

A VISUAL ANALYSIS OF BOSTON METROPOLITAN SHORELINE
FROM DORCHESTER BAY TO COHASSET HARBOR

by

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on Graduate Students

ABSTRACT

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Richard Arvid Peterson

Submitted to the Department of City Planning on May 20,
1961, in partial fulfillment of the requirements for
the degree of Master of City Planning.

This thesis pertains to one element of metropolitan planning. That element is the plastic organization of forms and activities within the environment. The particular environment of this study is the Boston metropolitan area from Dorchester Bay to Cohasset Harbor. The focus of the paper is the relationship and interaction of water, shoreline, land and hinterland.

The area is surveyed as to its characteristics, function and circulation. A set of assumptions are made upon which to structure a perceptual program based on a series of analyses -- form, activity and sequence.

The core of the thesis is formed by these analyses. Within each analysis methods and techniques are developed to perceptually study and record important image elements within the environment. A graphic notation is also developed to present the data in maps, diagrams and sketches.

Finally, a perceptual program is developed as a device to check the validity of the analyses.

Thesis Supervisor: Kevin Lynch, Associate Professor
of City Planning

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"A living idea is understood when seen in terms of its environment." -- Herbert W. Schneider, The Puritan Mind

PURPOSE

The following thesis is concerned with the relationship and interaction of water, shoreline, land and hinterland within the Boston metropolitan area from Dorchester Bay to Cohasset Harbor. It is based on the premise that plastic organization of space is a function of the planning process. By plastic organization is meant the disposition of human forms and activities in relation to natural environment. This organization is communicated through its perceived image. The thesis analyzes several image systems considered important to a visual or perceptual evaluation of a metropolitan area. Emphasis is placed on methods and techniques of analysis rather than on a design program. Therefore the design program of the thesis serves primarily as a device to measure the effectiveness of the total analysis.

It goes without saying that social, political and economic factors interact to influence the spatial organization of man's environment. Each factor has its own characteristics requiring special analytical methods and techniques. To facilitate study of the plastic organization of space it is analyzed here apart from the other environmental factors.

In order not to completely isolate the study, the natural and developed characteristics of the area, along with function and circulation, have been included to form a setting for the analyses.

The approach to this thesis has been colored by a belief in the need to create effective environmental design programs at a metropolitan scale. The belief grows from the same concern that Gyorgy Kepes has for man as a dynamic being struggling individually and socially for survival.¹ To survive man must orient himself to his surroundings. He must be able to measure and order the visual impacts of his environment to correspond with nature. He must be able to communicate his findings to his fellow men for the mutual reinforcement of their actions.

AREA DESCRIPTION

Natural Character:

The area from Dorchester Bay to Cohasset Harbor offers tremendous variety of landscape and seascape. It forms the southeastern portion of the metropolitan region as described by Charles Eliot in 1892.² The region is formed by two conspicuous though broken ridges. One called the Wellington Hills extends from Waltham to Cape Ann. The other and more important one to this study is the rock mass of the Blue Hills. It is carved into a dozen hills varying in elevation above the sea from three hundred to more than six hundred feet. Interestingly these are the highest hills this close to the Atlantic Coast from Maine to Mexico.

The topography of the region between these ridges has been depressed so far and worn so deep that the ocean has flowed over it forming Boston Harbor. However, contrary to what one might expect, the points within the region where ocean contrasts with rocks are few. In fact within the study area only the shorelines of Squantum, Cohasset and the outer islands have conspicuous rock formations. Almost all the seashore, river banks and dry land of the region between the Wellington and the Blue Hills are made up of either clay, sand, gravel or stones. This material deposited as glacial rubbish also forms various hills which are conspicuous elements of the natural environment. In contrast with these

hills are large areas that have been washed by water and weather to produce almost level plains.

Throughout this region is a delightful pattern of fresh water courses. These waters wander about in a tortuous manner following few sharply defined valleys as a result of unusual accumulations of glacial deposits. In the highlands and along the brooks and rivers are found ponds and marshes formed by dams of glacial drift. Ultimately these waters flow into the region's tidal flats.

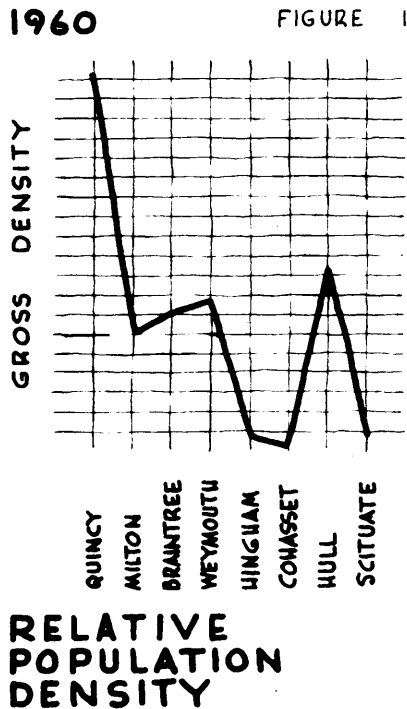
The ocean waters form major spaces delineating the land masses in the natural environment. Eliot describes it in this manner: "Eastward on a clear day, from almost any of the ... hilltops of the district, is seen the distant horizon of the sea -- sometimes a long field of blue spread across the whole 15 miles from Roaring Bull of Marblehead to the Black Rocks of Cohasset, and sometimes only a bowl-shaped patch lying between some near or distant elevation of the mainland."³ The ocean rocks of Cohasset guard the entrance to Boston Harbor as do the ocean rocks of Marblehead to the north. However, within the study area the main sentinels fronting against the ocean are Great Brewster Island, Allerton Point and Strawberry Hill buttressed by the bulk of the mainland to the south.

Inside the relatively still bays and harbors to the east of Pemberton Point numerous hills called drumlins rise out of

the water. Finally behind the shoreline lies the tidal flats and salt marshes. The estuaries and marshes of the Neponset River, Black's Creek, Weymouth's Fore and Back Rivers and the Weir River are rich settings in which the mingling of water and land varies according to tide.

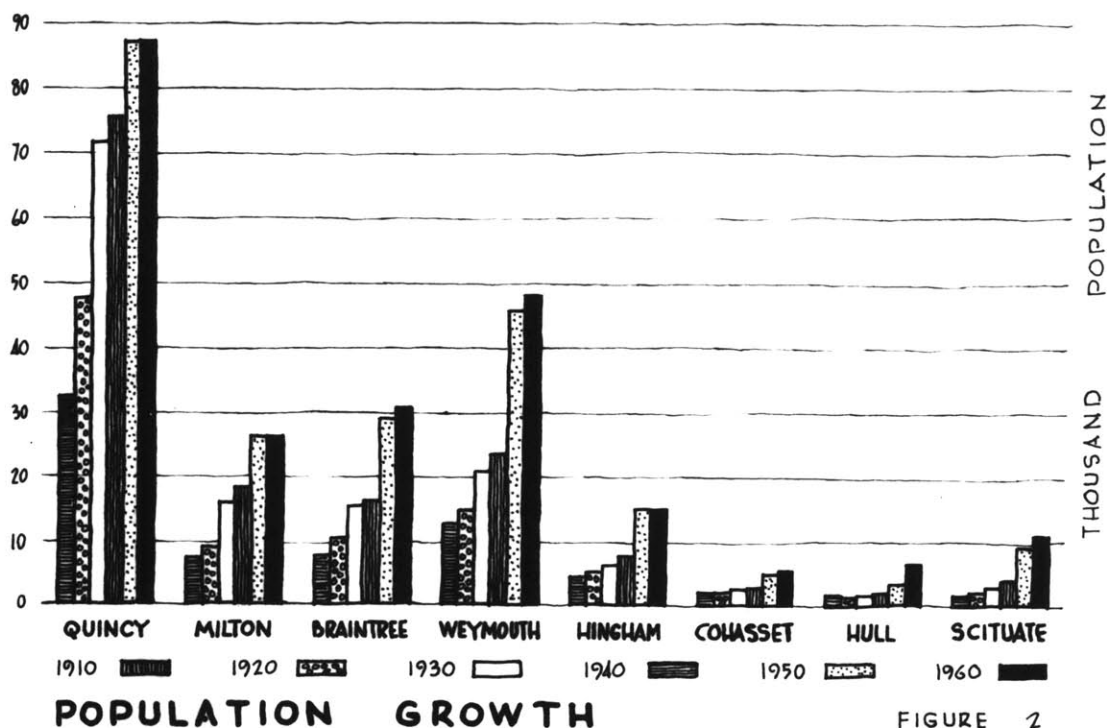
The tide is an important element in the relationship of water to land. There is a variation of nine feet between mean high water and mean low water in Boston Harbor. As a result, large areas of tidal land are exposed when the tide is out. Another point relative to the depth of water is the shallow character of the inner bays. At mean low water a considerable amount of land is less than six feet under the water surface.

