DESIGN PROJECTIONS FOR A COMMUTER FERRY TERMINAL AND COMMERCIAL PIER
IN PORTLAND, MAINE'S HISTORIC URBAN WATERFRONT

by

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Design Projection For a Public Place

Ferry Terminal Building and Commercial Pier

The is Project  Dept of Architecture  Massachusetts Institute of Technology  Eric Paul Schmidt  3 81
Abstract

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- The work is based on a design project: to connect the grid urban form, and its associated buildings, and their uses, to the larger Maine (natural) landscape, and its forms. These two contextual categories will strongly influence the evolution of the pier site design and ferry terminal design.

- This work investigates a possible design projection for a commuter ferry terminal and adjacent mixed-use commercial areas on a pier "finger" extension from the historic waterfront area in Portland, Maine.

- The thesis presents my attitude toward the assemblage of buildings and landscape forms. The assemblage process is the subject of this thesis; its evolution responds to the conditions and needs within the existing context, and is stated in the programmed requirements. The object of this thesis will be the collection of design process drawings.

- The focus of the thesis is a design exploration for the development of a ferry terminal, a "town room" at the water's edge that is simultaneously functioning as a transportation facility, and an aggregation of varied mixed uses for the public and private sectors. It responds and fits into the existing surrounding context.

Thesis Supervisor ................................................................. Shun Kanda
Title ................................................................. Professor of Architecture
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Preface
Introduction to Attitudes

I have certain images and emotions associated with the daily commuting I had to make between the islands of the Puget Sound and Seattle. These mental references helped to initiate the design exploration of a new ferry terminal for the city of Portland, Maine.

The ferry terminal in Seattle is located at the periphery of the urban core. It serves an important function as a terminus for travel on water as well as a gateway to the city. As a transition zone it must orient travellers who, within the distance of a quarter mile have made a complete change in their physical environment. Tall forests of Douglas Firs and stretches of water are replaced by high-rise buildings and lengthy streets. Re-orientation to a new organizational structure requires that both the new fabric and the context left behind be present within the building and site forms. The terminal must incorporate in its organizational territory elements of the urban framework and forms of the natural landscape.

This thesis explores the possible three-dimensional forms and organizations of a transitional territory/landscape. The intention is to define a built structure "framework" for the new ferry terminal facility which will locate "zones" of public and private activities. Further physical articulation of the "zones" is achieved according to their specific use-form.

The thesis is divided into four sections. The first contains a brief study and evaluation of the larger physical context and its impact on the organization of the building and site. The second section explores the location of various use-forms on the site. The components of the building form are considered in the third section and in the final section the overall building organization and forms are developed.

The thesis is a visual record of the evolution of certain attitudes I have towards the generation of three-dimensional forms. The emphasis is on the process of translating my images, attitudes and principles of design into a physical form solution.
Introduction to the Thesis

A Design Process

This thesis project is a design projection based on a program originating from an Urban Mass Transit Authority (U.M.T.A.) grant request by Portland Planning Department for the study and construction of a new commuter ferry terminal (see Appendix E for program requirements). In addition to the Planning Department's projections for the original terminal and site program, I enlarged the requirements to include additional functions I feel are supportive of a more complete and appropriate design solution. These requirements call for new commercial, retail and office space, expansion of the existing marine and aquarium facilities, and a new urban park at the water's edge. I envision the new mixed-use and transit facility as one of the major nodes of public activity for the city. It will draw tourists from the historic district shopping area, office and waterfront workers, yacht and power boat users, as well as the daily commuters, to a common place which will offer them a wide variety of public and private activities (see Appendix A for the additional program functions).

I used a real project program as a starting point from which I could explore certain issues and attitudes I have towards the assemblage of three-dimensional forms for a public building and its site.

These three-dimensional forms are developed through the combination of three areas of design exploration. These are: (1) the development of the site forms; (2) the major parts of the terminal building (the enclosure and spatial structuring system); and (3) the overall physical form and organization of the building.

It is my intention to focus on the simultaneous exploration in these three areas and to test certain design principles associated with them. Through the integration of these principles associated with the three areas of exploration, I hope to achieve a greater continuity and extension of the building-to-landscape relationship and vice versa. At the same time, certain principles which are applicable to individual parts of the building form or landscape form were explored, developed and utilized, so that within the continuum of building-landscape can be found distinct object pieces that relate to specific forms and uses.

1. The development of site forms includes the groundwork from which the larger building form evolved. During this process, three contextual physical references were considered and analyzed, and the information incorporated into the development of landscape as well as building forms. These references were: (a) the larger natural landscape of the marine coast; (b) the urban structure of the city of Portland; and (c) the waterfront edge of Portland Harbor.

2. The form framework and the building envelope became the testing areas for many smaller design decisions. The form framework or spatial structuring of the building is the point from which the evolution of use territories began and the distinction between public and private zones was established. Circulation networks were also explored and developed. The study of the building envelope included the investigation of vertical surface and uses along this edge, as well as roof forms and the volumes or massing of the total building form. These edge conditions were of primary importance. The represented location where the building envelope could expand with new use territories or reduce in size its uses and volume, as needed. This "margin" of growth or reduction relates directly to the seasonal fluctuation in the number of people using the terminal and accommodates the increase in the tourist population during the summer months.

3. The overall physical form and organization of the building developed from the synthesis of the previous two areas, and is the result of the process of simultaneous exploration of principles that were mentioned earlier. In the early stages of exploration, the principles associated with the site predominated and had a greater influence in determining the basic form of the building. In the later stages of exploration, the two study pieces of the terminal building became more important in affecting the physical form and the location of internal functions.
Introduction to the Project

The Design Task

The basic design task is outlined in the U.M.T.A. grant written by the City Planning Department of Portland, Maine. It requests federal funds to assist in the planning and construction of a new "Intermodal Transportation Facility" (see Appendix E). In the text several functional requirements for the terminal are listed, such as square footage and use requirements for the building and boat moorage areas.

A brief introduction of the existing terminal site which generated this grant request is as follows: the needs of the ferry terminal and its users are expanding beyond the available existing wharf space. In addition, the poor physical condition of the existing piers and decking along the edges, and the dilapidated terminal, forced the planning department to recommend relocation and new construction. The new site, named Commercial Wharf, lay adjacent to the existing site. In its present condition, the landfill is used as an auto parking area. A small bank occupies a corner of the underutilized site. This is especially true since
its location is more central to the downtown business district and is situated at the end of the major pedestrian street extending from the redeveloped historic core of the old downtown. The City Planning Department's major concern for this project is the development and expansion of a comprehensive public transportation facility geared primarily to the water ferryboat system. Its secondary goal is to assist and integrate, where plausible, with the adjacent landowner in order to create a complementary joint development.

It is this joint development idea that became the central theme for my thesis design task. The design task evolved into a mixed-use development, incorporating the original transportation requirements requested by the city with an alternative mixed-use development. The commuter terminal remained the single most important piece of the program, while the private mixed-use remained secondary but more interconnected with the terminal facility. The new mixed-use development includes major new offices, commercial retail space, as well as expansion and new facilities for the existing aquarium, existing marina and a new urban waterfront park (see Appendix A for thesis program).

