Chapter 1

DESIGN OVERVIEW

1.1 The Area of Concern

One generally defines Greater Boston as the area within Route 128's circumference. In a study of Boston as a port, however, the entire New England region figures, for Boston serves as a transfer point for many long-haul passenger and freight movements bound for a final extra-city destination (Figure 1.1). In the widest sense, the functioning of Boston's ports affects the entire nation.

In responding to these realities, we relied upon an awareness of national and regional economic and social trends. Yet our primary clients were the people and communities which would directly feel changes in the physical port or port policies. The intensity of our study reached its maximum focus at the sites we planned to develop; of central concern were the communities and districts neighboring these sites.

The airport and seaport of Boston commanded our primary attention. Each suffers, the airport from overcrowding and inefficiency which will worsen as national demand continues to soar, the seaport from obsolete

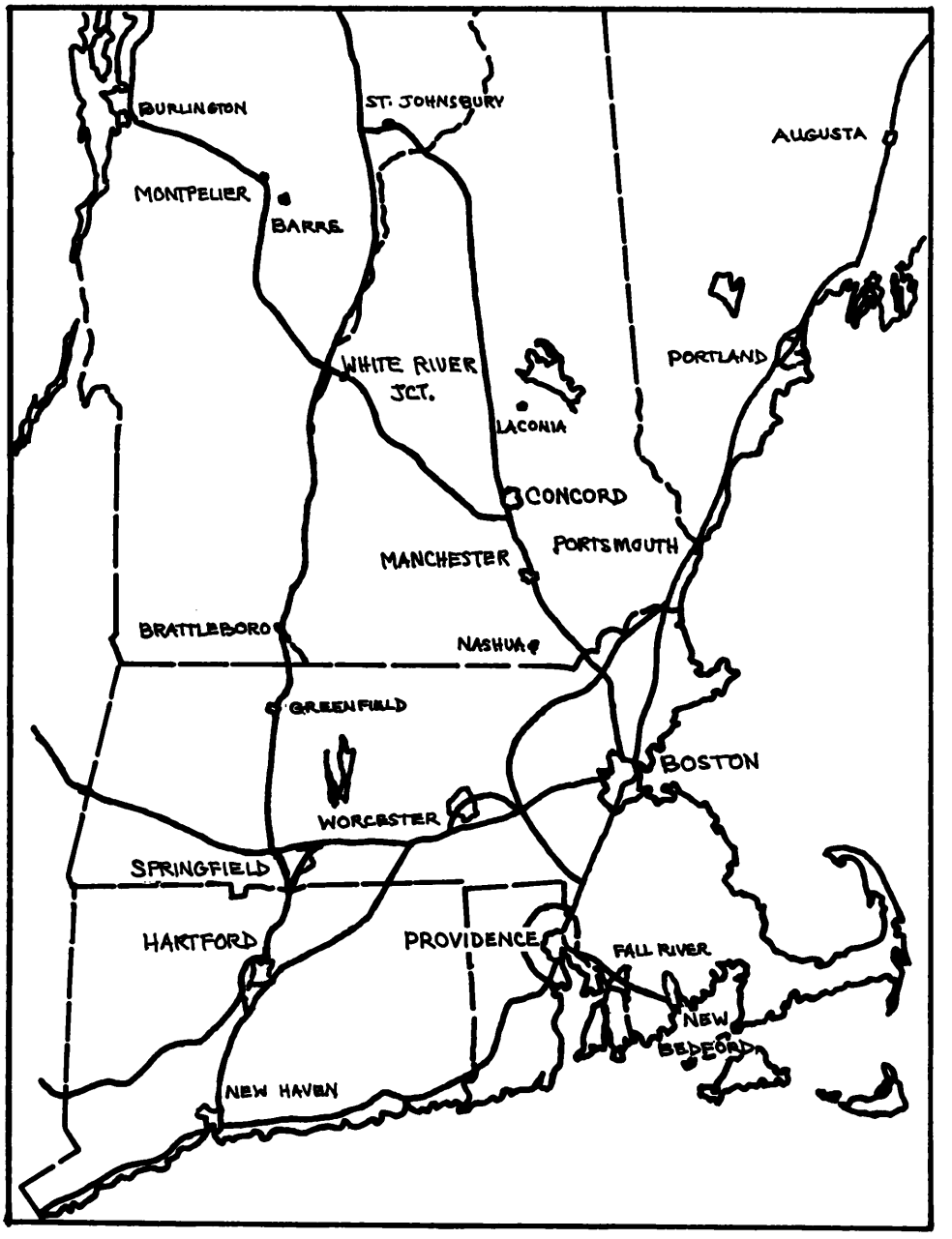

Figure 1.1 New England

methods and a resulting wane in traffic. The two facilities presently operate in almost uniform independence; we sought areas to consolidate, both in regard to physical facilities and management policies, so that one design interlocking plans for each port might create a fine total port.

1.2 Airport Problems

Commercial jets can fly at speeds greater than 600 m.p.h., yet we do not speak of a twenty minute trip from Boston to New York. Failure to realize the airplane's potential speed capability stems from two basic problems: the present system cannot handle the magnitude of current travel demand; appropriate technological advances have not been made in certain vital components of the total system. As a result of the first problem, passengers experience pre-flight waits due to traffic in preceding ports, long delays before becoming airborne because one's own port of departure is congested, and lengthy in-flight circling above one's overtaxed destination. Due to the second, they must tolerate large home-to-port access times because of overburdened highways and/or distant airports, and delays because of slow terminal transactions. Together these two problems spell an inefficiency, a loss of passenger time, that a truly all-weather capability and improved vehicles and operational procedures would but slightly alleviate.

Furthermore, the air industry afflicts those indifferent to its services, those beyond its boundaries. Airports generate traffic; cars clog local roads. Preferred flight times coincide with business rush hours; highway congestion

