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May 1985

San Francisco Bay Ports Access Study

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California
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Caltrans

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

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TO ALL INTERESTED READERS

This report, the San Francisco Bay Ports Access Study, is a comprehensive review of the port access needs of the San Francisco Bay Area ports, including the trends that will affect those needs in the years ahead. Developed primarily as a briefing document for department and port personnel, the report:

- describes the six active ports in the Bay Area, including their present facilities and development options;

- presents and evaluates the Bay Area waterborne commerce (dry cargo) flow forecasts, including both export and import cargos, moving both to and from domestic and foreign points;

- analyzes the patterns of land-side cargo movement and how they may change in the future, including mode share (truck, rail, other) and destination;

- identifies the present and projected port ground-access network demands and problems; and

- discusses the responsibilities and efforts by the ports, local agencies, the Metropolitan Transportation Commission, Caltrans, and the California Transportation Commission to identify and resolve these problems, in light of current transportation funding limitations.

This report is one product of the department's system planning efforts, as it endeavors to facilitate goods movement and the overall development of the state's transportation systems. Please contact us if you have any questions about these efforts or this report.

Sincerely,

D. L. Wieman

D. L. WIEMAN, Chief
Division of Transportation
Planning

WATERBORNE COMMERCE TRENDS

AND PORT GROUND ACCESS PROVISION:

SAN FRANCISCO BAY PORTS ACCESS STUDY

STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION
DIVISION OF TRANSPORTATION PLANNING

by

Richard A. Nordahl

Office of Policy Analysis

May 1985

Prepared with the cooperation
of the
U.S. Department of Transportation
Federal Highway Administration

San Francisco Bay Ports Access Study

May 1985

ERRATA

- State Route 17 between Interstate Routes 80 and 101 is now Interstate Route 880.

- (Page 194): Southern Pacific Road is wholly owned by Southern Pacific Railroad, rather than by the City of Oakland and the Southern Pacific Railroad.

- (Page 184): According to Encinal Terminals, "...Alameda Belt Line Railroad is not a city-owned railroad company. In fact, certain tracks of Alameda Belt Line were owned by Encinal Terminals until 1924, when Western Pacific and Santa Fe railroads, jointly, formed Alameda Belt Line Railroad".

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ACKNOWLEDGEMENTS

This report provides a review of San Francisco Bay Area Ports ground access problems: their sources, their locations, and their status, both today and in the foreseeable future. Its preparation would not have been possible without the generous assistance of numerous parties, including Bay Area port officials, industry representatives, and federal, state, and local government staffers, including dedicated clerical staffs. Particular thanks are expressed to Dennis Fay of the Metropolitan Transportation Commission and Phil Kern of the San Francisco Bay Conservation and Development Commission, for their guidance and information.

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I. EXECUTIVE SUMMARY

Introduction

Seaport ground access planning is an investigative effort to determine how the state's transportation systems might be affected by the growth in the movement of international trade through the state's seaports. Since one of its primary products is the identification of future trends and projected roadway demands, it serves as one element of input to the California Department of Transportation's (Caltrans) System Planning Process. This process in turn attempts to define what the future demands might be on the state highway system, and how that system might operate, given various alternative investment levels.

This study of San Francisco Bay Area port access is one product of that seaport ground access planning effort. Looking at both the present and the future, this study identifies:

- the specific waterborne commerce volume and transport trends that result in transportation system demand;

- how and where that commerce is transported (from a land-side, origin and destination focus);

- significant port access problems, from both a operational and a capacity perspective; and

- how organizations could or are working together to solve these problems.

This report both summarizes and updates the San Francisco Bay Area Seaport Plan (and related documents), prepared jointly by the Metropolitan Transportation Commission (MTC) and the San Francisco Bay Conservation and Development Commission (BCDC). This report is based on these Seaport Plan documents; interviews with maritime and port representatives, and governmental transportation officials; and on other recent information that has become available since the preparation of the Seaport Plan.

The report has been developed to serve two audiences: highway and rail system decision-makers and staffs; and port personnel. It is not designed to recommend solutions to port-access problems. Rather, it provides each audience with a summary and an update of the issues, problems, and procedures involved in the provision of adequate port ground access.

International Trade Trends

The demand for port ground access is being affected by some of the same trends that are affecting California's transportation system in general. For example, according to recent data compiled for the System Planning effort, and using 1983 as a base, by the year 2000, California's population is projected to rise 25 percent to 31.4 million. However, during this same period, vehicle miles of travel are projected to rise 46 percent. Likewise, goods movement is projected to rise at the same rate as auto travel, in part a reflection of California's expanding role as the main gateway to the Pacific and the increasing flow of international trade.

The increases in international trade projected for the San Francisco Bay ports is a reflection of these trends. Based on our analysis, dry cargo (i.e., that cargo which is primarily moved landside on the state's roadway and rail systems) volumes alone are projected to increase 92 percent between 1983 and the year 2000, and 121 percent between 1978 and 2000. As a result, significant increases in port operations and ground access system demand can be expected.

What are some of the components of this trend, and how are they changing? Dry cargos include containerized cargos, i.e., those which move in standardized shipping containers--the state of the art of shipping technology today. They also include those which move as separate pieces, on pallets for example, known as break-bulk. In addition, they include cargos which move in bulk quantities, such as grain or coal, classified as dry bulk, or autos or steel moving in full ship loads, classified as neo-bulk.

Given the ease of use and cost advantages of containers, however, more and more cargos are being containerized. As a result, containers are capturing a increasing share of all dry cargos moving through the San Francisco Bay Area ports. This is reflected in the revised forecasts used in this report. For example, looking from a short ton perspective, while containerized cargos comprised 53 percent of all dry cargos in 1978 and 56 percent in 1983, they are projected to total 73 percent of all dry cargo shipments by the year 2000.

Increasingly, these cargos are going to or coming from the nations of the Pacific Rim, including Japan, Taiwan, Korea, and Hong Kong. In the last few years, this trend has been affected not only by the rise of imports from these nations as a result of our nation's growing economy and strong dollar, but by the transshipment of cargos to and from West Coast ports and inland and East Coast points by rail, a transport innovation called landbridge.

These trends were identified in the forecasts prepared for MTC/BCDC in the late '70s. Bay Area dry cargo volumes, predominantly from the Pacific Rim, were forecast to increase 170 percent between 1978 and 2000. Containerized cargo volumes were expected to be the main growth component of this increase, growing 291 percent on a short ton basis, 347 percent on a revenue ton basis. (In references to containerized cargos, "revenue tons" is used throughout this report, for it reflects more clearly the growth in the size-to-weight ratios of container cargos, and thus the demand for port and ground-access facilities.)

However, two major shifts have taken place since the MTC/BCDC forecasts were prepared. First, the growth in container volumes has slowed, but not in terms of overall West Coast container trade. Rather, other West Coast ports, notably Los Angeles, Long Beach, and Seattle, have diverted some of the Bay Area ports collective share of this important trade. As a result, the Bay Area port's share of the trade has dropped, from 30 percent in 1979, to under 24 percent in 1983. The reasons for this share loss are neither explicitly clear nor well understood. However, it is surmised that a smaller local market, shallower port channels, the recent dominance of import versus export cargos, and slower overland transportation routes, may be contributory causes. Because of this shift since the forecast was prepared, Bay Area container volumes growth probably will be less than forecast. Whereas MTC/BCDC predicted an increase of 347 percent between 1978 and the year 2000 in their baseline (i.e., most likely) forecast, we conclude that they will grow only slightly more than 250 percent, i.e., the level shown in their low forecast.

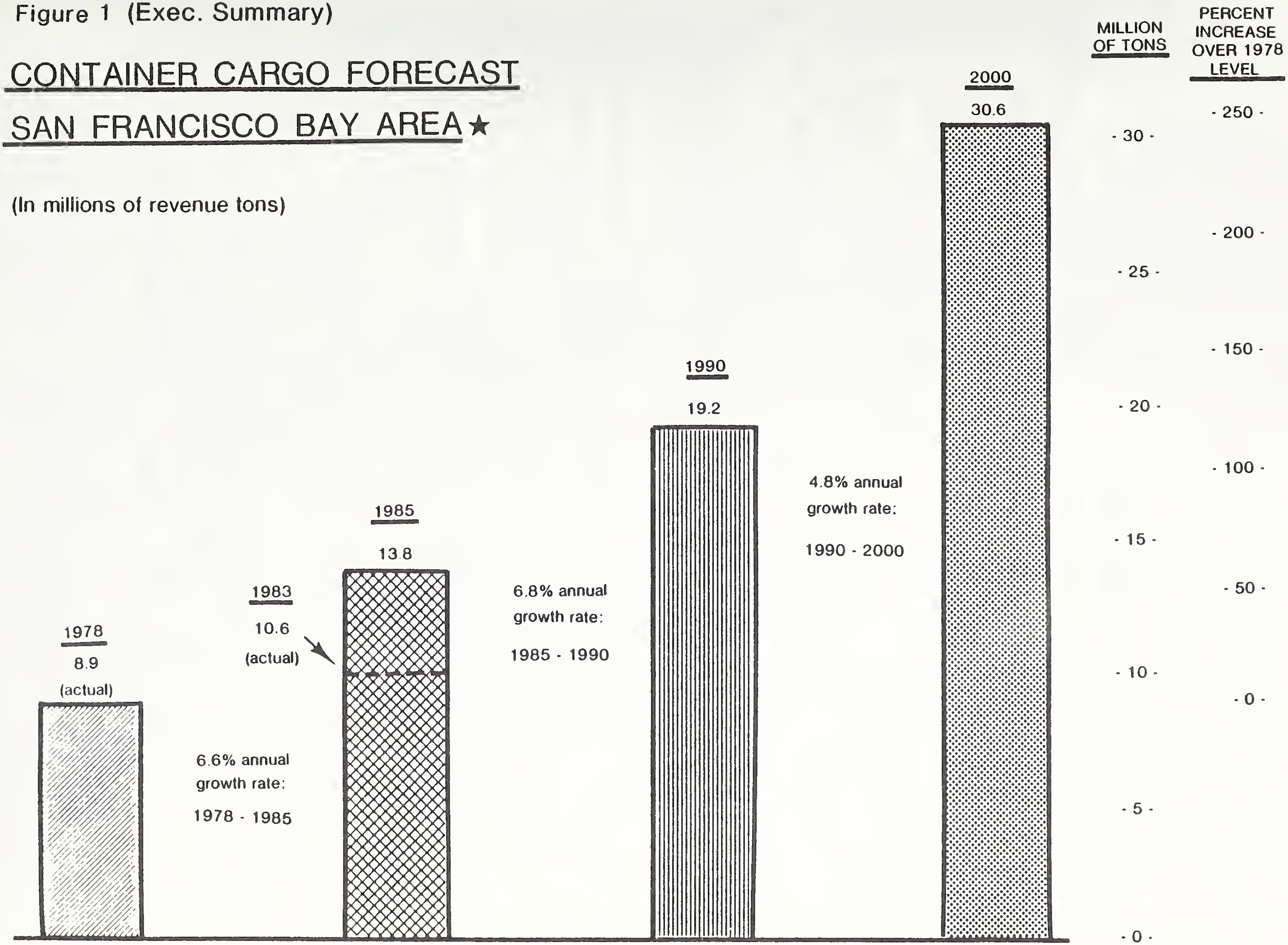
Second, grain export volumes between 1979 to 1983 have actually decreased markedly rather than grown, due to both the normal volatility in Bay Area and world grain trade, and the depressive trade effect of the sharp rise in the value of the U.S. dollar. As a result, it is very unlikely that the growth in the shipment of grains between 1978 and 2000 will be more than the 182 percent shown in MTC/BCDC's low forecast.

Nevertheless, using these two low forecast elements, it is apparent that there still will be substantial growth in cargo handled through the Bay Area ports. Container revenue ton volumes are expected to grow over 250 percent, from 8.9 million revenue tons in 1978, to 10.6 million revenue tons in 1983, to 30.6 million revenue tons by the year 2000 (see Figure 1). Meanwhile, the movement of noncontainerized cargos is expected to grow much more slowly, from 4.4 million tons in 1978, and an estimated 4.8 million tons in 1983, to 5.7 million tons in the year 2000, an increase of just 29 percent between 1978 and the year 2000. Overall, on a short ton basis, dry cargo volumes should grow from 9.4 million tons in 1978, and an estimated 10.8 million tons in 1983, to 20.8 million tons in the year 2000, an increase of 121 percent between 1978 and the year 2000.

Figure 1 (Exec. Summary)

CONTAINER CARGO FORECAST
SAN FRANCISCO BAY AREA ★

(In millions of revenue tons)



★ Developed from Seaport Plan Final Technical Report, p. 40

San Francisco Bay Port Facilities

In the previous section we discussed the demand side of the picture. But what is the supply side? At what port facilities will these cargos be handled? Will the ground access system be adequate to handle them in a efficient manner? To understand the issues, one has to look at the elements of the system today. The San Francisco Bay ports are made up of six public-serving, dry cargo entities (see Figure 2). Four are publicly owned (the Ports of Oakland, Redwood City, Richmond, and San Francisco), and two are privately owned (Encinal Terminals within the Port of Alameda, and the Port of Benicia). Together, they have a combined total of 163 wharfs, piers and berths (75 when only designated dry cargo berths are counted).

