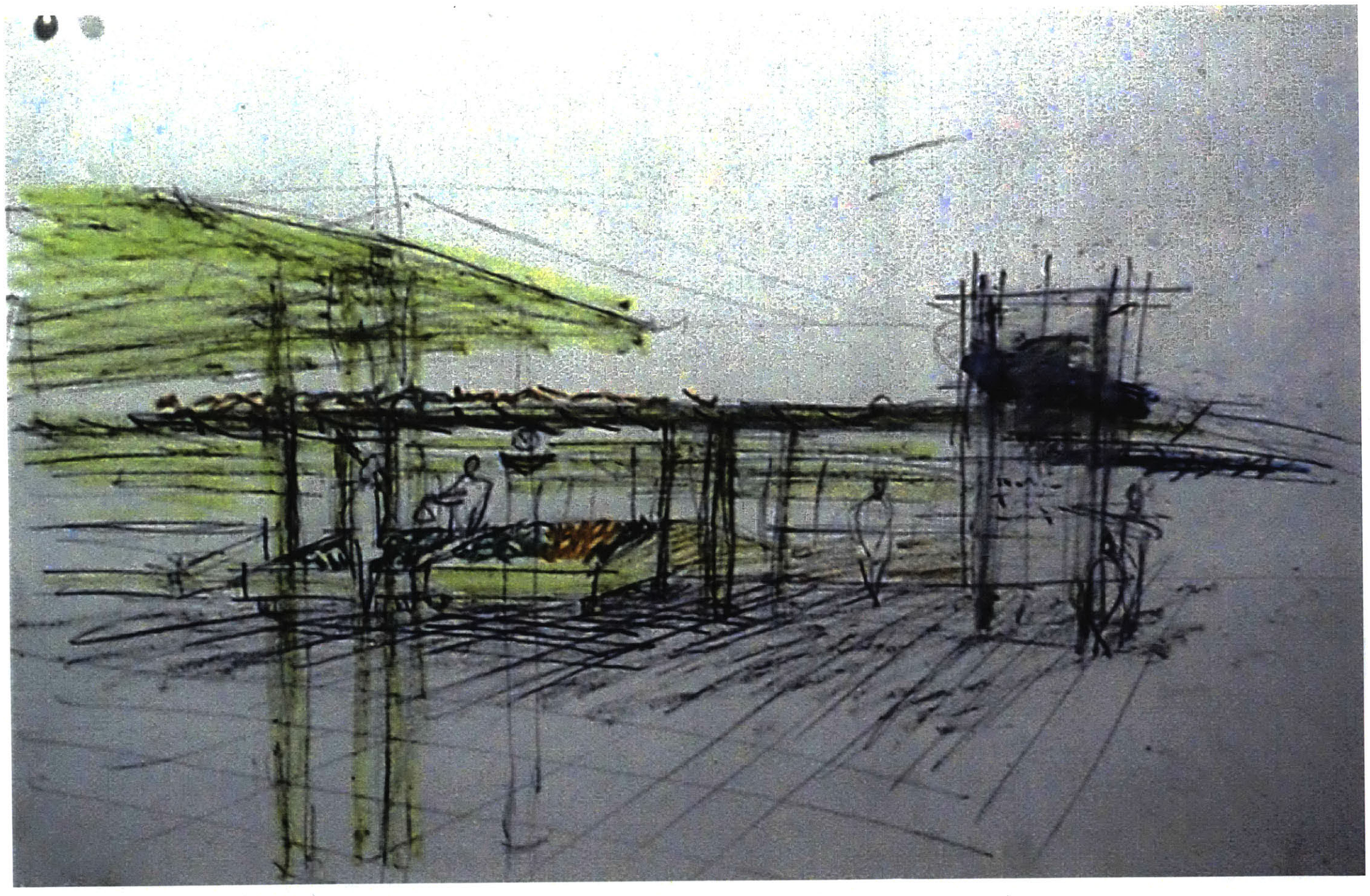
what's generally recyclable
from The Ecology of Design

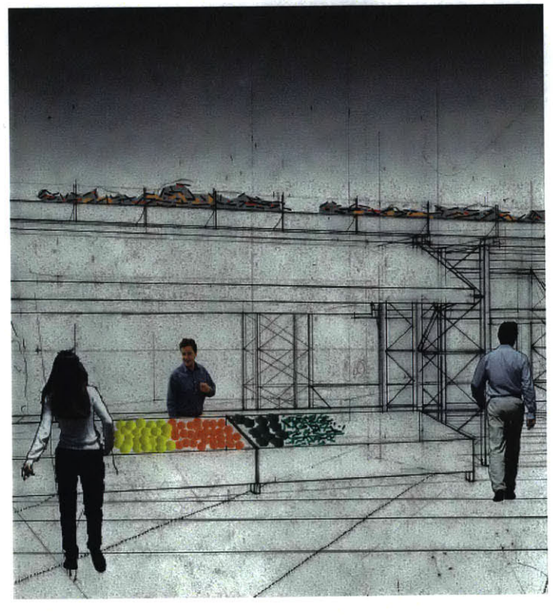
sorting

Many solid waste transfer stations also have provisions for sorting and preparing recyclables for resale. The proposed transfer station will sort and prepare plastics, glass bottles and other scrap metals for recycling in the same area as the produce market. The proximity of products awaiting recycling with new products will display lifespans of a multiplicity of items. Through the convergence of these items, traditional oppositions like new/used, useful/useless and fresh/spoiled are brought into question in the recycled, rehashed and reengineered world. To give physical form to the overlap between the market and the recycled products causes both activities to receive the same architectural infrastructure, a steel frame conveyor belt/market stall/pergola. The conveyor belt supported on a steel frame structure is a standard item found at a conventional transfer station, and it usually transports the waste to various sorting machines or to the transfer trailers. Using the language of the steel conveyor belt structure to also order the market stalls fosters a synergistic relationship between the market and the recyclables at the transfer station.

By pulling the infrastructure of the transfer station out to shape exterior public space, the components of the transfer station are liberated from the conventional "big box" container that conceals them. This market area of the park changes daily; the fresh produce that is sold and the recyclables on the conveyor belts change with each day's deliveries to the site. Through the introduction of the market to the transfer station site an activity that is seen in a positive light (such as going to the market for fresh food) is allied with one that is seen as negative (processing garbage). This pairing of "positive" activities with the handling of garbage is one way of removing the stigma associated with garbage.

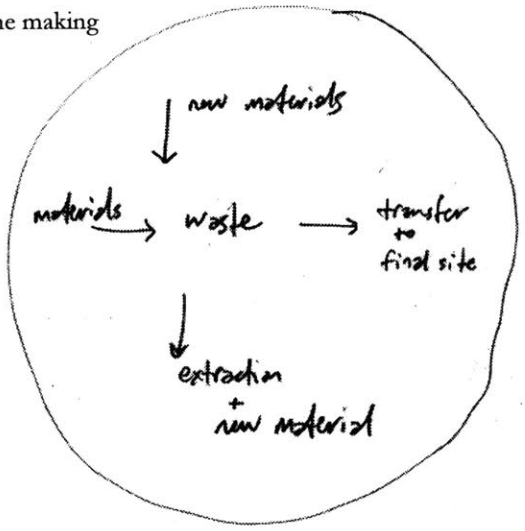
leaf conceptual drawing and rendered perspective showing design studies of market area with juxtaposition of fresh produce and sorted recyclables

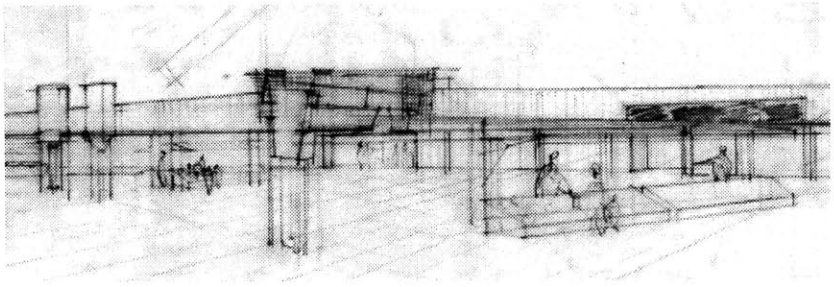




life span

Through the juxtaposition of goods brought in for sale at the market with those items recovered on-site for reuse, the park demonstrates the multiple lifespans of products and materials. Reintroducing fresh fruit and produce to a site that was home to the United Fruit Company is a way of restoring a link with the past. Also, fresh produce markets are a source of a large quantity of waste, so siting them in conjunction with a transfer station seems appropriate. In addition to the cardboard boxes that hold the fruit, much of the fruit at or in markets is thrown away at the end of the day. At Boston's Haymarket, two front-end loaders clean up the market each day, pushing the mass of boxes and fruit to a waiting truck. A fresh produce market located on-site that will produce much waste will raise questions like "what is the life span of a product?" and "how much waste is generated in the making and distribution of a product?"





early sketch perspective of market area showing integration of recycling machines, conveyor belts and market stalls

the open field

blueprints

carbon paper

cigarettes

cigarette packs

facial tissue

glued and gummed items

juice boxes

milk cartons

paper lined with foil

paper towels

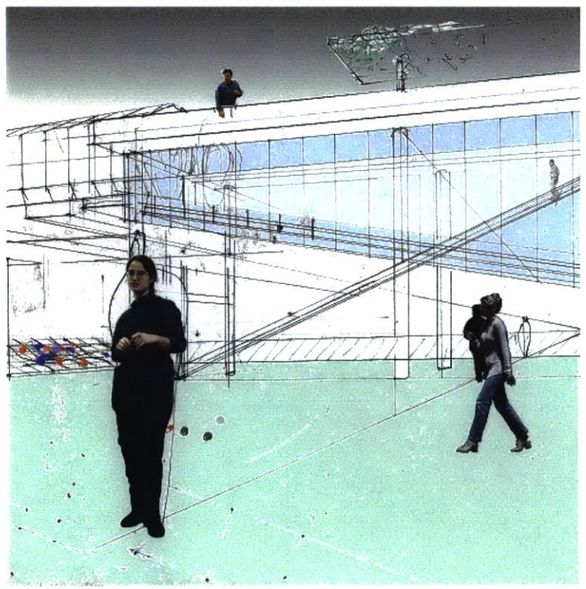
movement

The open green lawn around the station offers space for activities coexisting with the movement and removal of garbage. A large open area in the North End would appeal to all ages of residents and visitors. Sinking the lawn four feet provides a sheltered space for frisbee playing, bocce, croquet or other lawn games. Also, this area could be used for relaxation or as a garden, depending on the seasons and the users. With the transfer station elevated on pilotis, the overall impact by the transfer station on the ground is minimized and the field layered underneath occupies a larger area. Cladding the transfer station with a glass enclosure reveals the path and movement of the garbage from collection truck to transfer barge. The movement of the garbage may be viewed in the same place as the movement of people. The berms that shelter the space are made of baled goods revealed behind a wire mesh. The intention is that visitors can watch the decomposition process of the garbage and observe something that is ever changing but at a decomposition rate invisible to the eye. The constant movement on the conveyors above is juxtaposed with the slow decaying of the garbage berms. The entire park is intended to be didactic, explaining and showcasing the wasting cycle, from new to used/recycled to decaying products. One learns about waste by using the park, not by going to an area of the site designated "teaching area".

Intentions to change attitudes about waste are presented in a transparent way so that living in proximity to waste can be seen as a pleasurable experience. A pleasurable experience will occur only if the waste is handled properly from resident to collector. At the park, visitors are never in direct contact with the garbage. The waste is seen in its various states throughout the park, but it is a visual connection with the waste and not a physical one that exists.

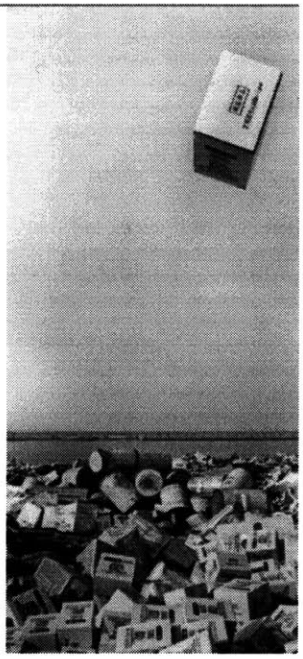
leaf conceptual drawing and rendered perspective showing design studies of sunken field for recreation and relaxation

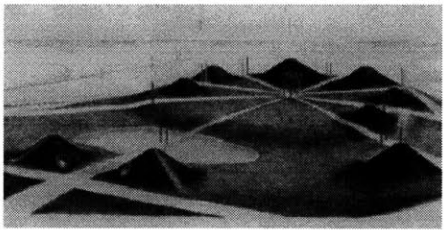
what's generally not recyclable
from The Ecology of Design



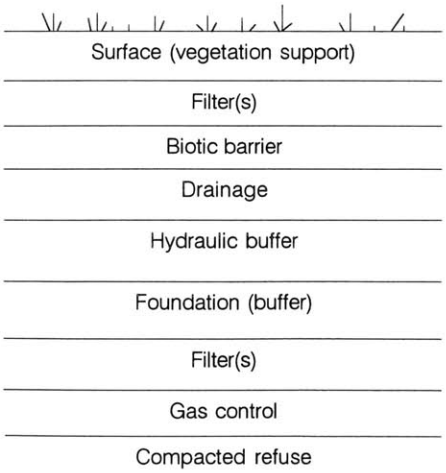
ground

The open field reappears on the roof of the transfer station. By recreating the ground on top of the transfer station, the structure actually creates more ground than it occupies. From the roof of the transfer station visitors can view the island landfill in the Harbor, the destination of the garbage. Also, a scrim and plantings on the roof of the transfer station metaphorically allude to the process of "capping" a landfill with vegetation. The issues of created ground and "the ground" are philosophically at the heart of the waste industry. What is a landfill if not created ground, and yet there is much care taken to see that trash does not touch *the ground* until it is dumped in its proper place, on the ground at a sanitary landfill.

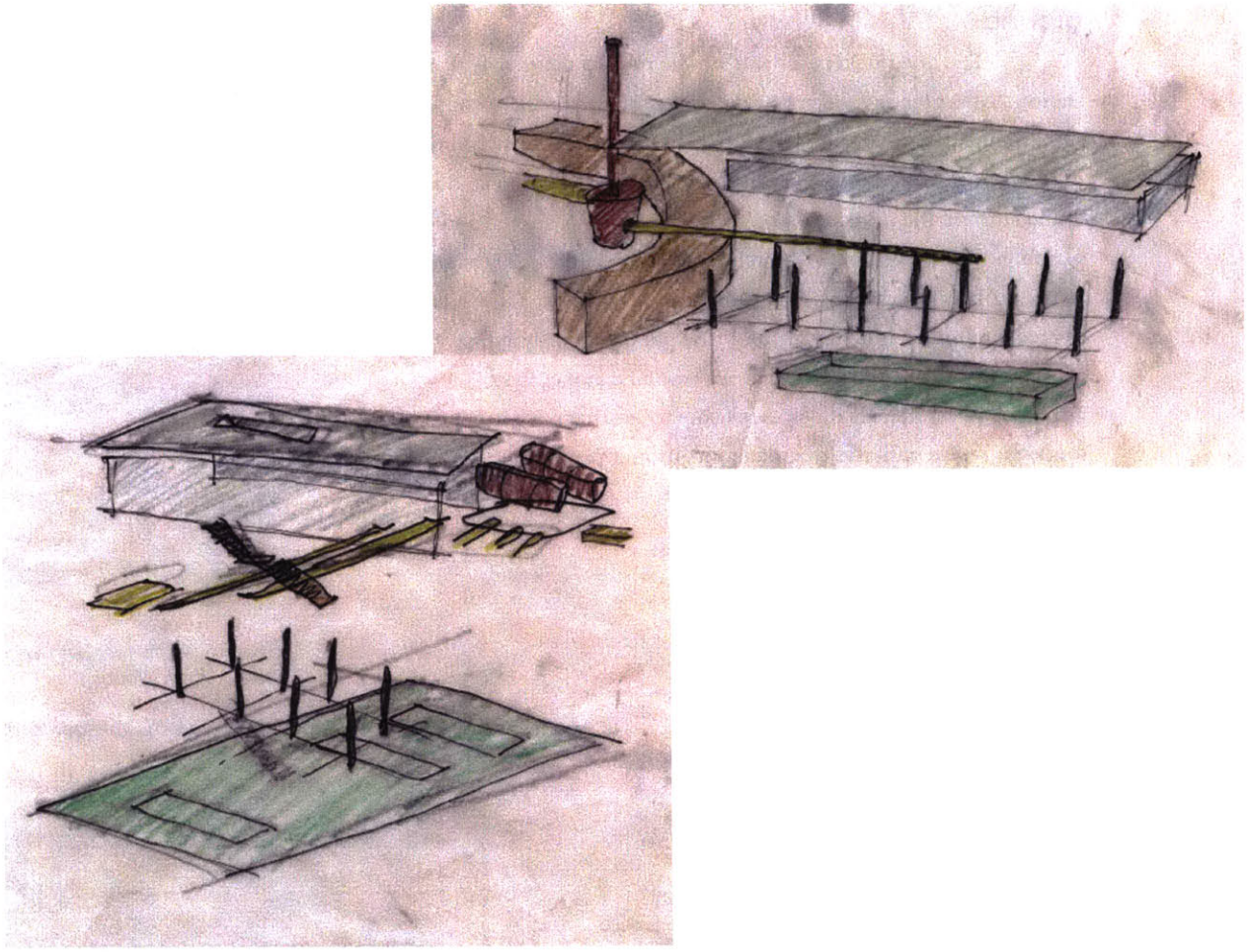




above: landfill receiving waste
below: park proposal for closed landfill,"sky mound", nancy holt, the meadowlands, new jersey

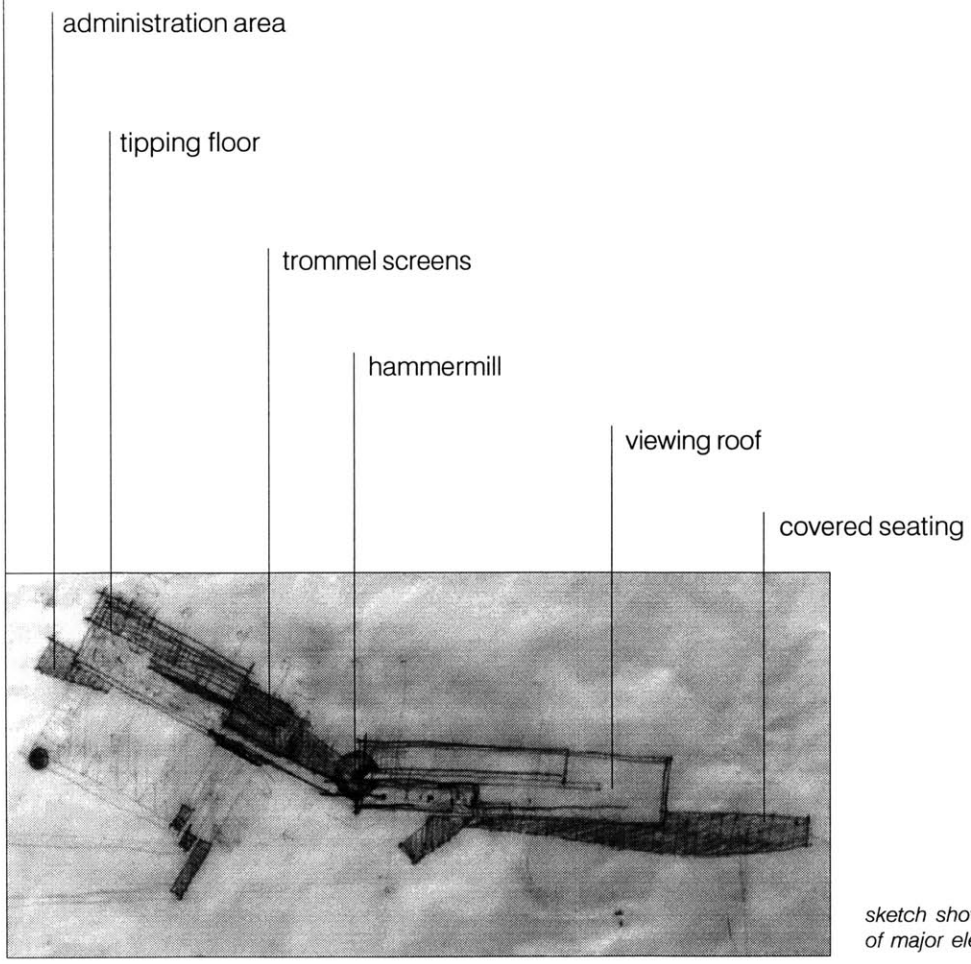


potential layers in a soil cover system from Solid Waste Management Engineering



top: exploded axonometrics of components that define two parts of transfer station
bottom: sketch of vertical shaft hammermill

The interface between the public and the waste infrastructure was a major determinant in its design. The transfer station itself occupies and orders all three areas of the park. Waste flows to and from the site dictated the location of the transfer station building since garbage collection vehicles needed access to the site as well as pedestrians. The design of the transfer station incorporates standard equipment used at conventional transfer stations (trommel screens, hammermill, etc.), but like the conveyor belts, modifies the equipment to be experienced by the public. The design of the transfer station is linked to and emerges from the processes and path by which the garbage moves. My attitude towards the design of the building was that every decision should reflect bringing the waste into the public realm.