is augmented. Jet aircraft make noise. Offensive noise levels from jet aircraft are detected up to three miles on either side of flight paths. Jet engines contribute 2 to 4% of all air pollutants to the city.

By 1971, long-range, fixed-wing aircraft, carrying nearly five hundred passengers, will be in service. This leap in jetcraft technology - the jet is already the best designed, the most efficient single element of the system - increases our apprehension about future air service. A single jumbo-jet touch-down could involve 1,000 passengers (500 arriving at the airport, and 500 departing), 2,000 pieces of luggage, scores of relatives, friends, greeters, and well-wishers, all to be properly handled within the short turn-around time desired by the airlines. Ground transport for these people alone, for this one flight alone, could involve over 1,000 automobiles or 200 buses or one full-length train. Late on a summer afternoon, an airport such as Logan or J.F.K. may be expected to handle, simultaneously, several superjets and numerous smaller commercial aircraft, as well as the usual covey of private planes. Response to passenger demand will soon place an immense burden on our airports which will not be lightened without new methods of passenger and baggage handling, new means for providing access to the airport and new airport configurations.

To make specific recommendations, we focus an investigation on one city and its airport: Logan Airport in Boston[1]. The site Logan International

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[1] Logan Airport is the 8th busiest in the world.

Airport now occupies was never chosen as a good airport location; rather, the area has gradually developed since September 8, 1923, from a small flying field to the present 2,200-acre Logan Airport complex, with its four runways (a fifth is under construction), a multitude of terminal facilities, and a partially completed $175 million expansion program.

Although Logan lies within four miles of the major commercial, population, and industrial centers of the city, it is not close in terms of time. To reach Logan, the majority of users must cross the harbor via either the Mystic Bridge or the Callahan Tunnel, plus the Central Artery. In the morning and afternoon rush hours, when most flights leave, the main arteries overfill, slowing traffic. One study[2] has predicted a rush hour trip from the airport to any of the major city centers of 60 to 70 minutes by 1980. Industrial and population centers also currently appear to be expanding in the outer rings of 128 and I-495 and to the south and west of the core city. In time, the location of Boston's only major airport on the north side of the city will prove an even more acute problem.

