A NEW PASSENGER TERMINAL
FOR THE PORT OF
BOSTON, MASSACHUSETTS
BY
JOHN M. PETERSON
B. Arch., North Carolina State College
(1958)

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF
ARCHITECTURE
at the
MASSACHUSETTS INSTITUTE OF
TECHNOLOGY
August, 1959

Signature of Author

Department of Architecture, August 10, 1959

Accepted by

Lawrence B. Anderson
Head of the Department of Architecture
A. A New Passenger Terminal for the Port of Boston, Massachusetts

B. John M. Peterson

C. Submitted for the degree of Master of Architecture in the Department of Architecture on August 10, 1959.

ABSTRACT

Boston, Massachusetts, an Atlantic seaport, has a history in which its harbor has played such an integral part that the two are almost inseparable. The backbone of the economy was commerce. Boston felt the impact of the fluctuations in commerce resulting from wars and the depression. She enjoyed the foreign influence and the resulting cosmopolitan atmosphere.

Today a seaport is not just a clearing house for the ever mounting import-export business, but the gateway to the world for thousands of tourists every year. As money and leisure time become more plentiful, the desire for travel increases; the cruise enjoys a growing popularity and luxury liner companies a growing prosperity.

Passenger port facilities have not been developed correspondingly, particularly in the United States; in many cases, where cargo handling has consumed passenger facilities, development has been retarded. In Boston, luxury liners dock at piers which are cargo-oriented. It is not surprising that Boston is
suffering the loss of passenger-liner business. Boston would benefit both financially and aesthetically from the construction of a luxury-liner passenger pier. Its pier facilities are as important as its airport and railroad stations.

The terminal herein is designed to compliment the scale of the docked ships and provide a suitable gateway to the world. This terminal will approximate the luxury of the liners themselves. It will provide services, not only to passengers and their friends, but also to the people of Boston. It should also bring order and beauty to the Boston waterfront by encouraging improvement throughout the entire waterfront area.

Thesis Supervisor: Imre Halasz
Title: Associate Professor of Architecture
Cambridge, Massachusetts
August 10, 1959

Dean Pietro Belluschi
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Dean Belluschi:

I hereby submit the enclosed thesis entitled "A New Passenger Terminal for the Port of Boston, Massachusetts" in partial fulfillment of the requirements for the degree of Master of Architecture.

Respectfully submitted,

John M. Peterson
ACKNOWLEDGEMENT

I wish to extend my thanks to the following for their interest and sincere criticism.

Lawrence B. Anderson,
Professor of Architecture;
In charge of the Department of Architecture.

Eduardo F. Catalano,
Professor of Architecture.

Imre Halasz,
Assistant Professor of Architecture

The Faculty and Staff of the Department of Architecture,
Massachusetts Institute of Technology.

For their moral help and assistance in furthering my education, I wish to thank the following:

Dr. and Mrs. Walter J. Peterson
my parents.

Mrs. Mary P. Peterson
my wife.
# TABLE OF CONTENTS

Title Page

Abstract

Letter of Submittal

Acknowledgement

Table of Contents

Graphic Material

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. A New Passenger Terminal for the Port of Boston, Massachusetts</td>
<td>6</td>
</tr>
<tr>
<td>II. History</td>
<td></td>
</tr>
<tr>
<td>-Passenger Movement in the Port of Boston, Massachusetts</td>
<td>8</td>
</tr>
<tr>
<td>-Passenger Terminals</td>
<td>11</td>
</tr>
<tr>
<td>III. Findings and Observations</td>
<td></td>
</tr>
<tr>
<td>-The Port of Boston: Its Character and Situation</td>
<td>13</td>
</tr>
<tr>
<td>-Water Approaches to the Port of Boston and its Facilities</td>
<td>24</td>
</tr>
<tr>
<td>-Weather and Tides in Boston, Massachusetts</td>
<td>31</td>
</tr>
<tr>
<td>-Streets and Highways</td>
<td>37</td>
</tr>
<tr>
<td>-Railroad Service</td>
<td>40</td>
</tr>
<tr>
<td>-Public Transportation</td>
<td>41</td>
</tr>
<tr>
<td>-Terminal Site and its Description</td>
<td>43</td>
</tr>
<tr>
<td>-Ships and Passenger Liners</td>
<td>60</td>
</tr>
<tr>
<td>-The Nature of Passenger Service and Travel</td>
<td>63</td>
</tr>
<tr>
<td>-Quays, Docks, Wharves, Basins, and Approaches</td>
<td>64</td>
</tr>
<tr>
<td>-Customs, Immigration, and Public Health</td>
<td>68</td>
</tr>
<tr>
<td>-Customs</td>
<td>68</td>
</tr>
<tr>
<td>-Passenger Terminal Facilities and Functions</td>
<td>73</td>
</tr>
<tr>
<td>-Finances</td>
<td>80</td>
</tr>
</tbody>
</table>
IV. Conclusions

- Passenger Traffic in the Port of Boston 81
- Programs 84
  - Site Development 84
  - On-Site Storage 85
  - Traffic and Parking 85
  - Berthing 87a
  - Terminal 88
  - Estimated Cost 94
  - Design Objectives 95

V. Description of Design

- Site 98
- Terminal 100

Footnotes 103
Bibliography 104
Authorities Consulted 105
Appendix 106
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Passenger Volume, Boston Port of Boston Authority</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Passenger Volume, Boston Port of Boston Authority</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>Commonwealth Pier 5 Mooring Author</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Ship Moored at Commonwealth Pier 5 Author</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Quay, Commonwealth Pier 5 Author</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>Cargo Entrance, Commonwealth Pier 5 Author</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>Passenger Entrance, Commonwealth Pier 5 Author</td>
<td>21</td>
</tr>
<tr>
<td>8</td>
<td>Passenger Facilities, Commonwealth Pier 5 Author</td>
<td>22</td>
</tr>
<tr>
<td>9</td>
<td>Front of Commonwealth Pier 5 Author</td>
<td>23</td>
</tr>
<tr>
<td>10</td>
<td>Boston Harbor U.S. Coast and Geodetic Survey</td>
<td>26</td>
</tr>
<tr>
<td>11</td>
<td>Harbor Entrance Author</td>
<td>27</td>
</tr>
<tr>
<td>12</td>
<td>Fort Point Channel Entrance Author</td>
<td>28</td>
</tr>
<tr>
<td>13</td>
<td>Central Waterfront Area Author</td>
<td>29</td>
</tr>
<tr>
<td>14</td>
<td>Upper Harbor Author</td>
<td>30</td>
</tr>
<tr>
<td>15</td>
<td>Seasonal Wind Direction Pattern U.S. Department of Commerce, Weather Bureau</td>
<td>32</td>
</tr>
</tbody>
</table>

(3)
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Tides at Commonwealth Pier 5, 1959 U.S. Coast and Geodetic Survey</td>
<td>33</td>
</tr>
<tr>
<td>17</td>
<td>Tides at Commonwealth Pier 5, 1959 U.S. Coast and Geodetic Survey</td>
<td>34</td>
</tr>
<tr>
<td>18</td>
<td>Tides at Commonwealth Pier 5, 1959 U.S. Coast and Geodetic Survey</td>
<td>35</td>
</tr>
<tr>
<td>19</td>
<td>Tides at Commonwealth Pier 5, 1959 U.S. Coast and Geodetic Survey</td>
<td>36</td>
</tr>
<tr>
<td>20</td>
<td>Boston Street Map</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Gulf Oil Company</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Metropolitan Boston</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Gulf Oil Company</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Public Transportation Map</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Metropolitan Transit Authority</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Boston Inner Harbor</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>U.S. Coast and Geodetic Survey</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Site Map</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>U.S. Coast and Geodetic Survey</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Air View of Site</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Author</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Fort Point Channel Corner</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Author</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Transit Shed Opposite Site</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Author</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Transit Shed on Site</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Author</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Pier 2</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Author</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Existing Piers</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Author</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Small Craft Launcher</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Author</td>
<td></td>
</tr>
</tbody>
</table>

(4)
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>Existing Piers</td>
<td>55</td>
</tr>
<tr>
<td>33</td>
<td>Harbor Approach to Site</td>
<td>56</td>
</tr>
<tr>
<td>34</td>
<td>Existing Buildings on Site</td>
<td>57</td>
</tr>
<tr>
<td>35</td>
<td>Northern Avenue</td>
<td>58</td>
</tr>
<tr>
<td>36</td>
<td>Land Approach to Site</td>
<td>59</td>
</tr>
<tr>
<td>37</td>
<td>International Passenger Flow Diagram</td>
<td>77</td>
</tr>
<tr>
<td>38</td>
<td>Baggage Flow Diagram</td>
<td>78</td>
</tr>
<tr>
<td>39</td>
<td>Cargo Flow Diagram</td>
<td>79</td>
</tr>
</tbody>
</table>
A NEW PASSENGER TERMINAL FOR THE PORT OF BOSTON MASSACHUSETTS

Cambridge, Massachusetts
August 1959

Dean Public Buildings
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Dean Belknap:

I hereby submit the enclosed thesis entitled "A NEW PASSENGER TERMINAL FOR THE PORT BOSTON MASSACHUSETTS" in partial fulfillment for the degree of Master of Architecture.