The specific features I envisioned for the development of the site were the following:

1. to create an opening in the commercial urban wharf edge and create on the waterfront an urban park as a terminus to the major pedestrian street extending from the historic redevelopment area;
2. to re-connect the "actively populated" part of downtown with the waterfront without developing a shuttle bus or a park dependent on autos;
3. to construct a medium-size hotel of between 250 and 300 rooms adjacent to the terminal site between Commercial Street and the old armory building, and to renovate the old armory as exhibition space for the hotel and city;
4. to create a mixed-use complex which increases the diversity of uses as well as duration of time on a yearly and daily basis in which people will occupy the site without adverse conflict with the transportation facility;
5. to increase the commercial and retail activities which cater to the needs of the daily island commuter;
6. to develop more extensive marina facilities by including more boat moorage space, a yacht club, custom docks, restaurant at the end of the pier, and maintenance docks,;
7. to create a new terminal facility which is more than one large waiting room with a snack bar and storage area; instead, to create the new terminal as an integral part of the larger commercial development.
The Larger Context

As a preface to the central thesis topic an exploration and analysis of the urban form and regional landscape were compiled. The purpose of this preliminary study was to provide a reference of the larger context, its overall form and organization, as well as to collect information from the larger context such as land use, traffic patterns, building uses and density, which pertained to the site development. The study was broken up into three areas: (1) the physical structure and form of the Maine coastline; (2) the urban fabric and land uses of the city of Portland, Maine; and (3) the waterfront wharf edge, its physical condition, forms and various commercial uses.
Maine Coastline

The coastline’s organizational structure can be easily observed on navigational charts or geologic contour maps. The glacially formed landscape of Maine consists of a series of drumlins (figure) which extend from the land (ground) into the Continental Shelf. The Maine coastline edge is a transitional zone in which the groundform changes from the land to sea. The patterns evident in this landscape are used in analogous form as fundamental organizing principles for the ferry terminal site and building. The following seven items are the dominant principles found in this natural landscape and incorporated into the terminal design.

1. The landscape organization of drumlins follows a rigid pattern across the Maine landscape and into the ocean. These long and narrow glacial hills all share a common direction of ±15°/18° in their long axis. The repetition of these forms creates a directional field; an easily legible landscape. This field serves as a physical link, creating a continuity of land and sea. The pattern of the drumlin fingers at the sea is reinforced and extended by the islands. These islands imply the continued directional field and extend the spatial dimensions and territory of the fingers. In the development of the site two major directional fields were established.
Maine Coastline
Geologic Form

2. The peninsula of land upon which the city of Portland is located is a portion of the directional field of drumlins. The rectilinear form of the urban grid responds directly to the edge conditions of this peninsula. Therefore, the streets run either parallel or perpendicular to the directional field of the landscape. The wharf edges extend the urban grid in a manner similar to that in which the drumlin fingers extend the ongoing landscape field. Objects (masses or buildings) in either field (the urban or landscape) which follow parallel to the directional field reinforce a continuity of form, whereas objects perpendicular to the directional field are discontinuous and disassociate, stopping the ongoing field direction. These principles of continuity and disassociation were employed throughout the design exploration.

3. The island forms are surrounded by a territory surrounding them which is a transition zone between the islands (figure) and the deeper ocean (ground). This tidal shelf is of distinct form, material, and elevation. Its overall boundary form is controlled by both the island (figure) and the ocean (ground); a distinct, identifiable territory. It serves as an extension of the island and implies a connection and continuity to other islands in the field organization. It acts as a transitional zone according to the tidal...
fluctuation, becoming either a part of the land or the sea. The new decking on the terminal site is analogous to this zone. It is a transition between building, existing landfill and/or water. It is an extension of both building and landfill and its edge is controlled by the water-related uses.

4. The physical forms of individual islands, as well as clusters of islands, define potential containment "U" forms where harbors could occur. These sheltered use areas have a maximum protected and usable edge. Continuous "U" shapes or partially complete "U" shapes were employed at all scales of the site and building design to define containments for specific use areas.

5. In the directional field there can be found islands and finger peninsulas which extend past one another. These passing forms can be either in an actual physical overlapping of land masses or an implied overlap by an extending chain of islands. These two types of passings or overlapping reinforce the physical form and extend both the zone of influence and the direction of the physical territory of the drumlin. These two basic principles of overlapping of physical forms and of passing connections portray two types of continuities of physical form. These principles were applied to the building form and site form at all scales of exploration.
Maine Coastline
Island and Peninsula Form

6. The finger form of land and the ocean inlets along the coastline portray a pattern of reciprocal physical forms between land and sea. The reciprocity is never a 1:1 ratio of solid to void as is the graphic yin/yang image. Instead, one form dominates by position or sheer physical size, and this dominant form tends to determine the location of the primary activities. Within the organization of the site and its water edge and the terminal building and its facilities, I employed a similar system of reciprocity in order to identify and integrate certain associative use areas.

7. The drumlin is a three-dimensional form which is a continuous three-dimensional "figure" of the "ground." It depicts both a growth direction and movement direction. Even as the groundform varies from landscape to ocean (water) the drumlin form continues from one territory to the next, thus integrating the edge zone of the coastline. On the site, the three-dimensional building form is the continuity as it extends its form from one territory (the decking area) to another (the landfill or water).
Urban Form, City of Portland

The structure of the city of Portland is a typical American urban form. Its basic layout of street grids responds to the generally rectangular peninsula upon which it is located. The grids are shifted to respond to the local variations in the topography. The blocks are also rectilinear forms, which are further subdivided into rectangular parcels. The overall form, a discontinuous field organization, is the antithesis of the larger landform. It is also a continual subdivision of pieces into smaller cellular forms, which when added together define only a local territory. It creates an object-oriented field with each object being a totality in itself.

The design of the site incorporated the dimensional and grid form of the city only at its edge along Commercial Street as a way to integrate site with city and complete the existing street enclosure. The urban edge form alternates between built forms and the landscape of the site, thus creating a reciprocal transitional edge between city and site. The object making associated with the urban blocks was incorporated in the mooring slip area as well as along the Commercial Street edge. These cellular pieces were located in the extended urban grid field. There are three basic areas of the urban environment that were observed as functional aspects of a city.
a) Building Density: Building Form vs. Ground From and Circulation;
b) Walls and Objects: Where Several Buildings Established a Vertical Wall or as an Object alone;
c) Open Spaces, Large and Small Streets, Plazas, Squares, Major Pedestrian Streets, Alleys.

URBAN CONTEXT FOR SITE
(Prepared by Portland Planning Commission)
Urban Form
Movement Activities

a) Pedestrian
b) Vehicular
c) Parking
d) Service.

URBAN CONTEXT FOR SITE
(Prepared by Portland Planning Commission)

Legend:
- x
- o
- a
- t
- s
- m
- n

PROPOSED TRANSPORTATION PLAN
map no. 7
Urban Form Sectors

a) Uses
b) Core Areas
c) Focus
d) Water and Landscape.