Proximity of the airport in terms of audibility, however, cannot be denied. Large residential areas are presently subjected to high noise levels. These include the communities of East Boston, South Boston, Winthrop, and Revere, all in the direct line of one or more of the airport flight paths. Residents and public officials in each of these adjoining

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[2] Munds, Allan J., Ground Access to Major Airports in the United States, Flight Transportation Laboratory Report FTL-R68-7, M.I.T., Cambridge, Mass., January 1969.

communities have complained vociferously about the noise and have effectively prevented the expansion of the port.

In addition, because Logan is bounded by the major shipping channels to the West, and by East Boston to the East, current runway construction cannot be expanded without difficulty and expense. Air service from Logan's present site is therefore restricted; increasing demand will render these limitations even more detrimental in the future.

1.3 Seaport Problems

With the rise of successful trucking, rail, and air operations, America's traditional shipping industry has declined. The superior efficiency, and consequent lower total costs, of air and land transport attracts many users, especially those who ship very valuable low-volume goods. In response to this competition, two major technological advances have been conceived for the shipping industry. Over-all ship size has been increased. A tanker which holds 20 to 25 times more cargo than was carried by ships during World War II can offer lower shipping prices per unit. Second, containerization of general bulk cargo can revolutionize cargo handling procedures, reducing time in port, cargo waiting time, and making theft virtually obsolete (Figure 1.2). Increased reliability and speedier shipping would inspire users to return to shipping service.

Of course, new technologies must be adopted and must be attended by appropriate alterations in over-all operations, if they are to work, and herein lies the wide discrepancy in current East Coast

