Revealing the Process: A Bakery for Kenmore Square

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Emory University
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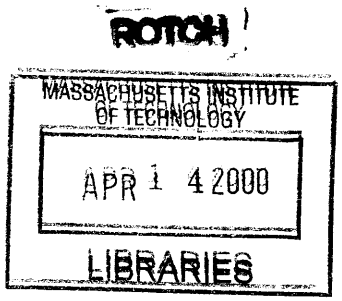

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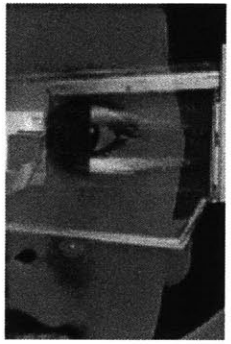


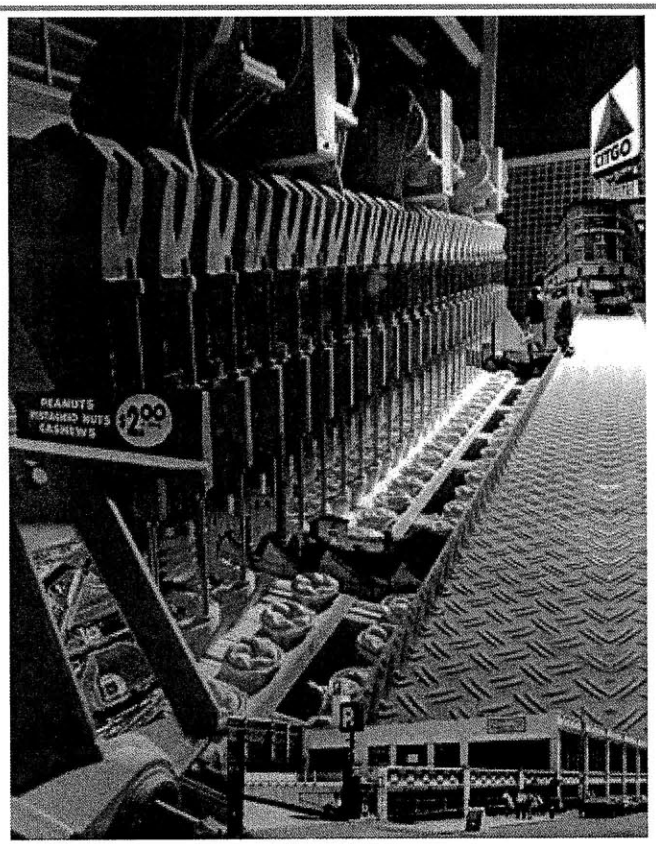
figure 1
photo montage view into oven

Revealing the Process: A Bakery for Kenmore Square

by Jessica Zlotogura

Submitted to the Department of Architecture on January 14, 2000, in partial fulfillment of the requirements for the degree of Master of Architecture.

ABSTRACT



This thesis seeks to explore the connection between humans and the machines they created. Machines in our daily lives have been miniaturized; one can no longer understand how they function, causing distress and anger. Exposure to a highly mechanized yet simple and understandable process will ease the stress caused by machines. The development of a large scale bakery is the mechanism through which to reconnect visitors with the technology they no longer understand.

Thesis Advisor: Andrew Scott
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figure 2
photo montage placing bakery in Kenmore Square

Most of all, thanks to my family: a true source of inspiration and courage in my life.

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Ryan Chin
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My **thesis buddies**
without all of your help, I'd still be constructing the site model.

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Tony Campos, Harrison Baking Company
Corinne, Clear Flour Bakery
Sal Battaglia, Rockland Bakery
Matt Carberry, Carberry Bakery
Phil Domenicucci, Winkler USA
Dave Machette, Sasib NA
Rob Roy Quinzani, Quinzani's Bakery

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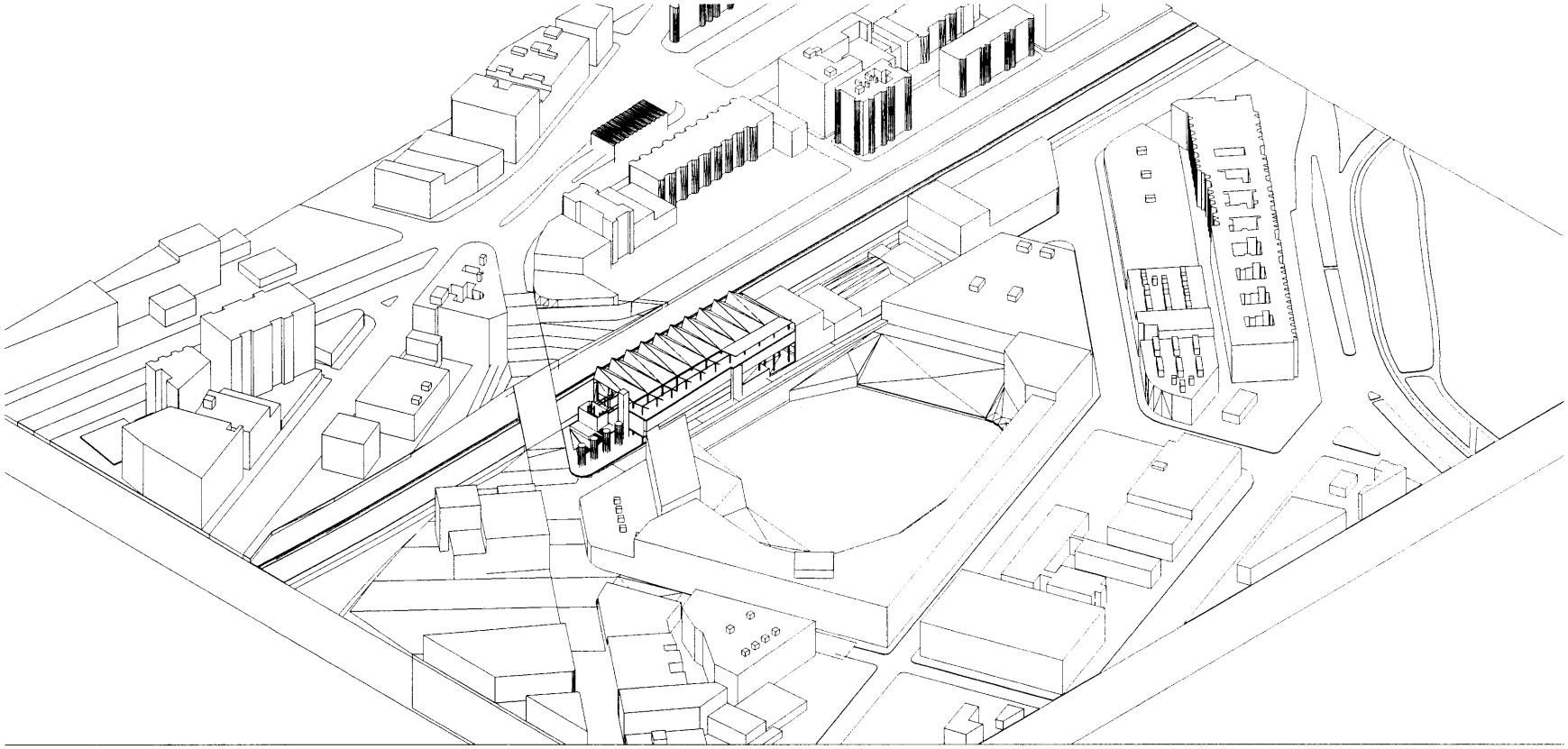
for your witty comments and patience before, during and after thesis prep.

Tom Fitzgerald and **Susan Midlarsky**
for computer troubleshooting tips always accompanied by smiles.

figure 3
aerial view of Kenmore Square



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collars: image of repetition

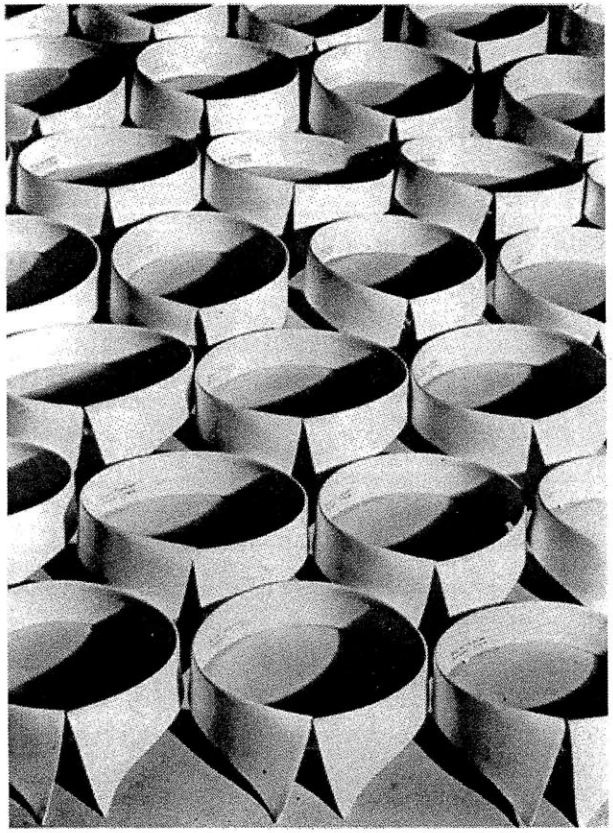


figure 5
cars: image of repetition

"It is contemporary man's peculiar tendency to place economic and technological considerations ahead of more fundamental human values. As a result, technology itself has become alienated from us, and the world defined by technological evaluations has acted to alienate us from our fellow man. Our human relationships have progressively degenerated to the mere exchange of information, and our objects are increasingly determined only by their usefulness."

Robert McCarter, from "Escape from the Revolving Door: Architecture and the Machine"

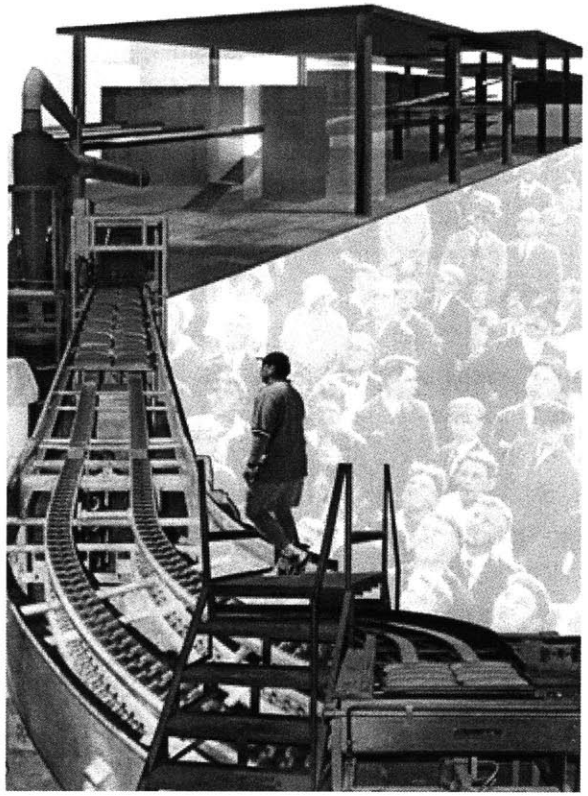


figure 6
photo montage of existing bakery machines with early design scheme

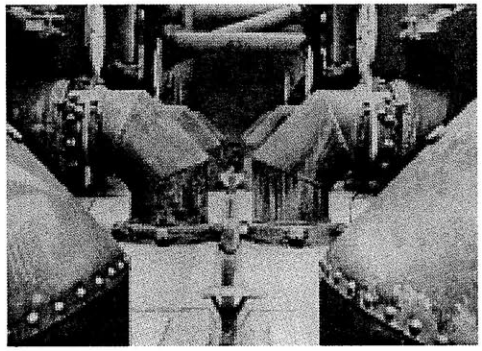


figure 7

This thesis began by looking at how we interact with technology on a daily basis. We take machines in our lives for granted, rarely stopping to think about the technology needed to make the machines we use. A simple example is the typewriter. Early typewriters were comprehensible; one could see the fan of metal bars beneath the cover, striking the ribbon as each key was hit. Today we sit in front of computers, essentially typewriters in a fancy box. The process by which keystrokes are delivered to the CPU and then to the monitor occurs at a frighteningly quick rate, but do we understand how that happens? Shouldn't we? The miniaturization of technology, in the form of the computer, has increasingly placed a "skin" over "the machine", preventing one from understanding how things work, or even how they are assembled.

As technology proliferates into our lives, there will be a desire to see and learn about how items are manufactured. Already we are seeing more being revealed. The example of a car wash has been around for many years, but this trend has been adopted by many in the food industry. Krispy Kreme, a southern U.S.-based donut chain, has a large neon sign telling customers when the donuts are "HOT". Bertuccis' restaurant chain opens the kitchen to the diners. Sushi chefs prepare food on one side of a bar, patrons sit on the other. Microbreweries and accompanying tours are growing in popularity as well. These types of establishments begin to reveal their craft, but it is possible to take the process a few steps further.

The idea of a bakery is designed to tap into this thirst for knowledge. It is meant as a destination for school children. The bakery is a place to stop before and after a Red Sox game. It is a place to meet your friends before heading off to see the rest of Landsdowne Street. It is a place to learn, to be entertained.

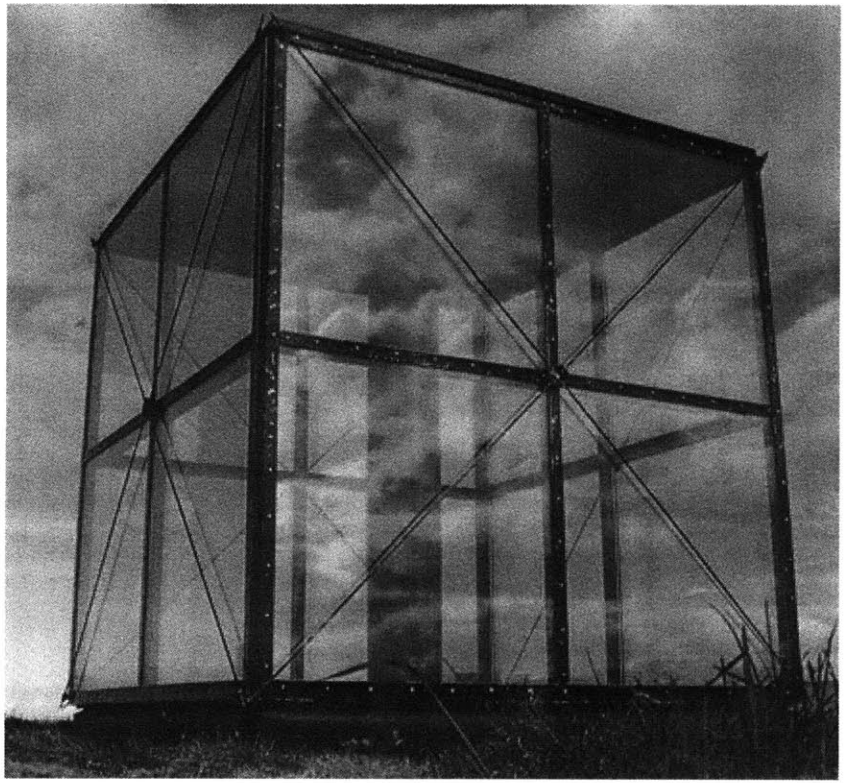


figure 8
Sewage Pumping Station
Bjorn Hallsson

These two pages contain precedent studies which served to illustrate several points inherent in the thesis. The first example, the Financial Times building by Nicholas Grimshaw and Partners, is a typical example of a newspaper printing facility. It opens its workings to visitors by means of a large glass facade. Traditionally newspaper presses were found within urban centers where it would be easy for someone to see the inner workings of the presses. For various reasons the presses were moved away from the urban cores and placed along the urban edges. One sense of manufacturing had been removed from people's lives. To see a working press today, it is necessary to make a special trip to visit them.

Financial Times Building

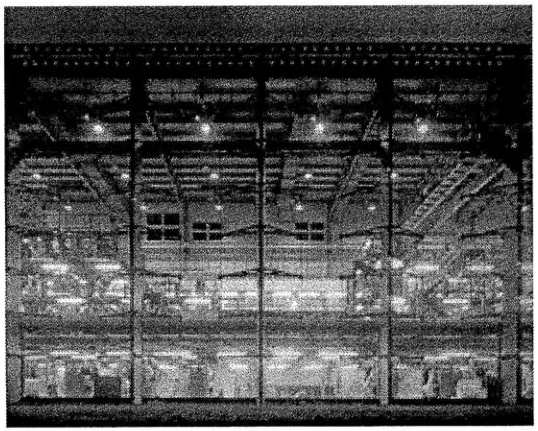


figure 9
Financial TImes Building
Nicholas Grimshaw and Partners

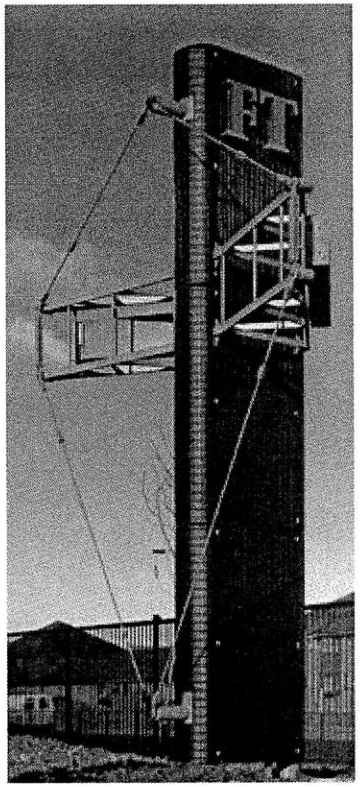
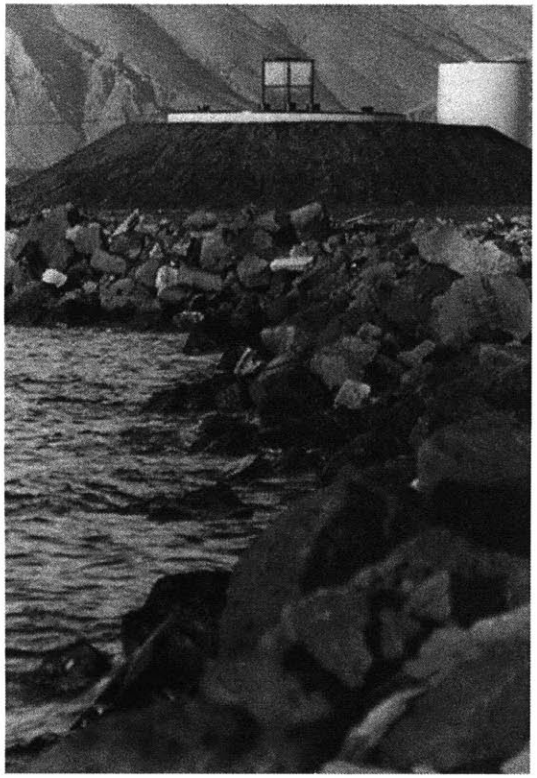


figure 10
Financial Times Building
Nicholas Grimshaw and Partners

The next example is a sewage pumping station by Bjorn Hallsson. Located in Reykjavik, Iceland, it is "reminiscent of an ancient settlement watched over by the benign eye of the cubic belvedere that marks the centre of the composition" (Phillips 1993). Thousands of tons of trash are generated every day in this country; perhaps if the recycling stations were a little more prominent in the public eye, we would be more aware of recycling, reducing and reusing. This project begins to take on this theme, but its remote location prevents it from accomplishing that possible goal.