Respectfully submitted,

John M. Peterson
A NEW PASSENGER TERMINAL FOR THE PORT OF BOSTON, MASSACHUSETTS

JOHN N. PETERSON

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

AUGUST 1959
A NEW PASSENGER TERMINAL FOR THE PORT OF BOSTON MASSACHUSETTS
JOHN M. PETERSON MASSACHUSETTS INSTITUTE OF TECHNOLOGY
AUGUST 1959
A NEW PASSENGER TERMINAL FOR THE PORT OF BOSTON, MASSACHUSETTS

JOHN M. PETERSON

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

AUGUST 1959
I. A NEW PASSENGER TERMINAL FOR THE PORT OF BOSTON, MASSACHUSETTS
The study undertaken here is of the passenger trade in the port of Boston, Massachusetts; with particular emphasis on a passenger terminal. This study will attempt to show the need for, and the requirements of, a new passenger terminal for the port of Boston. The final development and design of this terminal is meant to fulfill all of the requirements and meet all of the standards set forth as a result of this study.

The waterfront area and port of Boston are undergoing limited rehabilitation, but in several areas there is considerable evidence of a loss of initiative. This is particularly true as regards the movement of passenger liners through this port. It is my contention that the constantly decreasing number of liners docking at Boston stems from several causes, the most important of which is the present lack of suitable terminal facilities for passengers and passenger liners. I further contend that there is a great economic potential in passenger trade. The construction of a new passenger terminal for the port will in some measure introduce to the waterfront area a new vitality and interest which it has lost with increasing rapidity over the past several years.

Interest is also necessary in passenger terminals themselves. The great majority of passenger terminals provide a stark contrast with the luxurious appointments found on the passenger liners of today. Even most passenger-carrying cargo
ships provide facilities far more luxurious than any accommodations encountered in the terminals servicing those ships. A terminal should offer the luxury-liner passenger something resembling the luxury and decorum offered aboard the ship. Boston is one of the greatest offenders in this regard. The present terminal is now devoted almost entirely to cargo handling with all of its unpleasantness. As a result, the passengers have to evade trucks, and thread their way through stacked cargo. They are denied the meanest of conveniences, such as a place to sit down.

This then constitutes the problem to be solved; namely providing a new passenger terminal to revitalize the interest in the waterfront, and providing passengers and the public with facilities commensurate with those on board ship. This I propose to do by designing a new passenger terminal for the port of Boston; incorporating all the luxury and interest associated with ships of the passenger class.
II. HISTORY
The history of the port of Boston goes back to the colonial period of our country. Shortly after the first permanent colony was established in this country, Boston was established as a major port. It had many natural attributes which were conducive to the playing of this role. Foremost among these, were a natural deep-water approach, and a harbor sheltered from the open sea. For many years to follow, Boston was the major point of entry for the products of Europe and the new colonists coming to this country.

In the two wars with Great Britain; the Revolutionary War and the War of 1812, the Boston Harbor played a prominent part. Because of its importance as a seaport, many battles were fought to control it and its subsequent advantages.

After the wars, Boston sent its ships to all points of the globe. Across the docks and wharves of Boston passed merchandise and passengers from all over the world. As the country grew, Boston received many of the people who moved west to occupy the newly-settled land. When the west coast opened, the ships from Boston sailed around the horn with settlers for California, and back again with hides to supply the shoe industries of New England. When gold was discovered, Boston
ships carried miners to the gold fields.

The biggest boom occurred with the advent of the steam engine. Up to this point water travel was slow, uncomfortable, and, to say the least, unsafe. However, steam introduced speed, comfort, and safety into water travel. During the years that followed, more and more people took advantage of this progress.

Just prior to and immediately following World War I, a great flow of immigrants entered this country. Boston at that time enjoyed its greatest fulfillment as a passenger port. The use of steamship travel and unrestricted immigration combined to promote this traffic. This, however, was interrupted by World War I. Nevertheless, passengers still moved through the port but as "a captive audience".

After the war and in the prosperity of the Twenties a new travel innovation arose. It became the fashion to travel abroad. The nouveau riche went to Europe to acquire culture. Again Boston took part as a major passenger port. However, the depression began to take its toll. Just as the depression was easing, World War II began and troops replaced passengers.

After the war a potential blow to transatlantic water travel occurred - the airplane. "The passenger liners are doomed," was the cry of many. This was not the case however. The steamship owners introduced a new selling point. The sub-
stance of their idea was a traveling hotel; a ship going from port to port giving the passenger an opportunity to see and tour the area. This new move was typified by the slogan of one of the passenger lines, "Getting there is half the fun." The passenger business as a result of this move has enjoyed great prosperity.

However Boston has not taken part in this increased prosperity. The powers that be seem to be concerned about this failure. In 1951 a new passenger terminal was proposed, but because of the financial state of the port authority, the project was dropped. Now that the Commonwealth of Massachusetts has undertaken the administration of the port, the project will be restudied in the near future.

The future of the passenger trade in and out of Boston is dependent on two major factors; the concentration of administrative efforts on increasing passenger traffic, and the provision of adequate facilities for service. Even though Boston is still the second ranking passenger port on the Atlantic Coast, it is rapidly losing its status.
People were traveling by boat and ship before the advent of recorded history. Embarkation and disembarkation have been a problem for just as long. Docks and piers were usually simple, as were the ships and the things they carried. However, as the number of passengers and ships increased the problems increased. When the Americas and the Orient were opened, sea travel became open to anyone with the price of a fare.

The terminal of the early transatlantic day was either a stone wall just wide enough to permit a wheelbarrow, or the open sea. Passengers were at the call of the tides. Even in the dead of night, passengers had to feel their way along narrow docks and up wobbly planks to reach the ship. If no anchorage was available, the passengers and their luggage were loaded into long boats and rowed out to the ship. The gentlemen were obliged to scramble over the side of the ship while the ladies were hoisted over the side with what baggage had survived the trip through the surf.

As shipping increased and ports grew, more passengers braved the seven seas. Facilities improved, open wharves were covered, gangways were railed, and ships began to offer more services. But in this country, passenger facilities stopped at that point. Terminals in this country were built for the
handling of cargo. Those terminals which were built for passengers have been slowly converted to cargo terminals. Even with a rise in passenger traffic, the passengers have been relegated to the dark corners, or set in the midst of the cargo. Here they dodge cargo trucks and bailing hooks, and seek out their baggage in dirty, damp, ill lighted halls. The sharp contrast between air travel terminals which are passenger oriented and sea travel terminals which are cargo oriented clearly points out some of the deficiencies of port facilities.

However, in Europe progress has been made in improving passenger terminals. Terminals in Denmark, France, and England have been built to provide some degree of convenience for the passengers. The United States has just recently come to realize the importance of this innovation. Ports such as New Orleans and San Francisco have made moves to provide adequate facilities. Boston had such a facility proposed in 1951 by the Port of Boston Authority, however lack of funds prevented the development of the project.
III. FINDINGS AND OBSERVATIONS
THE PORT OF BOSTON: ITS CHARACTER AND SITUATION

"The port of Boston, a sailor's, trader's rendezvous since the 17th Century, was created a great port by Yankee shrewdness, industry, and the good fortune in having a natural landlocked harbor closed to the open sea. Although geographically well North Atlantic, it is still strategically located on Massachusetts Bay where the Mystic, Charles, and Chelsea Rivers merge into a 35 foot, 1200 foot wide 6 mile long channel running largely North and South and Southeast. The character and location of the harbor itself, created by nature to attract settlement, commerce, and shipping, helped give the port a trader-skipper heritage. As the New Englander has never really lost the early Yankee trader interest, the Commonwealth, the City, and significantly, the relatively new Port of Boston Authority (now the Massachusetts Port Authority, 1958), have today an awareness of the need and value of good port operation as the factor which makes location significant. All in all, the port occupies approximately 47 square miles of tidewater area and includes Boston Proper, East Boston, Charlestown, South Boston and several other communities located inside or outside the limits of Boston. Although most of New England serves as the ports natural near hinterland, the port does attract traffic from a large far hinterland. It has been referred to as the economic gateway of one of the world's most concentrated industrial areas."