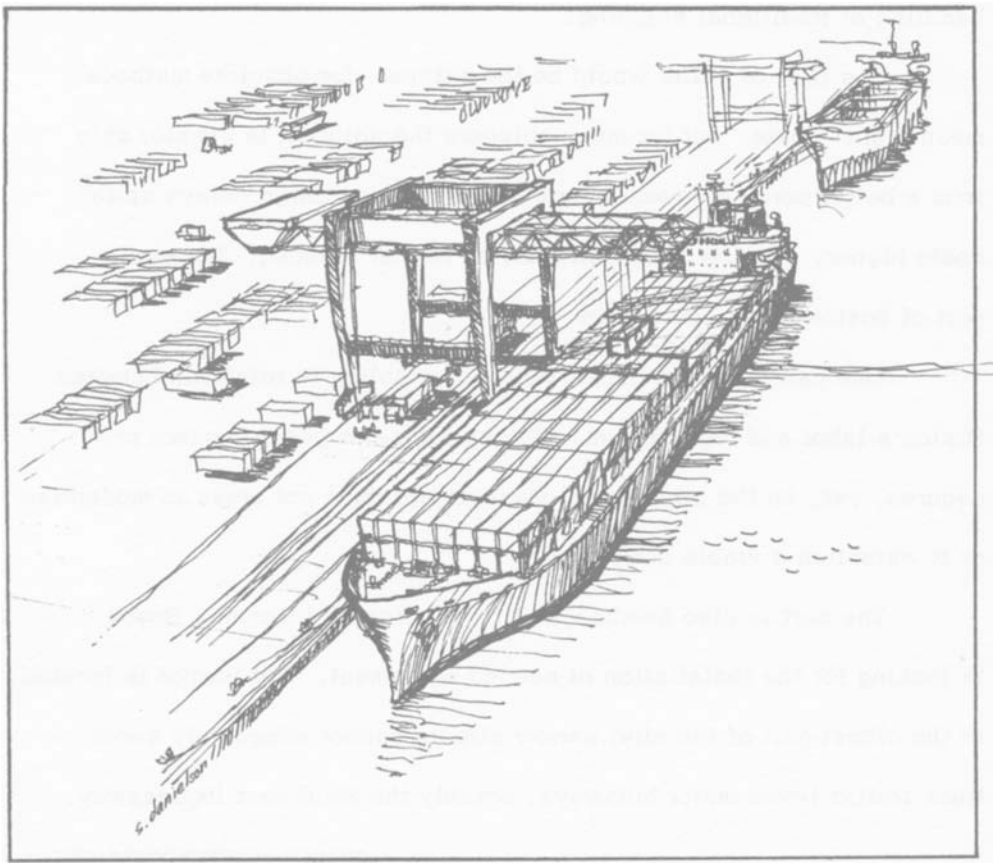

Figure 1.2 Containerized Shipping

port success. Boston has not built the facilities, has not bought the equipment, has not achieved the procedures needed for successful containerized shipping. The city has failed to construct suitable marshalling areas and access routes to city storage centers and regional highways. Wide shipping lanes have not been created. Rather than these physical prerequisites to modern shipping, Boston continues to offer the small sheltered inlets, the uncooperative labor attitudes, the primitive docks, warehouses, and cargo

handling of traditional shipping.

The first to suffer would be the shipper, for obsolete methods mean higher costs. But for many shippers the solution is simple: ship from a better port. For remaining users, resulting cargo delays spiral costs higher. Service to Boston must be further reduced. The dying port of Boston is its own victim.

One can largely attribute regressive policy to relations between Boston's labor and management. Unions refuse to permit modern procedures, yet, on the other hand, management does not press to modernize or to establish a viable compromise.

The port is also handicapped by its present location. Space is lacking for the installation of needed equipment. The Harbor is located in the oldest part of the city; narrow streets cannot adequately serve truck traffic (even major highways, notably the Southeast Expressway, cannot accommodate car and truck traffic emanating from the Harbor.) Active facilities are interspersed among rotting docks (Figure 1.3), further inhibiting port efficiency.

Figure 1.3 Rotting Docks

For a city so pressed for housing and open recreational areas, so mindful of the beauty and natural value of the ocean, the disintegrating

port is not alone a "seaport problem" Unprofitable and unsound docks preclude other urban uses. Shipping, though fitful, pollutes the harbor's waters. The problem of the Port of Boston is the problem of the city of Boston.

1.4 The Airport and Seaport Viewed Together

Logic dictates the parallel study of subsystems performing similar functions within a total transportation system. Consequently, the Boston airport and seaport situations were compared. Both ports occupy sites in the city harbor, both provide the region with terminals for cargo and passenger service, neither is sufficiently accessible for much of the metropolitan area. The airport lacks room to expand; the seaport withers from insufficient demand.

Such simple observations as well as more intricate relationships suggested solutions - why not give seaport lands to the airport? - which in turn transmuted into real innovative proposals - why not move airport functions to distant harbor islands, give airport land to consolidated seaport functions, thus freeing harbor land for other urban development? A unified concern for both ports contributed essentially to the final Project BOSPORUS design.

1.5 The Design Overview

Project BOSPORUS represents an attempt to comprehend the problems of Boston as a port and to create a design whose implementation

would eliminate or minimize present and future transport troubles. By examining the port in its several contexts, as a functioning node of the transportation system of the region and country, as a physical portion of the metropolitan community, and as a social and economic influence on the region, one can determine, in general, port characteristics and criteria, and the costs of solving port problems. A summary of the resulting design forms the remainder of this chapter. A detailed account of decision-making, precise recommendations, and the design will follow in succeeding chapters of this book.

Our airport design responds primarily to trends in the aircraft industry and in Boston's air traffic. We believe that large, fast, fixed-wing jetcraft will dominate long-haul flight service. Social pressure, discontent with noise and pollution, will dictate removal of fixed-wing airports from population centers. V/STOL[3], on the other hand, appears virtually free of social annoyances. We therefore think that V/STOL will assume the numerous short distance, "shuttle" flights to New York, Philadelphia, Washington, and other smaller cities formerly assigned to CTOL[4] flights. V/STOL will operate from small ports close to or in the midst of urban activity centers. Air traffic control techniques and instrumentation are expected to improve to the point that V/STOL and fixed-wing operations may proceed simultaneously in close proximity.