Bakery visits also played a large role in the precedent studies for this thesis. Those will be discussed in Chapter 5: Baking.



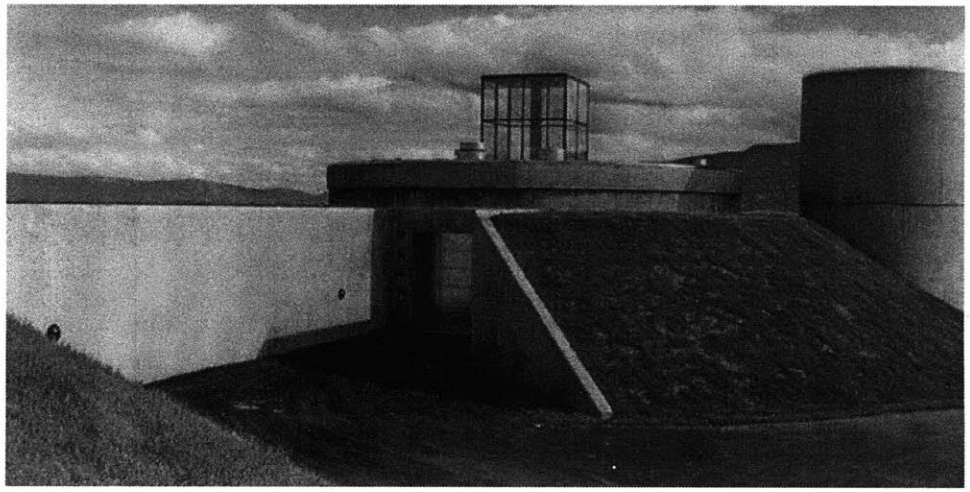


figure 11
Sewage Pumping Station
Bjorn Hallsson

figure 12

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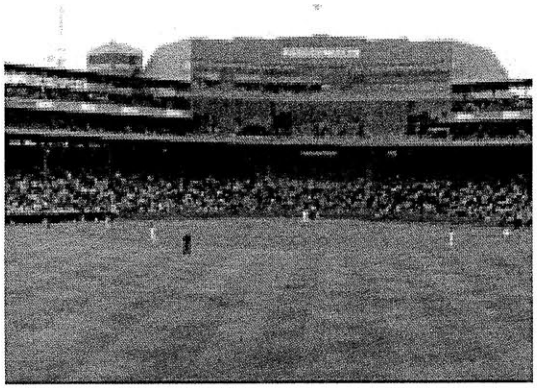

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Fenway Park, with Kenmore Square and the famous Citgo sign beyond

"It is a New England landmark, no less so than the Bunker Hill Monument, the Old Man of the Mountain, or Walden Pond. And when Major League Baseball is no longer played in Fenway Park, there is a good chance that the left-field wall will be preserved, either as part of the next park or as a monument to the first century of American League baseball in Boston."

Dan Shaughnessy, Boston Globe Columnist

figure 16
aerial photo
Kenmore Square

Kenmore Square is located within the city of Boston, just next to the border of Brookline, Massachusetts. The square marks the convergence of Commonwealth Avenue, Beacon Street, Brookline Avenue and Deerfield Street. The site is perhaps best known for two of its landmarks, the neon Citgo sign and Fenway Park, home to the Boston Red Sox.

Kenmore Square presents an unique situation within the city of Boston. It is one of the few neighborhoods which sustains activity close to twenty-four hours a day. Boston University, with its staff, faculty and students, draws a large number of people into the area. There is a major T stop to mark the convergence of three of the MBTA Green line branches. Keeping activities running into the night, Landsdowne Street bars and nightclubs offer entertainment to adult visitors. Fenway Park and the Boston Red Sox have been another crowd attraction for the past 88 years. The Park draws crowds both during the days and nights, weekdays and weekends.

figure 17
view of Kenmore Square T Stop

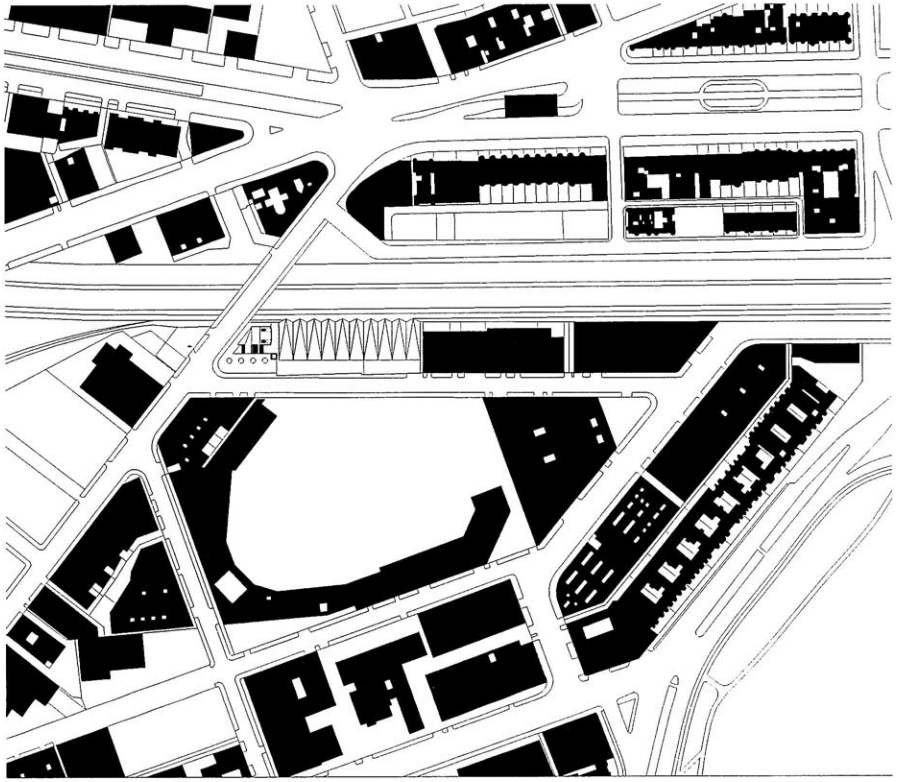

figure 18
site plan
not to scale

There are few spots within an urban setting in which one can place a large scale industrial building. The scale of Kenmore Square allows for more non-traditional building types than most neighborhoods of Boston. Already inherent in the neighborhood is the sense of a nightlife and entertainment, two ideas important within the bakery.

The site provides several important design determinants for the project. The relatively narrow depth of the site has an impact on the potential arrangement of the machinery and therefore the visitor circulation. The proximity of Fenway Park is another advantage to the site. As a corner parcel, this site serves as a marker for the area. Elevating the viewer to a height above the park affords another learning experience within the bakery.

This page shows some images of Kenmore Square. Images of the site and surrounding streets are found on the next two pages.

figure 19
view of intersection of Brookline and Commonwealth Avenues

figure 20
view of Buckminster Hotel, Kenmore Square

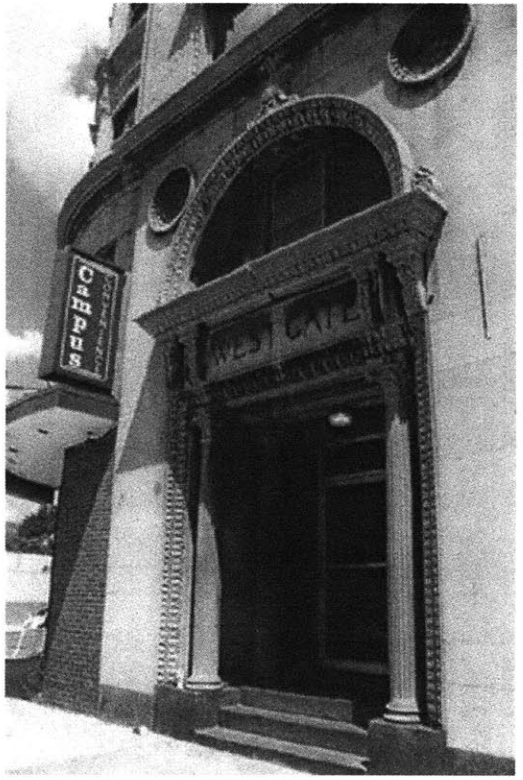

figure 21
building in Kenmore Square

Consideration of noise and pollution from the highway will also shape some design decisions. Revealing the process within this project goes beyond showing how the machines function. It involves exposing the mechanics of the building to the patrons to demonstrate how it functions to allow for light and ventilation. Although the machines are highly automated, several employees on the production floor will be necessary; adequate natural lighting without glare is essential to the production line.

figure 22
image of Fenway vendor

figure 23
view of highway and rail tracks directly behind the site

figure 24
souvenir shop, Fenway Park

Kenmore Square affords the opportunity to move an industrial process back into the urban fabric. It is a chance to take the industries located along the urban edges and move them back to a place where they will experience a rediscovery by its visitors. The relocated industries themselves will experience a rebirth of sorts as they move more prominently into the public eye.

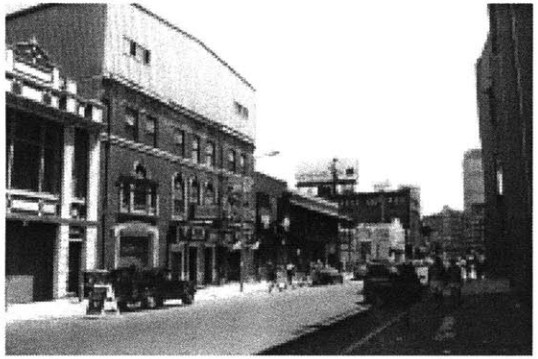

figure 25

figure 26

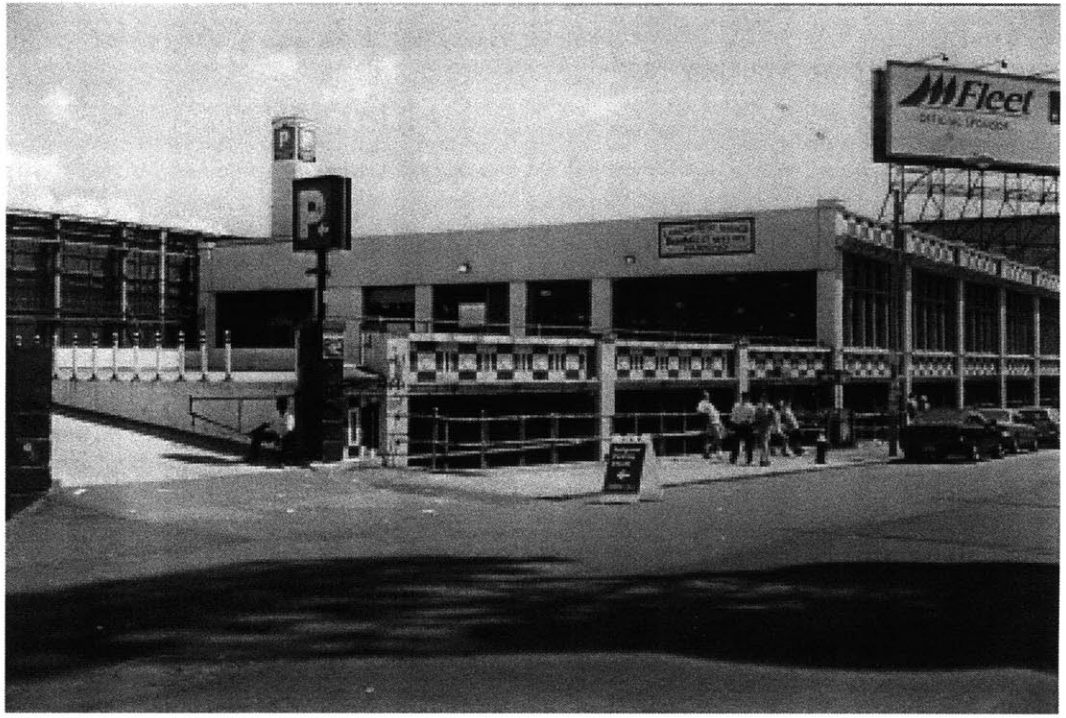

figure 27

Fenway Park, although a favorite ballpark to many, is sadly growing old and is becoming rapidly outdated. Local community efforts and the Red Sox organization have both proposed development schemes for the new park. Local efforts, as seen on this page, favor a renovation plan for the existing facilities. The Red Sox organization prefers buying surrounding parcels of land and building an entirely new facility, as shown on the opposite page. For the purposes of this thesis, it was assumed that a new park would be built, but the Green Monster and portions of the seating would remain as a tourist attraction. The design of the bakery takes advantage of the current and proposed situation at Fenway Park.

figure 28 (right)
proposed renovation plan for Fenway Park
Charles Hangenah

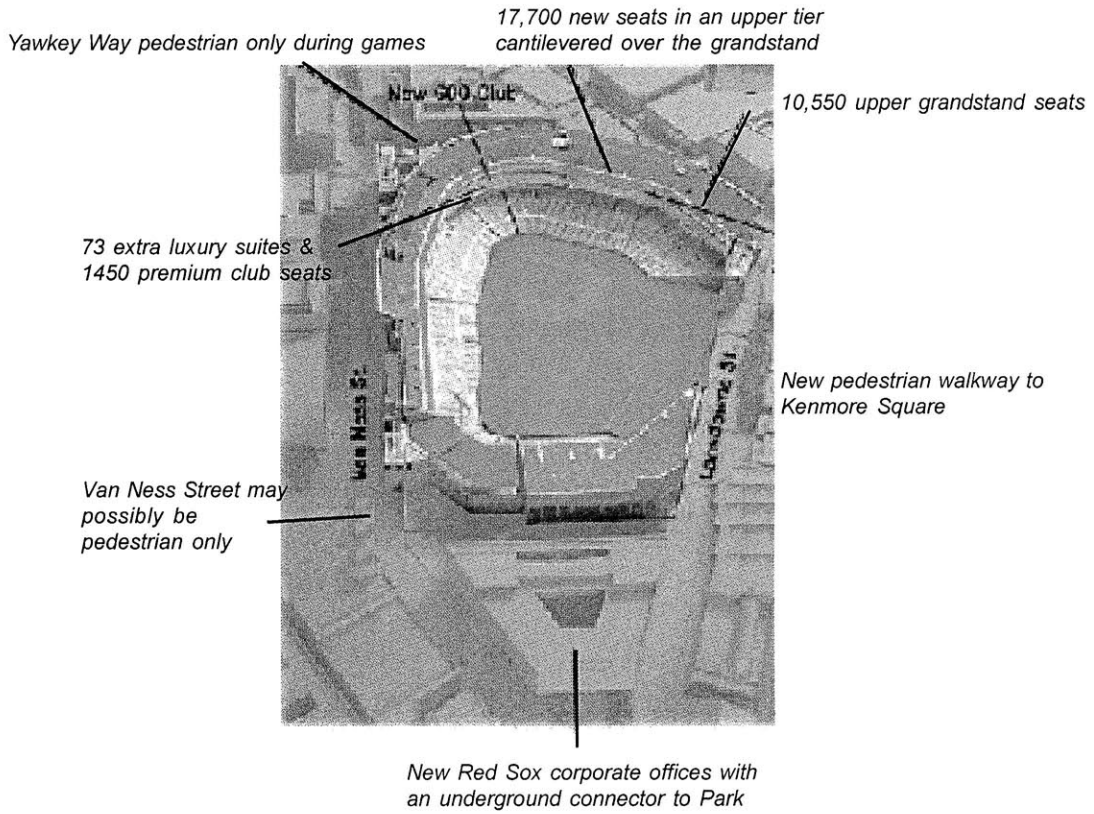

figure 29
score keeper's space inside the Green Monster

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illustrations for new Fenway Park
Red Sox organization