At the present there are some 30 steamship lines operating from the port of Boston. However, this does not imply that all of these lines will be represented in any one month. In the past year four new passenger lines have added Boston as a scheduled port of call. The list of lines is as follows: the Italian Line (I.L.), the Greek Lines (G.L.), the Home Lines (H.L.), Swedish American Lines (S.A.L.), and Furness Warren Line (F.W.L.). At the present time negotiations are underway
to bring additional lines into the port during the next year. In 1959, ship arrivals occur on the average of once or twice a week at Commonwealth Pier 5. There are also other lines which call at Boston but use other piers. In addition to the passenger liners putting in at Boston, there are also cargo ships carrying passengers into and out of the city. Local cruise liners bring more passenger traffic to Boston but these lines operate mainly in the summer, late spring, and early fall.

The introduction of these new lines and the addition of more lines next year will continue the pull out of the cellar which started several years ago. A campaign is underway to enlarge the passenger traffic in the port. However, the only passenger terminal in Boston is Commonwealth Pier 5. This pier was built before World War I and is now devoted almost entirely to cargo handling. Pier 5 is only one example of the poor condition of some of the waterfront facilities in Boston. The greater majority of the facilities on Atlantic Avenue in Boston are in a state of decay and disrepair.
Foreign

--- Intracoastal

500000

400000

300000

200000

100000

1900 1910 1920 1930 1940 1950 1960

Passenger Volume, Boston

Figure 1
Passenger Volume, Boston (Figure 2)
Commonwealth Pier 5 Mooring

Figure 3
Ship Moored at Commonwealth Pier 5  Figure 4

(18)
Quay, Commonwealth Pier 5

Figure 5

(19)
Cargo Entrance, Commonwealth Pier 5

Figure 6

(20)
Passenger Entrance, Commonwealth Pier 5  Figure 7
Passenger Facilities, Commonwealth Pier 5
Front of Commonwealth Pier 5

Figure 9

(23)
WATER APPROACHES TO THE PORT OF BOSTON AND ITS FACILITIES.

The seaward approach to the Boston Harbor is made through Massachusetts Bay to a point due east of Winthrop Head at Finns ledge, then proceeding southwest through a dredged channel (44 foot average depth)* to Presidents Roads. This is a natural channel which moves due west to the main harbor channel. The harbor channel runs northwest and is divided into two 200-foot channels. The north channel is about 35 feet deep and the south channel is about 40 feet deep. Opposite Piers 1 and 2 the channels turn northeastward and merge into a single channel 300 feet wide, 40 feet deep. The channel is not open to indiscriminate navigation as a harbor pilot is required on all ocean-going craft.

The piers and docking facilities of Boston start in South Boston with the Castle Island and Reserved Channel facilities. These facilities are equipped for handling cargo and are of recent vintage. Military and Naval installations are located between Reserved Channel and "Fish Pier", or Pier 6. "Fish Pier" is just what the name implies, a commercial fishing pier. Moving north, the next pier is Commonwealth Pier 5, presently Boston's only passenger terminal. Its use at present is primarily for cargo handling, however. Pier 5, as far as Fort

*All depths are measured at mean low tide.
Point Channel is derelict; this includes Piers 1 and 2. At the intersection of the main channel and Fort Point Channel there is a small rail yard in limited use. Fort Point Channel has very little traffic and plans are under construction to have it filled.

All the piers, docks, and wharves from Fort Point to the Coast Guard Station at the mouth of the Charles are run-down. The majority of them are occupied by small fishing concerns, marinas, residences, and storage houses. At present there are not any large scale enterprises in operation in this sector of waterfront in Boston, and the city planning board has plans for its conversion into a residential and park area. (See figures 10, 11, 12, 13, and 14 for a graphic representation of the described areas.)
Harbor Entrance

Figure 11
Central Waterfront Area

Figure 13

(29)
Upper Harbor

Figure 14

(30)
Boston has an average precipitation of 2.75 to 3.5 inches per month. The snow season runs from November through March with an average fall of 40 inches a year. The average relative humidity is 70% in the morning, evening, and night, falling to 55% in the afternoon.

The sun is visible for approximately 58% of a possible 4459 hours. The longest period of visibility occurs during the summer months, and the shortest during the winter months.

Storms and gale-force winds normally come out of the Northeast. For seasonal wind-direction patterns and average velocities, consult figure 15 on page 32.

For 1959 tide charts and further tidal information, consult figures 16, 17, 18, and 19 on pages 33, 34, 35, and 36 respectively.
WINTER 13.5 M.P.H.
SPRING 13.4 M.P.H.
SUMMER 11.2 M.P.H.
FALL 12.0 M.P.H.

AVERAGE WIND VELOCITY

SEASONAL WIND DIRECTION PATTERN

FIGURE 15

(32)
Tides at Commonwealth Pier 5, 1959

Figure 16
Tides at Commonwealth Pier 5, 1959

Figure 17
Tides at Commonwealth Pier 5, 1959

Figure 18
The vehicular approaches and communication are extensive and varied, though at times hopelessly congested. However, this situation is under constant study and redevelopment. Two major developments just recently completed are: the Route 128 belt road which connects many of the industrial and residential areas in and around Boston, and the Central Artery which makes possible the unopposed entry into Boston from the North and South Shores. Further connections to central Boston are: Storrow Drive in Boston, Beacon Street, Boylston Street-Huntington Avenue, Columbus Avenue, Summer Street, and, in Cambridge, Monsignor McGrath Highway, Memorial Drive, Massachusetts Avenue, and Broadway Avenue. An inner belt in the Metropolitan Boston area is now in the study stage.

The greatest avenues of approach and communication on the immediate Boston waterfront are the Central Artery and its connected network, Summer Street, Northern and Atlantic Avenues, and Commercial Street. These roads and streets connect the waterfront area with the storage facilities, sales areas, and all the major entry and departure routes of Boston and the metropolitan area.
RAILROAD SERVICE

The railroad service in Boston at the present time is good, but the increasing lack of passengers and freight is making serious inroads into the railroad economy. The strongest contenders for the railroad business are the truck lines for freight, and the airplanes and automobiles for passengers. Nevertheless the service now offered is comprehensive; vehicles are equipped to handle almost every type of cargo in any quantity.

There are two major rail yards and four minor rail yards servicing the Boston area. The two major yards are operated out of North and South Stations. The minor yards are operated south of Commonwealth Pier 5, at the headwaters of the Mystic River, in Everett, and in East Boston.

The service to the waterfront area exists on short spurs in East Boston, as well as a spur along Atlantic Avenue connecting North and South Stations. However the latter will be removed in the near future.

(40)
PUBLIC TRANSPORTATION

The public transportation system in the Boston area leaves much to be desired. The Metropolitan Transit Authority is trying to remedy this situation without much success.

The main transportation lines consist of subways which reach out to Revere, Everett, Cambridge, Forest Hills, and Ashmont. The gaps are filled with a network of surface and underground bus, car, and trackless trolley lines. Operating out of North and South Stations are commuter trains servicing the North and South Shores respectively. These lines are, at present, in an unresolved status as regards their continued existence.

The subway accesses to the waterfront area are located at North and South Stations and at Atlantic Avenue. These lines converge on central Boston with connections to the outlying districts. There is a single bus line serving the area; it runs from South Boston to South Station via Summen Street with a spur to Pier 5, and a loop from North to South Station along Atlantic Avenue.
TERMINAL SITE AND ITS DESCRIPTION

The site selected for this project is located in South Boston at the bridge head of Fort Point Channel. The site limits are: eastern corner, longitude $71^\circ-3'-4''$ West and latitude $42^\circ-21'-14.5''$ North, South $43^\circ$ East-1200 feet, South $17^\circ-45'$ East-325 feet, North $45^\circ$ East-1236 feet, North $46'-15'$ West-370 feet, arc $86^\circ$-Radius 975 feet. (The compass readings given here are Magnetic Declination.) These limits are those of the site as it exists, as limited by Northern Avenue. However, there is the possibility of moving Northern Avenue farther to the Southwest or crossing it in some areas; specifically in the area of the New York, New Haven and Hartford Railroad yard.