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3 Vertical/Short Take-Off and Landing
4 Conventional Take-Off and Landing

Figure 1.4 depicts our total port design. We recommend the removal of all long-range jet service from Logan Airport to a proposed new runway area in and around the Brewster Islands in the Outer Harbor. These facilities would include runways, taxiways, operations for minimal aircraft servicing, and special aircraft loading platforms (Figure 1.5). Projections stating that Logan runways will be saturated by 1975 justify the construction of a second runway system. The location fulfilled social and economic criteria; of a number of possible airport sites, Brewster was found least expensive, yet maximally beneficial for the metropolitan region. Modified Logan terminals will offer primary staging functions not assigned to Brewster, thus preserving capital invested in Logan.

Typically, a jetliner will land at Brewster, taxi to a loading pad, and off-load its passengers and their luggage onto "mobile lounges". The lounges will then travel to Logan for passenger debarkation. Meanwhile, at Brewster, the airplane will be cleaned, reprovisioned, and then a new complement of passengers brought from Logan by the mobile lounge will board. The airplane will taxi to an outbound runway and take off. Only landing, take-off, aircraft turn-around procedures, servicing, and baggage transfer will occur at Brewster.

The mobile lounges will drive at high speeds over a special roadway, eventually to be adapted to a fully automated guideway system, to the major passenger terminal located at the present Logan site. (An extension of this roadway might link the South Shore to Logan; consideration