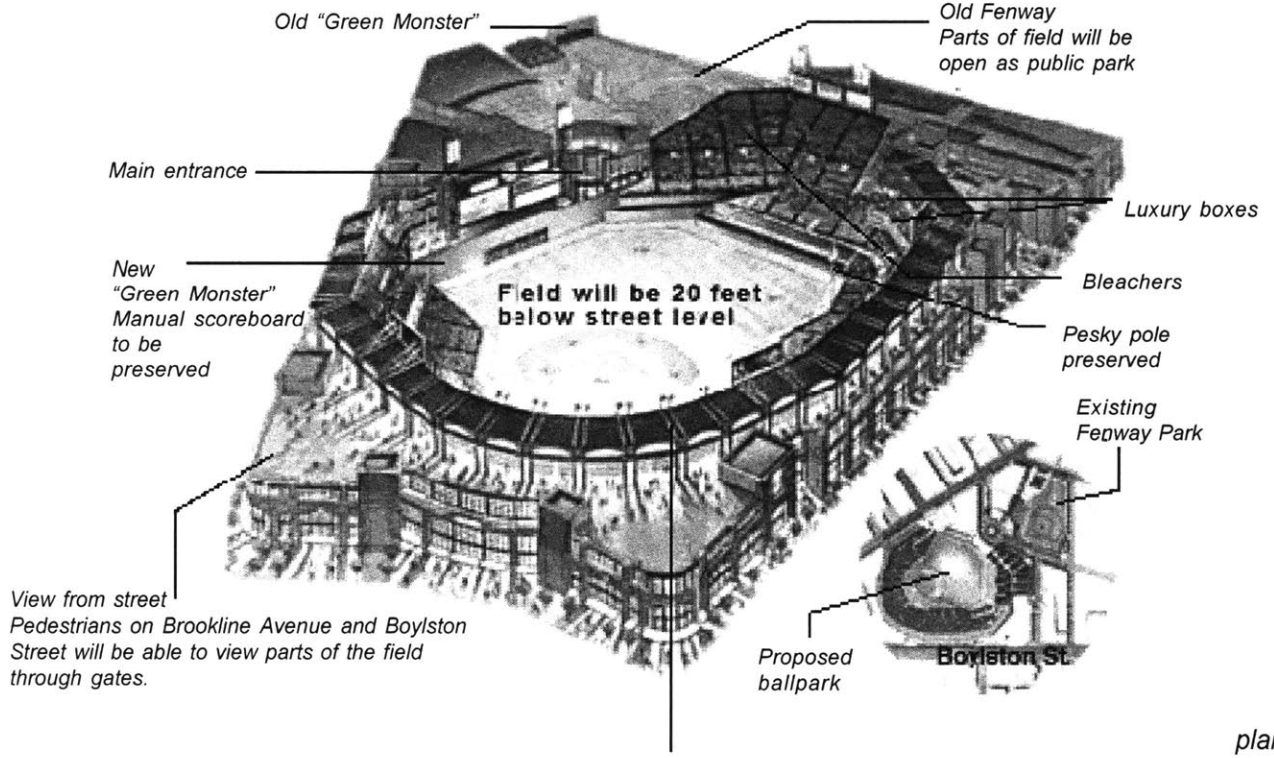

figure 32
plan for new Fenway Park
Red Sox organization

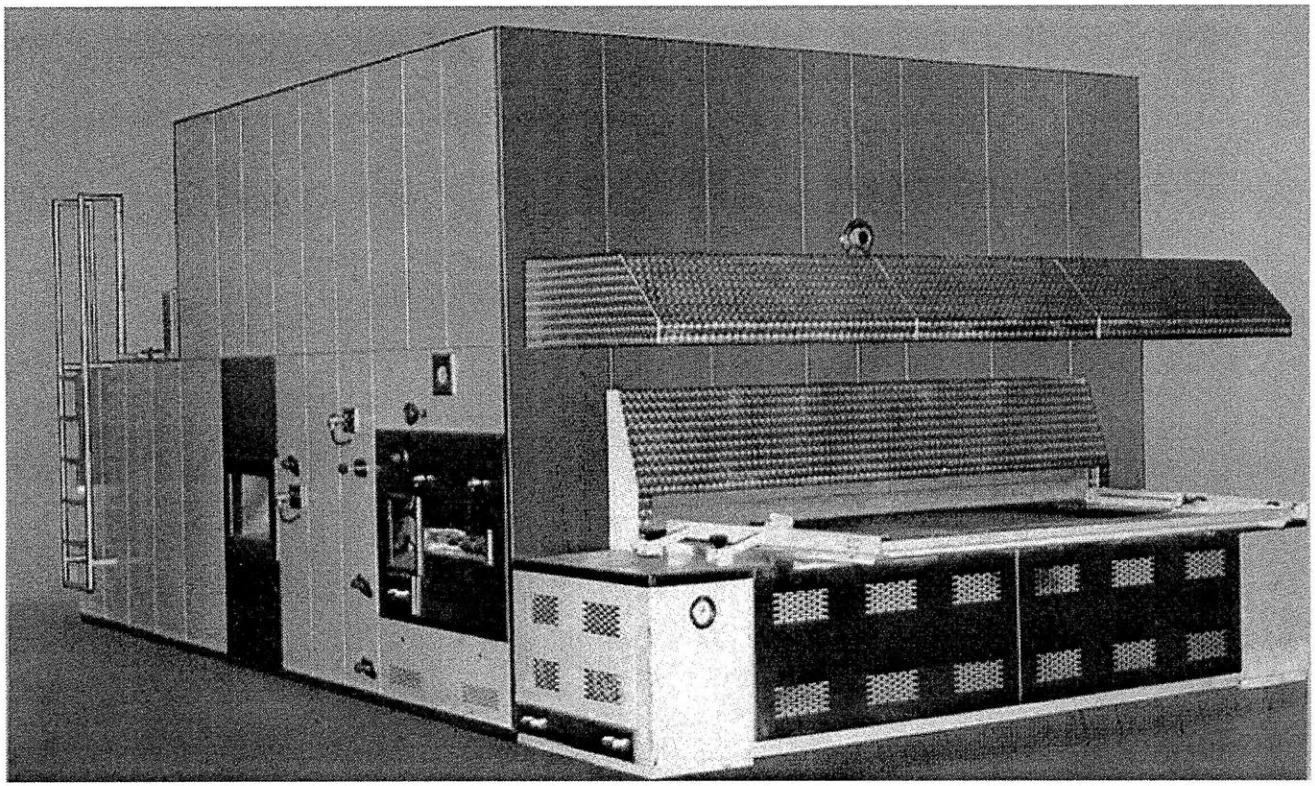

figure 33
large oven

"The ability of the human operator to handle fragile products at very high production rates is unmatched by most machines. The fact is that high-volume repetitive packaging tasks are tiring for operators and can cause serious repetitive motion problems."

-Richard B. Tallian and Michael A. Weinstein, "Flexible Automation Solutions for Today's Bakeries"

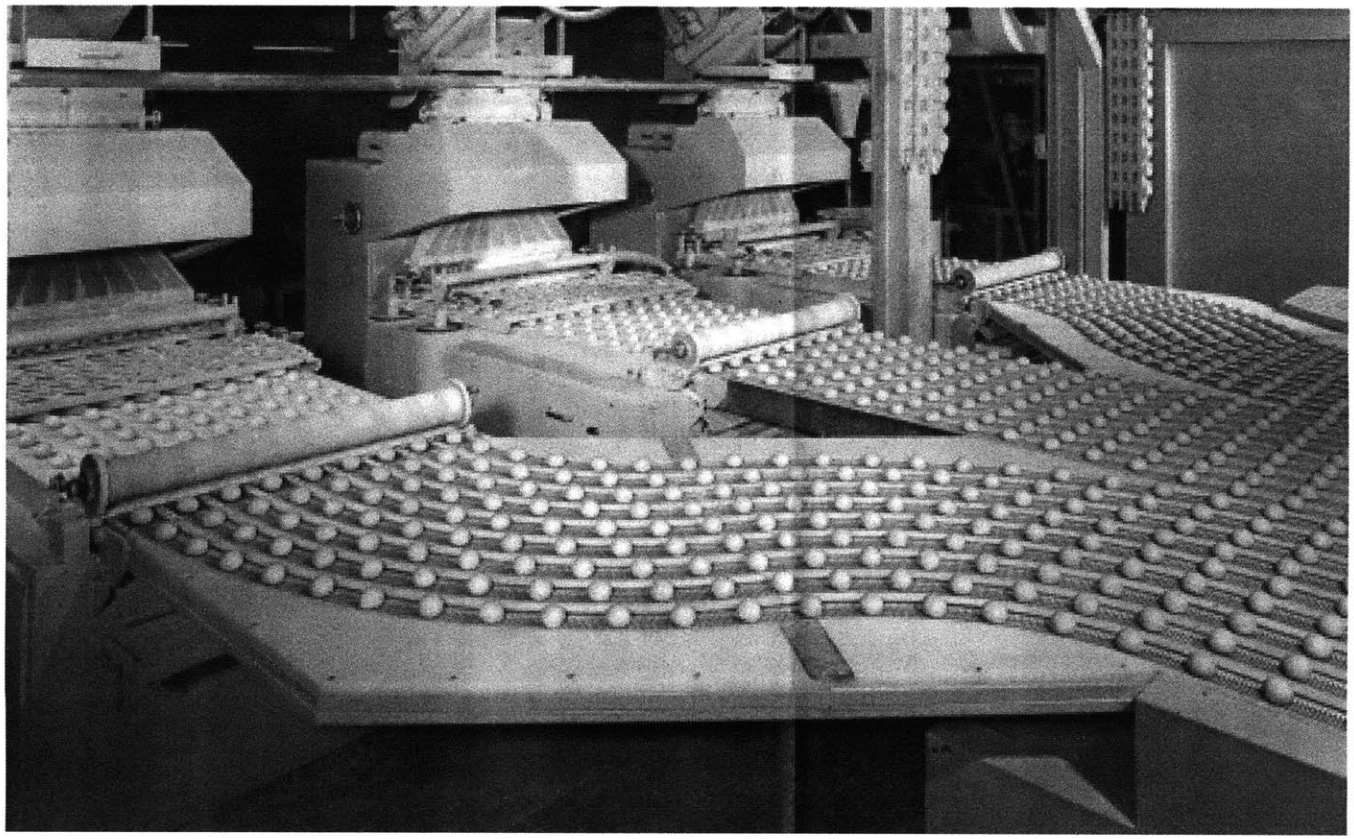

figure 34 automated baking process

When looked at from a broad perspective, baking is not an inherently difficult task. Mix up some dough, let it rise, bake it, eat it. But when one looks beneath the surface, there are numerous issues which one must consider. The decisions to use machines is not a decision to be made lightly. Those in the business of artisan breads believe that the only way to craft high quality bread is to produce it entirely by hand. While this may be true to some extent, there are certain types of bread and rolls which need to be produced through automation because the costs of human labor would be too great. This project uses machines which produce 400 rolls per minute. This is considered to be a low-end output. McDonald's bakeries, an example of a high-end output, would use a 1,200 rolls per minute machine (Domenicucci 1999).

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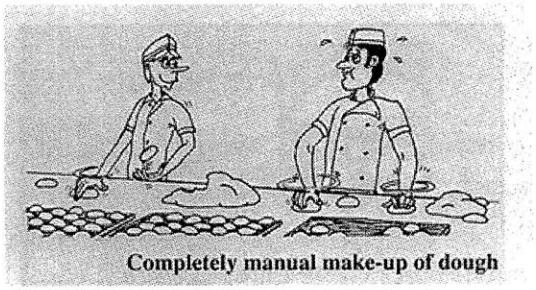

figures 35 - 37
different types of production

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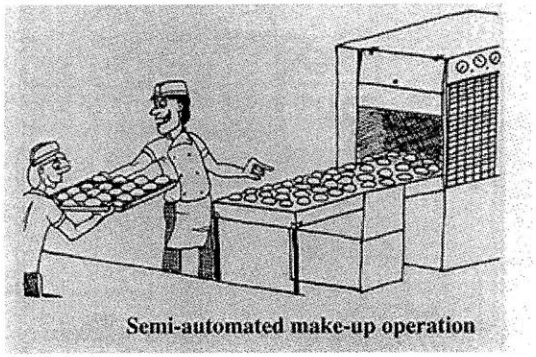

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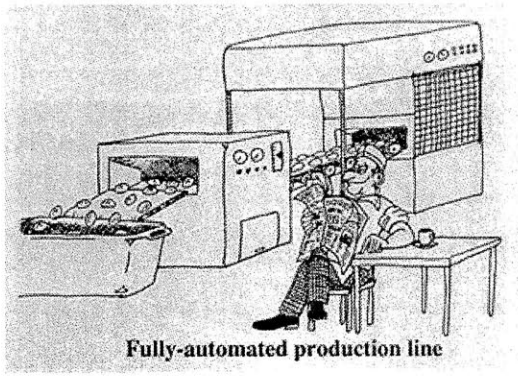


Four different automated bakeries and two hand-crafted bakeries were visited over the course of the semester. The first bakery, Quinzani's in Boston, Massachusetts, produces breads and rolls but no pastries. They operate 6 days a week, 24 hours a day. The down-time on Sunday is to allow for repairs. The bakery has several lines, each added as the bakery expanded. The newest one is outfitted with Winkler machines and will be discussed later. The high speed roll line is located on a second floor. There is no retail business associated with Quinzani; only wholesalers, distributors and restaurants may purchase goods.

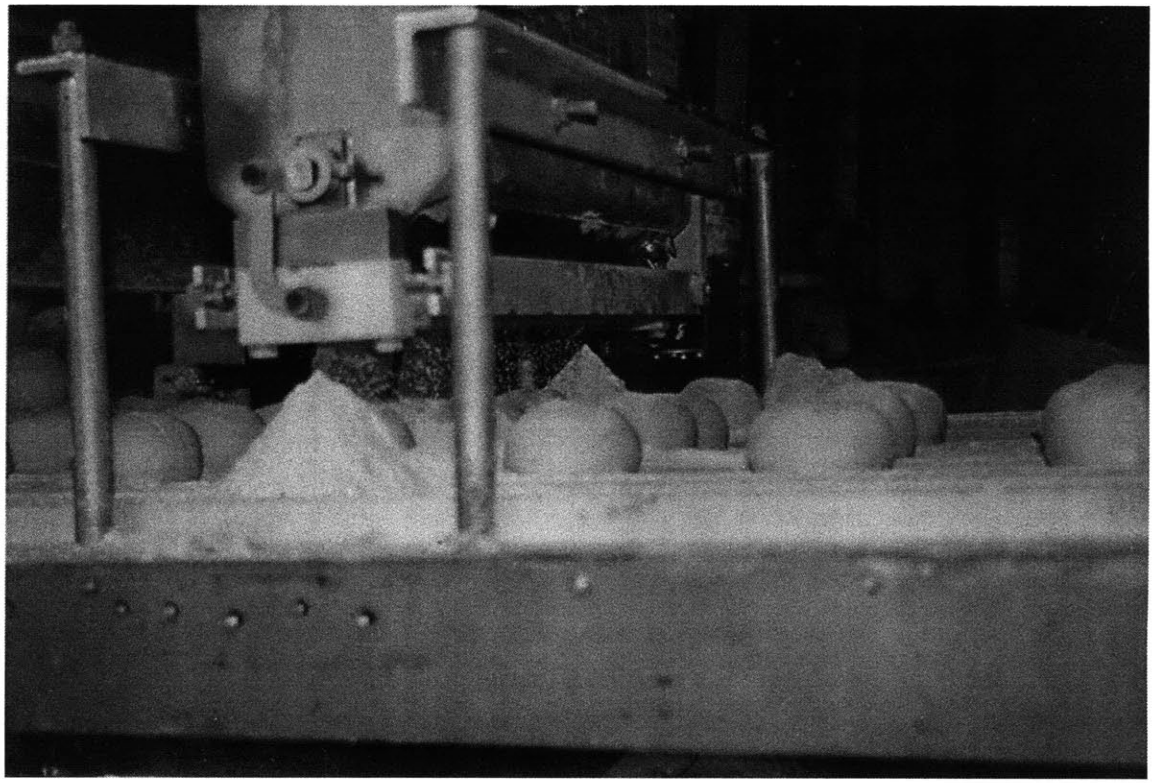
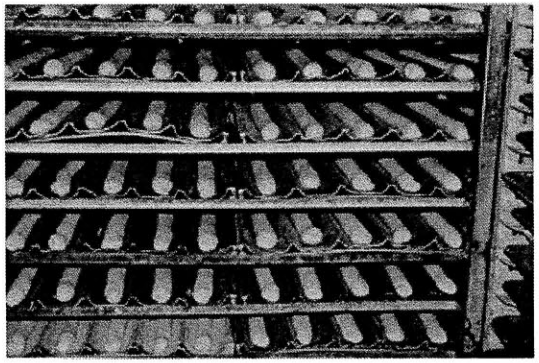


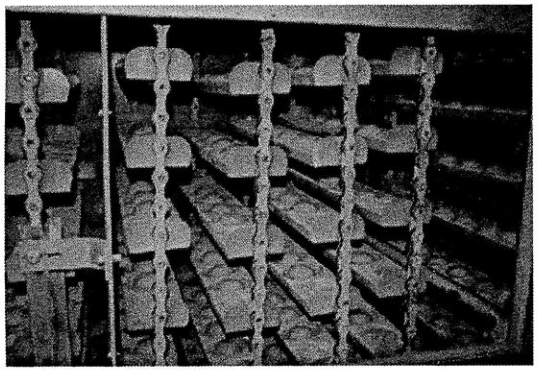
figure 38
dusting dough to prevent sticking
Quinzani's Bakery

The second bakery, Signature Breads in Medford, Massachusetts, is a par-bake facility. This means the bread is baked slightly more than half-way. The product is then frozen in a spiral freezer and sent to supermarkets or restaurants like Legal Seafoods. There the kitchens complete the baking process enabling these businesses to deliver fresh bread to their customers. This process enables restaurants and supermarkets to provide fresh bread without having to outfit their facilities to accommodate the entire baking process. Of all the bakeries visited, this one was the most recently built. As such, it had the most linear process. They employ a large amount of employees because their customers prefer a more "handmade" look to the product.

Signature Breads



baguettes rising: figure 39



rolls in the proofer: figure 40

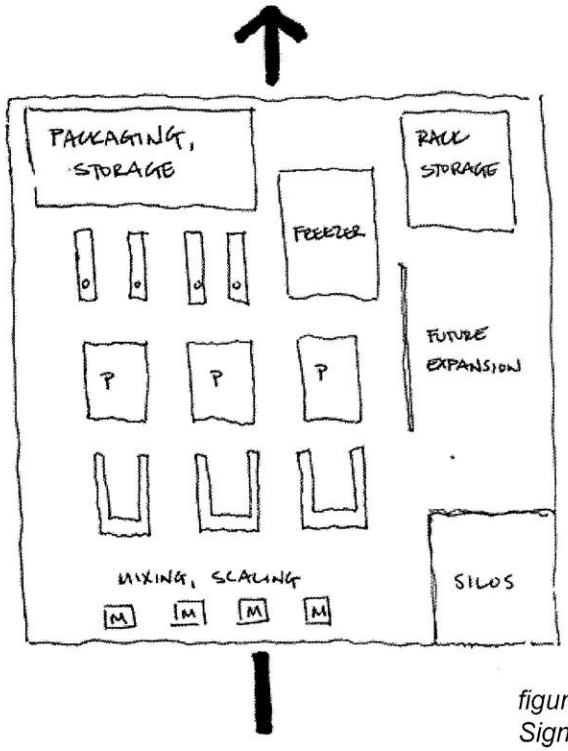


figure 41
Signature Breads, Medford, MA
linear arrangement of production

The third bakery, Harrison Bakery in New Jersey, is a classic example of how a bakery continues to function even though many pieces had been added over the past 100 years. This bakery was the least automated of all four visited. This bakery produces rye, sourdough, challah, white bread, pullman loaves, and submarine rolls to name a few types. The numerous types of bread and rolls require more silos for different types of flour. When the baking process is discussed later in this chapter, the approximate weights of ingredients and baking times are based upon the information obtained from Tony Campos, Plant Manager, during the visit and interview.