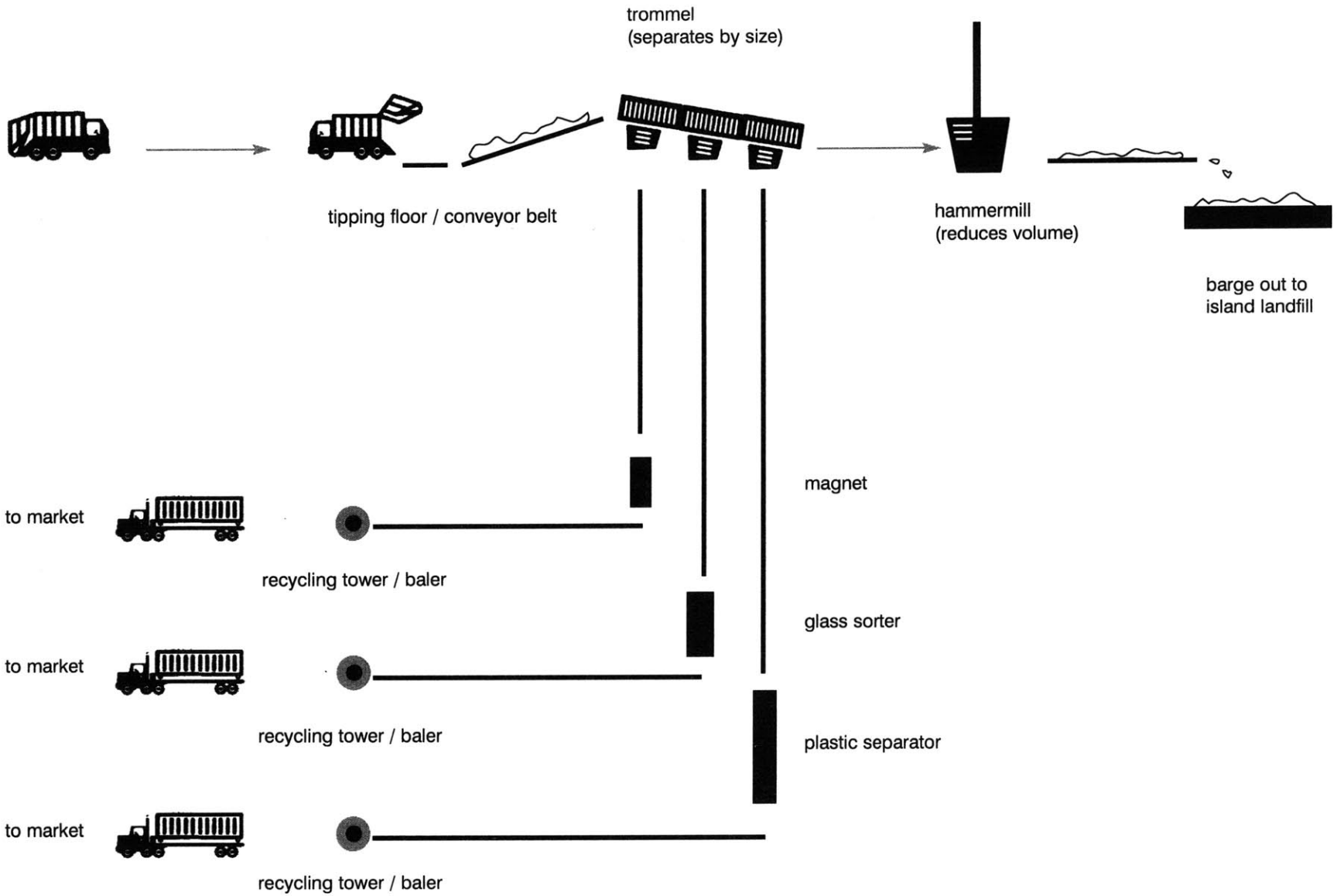
sketch showing location of major elements

movement

The garbage process begins with curb-side garbage collection twice weekly at residences and businesses in the Boston area. (In Cambridge, Massachusetts residential garbage collection occurs weekly by a fleet of 24 men and eight collection trucks. Cambridge municipal solid waste is about 85 to 125 tons per day.) From their collection routes, the garbage trucks approach the site by two ways. Vehicles servicing the North End enter the site from Atlantic Avenue on the northern edge of the site, while collection vehicles servicing the downtown of Boston emerge on the site from an exit off the submerged highway. Upon arrival to the site, trucks are queued and directed by supervisors located in a cantilevered administration building to dump their load onto the tipping floor. The tipping floor can service two collection vehicles at a time and is connected to the conveyor belt system that carries the garbage to the transfer barge. After dumping their load, the collection trucks exit the facility along Atlantic Avenue or out onto Richmond Street. The transfer station is aligned with Richmond Street to demonstrate that it is a part of the flow of trash, as much as road infrastructure is a part of the flow of vehicles.

front-end loader moving trash at a conventional transfer station's tipping floor

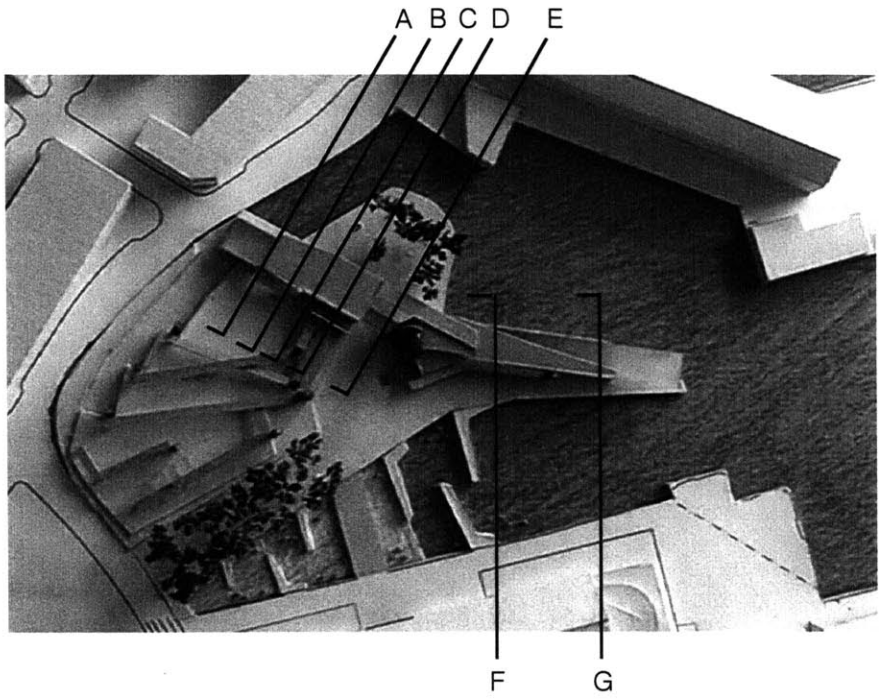
opposite diagram of the waste flow at the site for the proposed solid waste transfer station

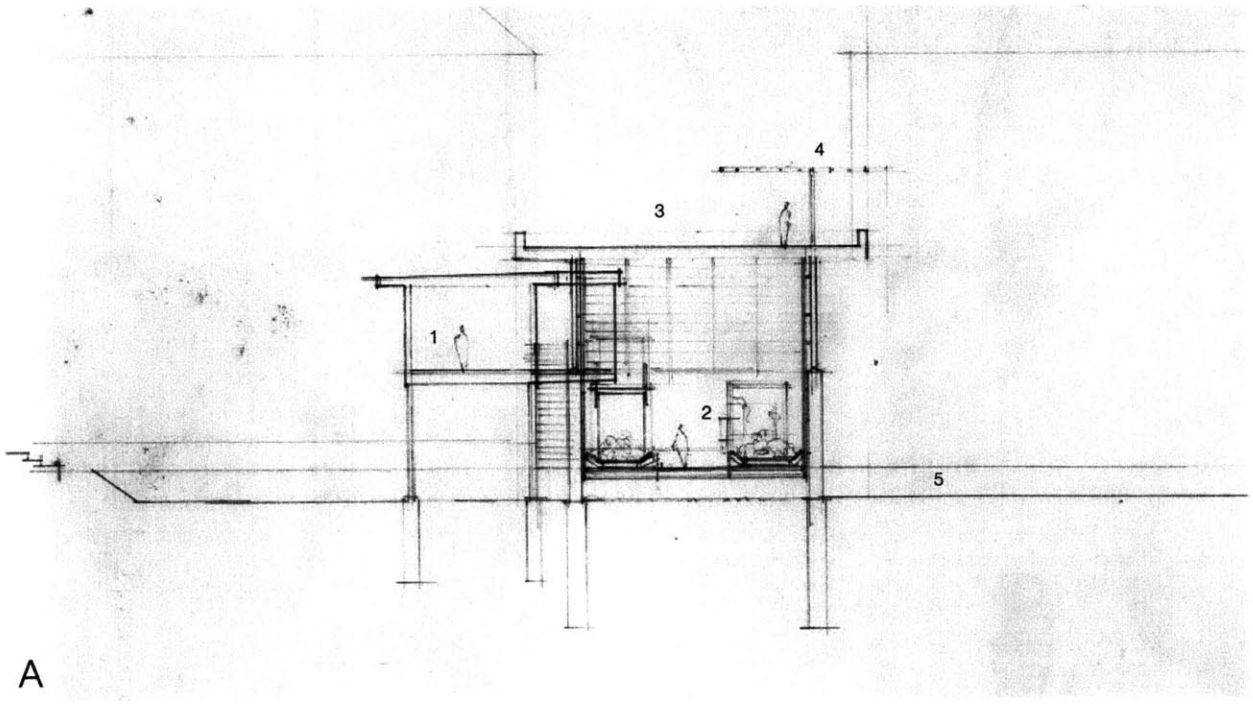

trommel
(separates by size)
tipping floor / conveyor belt
hammermill
(reduces volume)
barge out to
island landfill
magnet
glass sorter
plastic separator
to market
recycling tower / baler
to market
recycling tower / baler
to market
recycling tower / baler

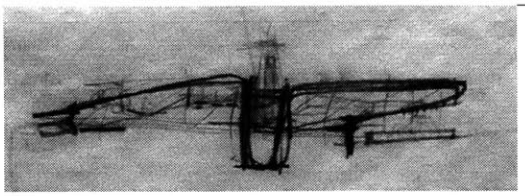
sections
this and the following six pages contain sections cut through the transfer station. these sections reveal the physical expression of the process of transferring garbage at the site. the sections expose and celebrate the movement of the garbage.

numbers on the drawings are keyed to the terms below.

1 administration area
2 conveyor belts
3 roof terrace
4 scrim
5 sunken field
6 pedestrian stair
7 recyclabes berm
8 trommel screen
9 hammermill
10 viewing area
11 seating for water taxi
12 trash barge
13 water channel

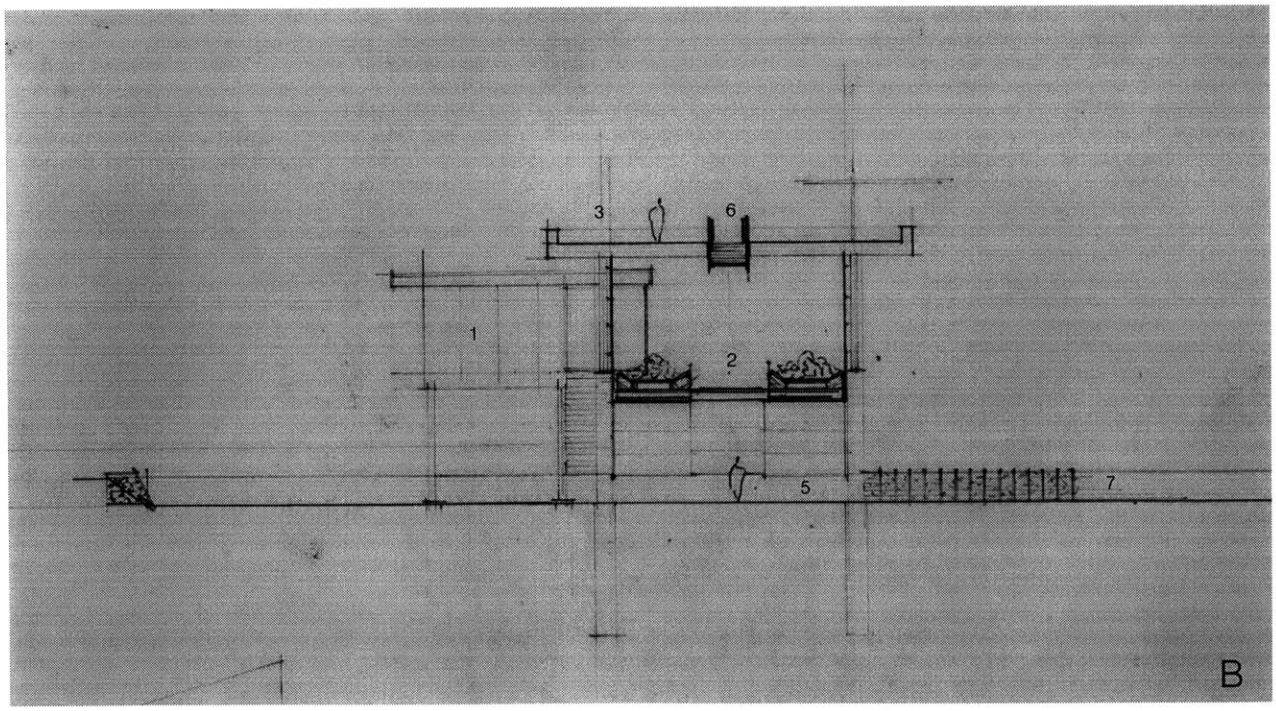


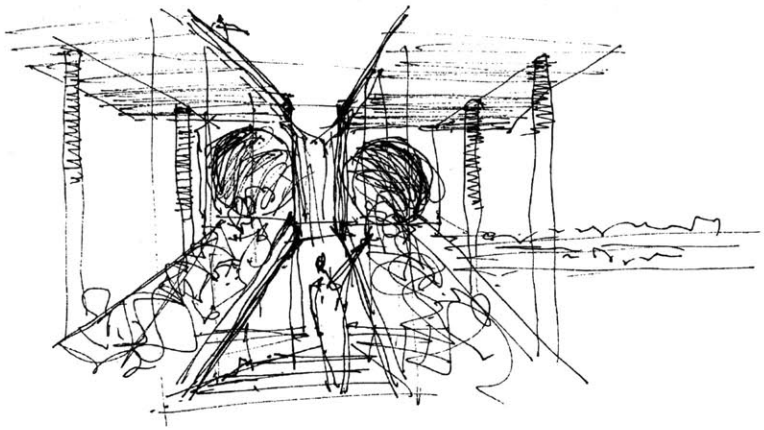




early sectional study

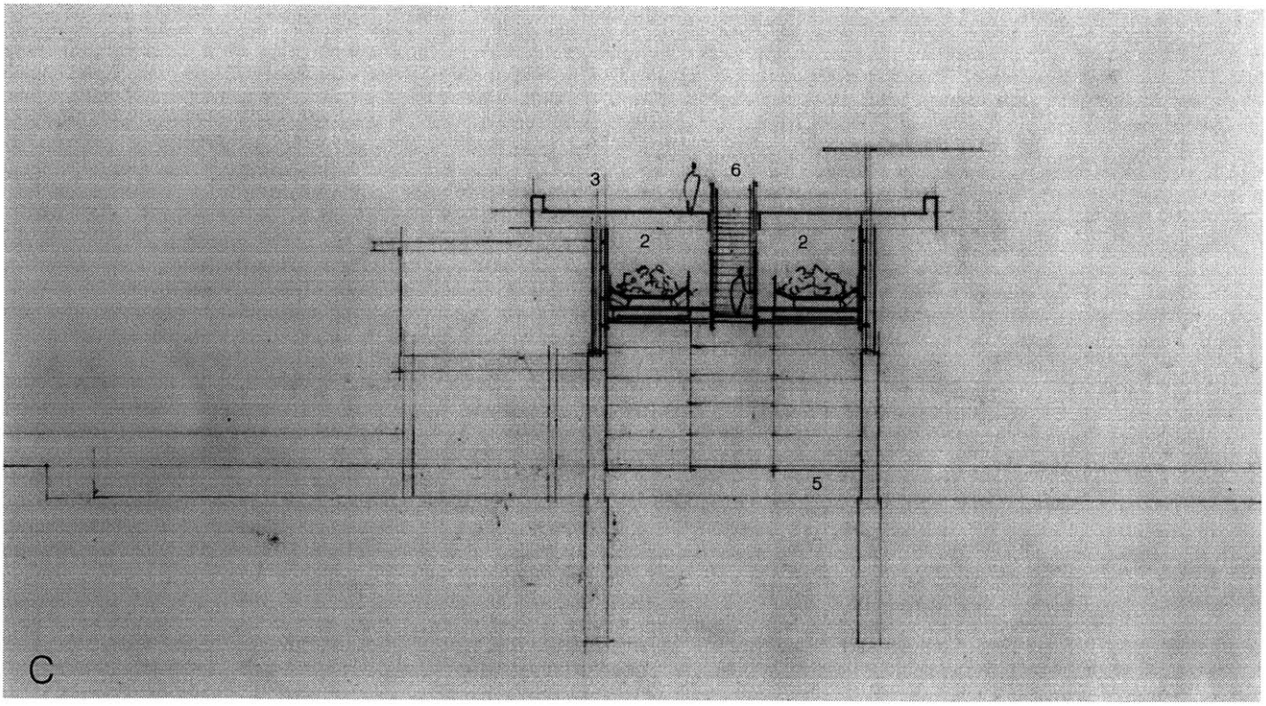
From the tipping floor, the trash travels through a bag breaking apparatus and is sprayed with a fragrance and washing solution to combat the usual smell. The conveyor belt slopes up over the open field to a trommel screen. The glass clad conveyor belt area allows park visitors to view the process from the market or grassy areas.





view of staircase in-between conveyor belts

In the trommel screen the trash travels through successive rotating drums and is sorted according to size. Trash that is extracted by the trommel emerges from the machine onto conveyor belts leading to other machines located above the market for final sorting for recyclables. Machines sort glass, plastic and scrap metal and non-comforming items are

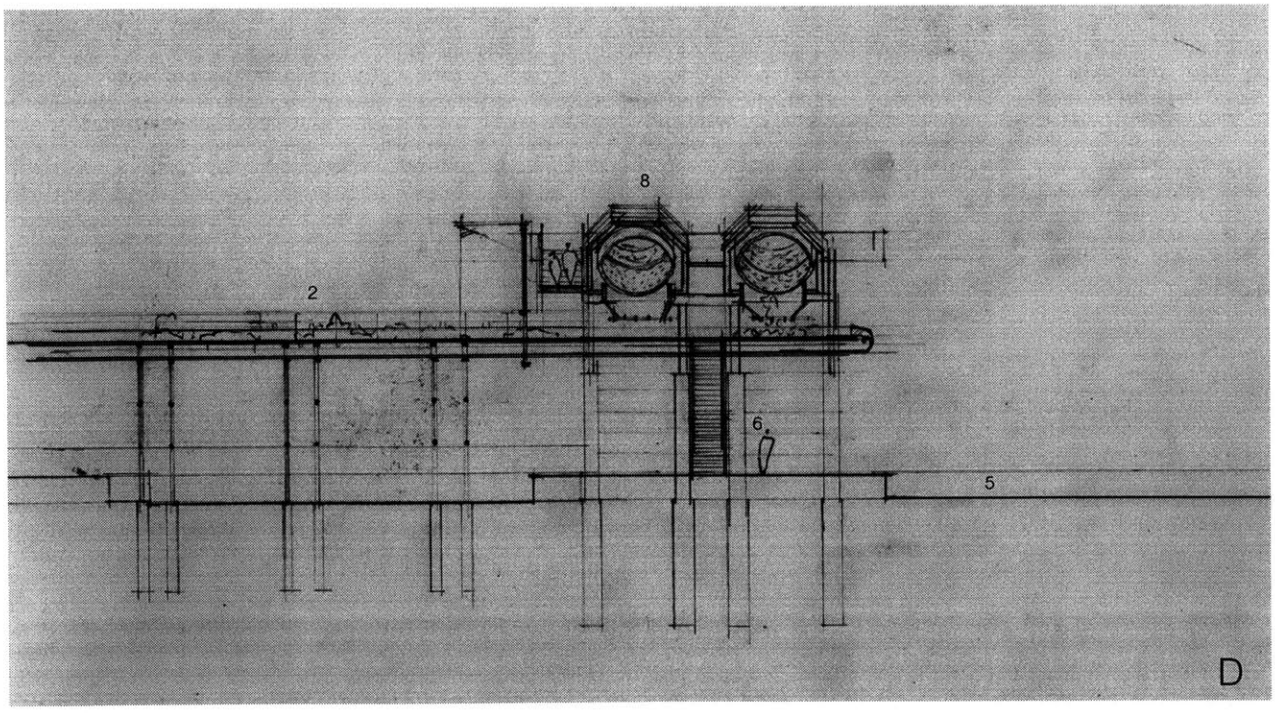


pedestrian movement and access

The movement of people through the park is choreographed in conjunction with the movement of the garbage. The public can amble throughout the park like any other, but there is a designed route through which a visitor can experience all elements in the process of transferring the waste. The route starts/ends in the open field with the sight of the recycle berms. Here are examples of what their garbage will look like in one year, two years and five days. From the open field a pedestrian staircase leads up through the middle of the first conveyor belt area. The staircase is encased in glass walls where it emerges into transfer station to allow the visitor to get a real-time, real-scale view of the workings of the transfer process. The staircase terminates on the roof terrace where visitors can oversee the entire site from a point thirty feet above the ground. Views of the market with the recyclables, the water channel and the access road are possible as well as views to the North End and downtown Boston. From above, the park's role in the city becomes apparent and visitors can hypothesize as to the role of waste in the city. Another stair leads from the

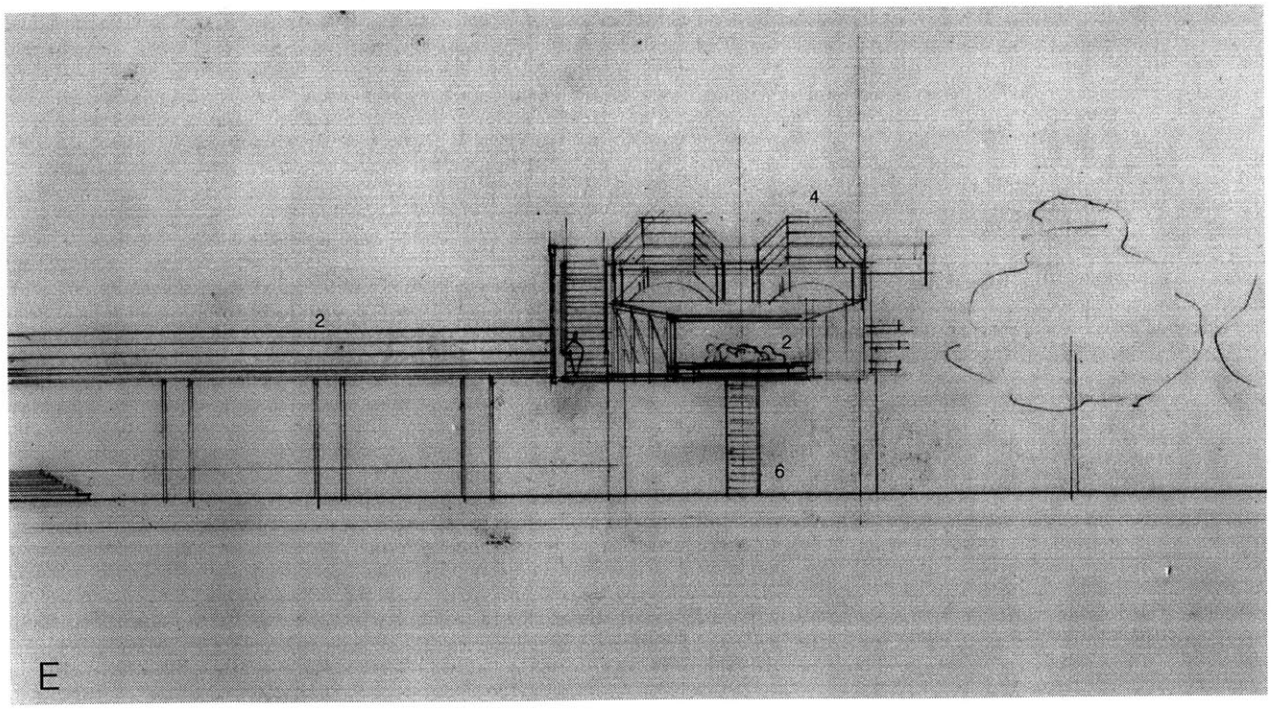
returned to the station and are sent to the transfer barge. This sorting process requires no manual input, and the machines can run in all types of weather with minimal maintenance.

