A BUILT FORM PROJECTION
ORGANIZATION EXPLORATION
OF A MIXED USE, HIGH DENSITY
INNER SUBURBIA
OUTER DOWNTOWN EDGE

by

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Signature of Author

Department of Architecture
May 9th, 1975

Certified by

Thesis Supervisor

Accepted by

Rotch

JUN 3 1975
I would like to extend thanks to the following who have helped me with my thesis, either directly or indirectly, constructively or nonconstructively.

JGA
MA
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TITLE:

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NAME OF AUTHOR:
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ABSTRACT

The initial intention of this thesis was to explore middle-density housing in an urban context- in this case, the Chelsea Naval Hospital Site. As it turned out, the thesis consists of two parts. The first part deals with the growth of the city of Chelsea onto the naval hospital site and establishing a use pattern for that growth (e.g. roads, pedestrian streets, open spaces, commercial, private, public and institutional uses). The second part of the thesis involves the design of approximately 100 units of low and mid-rise housing within the pattern already established for the site.

THESIS SUPERVISOR:
Richard Tremaglio
Associate Professor of Architecture
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INTRODUCTION TO THE PROBLEM

In the Spring of 1973, the United States Naval Hospital at Chelsea, Massachusetts was closed after 138 years of service. This occurred as part of a large-scale operation closing hundreds of military installations throughout the United States. Under the General Services Administration's surplus property disposal procedures, the 88 acre site has been offered to the city of Chelsea.

There are several alternatives open to the city of Chelsea, the first is to buy the property from GSA and resell it to private developers for tax-generating uses. Since the city's basic goal for the site is to generate increased municipal revenues, the emphasis on private development of high-yield uses would seem to be indicated. However, if the city commits itself to public use of the site, it may receive the property at a considerable discount. A third alternative is to combine public and private uses. As a
final alternative, the city may simply decline the offer altogether and leave the disposition of the site to a private developer to GSA. Then, of course, the city can only hope that GSA will accept its recommendations for the development most beneficial to Chelsea.

In order to decide on the best possible alternative, the city of Chelsea hired the firm of Justin Gray Associates of Cambridge, Massachusetts to study the possible reuses of the naval hospital site. The study team analyzed the site and met with city officials and private citizens to explore public needs. They developed a preliminary list of appropriate public and private uses and analyzed the market for private uses and the programmatic and funding support for the public uses. Finally, the study team was able to draw up a list of development alternatives and a recommendation for a preferred alternative.

In June, 1974, the Justin Gray Associates
report came out with five alternatives for the reuse of the site. In general terms they are: residential development, industrial development, corporate headquarters, sports stadium complex and public use package. The study team felt, however, that the public use package would not actually be an alternative to the other uses, but rather a group of uses which could be houses in some of the historical and existing buildings on the site and not interfere with the private development of the rest of the site.

The preferred alternative recommended by the JGA study team was that of residential housing program for one and two person households using conventional mortage financing. This was expected to generate the highest level of income and other benefits to the city but market analysis showed that, at today's interest rates, no one could afford to move into such housing.

The residential development alternative
was then reworked based on financing by the Massachusetts Housing Finance Agency. Under MHFA guidelines, 25 percent of the proposed 1200 units would be subsidized for low-income families. (See appendix for JGA's program.)

Included in the residential development would be a package of amenities including recreation facilities, security and transportation service to Boston. Also recommended by the study team would be support commercial facilities, a Hotel-Motel, a Conference Center, a marina and several restaurants. However, the development is basically to be a self-contained environment.
I worked on the thesis using the materials from the JGA's report as the basic background work. I looked at the organization of the site in terms of JGA's program and assumptions and decided that JGA's basic approaches (kinds of housing, the organization of the housing as well as their relationship to the city) were incorrect if the site is to be successfully integrated into the fabric of Chelsea. I must say here that my attitude was that a piece of land as large and as valuable as the Chelsea Naval Hospital Site should not be looked upon as being separate from the rest of the city.