Developed Character:



The study area encompasses the towns of Scituate, Hull, Cohasset, Hingham, Weymouth, Braintree and Milton along with the city of Quincy. Boston, as the core city, exerts various pressures on metropolitan activities. However, for ease in developing the analyses and evaluating data it is not included among the principal towns. The urbanized character of the area is indicated in Figure 1 showing relative population

density.⁴ Quincy, immediately adjacent to Boston, is a highly urbanized community with 5,300 people per square mile while Cohasset typifies the rural, natural environment of the eastern portion of the area with a density of 590 people per square mile. Atypical of this pattern is Hull with a density similar to Weymouth. Hull's density results from the winterizing of a large supply of potentially year-round housing in a community developed for summer residence. This is reflected in the 59 per cent of dwelling units with central heating in 1950 as compared with the 82 per cent for the Boston Metropolitan Area. Of interest to the study are three other former summer colonies that for the most part have been winterized. They are Houghs Neck in Quincy, Wessagusset Beach in Weymouth, and the area between Crow Point and Hewitt's Cove in Hingham. The dwelling units in these developments tend to be substandard.⁵



Population growth within the area is shown in Figure 2.⁶ All communities experienced a considerable population increase during the 1940s. The 1950s was a period when Quincy, Milton and Hingham approached equilibrium while Braintree, Weymouth, Cohasset and Scituate returned to their pre-World War II growth patterns. The phenomenon of Hull's population growth has been discussed previously.

The dwelling unit type -- over 75 per cent -- in Milton, Braintree, Weymouth, Hingham, Cohasset, Hull, and Scituate is the single-family detached house. Though almost 50 per cent of Quincy is of this type, there is a large portion of multiple-unit dwellings in the city.

Function:

In general, these South Shore communities serve as residential suburbs for Boston, with perhaps the exception of Quincy. Quincy is primarily a manufacturing city, with the Fore River shipyard as its main industrial unit. Quincy also contains a regional shopping complex and serves as a recreation area along its beaches. In addition this city is historically important as the birthplace of two presidents and the site of famous granite quarries.

Milton, Braintree, Weymouth and Hingham are now suburban communities but at one time were industrially important due to the factories which utilized power created by the rivers

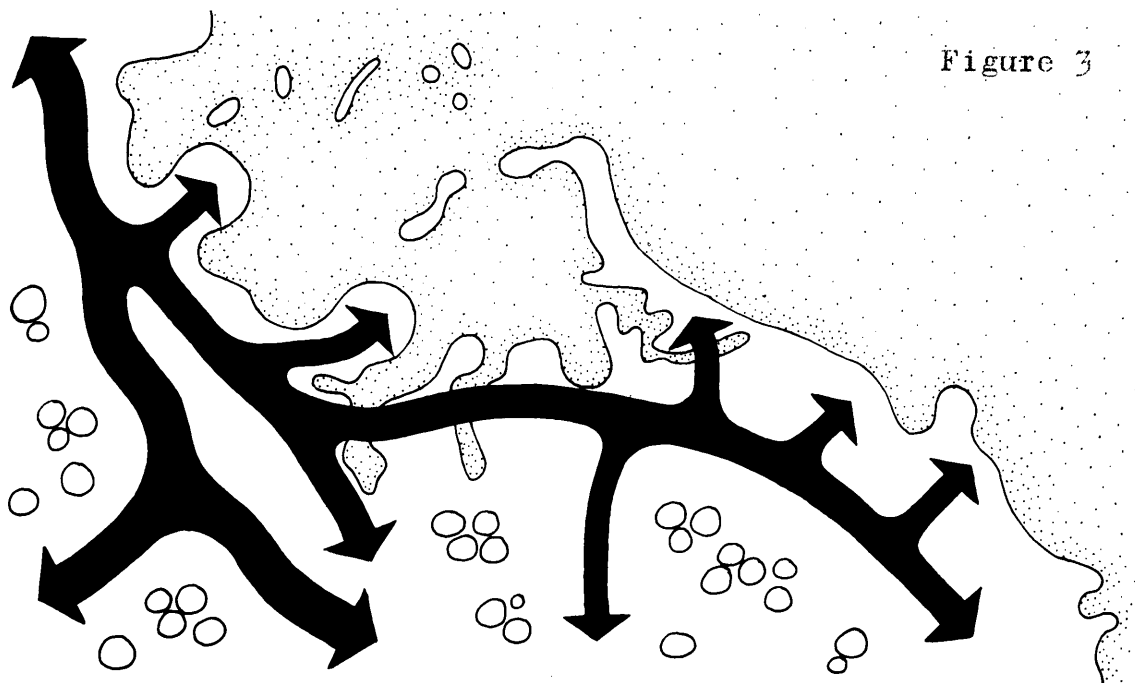
like the Neponset in Milton and the Monatiquot in Braintree. Until its fishing waters became polluted, Weymouth for 200 years was important as a fishing and agricultural community. Hingham attributed its early development to sailing ships which anchored in its protected harbor. Today there is only a small amount of industry in these four communities.

Cohasset and Scituate are attractive communities that function primarily as residential suburbs for people employed in Boston and Quincy. In addition they serve as summer colonies. The attractive character of Cohasset's common area and its dramatic shoreline backed by extensive wooded areas draws a large volume of summer visitors and residents. Scituate also has a large summer population because of its good beaches and the fine harbor. This harbor, at one time, was a port of considerable commercial importance.

Hull is a residential suburb which functions primarily as a resort community. Its attraction is a fine and extensive sand beach with adjacent privately-owned amusement centers. During the summer the town estimates a population of 35,000. On a good-weather weekend it is estimated that about 225,000 people are drawn from the surrounding region to enjoy its beach and amusements.

Circulation:

The study area does not have a rapid transit system and no longer has rail passenger service. However, rail freight service is provided all communities except Hull. The highway system is the principal means of moving material and people. The Southeast Expressway and circumferential Route 128 connect the area to the balance of the metropolitan region and to the interstate highway network. Within the area Route 3 with its by-pass 3A forms a primary circulation artery linking the communities of the South Shore from Quincy to Cohasset and Scituate. It then continues parallel to the coast south to Plymouth. From this main channel several secondary arteries "feed" the shoreline and the hinterland as illustrated in Figure 3.



Public transportation within and through the area is provided by several bus companies. However, the South Shore is basically oriented to a circulation system based on the automobile. Despite a myriad of waterways in the area, the only water transportation system is a steamship line which operates daily in the summer months from Boston to Nantasket Beach.

Figure 4 is the base map of the study area discussed in this thesis.

STUDY AREA

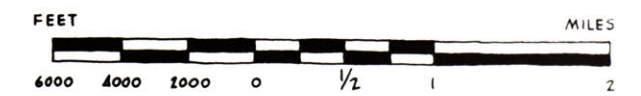
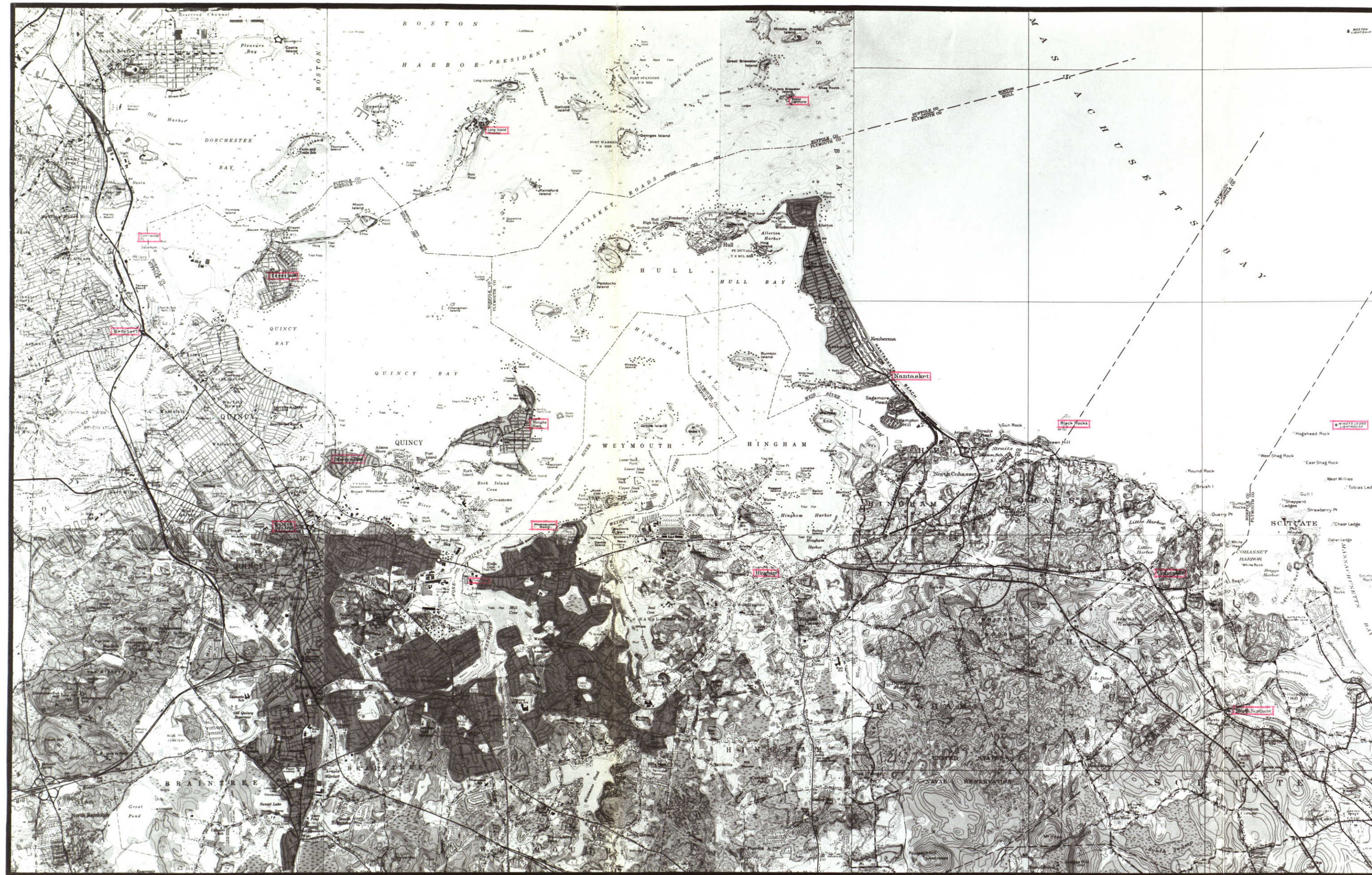