Of these Bay Area ports, by cargo volume, Oakland is the largest. It handles over 50 percent of all Bay Area dry cargo tonnage, and almost 90 percent of all containerized cargos. From a physical standpoint though, San Francisco is the largest. Of the Bay Area ports, it handles the second largest volume of cargo and containers, and it is presently the only Bay Area port with direct on-site intermodal transfer of cargos from ship to rail.

It was the continuing growth of these ports and of cargo demand, and an attempt to guide the ports' development, that led to the development by MTC, BCDC, and the ports of the Seaport Plan.

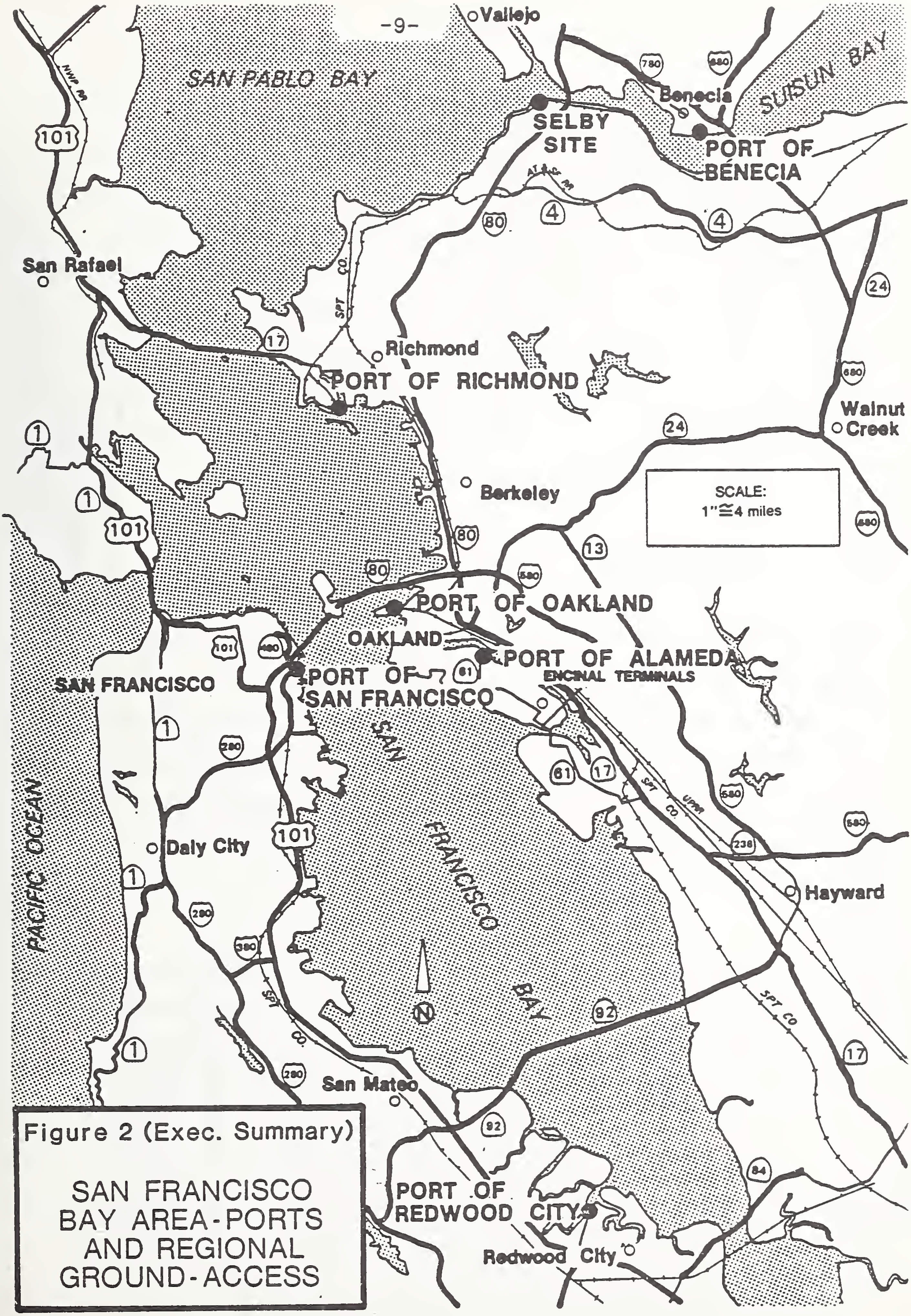


Figure 2 (Exec. Summary)

SAN FRANCISCO BAY AREA-PORTS AND REGIONAL GROUND-ACCESS

Adjusting for recent events, the plan identifies 21 "near-term" port terminal development sites, of which 17 would be suitable for container terminal development. At these sites, 40 berths could be developed, including 34 for container cargos. These sites were considered the best of the 87 sites identified for potential new or modernized Bay Area port terminals, as a result of MTC/BCDC's analysis of each site's environmental, land-use, and ground-access characteristics. But given the trends outlined above dealing with projected cargo flows, it is estimated that only 21 new berths will be required, 16 for container cargos, by the year 2000.

Port Ground-Access Demand

What do these increases in cargo movement mean for the area's local, regional, and state transportation systems? One can look at the projected volumes of trucks and autos moving to and from the area's container terminals. Truck movements amounted to 6,000 in 1978 and 7,200 in 1983, but are projected to grow to 20,800 by the year 2000. Auto movements, in turn, will grow from 9,900 in 1978, and 11,900 in 1983, to 34,300 by the year 2000.

Figure 3 depicts the near term effect of the projected increases in cargo movement from a origin/destination and trip mode perspective. Given the 1985 cargo demand forecast, 53 percent of these cargos will move to and from Bay Area locations, 18 percent to other

Figure 3 (Exec. Summary)

BAY AREA CARGO MODAL SPLIT

(MTC's Consultants' Assumptions)

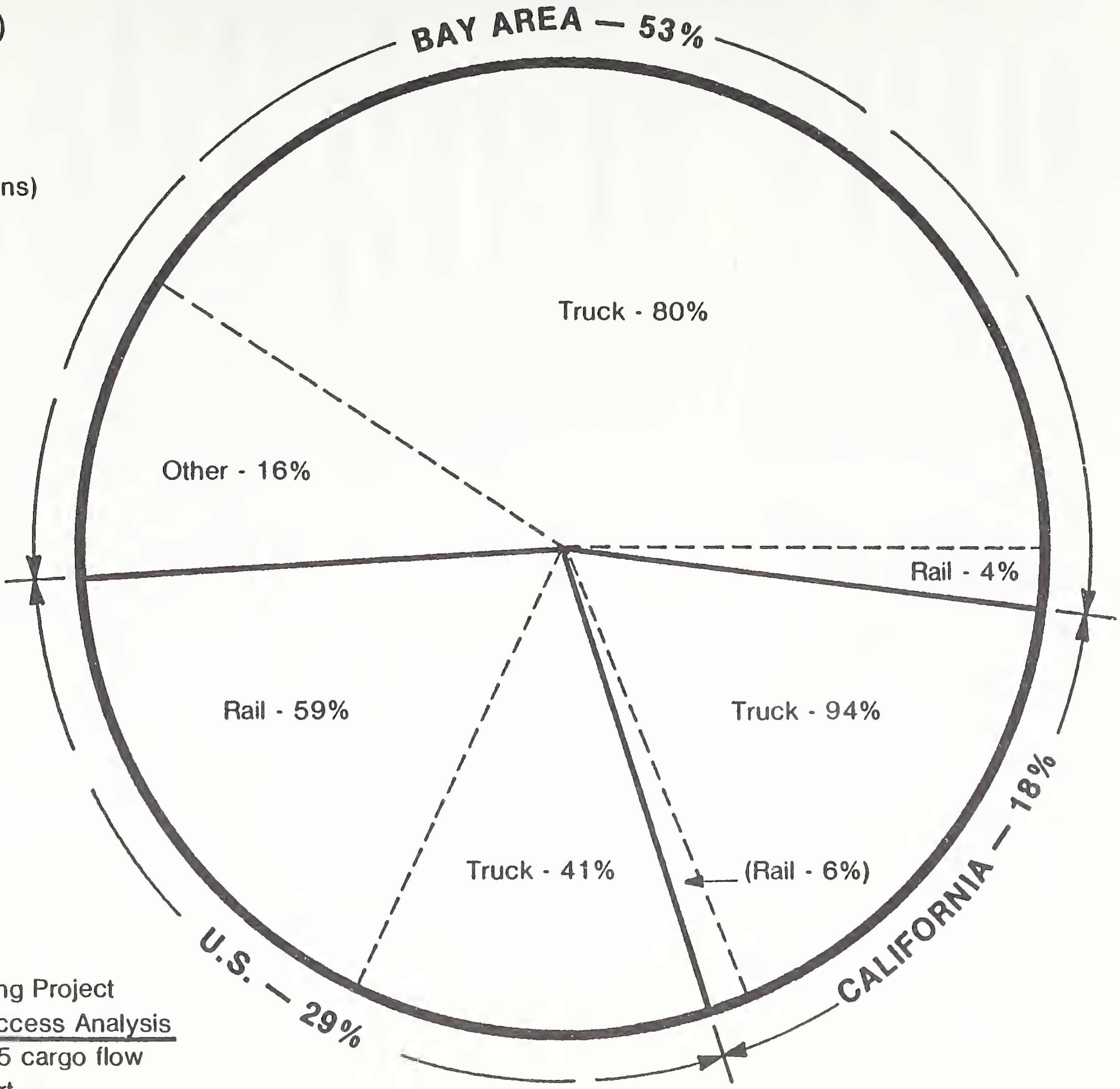
Overall Modal Split

- Truck: 71%
- Rail: 20%
- Other — Pipeline, barge, or on-site use: 9%
- Total, All Movements: 100%

Overall Cargo Volume Split

- Exports, Domestic Shipments: 59%
- Imports, Domestic Receipts: 41%
- Total, All Shipments: 100%

Basis: MTC/BCDC Port Planning Project Working Paper #12, Ground Access Analysis (Berkeley, 1980), and the 1985 cargo flow forecasts identified in this report.



California locations, and 29 percent to other states. Just 20 percent of these cargos will move by rail, mostly to other states. But note that virtually all cargos must at least begin or end their trips by truck. Furthermore, these line-haul modal shares were forecast prior to the deregulation of the freight transportation industry. Thus, they do not reflect the major impact that deregulation has had in the movement of freight.

Even with these caveats, it can still be seen that the area's transportation systems will be impacted by these increases in cargo movement. Yet that impact will vary widely, as it does now. On some local access roadways, port-related traffic, as a share of all traffic and/or truck traffic, can be quite high. But on the regional network, that percentage share is quite small, averaging generally one to two percent of all traffic, and 10 to 15 percent of truck traffic. Even on the Nimitz Freeway (State Route 17) in Oakland, port-related traffic presently comprises just 2.7 percent of all traffic, and 10 percent of all truck traffic. Nevertheless, considering the relative amount of land devoted to port operations, the Bay Area ports still generate a significant share of regional, as well as local roadway system traffic.

Port Ground-Access Problems

Yet, how are the transportation systems and their components handling this traffic today? What is likely to be the situation by the end of the decade? Based on our analysis, listed below are the most significant problems found at each port and/or region as a whole:

- Port of Alameda/Encinal Terminals: Access to Encinal Terminals will continue to be difficult, due to an at-capacity operation of the Alameda Tubes, and because of a complicated truck access from State Route 17 to the port through the east side of Alameda.

- Port of Benicia: No significant problems.

- Port of Oakland: Currently, Seventh Street is operating at the desired minimum roadway service level (technically, Level of Service "D"). Due to both port development, and the expansion of the Southern Pacific West Oakland Yard, this condition is likely to further deteriorate. Outbound access, from the Outer Harbor Terminals area (West Grand Avenue, Maritime Avenue area) to southbound State Route 17, is presently neither direct nor convenient.

- Port of Redwood City: No significant local access problems.

- Port of Richmond: Access to the port area will remain congested until the John T. Knox Freeway (Interstate 580) is completed. Rail services may also be affected by the proposed closure of Santa Fe's Richmond Yard.

- Port of San Francisco: Depending on the final plan of action selected, access to the Northern Waterfront area (north of the Ferry Building) could deteriorate due to changes to the Embarcadero Freeway. Local access to the San Francisco Container Terminal-North (via Army Street), will continue to be difficult, particularly for oversize trucks coming from or going to the East Bay.

- Regional highway access-East Bay: Both State Route 17 (the Nimitz Freeway) and Interstate 80 are presently operating at or below an adequate roadway service level. Highway construction impacts (through the early 1990's) and East Bay traffic growth may lead to continued impeded access to Encinal Terminals and the ports of Oakland and Richmond.