The piers presently on the site have either burned over or collapsed. Pier 1, nearest to Fort Point Channel, is still standing with a run-down transit on it and a small rail yard to the east. The rail yard is of little use except as a parking lot. The remainder of the site is not in use; with the exception of some small restaurants and shops on Northern Avenue.

Rail service to the site is to a great extent already provided. The New York, New Haven and Hartford Railroad has a classification yard which terminates at Northern Avenue. Although this yard has a limited use, the facilities are available for use. Passenger service by rail is located at South Station, about 600
yards east of the site. North Station, however, is located 2000 yards northeast of the site on the opposite side of downtown Boston. North Station is easily reached by the Central Artery.

This brings us to vehicular movement and accessibility. Northern Avenue, the major street access to the site, crosses Fort Point Channel where it connects directly with the Central Artery, Atlantic Avenue, and places the vehicle on the southern edge of the Boston business district. Pier 5, the southeast limit of the site, has a direct overhead connection to Summer Street which is a major vehicular artery.

The seaward approaches to the site occur at the corner of a turn in the main channel where the channel widens for the turn. An approach will have to be dredged up to the site. This could be simplified by continuing the approach to Commonwealth Pier 5.

The warehousing and storage available in the area is located primarily along Fort Point Channel. There are three transit sheds just across Northern Avenue from the site but they are in rundown condition and would be of little use. The buildings further down the channel, though old, offer more in the way of possible usage.

The physical characteristics of the site are much the same as those of the entire area. The site is either onfill or is open water. Solid sub-base varies in depth from 35 to 100 feet.
The ground level is of poor quality with a low compression value. None of the present structures and piers are in sufficient repair to retain and use for any future construction.
Air View of Site

Figure 25 (48)
Fort Point Channel Corner  

Figure 26

(49)
Transit Shed Opposite Site

Figure 27

(50)
Transit Shed on Site

Figure 28

(51)
Figure 29

(52)
Small Craft Launcher

Figure 31
Harbor Approach to Site  Figure 33
Existing Buildings on Site

Figure 34
Land Approach to Site

Figure 36

(59)
The ships and passenger liners that will service a port are largely the determining factor in setting the standards for a terminal, whether it be passenger or cargo. Future growth must also be considered in the determination of standards. Therefore, the largest ship in the passenger fleets would be the maximum limitation. This would naturally make the Queen Elizabeth the choice. A recent article in The Boston Traveler stated:

"The world's largest luxury liner, Queen Elizabeth, set a new turnaround record this week when it docked in New York.

"The 83,673 ton ship moved in and out of New York in 16 hours and 55 minutes less than the previous turnaround record, also held by the Elizabeth.

"During its brief stay the liner disembarked 1,071 passengers and embarked 1,603. Loaded on board were 2 1/2 tons of meat, eight tons of poultry, four tons of fresh vegetables, five tons of frozen vegetables and three tons of frozen fish.

"Some 15,000 pieces of luggage, 180,000 items of linen and 250 tons of general cargo were either loaded or unloaded. Also handled were 4,000 tons of fresh water and 7,200 tons of fuel oil."

Some further statistics on liners in service are as follows:

<table>
<thead>
<tr>
<th>Ship</th>
<th>Built</th>
<th>Length</th>
<th>Beam</th>
<th>Draught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ile De France</td>
<td>1926</td>
<td>792'</td>
<td>92'</td>
<td>32'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Decommissioned 1957)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normandie</td>
<td>1936</td>
<td>1029'</td>
<td>118'</td>
<td>36.5'</td>
</tr>
</tbody>
</table>

(60)
This list, it must be understood, contains some of the largest passenger liners now in service. The service to passenger carrying cargo ships would be less extensive except in terms of cargo handling.

As far as the future is concerned, the consensus of informed opinion seems to be that the race for the biggest liner has been won. The race for the best continues. Just as skyscrapers reached a maximum height, so liners reached a maximum when the Queen Elizabeth was built in 1940. Again to draw an analogy from the skyscrapers: it was found that beyond a certain height the law of diminishing returns applied. So it is with liners; the majority of the liners now in service and being planned are in the neighborhood of 600 to 700 feet. The future growth of liners will occur internally. Power plants are becoming smaller and more compact. Fuel storage will soon be non-existent. Compactness of service and the like will open more space for passengers and cargo, providing a greater return on the amount of space available.
Therefore, it can be stated that the size of liners has reached a peak, whereas capacity is still increasing.
As previously mentioned, a major shift in emphasis is taking place in passenger service and travel on the water. Airplanes provide speedy transportation while ships provide the luxury and accommodations of a hotel. There is an increasingly large group of people who look forward to the glamour of the voyage even more than to their destination.

The liners operating off of our East Coast serve the Caribbean, South America, and the North Atlantic in the immediate area; and Europe, the Mediterranean, the Near and Far East, and the West Coast of the Western Hemisphere. With the recent completion of the St. Lawrence Seaway the "Fourth Coast" was opened. (Boston is the closest American deep-water port to the Seaway.) Larger and larger volumes of passengers are embarking for foreign and domestic shores.

With this increasing volume, the lines are concentrating their efforts more and more on luxury. Passengers, in like manner, are demanding, and getting, more luxury and service. The ships of every line are being fitted with the best of facilities and staffed by the best available crews.
In the language of the maritime engineer, a dock is an artificial enclosure for receiving of ships and shipping. Docks can be divided into three major categories; wet docks, dry docks, and floating docks. Wet docks are areas of enclosed water in which vessels can remain afloat at a uniform level without being influenced by external tidal action. Dry docks are areas in which vessels can be enclosed and all water removed. Floating docks are areas, adjacent to the water, which rise and fall with the tide.

Impounded, or wet docks normally maintain a water level in the dock higher than the high-water spring tide. This is accomplished by means of pumps much like those in locks. The advantages of a constant water level are mainly in terms of leading and unloading and ship berthing. The benefits are: facilitating the loading and unloading of cargos, avoiding chafing of the ship against the quay, and eliminating the necessity of constant attention and alteration of moorings. An enclosed and sheltered dock area which is unaffected by tidal, waves, and storms provides a further advantage -- the ship master is not required to maintain maneuvering power in his engines. This allows the engine room to be closed as far as ship movement is concerned. The disadvantages of the wet dock are mainly higher original cost and higher
maintenance costs. However, in the case of Boston there are no opinions or facts which would tend to discourage the use of this type of dock. Furthermore, there are no facts and figures on the differential in cost between open and closed berths. In order to determine the differential a complete detailed cost-estimate would have to be made. The figures necessary for making such an estimate are non-existent for this country.

Tidal or open docks are feasible only where the rise and fall of the tide are not great, and where wind and current velocity are not excessive, and where heavy swell and waves are not encountered. Opinion on the limit of tide rise and fall is divergent. Ship-owners content to berth small ships and vessels at quays where the tidal range approximates 12 feet would not risk mooring large or sea-going ships at such a berth. The major disadvantage of this type of berth concerns the possibility of vessels going adrift in the tide in case of accidental breakage of moorings; there is also the risk of attempting to berth or remove a ship in a current or running tide of several knots. Further disadvantages of tidal berths are: the necessity of maintaining continual watch on board a ship to slacken and take in the moorings as the tide rises and falls, and the varying inclination of the gangways, shoots, conveyors, etc.

However, both of the above objections could be overcome by the use of floating structures which rise and fall with the
moored ship as the tide rises and falls. The problems and character of floating docks and dry docks, however, eliminate them from consideration.

The physical dimensions of berths vary in relation to the type of shipping to be handled. In order to arrive at proper figures the traffic situation in the basin and the quays on both sides must be considered. Consideration must be given to the maximum ship size to be berthed at the quays. Moorings for lighters should be calculated if they are to be brought to ship side; otherwise they must be moored within serviceable distance. The channel and consequently the berth depth for the large superliner should be from 40 to 45 feet deep, below mean low water. This allows for steerage clearance and "squat", or changes in draught during loading. Similarly, cargo vessels require 30 to 32 feet and tankers 35 to 38 feet. However, the necessary depth of a channel and basin in a port should not be determined solely by the maximum draught of the arriving ships. A port should have a sufficient depth for the accommodation of the largest arrival. But consideration should be given to the average of draught necessary for arriving ships. Great numbers of ships of only moderate draught arrive in ports and often larger ships are only partially loaded. In open tidal ports with great tidal fluctuation the quay may be only slightly above maximum high water. The width of basins may vary to a greater or lesser
degree. The inner end may be narrower than the outer. If the basin is 300 feet wide and 1200 feet long, the outer end should be 30 feet wider than the inner end. Many ports consist of a number of piers protruding from the shore at or about 90 degrees. Such piers accommodate only one ship at each quay. The width of these basins does not have to include a fairway. In Great Britain and the United States the width from quay to quay varies from 1000 to 600 feet. The length, as well as the width, of a basin should be a function of the largest ship to be accommodated, but should not be excessive.\(^{12}\)

Next in order of consideration is the quay space; its width, height, length, construction, and necessary service. In most ports, quays provide a frame for the basins and piers. A quay should have no buildings on its surface to obstruct the movement of men and the transfer of cargo between ship and shore.\(^{13}\) The width of quay space in American ports varies from 3 to 150 feet. This is due to the use of many mechanical devices for the quick clearance of quay space. The quay should be long enough to accommodate the total length of the largest ship berth, and the clearance above the quay must be unobstructed.
Customs:

The United States Customs Service is an adjunct to the United States Treasury Department.