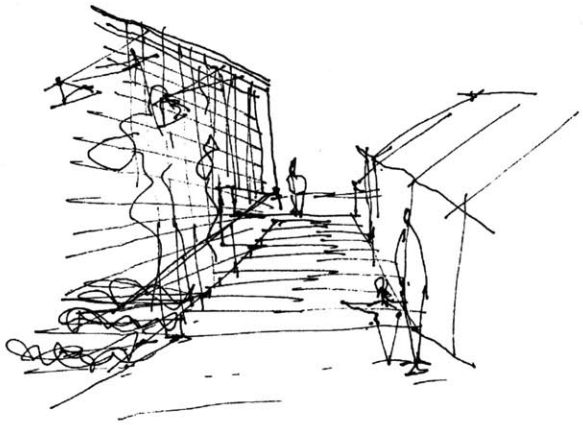
Although manual separation of recyclables is used at many transfer stations to improve performance or for economic savings, I chose to fully automate the process because I wanted



terrace above the conveyor belts that emerge from the trommel screens. The path continues along the hammermill to a viewing area above the trash barge. Here, people can see the crushed trash fall onto the barge and can compare the size of these pieces with those first seen on the conveyor belts. From the viewing area visitors can proceed onto the other roof terrace for views of the Harbor and the island landfill. Exiting the roof terrace places the pedestrian back on ground at the water channel. Since all the elements are open-air viewing can happen at all times of the year without supervision. The process may be viewed at all parts of the park, from seeing the tipping floor and conveyor belts from the open field to watching the recyclables emerge from the market area to observing the transfer barge while waiting for the water taxi. Designing for public access was important and it was a goal to hide nothing of the workings of an industry that has been hidden and stigmatized for far too long. Revealing the previously "unseen" infrastructure may be confrontational but it is through confrontation that change happens. Perhaps we will change our consumption and wasting habits if we are faced with their results and implications.

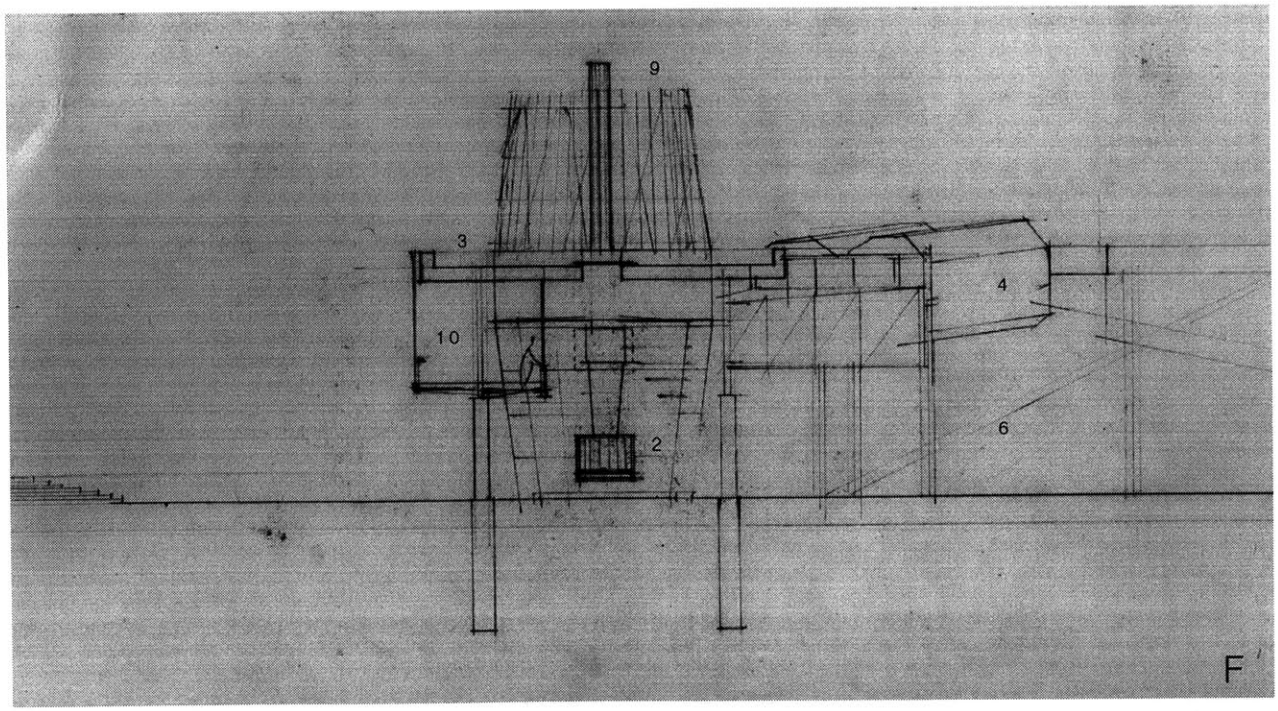
to explore using the machines in a park setting. The sorted recyclables travel on conveyor belts above the market back towards the access road. Here they are dumped into a recycling tower/ baling machine that compacts the recyclables before they are loaded onto a different truck and taken to a paying customer.

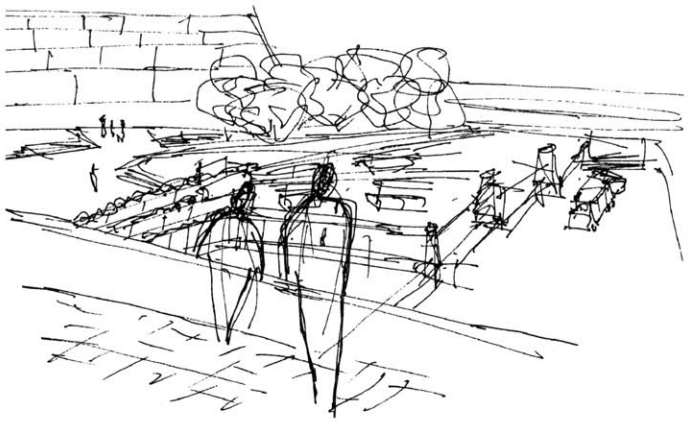




view on walkway along trommel with screen

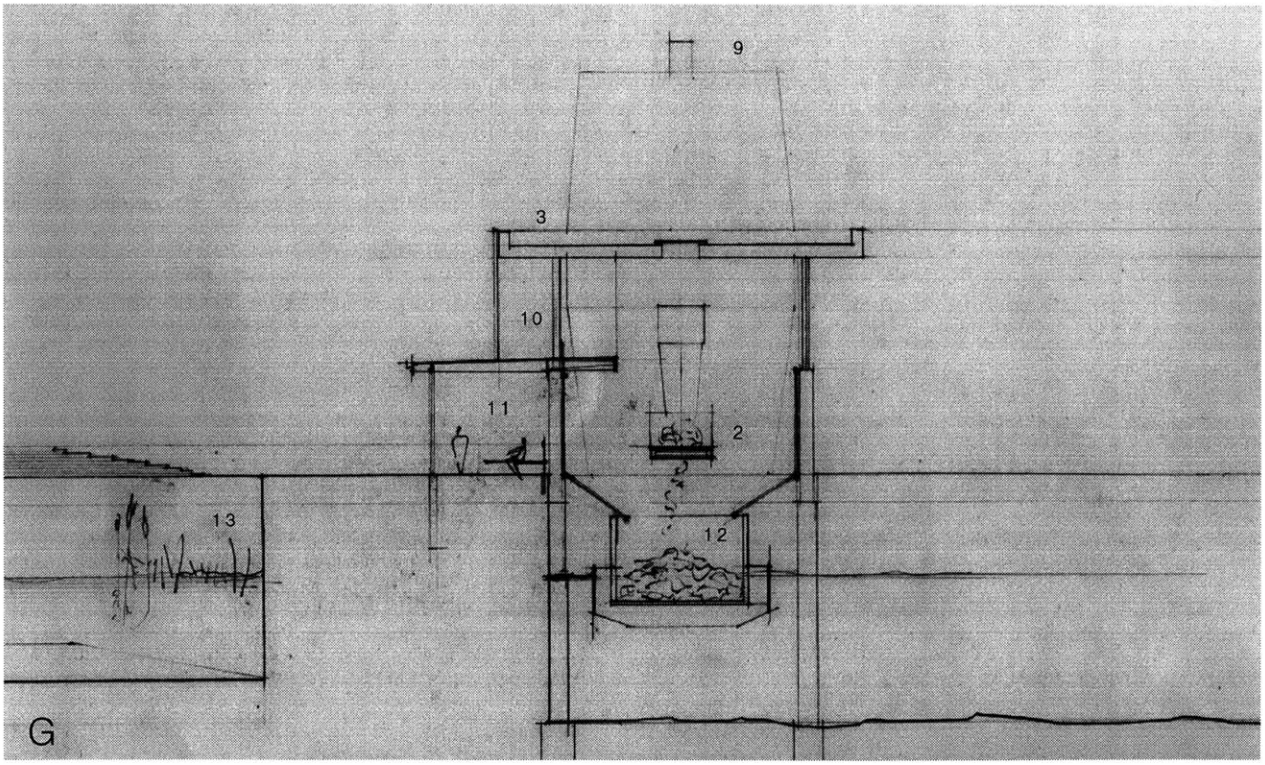
Trash that is too big to fall through some of the trommel's holes and that is not sorted by the recycling machines travels to the hammermill which reduces the size of the remaining garbage. From here it moves along another conveyor belt and then falls into the transfer barge.





view from roof terrace overlooking market

Once filled, this barge is pulled out to an island in the harbor and its contents dumped in the landfill.



view from along propsed Harborwalk

Harborwalk

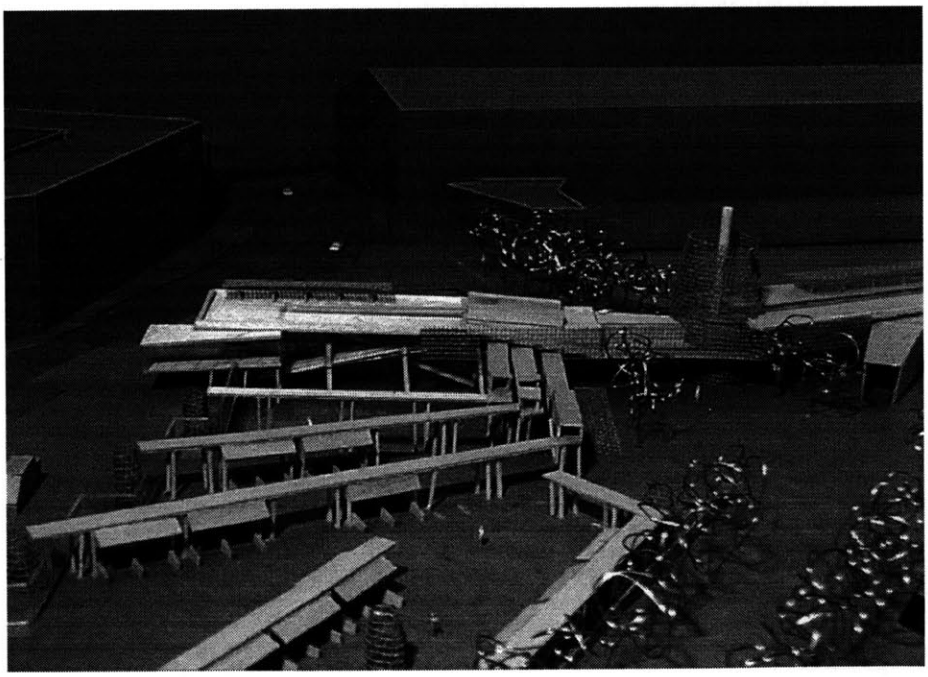
"...evey inhabitant who is a householder shall have free fishing and fowling in any great ponds, bays, coves and rivers, so far as the sea ebbs and flows..."[8]
This statement from a 1641 ordinance by the Massachusetts Bay Colony suggests equal access to Boston Harbor for recreational purposes. Interpreted today, the ordinance manifests itself in a public path along Boston's waterfront. All of the land's edge along the Boston Harbor is open to public pedestrian traffic. Instituted in 1984, "Harborwalk" was part of the Boston Redevelopment Authority's plan to revitalize the Boston waterfront as a tourist and historical destination since the area had long ceased being a major commercial center. The waste park provides a "harborwalk" under an allee of trees that connects the park with Commercial Wharf to the north and Long Wharf to the south. The walk travels through all three areas of the park as well as underneath a "bridge"of garbage leading to the hammermill. Experienced in conjunction with the public route through the transfer station, the "harborwalk" provides the visitor with a complete overview of the park.

[8] Boston Redevelopment Authority, **Boston Harbor,** p. 1.

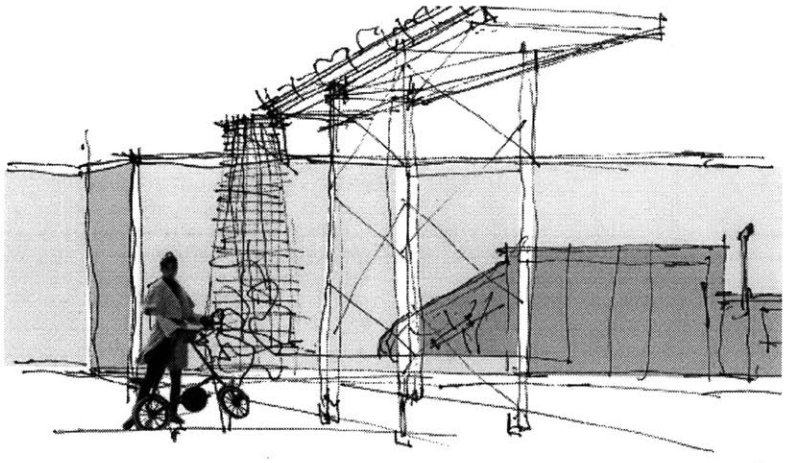
access

One aspect of the site where an overlap between the waste infrastructure and the public park is not wanted is in the access to the park. Pedestrians do not want to have to scan for garbage trucks before entering the site and vice versa. And, pedestrian access to the site should not deviate from existing public paths and entry routes. Separating the trucks from the public by constructing a barrier around the truck access to the site would provide a solution, but this would go against the goal of revealing the unseen infrastructure. The trucks, like the rest of the waste infrastructure, should be seen but not physically confronted.

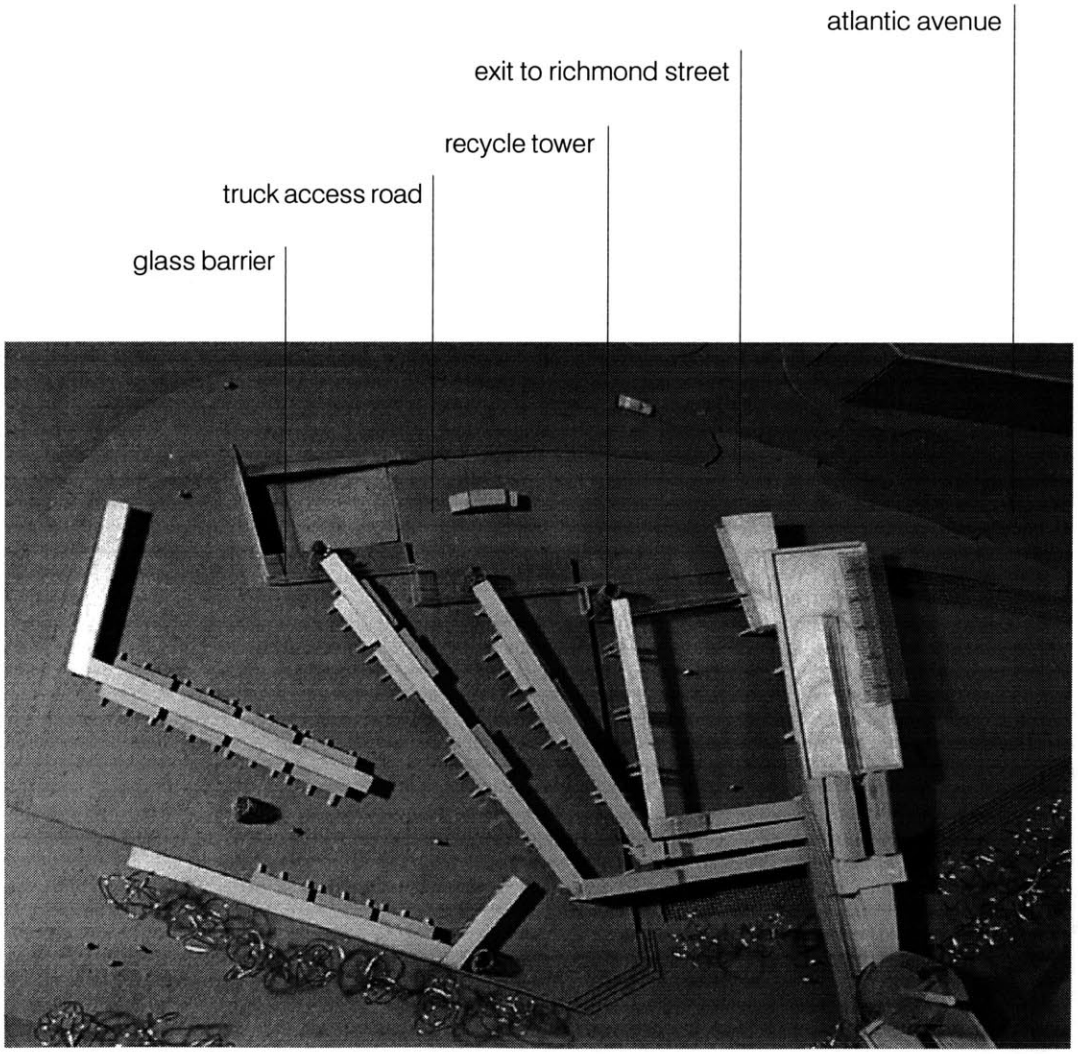
Locating vehicular access to the northwest side of the site allows for the public path from the Quincy Market area to the site, the "Walk to the Sea", to be kept intact. Located along Atlantic Avenue, the truck entry to the site will be along one of the busiest streets for commercial traffic in the North End. Visitors to the waste park can still see the trucks as they enter the site, behind a glass barrier. The glass barrier, similar to the one cladding the actual transfer station, allows views of the recycle towers, baling machines and truck access road. People will be able to follow a truck's trash load from tipping floor to conveyor belts to barge, getting a sense of how much trash a collection truck can carry.