URBAN CONTEXT FOR SITE
(Prepared by Portland Planning Commission)
Waterfront Edge of Portland Harbor

Existing pier warehouse building forms and uses

Existing pedestrian ferryboats

Pier entry to existing auto ferry terminal, looking north toward the city (adjacent pier to new site)
The waterfront form of Portland is a typical nineteenth-century wharf/pier edge. Its almost perpendicular direction to the major commercial street at the water's edge creates an area where the maximum number of boat slips could occur within a minimum length of street. The wharves and piers extend the streets and uses of the city. The waterfront edge form is analogous to the landscape form of the Maine coast. The form of the wharf is reinforced through the aggregation of building masses. The buildings share the wharf's directional field and reinforce it through the vertical walls. Yet each building use is separate and is identifiable through the individual roof forms.
Waterfront Edge
Conditions

EDGE CONTEXT FOR SITE
(Prepared by Portland Planning Commission)
The Site

Existing site looking south from sixth floor of building across Commercial Street from site
Introduction to Pocahontas Wharf

The site, known as Pocahontas Wharf and/or Commercial Wharf, consists of a landfill area and pier edges, some of which have been partially destroyed by fire. The lot measures 350 feet across the entrance along Commercial Street and has an allowable length of 1000 feet, from the street edge to the channel pierhead limit line established by the U.S. Coast Guard. Presently, the landfill portion stretches out 500 feet from the street edge and an additional 200 feet of marina decking and moorage slips extend from the landfill, so that approximately 300 feet separate the end of the existing site from the pierhead limit line.

The site is located adjacent to the southern end of the recently renovated historic downtown district of the city of Portland. It occupies a central position along the rows of wharves and piers in the waterfront. Its longer axis lies 30° east of magnetic north/south axis.

The site is presently being used as a parking lot which serves the nearby waterfront shops and the small marina located at the wharf's edge and a small two-story building is presently occupying the street edge of the site.

TRACINGS OF THE DESIGN PROCESS, 1" = 100' reduced to 1" = 200'  
C. Auto and pedestrian ferryboat uses generating two distinct field directions; Sketch #1
Extending the pier with real groundform islands of rock and dirt connected by a decking system.

Site for new hotel across Commercial Street from existing site.

Existing pier and pedestrian loading area for ferryboats.
Overlapping two major directional fields one over the other.

Organization of uses on site all reinforcing the directional grid of the piers.

Overall site dimensions and use divisions, i.e., the nine-square grid.

Exploration in directional changes for various transportation facilities.
Premises for the Site Design

Developing the site design (ground form) was the primary task in the early stages of thesis work. The existing two-acre landfill site had to be extended as the new terminal program evolved and expanded. This additional ground plane (virtual ground) consists of decking and piers, which doubled the surface area available for development. As a result, the range of possible design solutions for the overall site increased.

During these early stages of development, several guidelines regarding form, use and spatial organization of the terminal building were hypothesized. These specific design decisions helped to reduce the potential for confusion and conflict when considering the numerous possible preliminary site forms and types of organization. These decisions also helped to integrate the site design process and the building design process early on. The guidelines developed for the terminal building specified:

1. that the terminal and its facilities serve as a gateway for travelers, tourists and commuters entering both the city and the islands along the Maine coast;

2. that the building have a distinct use among the other piers found on the waterfront and have its own identifiable three-dimensional physical form;
3. that the building accommodate both pedestrian traffic and vehicular traffic, with minimal conflict;
4. that the building and site create a new terminus for the recently redeveloped historic district of downtown Portland by opening up the water's edge to the public and creating a large, open area at the sea;
5. that the actual terminal be integrated with various commercial retail and office spaces in order to provide an increase in the types of activities available;
6. that the additional functions and square footage for space create a transportation facility in which the circulation becomes more than a network of corridors and lobbies;
7. that the main terminal space be designed to function as "town meeting room" and a central lobby waiting room;
8. that the building form consist of an aggregation of smaller forms, similar to New England farm complexes as well as wharf fishing and shipping developments, also acknowledging the formation of the Maine coastal landscape;
9. that the building be a three-dimensional extension of the new pier decking from the existing fill.
The Design Exploration
Projections and Process

The final site design emerged after several phases of exploration involving specific building pieces, as well as the overall organization. The new enlarged program remained constant; the numerous use areas and their associative sizes did not change, even as various site forms and organizations were tested. Various uses were grouped together as aggregations of physical form associations. Once established, they also remained constant. This chapter defines the dominant principles which influenced the evolution of the site design and illustrates the relationship between these principles and specific physical forms and organizations. These principles are the major physical form tasks and are not the complete range of issues from which I worked. Several of the site forms developed from references to other projects which are listed in the Appendix. The principles which guided my design explorations were:

1. to organize the site according to the strong axes of the waterfront edge and the urban grid form of the city (figure);
2. to support and extend the existing north/south axis of the urban grid and waterfront edge that is reinforced by the landfill through the use of the new decking (figure);
3. to create a second major direction, 30° off the north/south axis, for the new terminal building, in order to intensify the differences of its form and use from those of structures on adjacent piers and wharves (figure);
4. to offset the two major axes of the site (north/south and 30° off north/south) with two minor axes perpendicular to the major field directions and which begin to set up a hierarchy of movement and forms (figure);
5. to establish three distinct zones on the site: (i) the primarily public edge on the east side of the site, which is associated with the terminal; (ii) the mostly private, west side with the marina yacht club; and (iii) the central park space, which serves as territory that can be either public or private by defining and being defined by the edges of either the public and private zones ("slack"). The distinction of zones helps establish a hierarchy of uses and increases the legibility of a site that tends to be rather flat;
6. to establish types of physical form and use within the boundaries of the program which respond to the larger context of the urban form of Portland and the landscape form of the Maine coast. Specifically: (i) the territory along Commercial Street will respond to the layout of forms and the functions of the city; (ii) the area consisting of new decking and piers will be associated with coastal forms and the use of water vessels; and (iii) the central area will be the location of the terminal building which serves as a transitional form between the new decking and the existing landfill;
7. to articulate and intensify differences in physical structures and uses between: (i) the existing landfill and the new decking; (ii) the terminal building and the retail space (Commercial Street); (iii) the floating marinas and the fixed ground (landfill and decking); (iv) the decking (virtual ground) and the landscape (fixed ground); (v) the relationship of the existing landfill to the urban landscape; and (vi) the relationship of the new decking to the terminal building and other facilities;
8. to interlock use areas on the site by utilizing reciprocal forms, so that extensions of the water-related forms (e.g., the aquarium) reach into the urban grid territory of the street edge; and pieces of the urban fabric (commercial, retail, office spaces) are found on the site and influence the terminal building itself;
9. to establish differences of three-dimensional physical form according to the
three distinct use zones on the site. The major public zone is primarily a vertical massing, while the major private zone is a horizontal built form which includes the decking and the marina moorage slips. These volumetric and planar differences also evolved from views across the site, shadows, and sun penetration. For each use activity, a horizontal, vertical massing and solar orientation of this mass were chosen to either maximize uses or minimize adverse impacts of use territory;