"The functions of the Customs Service are largely related to the entering and clearing of vessels and to the discharging and loading of cargo and passengers at ports. Specifically, the functions are to enter and clear vessels; supervise the discharge of cargo; ascertain the quantities of imported merchandise, appraise, and classify such merchandise, and assess and collect the duties thereon; control the Customs warehousing of imported merchandise; enforce Customs and other laws at the international borders by inspecting international traffic by vessel, highway, and air; review protests against assessments of duties; determine and certify the payment of amount of drawback due upon the exportation of articles manufactured or produced duty paid or tax-paid imports; prevent the smuggling of contraband merchandise and the release of prohibited articles; prevent and detect undervaluations and frauds on the Customs revenue; apprehend violators of the Customs laws; enforce the antidumping act, and perform certain duties under the foreign Trade Zone Act.

"The fact that the Customs Service administers the entrance and clearance of vessels has made its functions a vital part of port administration. It is in the power of the service to board a vessel at any time it sees fit to do so for the inspection and to hold up entrance or clearance pending its compliance with all regulations if such vessel is engaged in foreign trade, whether it operates under the American or a foreign flag. Most of these duties have been developed in the various tariff acts. The Customs Service is authorized to report the arrival of vessels. Vessels entering must submit an original and one copy of the ship's manifest and deliver it to the boarding officer. The vessels must also submit lists of passengers and baggage. A copy of the crew list is also required, the same being required by the United States Coast Guard. The Customs Service enforces the practice required by the United States Public Health Service. The Service also is authorized
to assess tonnage taxes and make light money assessments. The Bureau of Customs also requires vessels engaged in coastwise and intercoast trade, as well as those engaged in foreign trade, to obtain a permit to proceed from each port of call prior to the sailing on the outgoing voyage. This permit indicates the cargo and passengers destined for United States Ports whether origin is domestic or foreign or whether the route is by way of foreign ports. The back of the permit provides for the report for the place and time of taking on bunker fuel." 14

The above statement is from Marvin L. Fair's book, Port Administration in the United States, and is similar to the information received from a United States Customs official and publications of the Service.

In addition to the information above the following information was obtained from Customs Service officials. The procedure of entrance into this country begins aboard ship with the submission of a claims and declaration list. Upon leaving the ship the passengers are detained in an examination area where they meet their baggage. Each passenger, and his baggage, are inspected, and assessments of duty are made. If any items are not released because of failure to pay duty, they are held for five days and then sent to a government warehouse. Any item not claimed in a stipulated time is sold at public auction. No one is allowed in or out of the examination area without being so examined by the Customs Service. However, upon leaving a United States Port the passenger is not required to make any contact with Custom Service
at the terminal.

The number of personnel required to make Customs examinations is relatively small. A large ship might require one examiner to every 25 or 30 passengers, whereas a smaller ship would only require one examiner for every 50 or 60 passengers. The facility requirements for examinations vary in accordance with the size of the ship. Small ships naturally require a small area and a small amount of counter space. Larger ships require large space which is subdivided by alphabetized counters, an office for a supervisor, and possibly one or two personal examination rooms. In both cases a physical barrier is needed to control passenger-public contact.

Cargo offers yet another problem. All cargo unloading is supervised in its entirety by a Customs official. He also sees that the cargo is properly sorted and classified. At the proper time the proper authorities assess and/or sample the cargo. After assessments have been made and duties have been set the cargo is released to the owner. If the duty is not paid, and the cargo not claimed, it is held at the terminal for five days. After that time the cargo is removed to a government warehouse until such time as the fees and costs are paid. If after a stipulated time this has not been done, the cargo is sold at public auction.

The facilities required for Customs cargo handling are pri-
marily administrative in character as far as the terminal officials are concerned. An office for six or seven officers and a file and records office is all that is required. It should be pointed out at this time that Customs officials are responsible for the control of the movement of all individuals as well as cargo in and out of the terminal. However, this control is more indirect than direct; that is, examination is not made of every vehicle and person entering and leaving the terminal. The majority of this traffic is controlled by manifest and passes.

Immigration and Naturalization Service and the United States Public Health Service

"The Immigration and Naturalization Service is charged with the responsibility of examining each person seeking admission to the United States, to determine whether he is legally entitled to enter, and to prevent unauthorized entry. Legal entry may be made only at specified points of entry. As a result, the administration of the immigration laws involves the boarding of ships as they arrive in the ports of the United States; the right to board ships by officials of the Immigration and Naturalization Service is established in larger ports having passenger-line service. These officials often board passenger ships at some point where the harbor or channel pilots are taken aboard prior to entering the harbor proper. Since physical and mental deficiencies and ailments are among those that disqualify aliens from admission, the inspection of immigrants by the Immigration and Naturalization Service is carried on in close cooperation with the Public Health Service." 15

As is pointed out in this quotation from Marvin L. Fair's Port
Administration in the United States, these two services operate independent of any specific terminal.
The expansion of passenger traffic and the addition of passenger accommodation on cargo ships has raised many special problems. These problems are further complicated when two different countries are involved. Just a few years ago ports offered casual service for passengers. Luxurious passenger liners were berthed at ordinary transit sheds, dirty and poorly lighted. The passengers had to scamper up and down long, unstable ship's gangways before they reached the pleasant and refined surroundings of their cabins and ship's saloons. Customs examination, ticket and passport service took place in dark, dingy rooms. Luggage and goods were also discharged into the same area making the entry and exit areas of the port a picture of chaos. However, in recent years efforts have been made in the majority of European Ports to give passengers good, and sensible, service. The handling of baggage, and the flow of passengers receiving and bidding farewells, are separated and regulated on the landing stages, in order to bring the luxury of the ship to the port and reduce the extreme contrast between ship and shore.

The standards and conditions for the design of a passenger landing-stage or terminal begin with the passenger himself. Passenger movement should be independent of cargo and baggage handling. The passengers should be protected from the rain as
they proceed from the ship to the waiting hall or Customs examination hall. If Customs examination is mandatory the passenger and his baggage should arrive independently of each other and via different routes. In the immediate vicinity of the Customs hall there should be an information center, a money exchange and various other services for the convenience of the traveler as well as the general public. The waiting area should be available to friends of passengers as well as passengers themselves. The ship or ships at the moorings should be visible from the waiting area. The circulation of the passenger, from the Customs examination area to the waiting area, must be easy but controlled. It should facilitate the easy meeting of waiting friends, and their ultimate departure, without delay. All ordinary cargo should be discharged without encumbering the passengers. At a convenient position there should be a vehicular area for the further transportation of the passenger and his baggage.

At practically all ports, the major problem of passenger handling lies in the fact that passengers are brought in at one level of the terminal by means of a closed gangway, whereas baggage is swung onto a lower level. This problem can be further complicated if the arrival and departure of liners is a popular event attracting a large number of sightseers. However, the process continues with cargo and baggage discharged to the lower floor and then brought up by elevators or lifts into the Customs
examination area on the level above. At this level, facing the quay, movable gangways are attached. They are installed in couples projecting from and supported by travelers in order to allow movement up and down the terminal. The gangways are telescoped and totally covered. When not in use they are collapsed and brought up against the building. As the ship is moored the gangways are moved to the required position and they are turned toward the ship. They are telescoped out, and slanted up or down, until they reach the corresponding position of the ship, where they are finally fixed. If the ship should move at its moorings, or if the moorings should give way, the gangways would extend, turn, or traverse sufficiently to follow the movements of the ship. This covers to a greater or lesser degree passenger facilities and handling.