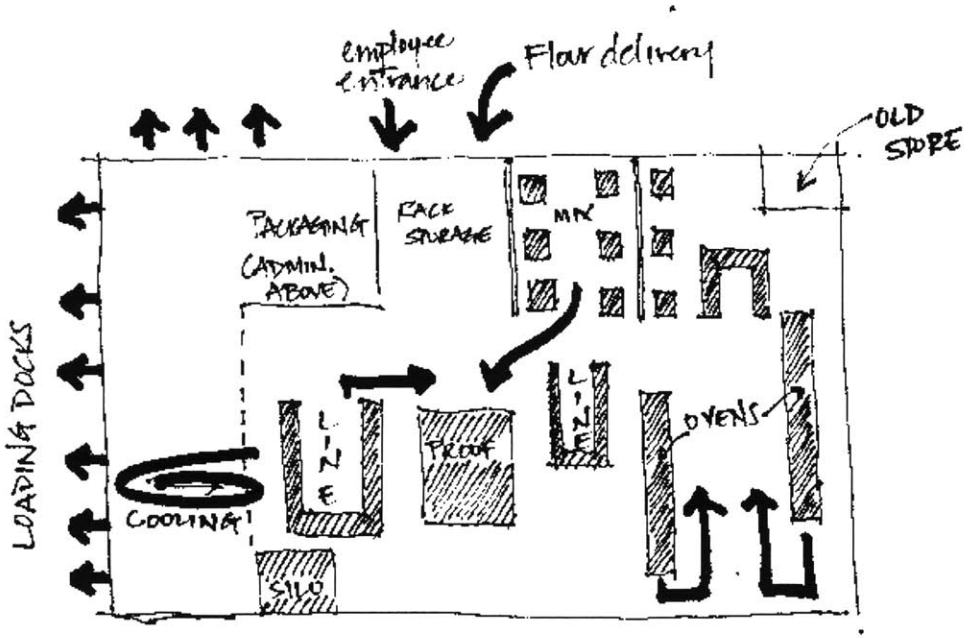
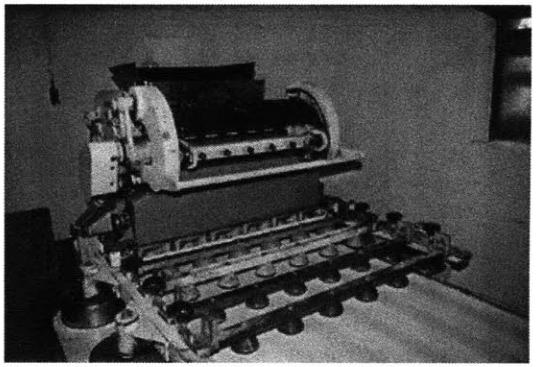


figure 42
Harrison Baking Company, New Jersey
non-linear arrangement of production

panned loaves ready for the oven: figure 43



dough divider: figure 44

The Rockland Bakery was the last bakery visited. This bakery is unique among the four; it is the only bakery to have retail sales on the premises and allows the customers to walk near the machines as they select their bread and rolls from the carts and racks. Retail sales account for about 15-20% of the total revenue. They produce 15 types of rolls and 10 types of breads on a weekly basis in addition to a full line of pastries on the premises. They ship to New York City, New Jersey, and as far away as Philadelphia. The bakery operates 24 hours a day, seven days a week, and has retail hours every day. They hire about 150 employees to run the bakery alone. Additional help is needed in the pastry preparation, retail areas and in administration.

Most of the cooling conveyors are overhead, allowing customers to walk around in a limited area where the ovens are operating. Mr. Battaglia, one of the owners, mentioned that the equipment is chosen as

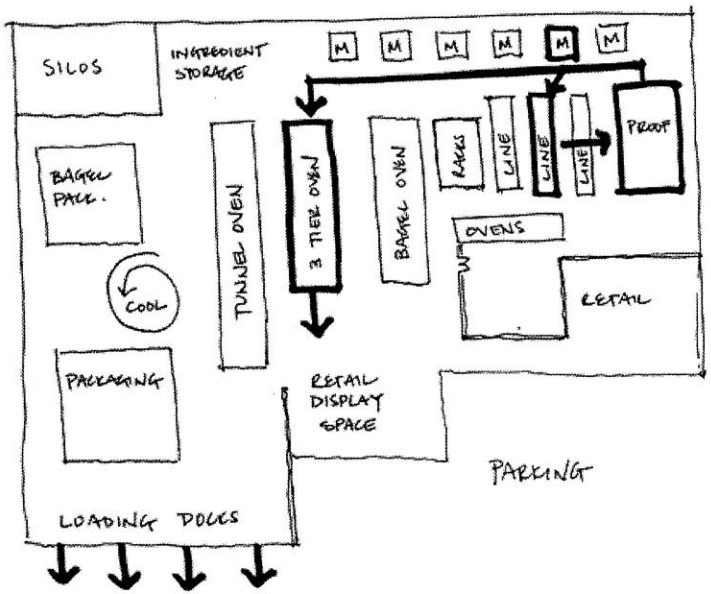


figure 45
Rockland Bakery, New York
non-linear production

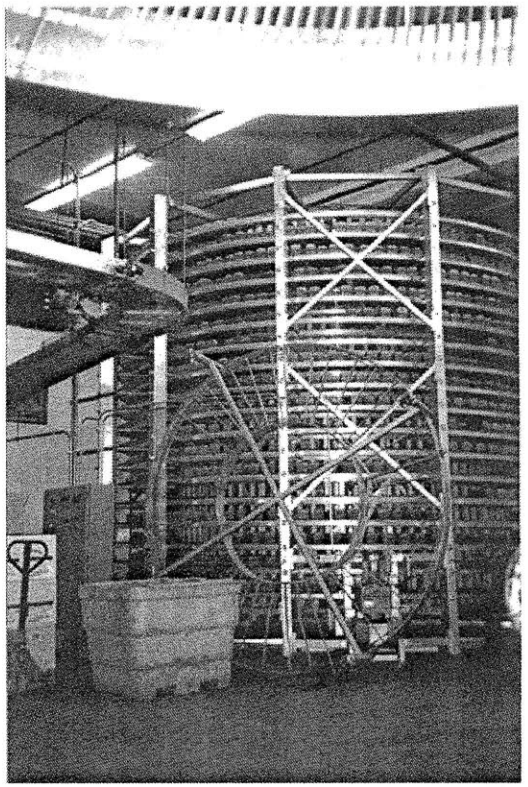


figure 46
Rockland Bakery, New York
cooling carousel

much for its baking capacities as its ability to be used as an obstacle to keep customers out of other areas of the bakery. The bakery has undergone extensive renovations in the past few years. The first phase is complete and a second one is in the planning stages. The retail and pastry preparation spaces will be expanded; customers will no longer be able to walk near the machines once the work is completed.

This bakery served as the model for the thesis bakery with one fundamental difference. The Rockland Bakery allows customers into the bakery primarily because the retail space was once too small to hold both products and customers causing unavoidable overflow into the bakery. The tradition has continued despite modernization of the facilities. The thesis project seeks to incorporate the visitors' experience from the beginning, to think about how the machines and people interact together.

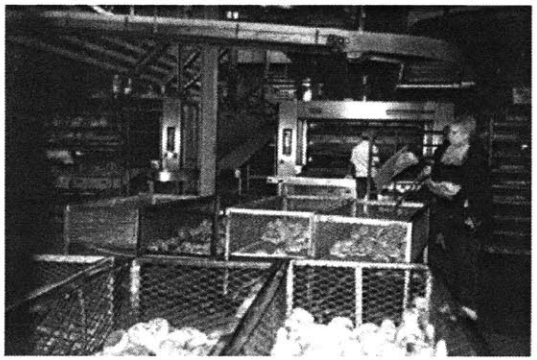


figure 47
Rockland Bakery
bread carts

figure 49
Rockland Bakery
notice to customers

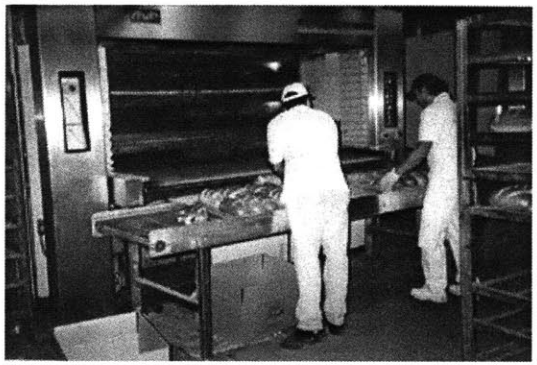


figure 48
Rockland Bakery
bakers working at oven

figure 50 (below)
Rockland Bakery
bread racks

Typically, a factory of this size would require at least four truck loads per week of flour. The flour is stored in several 120,000 lb capacity silos. Roughly 200 lbs. of flour are needed to make each batch of dough. Water, salt, yeast and a baking agent are added to the mix as well. This yields a dough which weighs about 1,000 lbs. If it is a sponge dough it will need to rise for 3-4 hours, but straight dough (used for rolls) can be used immediately.

The dough is divided into portions using a scaler. It rises again in an intermediate proofer for about 2 minutes. This allows the dough to be worked into a shape. If it wasn't subjected to this intermediate step, the dough would spring back into the original ball shape. From the intermediate proofer, the dough moves into the stringline, where the rollers stretch the dough into its final shape through a variety of small steps. At this point, the dough may or may not be placed into pans, depending upon the type of product being made. Most of the bakeries used pans in this step. The dough is in a constant state of flux; it is important to keep the dough

figure 51
baking times and temperatures

	Bread Type	Temperature	Baking Time
0,500 kg	Mixed rye bread, baked without a pan	260–210 °C	35– 40 Min.
0,500 kg	Mixed wheat bread, baked without a pan	240–200 °C	30– 35 Min.
1,500 kg	Mixed rye bread, baked without a pan	270–220 °C	65– 75 Min.
1,500 kg	Mixed rye bread, baked in a pan	260–220 °C	75–120 Min.
1,000 kg	Rye bread, baked without a pan	270–220 °C	60– 65 Min.
1,000 kg	Coarse rye bread, baked in closed boxes	220–160 °C	240–300 Min.

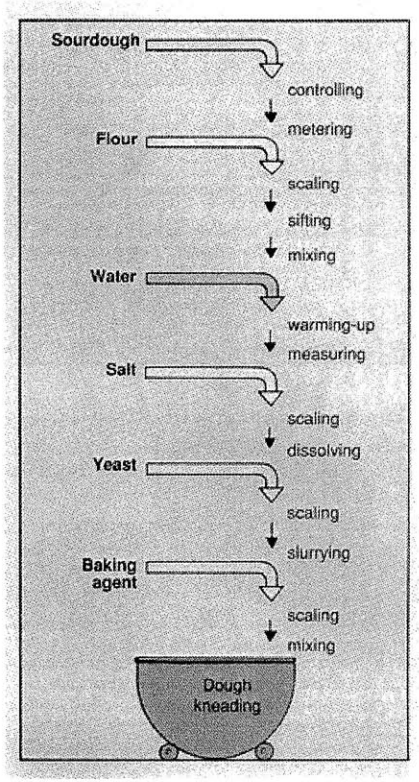


figure 52 (left)
ingredients and preparation chart

facing page:

figure 53
mixer

figure 54
shaper

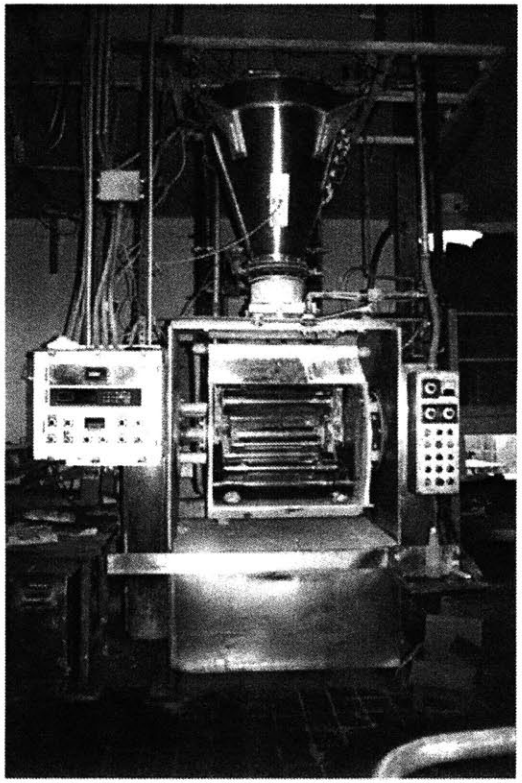
figure 55
product moving from proof to oven

figure 56
finished product on cooling conveyor

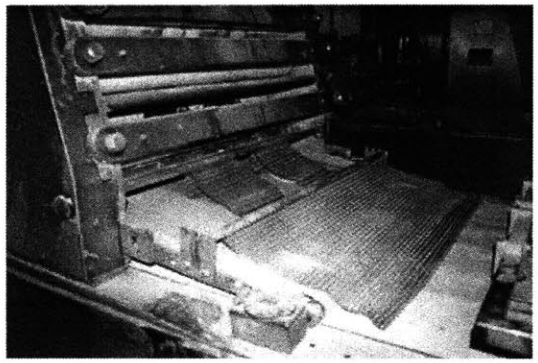
moving. This part of the process takes about 12 minutes to complete. The machines used in this portion of the design project were sized according to product literature from Winkler, Inc. This can be seen in greater detail in the next chapter.

The pans are conveyed into a proof box, or steam box, where the dough rises for about 50-60 minutes depending upon current temperatures and humidity within the bakery. If the line is completely automated, the pans are moved through the proofer on a series of conveyor belts. If the bakery uses racks, then the pans are manually placed on large carts, called racks, and those are pushed into the proofer. Each new batch comes in on new carts which are pushed into the steam box, moving the older carts forward. The risen dough is retrieved from the other side of the proofer when it is ready.

From here, the dough moves to the oven, where it bakes for eight to nine minutes (breads require more time). The product comes out of the oven and is cooled for roughly 25 minutes, then packaged and shipped.

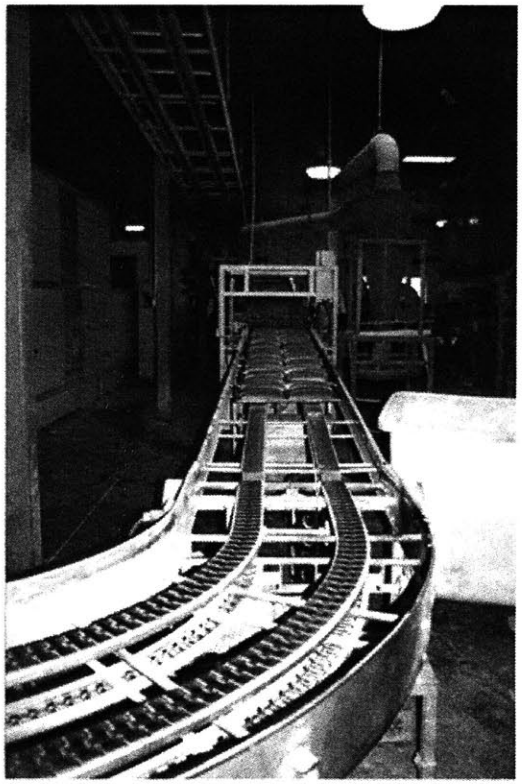


53



54

55



56

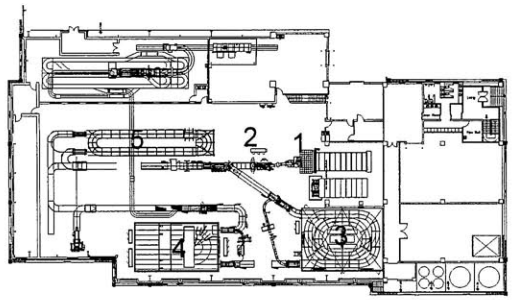
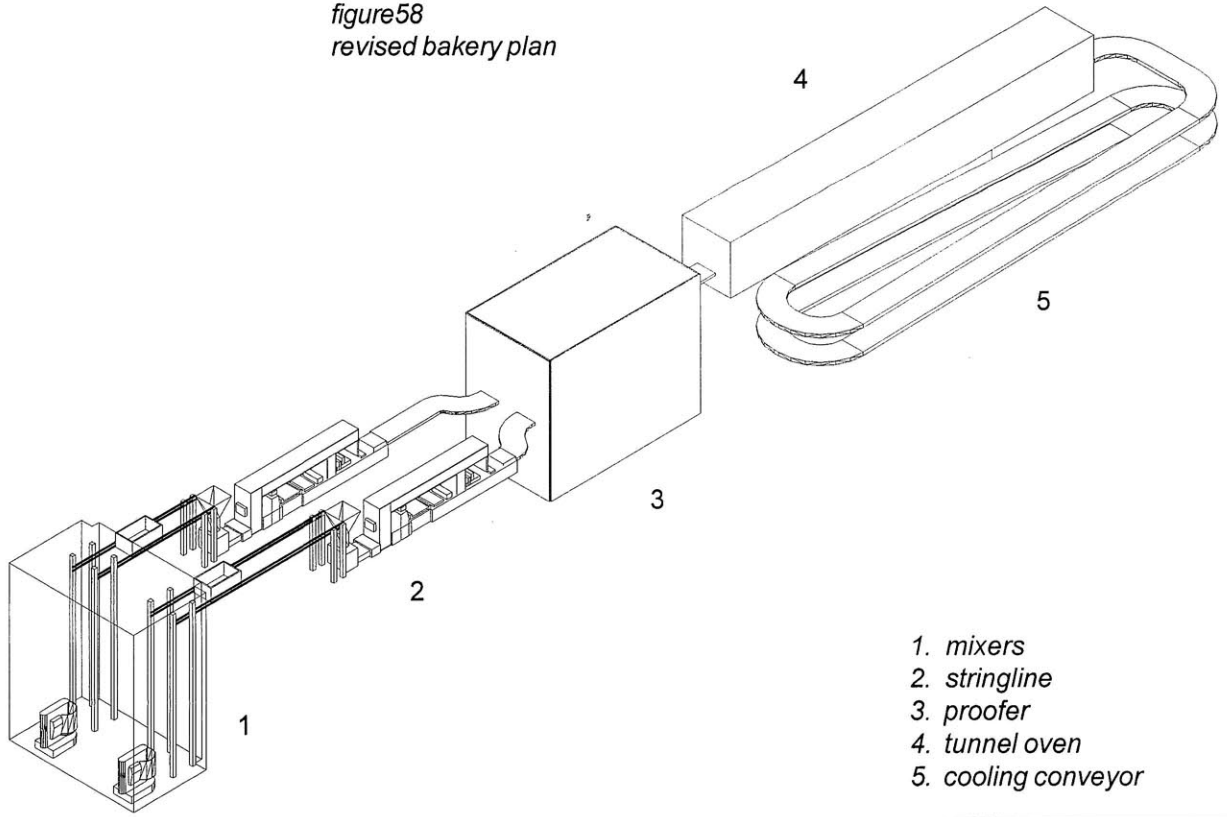


figure 57
traditional bakery plan

figure58
revised bakery plan



1. *mixers*
2. *stringline*
3. *proofer*
4. *tunnel oven*
5. *cooling conveyor*

"The transit of a nail through a plank, the compression of a column of steel, the tense stretch of aluminum skin, the modulation of a breeze, the framing of a view, the pleasurization of a place form the metrics of the built machine. This poetics is not applied but indigenous, not borrowed but discovered, not timeless but temporal, not arbitrary but directed. Architecture's return to the machine - in the full dedication and richness of its possibilities - holds the hope for architecture's future as both servitor and art."