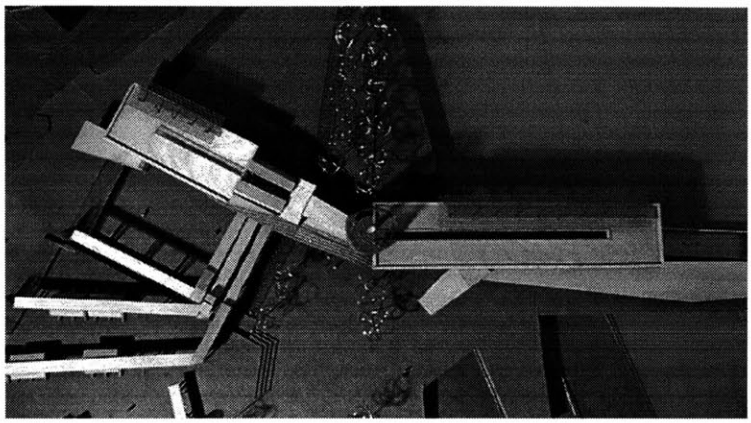


view of transfer station looking from above market area



sketch of glass barrier and garbage truck





view of model showing the two parts of the transfer station

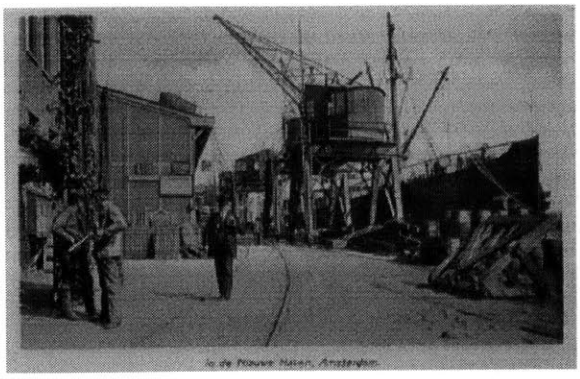
two parts

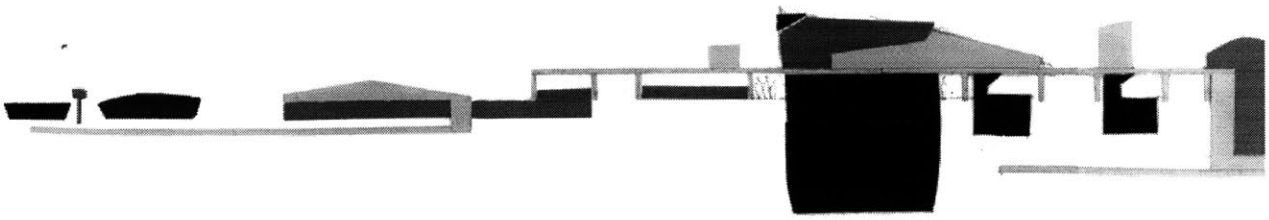
The physical mass of the transfer station is separated into two parts which are hinged by the hammermill. Each part corresponds to a particular aspect of the transfer process on the site. The first half of the station, the urban half, provides access from the city to the station. Here the tipping floor and the trommel screens are located. This part of the transfer station receives the garbage from the city, screens recyclables from it and returns the recyclables to the city. Once the unsorted garbage leaves the trommel for the hammermill, it is destined for the landfill. The hammermill plays a critical role in preparing this garbage(size reduction) for the landfill and is thus given a prominent location and expression. On the site, the hammermill is the node which represents the shift between recycling and landfilling.

view showing "urban" part of the transfer station above the open field

wharf buildings and machines, taken from old dutch postcards

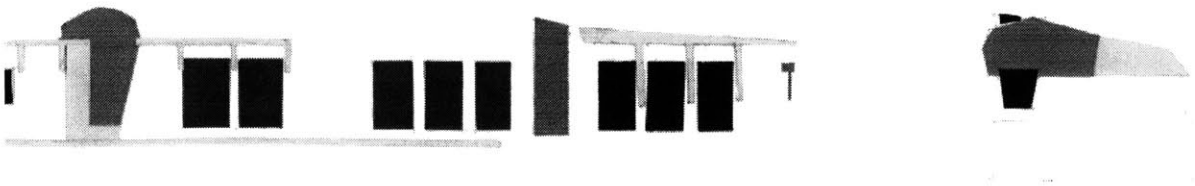
The second part of the transfer station is located along the water and houses the barge and seating for the water taxi. Whereas the first part of the station is associated with the city, this area is about production. Like the wharf buildings at the site before it, the transfer station depends on the exporting and the importing of products for its economic livelihood. Instead of food (United Fruit Company), however, this transfer station depends on commuters and garbage. Machines are celebrated at the waterfront where they are associated with industry. The design of the hammermill alludes to this tradition; at a height of 60' it is the most prominent element at the site. The hammermill, like waterfront machines of another era, marks the site and embodies the industrial workings of the waste industry.



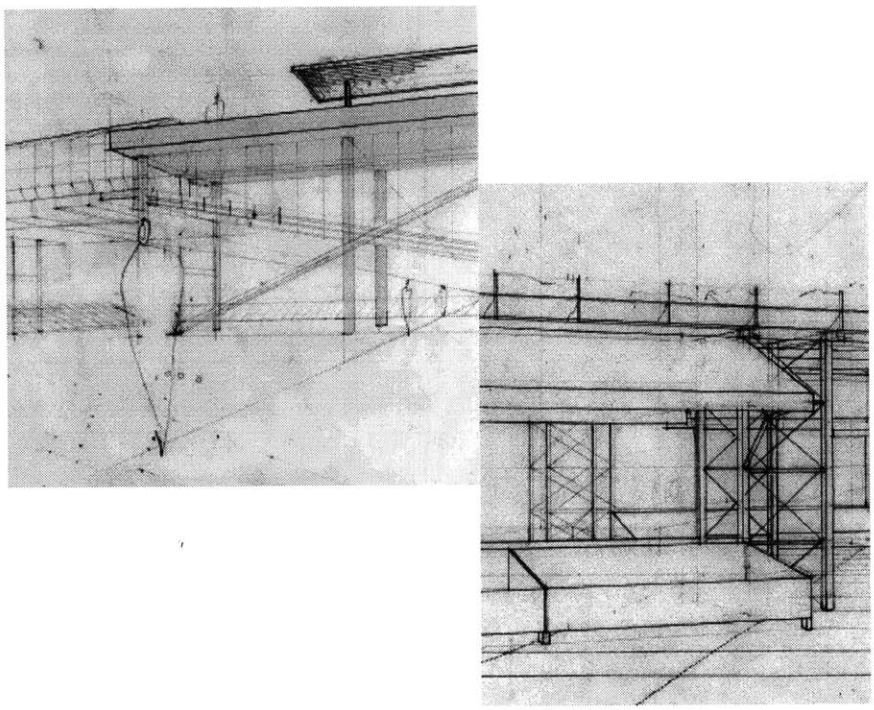


structure

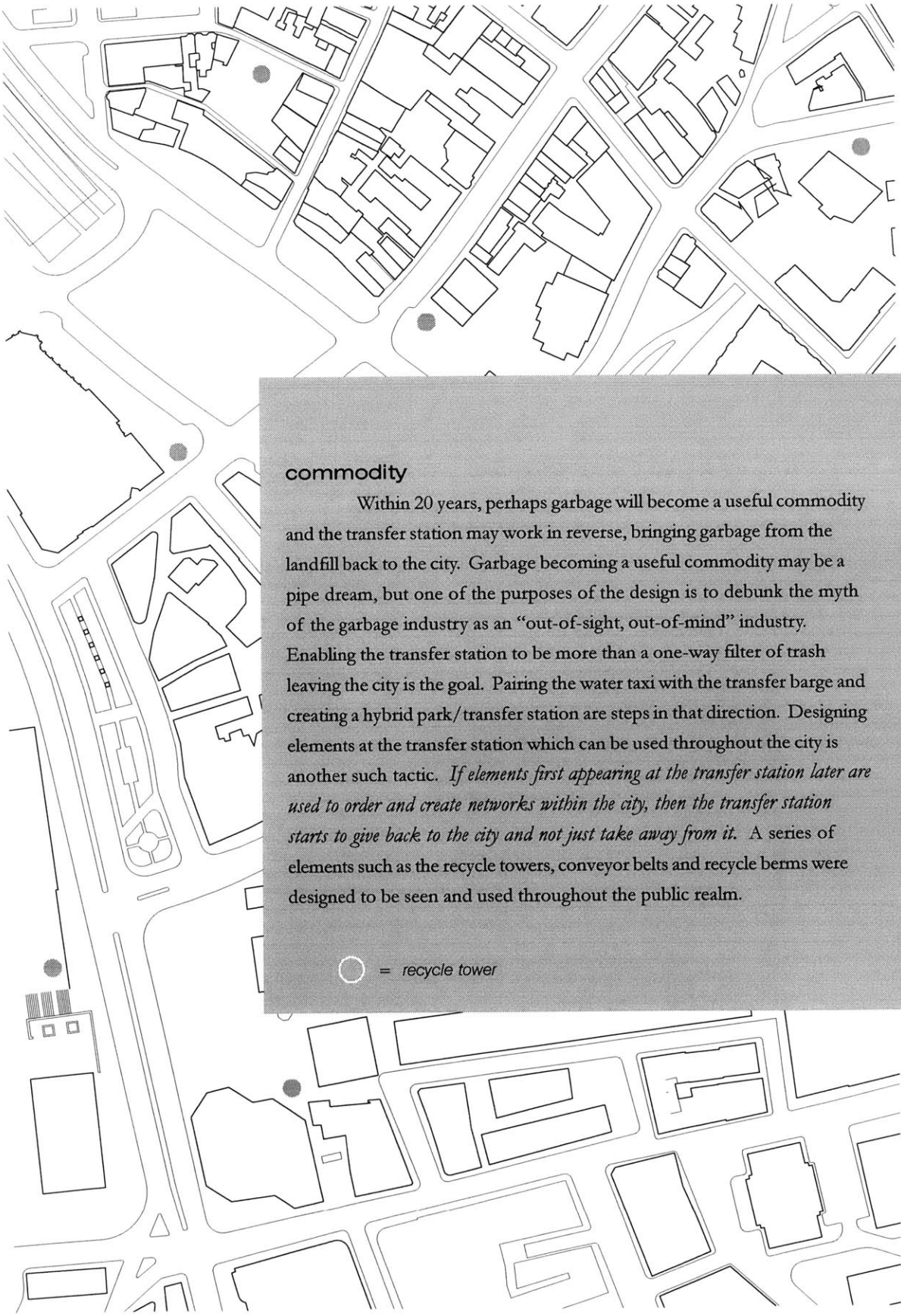
The tectonic expression of the transfer station itself is designed to reflect the various speeds of the garbage industry. The structure accomodates public components like the market stalls and pedestrian stairways. A concrete slab roof and pilotis give the station a solid and permanent structure. The steel infrastructure and machinery is designed to handle the everyday load of the garbage, yet allow for updating and modification as necessary advances in the technology of the garbage industry are introduced. It is estimated that the steel structure and machines will change in some fashion every five years; this change can be made without compromising the concrete superstructure of the transfer station. Another advantage of separating the superstructure from the machinery is that, over time, the site may no longer be required to function as a transfer station. This flexibility in the structure also allows the capability to move out the waste industry so that another industry may move to the site and use the existing concrete shell structure. Allowing for adaptation and mobility in the design anticipates change and prepares for it in advance. Variables like machine life-span and quantity of delivered trash demand that the building adapt; however, the permanent elements of the structure such as the steel scrim encourage the growth of climbing plants so that the transfer station's duration at the site can be determined.



early study of process and separation of components



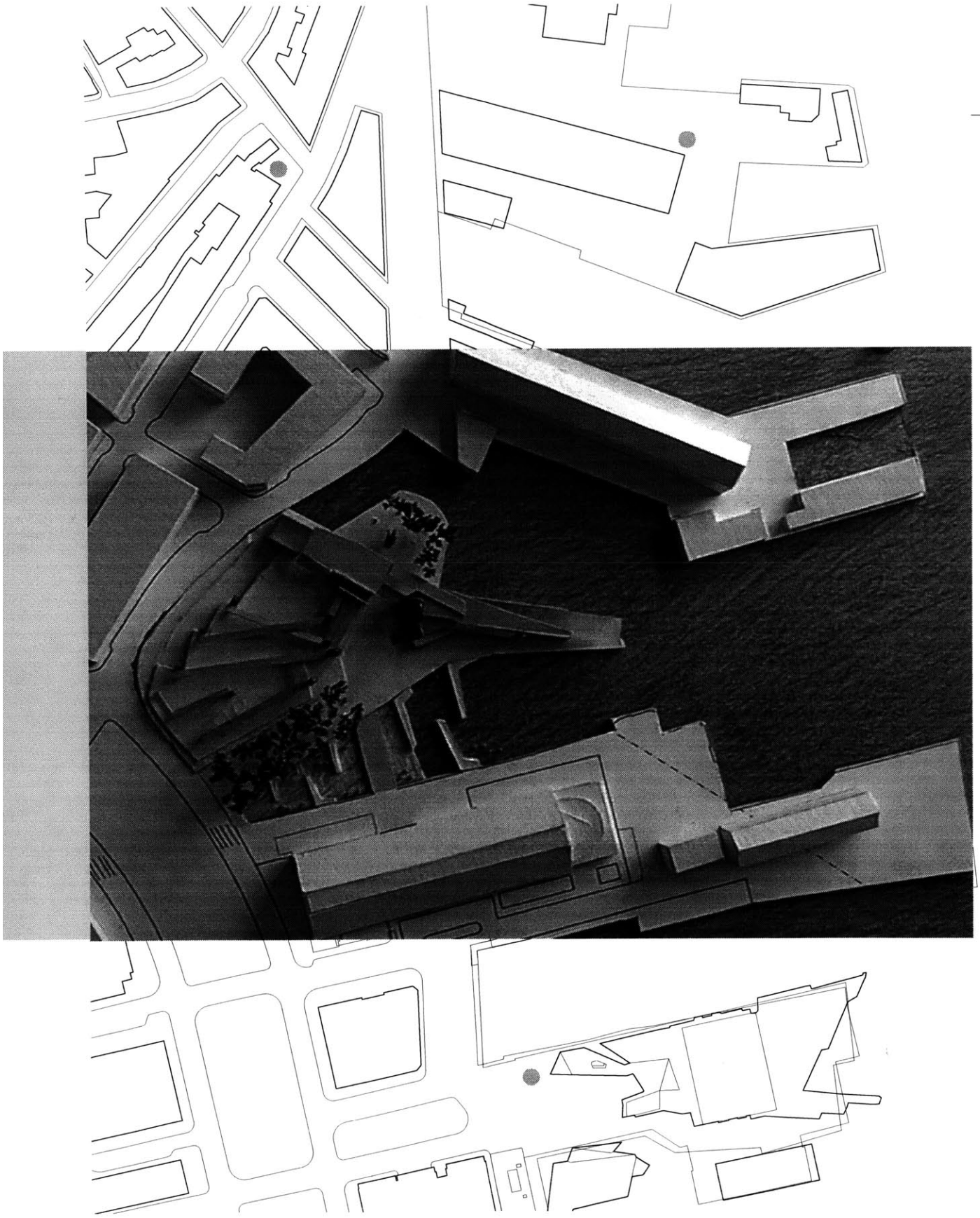
perspective sketches showing concrete structure of transfer station building and the conveyor belt / market stall

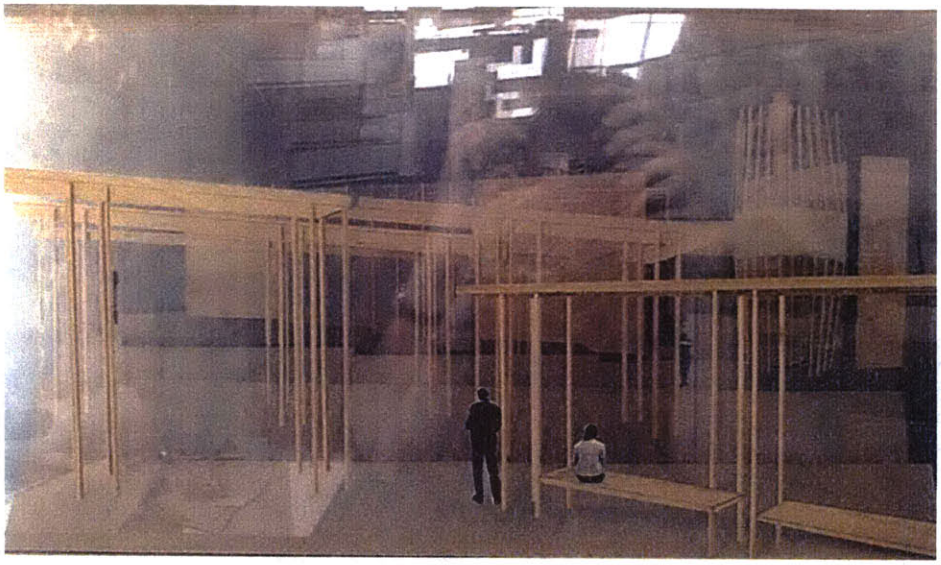


commodity

Within 20 years, perhaps garbage will become a useful commodity and the transfer station may work in reverse, bringing garbage from the landfill back to the city. Garbage becoming a useful commodity may be a pipe dream, but one of the purposes of the design is to debunk the myth of the garbage industry as an "out-of-sight, out-of-mind" industry. Enabling the transfer station to be more than a one-way filter of trash leaving the city is the goal. Pairing the water taxi with the transfer barge and creating a hybrid park/transfer station are steps in that direction. Designing elements at the transfer station which can be used throughout the city is another such tactic. *If elements first appearing at the transfer station later are used to order and create networks within the city, then the transfer station starts to give back to the city and not just take away from it.* A series of elements such as the recycle towers, conveyor belts and recycle berms were designed to be seen and used throughout the public realm.

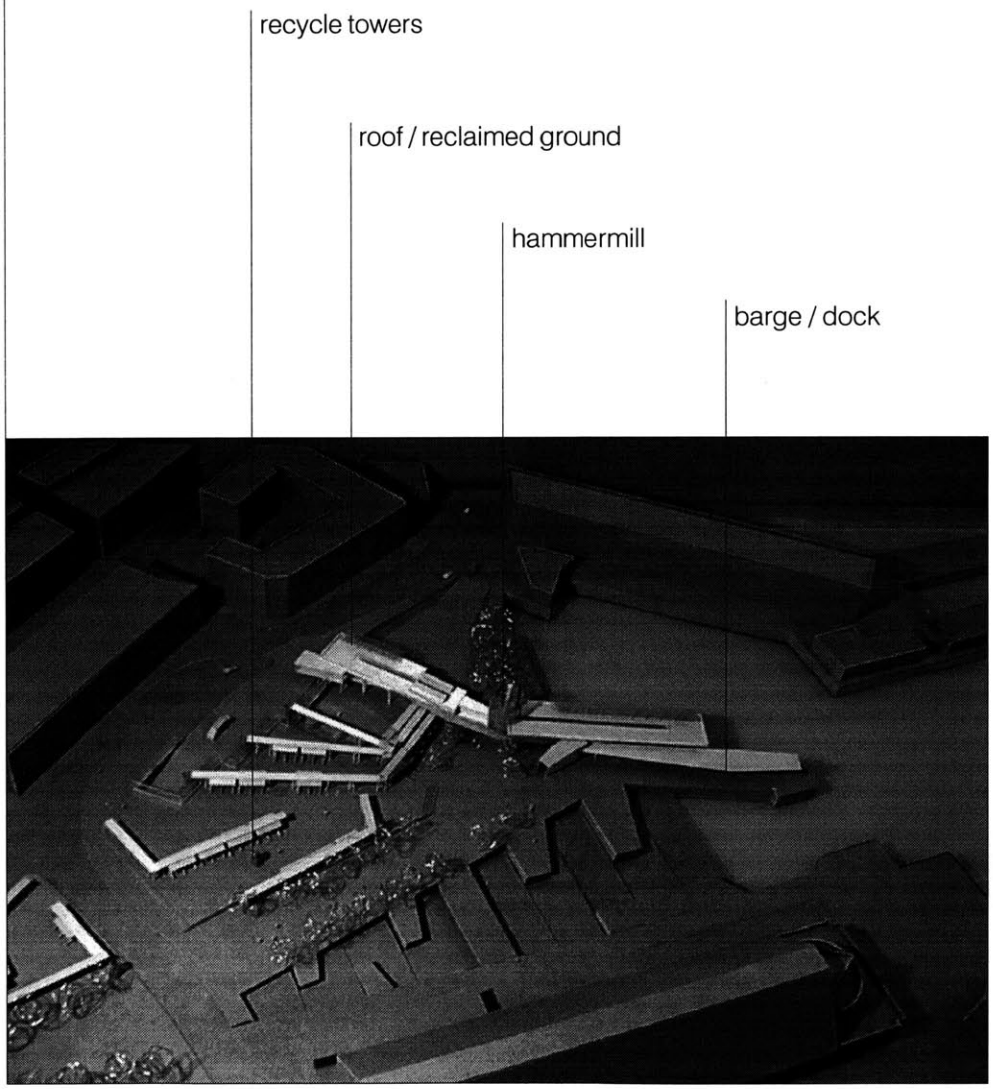
○ = *recycle tower*





exploded perspective
of market area

Most of the elements at the transfer station were generated from standard items at conventional waste infrastructure sites (trash cans, shredding machines, etc.) but modified through the addition of another program or use. Through sensory contact with the components of the transfer station the visitor is most connected with the waste process. The individual elements of the site provide clues towards an expression of a *public* waste infrastructure.