Cargo presents a different problem; one that is somewhat less complicated. Cargo is drawn from the holds of the moored ship by means of the ship's cranes. The cargo is placed on the quay where it is quickly moved into the terminal. Here it is classified and stored for shipping. Then trucks and railroad cars are brought into the terminal and loaded. All these functions take place under the watchful supervision of Customs officials. This process is reversed in the case of outgoing cargo.

The physical necessities of cargo handling are simple. The
one greatest requirement is space. Easy access to and from the quay as well as a depressed area for truck and rail traffic is required. The depression allows for the loading of cargo without a change in level. Much of the simplification and elimination of additional facilities has been accomplished by the introduction of a great many mechanical devices, especially in American ports.
INTERNATIONAL PASSENGER FLOW DIAGRAM

FIGURE 37
IN BAGGAGE SAME AS IN CARGO.

BAGGAGE FLOW DIAGRAM

FIGURE 38
FINANCES

The financial burden of a new terminal will rest with the Commonwealth of Massachusetts. This could be done by bond issue or by direct appropriation. The administration of the financial matters concerning the terminal would be the responsibility of the Commonwealth of Massachusetts Port Authority.

The terminal would eventually be supported through leases to the shipping lines served. Further revenue would be derived from miscellaneous service-charges made on individual ships. If the terminal could not support itself, it would necessarily be subsidized by the Commonwealth.

In 1951 the terminal then under consideration was discarded. This was due to the fact that responsibility for the entire cost of the terminal was placed on the Port of Boston Authority, and they simply did not have sufficient funds. Their only resources were those of the port itself. However, this is not the case with the present Authority. The new Authority has the backing of the Commonwealth of Massachusetts. Even in its dubious state of financial affairs it would be better able than before to cope with any financial problems which might arise.
"Facilities are not the magical keys by which cargo is drawn into a port's orbit ... nor does the possession thereof serve traffic promotion managers, but their possession opens the door to trade not otherwise attracted. Certainly, it is true that an important number, kind, and adaptability of terminal facilities are available to handle trade. For, although it remains a bromide of the port business that ships will always go where cargo is available, the corollary which has not yet been so widely accepted is that most shippers are able to influence the availability of cargo. Thus, preference may be, and often is given to ports where terminal facilities are especially profitably adaptable to the cargo. That is, a port's trade potential is conditioned in considerable measure by the particular suitability of the facilities."¹⁷ Thus states George Fox Mott in *A Survey of United States Ports*. This can also be true of Boston in terms of passenger traffic.

With the construction of a new passenger terminal Boston can regain the traffic which it once had. The potential which Boston has to draw upon is equal to or greater than that enjoyed during the immediate postwar years. In the not too distant future, Boston, with further planning, could attract even greater traffic than that of the prewar years. The fact that at
one time there were a large number of passengers passing through the port of Boston indicates that there is passenger potential. The Port of New York now holds top position as the largest passenger port in the United States. Why? Liners come to that port for the services which are offered. Therefore, if Boston offered better and more efficient service, liners would be more eager to enter the Port of Boston.

The port would not be restricted only to summer movement, though this period would constitute the most active part of the year. During the summer ships would sail for all points on the globe. This traffic volume would be increased by summer cruises to places such as the Cape Cod Area and the Newfoundland Area. With the opening of the St. Lawrence Seaway, Boston is placed in a unique position. Despite the great fight waged by New England against the Seaway, Boston, as the closest United States deep-water port, has an excellent opportunity for sending cruise ships into the Seaway and Great Lakes during the summer shipping season.

During the winter there is naturally less activity. Nevertheless there is and will be a great interest in the Caribbean and South American Areas. This traffic, as a matter of fact, will increase during the winter months. There is also great interest in the Mediterranean Area in particular, and in tropical and semi-tropical areas in general.
With the travel interest in, and the potential traffic available to the Port of Boston, there is a need for a passenger terminal in Boston.
Site Development

The development of this site will have to begin with the construction of bulkheads and the filling of existing voids on the present site. Further, with the filling of the Fort Point Channel, the site can be extended across the channel and out to the pier-head line. The site can also be extended across Northern Avenue, or Northern Avenue can be moved back from its present position. This can be accomplished by the demolition of the three old transit sheds on the opposite side of Northern Avenue, and the reorganization of the railroad yards so that they will be able to serve the terminal facilities more efficiently.

Bulkheads must be constructed at all meetings of land and water. These bulkheads will provide a 20 foot minimum quay space at this location. Behind this will be the fill and base fill for all structures. The fill and its restraining bulkheads should be at a minimum of 18 feet above mean low-water mark. From this level all structures will emanate. However, all structures will require piles and/or caissons of 35 to 100 feet in depth. Any services which are brought onto the site under the surface of the fill will require support and complete waterproofing.
ON-SITE STORAGE

For the most efficient functioning of facilities there is a need for two transit-storage sheds. The first of the two sheds will be used for transit-storage of ships stores such as meats, fish, vegetables (frozen and fresh), linens, furniture, and other materials necessary for proper ship management. The second of the two transit sheds will be used for general cargo, whether brought in by ocean-going vessels or brought down by lighters for loading on outgoing ships.

Because of the close relationship of the sheds to the terminal and the shipping, they should be placed in close proximity to the terminal, with easy communication between them. They require a position on quay space, in order to service lighters and small freighters.

These transit sheds should be one story buildings of approximately 100,000 square feet, equipped to handle both railroad cars and trucks. The ship's-stores shed should be at least fifty-percent refrigerated.

Traffic and Parking

Railroad:

One or two railroad spurs will be necessary to serve the
terminal. They do not have to enter the terminal, but must be in close proximity to it. These spurs will connect the terminal with the transit shed and a main line or a railroad-classification yard. If possible the track should be so placed as not to interfere with other patterns of circulation.

Trucks:

Trucks, constituting the major freight mover to and from the terminal, will necessarily command more consideration than the railroads. These trucks should have a separate approach and departure pattern, with connecting patterns for the service of the terminal and the transit shed. There should also be a parking area with enough space to accommodate 50 of the largest tractor-trailers on the road.

Buses:

Buses serving the area and the terminal should have a standing area for a minimum of 10 buses. This area can be either in or near the terminal. If the stand is outside the terminal proper, two bus stops should be provided, with cover, connected to the terminal building.

Taxi:

A taxi stand is most important to the terminal. A taxi stand
for a minimum of 100 cabs should be provided in or near the terminal. The taxis should be able to enter the terminal proper to a pickup point, or, if this is impossible, provisions should be made to allow passengers to get to the taxis in the most convenient and comfortable manner.

Private Cars:

Private cars will constitute by far the greatest volume of individual vehicular traffic. A parking area for 1000 cars will, therefore, be required. These cars might be covered completely or partially, or even left uncovered. An additional 300 cars must be provided with closed storage. This would accommodate passengers who are on cruises, and who wish to leave their cars at the terminal. These facilities must be connected with the terminal, and with approach and departure patterns. In, or adjacent to the terminal should be a pickup area. This would not be a parking area but an area where cars could remain only a short length of time.
Berthing

The terminal should be serviced by two berths. In order to serve the great majority of ships now in operation or shortly expected to operate, the dimensions of a berth should be a minimum of 1200 feet in length, 120 feet in width, and 40 feet in depth at mean low-water.

It is my opinion that closed or wet docks should be used. There is no basis for economic comparison, because there are no facilities of this kind in the United States. However, Boston is in an unusual position in that it has a greater tidal variation than any port on the East Coast. The range in Boston is from 9 to 14 feet, whereas the range in New York is from 4 to 5 feet. This type of facility has never been tried in this country in combination with our ship-handling methods, and none of the existing authorities will make a definite statement on the advisability of this form of berth.

This berth would require watertight doors at its mouth. The doors would swing in, and would not close in a straight line but at a slight angle so as to better resist the pressure of the water in the berth. The height of the berth would be equal to that of the quay and cargo-hall floor.

Open or tidal berths shall be provided at the transit

(87a)
sheds, and at the harbor end of the terminal. These berths will service the lighters and local cruise ships in the area. Here again the height of these berths will be equal to the floor level of the area they are to serve.

The present deep-water channel is 40 feet in depth. In connection with Commonwealth Pier 5 there exists a 40-foot approach channel. By extending this approach channel a sufficient approach can be obtained. The approach and mooring depths at all other berths should be 30 feet.
TERMINAL

PASSenger AND PUblic AREAS

Transportation Center and Entrance

Within or directly adjacent to the terminal there should be a transportation center. This center should be situated so as to have direct access from the vehicular traffic pattern. The center should have the capacity to handle more than 1000 cars and taxis per hour. This area will be used for the arrival and discharge of passengers, their baggage, and accompanying friends.