Michael Sorkin, Pamphlet Architecture

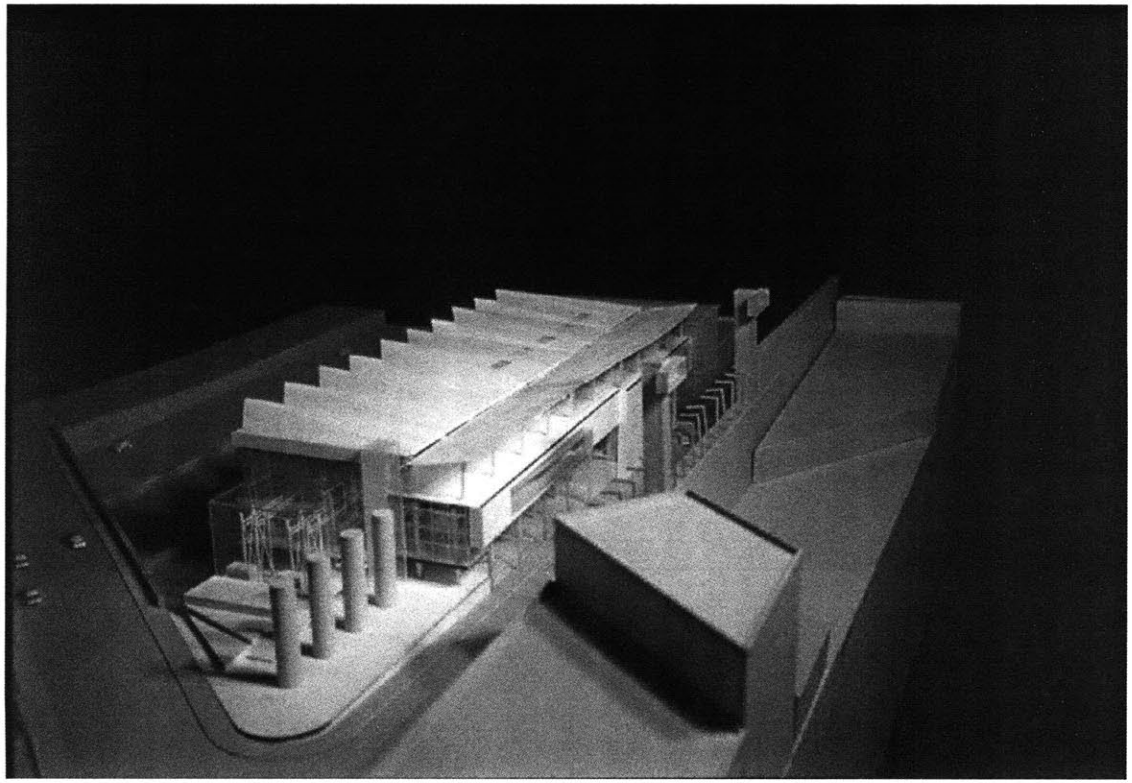


figure 59
aerial view of model

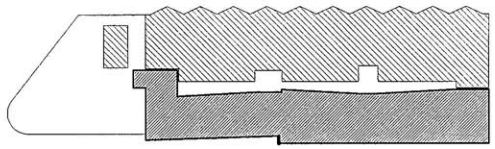


figure 60
program diagram

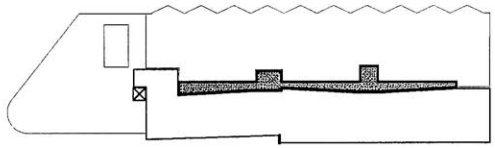
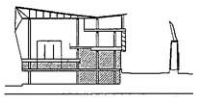


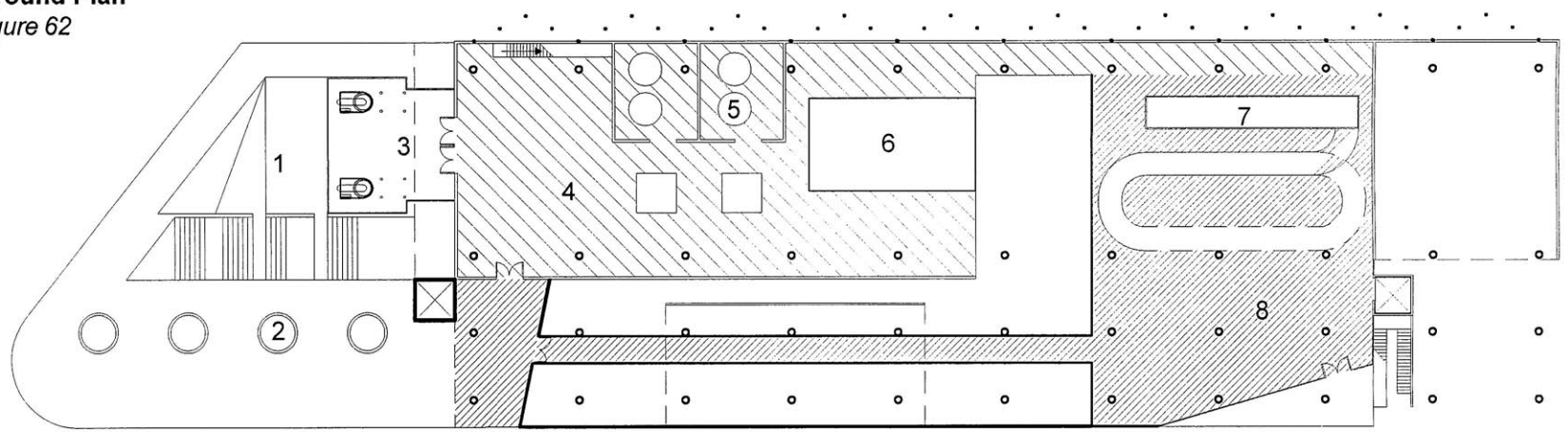
figure 61
circulation diagram

This project was developed through a series of diagrams and small study models. After several studies, it was determined that the best arrangement was to place the bakery's functions along the highway and to place the more public functions along Landsdowne Street, as shown in the program diagram.

Circulation is treated as the piece which holds the two parts together. From the walkways, one can see both the cafe / restaurant spaces and the bakery floor.



Ground Plan
figure 62



1. *outdoor space*
2. *flour storage silos*
3. *mixers*
4. *scaling area*
5. *ingredient storage*
6. *proofer*
7. *bulk packager*
8. *retail space*

Upon entering the building, one finds that the lobby of the building and the bakery are one and the same. One is immediately immersed in the baking environment.

What arises from these diagrams is the concept of nesting spaces in one another.

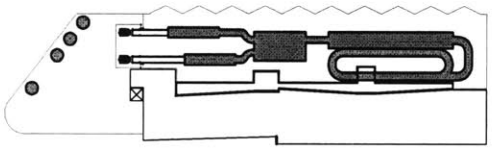


figure 64
machines diagram

Machines were aligned in a linear fashion to maximize production and to accommodate visitors.

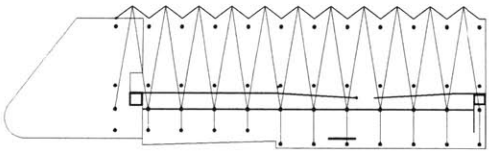
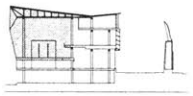
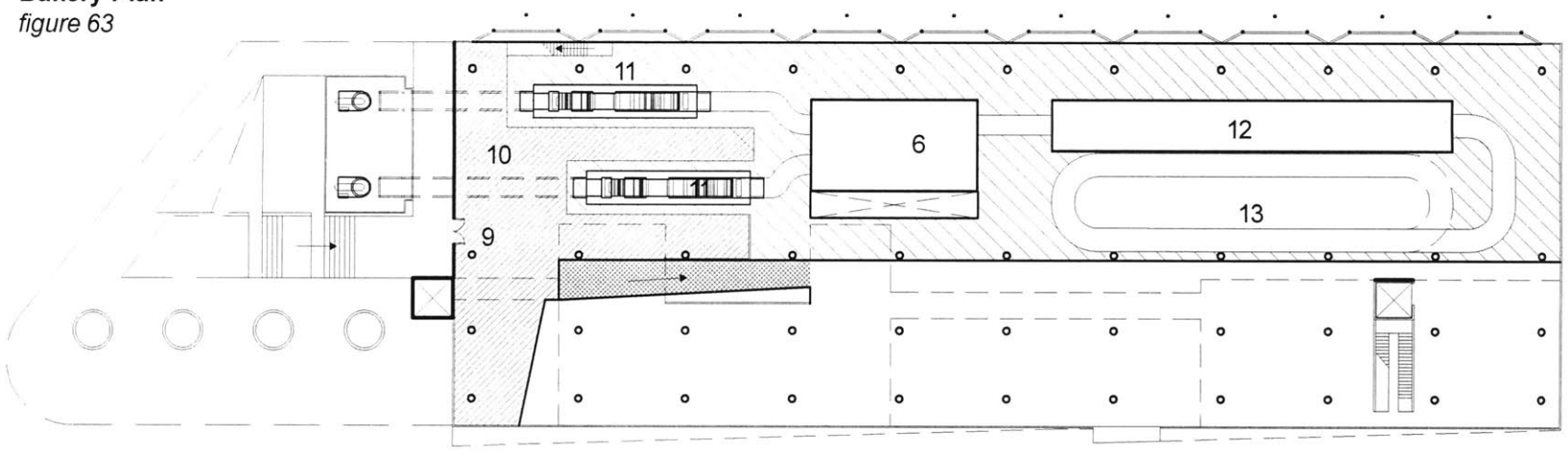


figure 65
structure diagram

A structural diagram emerged as part of a later study of the project.

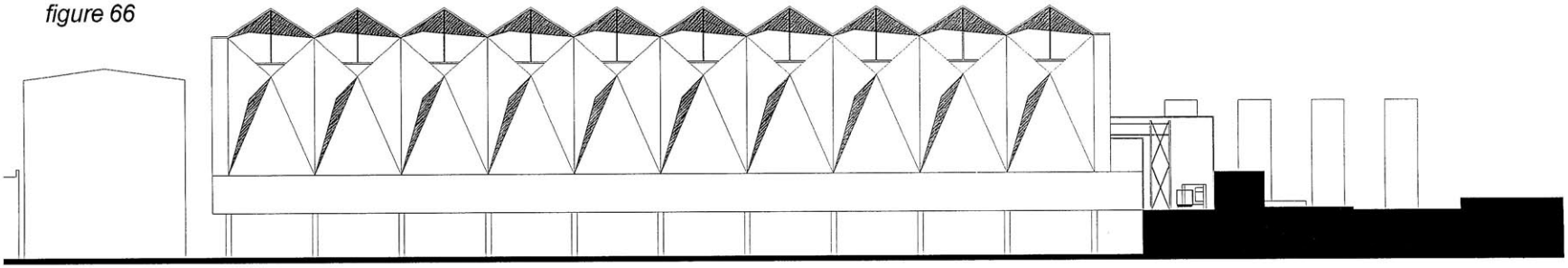


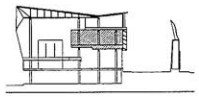
Bakery Plan
figure 63



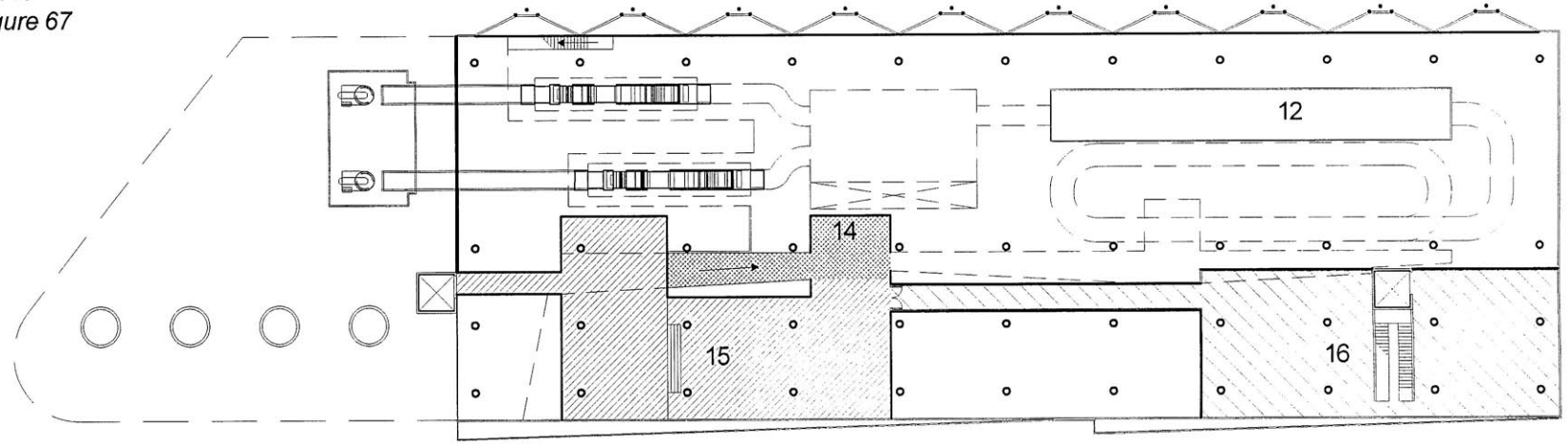
6. proofer
9. entrance
10. viewing area
11. stringline
12. tunnel oven
13. cooling conveyor

South Elevation
figure 66



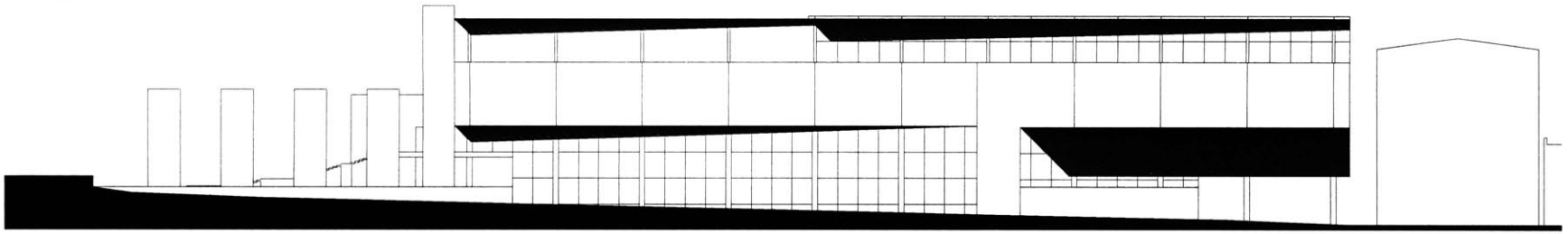


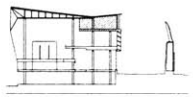
Cafe Plan
figure 67



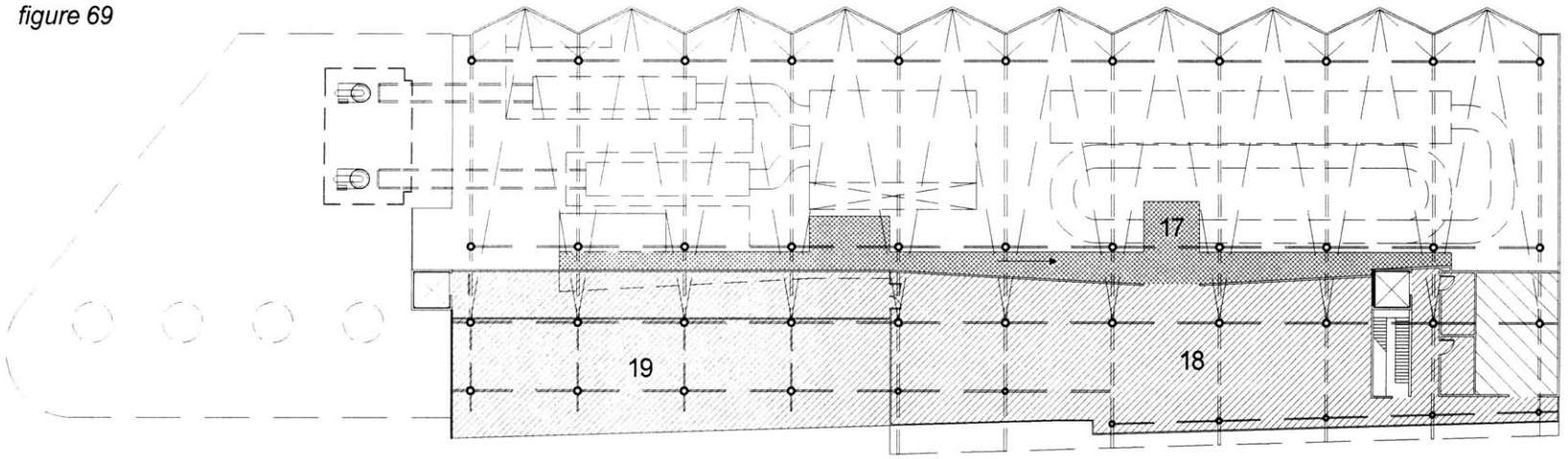
12. tunnel oven
14. viewing platform
15. cafe
16. restaurant / cafe kitchen