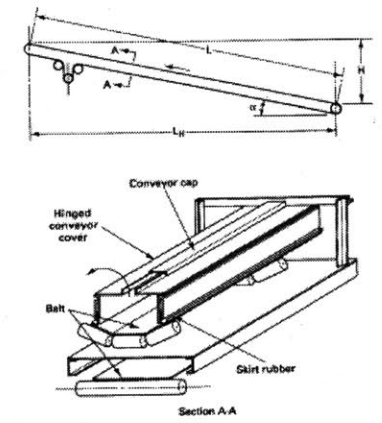


overall model view

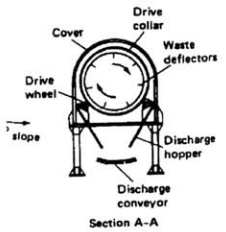
the barge / dock

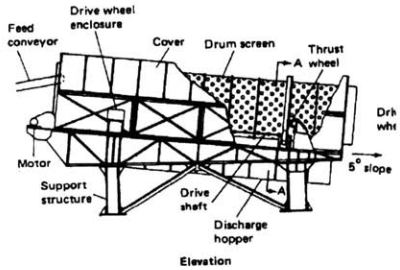
machines

Machines, as much as trash, are residents of waste infrastructure. The following drawings are examples of the types of machines likely to be found at transfer stations involved either in the recovery of recyclables or in the size reduction of the remaining commingled garbage. Not every machine will be found at every transfer station, but examples of combinations are shown in the description of existing waste infrastructure found in Appendix B.



conveyor belt





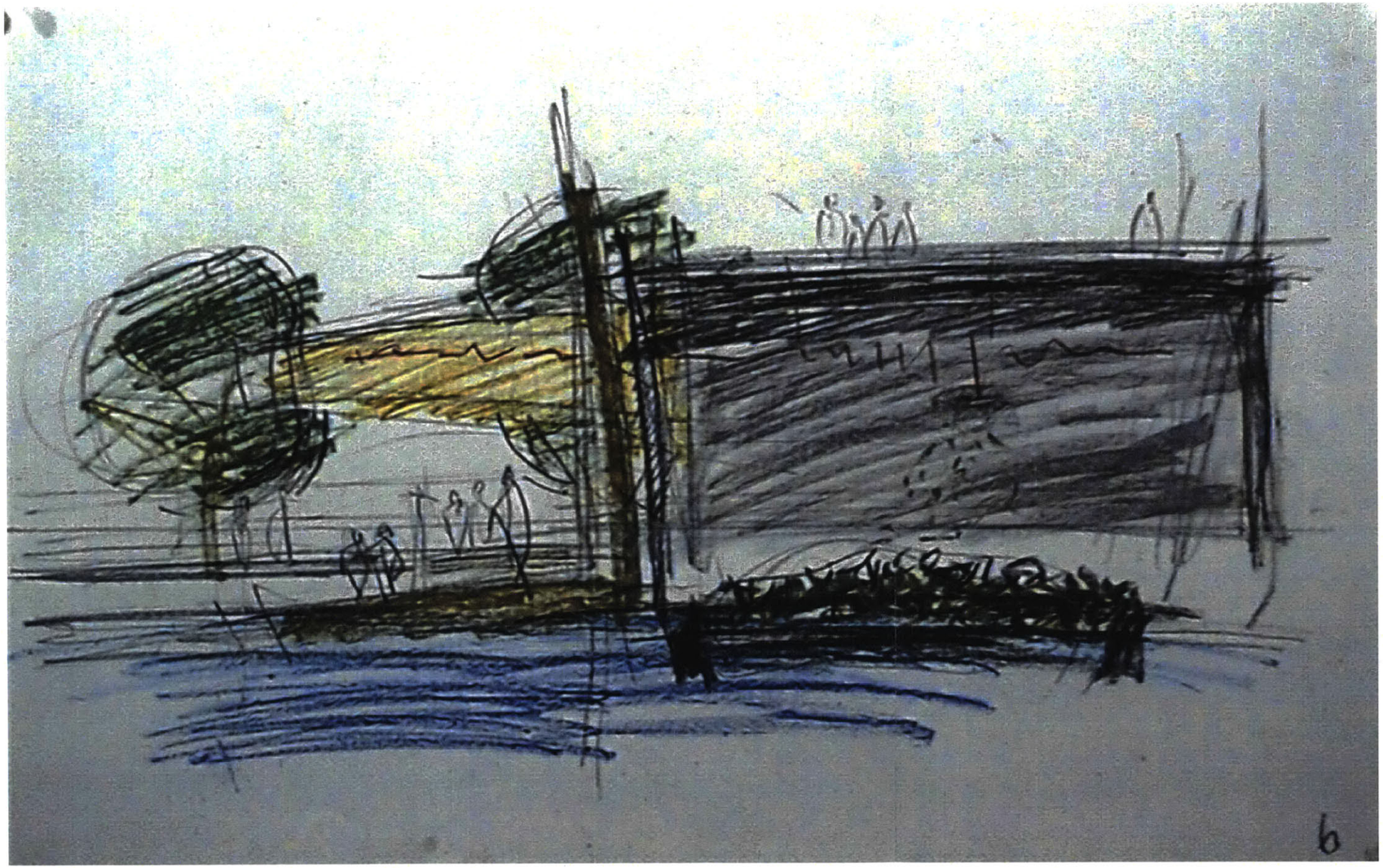
trommel screen

smell

At most conventional transfer stations the public is not allowed close to the garbage. Smell, as well as safety, is a concern. Most garbage smells because it has been stagnant for too long. At the designed transfer station, the routes of the collection vehicles and the transfer barges will be synchronized so that the barge leaves for the landfill immediately after it has been filled and no transfer barge remains at the transfer station overnight. While this "just-in-time" routing system does not guarantee a smell-free transfer station, taken in conjunction with the cleansing and fragrance spray, steps are taken to mitigate this notorious trash nuisance. (Upon visiting transfer stations and other waste infrastructure this summer I was not overwhelmed by the smell. The places did not smell like a rose garden, yet they were not unpleasant by any means.) Also, locating the fresh produce market at the site and receiving breezes off the Harbor will help counteract any potential smells.

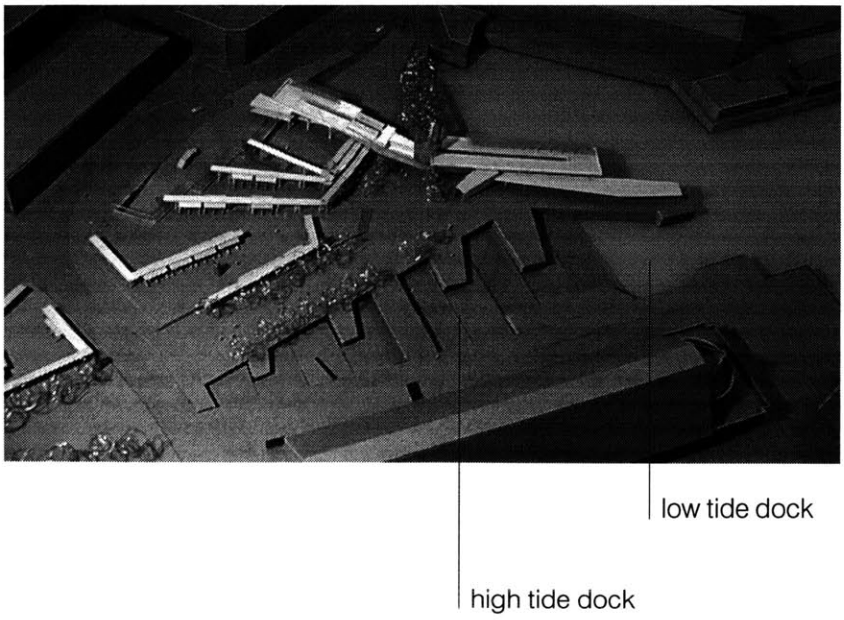
barges filled with trash awaiting towing to Fresh Kills Landfill, NYC

leaf conceptual drawing showing design study of the barge/dock overlap


6

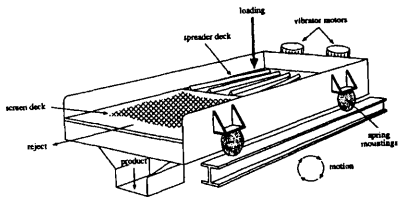
integration

The dock area is a formal reference to the wharf "finger pier" buildings of the Harbor's 19th century industrial past. At the dock, the transfer station provides covered seating for commuters waiting for the water taxi as well as a shelter for the barge while it is being filled with trash. A steel mesh divides the commuter from the trash area as well as keeps any stray garbage from falling into the Harbor (Section G). The commuter boats pull into the water channel on the site as far as the tide will allow. At high tide the boats will able to dock close to the bridge connecting Long Wharf to the waste park. The commuter boats and the trash barge are integrated into the site design and linked to each other. At the end of the day, when the trash barge follows the commuter boat out to the Harbor, commuters will sense that their trash is valuable, perhaps even more than their $5 seats. This overlap of programs and experiences is intended to raise larger questions regarding wasting and our waste infrastructure.

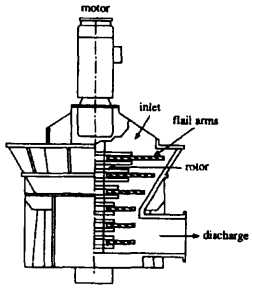


overall photo of site model showing location of commuter boat docks

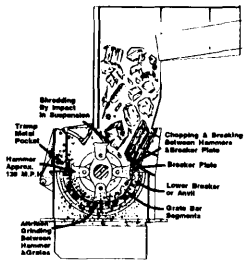
the hammermill

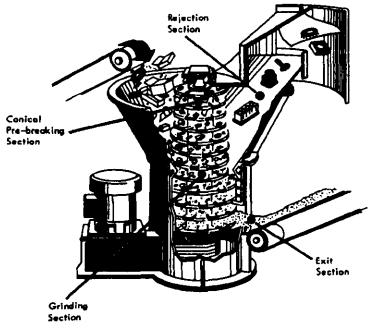


vibrating screen



vertical shaft flailmill





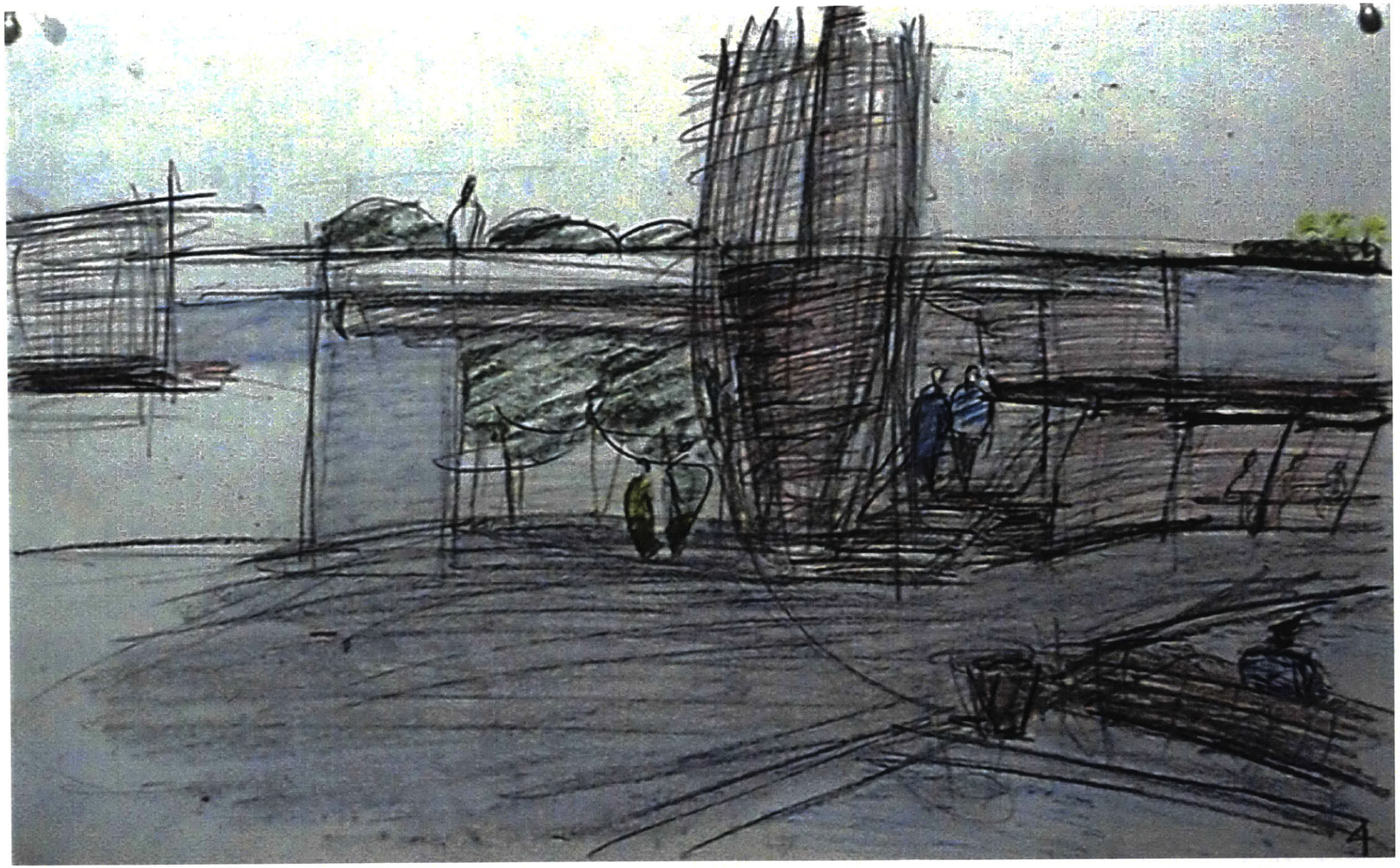
hammermills

sounds

The sounds of the productive park are not just birds chirping and breezes rustling through trees. On the site the trommel screen, recyclable separators, hammermill and conveyor belts all make noise. Some noise will be abated by the plantings on-site, but during the day the site will not be quiet. Not only machines, but also activity in the market, recreation in the open field and boating at the water channel will contribute to the park's aural display. The sounds of the transfer station will not proceed all day or night without interruption. It is intended that the machines will run only when transferring and processing the trash. Much like the "fresh bread" signs at bakeries, sound will be a signal that the transfer station is working. This will not be a park where visitors need to bring earplugs, however. In addition to the plantings (trees, climbing plants, etc.), noise reduction will be sought through sound insulation in the machinery.

The machines themselves will be accented by being painted in vibrant colors and through spotlighting them at night. Spaces around certain machinery might also become meeting places and become identifiable with the site. "Go play children, but be sure to meet your father in half an hour under the eddy current machine."

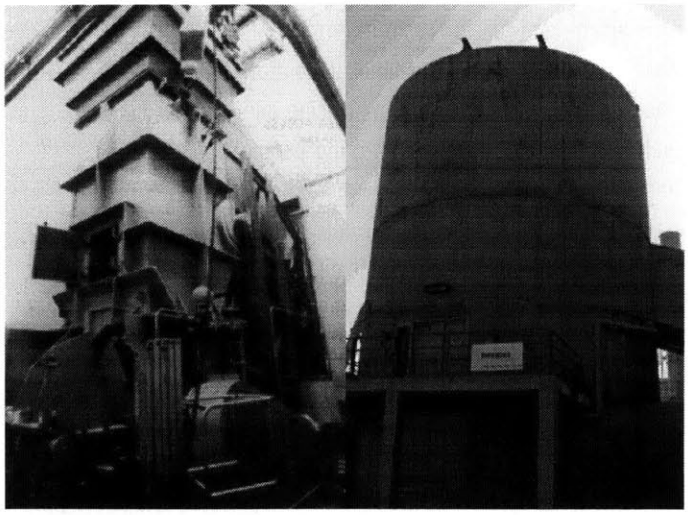
leaf conceptual drawing showing design study of hammermill and harborwalk



hammermill

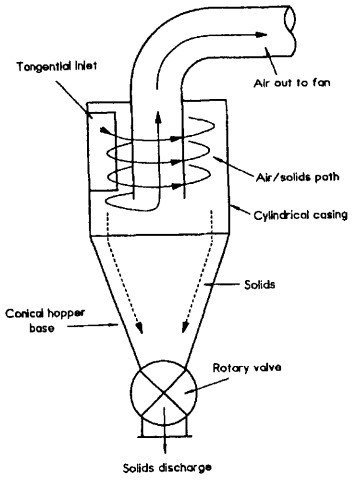
The hammermill is the focal point of the transfer station. The design stems from an existing hammermill that was accentuated to make its importance in the waste infrastructure known. Monumentalizing this machine creates an identity for the site, a marker next to the water. The rest of the transfer station is somewhat subdued underneath its 30' tall concrete roof, but the industrial nature of the waste processes manifests itself in the 60' tall hammermill. Many other buildings in the site's context have roof heights of 60' so the hammermill is not large in comparison to its surroundings. The physical expression of the hammermill structure consists of a conventional machine, exaggerated in size, and a steel mesh wrap. The steel mesh prevents visitors from contacting the machine and also prevents injury if the machine malfunctions. At existing transfer stations in some states, size reduction equipment must be placed within concrete shells to prevent injury from explosion. (Explosions can occur when trying to quickly and substantially reduce the size of elements of the waste stream and items jam the machine) Isolating the machine but still exposing it as part of the process was important in the design.

proposed hammermill

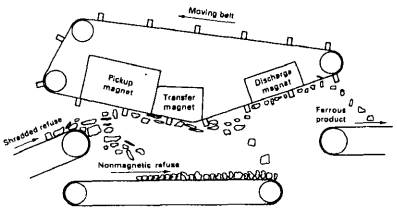


views of the inside and outside of a shredding machine at a conventional transfer station. note that the steel machinery is completely independent from the concrete encasing

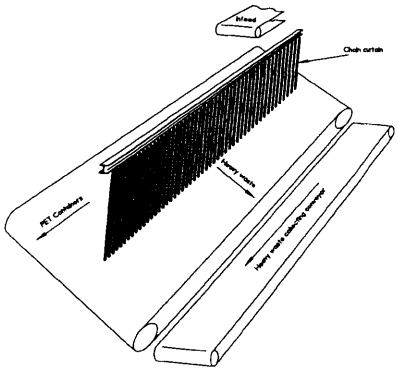
recycle towers



cyclone separator



overhead magnet



plastic separator

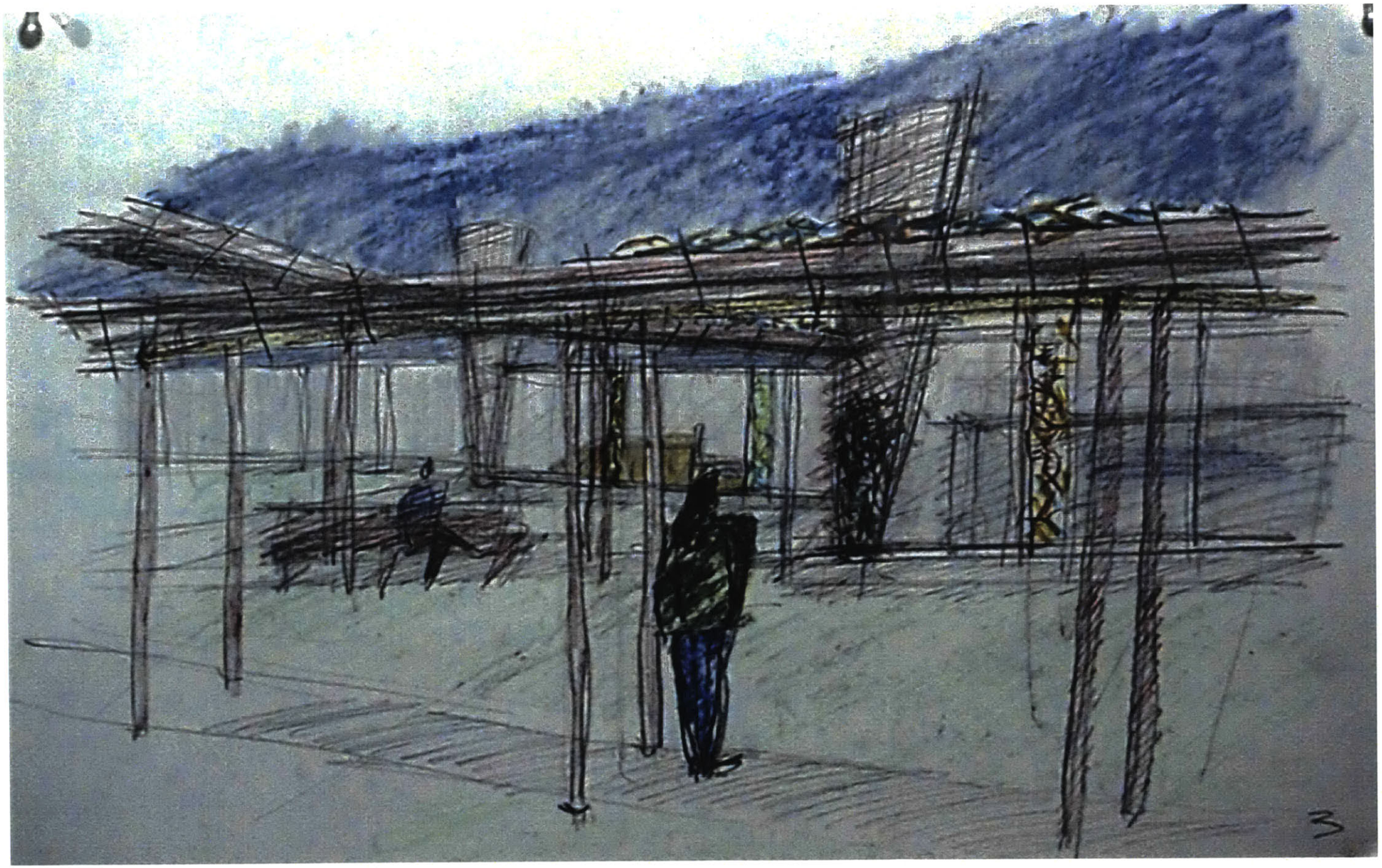
sight

The recycle towers are multifunctional; at the site the basic form appears in a variety of scales, from a trash can to information kiosk to large-scale holder of recyclables. The design is a variation on the wire-frame trash can. A steel mesh forms the outline of the recycle tower, giving it the same external expression as the hammermill. This steel mesh is given a conical shape to provide stability within the frame and to allow for the inevitable settling and spreading out of the trash. Giving an information kiosk the same physical structure and expression as a trash kiosk equilibrates the two items. Both are necessary in the infrastructure of a city, and both should be seen as important. It is intended that this type of trash kiosk/recycle tower be placed throughout the city in areas serviced by this transfer station. The process of the transfer station is extended out into the city into residential and commercial trash cans. People will be able to identify where their garbage goes after they place it on the curb. This act of taking the ideas from the transfer station back into the city brings a conspicuousness and consciousness to an industry about which most people never think or are never confronted.

The shame and fear of waste have made its facilities invisible, inaccessible, uncontrollable, and unsafe. Instead of distancing ourselves from waste, design can bring people closer to waste operations and help foster creative solutions to problems intrinsic to waste disposal, issues common to all people.

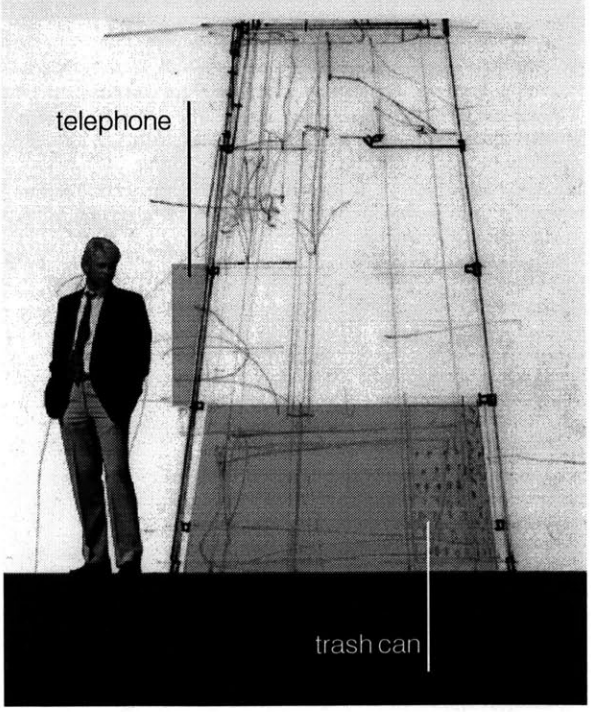
Mira Engler, **Waste Landscapes**

leaf conceptual drawing showing design study of recycle towers connected to conveyor belts


3

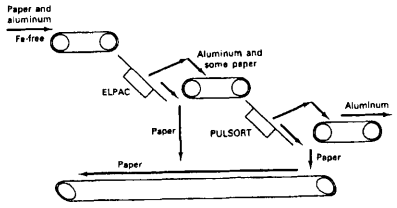
convergence

Independent networks of trash cans, telephones, automatic teller machines and other items exist within a city. The intended design of the recycle tower is to consolidate some of these networks into one item of infrastructure. A recycle tower could easily incorporate a telephone or ATM into its expression. Doing so would also help alleviate the stigma associated with waste; the idea of delivering a positive service (phone, money) is key in the removal of the stigma. (We like seeing the UPS person yet not the sanitation worker because we transfer the idea of the message to the messenger; we like the idea of receiving new items more than discarding something unwanted.) Sanitation could be allied with information infrastructure (phone, cable and internet etc.,) to provide a holistic view of providing services to a community. If a trash can was associated with an ATM or telephone, the next step would be a consolidation of service workers. The sanitation worker could be trained to fix ATM problems or update phone service and ATM and phones service workers also could be trained in sanitation. This conciliance between industries will help to raise the public perception of workers in the service industries.