10. to reinforce the form of a harbor as a semi-enclosed protected territory in three distinct areas on the site; (i) the park space; (ii) the boat marina; and (iii) the ferry terminal dock. In each instance, the planar areas are defined by either an enclosure of continuous built form, or a series of larger three-dimensional built objects, or an intensification of the ground form edge (for example, the new decking);

11. to establish (image and physical form references) between the overall site form of the project site, with the context of the Maine coast form, as a coherent and formal territory of fingers of land, inlets and islands that follow the northeast/southwest directional field and extend it into the sea.
Site Design
Drawings

9/18/80  * Preliminary building masses; circulation networks for pedestrians and vehicles; and the basic territory zones of landfill, decking and building.
* Two major pedestrian pathways connect from the hotel and urban core area as well as from the aquarium and major entry plaza space on Commercial Street; to the ferry terminal.
* Vehicle circulation wraps around both the ferry terminal and the office building on Commercial Street.
* Ferry dock area in harbor defined by building masses (objects).

9/26/80  * Vehicle circulation changes to support both the dimensional forms of the urban grid but also the directional field established by the landfill.
* Drop-off area further removed from terminal area.
* Marina definitions begin to evolve.
* Terminal becomes direction with the pier fingers.
* Separation of auto ferry slip from other decking direction occurs.

10/1/80  * Sketch, continued refinement of harbor edge and containment form.
* Increase of decking at end of pier, creating a larger virtual ground with the urban grid geometry.
* Terminal building changes directions to associate with the angle direction of the ferryboat direction and aquarium.
* Vehicle circulation changes to reinforce the new terminal direction.

10/7/80  * First pass at the form framework or spatial structuring system at the site scale.
* The terminal building area is the focus for the intersection of all these bay systems.
* Each framework spine is asymmetrically loaded and partially open for passage through it.

SITE PLAN

10/17/80  * Dimensional bay for the edge enclosure of various use territories evolves. The overall edge condition develops.
* Physical overlapping of uses and groundform continues to evolve.
* Circular containment forms evolve in three areas; the two major entries to the site and the terminal building.

10/22/80  * Preliminary final site plan.
* Major park space evolves in the central area connecting the Commercial Street edge with the end of the landfill and to the water. Major "slack" space.
* Further edge refinement of the (virtual ground) decking territory along the east and west sides.
* Greater dimensional separation between the auto and passenger ferry slips. From 1:2 to 1:4 ratio.
* Commercial spine increases in its overall definition.
* Further change at the end of the pier.
* Displaced deck and groundform pieces occur.
SITE DESIGN DRAWINGS, 1" = 50'
reduced to 1" = 100'

09/18/80 - Circulation of auto responding in
form to the two major directional
fields (decking is clear; ground
is dark)
09/26/80 - Basic agreement of site design with change in aquarium barge direction
10/01/80 - Major uses identified as "rocks" defining the harbor area for the pedestrian ferry's floating covered dock

SITE DESIGN DRAWINGS, 1" = 50' reduced to 1" = 100'
SITE DESIGN DRAWINGS, 1" = 50'
reduced to 1" = 100'

10/07/80 - Exploration into the column grid
and bay system of the two major
direction fields
10/17/80 - Exploration into the edge enclosure; overall form is outlined and defined, uses located on site
SITE DESIGN DRAWINGS, 1" = 50' reduced to 1" = 100' 10/22/80 - Preliminary final site plan
Component Parts of the Terminal Building

Reference for overlapping of structure system and enclosure system

Reference for enclosure system, structure system and building "margin"
Introduction to the Parts of the Terminal Building

The material in this section predominantly serves as an avenue for exploring the smaller-scale components of the larger overall building form. Along with defining spatially the overall building form, these two studies are also physical form explorations in themselves. The Spatial Structuring System is a study of the physical form pieces which combine to define a "form framework" or "footprint" of the building. This physical form is the primary indicator by which the building user is able to understand the spatial organization of the building as well as to sense his location within it. The second area of study is the Envelope or Enclosure System of walls and roof planes which define the exterior surface of the building. At different locations this enclosure system is extendable. This zone or "margin" for growth is a territory which can adapt to become either indoor or outdoor space, depending on the season. This study also includes as one of its parts an exploration of a partial building elevation or facade, which develops the visual image of the building.

These two studies are also explorations into the range of possible construction materials and their connections. The studies in this section have equal importance and influence, with the site form and context, in determining the overall form of the building. In both these studies references to other buildings and landscape forms aided in the design exploration.

This section does not include all the issues involved in designing these two specific pieces. The two pieces are best seen in the supportive role they play in the overall design form of the terminal. Although these two studies are presented separately in the thesis, they are, in fact, physically interlocking elements and extend into each other's territories. It was for the purpose of explaining in detail these two generic types that they appear separately in the thesis text.

Reference for new decking and wind screen device
The Spatial Structuring System Attitudes and Decisions

The development of the spatial structuring system included a study of the general form framework as well as the non-structural but permanent, built enclosure elements such as walls, screens and partitions. It is at this point in the development of the overall form of the terminal building that the human scale is introduced by way of specifically-proportioned structural elements and materials. Introducing the human scale and determining the layout of the form framework both begin to clarify the size and shapes of internal use territories; containment forms (walls, screens, etc.) will then determine the final dimensions of territories that either reinforce the framework system or set up a new directional field within it. The new directional field refers back to one of the three other directional fields on the site (see page )

In developing the spatial structuring system, I chose to emphasize one feature of it, the public path framework, which is the major determinant in the design of public transportation facilities. Overall, the form framework was not developed in as great detail as the public path framework; however, parts of it were elaborated locally, when pertaining to parts of the public path system. The premises considered in the explorat-

Column system for pedestrian expressway, revised section
building whose design is generated by circulation and whose function is facilitating transportation. The bay system helps to visually and physically organize a circulation network that includes seven major entrances, four different major and minor axes, and two large collection areas;

2. to develop three post-and-beam form families that are the components of the structural bay system and that define the three distinct areas in the building: (i) the public pathways; (ii) the various public and private use territories adjacent to the circulation paths; and (iii) the transitional areas in which there occurs a shift in the directional field or a change in use. The dimensions of the post-and-beam form families relate both to the site conditions (a soil with poor load-bearing capacity) and to the human scale. The path system framework is based on an elongated bay, twelve feet wide and twenty feet long, that reinforces the direction of pedestrian movement. The public and private use territories are organized on a nearly square bay, eighteen feet by fifteen feet. In the transitional areas a "free column" system was employed, to reflect the variable nature of the form framework at this location and to facilitate the shift from one bay system to the other. The bay types are repeated and assembled in order to create two types of use terri-

Column tree systems and their footprints
tories. The smaller territories relate and refer to the human scale and uses associated with small numbers of people, for example, offices, ticket booths and locker facilities. The larger territories refer to the dimensions of ferry boats themselves and to uses associated with large numbers of people: restaurants, the lobby space and commercial facilities. From these two forms evolved several intermediate forms. Around each bay is found a "slack space" of either three feet or six feet to allow for freedom in location of individual bays according to user needs.