Figure 4

ASSUMPTIONS

The thesis study area lies within Sector 8 of the Greater Boston Economic Study Committee report on metropolitan population projection.⁷ The predicted population growth for this sector is 48.6 per cent by 1970. This is conservatively based on the belief that major highway construction will have little effect on the growth and distribution of population within the metropolitan region. Based on the 1960 population it is therefore assumed that the 1970 population for the study area will be about 355,000. This is an increase of 122,500 people.

Let's look at the magnitude of this growth. If it was to be uniformly distributed throughout the study area, the present density would increase by roughly 1,100 people per square mile within each community. This increase, itself, is about twice the density of Cohasset today. It is assumed that this growth can be channeled and distributed through the framework of a design program.

Along with this population growth there will be an opportunity to strengthen, modify and extend the existing industrial pattern. Naturally, an expansion of service activities will follow, and a demand for more public service institutions will develop.

Several areas lend themselves to redevelopment. This is particularly true of those areas originally developed as summer colonies. Therefore, it is assumed that extensive portions of the shoreline will be available for restructuring. It is also assumed that the naval reservation in Hingham will become available for public or private development. Increased leisure and public acceptance of open space values are assumptions of this thesis. It is assumed that it is possible to engender in the public a realization that more effort should be devoted to public constructions for leisure, education and culture.

Within the framework of this rapidly growing area it is assumed that a rapid transit system will be introduced to serve commuter circulation. However, the automobile will continue as the primary means of general circulation within and without the area. Other circulation systems will be secondary to that which serves the automobile.

Finally, it is assumed that we can analyze form, activity and sequence as a means of developing a design program at a metropolitan scale.

METHODOLOGY

In general the analyses in this thesis are subjective. This reflects the difficult nature of perceptual analysis. There are few studies that can be used as a guide or comparison. However, among the studies relating to the image of the environment, Kevin Lynch's contribution to the establishment of a method is a valuable one.⁸

In this thesis a set of objectives form the core of our method. The first objective is to collect general visual impressions. The second is to identify dominant elements. The third is to examine the physical and perceptual structure of the study area. These objectives center on perceptual exploration. The means for this exploration is inherent in the circulation or communication system.

The automobile has contributed to the formation of the metropolitan region. The circulation arteries used by it form a communication network tying together the region's various communities. Therefore, in relation to today's time measure this combination of automobile and highway provides the basic means for perceptual exploration at the metropolitan scale. Walking, the boat, and the airplane are other devices for this purpose. They contribute insights into community detail or regional interaction. However, they do not appear to be essential to basic analysis at the metropolitan scale.

The fourth and final objective of our method is to translate the collected data into graphical terms. The problem here relates to the difficult nature of perceptual analysis mentioned previously. Spoken and written language has pre-empted graphical symbolization as a means of communication. Training in the visual arts is, at most, an insignificant element in our education system -- planners do not receive it. Yet graphical symbolism may be as important to a civilized culture as it is to a primitive culture. Certainly, lack of this ability represents a void in any communication system. Kepes, Moholy-Nagy, Klee and Kadinsky, among others, have done stimulating projects related to graphical symbolization. However, there is still the question as to whether present western society can "read" the components of graphical language. This brief digression casts light on a problem fundamental to this thesis. That problem is the creation of a graphical language that will communicate analytical data of a perceptual character.

ANALYSES

This study is based on the belief that a poignant and clear perceptual analysis is essential to the determination of a realistic design program. For clarity the analysis is divided into three sections -- form, activity and sequence.

The form analysis is concerned directly with the plastic organization of space within the environment. It records the physical systems and shapes that are easily identified with the metropolitan scale. Both natural and man-made components of the environment are important to this survey. It attempts a dynamic rather than static analysis of the environment. As an example, the plastic organization of space -- its physical systems and shapes -- has meaning for this analysis only when viewed from a series of points.

The activity analysis is concerned with the spatial distribution of activities. The criteria for selection is perceptual. Activities recorded have either a magnitude or character easily identified at the metropolitan scale.

The sequence analysis relates to movement through the environment along its primary highway paths. This provides a continuous record of significant elements and spatial qualities in relation to the study area's circulation or communication network. The data of the form and activity analyses reinforce the material of the sequence analysis. As an example,

dominant forms and activities in relation to the paths serve as perceptual punctuation in the sequence experience. This results in the sequence analysis acting as a feedback to correct the initial evaluation of forms and activities. There is an opportunity to observe these elements in a different syntax. Originally they were evaluated as elements in a loose perceptual system. Now they can be checked as elements in a well-defined sequential system that binds the study area together. This interaction and feedback results in analytical refinement.

These three analyses are interdependent. Each analysis in its entirety either intensifies or minimizes the perceptual impression contained within the other analyses. Together they create an image of the environment.

FORM ANALYSIS

Form is the first of the three analyses. This includes surveys of masses, textures, spaces and edges within the study area. The meaning of these terms may vary from their usual connotation. The masses denote physical objects -- natural and developed -- of the environmental image. The textures signify the character of the environment. The spaces primarily denote special forms related to a major water surface. The edges specifically mean the articulation of land and water along the shoreline.

Masses:

In analyzing masses this study records touchstones, external landmarks, internal landmarks, building compositions and dominant topography. The touchstones are strong conceptual

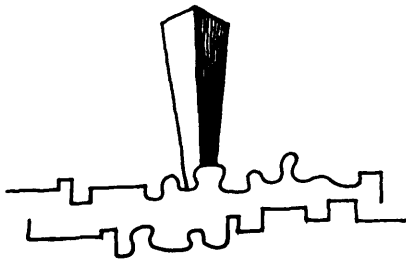


Figure 5

or physical forms. As sketched in Figure 5, they are conceived or seen beyond several vertical planes of either landscape, waterscape, or urbanscape.

Their presence is repeatedly experienced within the environment. The touchstones are the

gas tank at Commercial Point, the smoke stacks of the Weymouth power plant, Boston Lighthouse and Minot Lighthouse.

Unfortunately, the lack of a common identity between all but two of these touchstones weakens their potential to structure the environment. The external landmarks are seen from several points within the study area. They usually are

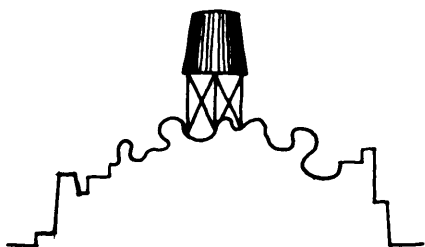


Figure 6

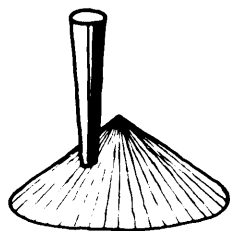


Figure 7

water towers located on hilltops and read as shown in Figure 6.

The ship cranes at Weymouth's Back and Fore Rivers are an exception. The conceptual image of this element sketched in Figure 7 is a silhouetted form identifying dominant topography or an unusual activity form.

Several of the hills surrounding the shoreline are identified with these elements, and they are potentially important in structuring the environment. The internal landmarks are primarily important for their meaning with-

in the area. They identify a particular point. Their significance results from their special form or historical importance. They are collectively underutilized in strengthening the image of the area environment. The building compositions are subtle but valuable massings that organize the environment. They are usually inadequately developed.










Seldom do they utilize the natural environment to advantage. The hills of the area are the dominant topography of the analysis. Their cover forms a part of the image of the environment. Natural cover refers to buildings -- usually housing.