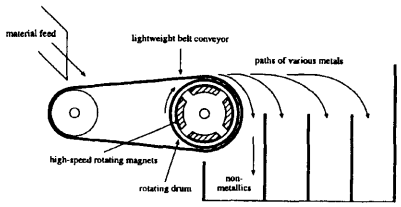


proposed recycle tower

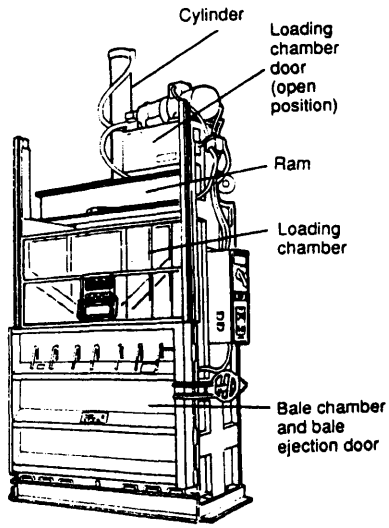
roof / garden



aluminum sorting system



eddy current separator



vertical baler

(in) touch

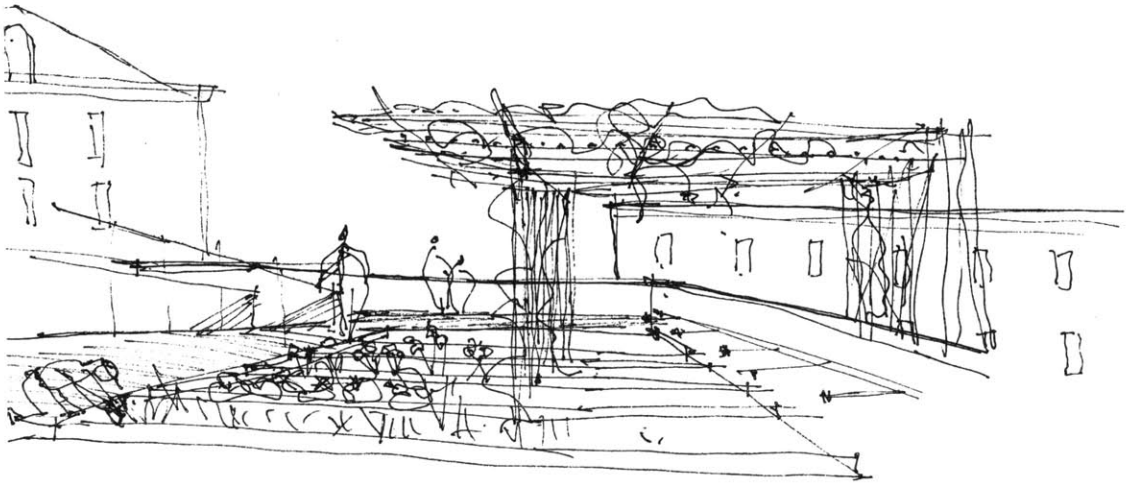
On the roof, a community garden is planted with climbing vines and other greenery dependent upon the individual gardener. It is hoped that residents using the community garden explore ways to use items from the municipal solid waste to help grow plants. Compost would be used as a soil additive, and could be generated on-site. It is on the roof where visitors contemplate the usage and value of garbage. At the site some trash is extracted to be recycled into new materials, some is used for compost, and the rest is shipped to an island landfill to create new ground. In the gardens, visitors can actually see plants growing off of the nutrients provided by the garbage/compost and question whether they are making the most out of their own trash. What is the correct attitude towards garbage? The planner Kevin Lynch said that wasting could be as natural as breathing.

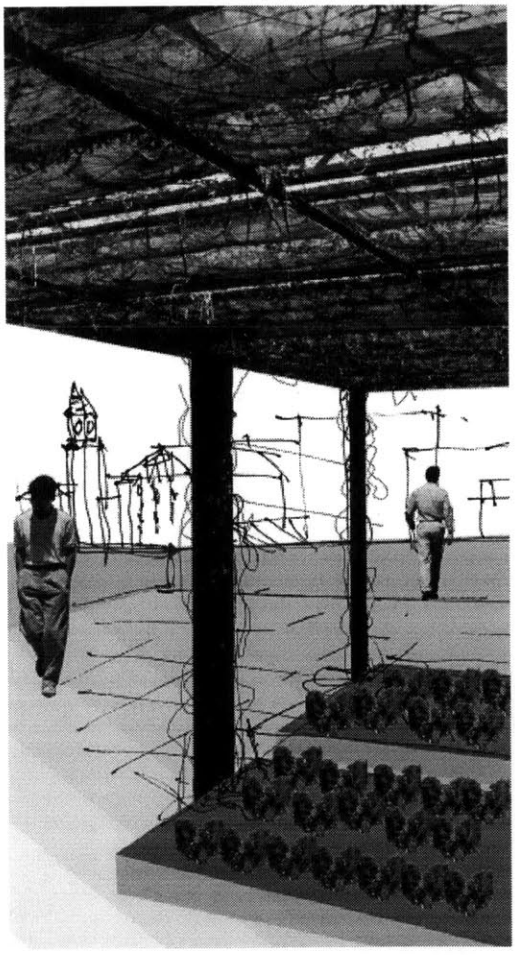
> Can we accept that we are part of a universal wasting stream, and see in that our place and our connection? Breathing in and breathing out, we would find our identity in the flow of things around us. Cleaning and repairing and passing on the world might become as important as using or making it.[9]

The roof gardens could become a community laboratory researching creative uses of waste in everyday life. The roof garden and the park in general become a public place, even a community meeting place, that the local residents have a prominent role in the creating.

leaf conceptual drawing showing design study of roof terraces

[9] Kevin Lynch, **Wasting Away,** p. 41.





views of roof garden

summary

networks and connections

Our society is constructed around flows: flows of capital, flows of information, flows of technology, flows of organizational interaction, flows of images, sounds, and symbols. Flows are not just one element of the social organization: they are the expression of processes *dominating* our economic, political, and symbolic life. If such is the case, the material support of the dominant processes in our societies will be the ensemble of elements supporting such flows, and making materially possible their attraction in simultaneous time. ...By flows I understand purposeful, repetitive, programmable sequences of exchange and interaction between physically disjointed positions held by social actors in the economic, political, and symbolic structures of society.[10]

The rhizome (subterranean stem, [*i.e. infrastructure*]) connects any point to any other point, and its traits are not necessarily linked to traits of the same nature...it is composed not of units but of dimensions, or rather directions in motion. It has neither beginning nor end, but always a middle (milieu) from which it grows and which it overspills.[11]

Our waste infrastructure is a complex network that organizes and is organized by our lifestyle. One could map a city and locate main streets and public buildings simply by charting garbage collection routes and the frequency of collection over time. These routes, taken in conjunction with other delivery/removal routes (mail, public transit, etc.) begin to show the morphology of a city. As our society becomes increasingly more networked and network dependent, the design and implementation of our waste infrastructure provides a model for the networked, informational city. The waste industry is built to handle a variety of flows at constantly changing velocities, magnitudes, and mandated degrees of control. Waste infrastructure has been so successful at this job that we no longer have any relation to it. We simply take our garbage and recycling to the curb in the morning and then put the empty can and bin back in the garage that evening. Our garbage could be located in an out of state landfill by the evening, and who knows if our recycling actually gets "recycled"; we simply know that our trash has been taken away. Not being confronted with or living in proximity to our waste renders us oblivious to the problems arising from our wastefulness. However, for those who live near a waste infrastructure site, obliviousness is not an option. Since most people who can afford not to live close to a waste site do not, a social stigma befalls those who actually do.

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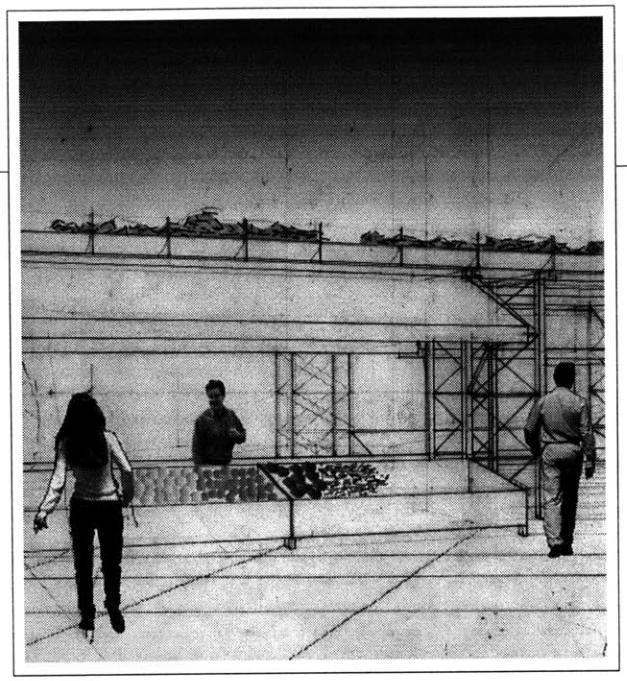
[10] Manuel Castells, **The Rise of the Network Society,** p. 411-412.
[11] Gilles Deleuze and Felix Guattari, **A Thousand Plateaus,** p. 21.

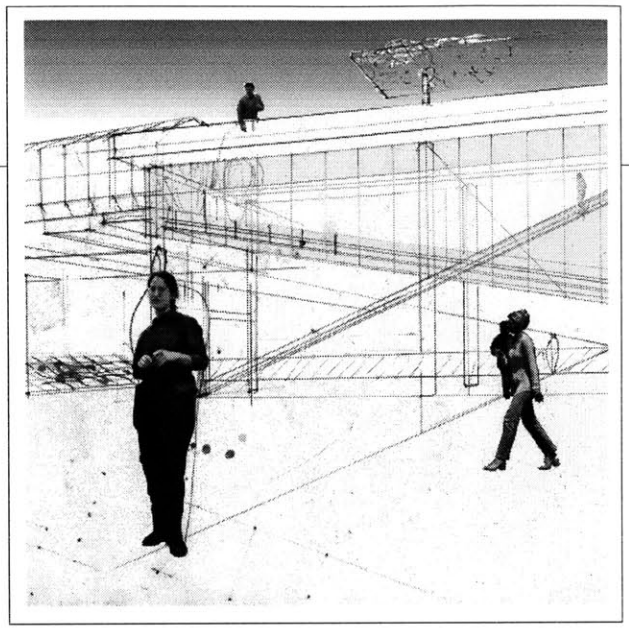


The problem is dual: to learn new attitudes toward waste, and to invent new techniques and rituals so that attitude and action support one another. Effective disposal is important to our survival. It could also be shaped to make wasting a pleasure and a fulfillment, an enrichment of the person. [12]

Additionally, whereas the waste infrastructure network may be a model for the informational city, the actual design of the waste facilities is no model for buildings in the informational city. Little or no forethought is given to the aesthetics of these "manufactured sites"[13] until possibly after they contaminated the land around them and have been shut down. Also, there is no provision for the public to experience the facilities even if they had a desire. Isolated, the waste industry has no incentive to innovate or change the status quo of disposal options, namely landfilling and incineration. Also, there is little reason to ask people to change their wasting habits, as less trash means less money. Waste infrastructure as it stands today is an "out-of-sight, out-of-mind" industry that is preferred that way by the public and the facilities themselves.

The problem then, is complex. First, how do designers bring people to a closer connection with their own waste. Simply siting waste infrastructure in all areas of the municipality may cause people to feel stigmatized. The more pertinent question is, "How do designers create the waste infrastructure so that people are willing to have it as a neighbor." The goals of these questions is to remove the stigma associated with wasting and waste infrastructure so that we might see it as a valuable and integral part of life, as important as working and resting.

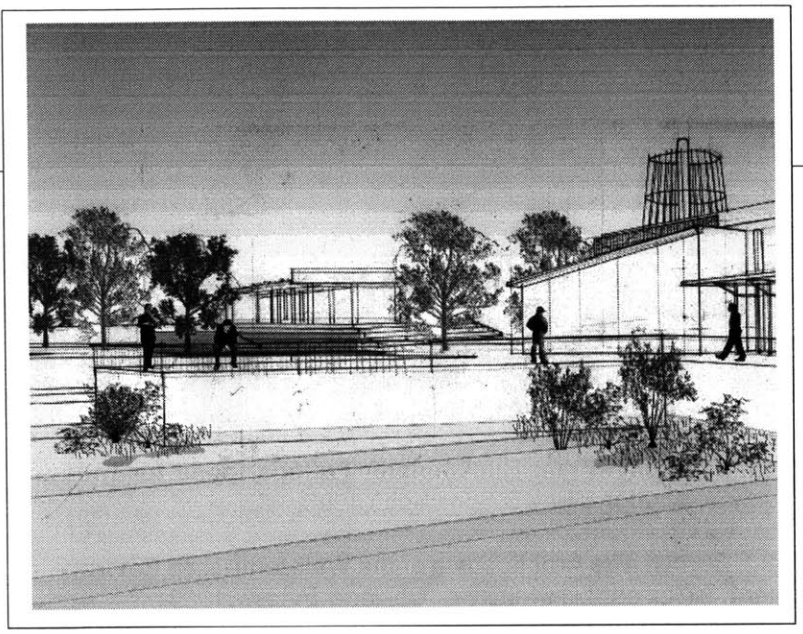
[12] Kevin Lynch, **Wasting Away**, p. 40.
[13] this term is taken from a conference of the same title given at the Harvard University Graduate School of Design on April 3-4, 1998, coordinated by Niall Kirkwood.

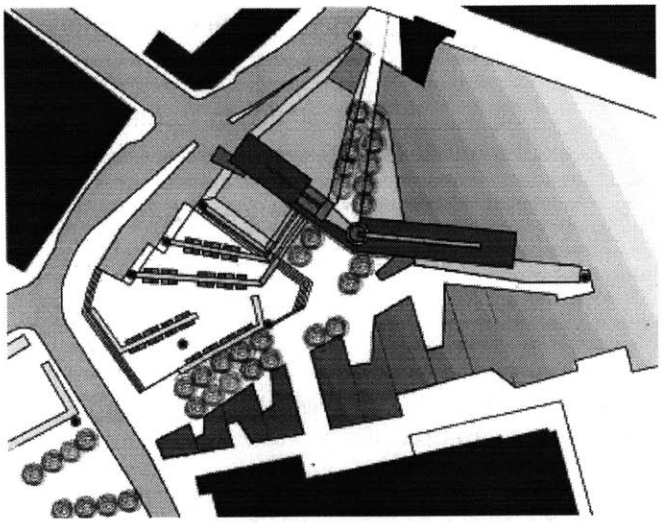


Perhaps no other project [parks, specifically urban parks] today offers a more concentrated opportunity for specialists to experiment with the possibilities of cross-disciplinary design. Most people accept that the hallmark of urban parks today is their rich cultural and social diversity. Their design can also be a meeting ground for diverse and contradictory ways of thinking.[14]

To eliminate the stigma of waste treatment and removal that is pervasive in contemporary society, the central elements of this process should be visible and prominently located in the city. This thesis proposes siting a solid waste transfer station in combination with a public park in the center of the City of Boston. Associating waste processing with another program, in this case a park, forces it to be made public. I treated the design of the transfer station/ public park as an opportunity to showcase the workings of the waste industry while still providing the amenities of a park. Through the infusing of the "positive" elements of park design, the stigma associated with waste can be overcome. The overlap of processes of the transfer station with activities in the park will encourage dialogue about our habits of wasting and the vital role that waste infrastructure plays in a city, as vital as urban parks. By defining occupiable places within the infrastructure, the waste process is no longer limited by given boundaries but becomes an urban and architectural form generator.

[14] Herbert Muschamp, **Looking Beyond Vision,** in The Once and Future Park, p. 13.





proposed waste park for the city of boston

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appendix a

glossary

This glossary contains terms that relate to the waste industry and are used in the text of the thesis. All the definitions come from the book entitled, Handbook of Solid Waste Management by Frank Kreith.

aerobic digestors, ethel m chocolates, henderson, nv
p. 89

Aerobic digestion the utilization of organic waste as a substrate for the growth of bacteria which function in the presence of oxygen to stabilize the waste and reduce its volume. the products of this decomposition are carbon dioxide, water, and a remainder consisting of inorganic compounds, undigested organic material, and water.

Anaerobic digestion the utilization of organic waste as a substrate for the growth of bacteria which function in the absence of oxygen to reduce the volume of waste. the bacteria consume the carbon in the waste as their energy source and convert it to gaseous products. Properly controlled, anaerobic digestion will produce a mixture of methane and carbon dioxide, with a sludge remainder consisting of inorganic compounds, undigested organic material, and water.

Ash the residue that remains after a fuel or solid waste has been burned.

Baghouse an air pollution abatement device used to trap particulates by filtering gas streams through large fabric bags usually made of cloth or glass fibers.

Baler a machine used to compress recyclables into bundles to reduce volume. balers are often used on newspaper, plastics, and corrugated cardboard.

Biodegradable a substance or material which can be broken down into simpler compounds by microorganisms or other decomposers such as fungi.

Cogeneration production of electricity as well as heat from one fuel source.

Collection the act of picking up and moving solid waste from its location of generation to a disposal area, such as a transfer station, resource recovery facility, or landfill.

Commercial waste all types of solid wastes generated by stores, offices, restaurants, warehouses, and other nonmanufacturing activities, excluding residential and industrial wastes.

Compost a relatively stable mixture of organic wastes partially decomposed by a aerobic and/or anaerobic process. compost can be used as a soil conditioner.

Curbside collection collection of recyclable materials at the curb, often from special containers, to be brought to various processing facilities. collection may be both separated and/or mixed wastes.

Decomposition the breakdown of organic wastes by bacteria, chemical , or thermal means. complete chemical oxidation leaves only carbon dioxide, water, and inorganic solids.

Dioxin the generic name for a group of organic chemical compounds formally known as polychlorinated dibenzo-*p*-dioxins. Heterocyclic hydrocarbons that occur as toxic impurities, especially in herbicides.

Disposable something that is designed to be used once and then thrown away.

Disposal the activities associated with the long-term handling of (1) solid wastes that are collected and of no further use and (2) the residual matter after solid wastes have been processed and the recovery of conversion products or energy has been accomplished. normally, disposal is accomplished by means of sanitary landfilling.

Dump a site where mixed wastes are indiscriminately deposited without controls or regard to the protection of the environment. Dumps are now illegal.

Eddy-current separation an electromagnetic technique for separating aluminum from a mixture of materials.

Effluent waste materials, usually waterborne, discharged into the environment, treated or untreated; the liquid leaving wastewater treatment systems.

EPA U.S. environmental protection agency; a federal agency created in 1970 and charged with the enforcement of all federal regulations having to do with air and water pollution, radiation and pesticide hazard, ecological research, and solid waste disposal.

Ferrous metals metals composed predominantly of iron. in the waste materials, these metal usually include tin cans, automobiles, refrigerators, stoves, and other appliances. in resource recovery, often used to refer to materials that can be removed from the waste stream by magnetic separation.

Filter a membrane or porous device through which a gas or liquid is passed to remove suspended particles or dust.

Flow control a legal or economic means by which waste is directed to particular destinations. for example, an ordinance requiring that certain wastes be sent to a combustion facility is waste flow control.

Fly ash all solids, including ash, charred papers, cinders, dusty soot, or other matter that rise with the hot gases from combustion rather than falling with the bottom ash. Fly ash is a minor portion (about 10 percent) of the total ash produced from combustion of solid waste, is suspended in the flue gas after combustion, and can be removed by pollution control equipment.

Front-end loader (1) a solid waste collection truck which has a power-driven loading mechanism a the front; (2) a vehicle with a power-driven scoop or bucket at the front, used to load secondary materials into processing equipment or shipping containers.

Garbage solid waste consisting of putrescible animal and vegetable waste materials resulting from the handling, preparation, cooking, and consumption of food, including waste materials from markets, storage facilities, handling and sale of produce, and other food products. Generally defined as wet food waste, but not synonymous with "trash," "refuse," "rubbish," or solid waste.

Groundwater water beneath the surface of the earth and located between saturated soil and rock. it is the water that supplies wells and springs.

Hammermill a type of crusher used to break up waste materials into smaller pieces or particles, which operates by using rotating and flailing heavy hammers.

Hazardous waste a waste, or combination of wastes, that may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating illness or that pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. hazardous wastes include radioactive substances, toxic chemicals, biological wastes, flammable wastes, and explosives.

Household hazardous waste those wastes resulting from products purchased by the general pubic for household use which, because of the quantity, concentration, or physical, chemical, or infectious characteristics, may pose a substantial known or potential hazard to human health or the environment when improperly treated, disposed, or otherwise managed.

Incineration an engineered process involving burning or combustion to thermally degrade waste materials. Solid wastes are reduced by oxidation and will normally sustain combustion without the use of additional fuel.

Infrastructure a substructure or underlying foundation; those facilities upon which a system or society depends; for example, roads, schools, power plants, communication networks, and transportation systems.