- Regional highway access-West Bay: Presently, U.S. 101 operates at or below adequate roadway service levels.

With the amount of commercial development underway or planned along the entire San Francisco peninsula corridor, this situation probably could deteriorate significantly. Thus, given limited roadway capacity expansion options, regional access to the ports of Redwood City and San Francisco may deteriorate further, unless other transportation alternatives are expanded and promoted.

- Rail access: Due to the decline of freight volumes to and from Peninsula points including San Francisco, freight rail service to San Francisco and the port has been infrequent. It is likely Bay Area rail services will be affected by the proposed merger of the Southern Pacific and the Santa Fe Railroads. Yet the significance of that impact on the ports individually or collectively, or whether that impact will ultimately be positive or negative, cannot be determined with any certainty at this time.

Port-Access Problems Resolution

A number of agencies and organizations are involved in different ways in trying to improve port ground-access. They include: the California Transportation Commission (CTC), in the programming and allocation of funds for construction projects; Caltrans, in long-range system planning, project design and construction, and highway maintenance; MTC, through its Seaport Planning Advisory Committee and its cooperative regional and local programming process; and the ports and their enveloping local jurisdictions, as they deal with port long-range development plans and day-to-day operational needs, and as they respond and/or provide input into Caltrans' and MTC's transportation improvement programs. Yet, in defining and implementing solutions to port ground-access problems, they share a common problem: Limited transportation funding resources.

The magnitude of this funding problem is illustrated in the results of two recent analyses. On the local access network, there exists a significant shortfall in the funds needed to maintain the existing network, let alone to make significant additions and/or improvements. According to a recent MTC study, the region-wide shortfall in fiscal year 1980/81 amounted to over $100 million. On the regional access system, rising construction and maintenance costs, and relatively fixed categorical revenues, may limit future highway improvements. According to a recent California Transportation Commission report, statewide there is a projected $763 million shortfall in the state funds required to sustain existing 1984 STIP commitments, and to match all available federal funds expected to be available, for the 1985 STIP. A similiar conclusion was reached by Caltrans in its recently released System Planning report. Nor is the region's transit network immune from these problems, for as costs continue to rise, and as federal capital and operating funds are frozen at current levels or reduced, the ability of these systems to relieve some of the pressure from the highway network will be reduced.

Despite these future constraints, many current projects are in the development stage or are under construction, including the John P. Knox Freeway (Interstate 580) in Richmond, and improvements to Interstate 80 and the Nimitz Freeway (State Route 17). According to the CTC's adopted 1984 State Transportation Improvement Program, $362.5 million is programmed over the next five years for major (i.e., over $250,000) projects that will directly benefit regional port access. Nevertheless, the shortage of funds may limit or delay additional necessary improvements to the transportation network. Thus, restructuring of the revenue base may have to be considered, plus a greater participation by the ports and maritime industries in financing transportation improvements may be required. Involvement, such as the Port of Oakland's financial role in upgrading Maritime Avenue, may have to become more commonplace if necessary improvements are to occur.

These are the trends and problems facing transportation decision-makers and planners as they attempt to improve San Francisco Bay Area ports ground-access. It can be done, but it will take an integrated, cooperative effort by all parties involved.

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II. INTRODUCTION

Over recent years, our ports have seen tremendous growth in trade, as this nation's demand for goods and services increases, and as the world's, and particularly the Pacific Basin nations'[1] markets open up to American foodstuffs, products, and services. Trade specialists project these trends to continue, particularly in the shipment of commerce in containers, and of grains, coal, and oil in bulk.

For this state (and this nation) to be a successful exporter and importer, the ports must be able to move that commerce quickly and efficiently to and from their operations. This requires, in part, good port ground-access facilities, which are designed, built, and operated with the needs and desires of the ports in mind. In response to this transportation need, the California Department of Transportation (Caltrans) has conducted in recent years studies into the demand for, the supply of, and the operational characteristics of port ground-access facilities. Previous studies have looked at certain California ports in particular (e.g., the Ports of Los Angeles and Long Beach[2]) and at some of the emerging methods and technologies that could significantly affect port ground-access provision (e.g., intermodal freight transfer

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[1]See Glossary for the definition of this and other terms.

[2]California Department of Transportation (Division of Transportation Planning), The Role of the California Department of Transportation in Port Transportation Planning: The Ports of Los Angeles and Long Beach, (paper), Sacramento, November, 1982

facilities[3]). This study focuses on the port ground-access needs of the San Francisco Bay Area ports.

In reviewing this report, the reader should be aware of two points regarding its intent and purpose. First, given the resources available to conduct the study (as well as the expected audience), this report is intended to be an overview. Thus, it is a review of existing literature and data, and the thoughts and understandings of port and industry officials and governmental staffs. It describes their view of:

- What makes up the ports? What do they represent?

- What are the volumes of commerce being moved through them, both now and projected into the future?

- What are their current and potential port ground-access problems?

- How is the public and the private sector responding to these problems? and,

- What might be done to address them in the future?

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[3]California Department of Transportation (Division of Transporttion Planning), Intermodal Freight Transfer Facilities in California, (paper), Sacramento, October, 1982

Second, the purpose or intent of this report is to help its readers understand the complex nature of the ports, their operations, and the challenges they face in moving commerce between the ports and destinations worldwide. Through this understanding, the reader will be better equipped to balance the need to enhance the economic viability of the Bay Area ports through ground-access facilities, versus the need for such facilities by other ports and for transportation facilities by the society at large in an equitable, cost-effective, and environmentally sensitive fashion. It is on these bases that this report has been developed.

III. BAY PORTS DESCRIPTION

A. Introduction

The San Francisco Bay Area ports are a grouping of six main ports which lie on San Francisco Bay and associated inlets (see Figure 1). Of these six ports, four are publicly operated, San Francisco, Oakland, Richmond, and Redwood City, and two are privately operated for general public cargos, Encinal Terminals and Benicia. In addition, there are numerous privately operated proprietary facilities (particularly within Alameda and the area in and north of Richmond), the most notable of which are for the receipt and shipment of petroleum products. The Bay Area is also known for its naval installations and repair facilities. These include the Alameda Naval Air Station, the Mare Island Naval Yard, and the Treasure Island Naval Base.[4,5]

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[4]For a more general, statewide overview of California port facilities and their operations, see California Department of Transportation, The California Transportation Abstract (Sacramento, 1983), pp. 135-184.

[5]Currently, most of the Bay Area's non-liquid cargos move through these general, public-serving ports. This includes most military cargos which are neither destined for open ocean ship deployment, or are sensitive (i.e., classified) in nature. Thus, the analyses contained in this report will be generally confined to these commercial, public-serving, facilities.

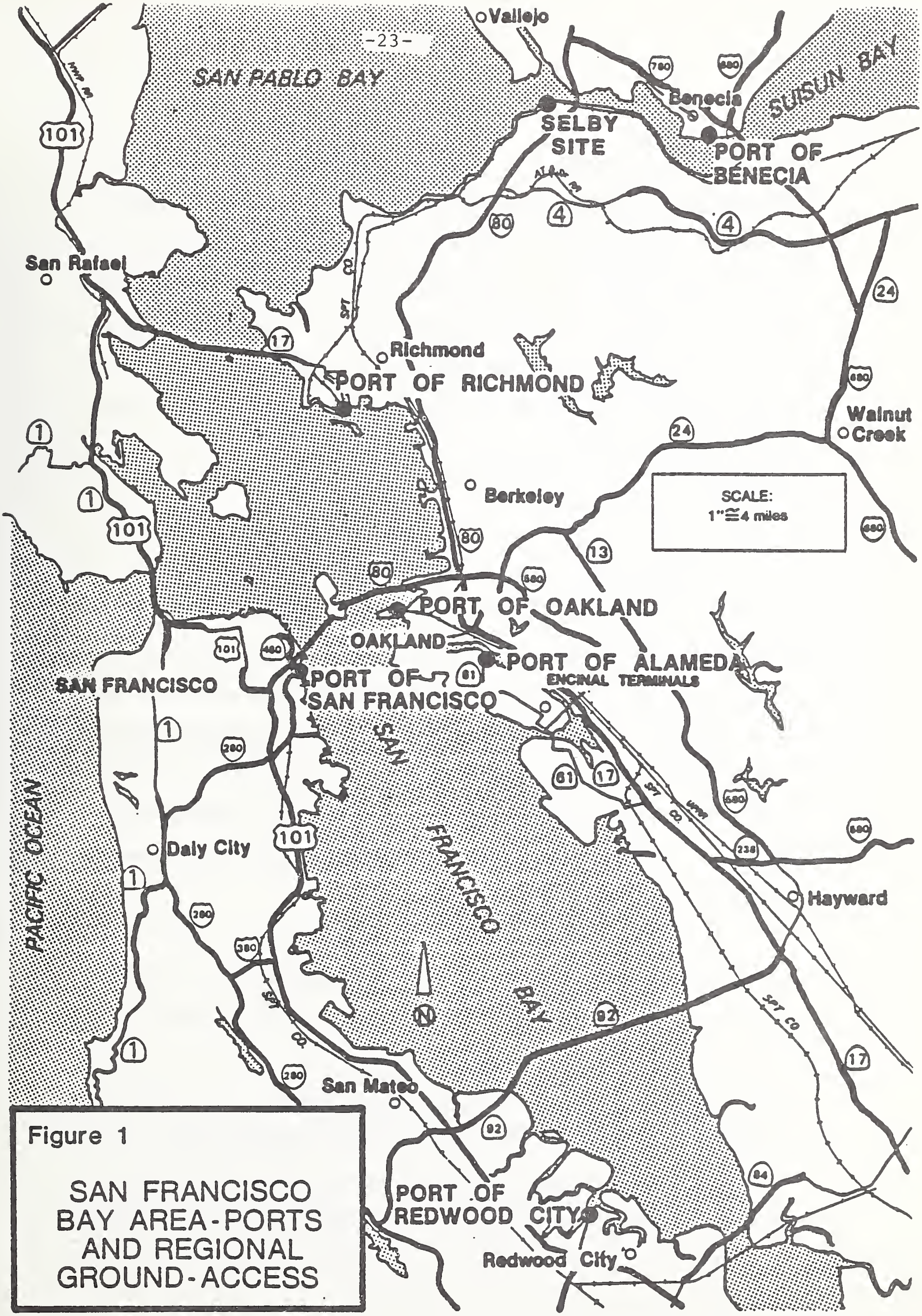

Figure 1

SAN FRANCISCO BAY AREA-PORTS AND REGIONAL GROUND-ACCESS

As a group, the Bay Area ports lie in the middle of the state's coastline, approximately 420 miles north of the San Pedro Bay ports of Los Angeles and Long Beach, and 650 and 830 miles south of the Columbia River ports (e.g., Portland) and the Puget Sound ports (e.g., Seattle), respectively. From a regional vantage point, highway access is provided by several interstate, U.S., and state numbered highways, the most notable of which are Interstate 80, U.S. 101, and State Route 17.

Rail access is provided by three main systems and three port area short-line railroads. The main systems are the Southern Pacific Railroad (part of the Southern Pacific Transportation Company), the Union Pacific Railroad (which includes the former Western Pacific Railroad), and the Atchison, Topeka and Santa Fe (or just Santa Fe for short). On the port maps, these railroads are identified SPT & CO or SP RR for the Southern Pacific, UPRR for Union Pacific and AT & SF RR for the Santa Fe.

Waterborne commerce, in this report, generally will be identified in the number of short tons carried, and includes foreign trade, domestic coastal movements (including to and from Hawaii), internal water body movements (for our purposes, within San Francisco Bay), and local movements within a port. From an overall tonnage perspective, the San Francisco Bay Area ports handled 64.1 million tons of cargo in 1981 (the latest year for complete U.S. Army Corps of Engineers waterborne commerce statistics). This amounted to 42 percent of California's waterborne commerce trade. California itself accounts for 49 percent and eight percent of the total West Coast and U.S. waterborne commerce, respectively. Looking at foreign and domestic waterborne commerce alone, the San Francisco Bay Area ports handled 49.3 million tons of cargo. However, when only dry cargos are considered (i.e., excluding such items as crude oil, petroleum products, liquid chemicals, and animal fats), the 1981 volume was just 10.6 million short tons.[6] Unless otherwise noted to the contrary, all tonnage figures noted in this report will be only for dry cargos moving in foreign and domestic commerce. From an economic standpoint, the Bay Area ports in 1981 accounted for $14.2 billion in foreign trade (20 percent of the state total, four percent of the national), and are responsible for over 17,000 civilian jobs in direct maritime industry employment in the Bay Area.[7,8]

Historically known as the gateway to the San Francisco Bay/ Northern California region, at least in the 20th century the

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[6]Percentages and volumes derived from U.S. Army Corps of Engineers, Waterborne Commerce of the United States: Calendar Year 1981 (Washington, 1983).