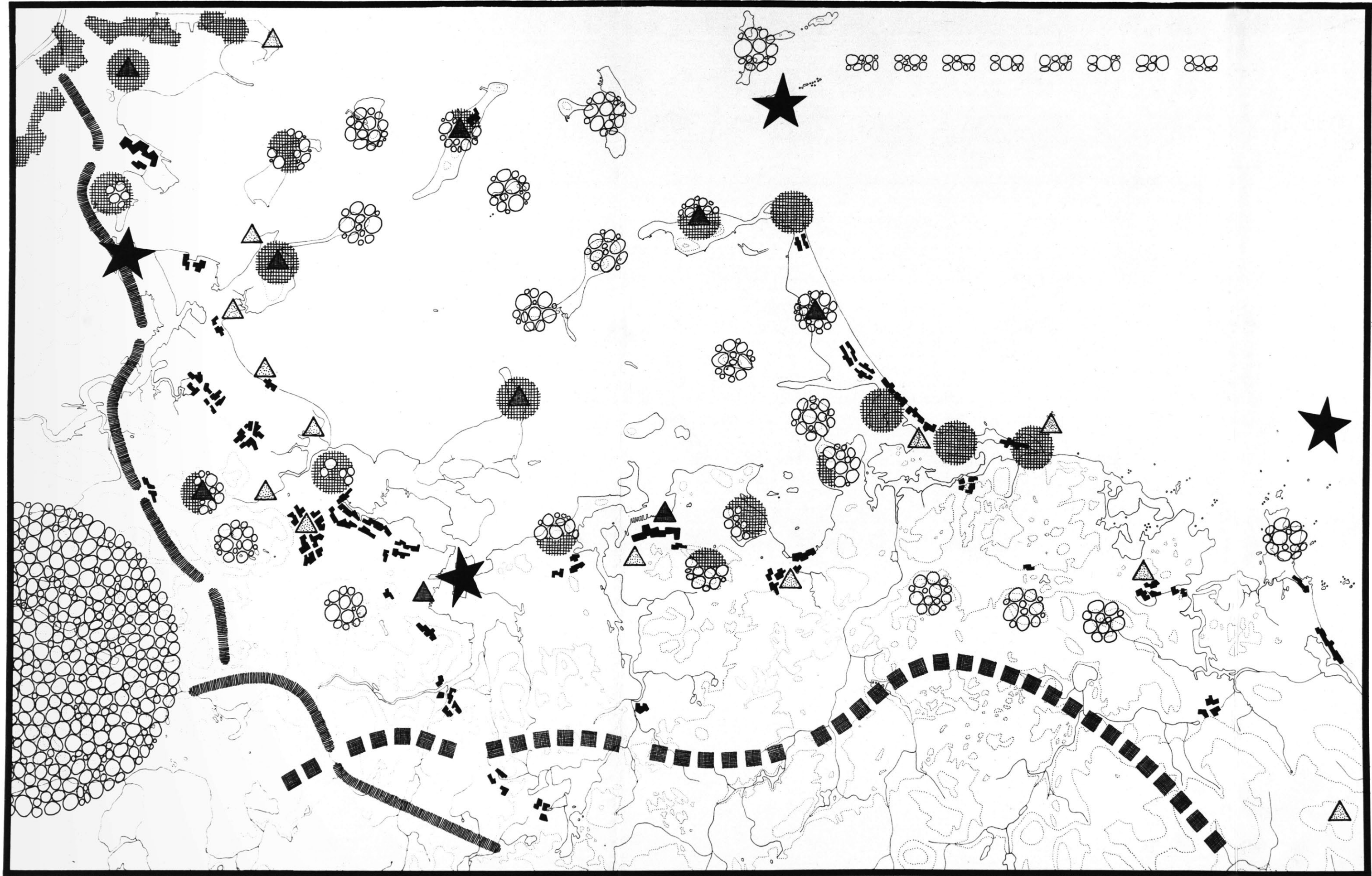
The graphical presentation of this material is shown in Figure 8. Notice the fine distribution of forms. There is a natural structuring of the area. External landmarks tend to amplify topographical features throughout the environment. The distribution of developed and natural cover on the dominant topography is such as to offer delightful contrast. Unfortunately, the massing of buildings relates poorly to the study area's natural structure. As an example, at only one point does an important massing of buildings work with a feature of dominant topography. That point is the hospital group on Long Island. Nowhere within the study area is there a building massing that successfully utilizes the relationship of water and land. At Hingham Harbor and Town River Bay building massings ignore the presence of adjacent shoreline.

There are other important forms in relation to the image of this environment. One is the distant shoreline of Cape Ann as seen on a clear day across Massachusetts Bay. Another is the bulk of the Blue Hills behind Quincy Bay. The broken line along the bottom of the map in Figure 8 represents the

FORM ANALYSIS

MASSES

-  TOUCHSTONE
-  EXTERNAL LANDMARK
-  INTERNAL LANDMARK
-  BUILDING COMPOSITION
-  DOMINANT TOPOGRAPHY DEVELOPED COVER
-  DOMINANT TOPOGRAPHY NATURAL COVER
-  DISTANT SHORELINE
-  HINTERLAND BACKDROP
-  EXPRESSWAY BARRIER



NORTH



approximate line of the perceived hinterland backdrop. A form new to this area is the expressway which forms a physical barrier with a few openings along the western portion of the study area.





Textures:

The textural pattern shown in Figure 9 is really the fabric of the environmental image. The terms used for these textures are developed, natural, water and void. With the exception of "void," these terms are self-explanatory. Textural void refers to an area that is "lost" and unidentified in perceptual terms. This pattern does not include the broad water surfaces. By definition of the categories within the form analysis the major water surfaces are analyzed as spaces.

Referring to Figure 9, notice that the textures are collected into amoeba-like areas. For the most part, these units result from a real break in the pattern -- a decisive cut by a circulation path or a sharp change in texture. However, in some places the divisions are arbitrary, relying on subjective impressions. Within a unit the textures tend to interact. For example, at Hingham Harbor the pattern indicates the successful perceptual interaction between textures. This interaction means that the relationship between textures is easily read and contributes to the image of the environment. Between voids and other textures interaction is meaningless.

FORM ANALYSIS

TEXTURES

-  DEVELOPED
-  NATURAL
-  WATER
-  VOID

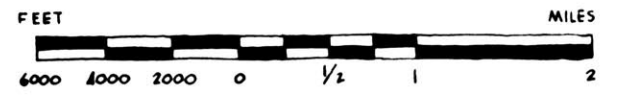
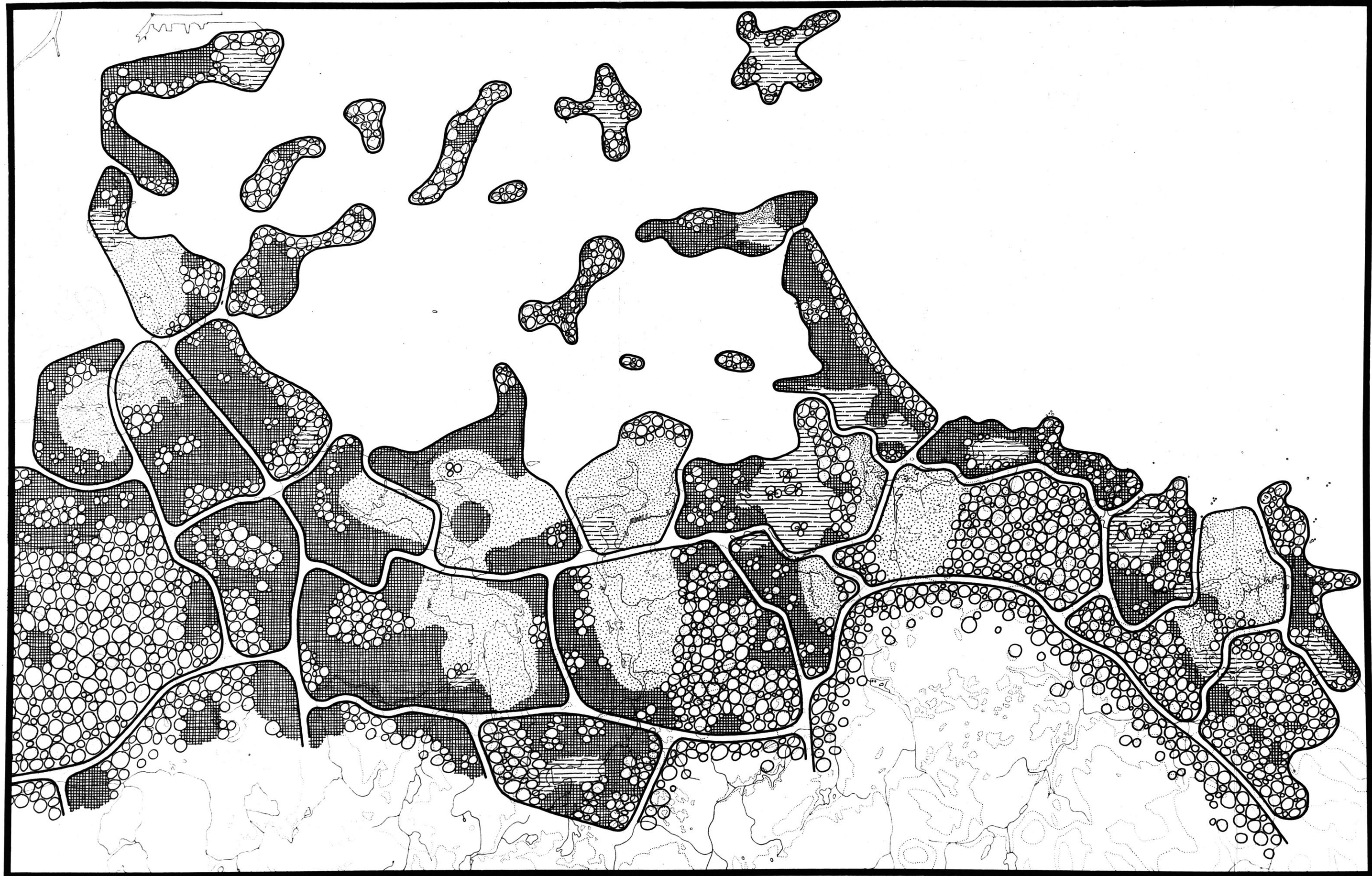