Leachate liquid that has percolated through solid waste or another medium and has extracted, dissolved, or suspended materials from it, which may include potentially harmful materials. leachate collection and treatment is of primary concern at municipal waste landfills.

Liner impermeable layers of heavy plastic, clay, and gravel that protect against groundwater contamination through downward or lateral escape of leachate. most sanitary landfills have at least two plastic liners or layers of plastic or clay. also refers to the material used on the inside of a furnace wall to ensure that a chamber is impervious to escaping gases.

Litter that highly visible portion of solid wastes that is generated by the consumer and carelessly disgarded outside the regular disposal system. litter accounts for only about 2 percent of the total waste volume.

Magnetic separator equipment usually consisting of a belt, drum, or pulley with a permanent or temporary electromagnet and used to attract and remove magnetic materials from other materials.

Manual separation the separation of wastes by hand. sometimes called "hand picking" or "hand sorting", manual separation is done in the home or office by keeping food wastes separate from newspaper, or in a materials recovery facility by picking out large cardboard and other recoverable materials.

Material recovery extraction of materials from the waste stream for reuse or recycling. examples include source separation, front-end recovery, in-plant recycling, postcombustion recovery, leaf composting, etc.

Methane (CH_4) an odorless, colorless, flammable, and asphyxiating gas that can explode under certain circumstances and that can be produced by solid wastes undergoing anaerobic decomposition. methane emitted from municipal solid waste landfills can be used as fuel.

Municipal Solid Waste (MSW) includes all the wastes generated from residential households and apartment buildings, commercial and business establishments, institutional facilities, construction and demolition activities, municipal services, and treatment plant sites.

NIMBY (not in my back yard) refers to the fact that people want the convenience of products and proper disposal of the waste generated by their use of products, provided the disposal area is not located near them.

Nonferrous metals any metal scraps that have value and that are derived from metals other than iron and its alloys in steel, such as aluminum, copper, brass, bronze, lead, zinc, and other metals, and to which a magnet will not adhere.

Paper the term for all kinds of matted or felted sheets of fiber. made from the pulp of trees, paper is digested in a sulfurous solution, bleached and rolled into long sheets. acid rain and dioxin are standard by-products in this manufacturing process. specifically, as one of the two subdivisions of the general term, paper refers to materials that are lighter in basic weight, thinner, and more flexible than paperboard, the other subdivision.

Plastics synthetic materials consisting of large molecules called polymers derived from petro-chemicals (compared with natural polymers such as cellulose, starch, and natural rubbers).

Pollution the presence of matter or energy whose nature, location, or quantity produces undesired environmental effects. also, the artificial or human-introduced alteration of the chemical, physical, biological, and radiological integrity of water.

Processing any method, system, or other means designated to change the physical form or chemical content of solid wastes.

Reclamation the restoration of a better or more useful state, such as land reclamation by sanitary landfilling, or the extraction of useful materials from solid wastes.

Recovery refers to materials removed from the waste stream for the purpose of recycling and/or composting. recovery does not automatically equal recycling and composting, however. for example, if markets for recovered materials are not available, the materials that were separated from the waste stream for recycling may simply be stored or, in some cases, sent to a landfill or combustor. the extraction of useful materials or energy from waste.

Recycle to separate a given material from waste and process it so that it can be used again in a form similar to its original use; for example, newspapers recycled into newspapers or cardboard.

Recycled material a material that is used in place of a primary, raw, or virgin material in manufacturing a product and consists of material derived from postconsumer waste, industrial scrap, material derived from agricultural wastes, and other items, all of which can be used in the manufacture of new products. also referred to as recyclables.

Refuse all solid materials which are discarded as useless. A term often used interchangeably with the term *solid waste*.

Sanitary landfill an engineered method of disposing of solid wastes on land in a manner that protects health and the environment. Waste is spread in thin layers, compacted to the smallest practical volume, and covered with soil or other suitable material at the end of each working day, or more frequently, as necessary.

Scrubber a device for removing unwanted dust particles, liquids, or gaseous substances from an airstream by spraying the airstream with a liquid (usually water or a caustic solution) or forcing the air through a series of baths; common antipollution device that uses a liquid or slurry spray to remove acid gases and particulates from municipal waste combustion facilities' flue gases.

Shredder a machine used to break up waste materials into smaller pieces by cutting, tearing, shearing, and impact action.

Sludge (now Bio-solid) any solid, semisolid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility, or any other such waste having similar characteristics and effects. must be processed by bacterial digestion or other methods, or pumped out for land disposal, incineration, or composting.

Solid wastes any of a wide variety of solid materials, as well as some liquids in containers, which are discarded or rejected as being spent, useless, worthless, or in excess, including contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.

Source reduction reduction of the amount of materials entering the waste stream by voluntary or mandatory programs to eliminate the generation of waste. the design, manufacture, acquisition, and refuse of materials so as to minimize the toxicity of the waste generated.

Source separation the separation of waste materials from other commingled wastes a the point of generation.

Tipping fee unloading area for wastes delivered to a materials recovery facility, transfer station, or waste combustor.

Toxic defined for regulatory purposes as a substance containing poison and posing a substantial threat to human health and/or the environment.

Transfer station a place or facility where wastes are transferred from smaller collection vehicles (e.g., compactor trucks) into large transport vehicles (e.g., over-the-road and off-road tractor trailers, railroad gondola cars, or barges) for movement to disposal areas, usually landfills. In some transfer operations, compaction or separation may be done at the station.

Trash wastes that usually do not include food wastes but may include other organic materials, such as plant trimmings. Generally defined as dry waste material, but in common usage, it is a synonym for rubbish or refuse.

Trommel a perforated, rotating, horizontal cylinder that may be used in resource recovery facilities to break open trash bags, to remove glass and such small items as stone and dirt, and to remove cans from incinerator residue.

Waste unwanted materials left over from manufacturing processes, or refuse from places of human or natural habitation.

Waste stream a term describing the total flow of solid waste from homes, businesses, institutions, and manufacturing plants that must be recycled, burned, or disposed of in landfills; or any segment thereof, such as the "residential waste stream" or the "recyclable waste stream". the total waste produced by a community or society, as it moves from origin to disposal.

Wastewater water carrying dissolved or suspended solids from homes, farms, businesses, institutions, and industries.

Wetland area that is regularly wet or flooded and has a water table that stands at or above the land surface for at least part of the year. coastal wetlands extend back from estuaries and include salt marshes, tidal basins, marshes, and mangrove swamps. inland freshwater wetlands consist of swamps, marshes, and bogs. federal regulations apply to landfills sited at or near wetlands.

White goods large worn-out or broken household, commercial, and industrial appliances, such as stoves, refrigerators, dishwashers, and clothes washers and dryers.

Yard waste leaves, grass clippings, prunings, and other natural organic matter discarded from yards and gardens. yard wastes may also include stumps and brush, but these materials are not normally handled at composting facilities.

appendix b

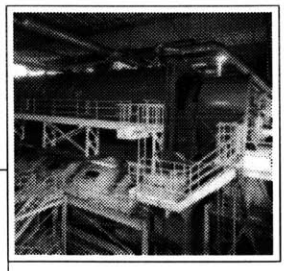
existing waste infrastructure

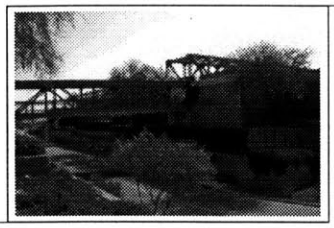
Facilites mentioned in this appendix represent a sampling of American waste infrastructure that I personally visited over the Summer of 1998. It is by no means a comprehensive listing of waste sites, but should provide an overview of existing conditions and ideas regarding the design of American municipal solid waste infrastructure.

conveyor belts
san marcos, ca

This appendix is a survey of existing American waste infrastructure. My time researching and traveling to these sites over the summer was generously supported by the Marvin E. Goody award. The following is a brief description of the sites visited that receive and/or process municipal solid waste. The survey of transfer stations begins with the smallest, a transfer station in Fairfax County, Virginia, proceeds to the critically acclaimed 27th Avenue facility in Phoenix, Arizona and concludes with the now defunct Materials Recovery Facility in San Marcos, California. The sites were chosen through correspondence with Professor Mira Engler of Iowa State University and telephone calls to waste management companies. The material presented here is taken from magazine articles, facility brochures, interviews and site photographs. The following excerpt from my grant proposal states my desire to embark on this research and its intended relation to the thesis project:

> The [grant] will strengthen my thesis by enabling me to document the background information necessary to formulate a conscientious view of current trends in waste infrastructure design so that I might better react to my architectural program through this filter. The publication will document processes, scales, construction techniques, etc. in order to provide a holistic (not just formal) precedent study of this industry. It is my hope that the publication could serve as a primer for the incorporation of techniques used in waste treatment and recycling into architectural discourse as well as serve as an architectural critique of the buildings themselves.





municipal solid waste facilites

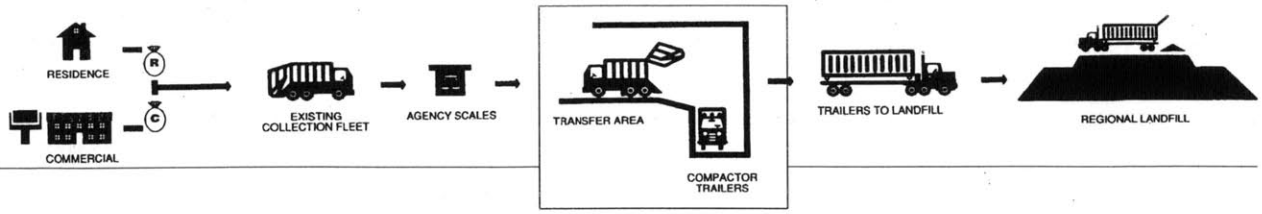
$7 million dollar facility
serves 38,000 homes
1993

west ox road transfer station

aerial photo showing transfer station and neighborhood of "undesirables"

Fairfax County, Virginia is a bedroom community on the outskirts of Washington, D.C. All of its residential trash is presently sent to the waste-to-energy incinerator in Lorton, Virginia, approximately twenty minutes away. The trash previously came to a landfill at this site, then located on the outskirts of Fairfax. The transfer station was built here within the past five years at the foot of the landfill. The transfer station itself is a minimal structure, like a warehouse and remarkably similar in size and detailing to the retail stores across the road. No provision is made here for sorting of recyclables or size reduction of garbage. The operations of the facility are defined as simply transfer the garbage from the garbage collection trucks to the transfer trailers.

the top of the landfill measures as the tallest point in fairfax county and is used to store school buses during the summer months.



sequence

Collection trucks return from their routes and are directed to a bay in the transfer station by a worker stationed in a signal box. The trucks then dump their load onto the tipping floor and exit. Front-end loaders push the discarded trash through one of the holes in the floor into a transfer trailer aligned underneath. Small cranes above the holes compact the garbage in the trailers and once full, the trailer exits the station bound for the incinerator.

notes:
the tipping floor is a four inch concrete slab covered with a thin layer of asphalt. since the floor takes a beating from the dumped trash and front-end loaders, operators found it cheaper to replace the asphalt topping every year than the concrete slab every five.

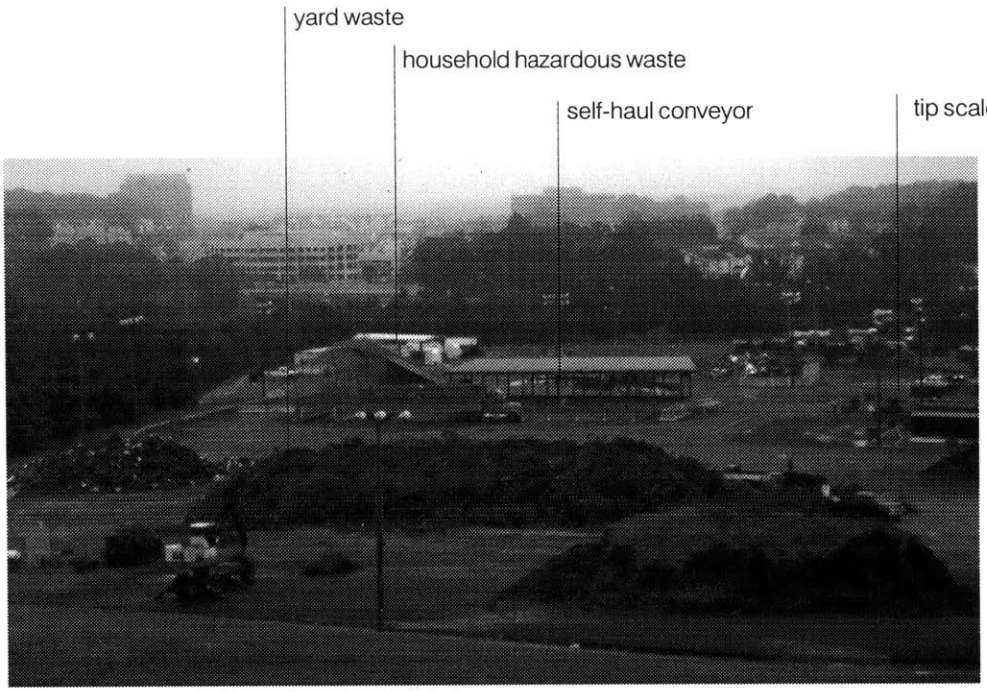
the roof is placed on open web steel joists. as the transfer station is open during hours of operation, many birds rest on the flanges of the joists waiting to pick through the trash. hard hats are required on the tipping floor, primarily to avoid bird droppings.

tipping floor

hole to transfer trucks below

transfer truck

views of transfer station from adjacent landfill



view of recycle area from landfill

recycle area

The recycle area is the unique part of this transfer station. A hodgepodge of shacks, quasi-enclosures, machines and containers, this area seems to have little order. Every little building is its own independent structure. This mini-city is abuzz on the weekends with local residents dropping off their recyclables into containers, and their unwanted items into the self-haul conveyor. (The transfer station itself is for collection vehicles and commercial trucks only, not for residential use.) A large area devoted to the handling of yard waste denotes that this transfer station is still located in a rural area. Operators told me that every October politicians come on the weekends to campaign to "the local people". This recycle area was the only place I visited that was used for social purposes as well as for processing waste.

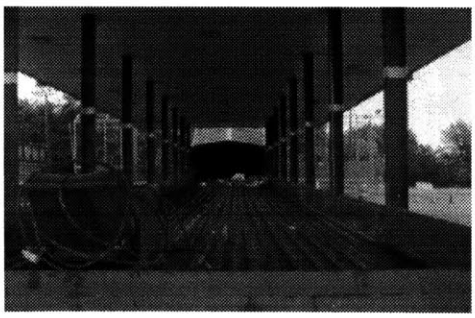
tip scale

household hazardous waste

note:
the recycle area was built directly on top of the existing landfill. the landfill is still settling as evidenced by the wavy pavement. the uneven, unpredictable settling of decomposing trash limits what can be built over it economically. all buildings in the recycle area were supported by concrete pads with footings reaching underneath the garbage.

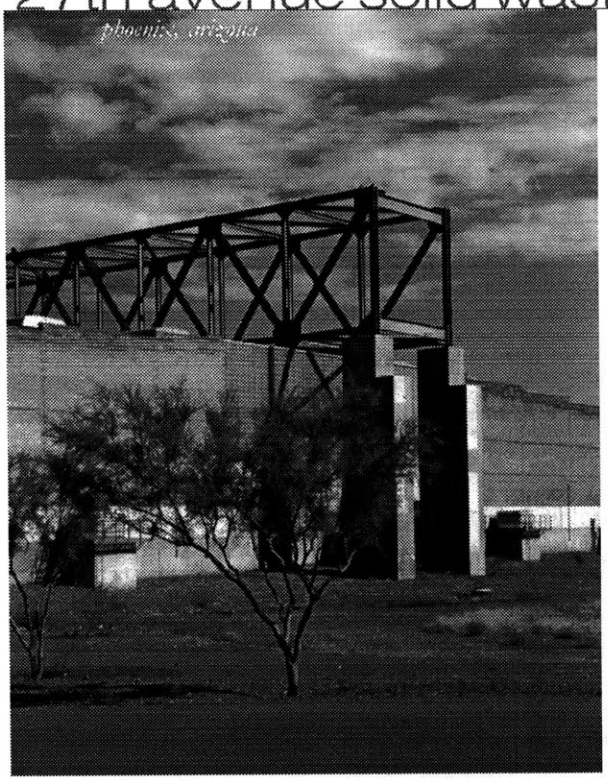
recycle containers

opposite *self-haul conveyor system*



$21million dollar facility
handles 1500 tons of MSW per day
1995

27th avenue solid waste management facility

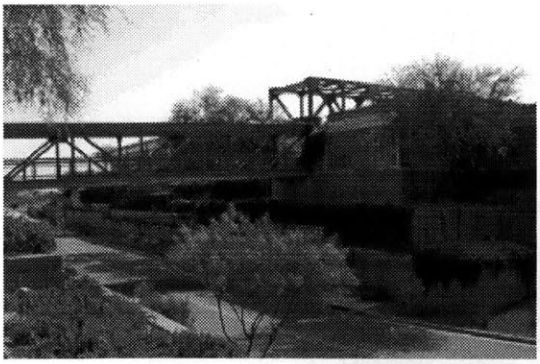


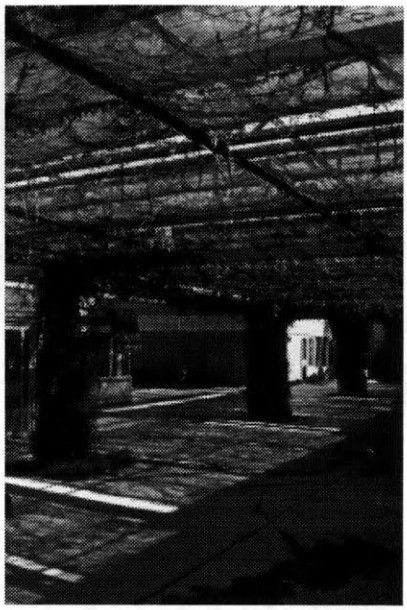
overall view of 27th street transfer station

Phoenix, Arizona is the third fastest growing city in America, trailing only Las Vegas and Orlando, and this growth rate taxes the capacity of the existing infrastructure. The city is in need of new roads, water sources and landfill space. Phoenix has taken a different path than most municipalities regarding the design and implementation of its new infrastructure. Phoenix uses a "percent-for-art" program that mandates that one percent of construction costs must be allocated to art on or at any public works project. Often "percent-for- art" programs yield standard engineering solutions with a mural or landscaping tacked on at the end of the project. But with Phoenix, and specifically with the 27th Avenue transfer station, the percent-for-art program was interpreted in a different manner.

Artists Linnea Glatt and Michael Singer were put in charge of designing the entire transfer station. Working with Black and Veatch Engineers, the artists "transformed this site from a devastated waste site to a condition of ecological health and life. Users and visitors can begin to realize deeper ramifications of garbage recycling, contemplating the relationship between the land, the water, and the garbage we create." These statements from a handout given by the transfer station display a commitment to changing attitudes towards waste. Yet the site does not seem very public. Sited far from downtown, and constructed of concrete block with a massive roof truss, the facility feels more like a bunker than a public place. The self-haul area is much smaller than the corresponding one at the Fairfax transfer station, and this is the only place where the public can truly use the site. There are many nice amenities at the site such as a walking tour that begins at a small ampitheater with views onto the tipping floor and proceeds along a catwalk viewing much of the waste infrastructure. Having any public component is truly revolutionary in a waste facility. In fact, it is hard to tell that this is a solid waste transfer facility if you are on the public route.

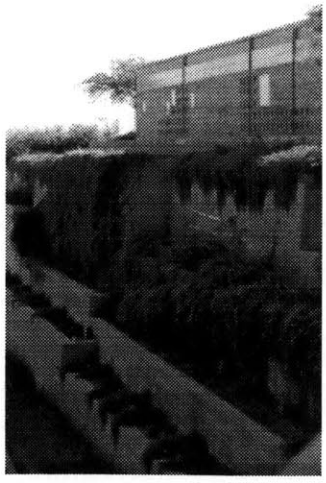
500 garbage trucks use the phoenix transfer station per day, one per minute.
transfer station was inaugurated with semi-formal "dance at the dump" party

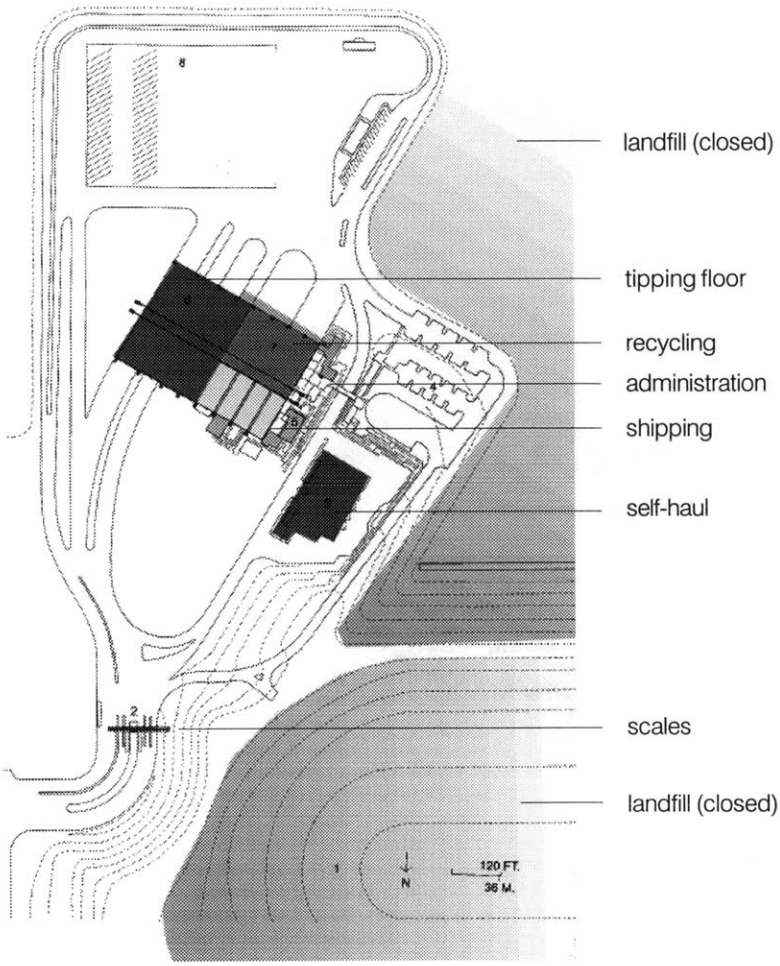




visitor entry sequence: after parking, visitors walk across a steel catwalk through a shaded courtyard to the small outdoor theater for the tour

landscaping and berms mask the scale of the facility to the viewer, but this is still a big box building. like the fairfax transfer station only bigger with better landscaping. this building is about disguising the fact that it a waste transfer station. waste infrastructure masquerading.