[7]Pacific Merchants Shipping Association, Maritime Industry: San Francisco-Oakland Bay Area (San Francisco, 1982).

[8]California World Trade Commission, About the Commission (Sacramento, November, 1983), p.1.

ports have been generally export oriented. Internally however, the change in conveyance trends and typical cargos has significantly altered the relationships among the ports.

Up to the 1960's, the Port of San Francisco was the area's major port, handling 2/3 of the area's dry cargos, with the Port of Oakland primary known for the export of agricultural and military goods. With the onset of containerized shipping, and its corollary requirement for extensive backlands and good truck and rail access, that relationship has reversed. Now, the Port of Oakland is the area's primary port, handling over 50 percent of all dry cargos and up to 90 percent of all Bay Area container cargos annually.[9]

The following sections are presented to give the reader an understanding of what comprises the San Francisco Bay port system including individual port facilities, cargo volumes and general expansion plans. From this basis, the region's trade trends and port ground access problems can be properly evaluated. The ports are presented, as in all sections of this report alphabetically, and are shown graphically in Figures 2 thru 7. Active public port terminals, and near-term

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[9]Based in part on conversations with Port of Oakland staff.

port terminal development sites, as defined and identified in the MTC/BCDC Seaport Plan,[10] are numerically identified in the figures, corresponding to the numbers and titles shown in Table One.

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[10] Metropolitan Transportation Commission and San Francisco Bay Conservation and Development Commission, San Francisco Bay Area Seaport Plan (Berkeley, December 1982).

Table One

PORT TERMINAL SITE AND LOCATION KEY

This table lists the sites by port by terminal site name, and referenced to the terminal or terminal area identification numbers shown on Figures 2 through 6. A conversion table, showing the corresponding Seaport Plan identifiers, is supplied in the Appendix, Table A1.

PORT OF ALAMEDA-ENCINAL TERMINALS

Active Public Terminals[1]
(1) Encinal Terminals, Berths 1 to 5

Near-Term Development Sites[2]
(2) Encinal Terminals, Berth 5 (northwestern quadrant expansion area)

PORT OF BENICIA

Active Public Terminal
(3) Port of Benicia (Pier 95)

Near-Term Development Site
(3) Port of Benicia

PORT OF OAKLAND

Active Public Terminals / Near-Term Development Sites

Outer Harbor

Active Public Terminals:
(4) Bay Bridge Terminal, Berths #10, 11 and 12[3]
(5) Berths #4-6, 8, 9:
-Sea Land Terminal, Berths 8 and 9
-Public Container Terminal, Berth 6 and Neptune Orient Lines Terminal, Berth 5
-Maersk Line Terminal, Berth 4
(6) Oakland Container Terminal, Berth 2

Near-Term Development Sites:
(4) Oakland Army Terminal (shown in Seaport Plan as a military site-see text, p. 66)

Seventh Street Complex[4]

Active Public Terminals:
(7) Matson Terminal
(8) Seventh St. Public Container Terminal

Near-Term Development Sites:
(9) Carnation/Albers Mill-Kaiser Steel Yard

Middle Harbor/Inner Harbor[4]

Active Public Terminals:
(10) American President Lines & U.S. Lines Terminals
(12) Howard Terminal (opened in 1982)
(14) Ninth Avenue Terminal

Near-Term Development Sites:
(11) Schnitzer Steel
(13) Ship Repair Area

PORT OF REDWOOD CITY

Active Public Terminals
(15) Port Redwood City Wharves 1, 2, 3 and 5

Near-Term Development Sites
(16) Port of Redwood City Wharf 4
(17) Leslie Salt Terminal
(18) Ideal Cement

PORT OF RICHMOND

Active Public Terminals
(19) Richmond Terminal #4
(20) Richmond Terminal #1
(21) Levin Metals
(22) Richmond Terminals #5, 6 and 7
(23) ARCO & Union Oil Tanker Docks
(25) Texaco Wharf
(26) Parr Bulk Commodity and Time Oil Wharves
(27) Richmond Terminal 3 (one wharf only)

Near-Term Development Sites
(21) Richmond Shipyard #3/Levin Metals
(24) Santa Fe Channel-Northwest Site and ATSF Intermodal Yard (latter not included as near-term development site under Seaport Plan--see text, p. 65)
(27) Richmond Terminal 3: North and South Sites

PORT OF SAN FRANCISCO

Active Public Terminals-Limited Term[5]
(28) Piers 15/17, 27/29 (north of Bay Bridge)
(29) Pier 26
(30) Piers 30/32[6]

Active Public Terminals
(31) Pier 48
(32) Mission Rock Terminal (Pier 50)
(34) Pier 70
(36) San Francisco Container Terminal-North (Pier 80)
(37) Piers 90 (San Francisco Grain Terminal) and 92
(39) San Francisco Container Terminal-South (Piers 94 and 96)

Near-Term Development Sites
(33) Piers 52 to 64
(34) Pier 70
(35) Western Pacific Railroad Ferry Slip
(38) Pier 94-North

SELBY

Active Public Terminals
None

Near-Term Development Sites
(40) Selby

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[1]Although listed as active, many of these are candidates to be modernized and converted, particularly from breakbulk into container terminals where sufficient backland area exists or can be developed.

[2]Most of these sites are current industrial or ship repair sites that could be modified into port terminals. The two sites which are considered new are Pier 94-North, Port of San Francisco (location 38, Figure 6) and the Selby Site, near the Carquinez Bridge (location 40, Figure 2).

[3]Also known as the Oakland Army Terminal.

[4]In some publications, the Seventh Street Complex Terminals are lumped with the Outer Harbor Terminals; the Middle Harbor Terminals with the Inner Harbor Terminals.

[5]Because of extensive nearby urban development, limited backland areas, poor ground access, and planning policies adopted by both BCDC and the City and County of San Francisco, MTC/BCDC assumed that these berths will not continue indefinitely as commercial wharfs.

[6]Presently closed due to extensive fire damage.

B. Port of Alameda-Encinal Terminals (Figure 2)

For those familiar with the Bay Area, Alameda Island conjurs up many images, from the quiet, almost New England like City of Alameda, to fishing fleets both past and present, to the huge U.S. Navy's Alameda Naval Air Station. On the north side of the island, along the Oakland Inner Harbor Channel separating Alameda island from the city of Oakland, lies the Port of Alameda. Once dominated first by fishing fleets and then later by naval operations, the area today includes 15 private pier, wharf, and dock complexes, engaged in the movement of general and bulk cargo, and in the outfitting and repair of ships.[11]

Of these operations, the largest private owner and the main public-serving general cargo facility is Encinal Terminals. Originally developed by the Del Monte Corporation, Encinal Terminals is presently comprised of three complexes totaling six berths: one for containers, four for general cargos, and one for bulk liquids. Import steel is the primary dry cargo moving through the terminal complex. The overall dry cargo volume moving through the facility in 1983 amounted to approximately 303,000 short tons.[12]

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[11] U.S. Army Corps of Engineers (Water Resources Support Center), The Ports of Oakland-Alameda, Richmond, and Ports on Carquinez Strait, California (Washington, 1982), p. 29.

[12] Encinal Terminals, communications, July 20, 30, 1984.

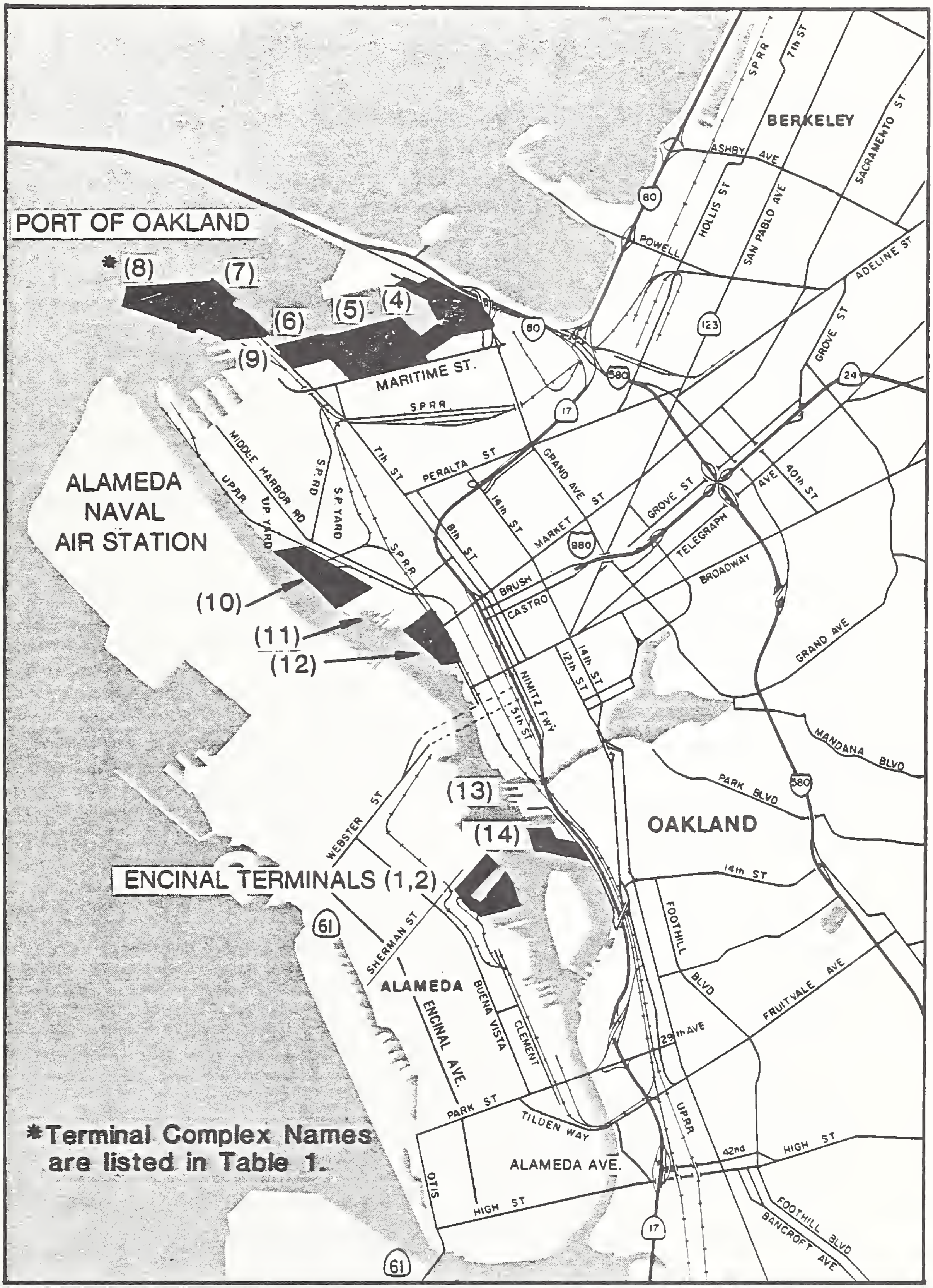

Figure 2

PORTS OF ALAMEDA (ENCINAL TERMINALS) AND OAKLAND

Adapted from Seaport Plan Technical Report

SCALE:
1" ≅ .95 miles

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Ground access to Encinal Terminals, and the general port area, is rather unique. Local access to Encinal Terminals itself is provided by Buena Vista Avenue, which is a two-lane, 30 miles per hour facility, bordered by both commercial and residential development. Access to Buena Vista from the west is via Webster Street (State Route 61), which connects Alameda to the City of Oakland and State Route 17 via the Alameda (i.e., Posey and Webster Street) Tubes. Access from the east is provided by Park Avenue and Tilden Way (Fruitvale Avenue in Oakland). However, eastern truck access to or from State Route 17 is difficult, for a truck must transverse five different streets in 3/4 of a mile to travel to or from State Route 17 at the High Street interchange, to Buena Vista Avenue and the port. Rail access is provided by the city-owned Alameda Belt Line Railroad, which interlines with the Southern Pacific Railroad.

In terms of future development, Encinal Terminals is also unique. Encinal Terminals was the first applicant, and the first recipient of port terminal development permits under the adopted Seaport Plan. Approved October 19, 1983 by the San Francisco Bay Conservation and Development Commission, the permit allows Encinal Terminals to essentially double the size of its main container terminal facility (berth number 5), and to convert its berth number 4 from a neo-bulk to a container cargo operation. The permit requires that construction must be commensed by December 1, 1985, with construction completed and full port terminal operations underway by December 1, 1987.[13] According to the project Environmental Impact Report (EIR), overall annual terminal cargo handling capacity would increase from 467,000 to approximately 830,000 short tons.[14]

With these permits, Encinal can prepare to handle a share of the projected growth in Bay Area container cargos. The extent to which this will occur is not assured. That will be determined in part by the extent that access to the terminal is improved and simplified, compared with access to the other Bay Area ports, as viewed by ocean shipping lines and potential terminal financiers alike.

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[13]Bay Conservation and Development Commission, Permit No. 5-83, November 7, 1983, pp. 7, 10.