Thus, I dropped the JGA program entirely (except for the idea that the site was to be used primarily as residential) and instead tried to deal with the site in terms of growth potential for the city of Chelsea. I started to establish some of the use patterns that would continue the pattern of the city. One of the consideration for that was the Chelsea
fire area (20 blocks destroyed in the 1973 and 1974 fire) is next to CNHS and that HUD has already considered putting some housing on part of that burned out area. Not knowing how to begin attacking the problem I used the size of the present unit of residential organization (the block) and looked at how within that block different uses are organized. I tried to use some of the information from the analysis as well as taking in the particular site conditions.

However, because the initial goal was to explore middle density housing in an urban context it became important to me that part of the site was designed, in one sense, to test the established pattern.
Because I dropped the JGA program it was important that a "new" program be developed inorder to begin to plan the site in any meaningful way.

According to 1970 census, the city of Chelsea has a population of approximately 30,639 and the total land area of the city is 1626 acres (including CNHS-88 acres). In terms of the hospital site this means approximate 2000 people or approximately 700 units of housing plus institutional, commerical and recreational uses.

After going over the chapter in JGA's report on community needs I came to the following institutional and recreational uses.

Medical Facilities:
Blood Research Laboratory- 20,000#- existing
Dental Clinic- 5,000$
Health Clinic

School Facilities:
Administrative Offices-14,000$
Vocational High School
Recreational Facilities:

Gymnasium - existing
Swimming Pool - existing

Thus the program would be the above plus approximate 700 units of housing and some commercial uses.

The major assumption was that since this site is to be a major portion of Chelsea, the city would take care of its transportation, electrical, sewage and other needs as it would any other part of the city.

Note
The information for the "new" program came from JGA's report.
THE BACKGROUND

The City

Chelsea is the smallest city (in area) in Massachusetts, covering 2.5 square miles. In the 1970 census, the population was 30,639 and studies showed that the population has remained fairly stable for the past decade.

Of the city's 1626 acres, 21% is used as industrial and only 21.8% is used as residential. Vacant land is minimal—with the exception of the CNHS and the burned out area. Only 2.5% of the land is used for recreational purposes and with no public access to the water.

In 1970, the figure showed 20% of the population is over 60 and that the median age is 32 years of age versus 29 for the metropolitan area. Median income was $8,973, approximately $2,500 below the median income of Metropolitan Boston. Only 41% of the population over 25 years old had at least a high school education compared to 65% in the metropolitan area. (Chelsea
has not built a new school since 1910.)

In terms of municipal facilities, as quoted from the JGA report, "serious deficiencies exist in virtually every aspect of municipal service delivery."*

In short, Chelsea's desire to use the CNHS to generate revenue is understandable. On the other hand, the city also has great needs (and perhaps even responsibilities) to provide an increase of its social and recreational facilities to its citizens.

The Site

The CNHS is located on the south-western corner of Chelsea. It is surrounded on three sides by the Mystic River. Most of the site consists of a hill with the total difference of top and bottom elevation of approximately 100 feet. The Tobin Bridge (I-93) goes over the eastern edge of the site, virtually cutting the site off from the city. The north-western edge of the site borders on some light industries and the north-eastern edge borders on
residential areas. The 1973-1974 burned-out area is three blocks north of the site.

**Soil**
The hill is a drumlin composed of sand, gravel and silt. Bedrock may occur irregularly in terms of distance from the surface, therefore high-rise structures can be supported with conventional construction methods at any elevation. The flat, low-lying portions of the site are composed of fill over underlaying layers of clay, silt or peat. Because of these conditions, construction might require piling or caissons.

**Existing Buildings**
It is assumed that most of the 56 buildings currently on the site will be removed due to their possibilities for reuse. There are five buildings on the site with the status of historical buildings that can not be destroyed. They are: commandant's office (9,484'), nurses quarters (54,475'), the first naval hospital building), magazine storage house (20,732'), storehouse (957').
and enlisted men's barracks (58,180\textdagger, the original marine hospital). These five buildings, in addition to a few others could be used for long-term community uses such as a nursing home, a vocational high school or recreational facilities.