3. to overlap and integrate the form framework with the building envelope. For example, at the several entries to the building, the public path framework extends beyond the weather wall and along the enclosure wall. This visually and physically integrates the two systems and extends internal paths of circulation onto the decking, thus reestablishing the integration of building and site;

4. to extend and develop the use areas comprised of non-directional (fifteen feet by eighteen feet) bays beyond the building envelope in order to create the "margin" territory along the edge of the building. It is here that the internal space may expand according to seasonal changes. The "margin" territory also provides the possibility for future growth of the terminal building.

Scheme two: concrete post and beam with concrete capital pieces
Family form for bay system trees; one- and two-story concrete columns and two-story steel columns for upper floors.
Modular bay spacing: layout for both the use territories 15' x 18' grid and the circulation bay system of 12' x 22' grid.
The Enclosure System
Premises and Development

The enclosure system study is the exploration of the edge territory of the building. This extendable weather wall is responsive to the local climatic conditions and internal uses. As a spatial zone, it occupies the territory between the internal use areas of the building, and the external decking and landscape forms. At the same time, it is a part of both territories.

The study of the building enclosure also includes an exploration of the overall massing of the terminal building. The massing of a building is its most important visual feature and offers clues to identify internal uses and their relationship to the overall spatial organization. This study also follows the evolution of a partial elevation which, along with several other built references, assists in formulating a visual image for the terminal building that supports and expresses the overall form and organization.

A study of the enclosure system is really an exploration of a three-dimensional edge zone, and the range of possible conditions in this zone may, in itself, become the focus of a thesis project (see theses by David Cylkowski, 1976, and Zorrie Zimmerman, 1980). In this section, however, only major issues that guided the development of a three-
dimensional building edge are considered. These are:

1. to develop a building edge that responds to the variety of climatic conditions of the site. This ensures the creation of different physical forms for each elevation (north, south, east, west) that reflect the different exposure conditions. The variance will be manifested in the amount of glazing and overhang of roofs as well as in the nature of materials and the use of sun-screening devices. The three climatic factors affecting the elevation are: (i) the angle of the sun and the subsequent shadows thrown by projecting building masses; (ii) the direction and force of winds from the ocean into the mouth of the river harbor; and (iii) the rain and snow which are propelled against the surfaces of the building. The development of building edges and the entire massing is a major consideration in the design of a building exposed to such severe weather conditions;

2. to create, as part of the building edge, a zone which is capable of responding to specific user needs which may vary from season to season. This "margin" has a depth of eight feet and its boundaries may be defined by either the form framework systems or pieces of the enclosure system. It allows for the expansion of the directional (twelve feet by twenty feet) and non-directional (eighteen feet by fifteen feet) bay systems and sets up a new, temporary screening system, but differs from it by virtue of the nature of the screening material(s) used;

ELEVATION STUDIES OF TERMINAL BUILDING AND COMMERCIAL SPINE (looking west), 1" = 16' reduced to 1" = 32'
3. to incorporate the human scale in the development of the elements of the facades and to assemble these pieces into larger modular units that create a more legible, coherent elevation. The use of smaller, human-referenced pieces ensures the maintenance of an intimate scale even where large expanses of wall enclosure occur;

4. to further articulate and intensify the three-dimensional forms at the areas in which a transition occurs between indoor and outdoor use territories. This heightened physical definition reinforces the overlap of the form framework system and edge enclosure system at the entrances to the building;

5. to insure that the overall physical form of the building reads visually as a whole and that the image includes responses to climatic conditions, internal uses, site forms and the larger regional context as well as to other references chosen (see ).
The Terminal Building

In this section the development of the major building forms on the site are illustrated. The design evolution of the ferry terminal building represents a progression from the two-dimensional field of the ground form (decking, landfill) to the three-dimensional growth of building forms. To help articulate the volumes and massing of the buildings, drawings at several different scales were employed.
Introduction to the Terminal Building

The development of the terminal building began at the public, east edge of the site. Three principles affecting the initial location and form of the building were: (1) the site form and context of the urban and natural landscape; (2) the basic needs and functions of a transportational facility; and (3) the conception of what a commuter ferry could become. These three principles were elaborated further after several visits to the city of Portland as well as researching other transportation facilities on the coasts of the United States and Europe.
Premises for the Building Design

The site form and the larger context of the urban waterfront edge began to define the approximate area for the terminal building, and served as starting points from which to develop the form and organization of the building itself. The actual square footage required had been set in the program developed by the city of Portland (U.M.T.A.) grant request.

As the site landscape form evolved, the terminal building became a physical territory that acted as a joint between the two types of activities on the site: the commercial spine on the east side, which had been generated from and relates to the historic district and urban context of the city; and the buildings on the newly established axis, which are associated with the ferryboats and transportational functions. These larger issues began to dominate the initial development of the terminal building; it was necessary to balance these broad concerns with some specific small-scale decisions. Thus, a study and exploration of the building pieces began, so that the development of the form framework and building envelope coincided with the development of the two directional fields ([1] commercial spine and [2] boat facilities) and the two-dimensional organization of landfill, decking and water.

The final building form evolved after several tests incorporating the site form, program requirements and large- and small-scale decisions. This chapter discusses in detail conceptions evolving from these larger issues that guided the growth of parts of the building as well as the building as a whole.
The Design Exploration
Projections and Process

The following physical form references and conceptions comprise the outline for the design exploration of the terminal building. Although these do not make up the entire range of influences on the development of the structure, they are the issues which had a major impact on the design process. Other influences, although in the drawings themselves, will not be discussed in detail. The decisions made were the following:

1. to let the form of the terminal building "grow" from the new decking and piers so that it creates an interlocking and overlapping of built forms with the existing landscape and the water. In order to help achieve this integration, portions of the building whose uses and forms pertain to the ocean will literally float on the tidal water, while other portions will be generated from the decking and still others from the existing landfill;

2. to locate the terminal building in the area that is the joint between the commercial spine and the axis of the boat facilities, so that both directional fields are incorporated in the terminal building, but do not determine the form of and movement through the terminal space. In particular, the central space or lobby of the building should generate the directional fields and not simply become the point at which they converge and shift. It should occupy a territory separate from the point of convergence of the two axes and major circulation paths;

3. to organize and develop the overall physical form and internal framework of public and private spaces and circulation networks to respond to the major and minor axes established on the site. This resolution in particular begins the integration of site and building that is important for a successful and coherent project;

4. to organize a pedestrian circulation network as a series of paths whose forms help to generate some of the use territories in the building. These paths combine with each other and with the use territories at times, to create a succession of transitional spaces as one moves through the terminal, from the ferryboat dock to the edge of the historic district;

5. to organize a circulation system that is legible and highly articulated and varied in terms of path widths, materials, views, forms, spatial enclosure and use of surrounding areas. In researching other transportation facilities, I organized the general types of circulation/lobby layouts into three distinct categories. These are: (i) the large, central lobby with arrivals and departures at opposite ends of the lobby (evident in the older train stations in the United States and Europe); (ii) the major corridor with gates opposite each other, on both sides, which can be found in most older airport terminals; and (iii) the circular space with gates that radiate from it, which can be seen in newer airport terminals. The ferry terminal incorporates features of all three typologies in order to create a fourth typology.