[14]Environmental Science Associates (for the City of Alameda), Encinal Terminals Master Plan Environmental Impact Report (Draft), (Foster City, California, October 1982), p. 1.

C. Port of Benicia (Figure 3)

The Port of Benicia lies on the northern side of the Carquinez Strait channel, on the eastern side of the City of Benicia. The port, situated at the site of a former U.S. Army supply depot, basically handles auto imports, petroleum coke exports, and miscellaneous petroleum liquids, both crudes and refined products. Total cargo volume by weight amounted to just under 1,000,000 short tons in 1983, 690,000 when petroleum liquids are excluded.[15] Ground access is provided by Bayshore Road locally, Interstate routes 680 and 780 regionally, and by the Southern Pacific for rail movements.

The owner of the facility, Benicia Industries, at various times has proposed redevelopment of its facilities, particularly its one main, general purpose wharf. This facility, known as Pier 95, is also the only port area near-term terminal development site which could be redeveloped into two to three container and/or neobulk/dry bulk wharves.[16] However, our analysis indicates its development potential is only moderate at best, a result of its relatively remote location from the Bay Area's main commercial and industrial

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[15]Adam Vincent, Benicia Industries, phone conversation, May 31, 1984.

[16]Metropolitan Transportation Commission and San Francisco Bay Conservation and Development Commission, San Francisco Bay Area Seaport Plan Final Technical Report (Berkeley, April, 1982), p. 168.

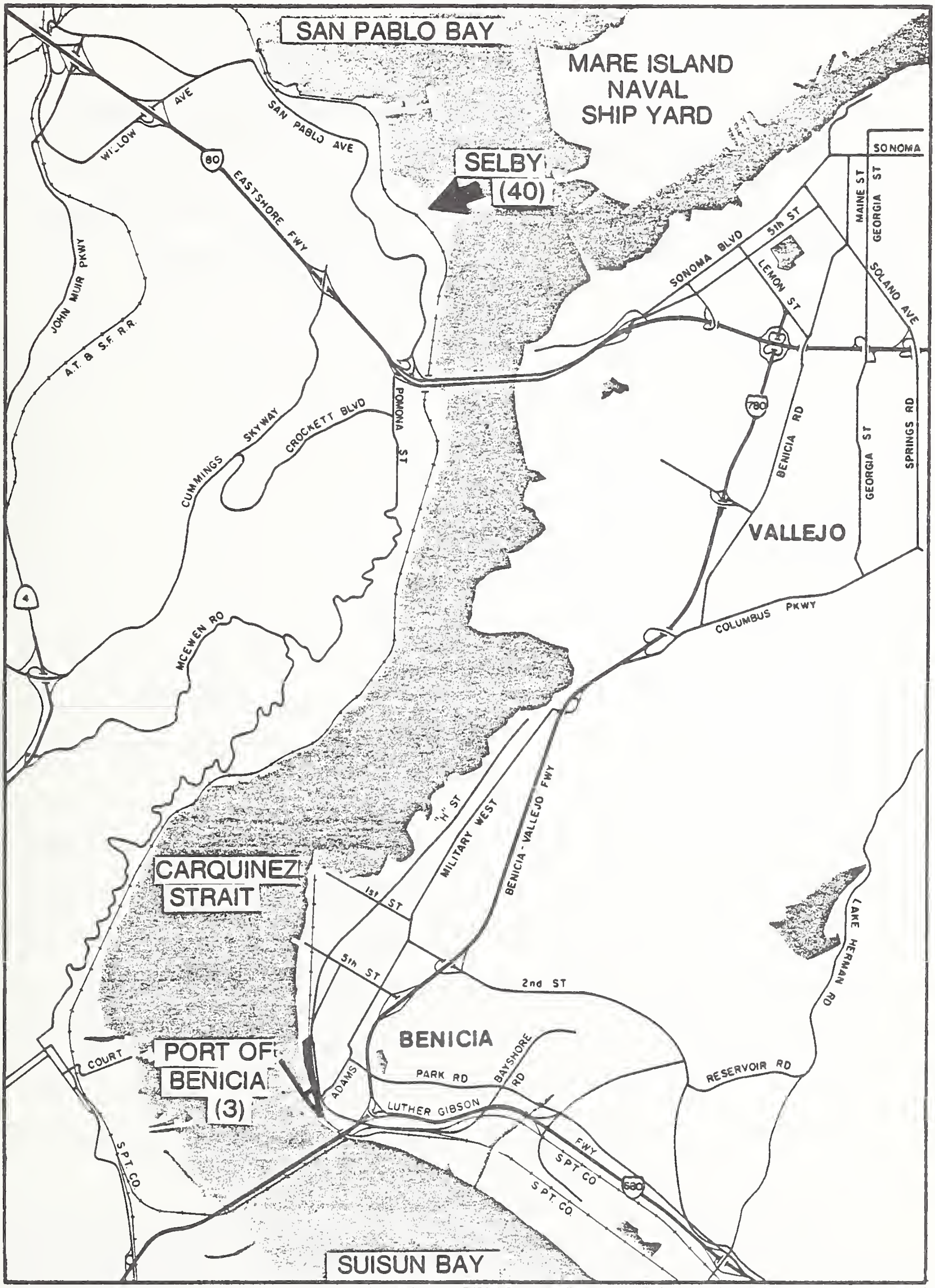

Figure 3

PORT OF BENICIA AND SELBY SITE

Adapted from Seaport Plan Technical Report

SCALE: 4
1" ≅ .95 miles

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centers, major rail yards, and truck terminals. Given these factors and the cargo demand forecasts, it is likely further port development will be concentrated toward its existing cargo specializations, at least in the near-term.

D. <u>Port of Oakland</u> (Figure 4)

In years gone by, Oakland lived in the shadow of the city across the San Francisco Bay. Many knew Oakland and its port as the terminus of the classic transcontinental passenger trains operated by the Southern Pacific and the Western Pacific Railroads. Much has changed; today Oakland is recognized in its own right, and the Port of Oakland is now one of the leading ports in the United States. Within the Bay Area, it exceeds the other Bay Area ports in cargo volumes handled. In recent years, it has handled more export cargo than any other port on the West Coast. Finally, with the Port of Los Angeles, it is the co-leader in the number of containers handled.

The figures for the port are impressive. In 1983, 11.70 million revenue tons were handled, container cargos accounting for 85.9 percent of the total.[17] This container volume of 10.05 million revenue tons accounted for 86.6 percent of all Bay Area container cargo revenue tons in 1983.[18] From a short ton perspective, an estimated 6.95 million short tons were handled by the port, of which

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[17]Ray Boyle, Marine terminals Department, Port of Oakland, phone conversation, 7/27/84.

[18]Based on interpretation of revenue ton estimates supplied by each of the Bay Areas ports.

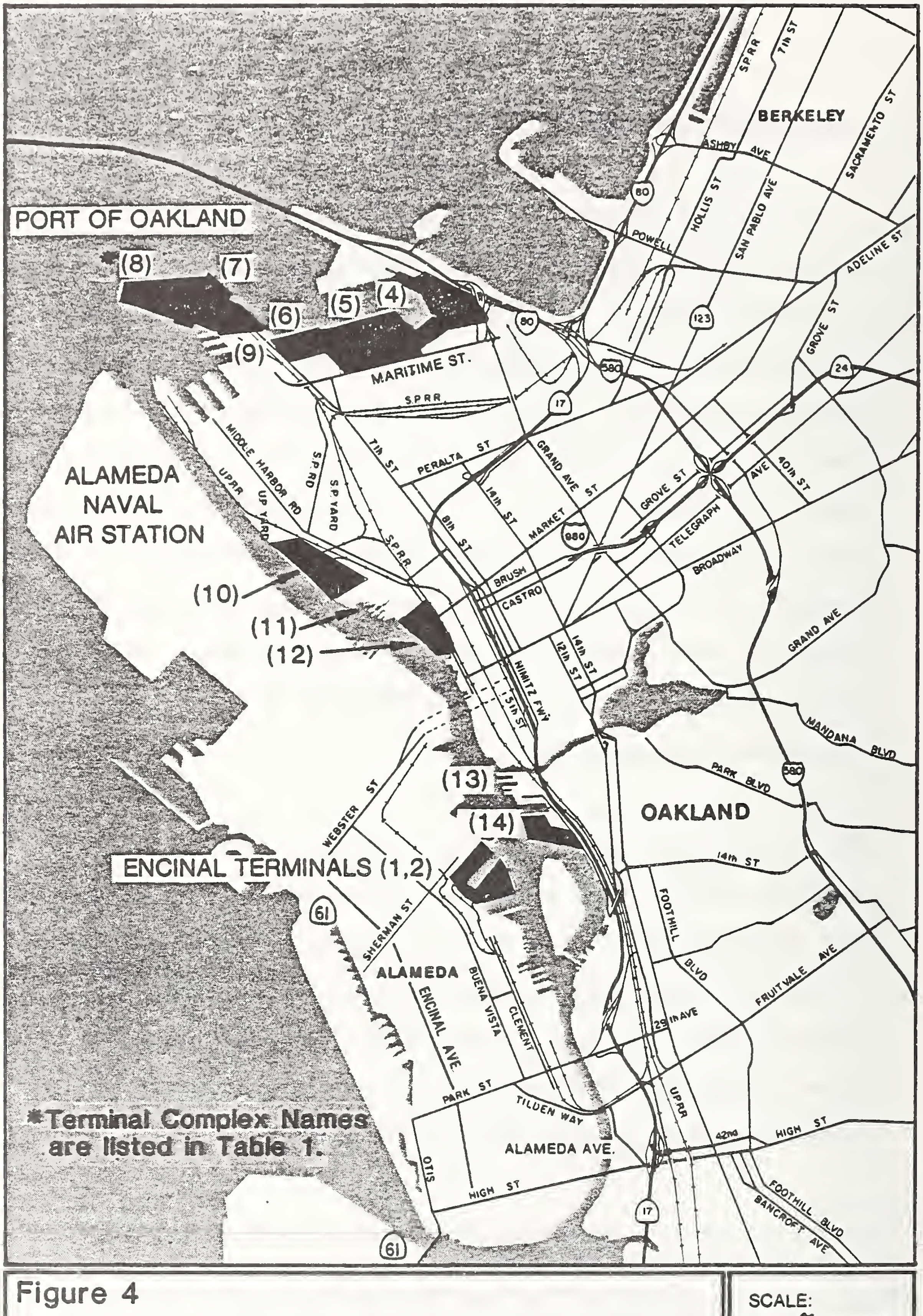

Figure 4
PORTS OF ALAMEDA (ENCINAL TERMINALS) AND OAKLAND

Adapted from Seaport Plan Technical Report

5.77 million short tons was dry cargo, 83 percent of the port total.[19] In recent years, by weight, cotton has been the port's primary export, iron and steel products the primary import.[20] It should be noted, however, that overall, almost 40 percent of the port's export "liner" cargos are agricultural commodities.[21] Despite these volumes, maritime operations contributed only 48 percent of the port's revenues in fiscal year 1982/83, the remaining coming from property transactions, interest earned, and airport operations (chiefly, Oakland International Airport).[22]

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[19] 1983 data estimated based on 1982 Oakland-Alameda tonnage data contained in, U.S. Army Corps of Engineers (Waterborne Commerce Statistics Center), Waterborne Commerce of the United States, Part 4: Pacific Coast, Alaska and Hawaii, Calendar Year 1982 (preliminary report) (New Orleans, 1984, pp. 20-21.

[20] Ibid.

[21] Jon Jacobs, "Farm Shipments Make Oakland The West's Horn of Plenty," The Port of Oakland (special supplement to Pacific Shipper), January, 1984, p. 0-24.

[22] Based on Touche Ross & Co., Port of Oakland-Report on Examinations of Financial Statements: Years Ended June 30, 1983 and 1982 (Oakland, September 1983), p. 3.

From a facilities standpoint, the port is comprised of 37 wharves, piers, and docks.[23] In a recent trade publication publicizing the port, it was reported that the maritime area directly under the Port of Oakland jurisdiction includes 28 berths, located on 535 acres (including backland), along 19 miles of waterfront.[24] Its facilities can be divided into four groupings: Outer Harbor (closest to the San Francisco/Oakland Bay Bridge); Seventh Street; Middle Harbor (closest to the railroad yards); and Inner Harbor, location of the port's newest facility, the Charles P. Howard Terminal. Both Middle Harbor and Inner Harbor terminal groups are located along the Oakland Inner Harbor Channel, which separates Oakland from the island of Alameda.

Given the size and extent of the port, the ground-access system is surprisingly simple except for the Inner Harbor Terminals group. The core access route to the port's terminals is Seventh Street, which can be reached via either the Broadway or Market Street exits from northbound State Route 17 (the Nimitz Freeway), or the Broadway Street/Alameda Tubes exit from southbound State Route 17. Radiating from Seventh Street are the main local access routes to virtually all the port's terminals. Moving in a westerly direction from downtown Oakland, Market Street is the main entrance to the Howard Terminal; Adeline Street/Middle Harbor Road serves the

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[23] The Ports of Oakland-Alameda, Richmond..., p. 27.