North Elevation
figure 68





Restaurant Plan
figure 69



17. viewing platform
18. restaurant
19. outdoor terrace

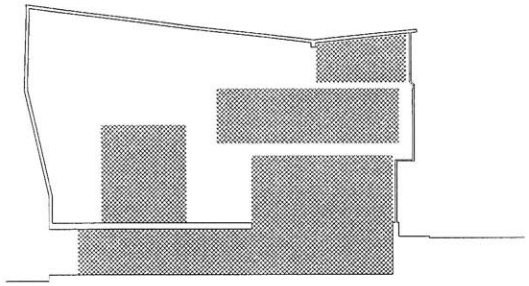
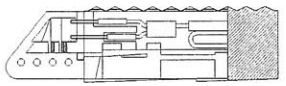
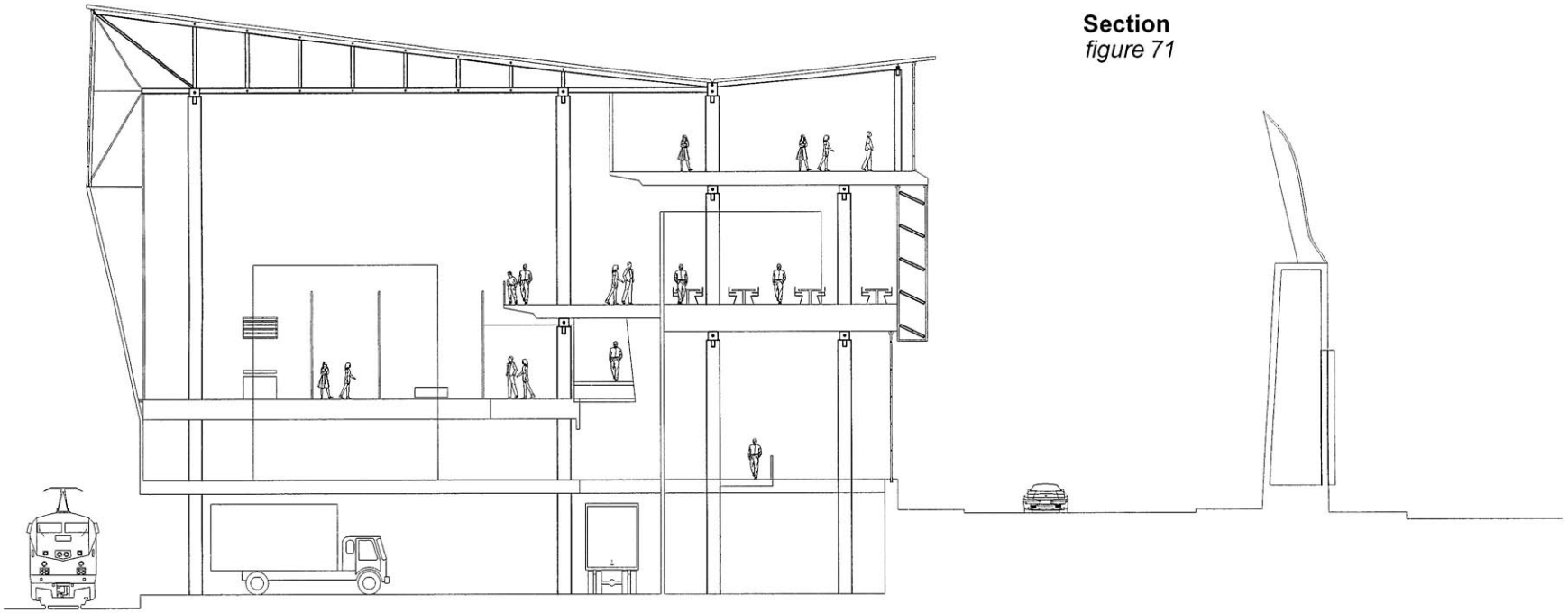


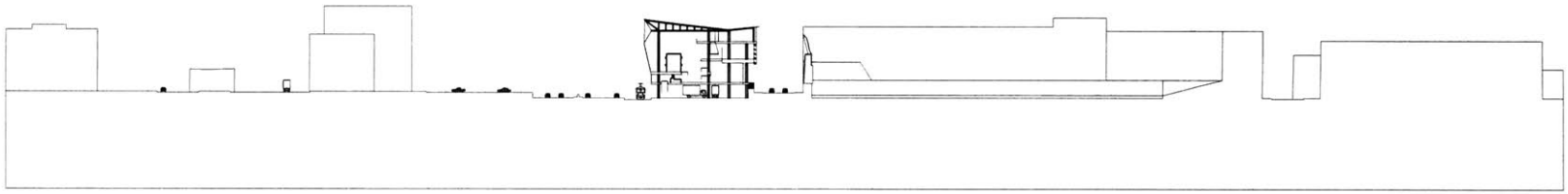
figure 70
nesting diagram

The idea of nesting is carried into the section as well, where one large membrane encloses smaller, discrete spaces. The nesting concept can be seen in the adjacent diagram. The layering of spaces, one after the other, provides an opportunity for the visitor to unfold them as they progress through the learning stages associated with the bakery.

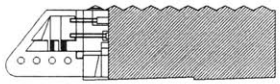


Section
figure 71

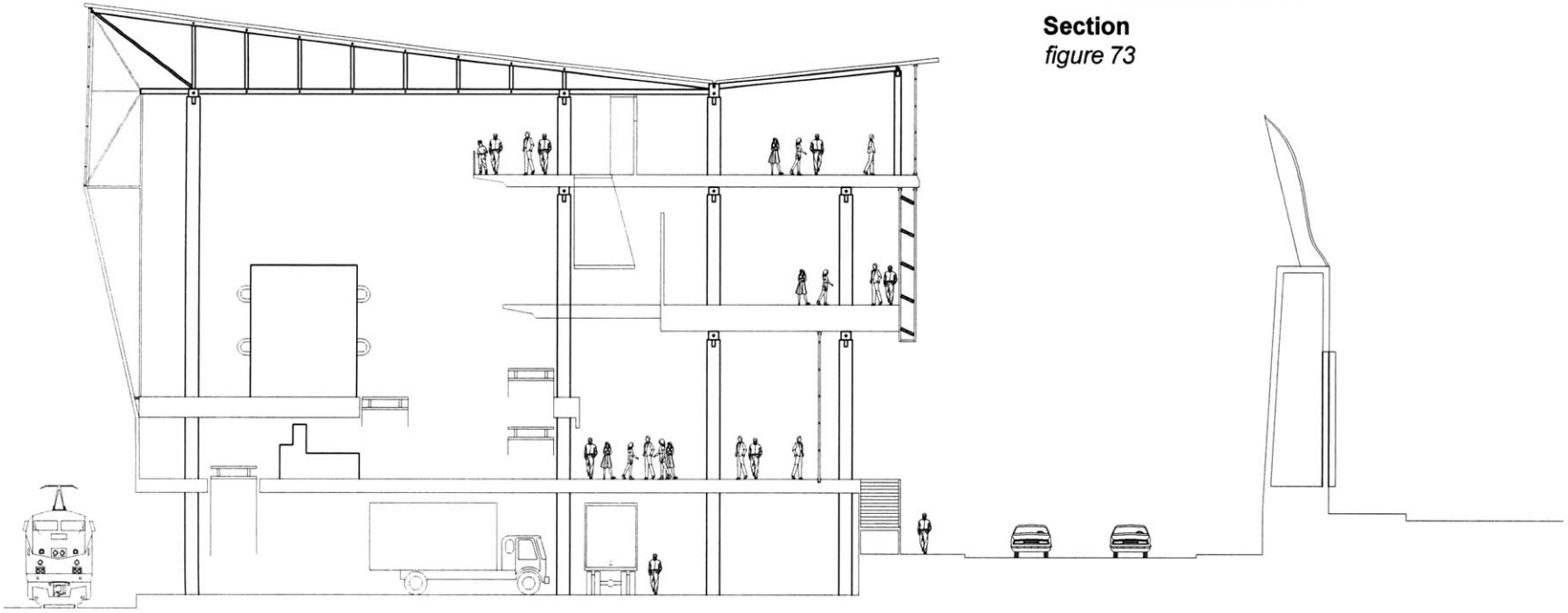




Site Section
figure 72



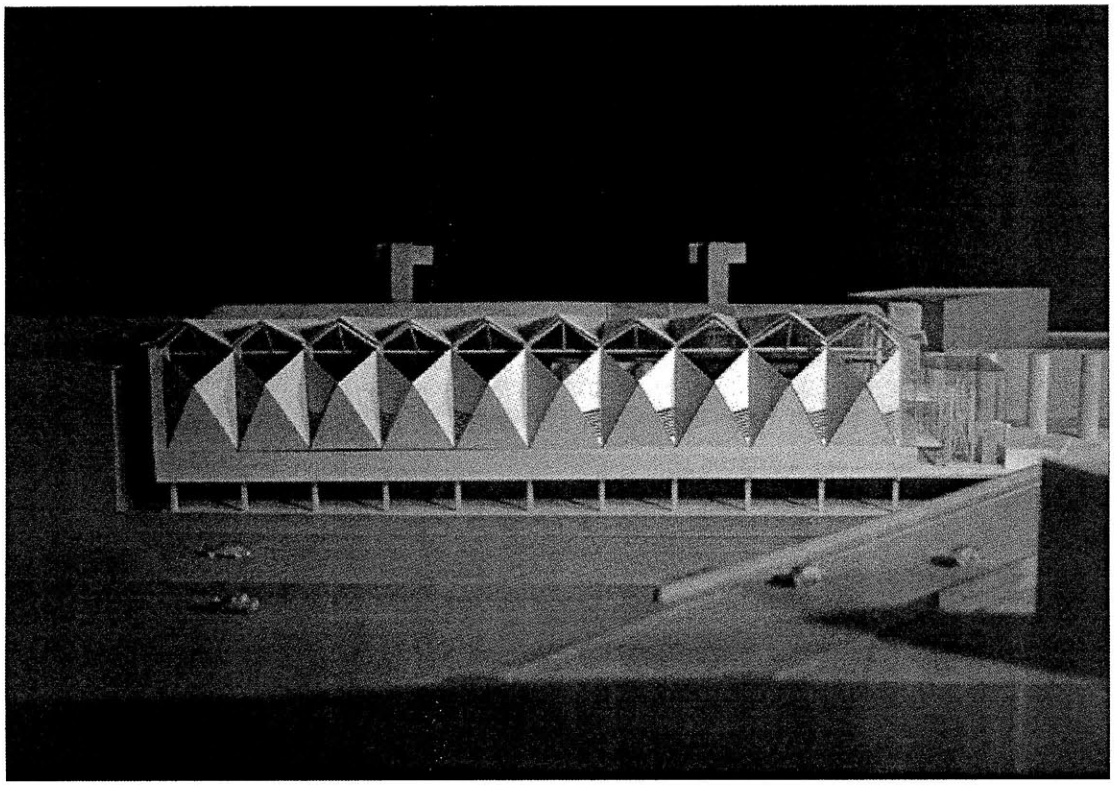
Section
figure 73

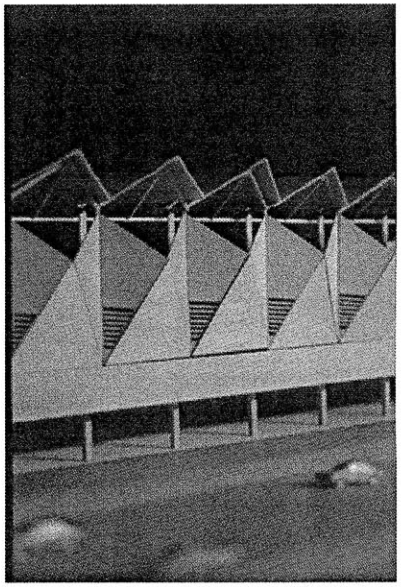


Lighting and ventilation became important design considerations. Prevention of glare while allowing light to filter onto the production floor provided a challenge. These two systems began to work together in the eventual design solution.

figure 74
north elevation

figure 75
north facade detail





The folding plates of the roof provide structural stability while devising a method to allow constant north light to filter into the spaces. The north light permeates the space through the folding planes of the facade as well. These planes are punctuated by ventilation louvers.

figure 76
south facade detail

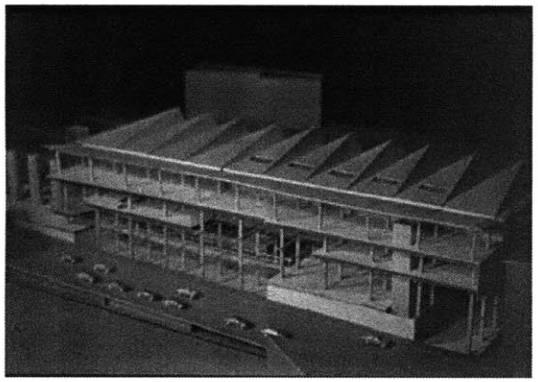
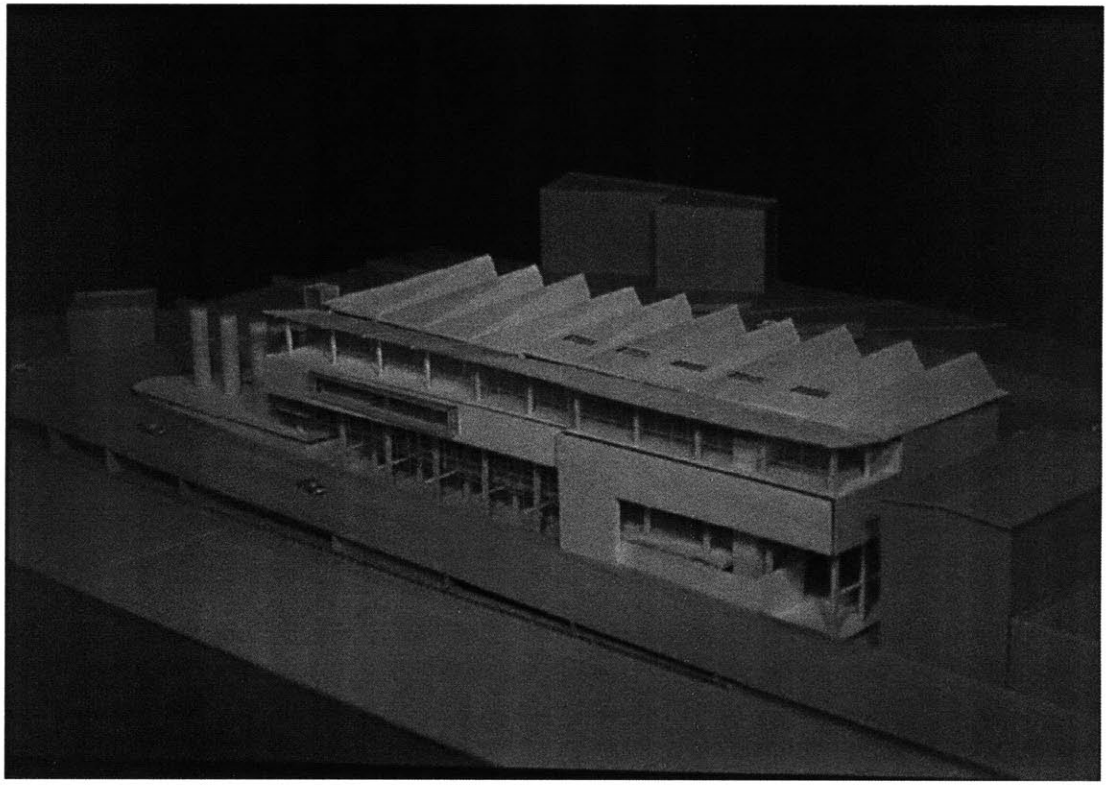


figure 77
south elevation



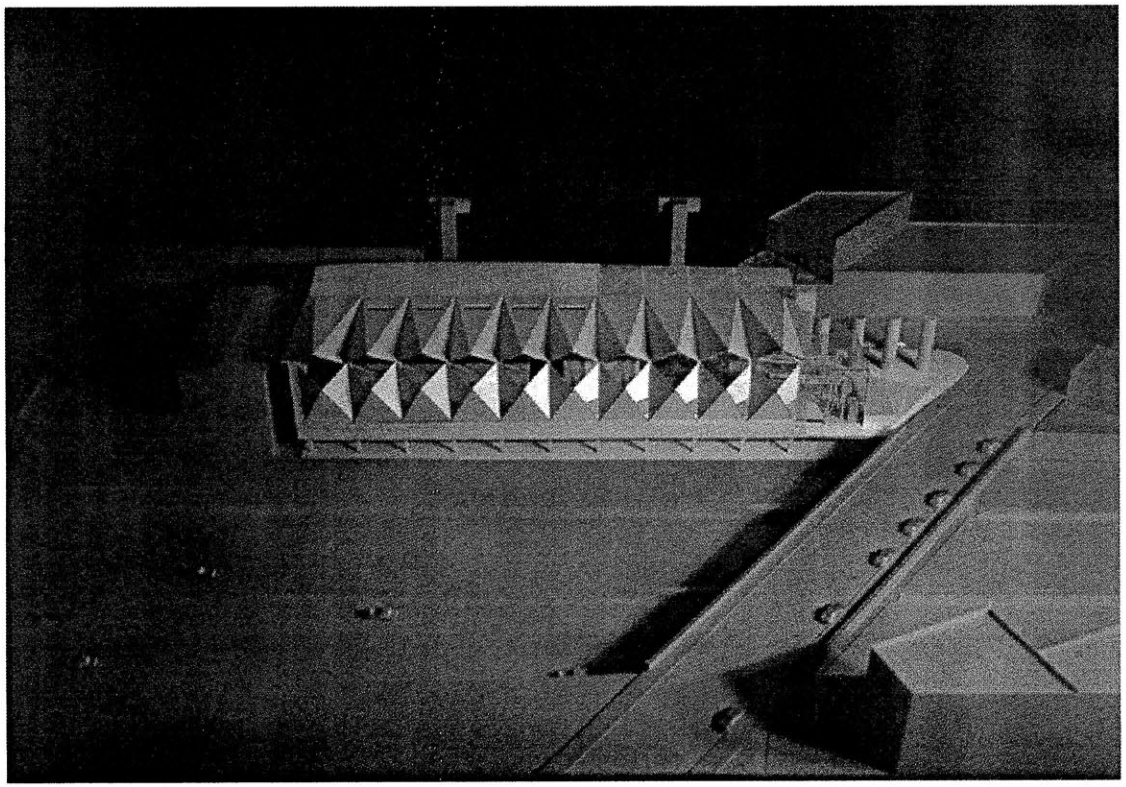


figure 78
aerial view

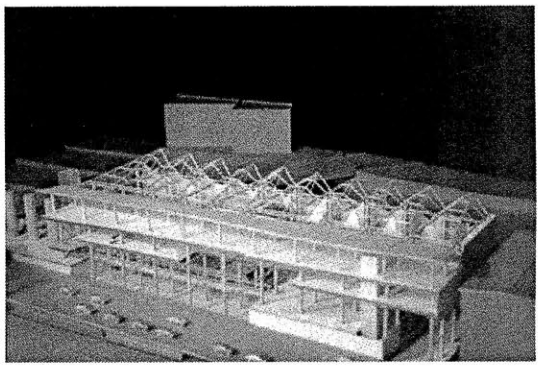


figure 79
south elevation, exposing structure

The mechanical louvers may be opened at different times of the year to facilitate natural ventilation. The louvers are fully automated and act in response to the climatic changes within the building. The visitors then realize and see the building react to the processes housed within. The overhead louvers are concentrated near the heat producing region of the building, the 100 foot long tunnel oven.