6. to develop the containment form analogous to the harbor in order to enclose and define a number of use territories in a variety of sizes. The containment form of these territories will refer back to the "use U" concept that is evident in several site forms: the marinas, the ferry docks, the area between these docks and the marina docks. The "U" form will be employed in several specific areas within the building as well as in the overall physical form of the terminal;

7. to separate public and private space into use zones of which one third will overlap and interlock with another use zone; also to separate private and public zones vertically within the building by limiting public space to the ground and first floor, and private space to the second and third floors;
8. to assign a dual role to the central lobby space in the design exploration, so that it is developed both as a waiting room for persons boarding the ferryboats and as a "town room" for public meetings and gatherings;

9. to establish an overall physical form for the roof of the terminal building that is an aggregation of small masses instead of one larger form. The aggregate forms should overlap and interlock to produce a continuity of overall form yet reflect the nature of the distinct use territories below. This typology is evident in New England farm buildings;

10. to further establish continuity of form for the overall building through the development of a continuous vertical surface above the ground floor. The surface is created by the repetition of modular elements which will also serve to "locate" the structural framework behind it. Local variations will occur in these modular panels, as dictated by internal and external uses;

11. to associate several different roof forms with specific climatic characteristics of the site as well as with internal use territories. For example, roofs sloping to the south or west will cover larger use areas in order to reduce possible heat loss. Smaller use areas, for example, the offices on the north and east sides, will have flat roofs, higher than the sloping roofs.

12. to locate the majority of the building mass on the east edge of the site, which corresponds to the public use territories. By placing the massing on the east edge, shadows are reduced on the central park space. Furthermore, the emphasized volume at the east edge contrasts and complements the horizontal and more private part of the site: the new decking, marina, yacht club, restaurant and boat slips. The organization of the massing follows four premises: (i) the tallest mass is located at the end of the commercial "space" and serves to stop this directional field; (ii) the tallest mass does not occur at the joint where the two directional fields pass; (iii) a hierarchy of massed forms corresponds to and identifies the three distinct parts of the terminal building: the commercial spine, the terminal, and the support facilities; and (iv) the massing breaks down and falls from the commercial spine to the south and west, in order to allow the sun to penetrate into the lobby space as well as into the other use territories;

13. to generate a variety of reciprocal edge form conditions at the ground level, involving the landscape and the building. The zones created will maximize both the linear footage of the edge and the potential for extending the building margin during increased summer use. The contraction/expansion of the edge occurs in a territory of ±8 feet from the building enclosure;

14. to utilize a range of building materials and methods in order to further identify particular (public or private) use territories or paths of circulation. The range will be obtained through a variety in size, type and joints of the materials used, which will articulate the spaces they envelop.
Building Design Drawings

10/5/80  * First sketch plan of Spatial Structuring System for the building.
  * Circular containment forms at the edges of the building for major public uses, i.e., the lobby and the restaurant.
  * Terminal building made of four separate pieces around a central space, all approximately equal in their mass and importance.

10/20/80  * Ground floor plan of Spatial Structuring System and Enclosure Envelope developing as one unit.
  * Heirarchy of directions develop. The ferryboat direction is the minor direction for entry to the terminal building only. The major direction is the commercial spine which generates through the building with a displacement due to the ferry direction.
  * Three major building masses and two minor masses for the entries and public spaces now complete the building form.

11/5/80  * Sketch plan of edge enclosure.
  * Terminal mass becomes wall at a perpendicular direction to the ferry direction. It becomes a stopping gesture, a mass to penetrate through to get to the landscape or the ferryboats.
  * Reduced mass of the commercial spine separates building from the forms of the urban context.

11/17/80  * Sketch plan of ground floor. "Footprint" of Final Design.
  * Building becomes two primary masses with a single circular containment space.
  * 1. The massing of the end of the commercial spine.
  * 2. The massing along the ferryboat direction.

11/21/80  * Preliminary drawing of roof framing for the terminal building (original drawing was in color to separate levels).
  * Building use territory dimensions are becoming fixed along with their location within the building.

12/10/80  * Preliminary study drawing for the public path Spatial Structuring System.
  * Vertical circulation begins to be defined.
  * Decisions on the bay spacing dimensions and organization for the use areas along the commercial spine evolve.
  * Lobby containment space continues to receive and displace both directional fields.

11/10/80  * Preliminary study drawing for the public path Spatial Structuring System.
BUILDING FORM, 1" = 16' reduced to 1" = 32', overall organization and structure

10/05/80 Sketch plan of bay structuring system
BUILDING FORM, 1" = 16' reduced to 1" = 32', overall organization and structure

10/20/80 Preliminary drawing, ground floor of edge enclosure system and bay structuring system
BUILDING FORM, 1" = 16' reduced to 1" = 32', overall organization and structure

11/05/80 Sketch plan of edge enclosure responding to two major and two minor directional fields
BUILDING FORM, 1" = 16' reduced to 1" = 32', overall organization and structure

11/17/80 Sketch plan of ground floor - general use territory size definitions
BUILDING FORM, 1" = 16' reduced to 1" = 32', overall organization and structure

11/21/80 Preliminary drawing of roof framing for ferry terminal building
BUILDING FORM, 1" = 16' reduced to 1" = 32', overall organization and structure

12/10/80 Preliminary drawing of public path bay structuring system
Conclusion

Issues and Attitudes

This design exploration has intended to broaden the range of possible three-dimensional forms for a active public urban space. The development of the "town room" and the connection to the downtown framework through a public market spine, became the most important considerations in the study. The "town room" evolved as an enclosed plaza area with spaces on the periphery for the addition of shops. The spine developed into an arcade with spaces available for infill by various uses over time. These two major features of the terminal building reinforced my contention that a transportation facility need not become a hierarchy of circulation networks and single-use spaces. Instead, I tried to show the potential for the creation of a public node that is an extension of the downtown activities and that has within it a variety of use-form territories, which relate directly to the water's edge.

If the design exploration had been able to continue, the next phase would have included a study of parts of the building form and organization in larger scale drawings, in order to test form sizes and the physical articulation of these use-territories. Given that the generating of physical forms is an ongoing process, this thesis has represented a portion of that process.
A complete set of final building plans for each floor, elevation, section, are available at Prof. Shun Kanda's office.

Ferry terminal is in the spatial junction between the directional field of the ferry facility building and the commercial category. Tracings of the design process, 1" = 50', reduced to 1" = 100', are available.
NOTE: This appendix does not include any of the programmed square-foot requirements found in the revised terminal program (Appendix A).