[24] Walter A. Abernathy (Executive Director, Port of Oakland), "Another Score Unfolds at Port of Oakland," The Port of Oakland, p. 0-12.

Middle Harbor Terminals; and via a one-block connector, Maritime Street serves and provides direct access to the Outer Harbor Terminals. In addition, Seventh Street is the direct access route to the Seventh Street Terminal complex. The only port facility not directly or indirectly served by Seventh Street is the port's Ninth Avenue Terminal, which is reached circuitously via the 16th Avenue exit south of the terminal from southbound State Route 17, and 5th Avenue from northbound State Route 17.

In addition to State Route 17, Interstate 80 is the other main regional access route serving the port. Direct access to the port from Interstate 80 can be made from the Oakland Army Terminals/West Grand Avenue interchange at the east end of the San Francisco/Oakland Bay Bridge, or via its nearby connection with State Route 17. The former connects by an interchange structure on West Grand Avenue with the north end of Maritime Street. In addition, two connectors are important in the port's local roadway system. They are Petroleum Street/Ferry Street, which provides the most direct connection between the Outer Harbor and the Seventh Street terminals, and Southern Pacific Road, which connects the Middle Harbor/railroad yards area to the Outer Harbor and the Seventh Street terminals. With their main intermodal yards in the port area adjoining the Middle Harbor terminals, Southern Pacific primarily, and Union Pacific to a lesser extent, provides the rail access for the port's operations. Limited on-dock rail operations are handled by the Port of Oakland Railway.

Future near-term development of the port will be proceeding in phases. According to port staff, full utilization of the Howard Terminal will be secured before further development proceeds. This will be followed by the development of the 40-acre, Carnation/Albers Mill-Kaiser Steel Yard site, adjoining the Seventh Street Terminals complex. This would probably be followed by the redevelopment of the Bay Bridge/Oakland Army terminals, upon completion of negotiations of a long-term leasing arrangement between the port and the U.S. Army. It is also at this latter terminal complex where the best opportunity exists in the port area for the development of an intermodal container transfer facility, at a site north and east of the terminal complex.

The port's success however could lead to additional ground access system problems as the port and the area around it continues to develop. Already the port possesses the most congested local port access route in the Bay Area (Seventh Street), as well as congested regional roadway access routes. Further, if Southern Pacific significantly expands its intermodal yard facility in West Oakland, as part of its proposed merger plan with Santa Fe, it is likely that the port's ground access sytem will become strained even further.

Accordingly, these problems with the port ground access system could be the weakest link in the port's future development plans. How well these problems are addressed may determine how much the port (and perhaps the Bay Area ports generally) might develop in the future.

E. Port of Redwood City (Figure 5)

The Port of Redwood City is located at the southern end of San Francisco Bay, on the west shore, approximately 20 miles south of San Francisco on the San Francisco Peninsula. The port area contains a total of nine wharves, five of which are under the jurisdiction of the Port of Redwood City, and four of which are private , the largest and most prominent being the Leslie Salt Terminal. Seaport Boulevard is the main local access roadway, and is served by a regional network that includes U.S. 101 (from the Woodside Road/Seaport Boulevard Interchange), and State Route 84 (Woodside Road through Redwood City, and to the East Bay areas over the Dumbarton Bridge). Rail access is provided by Southern Pacific.

To date, the port has specialized in the movement of dry bulk commodities and, to a lesser extent, petroleum products. Export commodities include steel scrap and salt; import, coastal movement, and Bay Area transfer commodities include cement, sand, and gravel. According to port sources, 1983 cargo volume amounted to 624,000 short tons, but have reached almost 1,000,000 tons in earlier years.[25]

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[25] Port of Redwood City, correspondence dated May 23 and June 13, 1984.

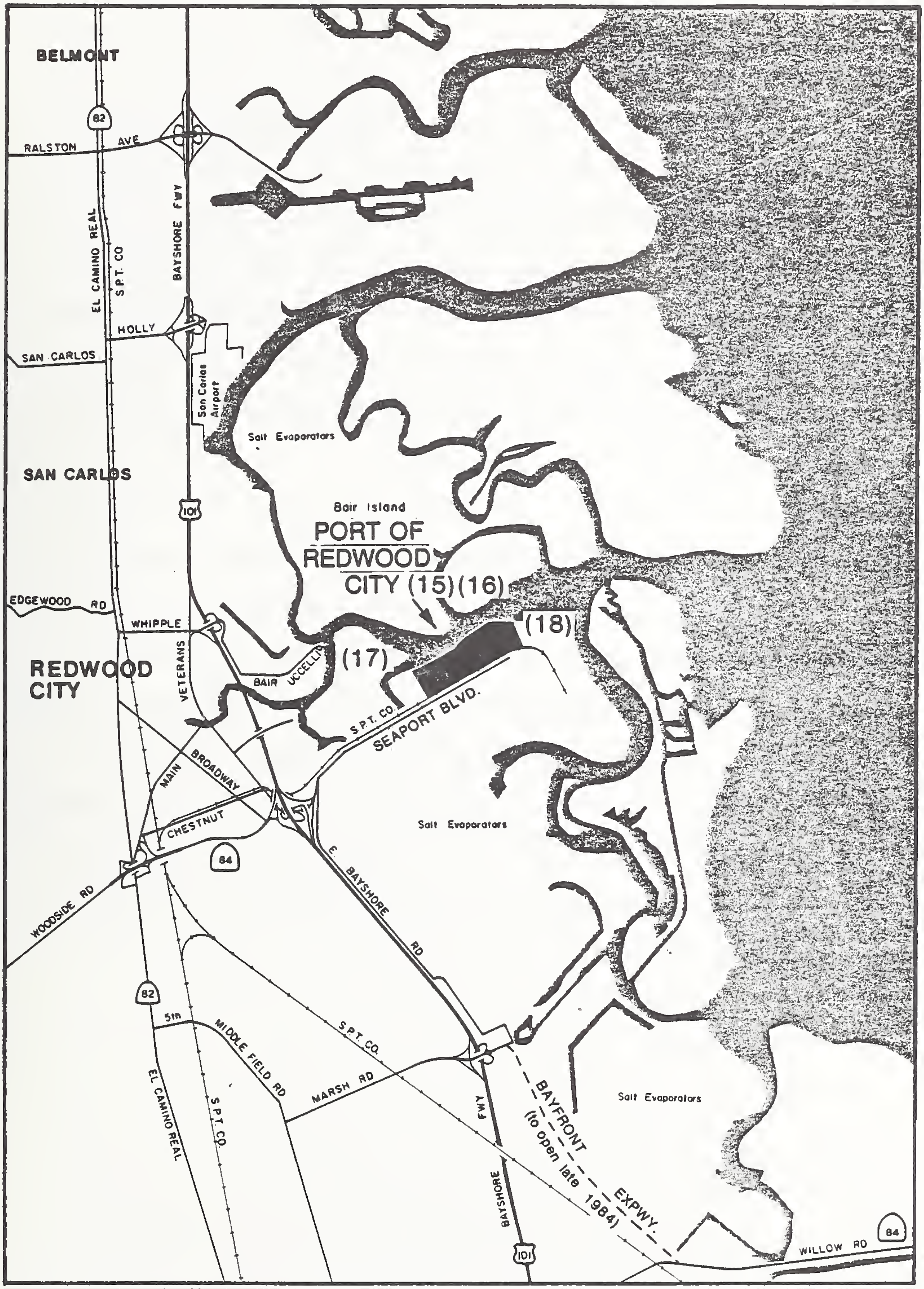

Figure 5
PORT OF REDWOOD CITY

Adapted from Seaport Plan Technical Report

SCALE:
1" ≅ .95 miles

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As one of the recommendations in the <u>Seaport Plan</u>, three near-term port development sites were identified in the port area: the port's wharf four (now being developed for the U.S. Geological Survey); the Leslie Salt Terminal; and the Ideal Cement Company site (see Table One). It was projected that development would likely be both additional and/or expanded dry bulk facilities, as well as development of the port area lands for industrial, non-port uses.

The extent to which port development will actually occur will be affected by the current users' operations and the port's relatively shallow (30 foot) access channel. Its remote location (relative to some of the region's industrial centers and rail yards), and its proximity to marshes and the San Francisco Bay National Wildlife Refuge, south and east of the port, will also be factors. Its proximity to the growing Santa Clara Valley however will be to its advantage, as the port plans for its future.

F. <u>Port of Richmond</u> (Figure 6)

During World War II, the war effort demanded large numbers of cargo ships, and the Port of Richmond's shipyards responded, building upwards of one ship per day at the close of the war. Nearby, for 24 years Ford Motor Company's Richmond Assembly Plant produced cars, from the Model "A", to the "Woody".

Much has changed since those days. New ship construction is no more, and the old Ford plant is now a warehouse. Today, the Port of Richmond is primarily a liquid bulk cargos port (liquid bulk cargo shipments comprise 93 percent of the port's tonnage),[26] with dry cargo movements becoming an increasingly important segment in the port's operations. Of the 32 piers, wharves, and docks identified by the Corps of Engineers as being part of the Port of Richmond area,[27] seven are city-owned, grouped around the main Richmond Inner Harbor Channel. These facilities, in general, are located 1-1/2 miles southwest of downtown Richmond, and 1-1/2 miles southeast of Santa Fe's Richmond Yard. Along this channel are the port's two main dry cargo terminals: its Richmond Container Terminal No. 3 (on the southeastern end of the channel); and its main Ro-Ro, auto import/export facility, Terminal No. 7 (on the southwestern side of the channel). Levin Metals is the other main dry cargo facility in the port.

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[26] Based on Port of Richmond statistics for 1981, 1982, and 1983.

[27] <u>The Ports of Oakland-Alameda, Richmond</u>..., p. 76.

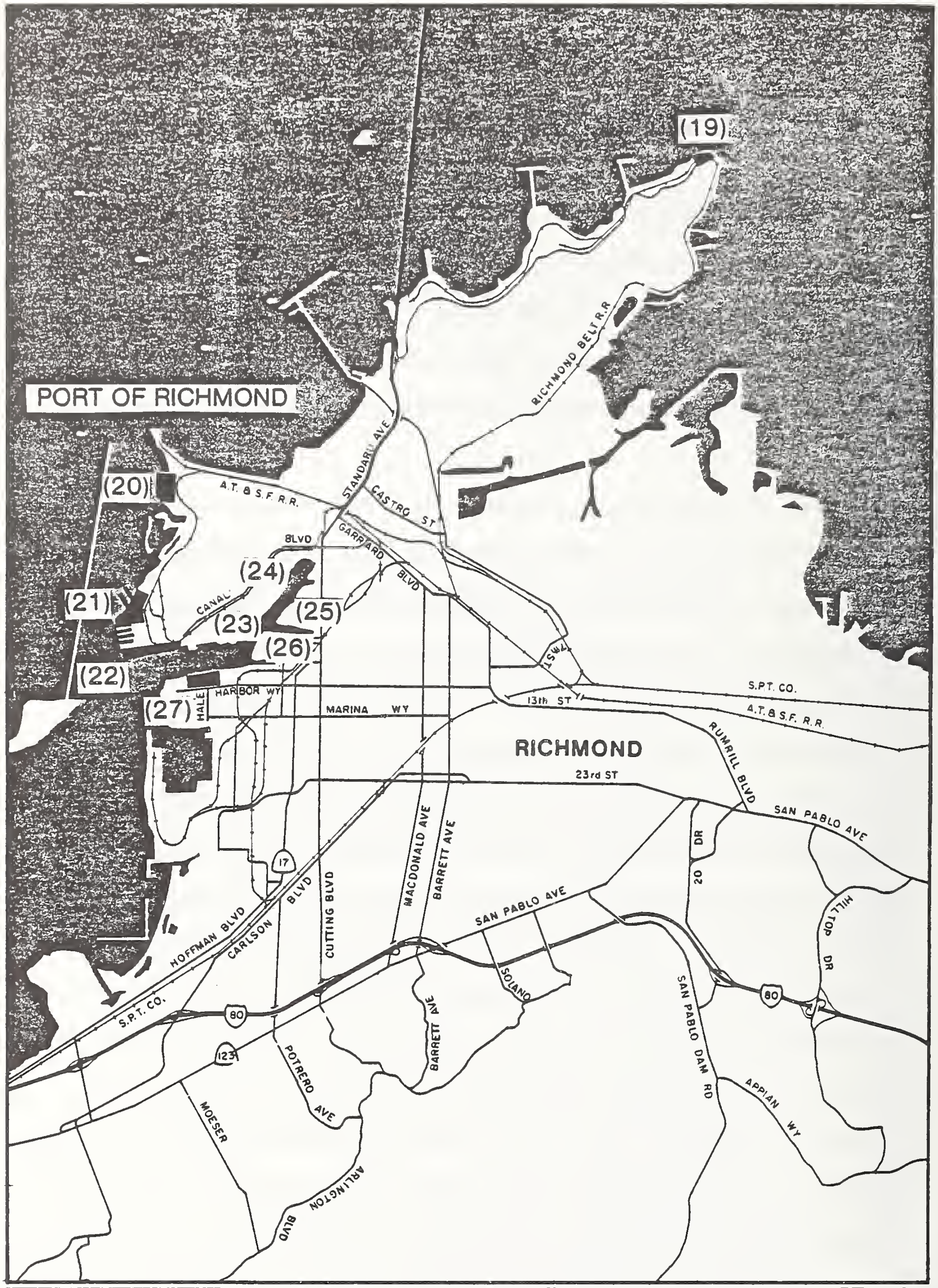

Figure 6

PORT OF RICHMOND

Adapted from Seaport Plan Technical Report

SCALE:
1" ≅ .95 miles

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All told, these facilities handled 1,142,200 short tons of dry cargo in 1982, 1,106,000 short tons in 1983.[28]

The ground access system serving the port is fairly simple, but at best only in fair repair. Harbor Way, a non federal aid route in the port area, runs along the east side of the Richmond Inner Harbor Channel, and serves Richmond Container Terminal No. 3. Canal Boulevard serves the west side of the channel, and at its north end is the main entry route into Santa Fe's Richmond Intermodal Yard. Regional access is provided by State Route 17, running along Hoffman and Cutting Boulevards, which connects to Interstate 80 southeast of the port area. Rail access is provided by both the Santa Fe and the Southern Pacific Railroads.