Figure 9

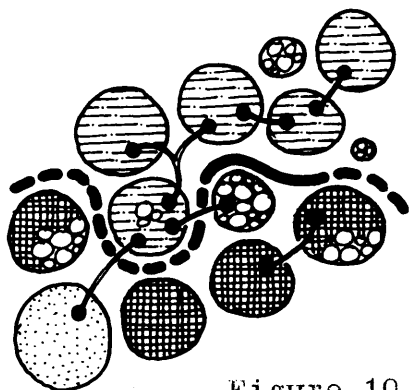


Figure 10

Figure 10 illustrates what a more detailed study might produce as to linkages between texturally composed units. An extension of the study might also include an evaluation of the edges.

Referring again to Figure 9, the problem of the textural voids becomes apparent. They are textural "moats" that interfere with perceptual organization of the environment. In addition, they indicate the failure to utilize the natural resources of the Neponset River, Weymouth's Fore and Back Rivers, and the Weir River. The void at Cohasset Harbor and the Gulf is equally distressing. Finally, due to the nature of the fresh water formations, they do not lend themselves to a perceived textural network related to the shoreline of our study area. Yet the textural accent of water at Whitman's Pond suggests their potential use in relation to the image of the environment.

Spaces:

An unusual and wonderful feature of the plastic environment within the study area is the series of water forms or spaces created by various islands and peninsulas. These spaces are analyzed as special elements important to the image of the environment. The diagram of Figure 11 indicates their

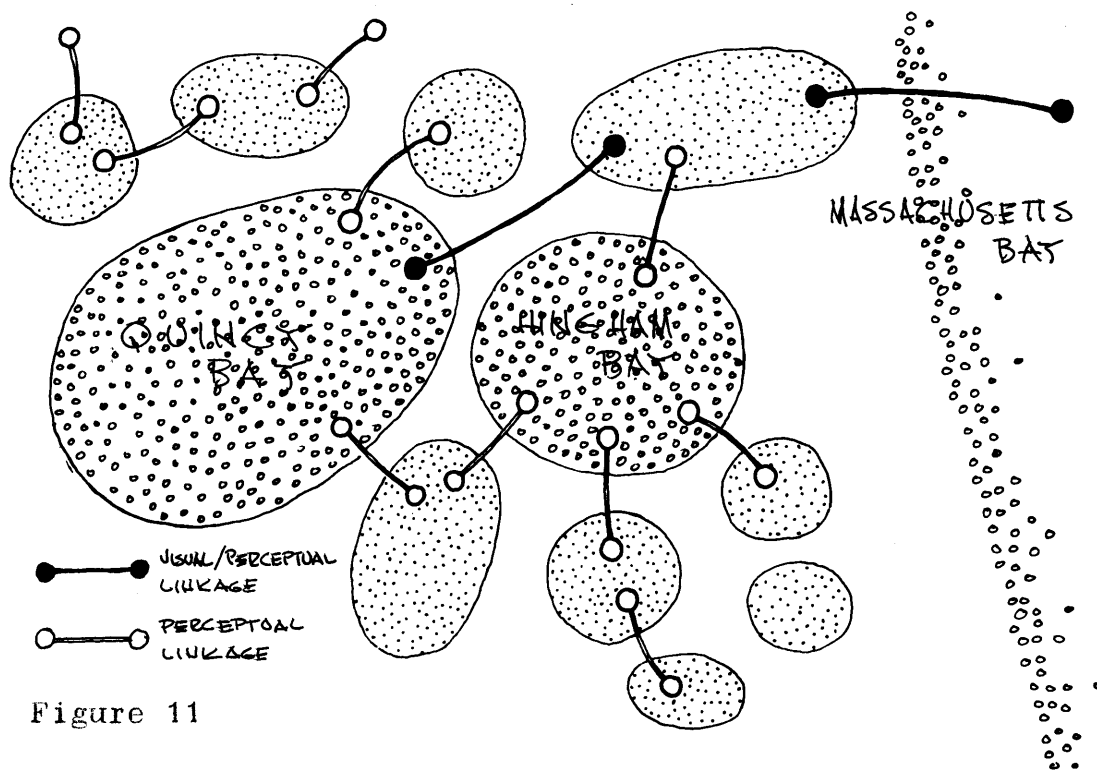


Figure 11

spatial organization and the linkages between them. The three major spaces are Quincy, Hingham and Massachusetts Bays.

Quincy Bay is a large, well-defined space enclosed on three sides. Though large, its total space is easily seen. Hingham Bay is quite different. It is a series of perceptually enclosed spaces that interconnect. These spaces are not well defined. It is impossible to see them as a totality. The variation within the series is interesting and rich. Massachusetts Bay represents the amorphous space of the open ocean tempered by distant land forms. The contrasts between these major spaces strengthens the image of the environment.

An important aspect of these water spaces is the system of linkages. Nantasket Roads is a part of the major visual and perceptual linkage existing between Quincy and Massachusetts Bay. Visual linkage means a connection between forms that may be easily seen. Its identity may be weak. Perceptual linkage means a connection not necessarily seen but always perceived due to surrounding forms. For this latter linkage to exist, its image identity must be strong. The linkages between the balance of the spaces in the diagram tend to be perceptual.

Edges:

The articulation of the shoreline within the study area is a disappointment. The transition between land and water generally fails to read in the image of the environment. Shoreline transition can be defined as gradual or sharp. Transition along most of the area's shoreline is gradual as illustrated in Figure 12. This type of shoreline is composed of

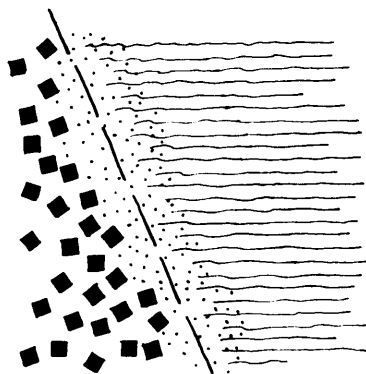


Figure 12

wide beaches or tidal flats. Because of the tide the water edge is vague. Extensive developed areas are often experienced adjacent to the shoreline in counterposition to the openness of the water. The beaches of Dorchester Bay, Quincy Bay, the

Weymouth Fore River estuary and Nantasket are examples of this type of shoreline.

In contrast there are short sections of shoreline within the bays of Boston Harbor where the transition between land and water is sharp. This type of shoreline, as illustrated in

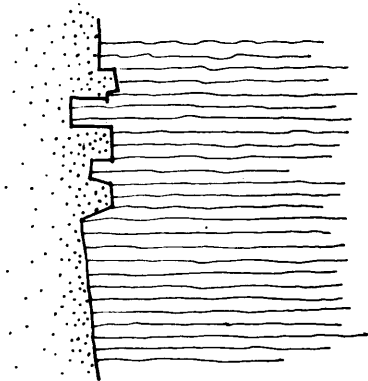


Figure 13

Figure 13, is composed of quays or rock formations. Despite variations in tide, the water edge tends to remain unchanged. Examples of this type within Boston Harbor are Squaw and Chapel Rocks, the east shoreline of Squantum, Nut Island, Hingham Harbor, and

the west shoreline of Nantasket. This is also typical of the shoreline of Cohasset and Scituate.

Nowhere within the study area is there a successful attempt to use building massing along a shoreline as shown in Figure

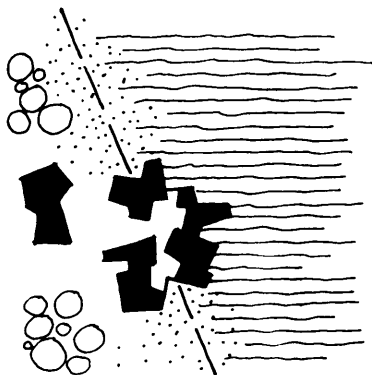


Figure 14

14. A sensitive combination of land, massing and water could produce a strong image. In series, distributed along the shoreline, these images would be valuable in perceptually organizing the environment.