figure 80
detail of mixers along north facade

figure 81
north elevation, exposing structure

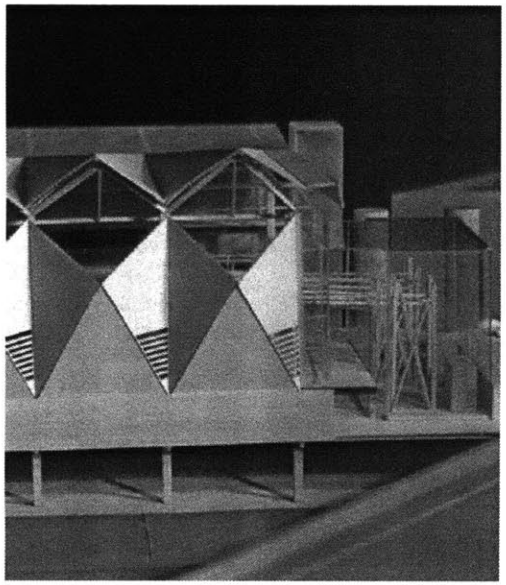
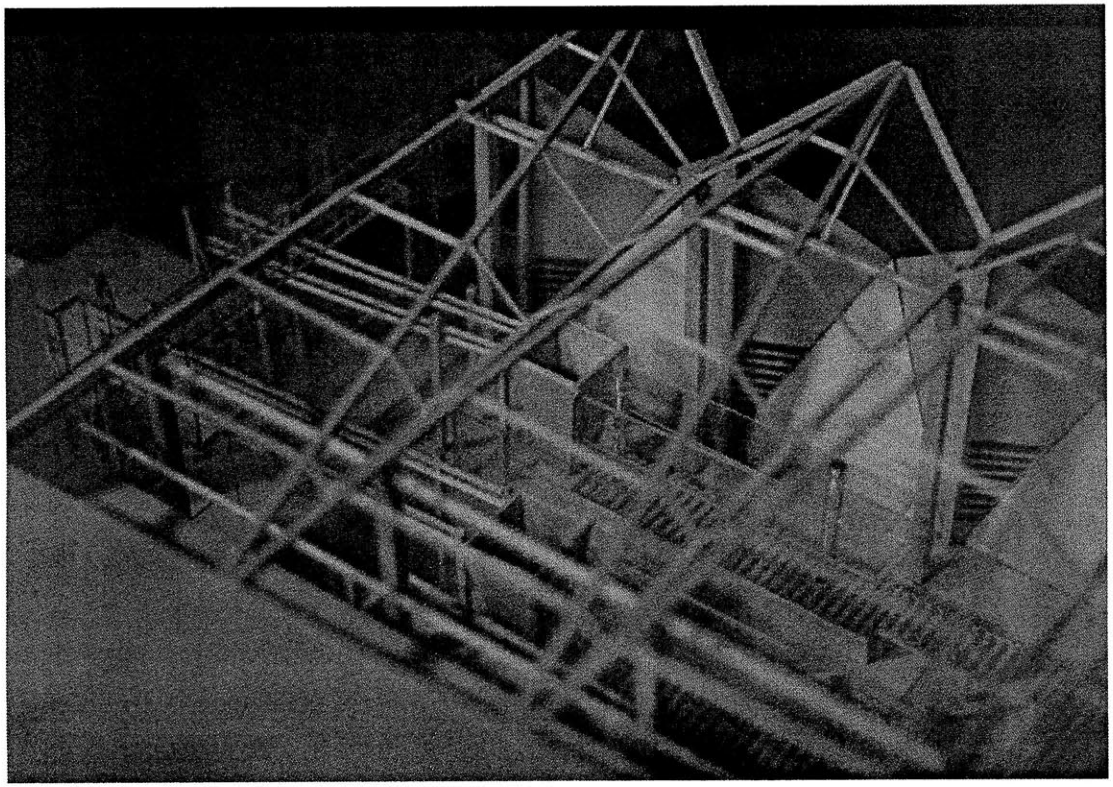
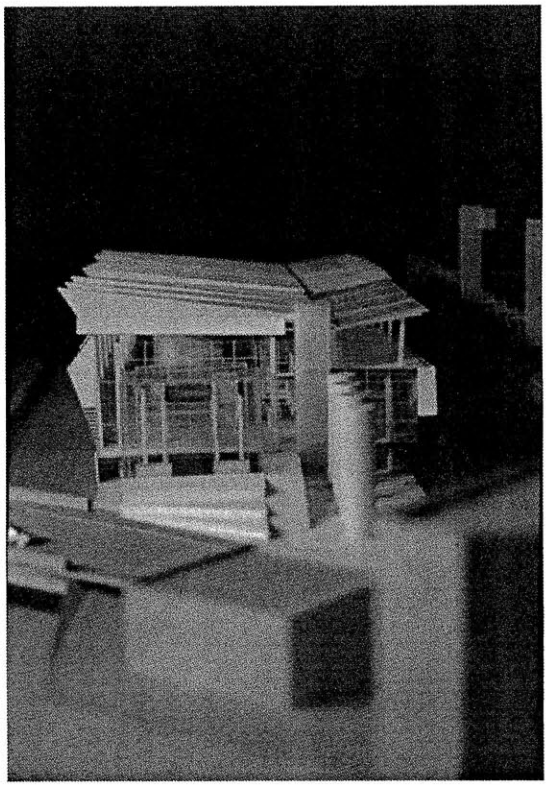


figure 82
detail of mixers below

figure 83
sectional view





Shown below are detail images of the interior of the model. It proved to be difficult both to physically model and photograph the interior spaces. A series of computer generated illustrations found on the following pages attempt to convey the feeling of the interior to the viewers.

figure 84
north elevation and outdoor space

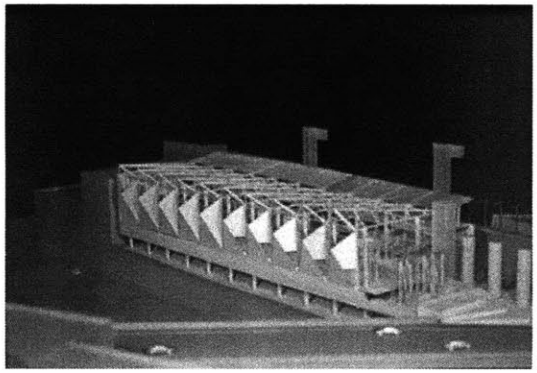


figure 85
detail of proofer below

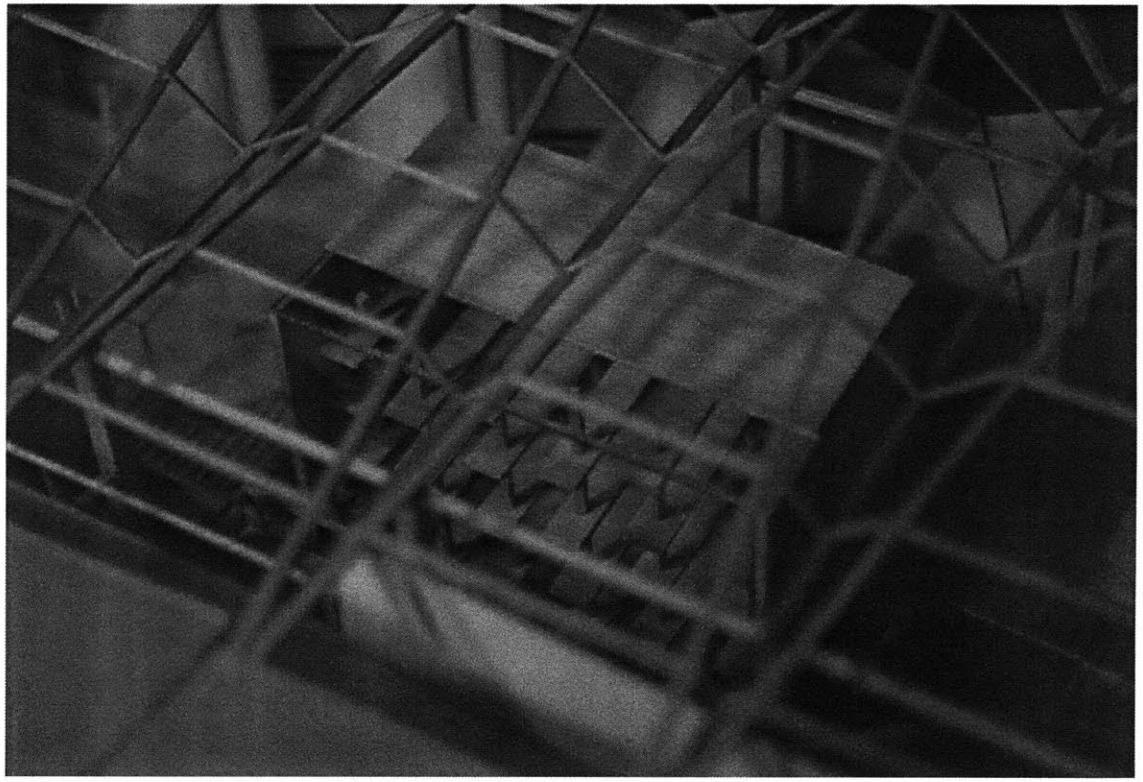


figure 86
aerial view from north west

Computer Renderings

46

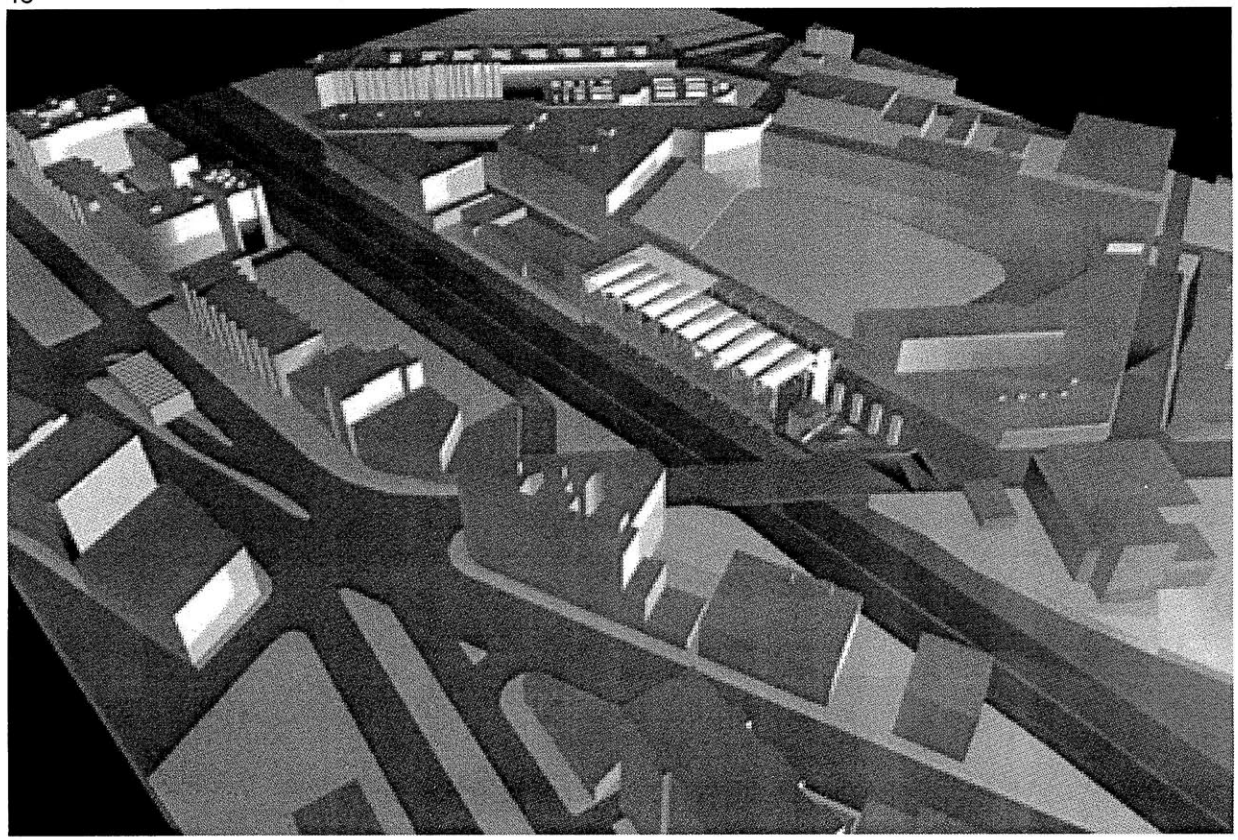
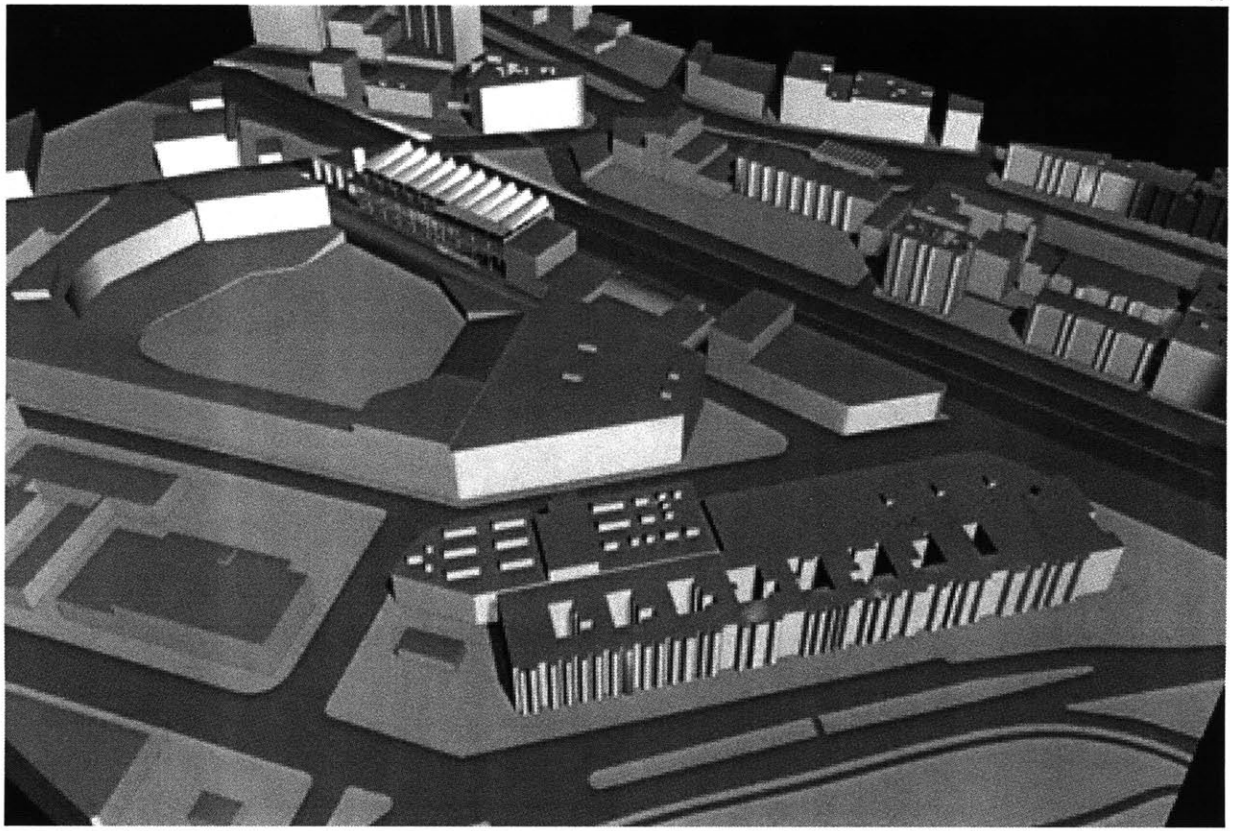