MTC/BCDC saw the greatest Bay Area port development potential both here and at the Port of San Francisco. In its 1980 port development plans, as analyzed by MTC/BCDC, the port foresaw the expansion of its just-opened container terminal complex from one to four berths, increasing its container cargos handling capability from 600,000 to 4,000,000 short

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[28]Based on Port of Richmond statistics, previously cited.

tons by the end of 1984.[29] During the same period, the port applied to Caltrans for federal Local Rail Service Assistance Program Funds to construct a 6.6 acre, seven track, 120 rail car intermodal container transfer facility, just east of the container terminals complex.[30]

However, one finds a far different picture today. The container terminal physically stands as it was in 1980, except for the addition of one more container crane. According to a San Francisco Examiner article, the container terminal alone has suffered a total of $10,000,000 dollars worth of losses since it opened in mid-1979.[31] Its last regular scheduled ocean carrier, Johnson Scan-Star, has returned to the Port of Oakland, leaving the facility without a regular customer.[32] There are many possible reasons for these events, but the availability of only one berth, the congestion along Hoffman Boulevard, and the plans by Santa Fe to close its Richmond Yard in its proposed merger with Southern Pacific, are probably key contributing factors.

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[29] Seaport Plan Final Technical Report, p. 210.

[30] California Department of Transportation (Division of Mass Transportation), 1982 California Rail Plan-Appendices (Sacramento, February, 1983), pp. A-37, A-38.

[31] David Weinstein, "Keeping Port Afloat in Black, Not Red Ink" San Francisco Examiner, February 8, 1984, p. F3.

[32] E.J. Muller, "JSS Leaving Richmond Port, Moving Back to Oakland," Pacific Shipper, May 28, 1984, p. 3

The port is responding to these problems. It has contracted with a new terminal operator, who besides guaranteeing certain base lease revenues to the port, has promised to expand the facility to two berths by 1987.[33] The construction of the much-needed John T. Knox Freeway (to be designated Interstate 580), and the U.S. Army Corps of Engineers plans to dredge the port's two main access channels, will definitely help. But until these events occur, along with the general growth in Bay Area container cargos, and until the financial health of the port improves, the port's development in all likelihood will proceed slowly.

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[33] Muller, pp. 3, 203.

G. <u>Port of San Francisco</u> (Figure 7)

San Francisco. When one thinks of the Bay Area, San Francisco as a bay, as a city, and even sometimes as a port, comes to mind. Although no longer the largest Bay port in terms of cargo volumes handled, it does lead the Bay Area ports in the diversity that it offers to shippers.

For purposes of this study, the Port of San Francisco can be seen as three port areas, each with its own character. The Northern Waterfront is comprised of the odd numbered wharves located north of the Ferry Building, from the foot of Market Street to the Fisherman's Wharf recreational, tourist, and fish industries area. Since it is located in an area of high real estate values and constricted, congested ground access, these breakbulk and ferry wharves are increasingly being converted to commercial/office operations, with passenger ship terminals and tug and ferry berths becoming the bulk of the maritime operations.

The Southern Waterfront (the even numbered wharves) is really comprised of two areas, a middle waterfront extending from the Ferry Building south to Pier 70, and a southern waterfront area containing the port's main container terminals. The Middle Waterfront is a mix of operations, from extensive ship repair facilities, the largest being the Todd Shipyard (formerly, the Bethlehem Steel Shipyard), to breakbulk and neo-bulk (paper, steel, autos) terminals. This area is also the one most likely to see extensive, land-side change, as

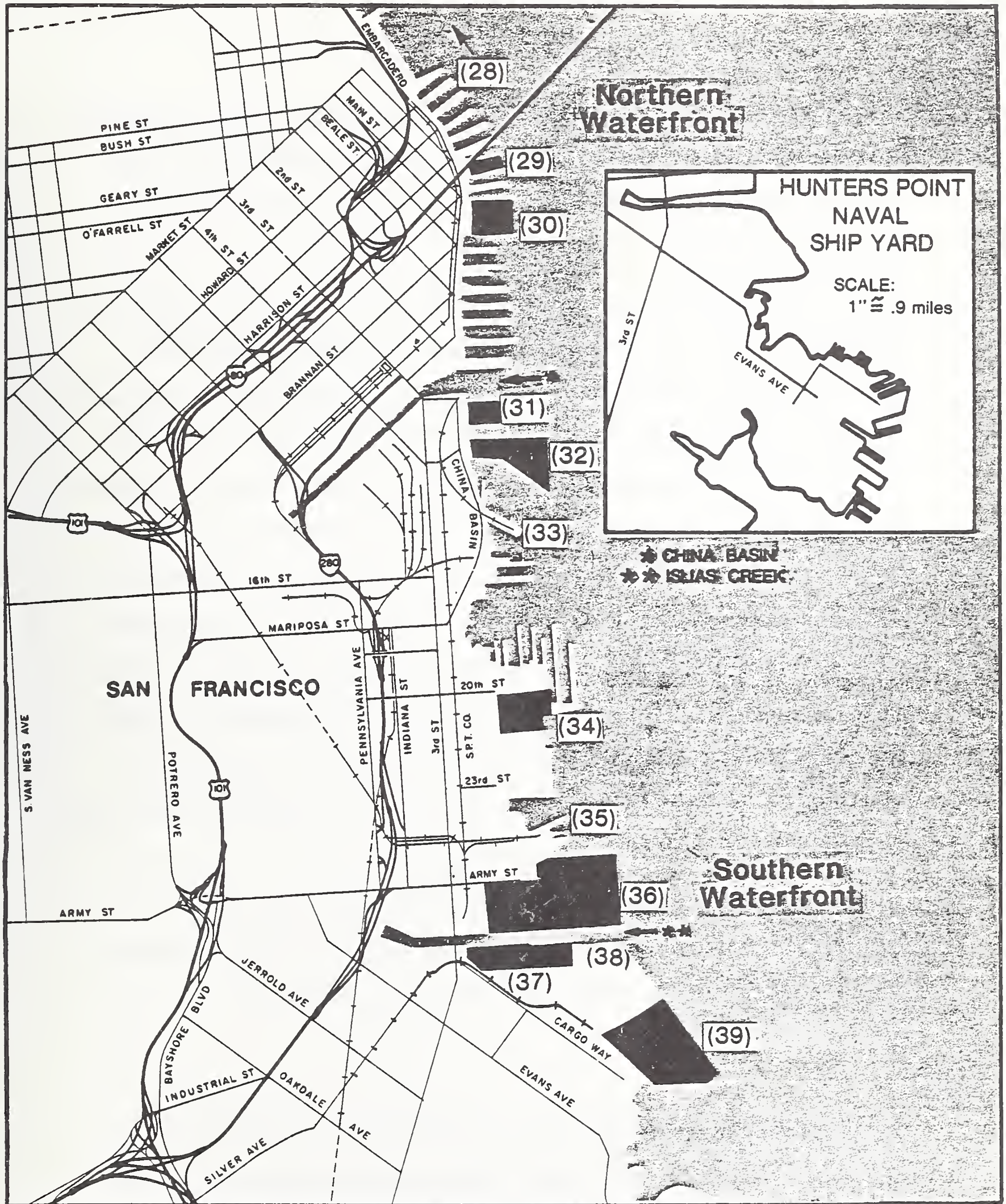

Figure 7

PORT OF SAN FRANCISCO
(active piers north of the Bay Bridge not shown)

Adapted from Seaport Plan Technical Report

SCALE:
1" ≅ .45 miles

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nearby industrial plants and warehouses, rail yards, and old wharves are redeveloped into new office, residential, and recreational complexes.

The Southern Waterfront is San Francisco's port of today and tomorrow. It is here that the port's primary container terminals are located: San Francisco Container Terminal-North (Pier 80, formerly known as the Army Street Terminal); and San Francisco Container Terminal-South (Piers 94/96). The Bay Area's main grain terminal, San Francisco Grain Terminal, is also located here. When the Hunter's Point Naval Shipyard is included (located just south of the San Francisco Container Terminal-South complex), in total, the Port of San Francisco comprises 69 piers, wharves, and docks, as reported by the U.S. Army Corps of Engineers.[34] According to the port's latest annual report, the port handled 2.35 million short tons through its facilities in FY 1982/83, of which 1.96 million short tons was general cargo, 71 percent of which was containerized. Maritime operations accounted for 43 percent of the port's revenue; commercial operations, 47 percent.[35]

The ground-access network serving the port is probably the most complex in the Bay Area. The Northern Waterfront is

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[34]U.S. Army Corps of Engineers (Water Resources Support Center), The Ports of San Francisco, Redwood City, and Humboldt Bay, California (Washington, 1983), p.26.

[35]Port of San Francisco, Port of San Francisco 1983 Annual Report (San Francisco, 1983) p.4.

served by The Embarcadero and a web of streets emanating from the waterfront. Local roadway access to the Middle Waterfront is provided again by The Embarcadero (north of China Basin), and a network of streets including Third Street, Illinois Street (west of Third, not shown), and China Basin Street. The Southern Waterfront proper is served by Third Street, Army Street, and Cargo Way. Regional access is provided by State Route 480 (Embarcadero Freeway), by Interstates 80 and 280, and by U.S. 101 from various interchanges, including Fifth Street from Interstate 80, and Army Street from either U.S. 101 or Interstate 280. Rail access is provided to the majority of the port's wharves by the port-owned San Francisco Belt Line Railroad. Although technically both the Santa Fe and the Union Pacific have yard facilities here, the primary line-haul railroad serving the port from both a local and a regional perspective is the Southern Pacific.

Future growth, from a waterborne commerce perspective, is focused on the Southern Waterfront. Presently, a $38 million dollar conversion of the former Army Street Terminal, from a combination breakbulk/container facility, to a five-wharf container/Ro-Ro facility, is underway. Begun in April, 1984 under an BCDC administrative redevelopment permit, this project is scheduled to be completed in early 1986. The port, in cooperation with the Southern Pacific, has also started initial development of an intermodal container transfer facility on the west side of the San Francisco Container Terminal-South complex (see Figure 17). The first phase, with a 20 rail car capacity, was opened in October 1984.[36] Other projects in the planning stage include: the repair/reconstruction of the fire-damaged Piers 30-32 (near the San Francisco/Oakland Bay Bridge); and the expansion of the San Francisco Container Terminal-South, the latter not planned for construction until 1986 at the earliest.

With deep water access, available land, relatively good location, and sufficient financial resources, the port is in a good position to capitalize on expected Bay Area cargo growth. However, the extent to which it will develop depends to a certain extent on what actual improvements are made to the port's ground access systems. Ultimately, how well the port can market its services to the ocean shipping lines and shippers alike, compared to its neighbor across the Bay, will determine its development fate.

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[36] Port of San Francisco, "Direct Rail Service to San Francisco Port Terminals," Wharfside (San Francisco, May 1984), p. 6.

H. Selby (Figure 3)

In general, MTC/BCDC identified new port development sites within existing port jurisdictions. Selby is the exception. Located on San Pablo Bay near the Carquinez Strait, the site presently is semi-rural in character, with limited industrial and residential development in the area. Although not suited for container terminal development, given limited backland and the presence of the main line of the Southern Pacific, the site could be developed for up to three non-container berths, according to MTC/BCDC's analysis.[37]

Access to the site itself is from San Pablo Avenue, which runs near the shore of San Pablo Bay. Regional access is provided by Interstate 80, via the Crockett interchange. In general, ground access is the site's weakest characteristic. This limited access situation, the site's remote location, and its nonavailability for container development, will probably preclude its development until the 21st century.