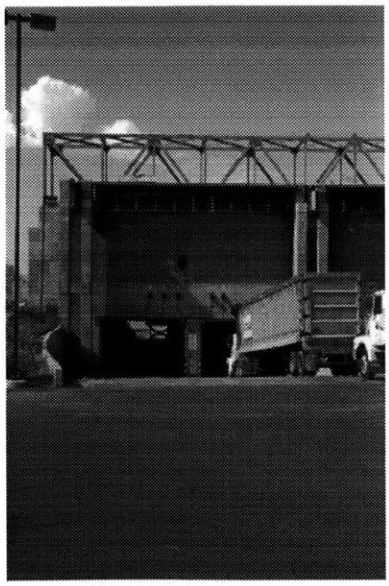


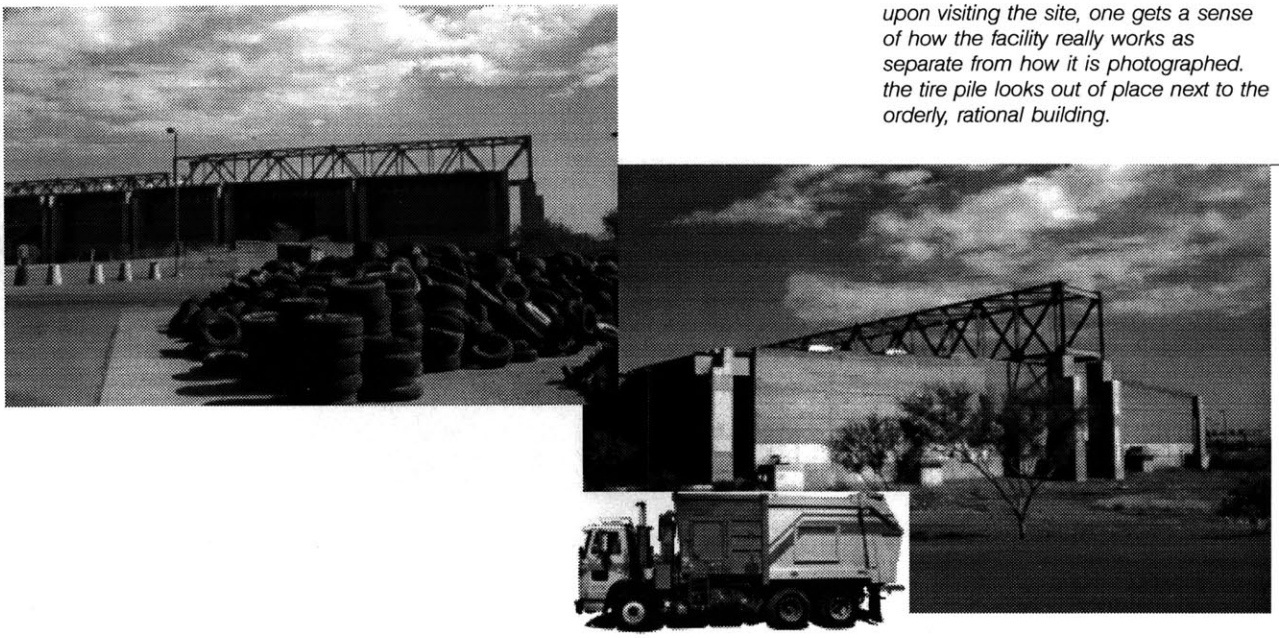
site plan showing isolation of building

plan

At conventional transfer stations, the tipping floor can occupy a large percentage of the floor area. The design principles that govern the area of the tipping floor also govern the amount of parking spaces required at shopping malls, namely design for the worst case scenario. It also makes sense to have a large tipping floor as garbage = money, so more garbage = more money.

The Phoenix transfer station's tipping floor is huge. It handles as much trash in a day as most incinerators do. Designing for economies of scale leads to limited solutions however. The poetic roof solution at Phoenix is an exception, a situation designed to be aesthetically pleasing, not the rule in the design of contemporary waste infrastructure. Much of the problem with the design of infrastructure today occurs because of scale, or lack of a recognizable scale in the elements. Bigger and bigger often leads to more alienation.





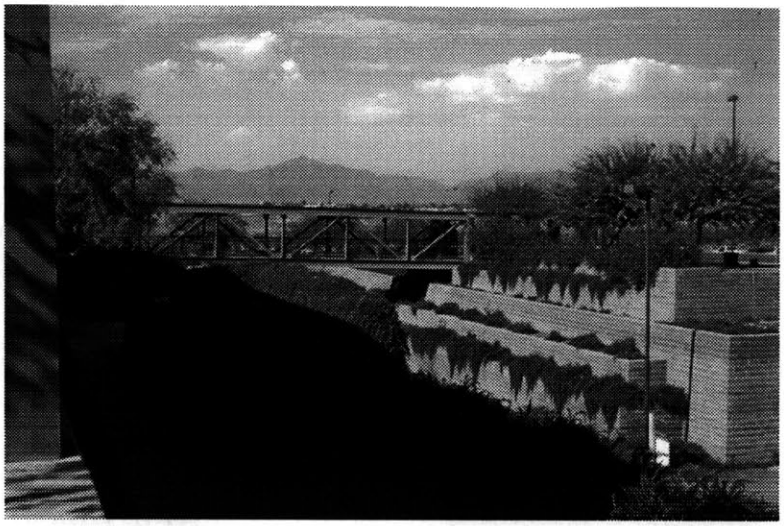
upon visiting the site, one gets a sense of how the facility really works as separate from how it is photographed. the tire pile looks out of place next to the orderly, rational building.

roof design

The roof is suported by a eight foot deep box truss, enabling the entire tipping floor and recycle area to be column free spaces. Whereas at Fairfax County, the structure was inside the enclosure, hear it is the reverse and there are no bird troubles. The roof design gives the transfer station an identity, an identity not associated with waste. Having a recognizable feature makes the facility harder to forget and brings the waste industry more into the public's consciousness.

transfer trucks waiting to drive under tipping floor to receive garbage

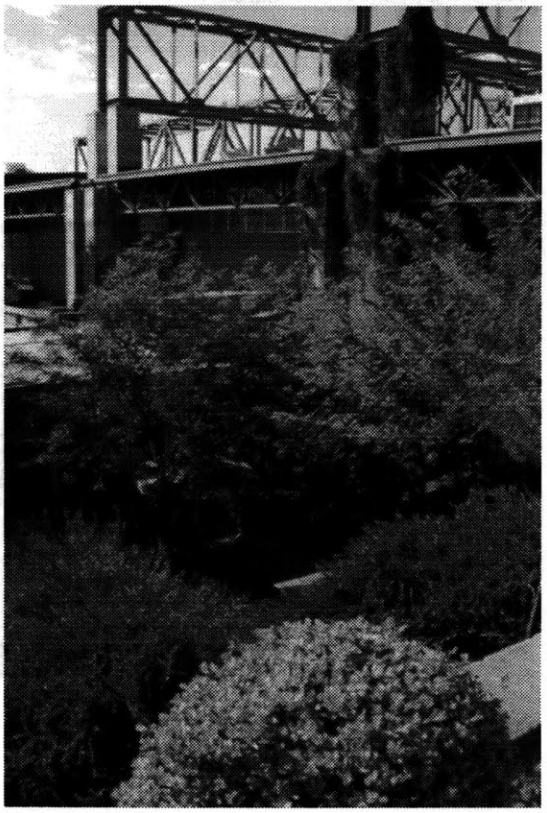
simultaneity of landscape and building



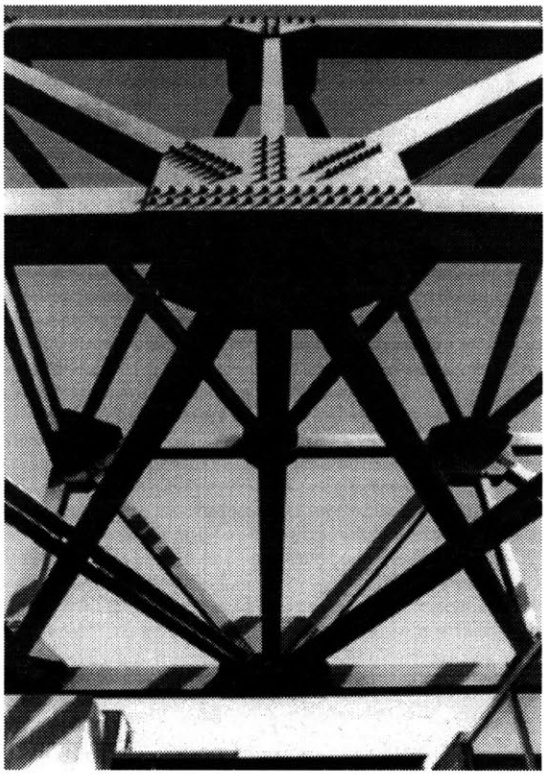
landscape

The most successful thing about the Phoenix transfer station is the integration of landscape and building. Through the berms and climbing plants spaces are created where visitors and employees can sit outside year-round. It was 98 degrees by noon when I visited but the shade was significantly cooler. In contrast to most buildings in Phoenix, this one addresses its climate.

The landscape breaks down the scale of the building and ties it to the site. The landscape even camoflauges the building. While the facility is supposed to be about the revealing of the processes of the waste, the building itself is slowly being concealed by the landscape. There are other mixed messages here as well like that the building and site are supposed to be "open to the public", yet only if the public calls ahead for a tour. Nevertheless, this design represents a significant step in the emergence of unseen waste infrastructure into the public realm.



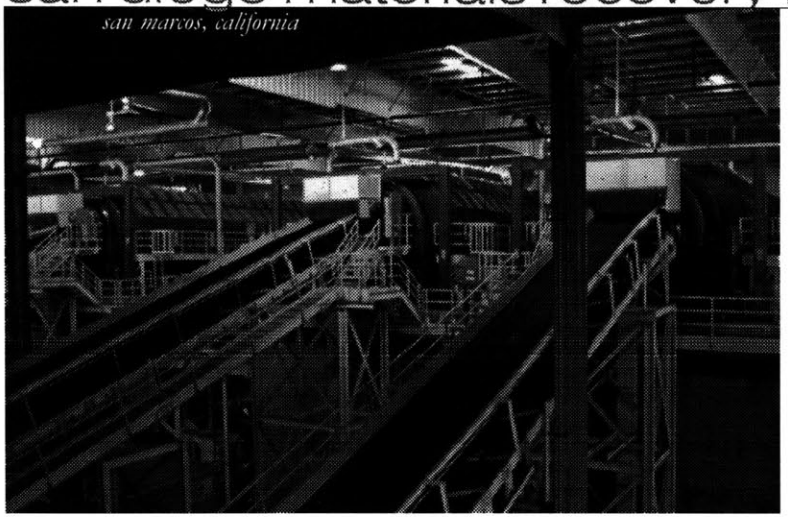
opposite *roof truss*



190,000 square feet
handles 2100 tons of MSW per day
1996-1997 (lifespan)

san diego materials recovery facility

san marcos, california

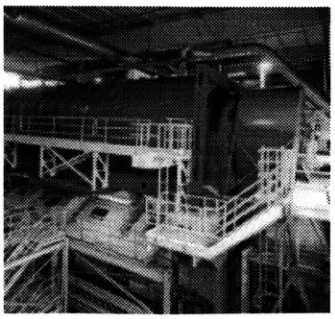


series of conveyor belts leading to trommel screen machines

politics

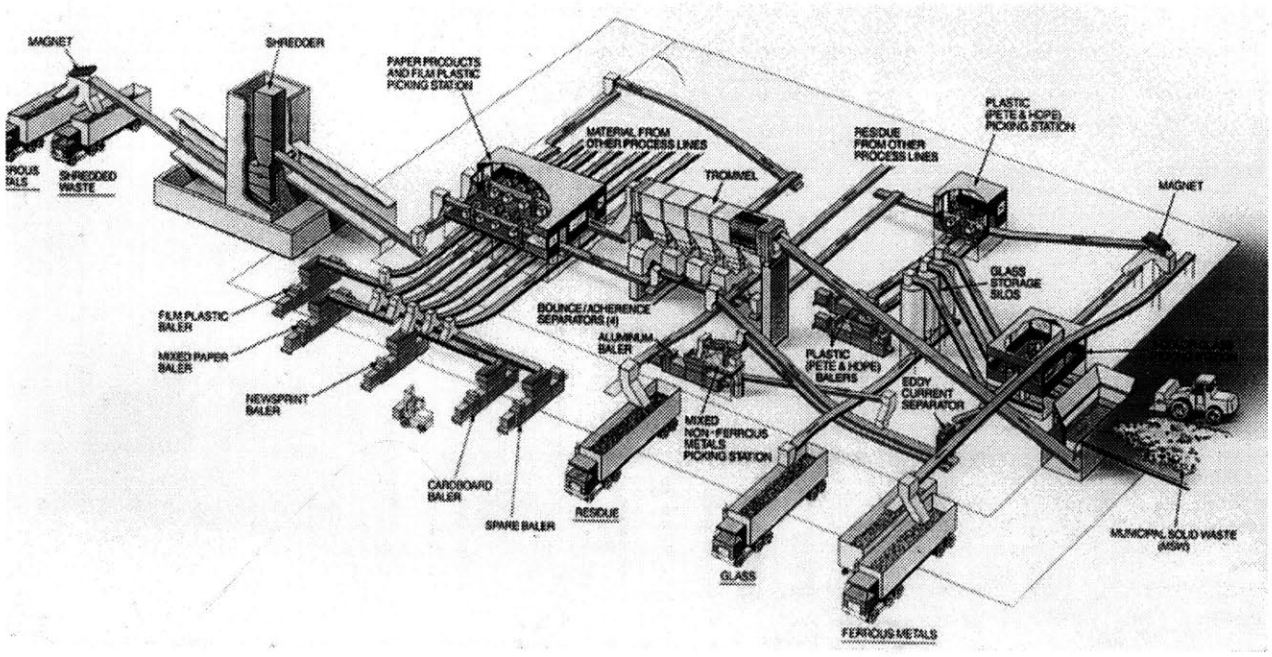
The Materials Recovery Facility at San Marcos could serve as a built case study showing the conflict between the waste industry and public perception. Like many transfer stations it was sited adjacent to a closing landfill, and built in a nondescript shed building encompassing the maximum allowable built area. The transfer station was to be the recycling "giant" of San Diego's waste industry. When the facility was planned, the city had no curb-side recycling law. Studies that were done showed that building a transfer station to sort commingled waste was cheaper and more effective in the long run that offering a blue box to every resident. The facility was planned to sort, automatically and by hand, almost everything recyclable from municipal solid waste, from cardboard to milk jugs. The apparatus designed and assembled to sort the trash resembled a Rube-Goldbergesque contraption winding its way through the building.

trommel screen



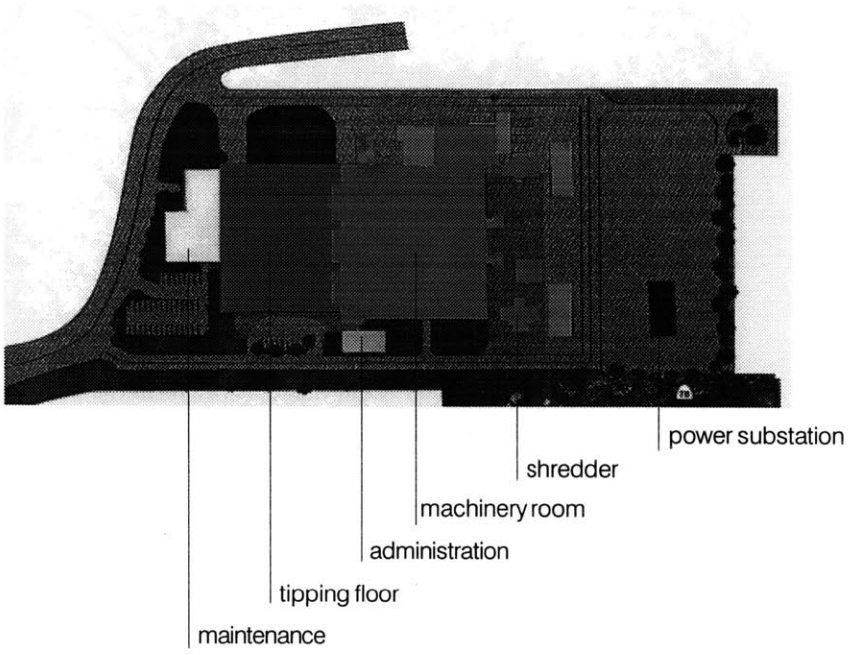
two miles of conveyor belts wind through the building. the tipping floor is a column-free space larger than a football field. facility diverted 40% of MSW.

While the transfer station was under construction, the city of San Diego passed a curbside recycling law. Effectively this law designed to be helping the environment cost the materials recovery facility half of their expected volume of recyclables. With only half the volume, and thus half the expected revenue, the facility barely got up and running before it went bankrupt. Meanwhile a real estate developer bought land surrounding the landfill to place expensive condominiums. The developer successfully had the transfer station's site zoning changed so that the transfer station was a non-conforming use. Today, even if the transfer station monetarily able to operate, it would be forbidden. The city of San Diego ended up designing and paying for a state-of-the-art materials recovery facility that it could never use.



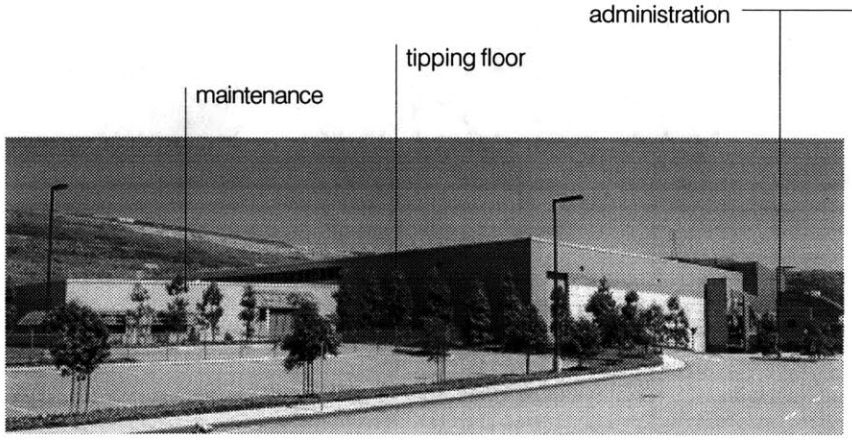
(one) of five identical sorting lines at the san marcos facility

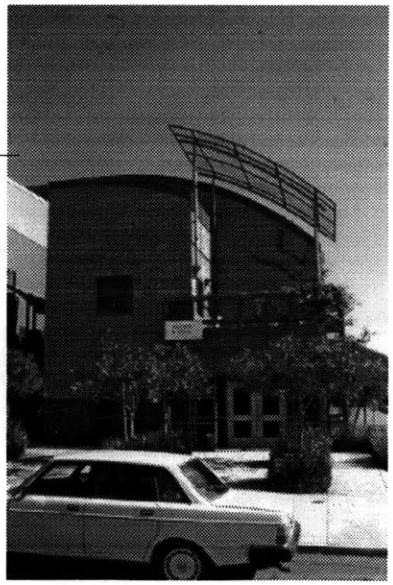
opposite *looking down a trommel screen*

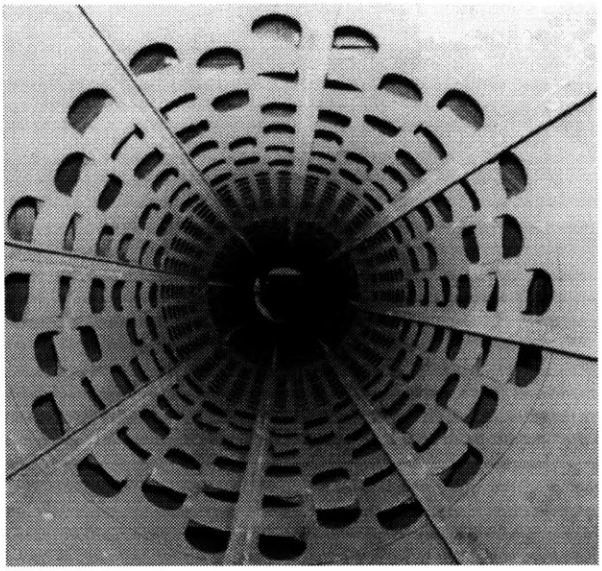


inside / outside

At San Marcos the difference between the expression of the process of the waste infrastructure and its built container has never bound more profound. The inside feels like one is in an engine, with the complex parts overhead and alongside, yet the outside is simply a box-like shell covering these intricate processes. The strong dissociation between processes and physical expression is a hallmark of the waste industry. In this case, the machines were where 90% of the budget seems to have been spent with the other ten percent going towards the cute administration building. Paying token attention to aesthetics of the infrastructure will perpetuate the stigma associated with it, and people will always shy away from the "realm of dirty things."







Embarking on this thesis defining and questioning current waste infrastructure was overwhelming at first. Who can change the way we deal with our waste, certainly not one architect. I was comforted with the words of Melville in *Moby Dick* perhaps overcoming self-doubt as well, "To produce a mighty book, you must choose a mighty theme. No great and enduring volume can ever be written on the flea, though many there be who have tried it." And so this thesis became an personal intelletual primer of sorts raising many questions not soon to be answered about waste, infrastructure and design.