figure 87
aerial view from south east



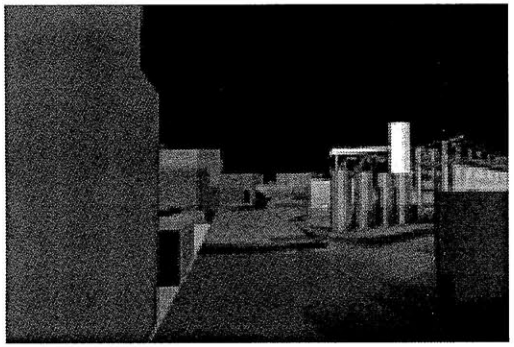
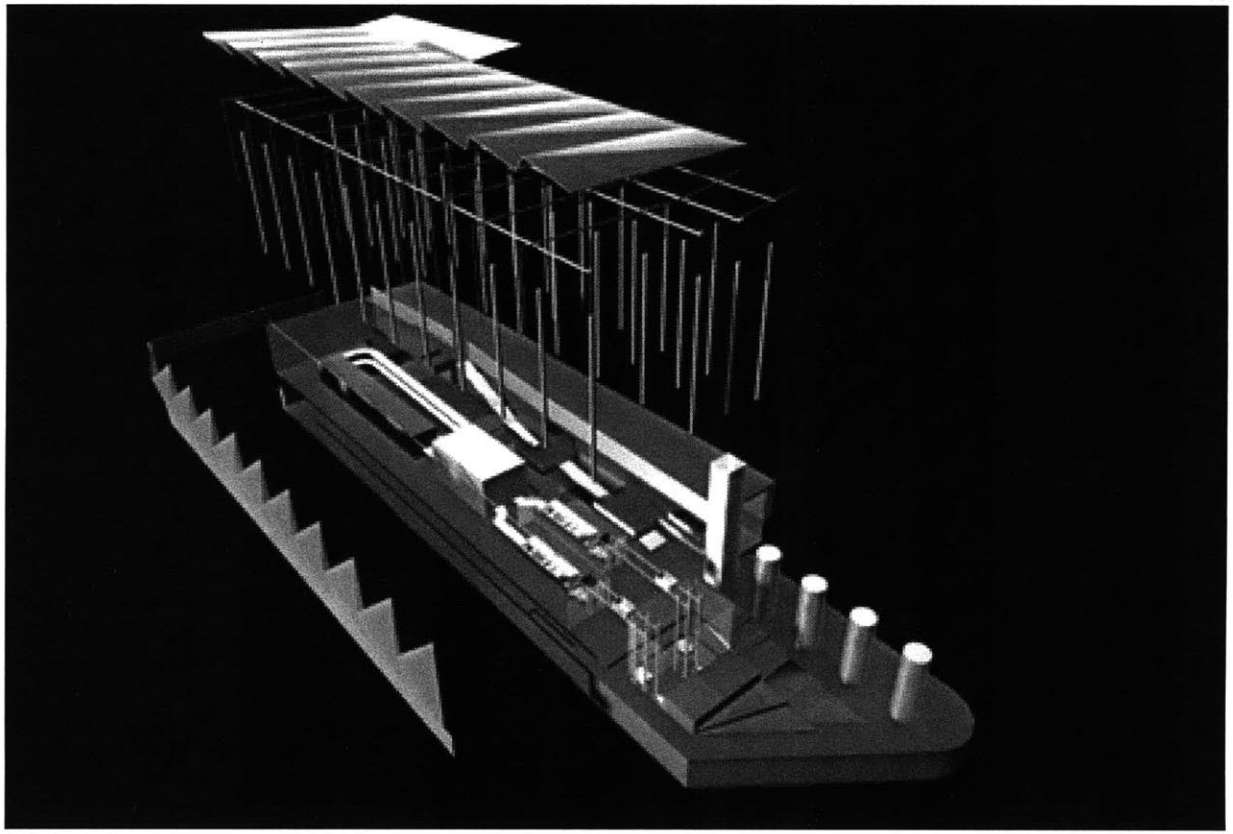


figure 88 (left)
view along Brookline Avenue

figure 89 (below)
view of south facade

figure 90 (right)
view from Kenmore Square along Brookline Avenue

figure 91 (below)
exploded axonometric perspective



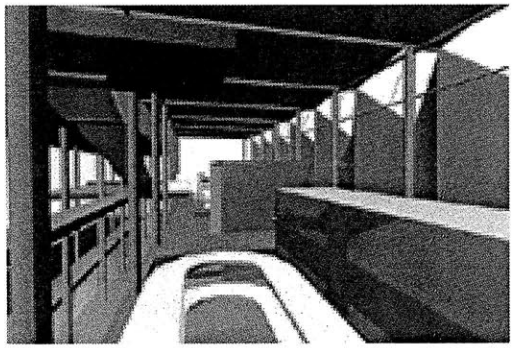


figure 92 (left)
view down entire bakery space

figure 93 (below)
view from entrance

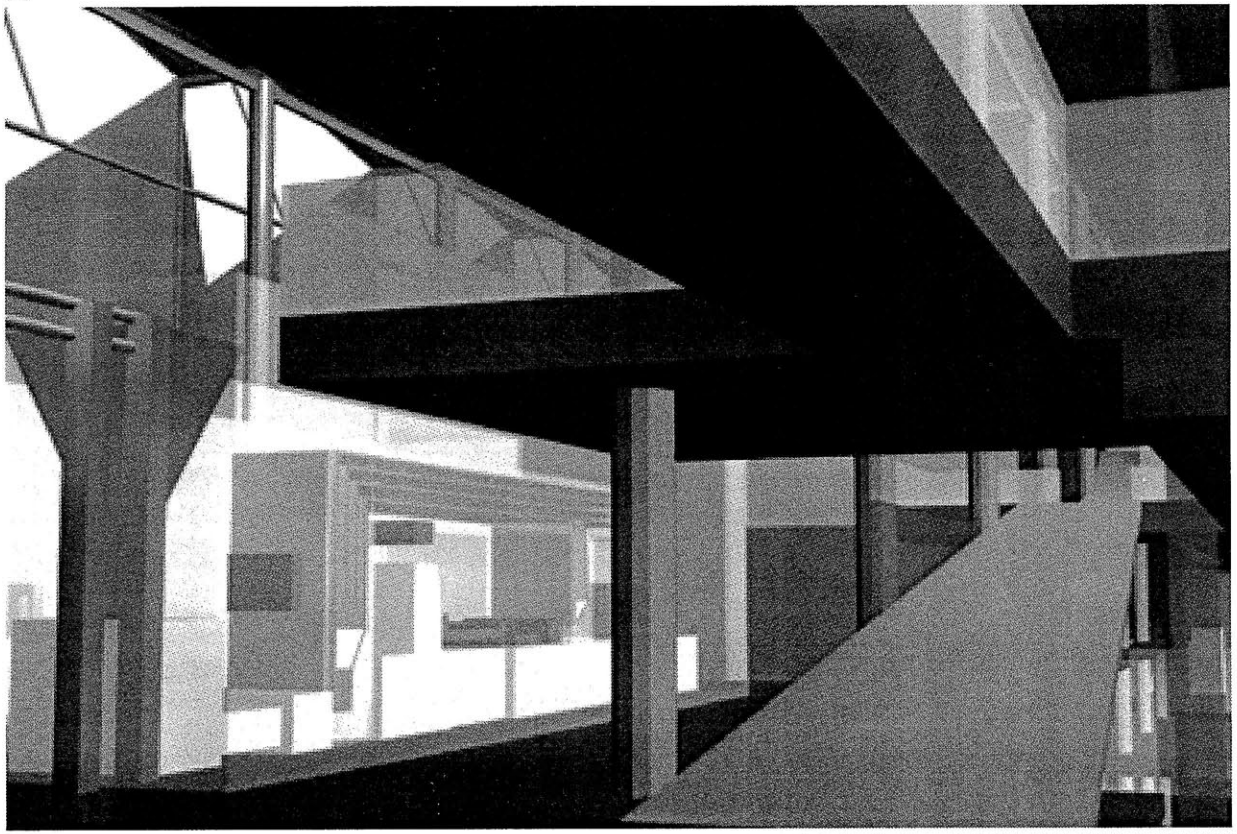


figure 94 (right)
view along north facade

figure 95 (below)
view from cafe viewing platform

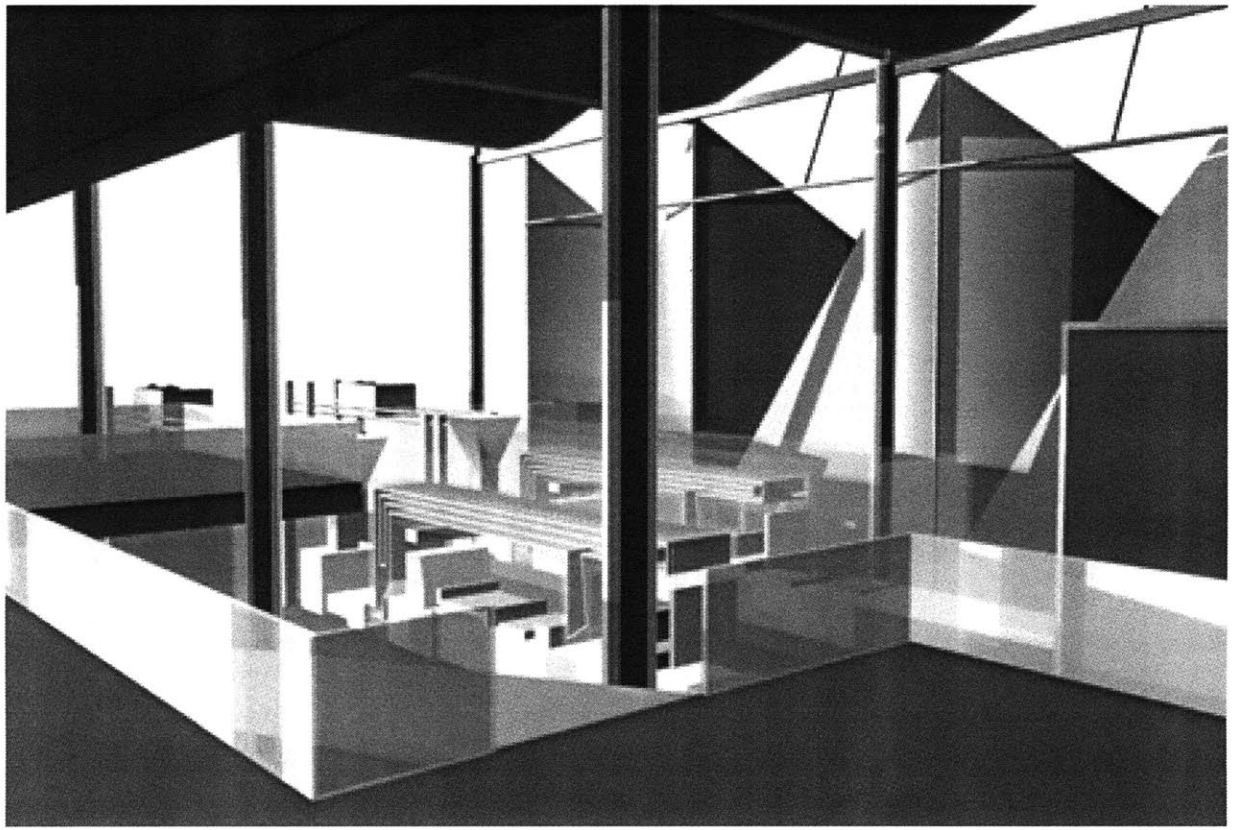
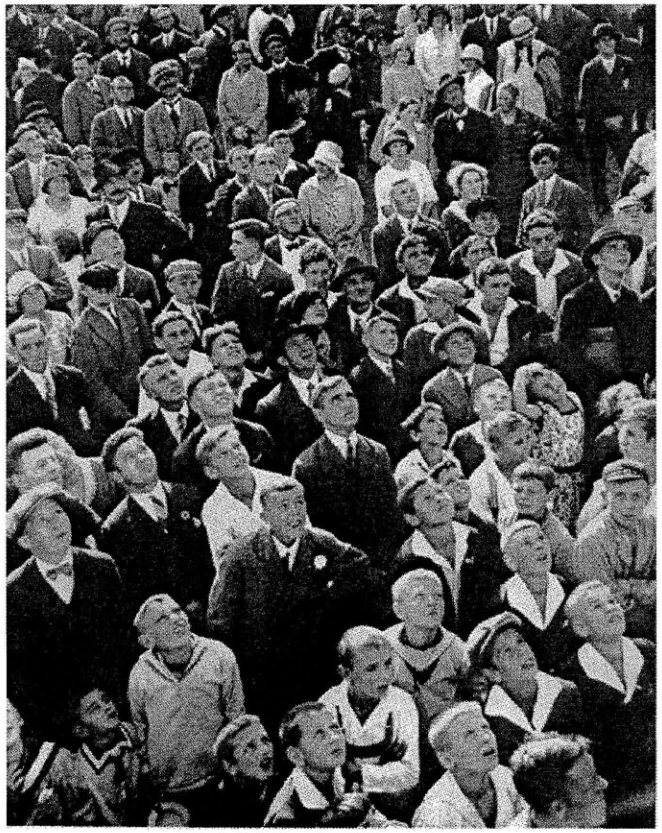


figure 96
the crowd stares in wonder



CONCLUSION

In conclusion, it is possible to bring industry back into the urban centers. In today's world one is no longer completely sure how things function. There is an increased awareness and desire to learn more about our surroundings and our possessions. The bakery in Kenmore Square reveals a process to its visitors and reveals something about ourselves in the process.

We are by nature inquisitive; hiding industries inside faceless boxes on the perimeter of our cities may no longer be the answer to today's challenges. The bakery gives us a chance to learn about a process in a passive way. Our culture is wrapped up in passive entertainment to a certain degree. It seems that as more people tune into the Internet, they turn themselves over to the possibility of passive entertainment. This is an opportunity to learn, to socialize, to enjoy what the bakery has to offer.

The bakery reveals itself through a series of layers, similar to the complexity of our society today. The bakery is therefore interpreted on many different levels. On one level, it is a place for learning. School children may visit the bakery to learn in the same way they will visit a museum or an aquarium.

On another level, the cafe is a place to meet people for a cup of coffee and a roll. A chance to talk, to catch up with one another, to see how your friend is coping with daily stresses.

Yet on a deeper level, the bakery is saying something about our society today. There is an endless need for more information and for that knowledge to be presented in an overly simplified manner. The bakery presents its inner workings as that clarified knowledge, as a way of communicating what it does and how simple the process really is. It in fact reveals the process.

Interviews and Meetings

Carberry Bakery, Cambridge, Massachusetts.
tour and interview with Matt Carberry, owner.

Clear Flour Bakery, Brookline, Massachusetts.
tour and interview with Corinne.

Hagenah, Charles.
local architect, working with Save Fenway organization.

Harrison Baking Company, Harrison New Jersey.
tour and interview with Tony Campos, plant manager.

Quinzani Bakery, Boston, Massachusetts.
tour and interview with Rob Roy Quinzani, owner.

Interviews and Meetings

Rockland Bakery, Nanuet, New York
tour and interview with Sal Battaglia.

Sasib NA
plans, phone conversation with Dave Machette.

Signature Breads, Medford, Massachusetts.
tour and interview with Dave Adler.

Winkler USA
brochures, plans, phone conversations with Phil Domenicucci, Vice President, General Manager.

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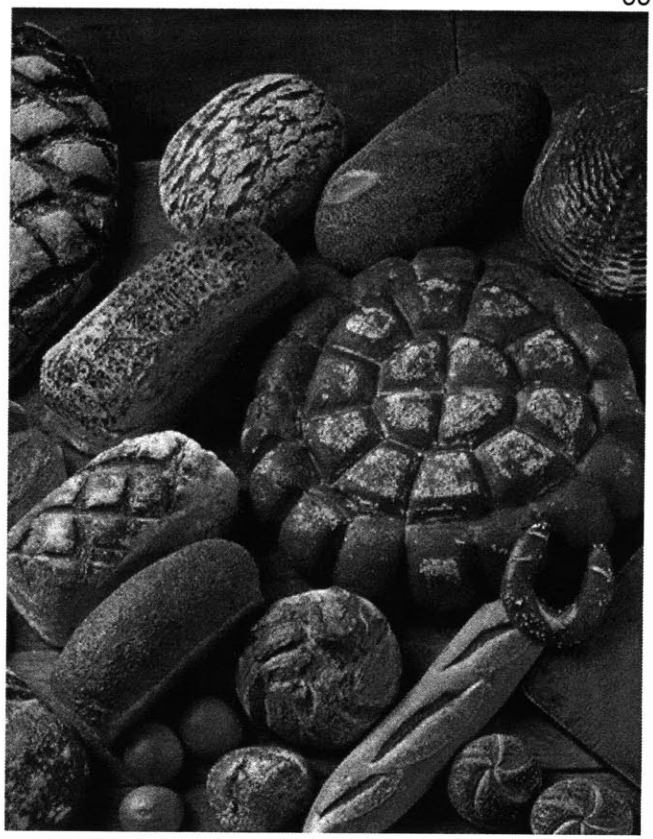

figure 97

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http://www.bakeryonline.com. Virtual Community for the Food Industry.

http://www.boston.com/news/packages/fenway/lotvalues.htm. "In the Ballpark." Boston Globe.

http://www.boston.com/news/packages/fenway/nosight.shtml. "Losing Sight." Nichols, Webb. Boston Globe.

Web Sites

http://www.boston.com/news/packages/fenway/thefenway.shtml. "A Look at the Fenway Neighborhood." Lupo, Alan. Boston Globe.

http://www.boston.com/news/packages/fenway/thehistory.shtml. "The Sox' Long History." Edes, Gordon. Boston Globe.

http://www.boston.com/news/packages/fenway/thepark.shtml. "Make Fenway a National Park." Mitrovich, George. Boston Globe.

Web Sites

http://www.boston.com/news/packages/fenway/thewall.shtml "The Wall." Dan Shaugnessy. Boston Globe.

http://ortho.mit.edu. MIT + MassGIS Digital Orthophoto Project.

http://www.redsox.com. The Official Site of the Boston Red Sox.

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figure 9: The Best in Industrial Architecture.
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figure 11: The Best in Industrial Architecture.
figure 12 The Best in Industrial Architecture.

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figure 57: SASIB NA product literature
figure 96: Avante Garde Photography in Germany 1919-1939.
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Software Used

Autodesk Mechanical Desktop 3
Adobe Photoshop 5.0
Adobe PageMaker 6.5
Microsoft Word 2000
Kinetix 3D Studio Max 3.0
Adaptec Easy CD Creator

CD ROM Information

A web site was produced in conjuction with the thesis project. It was used to show progress in the design process and to demonstrate spatial ideas through the use of several animations. The information on the CD ROM is best viewed on a PC using Netscape or Internet Explorer.