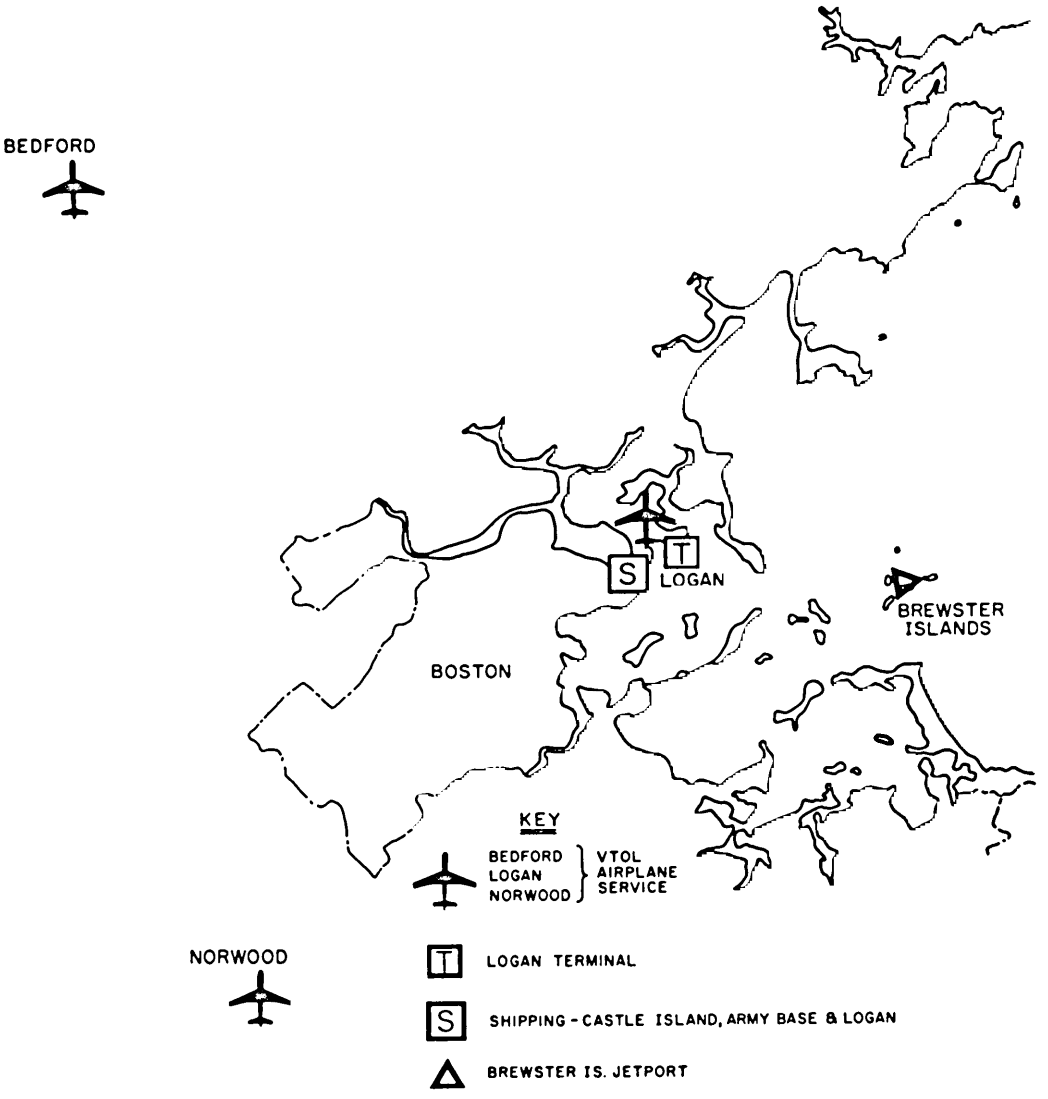

Figure 1.4 BOSPORUS Seaport and Airport Design

Figure 1.5 Brewster Jetport

should also be given to using such a route to provide rapid access to the North Shore.) At Logan, passenger luggage will be delivered and retrieved, tickets will be processed, small shops and colateral services such as car rental and hotel reservation booths will reside. A rational layout of all services will minimize passenger walking. Automated baggage-handling and ticketing systems will speed travelers through the terminal.

One of three V/STOL sites planned for the Boston region will also operate at Logan. The remaining two ports will be built at Hanscom Field in Bedford and Norwood Airport in Norwood, both of which are convenient to Route 128. V/STOL aircraft will handle all short-haul flights. Physical and time connections between V/STOL and long-range flights at Logan will be optimized. General aviation will be permitted at all three ports. Of Boston's present traffic, 70% consists of short-haul flights. Logan's share of future Boston service may thus be reduced by as much as 75%[5].

This plan will provide facilities for all types of users while curtailing undesirable and inefficient aspects of air service. One of the three short flight facilities will be within convenient distance, thus reducing airport access times. "Local" direct service to New York, Philadelphia, and Washington city centers will save users trip time. V/STOL craft produce far less noise and pollution. Noisy jets will be banished to the Outer Harbor.

Perhaps the above system contributes most significantly to over-all

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5 $\frac{70}{3} = 23$

$100 - 23 = 77$

port efficiency by reforming Logan land use. Large runways will be replaced partially by expanded terminal and cargo operations, and a V/STOL port. Excess land may be developed as an automated seaport terminal, storage, transfer, and marshalling areas. The remaining tracts may be sold to industry or used for recreation.

The most dramatic portion of our design may be a development proposal to rejuvenate Boston's seaport. While we anticipate that the port will, in fact, revive, we have provided for the port's historically tangled and unpredictable affairs by including in our plan numerous evaluation and decision points. Even a more settled port would demand such an adaptive plan given the constant changes in the cargo transport industry. Boston can decide its future role in the nation's seaborne transportation with the aid of a plan that spells out the repercussions of each alternative major decision.