**Environmental Factors**

One of the major environmental factors to be taken into consideration is noise, mainly from Boston's Logan Airport but also from the Tobin Bridge over the Mystic River. In regard to the airport (takeoffs and landings using runway 15-33 fly over the hospital site), on an average day, approximately 100 takeoffs and 33 landings use runway 15-33, about one-third of which occur during the night. This noise level is in a category of definition by HUD as discretionary-normally unacceptable (exceeds 65 db[A] 8 hours per 24 hours). This requires the approval of the HUD regional administrator if federal funds are to be used.
As a result of the flight patterns over the site, buildings on top of the slope cannot be built over 10-12 stories. Also, the method of construction would have to be masonry inorder to insure lower noise level inside the buildings.

Noise from the Tobin Bridge is not really a major factor except within a distance of 100 feet.

Access
Although access from the site to downtown Boston and Logan Airport is easily accomplished, there appears to be a problem of access in and out of the site. However, that problem will exist only as long as one thinks of the site as a separate section of Chelsea, thus needing entrances and exits. However, if one takes the point of view that this site is a continuation of the existing fabric of Chelsea, the problem becomes less serious.

Note
The above informations came from JGA's report.
NEW NETWORK

The new network is two loops - connecting to existing streets, secondary streets, sometimes connecting the two loops, other times deadends, work off the loops.

-- existing roads
NEW major roads
--- grid of city
DIAGRAM I
THE EXISTING FABRIC

EXISTING FABRIC SHOWS THAT:

- Long side of block parallel to major street.
- Supporting commercial for neighborhood along major street.
- When commercial happens elsewhere, it almost always appears at a corner.
- The block is divided into two halves by a private drive or service road which runs parallel to the major street.
- The commercial buildings take up 3/4 of the block, whereas the residential buildings take up 1/4 of the block.

Therefore, there are four systems making up the fabric: 1) major streets, 2) secondary streets, 3) private drives/service roads, 4) private yards.
Diagram II

The New Fabric - Reinterpretation of the Existing

The problem here is to find an organizational unit that is of a reasonable size, i.e., a size that is large enough for a "community"(or several "communities") to happen but at the same time small enough that it can work with other units.

It seems that the most obvious size that I can take hold of is that of a city block in Chelsea (approximately 250' x 500') and that within this unit there are the possibilities of smaller groupings or subdivisions. (See Diagram I.)

So, I decided to reinterpret the existing block so that the new "block" works better than the existing block, for the special conditions of the site as well as with other "blocks."

One of the problems with the existing fabric is the introduction of the major routes (see Diagram II). So I decided to take that as my starting point and try to deal with that.

I decided to overlay the two street patterns from that I abstracted an organizational unit (see above diagram).
Diagram II

The Organizational Unit or The Part

The positions of the organizational unit are not fixed in their uses. Each position can be built, not built or added to, depending on the particular conditions of the site.

The uses and their dimensions (as well as orientations) came from the existing fabric (core diagram I). However, as with the large unit, the uses and dimensions are changeable depending on conditions.
DIAGRAM IV
PARTS: ADDITION OF

BECAUSE OF THE TERRAIN
OF THE SITE, ALL ADDITIONS OF
THE PARTS CAN BECOME THREE-
DIMENSIONAL ADDITIONS.
USE MAP

NOTES:
- Residential units are to be organized off of pedestrian streets where they are indicated. When there is no pedestrian street, the units are to be organized from the secondary streets and the private driveway.
- Parking to be underground whenever possible. Otherwise, on street parking.
- Loading/servicing - on street
The is an initial diagram to illustrate plans of the hospital layout on the top of the hill.

Scale: 1" = 7
This is an initial diagram to explore ideas of the housing clusters on the flat area of the water.
Diagram V.a

This is an attempt to find a pattern and a dimension that can grow (add together) into a fairly large dimension - 600'. However, this large dimension should somehow be recognizable as made up of smaller parts. Also, the pattern itself can stand alone.

The structural pattern (as I called it) really comes from already existing patterns - single-loaded or double-loaded corridor. The dimension comes from fire codes - 150 ft max distance between two points of egress.