Directly associated with the transportation center should be the entrance to the terminal building itself. From this area an individual or a group should be able to orient itself and circulate to any portion of the building.

Landing Stage at Berthside

This area constitutes the second entrance to the terminal, but its importance is by no means secondary. To this area come all passengers, both embarking and disembarking. On embarking, both passengers and their friends enter the landing stage directly from the waiting area. They enter the ship via the gangway attached to the landing stage. However, on disembarking the passengers will have to be isolated physically from the general
public and their waiting friends. From the landing stage the passengers must go directly to the Customs examination area.

Waiting Area

The waiting area of the terminal is the center of all activity. This area should be the dominant space in the terminal and all other areas should center around and be subordinated to this area. From this area the majority of the activities of the terminal should be observable; the ship should be especially visible. The ships at the terminal-side should be at all times visible from the waiting area, as well as from all other areas. In this area there will be, at peak times, 3000 people, constituting passengers, friends, and sightseers. The area required for each individual will be, at a minimum, 40 square feet. This large space requirement is necessary specifically for those passengers who emerge from Customs with their baggage, which is at times of considerable volume. Therefore, a minimum of 120,000 square feet is required.

Restaurant

The restaurant in the terminal will serve two purposes: as a service and convenience for the passengers and their waiting friends, and as a restaurant for the general public. The restaurant should be convenient to the public and should have
visual connection to the ships at the moorings or in the harbor. The service should be by waiter or waitress and should not be cafeteria style. There should be a seating capacity of 500 people with a minimum of 10 square feet per person, or a total of 5,000 square feet.

Kitchen

The kitchen should be equipped to provide all of the necessary food and service for the restaurant as well as the provision of prepared food for the local cruise liners. The kitchen does not require direct access to the restaurant, but the two should be connected by dumb-waiters, elevator, and/or stairs. The area required for this kitchen will be approximately 2000 square feet.

Bar-Lounge

The bar-lounge should be an adjunct or further extension of the restaurant, and should be directly related to it. The character of the bar-lounge should be essentially similar to that of the restaurant but necessarily on a smaller, more intimate scale. The area required would be approximately 2000 square feet.

Rest Rooms and Lounges

Public rest rooms and lounges should be placed at strategic places throughout the terminal for the comfort and convenience
of the public. Approximately 10,000 square feet will be necessary to fill this need.

Steamship Line Representatives' Offices

This terminal will be able to serve approximately 12 steamship lines. Each of these lines will require an office in the terminal. These offices will not be the major offices (which are located in town) but will service the passengers and serve as the lines' ship offices. Each line will require about 1000 square feet, making a total of 12,000 square feet of line office space.

Auxiliary Services:

The auxiliary services provided in the terminal should constitute such services as may be required by the passengers and public. These services would not be on the same scale as similar services elsewhere. However, they should be placed to provide maximum service to both public and passengers. The services required are as follows: a flower shop (1000 square feet), a novelty shop (1000 square feet), telegram and cablegram office (1000 square feet), car rental office (1000 square feet), American Express office (1000 square feet), information center (1000 square feet), money exchange and bank (1000 square feet), first aid and emergency center (1000 square feet), Railroad Express office (1000 square feet), books and news stand (1000 square feet).
GOVERNMENT OFFICES AND SERVICE AREAS

Passenger Oriented Areas

Customs Examination Area

This area is the only area where disembarking passengers are allowed immediately after leaving the landing stage. It must be the most highly flexible of any area in the terminal. The number of passengers handled may range from 50 to 1500 passengers, with their baggage. The baggage must be brought up from a lower area and placed where the passenger may claim it and have it examined. The examination generally takes a short time and for convenience an examination counter should be provided. Under no circumstances must the passengers or their baggage come in contact with the public until the examination has been completed. However, upon completion the passenger should have easy and direct access to the waiting area and exit from the terminal. With a maximum of 1500 passengers, a minimum of 10 square feet per person, or 15,000 square feet will be necessary.

Customs Supervisor's Office

This office is for the use of the Customs supervisor and should have easy access to the Customs examination area (200 square feet).

Examination Rooms

Two rooms for personal search will be necessary. These
rooms should be completely private and directly associated with the Customs examination area.

Semi-public Areas

Offices

One office for eight Customs agents will be required (1000 square feet). This office is the central control point for all passenger and cargo movement into and out of the terminal. However, this office is more oriented to the cargo service than to passenger service. Even then, the control exercised by this office is more indirect than direct. The control is exercised by the officers in the terminal, using the office as a base. Also necessary is a file and record office (1000 square feet).

CARGO RECEIVING, DISTRIBUTION, AND STORAGE

This area is the place where all bulk is received, classified, assessed, stored, and distributed. The cargo area should open directly onto the quay where the ship is moored, so as to permit free and unobstructed movement of cargo to and from the ship. After classification and assessment, the cargo is moved to the quay for loading on the ship, or else loaded into trucks or railroad cars, if these are provided. Baggage is also handled in this area. Baggage to be shipped arrives via truck and is classified as to the ship on which it will leave. Then it is
loaded on the ship much like general cargo. However, incoming baggage is moved to a point where it can be lifted to the Customs Examination Hall. If possible the baggage should not enter the cargo area but should be moved directly to the elevator or lift.

**GENERAL SERVICES**

- Porters' lockers and rest rooms - 2000 square feet
- Janitorial and cleaning services - 2000 square feet
- Police-fire station - 1000 square feet
- Circulation, stairs, escalators, elevators shall constitute twenty per cent of the area or approximately 97,000 square feet.
- Mechanical distribution shall constitute five per cent of the area or approximately 24,000 square feet.
- Mechanical equipment rooms will require 10,000 square feet for heat, air conditioning, electricity, water, plumbing, fuel and other services.

The total area of this terminal will be approximately 614,600 square feet.

**ESTIMATED COST**

Estimating the building cost for this project is extremely
difficult because there is no comparable construction anywhere in the United States. Therefore, the figures given here (based on the general knowledge of this writer) are subject to a great amount of variation, and are open to criticism.

Acquisition of site and rights of way $1,000,000.00
Boring, engineering data, and miscellaneous data 500,000.00

Construction:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quays, fill, drainage, tracks, berths, and general site preparation</td>
<td>7,000,000.00</td>
</tr>
<tr>
<td>Passenger terminal</td>
<td>4,000,000.00</td>
</tr>
<tr>
<td>Transit sheds</td>
<td>1,200,000.00</td>
</tr>
<tr>
<td>Utilities, streets, and parking</td>
<td>700,000.00</td>
</tr>
</tbody>
</table>

Total $14,400,000.00

DESIGN OBJECTIVES

Along the waterfront there is a great contrast in size (scale). The size of the ships which come into this port present such a powerful form in contrast to the buildings and the pier upon which they rest, that the extreme contrast not only
destroys the power of the ship but the power of the spars, rigging, and ports atop the hull. Basic to this objective is the necessity of instilling into the terminal a dignity which it will retain after the ships have left. Further, the terminal must provide a scale which will allow an individual to relate the scale of the ship to the terminal and to himself. The terminal should modulate the scale of the hull, while bringing together the infinite detail which rests upon the hull.

Another objective for which to strive is the provision of an entrance. Seaports are gateways to the areas which they serve. Therefore, the terminal in this port must be the gateway for Boston and its near and far hinterland. The terminal and its facilities must present to those passengers, both entering and leaving, a suitable gateway through which to pass. At the same time, this gateway should not be so powerful that the individual is made insignificant and feels uncomfortable and dislocated as a result of any over-monumentality.

At the same time, however, the third objective calls for the relief of a further contrast which exists; namely the luxury of ships versus the lack of luxury on land. The terminal should offer in both scale and facilities the luxury of the ship which the passengers have just left, or upon which they are about to embark.
The last of the objectives, but not less important, is to offer some sense of order to the waterfront area by giving to the waterfront a dignity and attraction which until now has evoked mere curiosity and/or disgust. By impetus of example, this could move other interests to rejuvenate and order the waterfront, and possibly create or recreate a public interest and respect for the waterfront.
V. DESCRIPTION OF DESIGN
The original site has been expanded and reshaped. The waterfront profile has been modified as well as the overall pattern of traffic and building. The face of the area has been put through a rather sweeping change.