In addition, at a minimal cost the city may adopt independent portions of our proposal that remain valid regardless of the direction of general port evolution. We suggest that storage areas for petroleum and other liquid bulk cargoes be linked by pipeline to the Outer Harbor. Tank farms on the lower end of Chelsea Creek should be moved to vacant land in the upper Creek area, unifying these storage facilities. Supertankers can then call on the Port of Boston without entering the traditional harbor. Oil need no longer spill and pollute during transfer operations. Consolidation of port facilities can begin at once, independent of any further development plan. Large sections of the Inner Harbor would thus be freed

for other urban development and a general clean-up of Boston Harbor shores and waters could begin.

Solution of the labor problem must precede any seaport development. Labor must willingly agree to operate new or renovated facilities. The Boston waterfront has had a long history of labor difficulties, many of which stem from union efforts to maintain outmoded practices out of a fear of losing wages. Labor conservatism takes the form of overly restrictive work rules and general resistance to technological innovation. Fortunately, the situation is far from hopeless. Patterns of labor-management cooperation have begun to develop, particularly for grievance procedures. The union leaders, although flamboyant in public, sincerely care about the welfare of their following. Labor's dawning realization that a dead port provides no jobs is a final source of hope.

Acceptance of modernized procedures and equipment may be speeded by an offer of short term labor benefits. The natural attrition rate for longshoremen can be accelerated by lowering the retirement age to 62 and raising pensions. An option for retired men to work up to eight hours a week until they reach 67 promotes a sense of independence, as well as providing extra income.

After a labor and management accord, the first step toward rejuvenation, consolidation of facilities, can be undertaken. As a beginning, the presently existing container facility at Castle Island would be opened. By 1974, the remainder of port operations would be handled by facilities to be constructed at the Army Base. These two areas would shoulder the

burden of port operation until the conversion of Logan. With jetcraft relocation, construction could begin of a third seaport facility at Logan which would be so situated that a ship need traverse the basin in one direction only. Shipping activities at Logan will in no way interfere with the V/STOL and airport terminal which will have replaced the Logan CTOL port. Facilities will accommodate the most modern cargo handling techniques. At any one time, the harbor will be able to berth 20 ships.

Such massive development can take place only if shippers respond to lower costs made possible by the use of automated cargo handling techniques. Shipping to and from modern Castle Island should start the trend toward lower costs. As automated facilities grow, progressively lower costs will attract trade which will use the new areas at full potential. Today's vicious circle of inefficiency-greater costs-reduced business reverses to become a spiraling of efficiency-lower costs-growing demand.

The management of this future port operation must differ vastly from that presently in command. The current administration lacks managerial initiative; government transportation agencies fail to coordinate their efforts; port policy does not respond to issues of public welfare. Given the advanced technologies which shall operate, these deficiencies may best be alleviated by a centralized administration of all state transport activities. We therefore propose the creation of a Massachusetts Department of Transportation to combine all relevant

state supported agencies into one administration. It will also offer aid solicited by independent local bodies. The primary mission of the M.D.T. will be to create a master plan for all transportation systems within the state, and to annually update this plan in accordance with the quality of past performance and with revised technological, social and economic predictions.

To directly administer Boston's ports, we propose a Metropolitan Port Commission, possessing powers at the same level and of the same scope as the D.P.W., M.D.C., M.B.T.A., and a private development corporation, PORTAD. The M.P.C. will determine policy for the port and will own all port land and some port facilities which it will lease to PORTAD. The M.P.C. and PORTAD will subsequently interrelate as follows: the M.P.C. can underwrite some of the cost of port capitalization; it will dictate port policy (in accordance with the M.D.T. transportation plan). Through ownership of land and facilities, as leaser, it will be able to control PORTAD. PORTAD will raise the remaining capital and will operate the port so as to earn substantial profits for private investors. Incentive is thereby provided to operate efficiently, imaginatively, and progressively, within the policies established by the M.P.C. By dividing the policy and the operational control of the port, we aim to minimize the risk of loss to the general public and to maximize gain for the entrepreneurs. Figure 1.6 is a diagram of port management and finance relations.

Our plan outlines improvements solely in the two major terminal systems, yet it implies a challenge to Boston city planners and developers.