Spatial organization

Structural pattern

Possible vertical projections

Horizontal movement (not all shown)

Ground level - connects all

Spatial organization

MAJOR WAY UP

UPPER STOREY CONNECTS TO ALL LEVELS

NOT BUILT

Egress

Major way up

Horizontal movement

Spatial organization

Possible vertical projections
THE ADDITIONS GET COMPLICATED

PERPENDICULAR ADDITION
ALSO LOW-RISE
NO NEED OF VERTICAL CORE,
SPACE NOT BUILT
IF MID-RISE, CAN
BRIDGE OVER

WAY THROUGH GROUND

POSSIBLE SECTION PROJECTION
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APPENDIX

All pages from

A New Direction Recommended for the
Re-Use of the Chelsea Naval Hospital
Prepared for the City of Chelsea
Volume I, June 1974
by
Justin Gray and Associates
Cambridge, Massachusetts
### TABLE 5

**POTENTIAL MARKET USES FOR CHELSEA NAVAL HOSPITAL SITE: SITE ANALYSIS**

<table>
<thead>
<tr>
<th>USES</th>
<th>PROBLEMS</th>
<th>Location in Chelsea</th>
<th>Noise</th>
<th>Access*</th>
<th>Competition with Historic Buildings</th>
<th>Relation to Adjacent Naval Yard Uses</th>
<th>Glare</th>
<th>Odor</th>
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<td>Office: Speculative Space</td>
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<td>Conference Center</td>
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<td>Sports Stadium Complex</td>
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*Highly dependent on detailed characteristics of specific uses.*
<table>
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<th>USES</th>
<th>POTENTIALS</th>
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<td>CONSIDERED INAPPROPRIATE DUE TO NUISANCE FACTOR</td>
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<td>Community or Regional Shopping Center</td>
<td>Offset by closeness to downtown Boston</td>
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<td>Office: Speculative Space</td>
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<td>1&amp;2 person hlds</td>
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<td>Family</td>
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<td>OTHER</td>
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<td>Motel/Hotel</td>
<td>▲</td>
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<tr>
<td>Conference Center</td>
<td>▲</td>
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<tr>
<td>Restaurant</td>
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<td>Marina</td>
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<td>Dwelling Units/Gross Acre</td>
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<td>---------------------------</td>
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<td>Garden Apartments</td>
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</table>

SOURCE: Justin Gray Associates
e) Amenities and Related Uses for a Residential Development

In order to meet the requirement that the residential development be part of a total environment, amenities and other related uses must be provided on the site. The site must be developed in such a manner that it is viewed as a fine place to be, whether or not one lives there. Proposed, in addition to the standard amenity package of clubhouse, pools, sauna, putting green, games area, studio for mid-rise/garden apartments and singles, are:

Amenities:

Indoor Tennis Courts: an indoor tennis court of 20,000 square feet should be provided on the site. It should be a commercial venture, with costs distributed to its users, not to the residents generally.

Other Uses:

Commercial: 1,200 units can be expected to create a market for approximately 17,800 square feet of commercial space, distributed as follows:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Sq. Ft.</th>
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</thead>
<tbody>
<tr>
<td>Barber</td>
<td>600</td>
</tr>
<tr>
<td>Cleaner, laundry, shoe repair</td>
<td>1,200</td>
</tr>
<tr>
<td>Gift</td>
<td>2,000</td>
</tr>
<tr>
<td>Liquor</td>
<td>2,000</td>
</tr>
<tr>
<td>Bank</td>
<td>2,000</td>
</tr>
<tr>
<td>General store, food, ice cream, etc.</td>
<td>10,000</td>
</tr>
</tbody>
</table>

17,800
f) Related Uses: Conference Center/Hotel-Motel/Marina/Restaurants

Conference Center:

There is a major need in the Boston Metropolitan Area for a Conference Center (see Technical Supplement Two). This center differs from a convention facility. It is designed for training programs in which people come to the Center for a period of several days or weeks, not for short-term one- or two-day meetings. It requires a location and facility which meet the following criteria:

1. Close proximity to a major city and airport
2. Few outside distractions in the immediate area
3. Excellent recreational facilities for the limited free time of the participants
4. Superior meeting and conference room facilities
5. Superior audio-visual and meeting aid equipment
6. Good food and service in a relaxed and informal atmosphere

Clearly, the Chelsea Naval Hospital site meets criteria (1) and (2). Criteria (4) and (5) are part of the development program for such a Conference Center. And Criteria (3) and (6) are amenities and related uses that will be developed as part of the residential package, particularly the garden and mid-rise apartments.