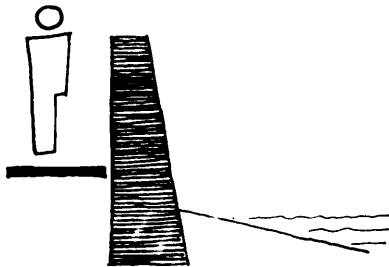


Figure 15

A final observation of the study concerns the sea walls built along the beach areas. They become necessary when the developed areas as shown in Figure 12 extend too close to the shoreline, thus requiring protection against easterly storms. As a detail of the environment these sea walls are a barrier not only against storms but to the visual enjoyment of the shoreline as well. The shoreline is "cut off" from anyone on the land side of these barriers, as illustrated in Figure 15. This points out the need to prevent encroachment of developed areas along the gradual-type shoreline. Also, there is need for a more creative solution to the storm problem. These comments are made primarily with the intent of encouraging a clearer image of the environment.

ACTIVITY ANALYSIS

Activity is the second of the three analyses. It subjectively records in Figure 16 the conceptual character of the activity pattern as perceived at the metropolitan scale. Conceptual character means the abstract form of the activity.

Three categories form this analysis -- structure, intensity, and function. The structure relates to the ease with which the activity, or activity group, is identified. A strong structure denotes an activity that is significant to the present environmental image. Examples are the storage of yachts at Malibu Beach, sailing on Quincy Bay, shopping in Quincy Center, ship construction adjacent to the Weymouth Fore River and the amusement activities at Nantasket Beach. A weak structure denotes an activity that is recognized as existing within the environmental fabric but one that contributes little to the image. They are important for their potential. Through restructuring -- shifting their activity forms -- they may be strengthened. The massings of the form analysis, also, affect the conceptual activity. The best example is the smoke stacks and enormous bulk of the Weymouth power plant. The result is a strong structure for what is perceived to be a low intensity activity. There are also important activities that exist without a structure. They are formless. However, they offer variety to the environment. Examples are the beaches, some parks and wooded reservations.

Intensity is a subjective measure of the quantity of activity per unit area. The measure is either high, medium or low. Interestingly, strong structure is not a correlate of high intensity. For example, there is the formless activity character of Wollaston Beach with high intensity. Even at the Town River shopping complex and at Hingham high intensity exists within a weak structure. As expected, when there is a combination of high intensity and strong structure -- Quincy Center, Nantasket and Cohasset Center -- a major image element results. The low intensity activity areas, especially those with recreational functions, provide valuable pauses within the environment's activity pattern.

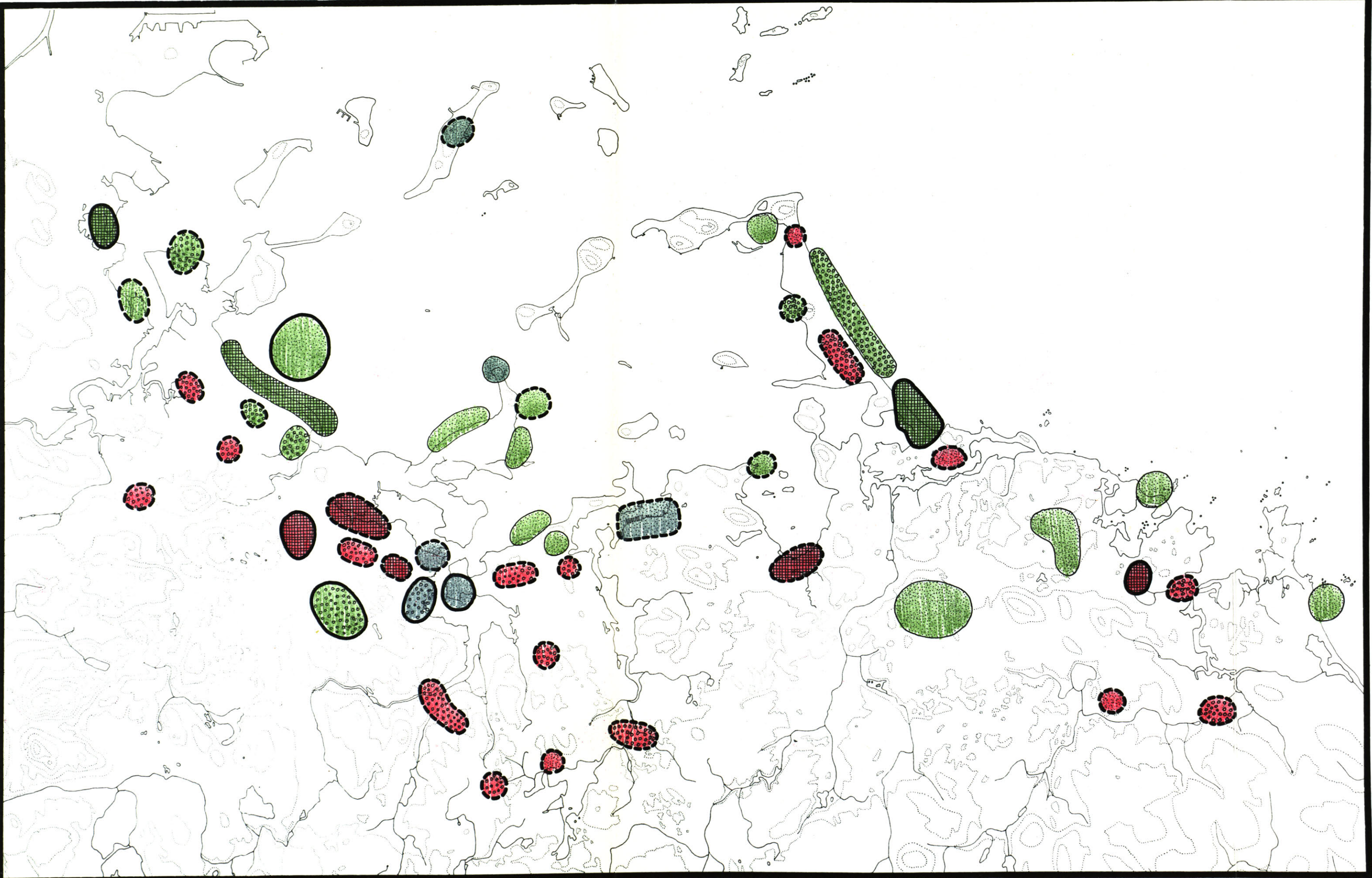
Among the combinations of structure and intensity, the weak structure and low intensity activity is usually a problem. It is often perceptually confusing. Within the image of the activity environment it acts as an irksome element. It can be neither identified or explained. The surplus World War II naval yard in Hingham is a prime example. It now houses a variety of low intensity industrial functions that cannot be perceptually identified. In this case the physical organization of the area does not relate to the present function.










To simplify analysis, the four functional categories are institutional, recreational, industrial and commercial.

When the developed texture of Figure 9 is compared with the activity distribution of Figure 16 it is possible to see the residential pattern of the study area.

The recreational activities of the shoreline have the potential of being a coherent activity system extending through the islands. In addition, a well-distributed series of strong activity structures would strengthen the image of the environment. Most existing activities and activity groups are not oriented to their surroundings. This should be corrected.

ACTIVITY ANALYSIS



-  STRONG STRUCTURE
-  WEAK STRUCTURE
-  HIGH INTENSITY
-  MEDIUM INTENSITY
-  LOW INTENSITY
-  INSTITUTIONAL
-  RECREATIONAL
-  INDUSTRIAL
-  COMMERCIAL

NORTH

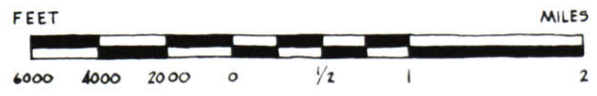


Figure 16

SEQUENCE ANALYSIS

This is the final of the three analyses. It records, as shown in Figure 17, the dynamic perception of the environment along its path system. The paths analyzed are of two categories.

Primary paths are existing roads. They are important to either the circulation network or the perceptual system of the study area. Often they are important to both. The perceptual system of this analysis is experienced in a time and space continuum. The resulting image is part of the area's perceived environmental organization.

The potential paths are, also, existing roads. They provide routes from the hinterland shown in Figure 8 to the shoreline. The sequences along these routes are rich in perceptual experience. These paths, however, are not effectively utilized in either the circulation or perceptual system.

Three qualities are measured along these paths -- perceptual space, oriented vision and visual attraction. Perceptual space denotes the spatial "draw" along a path. Spatial draw is an abstract term. It signifies the conceptual quality of environmental space as perceived in motion. This draw is measured on a scale of from one to ten. In the diagram of Figure 17 one-half inch equals the maximum draw. Where a

draw of this magnitude exists there is a sensation of open, almost unlimited, space. Examples are the Southeast Expressway as it leaves the Blue Hills, Morrissey Boulevard along Quincy Bay, and the drives along Nantasket and North Scituate beaches.