The most comprehensive changes are in terms of the handling and distribution of traffic. This was primarily brought about by raising the cars, taxis, and buses above the ground level, to the level of the passenger floor in the terminal. By this means it was possible to separate this traffic from that of railroad, truck, and service vehicles which constitute a large part of the traffic. The upper traffic level is connected with surface or artery traffic at four points. The first point is an extension of the central artery. This section goes east across the mouth of Fort Point Channel, which has been filled, and turns south to meet the second connection which is a ramp coming up from the surface at Sumner Street. These two then turn east to form the major approach to the terminal and the parking garages. After passing the terminal the traffic continues east to Commonwealth Pier 5, at which point are two ramps leading to the surface. The first continues east along the waterfront, and the second turns south to Sumner Street. The trucks and service vehicles follow a similar pattern at street level.
The parking for all passenger vehicles occupies a garage building on the land side of the terminal. There are three levels of parking including the surface level. The major garage entrances are at the terminal entrance. There are several secondary entrances at points along the approach and on the surface. Trucks are parked primarily within the terminal and transit sheds, except for approximately fifty parking spaces which are located across the north face of the eastern approach.

Just opposite this parking area is the cargo transit shed. This shed fronts on a depression which forms a basin for lighters and tugs serving the shed and the terminal. On the eastern face of this basin is a shelter which covers a railroad spur. At the outer end is a building which houses tug boat offices and the pumps for the docks. Atop this building and running back along the spur shelter are provisions for spectators. This connects with the roof of the garages, providing more spectator space. On the opposite side of the terminal, and parallel to it, is a promenade which continues out over the ship's stores' transit shed. This shed forms the eastern limits of the site.

The terminal itself is flanked on both sides by closed or wet docks. The doors of the locks are at the extreme end of the terminal pier. Slightly inward of the doors are bridges connecting the two above-mentioned platforms with the passenger level of the terminal. These bridges also serve as protective barriers guarding the lock doors.
The passenger terminal occupies a central location on the site. Passengers enter from the passenger-vehicle level on the land side of the site. Two traffic fingers extend into the terminal with provisions for short stops, taxi parking, and bus stops. This area leads directly into a low area flanked by service units such as Railway Express, money exchange, telegram-cablegram, etc. Centered in an opening in the middle of this area is the central information center. Next is the central waiting area. Beyond the central waiting area is another low area containing a restaurant, bar, etc.

Completely circling the waiting area is a mezzanine. Under the east and west section of the mezzanine is the landing stage and Customs area. Directly above these areas is an observation deck running the length of the inside of the terminal. At the north end of the mezzanine is a sitting area overlooking the harbor. At the south end of the mezzanine is located the office of the lines serving the terminal. The mezzanine is reached via two pairs of stairways at the north and south end of the waiting area.

At the extreme north end of the terminal is an observation deck which also serves as landing stage for local cruise ships. This deck opens into the terminal and is also accessible via two guard bridges.
External means of communication are located at the four corners of the terminal. These stairs connect the mezzanine with the passenger level as well as with an intermediate level below the passenger level. The northern level maintains facilities for service personnel while the southern level serves as Customs headquarters.

Below these areas is the cargo handling area. This area is entered at the south end of the terminal with a depressed truck lane running the length of the terminal. Lining both sides of this lane are loading docks. Beyond the loading docks are storage and classification areas which open directly onto the quays.

The mechanical service to the terminal is divided into four zones, each serviced by a core. Primary service is located in the garage. The cores contain the secondary heating and ventilating units, distribution centers, elevators, dumb waiters, and all other necessary and vertical distribution. All the horizontal distribution is carried through thickened floor slabs.

The base structure is based upon a forty foot square bay. Each column of the structure is supported by a pile or piles. The roof structure is based upon four hyperbolic paraboloids around a single column, repeated on the opposite side. The outer edges form a straight line; the inner edge forms a straight line twice as high as the outer edge. The two complimentary bays
are separated by a modulated skylight running the length of the terminal. However, at the ends of the terminal the center drops down to the level of the outer edge. Two additional bays constituting "umbrellas" cover the traffic center.
FOOTNOTES


5. Ibid., page 1.

6. Ibid., pages 18-19.


8. Ibid., page 45.


12. Ibid., pages 23-25.


15. Ibid., page 35.


BIBLIOGRAPHY


(104)
AUTHORITIES CONSULTED:

City of Boston City Planning Board.

Commonwealth of Massachusetts Port of Boston Commission.

Department of Architecture, Massachusetts Institute of Technology.

Department of Naval Architecture and Marine Engineering, Massachusetts Institute of Technology.

Steamship Line Representatives in Boston.

U. S. Department of Commerce, Coast and Geodetic Survey.


U. S. Department of Justice, Immigration and Naturalization Service.

U. S. Department of the Treasury, Customs Service.

(105)
A PASSENGER TERMINAL FOR THE PORT OF BOSTON, MASSACHUSETTS

A WORKING PROGRAM

Site:

The eastern extreme of the site is at longitude 71°-3'-4" west and latitude 42°-21'-14.5" north. It will extend south-east along Northern Avenue to Commonwealth Pier 5; north-west along the pier-head line to Fort Point Channel; and south-west along the channel to the starting point. The entire site will be on fill, and all structures will be on caissons or piles from 35 to 100 feet in depth.

On Site Storage:

Two (2) single story transit-storage sheds at 100,000 square feet each. These sheds must be serviced by rail and truck, and should have easy access to the terminal.

Traffic and Parking:

Rail,

One (1) or two (2) railroad spurs to service the terminal and transit sheds; with connections to a main line or yard.

Truck,

Approach and departure pattern for trucks and tractor-trailers. This pattern should service the terminal and sheds. There
should be parking for 50 such vehicles.

Bus;
Bus stop and standing area for ten (10) busses in or near the terminal. This shall be separate from rail and truck traffic.

Taxi,
Stand for 100 taxis in or near the terminal. This shall be separate from rail and truck traffic.

Private Cars,
Approach and departure pattern for cars (cabs and busses) linking the terminal, 1000 car parking area (may be covered in part or whole), and a 300 car storage garage. This shall be separate from rail and truck traffic.

Berthing:
Two (2) berths in conjunction with terminal. They will be closed berths: length 1200 feet, width 120 feet and depth at mean low water 40 feet. A third open or tidal berth should also be located at the terminal for the use of local cruise ships.

Quay:
Quay space shall be provided at all water-sides with 20 feet of clear unobstructed and continuous space with no overhead obstructions.

Channel Approach:
A channel approach of 40 feet at mean low water to terminal.
Terminal:

Passenger and Public Areas,
- Transportation center and entrance
- Landing stage at berths
- Waiting area for 3000 people with 40 square feet per person
  or 120,000 square feet
- Restaurant to seat 500 people with 10 square feet per person
  or 5000 square feet
- Kitchen, 2,000 square feet
- Bar-Lounge, 2,000 square feet
- Rest Rooms and Lounges, 2,000 square feet
- 12 line offices at 12,000 square feet each or 12,000 square feet

Auxiliary services,

- Flower Shop - 1,000 square feet
- Novelty Shop - 1,000 square feet
- Books and News Stand - 1,000 square feet
- Telegram and Cablegram Office - 1,000 square feet
- Car-Rental Office - 1,000 square feet
- American Express Office - 1,000 square feet
- Information Center - 1,000 square feet
- Money Exchange and Bank - 1,000 square feet
- First Aid and Emergency Center - 1,000 square feet
- Railroad Express Office - 1,000 square feet

(108)
Government Offices and Service Areas:

Passenger-oriented areas,

Customs examination area for a maximum of 1,500 passengers with 10 square feet per person or 15,000 square feet. Disembarkment must be directly into this area with controlled access to waiting area. There should be counters for baggage examination.

Customs Supervisor's Office - 200 square feet

Two (2) Examination rooms at 200 square feet each

Semi-Public Areas,

Offices for eight (8) Customs Officials - 1,000 square feet

This office shall be the central control point for all passenger and cargo movement.

Files and Records Office - 1,000 square feet

Cargo Receiving, Distribution, and Storage:

300,000 square feet with truck docks and rail spurs (can be omitted)

General Services:

- Porters Lockers and Rest Rooms - 2,000 square feet
- Janitorial and Cleaning Services - 2,000 square feet
- Police-Fire Station - 1,000 square feet
- Stairs, Escalators, Elevators, and Circulation - 20% of the total area - 97,000 square feet
- Mechanical Distribution 5% of the total area - 24,000 square feet
feet

-Mechanical Equipment Rooms - 10,000 square feet

TOTAL TERMINAL AREA - -------------- 614,600 square feet