Proposed is a 200-room Conference Center for the site with 100 units being constructed in the first phase, concurrent with the first phase of residential construction. The conference building contains approximately 75,000 square feet to be built at a construction cost averaging $40 per square foot. Total development costs are estimated at $63.33 per square foot. First-phase parking requirements are for 100-150 spaces. The center will require three acres of land with another three acres held in reserve. Located on the waterfront, it may be so designed as to incorporate the original Naval Hospital, designed by Bulfinch, and the commandant's house.
Hotel/Motel:

Another special market opportunity, resulting from the site's special locational advantages, is for a hotel-motel oriented toward airline and airport-related personnel. Commercial airlines currently contract with downtown hotels for rooms for transient personnel spending the night in Boston. The Naval Hospital site offers a first-class opportunity to develop a hotel-motel aimed at serving these personnel: the market, in this case, is guaranteed. A total of 100 rooms are proposed with 50 constructed in the first increment. Estimated cost is $25 per square foot for approximately 22,000 square feet of building space. An estimated 50 parking spaces will be required. Total land demands are therefore estimated in the vicinity of 35,000-40,000 square feet for the first increment and 70,000-80,000 square feet in all.

Marina:

The Chelsea Yacht Club is one of the oldest in the metropolitan area. The water off the Naval Hospital site is currently one of the few locations in the Inner Harbor where small boats can be moored. Marinas are currently proposed for Charlestown, East Boston, and, of course, Harbor Towers. The closeness of the Chelsea Naval Hospital site to downtown should give a marina developed there a real competitive edge. Proposed is a 100-slip marina, with each slip estimated to cost approximately $8,000, for a total cost of $800,000, plus an additional $20,000 for a small marine gasoline station/marine hardware store. Required sanitary pumping stations for a marina of this size will be an additional cost.

Restaurants:

The combination of 1,200 units of housing, a Conference Center, a hotel-motel, and a marina should create the market for two restaurants and one cocktail lounge. The first restaurant would be small, oriented primarily to the conferees at the Conference Center but open to the public. Though no market study was done for the second restaurant, it is estimated that it should contain a range of 100 to 200 seats and a cocktail lounge-discotheque seating a range of 100 to 150 persons. Its market potential consists of residents of the housing on the site, people using the Conference Center,
guests at the hotel-motel and marina, and others attracted to the site. Approximately 100 parking places may be required and a total estimated land area of 50,000-60,000 square feet.

g) Conclusions: Residential Program

This development package of 1,200 units of housing, a first-phase 100-room Conference Center, a first-phase 50-room hotel-motel, a 100-slip marina, and two restaurants provides the basis for the design of a total environment for the Chelsea Naval Hospital site. Each use supports and enhances the other. Amenities can be shared. The waterfront becomes an opportunity for recreation. The site's unique topography and view will help to shape this unusual development which can provide the best housing for one- and two-person households in the Boston Metropolitan Area, at the same time making a substantial contribution toward meeting the housing needs of Chelsea residents.

Its staging also creates immediate opportunities for a marketable environment. Proposed first-stage construction would include the town houses, the Conference Center/hotel-motel/marina/restaurants, 100 garden apartments and 250 mid-rise apartments.

For both the first phase and the total project, adequate transportation to both downtown Boston and the airport will be essential. During the first phase, bus system service will be provided to downtown and the airport. Once the project passes its half-way point, it is proposed to establish a boat connection to the Aquarium station on the Blue Line at Atlantic Avenue.

h) The Financing of Market-Rate Housing

The market program outlined of 100 town houses with their own patio, 200 garden apartments, 500 mid-rise apartments, and 400 singles units is aimed at meeting the demand of one- and two-person households. Seven hundred units, the garden apartments and the mid-rise apartments, have as their target those households currently attracted to such developments as Granada Highlands. The 100 town house units are aimed at those households who want their own house with open space, and the 400 singles units at those households who are attracted by this special housing type.