Overall square-foot requirements

1. terminal
   2. freight
   3. yacht supply and sail maker
   4. restaurant (in terminal building)
   5. commercial and retail
      a. commercial spine section (adjacent building)
      b. commercial spine section (terminal)
      c. terminal building
   6. office
      a. commercial spine (adjacent building)
      b. commercial spine (terminal)
      c. terminal building
   7. parking on site
      a. workers
      b. ferry loading
      c. tourist or marina use
     TOTAL
   8. auto ticket booth
   9. bus and taxi drop-off
      270 lineal feet
   10. ferry boat docking spaces
      800 lineal feet
   11. overall site size
      F.A.R. .30
      a. landfill exposed
      1.5 acres
      68,000
      b. decking
      1.3 acres
      56,745
      c. building area
      1.2 acres
      52,850

(NOTE: Parking garage planned as base of new hotel adjacent to site across Commercial Street, and public parking along all streets adjacent to project area.)

NOTE: The square-foot requirements for each category of the terminal and freight area are the same as those shown in Appendix A.
### Ferry Terminal Requirements For Uses and Dimensions

1. **overall square-foot requirements**
   a. terminal  
   b. freight and storage

2. **specific breakdown of square-foot requirements**
   a. circulation for building, 15 to 20 percent
   b. ticket office and information office
   c. waiting rooms
   d. cafe and bar
   e. employee area
   f. restroom area
   g. mechanical room
   h. maintenance room

### Design Data: General Site and Boat Conditions

#### APPENDIX C
**FERRY TERMINAL REQUIREMENTS, CITY OF PORTLAND, MAINE**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Square Feet</th>
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<td>overall square-foot requirements</td>
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</tr>
<tr>
<td>a. terminal</td>
<td>10,300</td>
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<tr>
<td>b. freight and storage</td>
<td>8,000</td>
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<tr>
<td>specific breakdown of square-foot requirements</td>
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<td>a. circulation for building, 15 to 20 percent</td>
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<tr>
<td>b. ticket office and information office</td>
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<td>c. waiting rooms</td>
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<tr>
<td>d. cafe and bar</td>
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<tr>
<td>e. employee area</td>
<td>800</td>
</tr>
<tr>
<td>f. restroom area</td>
<td>600</td>
</tr>
<tr>
<td>g. mechanical room</td>
<td>750</td>
</tr>
<tr>
<td>h. maintenance room</td>
<td>250</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>10,300</strong></td>
</tr>
</tbody>
</table>

#### APPENDIX D
**DESIGN DATA FOR TERMINAL AND SITE FACTS**

1. tidal shift, 9 feet
2. no ice problems in the winter for the ferryboats
3. 7,000 permanent island residents use the ferryboats (1978) daily
4. six hours is longest trip, the mailrun to the islands
5. auto ferry runs to Peaks Island only, maximum 11 autos
6. commuter ferryboats, total 6 boats, 3 drydock in winter
   a. maximum number of people 300 during tourist season, average number is 250
   b. length, 65 feet
   c. beam, 27 feet
   d. height above water, 12 to 14 feet, with 6 feet below waterline
   e. single screw, 10 m.p.h.
The following is an excerpt from the Urban Mass Transportation Administration (U.M.T.A.) request for funds from the city of Portland, Maine. It offers a general outline by the City Planning Department for the development of the site. It also includes specific data referring to the terminal design project.

I. BACKGROUND AND NARRATIVE STATEMENT

The project consists of constructing a new public ferry terminal and related facilities to replace an existing leased terminal on the Portland Waterfront. A major objective is to improve the transportation facilities and services for the 7,000 permanent and seasonal island residents of the service area who depend exclusively upon the ferry system for passenger transport, vehicular transport, freight and cargo delivery, mail delivery and the delivery of a range of public services. The need for a new public ferry terminal stems from the dilapidated conditions of the existing terminal facility and the inability of the private operator of the ferry service to finance the new terminal from the revenues of the line, as documented in the consultant's report, entitled "Casco Bay Ferry Service and Terminal Feasibility Study," which has previously been submitted to U.M.T.A.

The project will involve the construction of a 10,300 square-foot terminal building with ancillary facilities including an 8,000 square-foot freight transfer area, a 15- to 20-vehicle staging lane, ample pedestrian access, bus and taxi drop-off space, parking for 30 to 35 cars and over 500 feet of vessel docking space. Consolidation of an existing fragmented service on two separate piers will be achieved by this project.

A full discussion of the ferry terminal project is contained in the city of Portland application for a Section 3 U.M.T.A. grant. The discussion contained in this report is intended to show how the
project selection criteria and objectives of the Urban Initiatives Program are met in the proposed ferry terminal project as outlined in the Federal Register, Volume 44, Number 70, April 10, 1979.

A. Intermodal Transfer Facilities

This project is being submitted as an Intermodal Transfer Facility which provides for the integration of urban public transportation systems. This intermodal facility will be the property of the city of Portland.

The proposed Island Ferry Terminal Project would involve the construction of a facility which would provide for the integration of urban public transportation systems with other forms of public and private transportation and pedestrian circulation.

It is anticipated that the quasi-public island ferry service would be conveniently linked with the Greater Portland Transit District's bus service, as well as with private services such as taxis and charter buses. The linkage system would be further augmented by provision of currently non-existent auto and bus parking.

The G.P.T.D. currently schedules a bus at the terminal every half hour between 7:00 a.m. and 7:00 p.m. The facility serves 80 to 100 charter buses per year. Taxis meet most scheduled ferry landings.

The development of this new facility will allow a degree of intermodal integration which is physically impossible at the existing ferry terminal. A fragmented existing operation located on two separate piers together with inadequate available space does not presently allow the free and easy flow of passengers from one mode of transportation to another. A new terminal will allow the proper design of pedestrian concourse and access facilities including loading shelters for ferry vessels as well as for buses, taxis and private vehicles.

Since the vehicle transfer service of the island ferry is physically limited by the size of the vessel and the number of trips available, it is necessary for many ferry users to park

B. State Assistance

The state has lent its participation to this project in the form of an approved allocation ($120,000) to serve as matching funds upon project approval. More state assistance to this urban project is anticipated.

The improvements proposed by this project will greatly enhance the passenger terminal for the island ferry service. The existing terminal is located in a deteriorated waterfront area which poses threats to the health and safety of ferry service passengers.

The project as proposed would be totally owned by the city of Portland and would be operated under the terms of a lease agreement by the P.U.C. (Public Utilities Commission) approved island carrier.

II. OBJECTIVES OF THE PRESIDENT'S URBAN POLICY STATEMENT

A. Improve Local Planning and Management Capacity

The Island Ferry Terminal Project offers an opportunity to coordinate the efforts of several federal, state and local programs. Coordination of manpower training projects under the
References To Other Local Waterfront Projects

I refer to these five area requirement programs for the development of Pickering Wharf in Salem, Massachusetts for several reasons: (1) it is a similar site to the Portland, Maine site in its physical relationship to the sea and the city; (2) its square-foot area is approximately equal to the existing landfill; and (3) it is also adjacent to a redeveloped historic urban commercial core. These five programs were references for me as I developed the area requirement program for the site in Portland, Maine. Due to the fact that the Portland, Maine site has larger total square-foot area, and services a larger population, I increased the scope and numbers in several of the categories.