A draw of one indicates a spatial block. This results from either building masses, dense natural growth or dense development immediately adjacent to a road. Channelization results when this spatial block appears on both sides of the road. The cut through which the Southeast Expressway passes in East Milton is an excellent example of this.

Oriented vision signifies the visual sensation of seeing an important form that is meaningful to the organization of the environment. It is experienced as a result of the path's orientation. Throughout the area there are examples of this. The Southeast Expressway as it leaves the Blue Hills is oriented to a view of the Boston skyline and the Commercial Point gas tank. Morrissey Boulevard, as it leaves Merrymount, is oriented to a view of the distant smoke stacks at Weymouth Fore River. The potential path leading to Weymouth Great Hill has a section oriented to a fine view of Quincy Bay in the distance. There is a point along the path to Cohasset Center where the ocean is visible. In crossing Hatherly Road on the path to North Scituate Beach a magnificent view of the ocean unfolds.

Other situations exist within this system of oriented views where the form is in the foreground. An example is a point on Furnace Brook Parkway along Black's Creek. Here the form of Quincy Bay is suddenly seen. At Hingham there are two dramatic points where the harbor is first seen in the path sequence. Along the Cohasset shoreline, segments of path on Atlantic Avenue and Forest Avenue are oriented to Black Rocks.

The diagram of Figure 17 shows that visual attraction and maximum spatial draw exist together. Visual attraction is a general term. It signifies the undirected but powerful visual attraction of open space particularly when contrasted with dense natural and developed forms.

The system is marked by elements that determine the perceptual quality of the image structure as experienced in moving along the paths. Oriented vision focuses on perceptual accents. In this analysis these accents are either forms or spaces. Accents that read as forms are the Commercial Point gas tank, the smoke stacks at Weymouth Fore River and the Black Rocks. Quincy Bay, Hingham Harbor and Massachusetts Bay read as spatial accents.

The diagram in Figure 17 indicates the punctuation of the sequences with form and activity elements. As mentioned earlier in the thesis, these elements are the core of the previous two analyses.

Perceptual space qualities recorded in Figure 17 indicate the perceptual sequence systems within the study area. Primary paths shown without a perceptual space overlay are important to the circulation network but not to the perceptual system. Along the Southeast Expressway there are three segments of the path of interest to this study. One is the segment, as you leave the Blue Hills, from which is seen the waters of Quincy Bay. Another segment crosses the Neponset River marshes. Unfortunately the meaning of the area is hidden by the elevation of the road. The third segment is along Malibu Beach. Here activity, perceptual accent, water texture and land forms combine as a strong image. However, it is not related to the adjacent shoreline.

Principal among the perceptual systems within the study area is the one that parallels the shoreline. Beginning in the vicinity of the Neponset River, the confusion of Neponset Circle is an inauspicious beginning for this system. Either the Malibu Beach image or the void at the Neponset River marshes is experienced before leaving the expressway. At Neponset Circle a perceptual void exists that extends across the Neponset Bridge.

A fortunate turn at the intersection of Hancock Street and Morrissey Boulevard and you are still in the perceptual system. There is a sense of marshes and a promise of water somewhere but no perceptual statement to clarify this. Rapidly the space tightens as the movement proceeds through

a small developed area. Then there is a sudden expansion of space. Momentarily the path's orientation blurs. A sense of openness -- Quincy Bay -- and reorientation occurs along the shoreline. The Hummocks as form and a supermarket as activity register as one turns right onto the shoreline boulevard.

Moving along the boulevard the draw to the north detracts from the legibility of the southern edge of the path except where activity and form reinforce each other. The splendid isolation of the two yacht club houses reads as a noteworthy form. Until entering Merrymount, the spatial strength of the bay and its forms perceptually dominate our motion. One exception is the draw at the Merrymount marshes where Furnace Brook flows into the bay. The spatial expansion here is exciting. Moving along the boulevard one has already seen the smoke stacks of the Edison power plant on the Fore River. The perceptual experience along the bay gives evidence of an image structure. The textural surface of the bridge across Furnace Brook works as tactile accent.

Suddenly one is engulfed in Merrymount. Having climbed along a curve to a high point of this area, one is again directed toward those power plant stacks. There is also a glimpse of the shipyard. Continuing, the path tightens until one reaches a crucial junction. The junction is confused and without a sense of spatial direction.

Turning left one enters an area of disordered chaos. There

is activity and form but they do not combine in an area identity leading to a meaningful image. Here is a high potential requiring a reordering of elements. The lights of this area tend to shape and structure it at night. Even then it cannot be considered successful. The junction of Routes 3 and 3A is again spatially meaningless.

A turn to the left leads one along Route 3A. Until the Fore River circle the perceptual sequence is sterile. The activities along the path give no meaning to the structure. Crossing Weymouth Fore River Bridge is a kinesthetic experience. The grating sings as the auto tires roll across it. At night the sodium vapor lamps proclaim a strong identity. Again, the stacks of the power plant are seen. The form of the stacks, a function of the power plant, amplify and identify the activity of the shipyard on the west bank of the river.

Leaving the bridge there is a pull toward the open space and tidal flats of Kings Cove. One's motion is soon channeled through a meaningless linear space. Crossing Weymouth Back River the path dominates the experience. Spatially the sides open. One briefly reads the surrounding environment before entering the confined space immediately ahead. There is a structural massing to the north -- illegible -- and a form and activity to the south at the "Y" in the path. There is no strong image -- the perceptual structure is diluted.

Following is a series of gradual space variations without

form or activity punctuation. This perceptual "rest" is a successful pause in the environment. One now experiences a spatial expansion. The water of Broad Cove suggests a form and texture soon to be experienced. Otis Hill directs one's view to Hingham Harbor. Hingham Harbor exists as a well-defined space. However, there is a problem of legibility. The intersection of Main and Otis Streets is confused. The combination of activity and form of this area is in disharmony. At Hingham circle the path structure is understated.

Proceeding to Hull the perceptual system ends at the intersection of Rockland Street and George Washington Boulevard. Along Route 3A one experiences space variation without form or activity punctuation. One is unaware of important intersections.

Paths connecting this system to the shoreline and the hinterland are few. In many cases they exist only as potentials. In all but one case -- Furnace Brook Parkway -- their intersections with the principal system is weak. The two major hinterland connectors -- Route 3 and 128 -- do not have perceptual sequence systems in relation to the shoreline. The only effective connectors from Route 3A to the shoreline are Sohler Street to Cohasset and Gannett Road to North Scituate Beach. The diagram of Figure 17 indicates their success as perceptual sequence systems. The path to North Scituate Beach is particularly successful from North Scituate to the

ocean. Moving east there is a strong spatial draw to the north toward The Gulf and also to the south into the marshlands. This results in a dynamic spatial experience that facilitates environmental organization. The draw to the south is accented by the silhouette of Lawson Tower in Scituate several miles distant. Unfortunately this tower does not occupy the site of a dominant activity. The openness to the southeast directs one's attention toward Musquashcut Pond. The path continues through a contrasting wooded area. There is a slight spatial draw across the fairways of Hatherly Country Club before one arrives at a controlled intersection. Both sides of the path at this point are lined with interesting, though not overpowering, structural massing. Then as one crosses the intersection -- boom! The view is oriented to the ocean down the path and between two white pillars. Within minutes one arrives at the beach and a spatial panorama of the ocean.

Sohier Street to Cohasset is less varied but still a successful study. The Route 3A linkage is weak, but the path soon directs the view toward Little Harbor, intervening land and ocean. The result is spatial orientation. Little Harbor again is visually amplified as one comes to the end of Sohier Street and turns right to move along the spatially satisfying and meaningful forms of Cohasset Common. Unfortunately this sequence fails to successfully continue to Cohasset Cove.

Forest Road exists as a sequence path potential. It offers a direct link between Route 3A and the shoreline. There is a

fine introduction to the ocean as the path emerges from the woods and the view is oriented toward Black Rocks with the red shuttered cabin and flights of sea gulls.





The success and potential of Atlantic Avenue-Jerusalem Road is to be noted, though at present they are not part of an integrated path system. There are paths at Nantasket and elsewhere that are isolated though successful in their limited form. The broken spatial experience of Atlantic Avenue offers a richer experience than the continuous space along Morrissey Boulevard and Quincy Bay. The study area is dotted with potential viewing points from which the metropolitan structure can be assembled and the relation of water, land, hinterland take meaningful shape.