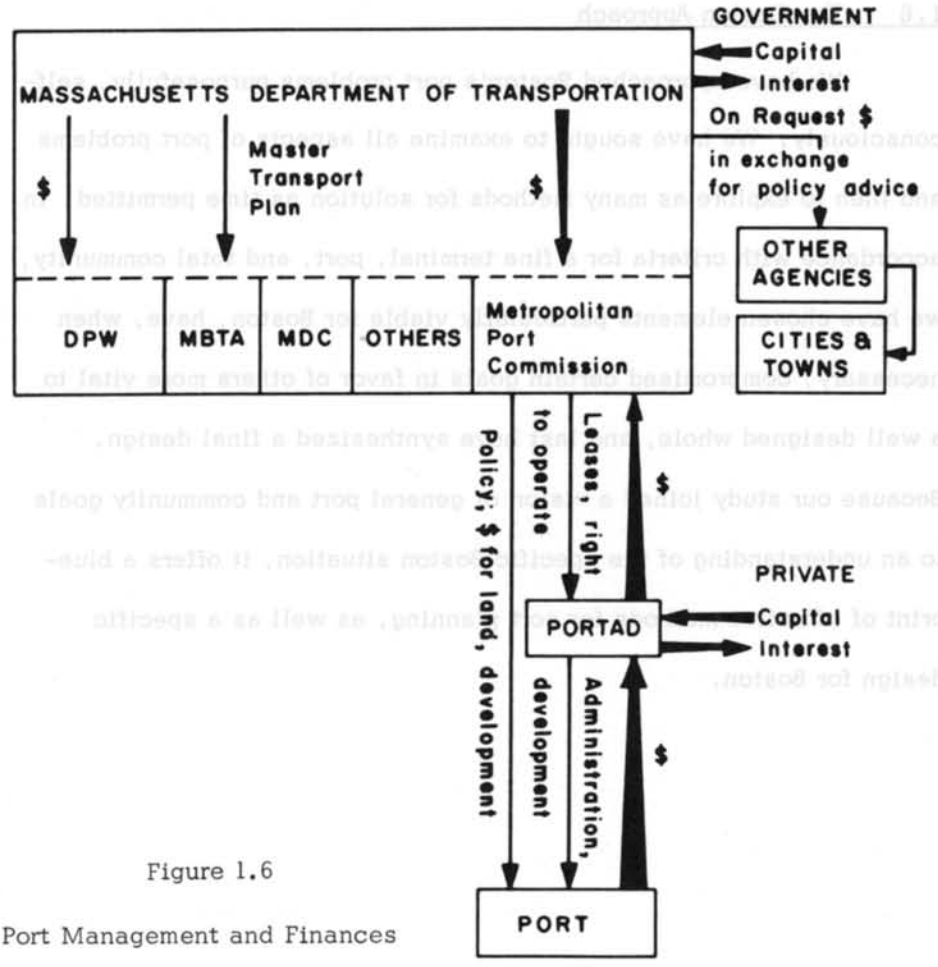

Figure 1.6

Port Management and Finances

As planned, the consolidated transportation facilities will occupy locations convenient to users yet which least deprive the community of valuable land. In some cases, large tracts, currently unused, would be freed. The relocation of jetcraft and certain seaport operations would reduce air and water pollution. Upon these reclaimed physical resources, others may exercise their imaginative concern for Boston.

1.6 The Design Approach

We have approached Boston's port problems purposefully, self-consciously. We have sought to examine all aspects of port problems and then to explore as many methods for solution as time permitted. In accordance with criteria for a fine terminal, port, and total community, we have chosen elements particularly viable for Boston, have, when necessary, compromised certain goals in favor of others more vital to a well designed whole, and last have synthesized a final design. Because our study joined a vision of general port and community goals to an understanding of the specific Boston situation, it offers a blueprint of effective methods for port planning, as well as a specific design for Boston.