SCHEME A

<table>
<thead>
<tr>
<th>Program</th>
<th>Area</th>
<th>Space Requirement</th>
<th>Coverage</th>
<th>Use</th>
<th>S.O.M. Recommendation</th>
<th>Revised Area</th>
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<td>18,000 sq. ft.</td>
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<td>Pool and terrace</td>
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<td>pool</td>
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<tr>
<td></td>
<td>Furnishing for 106</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>restaurant B</td>
<td>no</td>
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<tr>
<td></td>
<td>rooms at $2,000/room</td>
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<td>--</td>
<td>--</td>
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<tr>
<td>RESTAURANT</td>
<td>190 seats</td>
<td>4,800</td>
<td>65</td>
<td>3,800</td>
<td>marina</td>
<td>same</td>
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<tr>
<td></td>
<td>(in Pickering Bldg.)</td>
<td></td>
<td></td>
<td></td>
<td>parking</td>
<td>255 cars</td>
</tr>
<tr>
<td>OFFICE</td>
<td></td>
<td>7,600</td>
<td>20</td>
<td>--</td>
<td>budget lodging</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>(in Pickering Bldg.)</td>
<td></td>
<td></td>
<td></td>
<td>retail space</td>
<td>yes</td>
</tr>
<tr>
<td>MARINA</td>
<td>Admin./Service</td>
<td>1,400</td>
<td>--</td>
<td>1,400</td>
<td>parking</td>
<td>50 people</td>
</tr>
<tr>
<td></td>
<td>Dry boat storage</td>
<td>3,300</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>170 cars</td>
</tr>
<tr>
<td></td>
<td>77 slips plus</td>
<td>--</td>
<td>--</td>
<td>3,300</td>
<td>--</td>
<td>same</td>
</tr>
<tr>
<td></td>
<td>public walkway</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>same</td>
</tr>
<tr>
<td>PROGRAM TOTALS</td>
<td>.41 F.A.R.</td>
<td>84,200 gsf</td>
<td>255</td>
<td>30,800 (15%)</td>
<td></td>
<td>50 rooms</td>
</tr>
<tr>
<td></td>
<td>(73,900 gsf)</td>
<td>Coverage</td>
<td>173,200 (85%)</td>
<td></td>
<td></td>
<td>same</td>
</tr>
<tr>
<td></td>
<td>for bldgs.</td>
<td>Open area</td>
<td>204,000 (100%)</td>
<td></td>
<td></td>
<td>50 people</td>
</tr>
<tr>
<td></td>
<td>only)</td>
<td>Site area</td>
<td></td>
<td></td>
<td></td>
<td>same</td>
</tr>
</tbody>
</table>

This program was developed by Nancy Agnew in her Masters of Architecture thesis, 1976. It was a revised development scheme from the S.O.M. architects program, which they generated for the site, Pickering Wharf in Salem, Massachusetts.
### SCHEME B

<table>
<thead>
<tr>
<th>Program</th>
<th>Area</th>
<th>Parking Space Requirement</th>
<th>Building Ground Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESTAURANT</td>
<td>305 seats</td>
<td>8,000 gsf</td>
<td>107</td>
</tr>
<tr>
<td>RESTAURANT</td>
<td>190 seats</td>
<td>4,800 gsf</td>
<td>67</td>
</tr>
<tr>
<td>OFFICE</td>
<td>(in Pickering Bldg.)</td>
<td>7,600 gsf</td>
<td>20</td>
</tr>
<tr>
<td>RETAIL</td>
<td></td>
<td>8,000 gsf</td>
<td>53</td>
</tr>
<tr>
<td>MARINA</td>
<td>Sales and repair</td>
<td>4,800 gsf</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Admin./Service</td>
<td>2,400 gsf</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Dry storage</td>
<td>3,300 gsf</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>77 slips plus public walkway</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>PROGRAM TOTALS</td>
<td>.19 F.A.R.</td>
<td>38,900 gsf</td>
<td>247</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(35,600 gsf Coverage)</td>
<td>Open area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(for bldgs. only)</td>
<td>Site area</td>
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### SCHEME C

<table>
<thead>
<tr>
<th>Program</th>
<th>Area</th>
<th>Parking Space Requirement</th>
<th>Building Ground Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTEL</td>
<td>175 rooms, lobby, etc.</td>
<td>74,500 gsf</td>
<td>280</td>
</tr>
<tr>
<td></td>
<td>350-seat restaurant</td>
<td>9,500 gsf</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Meeting rooms</td>
<td>2,250 gsf</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Enclosed pool, sauna</td>
<td>7,000 gsf</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Retail</td>
<td>2,000 gsf</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Furnishing for 175 rooms at $2,000/room</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>MARINA</td>
<td>30 slips plus public walkway</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>PROGRAM TOTALS</td>
<td>.47 F.A.R.</td>
<td>95,250 gsf</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(95,250 gsf Coverage)</td>
<td>Open area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(for bldgs. only)</td>
<td>Site area</td>
</tr>
</tbody>
</table>

### SCHEME D

<table>
<thead>
<tr>
<th>Program</th>
<th>Area</th>
<th>Parking Space Requirement</th>
<th>Building Ground Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTEL</td>
<td>126 rooms, lobby, etc.</td>
<td>57,475 gsf</td>
<td>175</td>
</tr>
<tr>
<td></td>
<td>250-seat restaurant</td>
<td>7,000 gsf</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Meeting room</td>
<td>750 gsf</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Enclosed pool, sauna</td>
<td>7,000 gsf</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Furnishing for 126 rooms at $2,000/room</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>RESTAURANT</td>
<td>190 seats</td>
<td>4,800 gsf</td>
<td>60</td>
</tr>
<tr>
<td>RETAIL</td>
<td>(along Derby)</td>
<td>3,000 gsf</td>
<td>20</td>
</tr>
<tr>
<td>OFFICE</td>
<td>(in Pickering Bldg.)</td>
<td>7,600 gsf</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>(over Derby retail)</td>
<td>3,000 gsf</td>
<td>8</td>
</tr>
<tr>
<td>MARINA</td>
<td>30 slips plus public walkway</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>PROGRAM TOTALS</td>
<td>.44 F.A.R.</td>
<td>90,625 gsf</td>
<td>327</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(90,625 gsf Coverage)</td>
<td>Open area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(for bldgs. only)</td>
<td>Site area</td>
</tr>
</tbody>
</table>
Bibliography


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Hertzberger, Herman. Homework for More Hospitable Forms and Streets for People.


Agnew. "Salem, Massachusetts Waterfront Design."
Barker. "Waterfront Boston--Housing on the Waterfront."
Campbell. "Water in the Landscape."
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Imrich. "Architectural Journeying."
Miller. "Design Projections for an Astronomical Observatory."
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Ravens/Hansen. "Water and the Cities."
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Tuttle. "Long Wharf."
Zimmerman. "Edgeways."