SEQUENCE ANALYSIS




PATHS

- PRIMARY
- POTENTIAL

QUALITIES

-  PERCEPTUAL SPACE UTILIZED
-  PERCEPTUAL SPACE UNUTILIZED
-  ORIENTED VISION
-  VISUAL ATTRACTION

ELEMENTS

-  PERCEPTUAL ACCENT
-  FORM
-  ACTIVITY

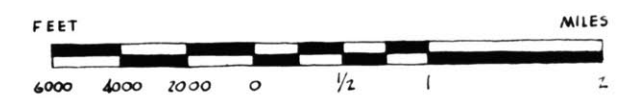
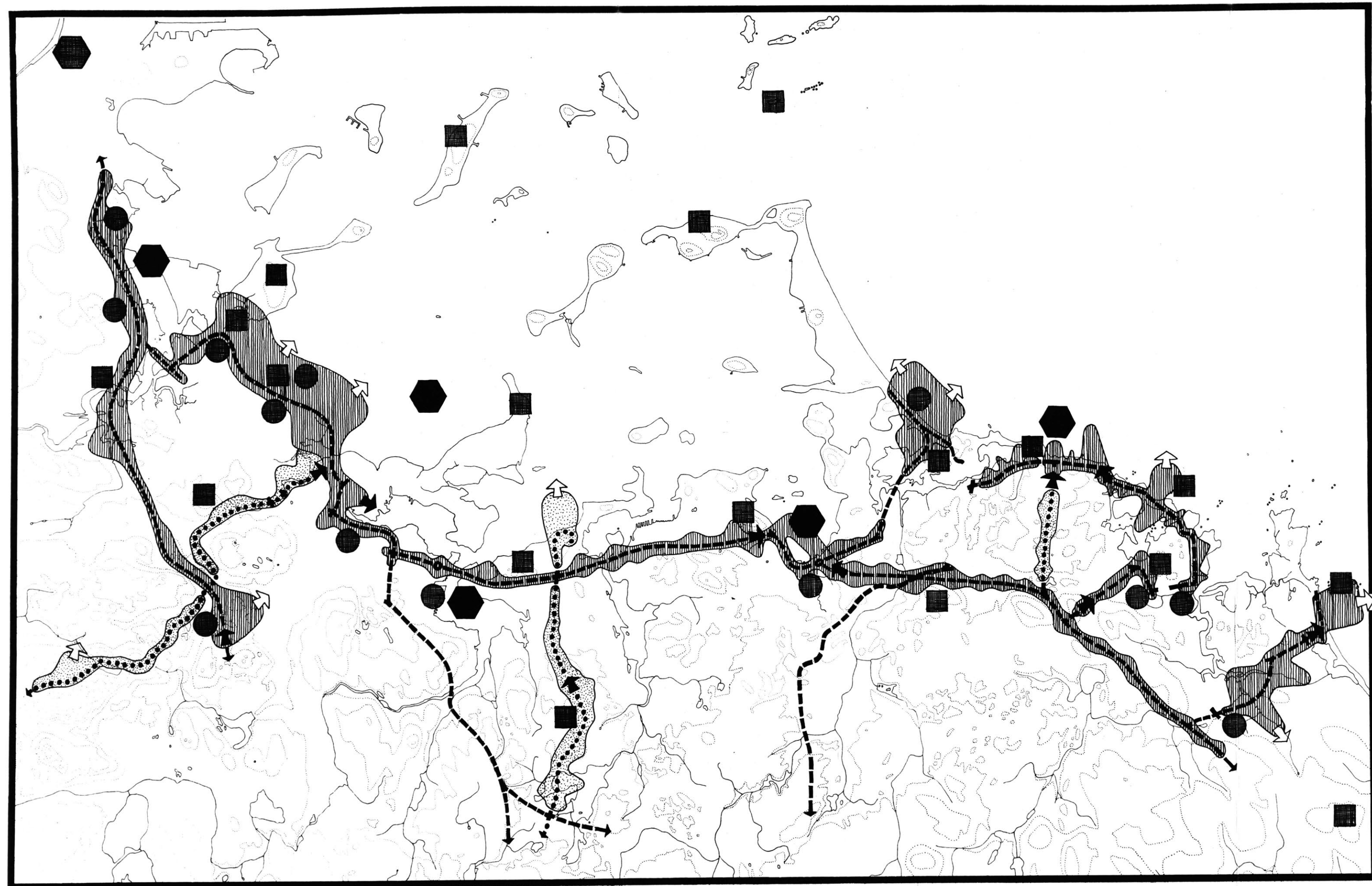


Figure 17

"It is neither the presence nor the absence of this or that part, or shape, or color, that wins our eye in natural objects; it is the consistency and harmony of the parts juxtaposed, the subordination of details to masses and of masses to the whole." -- Horatio Greenough, Form and Function.

PERCEPTUAL PROGRAM

Together the maps, diagrams and sketches of the form, activity and sequence analyses present a perceptual image of the South Shore's plastic environment. The natural characteristics of the study area are an important potential. An example of environmental texture and contrast is illustrated in the



Figure 18

photograph taken at Quincy's North Common. It shows a play of natural and developed texture, massing and distant water spaces formed by peninsulas -- Houghs Neck and Hull -- and by various islands.

Problems:

From the analyses five key problems are apparent. First is the problem of the textural voids. These voids cover extensive areas within the environment. The estuary of every

river within the study area exists in a textural void. Their image potential is not realized. These voids or "moats," as they were described in the analysis, prevent a cohesive perceptual organization of the environment.

Second is the problem of the shoreline. Despite the variety of land forms and water spaces this edge is seldom read within the environment at a metropolitan scale. Its image in the environment is so vague that it is not mapped in the form analysis. Instead it is discussed in general terms with sketches. Massings located as shown in Figure 14 are a means to sharpen this image.

Third is the failure to adequately utilize land forms in the image of the environment. As an example, the islands and peninsulas shape the water spaces. However, they usually lack effective activity or massing with which to create a strong perceptual framework for the spaces. Of all the dominant topography elements only six have external landmarks important to the environmental image. These six exist not as a part of a perceptual system but as isolated elements.

Fourth is the problem of the amorphous activity pattern. The study area needs and has the potential for creation of about a half-dozen activity nodes of a size meaningful to the metropolitan scale. Size relates to the conceptual structure of the activity as well as the dimensions of associated forms. Present activity coverage that reads at this scale suggests a

minimum of 20 acres for these sites. However, a powerful visual massing related to a strong structure activity, as conceptually illustrated in Figure 7, will succeed independent of its site dimensions.

Fifth is the problem of the perceptual quality of the paths as indicated in Figure 17. Many sections of the perceptual sequence system do not register the shoreline or the interaction of water and land. There are long sections of relatively dull experience on Route 3A. The most disturbing facet of this problem is the interruptions in the sequence system and the lack of perceptual connectors between Route 3A and paths to the hinterland and the shoreline.

Proposal:

The first objective of the perceptual program is to clarify the relationship of water, shoreline, land and hinterland. The second is to strengthen the total image organization within the environment. The third is to create a perceptual sequence system that efficiently communicates the image of the environment.

The perceptual program for the study area is of three parts:

1. The estuaries and shoreline should be developed as an image system. A community oriented to the water should be created at the Weymouth Back River naval reservation. Another community oriented to the water should be created in the existing void around the Weir River. These

communities should be designed to attract a major portion of the projected population growth. The Squantum Marina should be developed as a strong structure activity with an internal landmark to strengthen its image. A major leisure activity should be developed around Cohasset Harbor in order that this area will clearly read in the image system.

2. The peninsulas should be redeveloped to contain major metropolitan institutions -- educational, cultural and recreational. The form and activity of these institutions should be boldly stated by utilizing natural features of the topography. Houghs Neck should form the keystone of this evolving image structure. The creation of a regional aquarium in combination with a marine research center is suggested as a means of encouraging this keystone image.

The lowlands behind Nantasket Beach should be restructured with natural open space separating nodes of leisure activity. This activity should have strong conceptual structures and internal landmarks. The hills of Nantasket should be redeveloped as neighborhoods designed primarily to house families employed in these activities. The form of the amusement center at Nantasket Beach should be strengthened.

To complete an image system utilizing the peninsulas, Squantum should also contain a regional institution. A medium intensity, strong structure activity with an external landmark is recommended. A regional art Center sited along the steep shoreline could fulfill this criteria.

Long Island should have a stronger activity -- possibly a college or research center. The other islands should be developed for leisure activities. An activity image should result to reinforce the natural forms that create the water spaces.

3. The path system should be restudied and redesigned as both a circulation network and a perceptual sequence system. It should be the cohesive element within the environmental organization. It should effectively communicate the image of the environment to the individual. Within this system a series of paths should be developed that connect the major activities along the shoreline with each other and with the hinterland. Intersections of the hinterland-shoreline paths and the parallel shoreline path should be clearly stated in perceptual terms. The sequence experience of the parallel path should be enriched with a rhythm of important forms and activities. A system of water paths should also be developed with passenger boats serving the shoreline activities during summer months.

Conclusion:

Further expansion or detailing of the perceptual program is not within the scope of this thesis. It is believed that the thesis accomplishes its purpose. It proves that the environment can be analyzed at the metropolitan scale. It demonstrates the use of graphic notation in this analysis. Finally, it proves that this material can be used as a planning technique to create a perceptual program.

ACKNOWLEDGMENT

Although the weaknesses of this thesis are my own, any possible strengths are the result of the guidance of Kevin Lynch and my contact with his work.

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