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[37] Seaport Plan Final Technical Report. p. 172.

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IV. WATERBORNE COMMERCE/INTERNATIONAL TRADE TRENDS

Any evaluation of current and future port ground access problems must be predicated on an understanding of what determines port ground access demand. It quickly becomes evident, however, that determining port ground access demand is not simple, for it is made up of a complex net of interacting factors, essentially in two factor groups: commodity trade trends (i.e., volumes of commerce), and conveyance patterns (i.e., method or mode of commerce movement). It is from these factors that port development needs have been projected, and current and potential ground access problems have been addressed. Therefore, the purpose of this chapter is to examine these factors, including how, to what degree, and why they may be changing. From this basis, port ground-access problems can be properly reviewed and analyzed.

To structure this discussion, a few terms and boundaries need to be defined. First, in referring to trade, the analysis will be of waterborne commerce, thus excluding cargo movement by air, but including domestic waterborne cargo shipments to such locations as Hawaii. Second, the analysis will focus on dry cargos. For it is dry cargos, both in their handling and shipment, that cause virtually all port ground access demands. Finally, since they differ in the degree to which they cause ground-access systems impacts, the dry cargo groups will be addressed in the following order and level of detail: General cargos (particularly those which move in containers); followed by neo-bulk cargos (such as autos); and then finally dry bulk cargos (such as rice).

A. Port Development - The Seaport Plan

In the previous chapter, we described the ports and, in a general sense, identified how they may develop. However, given estimates of cargo movement demand, what port development will actually occur? How will that development be guided, so that it will occur in an environment in which both economic and environmental considerations are balanced?

The job of guiding port development in the San Francisco Bay Area has been the responsibility of two primary agencies, the Metropolitan Transportation Commission (MTC), and the San Francisco Bay Conservation and Development Commission (BCDC). A number of other organizations are directly or indirectly involved (the most prominent being the U.S. Army Corp of Engineers), but it is these two agencies that have the primary control over what port development is actually pursued by the ports: BCDC from a San Francisco Bay and shoreline development perspective; MTC from a land-based, transportation system supply planning, funding, and operational perspective.[38]

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[38] MTC's role is discussed further under Section V-D.

The understanding of BCDC's role here is critical. Created by the McAteer-Petris Act of 1965, and a forerunner of the California Coastal Commission, it was established to accomplish two basic goals or objectives:

Objective 1: Protect the Bay as a great natural resource for the benefit of present and future generations.

Objective 2: Develop the Bay and its shoreline to their highest potential with a minimum of Bay filling.[39]

These objectives, one environmental, one economic, are carried out through the Commission's power to legally permit development or redevelopment of any Bay Area or shoreline land area extending essentially 100 feet from the Bay shore.[40] This permit process in turn is guided by the BCDC's San Francisco Bay Plan. Given that all port development activities fall under BCDC's jurisdiction, port development plays a big role in the formation and operation of both the Bay Plan and its permitting process. Together with MTC's

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[39] San Francisco Bay Conservation and Development Commission, San Francisco Bay Plan (San Francisco, 1979), p. 5.

[40] Ibid., p. 3.

review of the land-side transportation impacts, this permitting process ensures that port and related water industries development is planned in a logical, deliberate, and warranted manner. By this process, BCDC attempts to balance, from both long and short term perspectives, the economic and environmental goals noted above.

The Seaport Plan is thus a logical outgrowth of BCDC's and MTC's concerns. Developed over a period of eight years, it defines: What, in terms of waterborne commerce, is likely to occur; where should port development occur (from a regional concensus basis); and, what might be the impacts of that development. It also spells out a series of findings, policies and recommendations that form the basis of the plan's implementation, through both BCDC's and MTC's planning and permitting/funding procedures.

The plan is reported in two main documents, a plan proper and a final technical report. In turn, this report is supplemented by a series of working papers and consultant reports prepared during the course of the project. These reports and papers, together with related documents, are listed in the Appendix, Table A2. Those which were used and/or consulted in the preparation of this report are listed in the bibliographical section at the end of this report. The plan's development was also guided by a 17 member Seaport

Planning Advisory Committee, composed of representatives from BCDC, MTC, the ports, and various Bay Area development interests, including Caltrans.[41]

The result of this work was really five integrated products. It can be best understood from a question/answer perspective.[42]

What is the current level and projected growth in waterborne cargo for the San Francisco Bay Area?	Three forecasts of projected cargo flows were produced. Their "baseline" forecast (i.e., their projection of what will most likely occur) is reproduced in Table Five. The high and low forecasts are included in Table Six.
Given projected cargo flows and existing terminal capacity, how many new terminals/berths will be required?	Their forecasts of terminal/berth needs given each cargo forecast level are listed in Table Two.

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[41]Membership on the committee included two members from BCDC, two from MTC, two from the Association of Bay Area Governments, one from Caltrans, one from the U.S. Army Corps of Engineers, one from the U.S. Maritime Administration, one from the Bay Area Council (business association), one from the Save San Francisco Bay Association, and one each from the region's six ports.

[42]The questions are based on the issue statements presented in the Seaport Plan, p. 5.

Where can the new marine terminals be developed with minimum adverse environmental impacts? What would be their cumulative impact and cost if all sites were developed?	The identified sites are listed tabularly in Table One and in more detail in the Appendix, Table A1. They are also shown graphically in Figures 2 thru 7 Cumulatively, the development of these sites would encompass nearly 1000 acres, result in over 300 acres of Bay fill, and could cost up to $1 billion (in 1981 dollars) to develop.[43]
What improvements are necessary to the deepwater channels and to the ground access network?	An analysis of particularly the ground access needs was done, focusing on the present and near-term (1985). The analysis is explored in detail in Chapter V.
How can these conclusions be implemented to best protect the environment, and to foster economic growth?	Through the implementation of the findings, policies, and recommendations of the Seaport Plan, by BCDC, MTC, and by the other parties involved in the development and operation of the Bay ports.

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[43] Seaport Plan, p. 17.

Table Two

MTC/BCDC MARINE TERMINAL BERTHS DEMAND FORECAST
SAN FRANCISCO BAY AREA
(DRY CARGO)

Terminal Category/ Forecast Level	Existing 1980	Projected Demand[1] 1985	1990	2000[2]
CONTAINER[3]				
Baseline	24	(2)	8	25
High		(1)	13	35
Low		(4)	3	14
BREAK BULK				
Baseline	32	(12)	(12)	(12)
High		(11)	(11)	(11)
Low		(13)	(14)	(14)
NEO-BULK[4]				
Baseline	13	1	3	5
High		2	5	8
Low		(1)	-	1
DRY-BULK[5]				
Baseline	3 to 4	-	-	-
High		1	2	2
Low		-	-	-

1 Parentheses indicate a surplus of terminal cargo handling capacity stated as an equivalent number of berths. The figures shown are cumulative; for example, using the baseline container forecast, the 25 new berths required by the year 2000 include the eight required by 1990. Although the estimates are stated as a number of berths, they assume each berth is accompanied by the appropriate amount of backland and equipment.

2 Estimates may overstate demand.

3 Includes the demand for new roll-on/roll-off terminals. No new LASH facilities are forecast.

4 Demand estimates are for terminals to handle autos and iron and steel products. No new scrap or newsprint facilities are forecast.

5 High demand estimates are for limestone importing and coal exporting facilities; no new grain handling terminals are forecast as need at this time.

Adapted from the Seaport Plan, p. 22. Modified to reflect existing terminals berths which were active in 1980. The effect of the change is to increase the number of projected needed container terminals berths by three over the numbers shown in the Seaport Plan in all forecast years.

Port development permits are being granted by BCDC, based on the baseline forecast of needed terminal berths. In this process, it is assumed that for a container terminal, it would take on the average of six years, from the time a permit application is filed with the Commission, to the time that the terminal is fully operational. Thus, the number of permits allowed, summed cumulatively, for each year is based on a six year lag time.[44] For example, in 1984, the total number of container berths that may be permitted under the Seaport Plan is eight (the total number projected that will be needed by 1990).[45] Permit levels in the intervening years is apportioned on a linear basis. For example, in 1985 a sum total of up to 10 permits may be granted for new container terminal berth facilities. MTC/BCDC's projections assume existing channel depths, that backland areas of existing marine terminals will not increase, and that after 1990, container terminal productivity will increase by approximately one percent per year through the year 2000.

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[44] Seaport Plan, p. 14.

[45] To date, five terminal berths have been permitted, three of which were approved prior to the finalization of the Seaport Plan. Since the plan was approved, only Encinal Termials two new container berths have been approved.

In terms of ground access, two policies are particularly important. Because of its clarity, one is quoted from the MTC Regional Transportation Plan; the other is from the Seaport Plan itself:

> Local and regional transportation planning and funding priorities shall facilitate the efficient movement of goods to and from the Bay Area ports. Local, state, and federal governments should not take actions...that would impede access to the marine terminal sites identified in the Seaport Plan. MTC shall approve or endorse funding for a transportation project only if the proposed development the project is intended to serve is consistent with the policies of the Seaport Plan (emphasis added).[46]

> Shoreline lands classified as active, near-term, and long-term by this Plan shall be restricted to marine terminal use. Interim uses shall be permissible but must be readily displaceable when the area is needed for marine terminals or directly-related ancillary activities.[47]

These policies, together with MTC's and BCDC's general policy objectives and permitting authority, are the authority behind the planning effort. From this basis, both BCDC and MTC, as well as the ports, hope port development can proceed in a logical and efficient manner.

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[46] Metropolitan Transportation Commission, Regional Transportation Plan, 1983 Edition (Berkeley, October, 1983), p. 5.

[47] Seaport Plan, p. 23.

In evaluating what are and will be the ground-access needs of the Bay Area ports, a basic review of the port terminal site identification and selection process is useful. This process occurred in two phases, and began with the listing of any and all possible Bay Area port development sites. This listing of 175 sites was quickly reduced to 87, by dropping out all active terminals, and such port sites which, in the Seaport Technical Advisory Committee's view, were clearly inappropriate for port development.[48] The remaining group of 87 sites was then reduced to 45 sites during the second phase of the analysis. During this second phase, the key areas of port terminal site analysis were: potential environmental impacts (including amount of fill and/or dredging required); land use compatibility (including present uses and public agency land use policies); and ground access characteristics. These ground access evaluation criteria, and their relative weights in the analysis, are shown in Table Three. While not actually included in the ranking process, an

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[48] Seaport Plan Final Technical Report, pp. 93, 103, 105.

Table Three

PORT TERMINAL DEVELOPMENT SITES
GROUND ACCESS EVALUATION CRITERIA AND WEIGHTING FACTORS

CRITERIA	WEIGHT	ALTERNATIVE WEIGHT FOR SENSITIVITY ANALYSIS
Traffic Volume vs. Capacity		
• Freeway Access Route	.10	0.40
• Primary Access Route	.07	0
• Secondary Access Route	.03	0
Subtotal	.20	0.40
Employee Access		
• Labor Force Auto Accessibility	.03	0
• Transit Access	.07	0
Subtotal	.10	0
Rail Access		
• Distance to Nearest Rail Yard	.09	0
• On Site Rail Access	.01	0
Subtotal	.10	0
Access Construction Requirements		
• Road Construction	.50	0.60
• Rail Construction	.10	0
Subtotal	.60	0.60
TOTAL	1.00	1.00

SOURCE: Adapted from _Seaport Plan Technical Report_, p. 131, from MTC/BCDC Working Paper #12, _Ground Access Analysis_.

economic analysis of the sites, particularly focusing on the new (versus modernization) near-term sites, was conducted. Included in that analysis were: a review of how steamship lines (i.e., carriers) select a Bay Area port and/or terminal site; what might it cost to operate a new terminal; and what were the physical characteristics of each new port-terminal development site.

This three part, numerically-scored evaluative information was combined into a composite score for each site. The sites were then classified as near-term, long-term, or not acceptable based on their scores and on the policy guidelines set by the Seaport Planning Advisory Committee. Under the ranking adopted by the Committee, the three main factors were equally combined, and those with a composite average score of 8, 9, or 10 (on a scale of 1-10) were identified as near-term development sites, unless otherwise excluded due to factors outside the normal evaluation process.[49]

The final result was a ranked grouping of 45 sites, 18 near-term, three long-term, and 24 military sites. Not counting the military sites, these sites could accomodate up to 43 berths, 37 for container cargo terminal operations.[50] These groupings may be described as follows:

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[49] Seaport Plan Final Technical Report, especially pp. 166, 176, 178.

[50] Based on Seaport Plan Final Technical Report, pp. 176, 178, and the Seaport Plan, p. 32.

- Near-term: These sites are the ones with the best development potential. Most are already developed for water and/or port related uses (and thus termed "modernization" rather than "new" sites), are served by at least an adequate ground-access network, and could be developed with minimal environmental or land use impacts.

- Long-term: These are generally less desirable port development sites. Virtually all new sites, they are served by generally a poorer ground-access network, and if developed, would create greater environmental and/or land use impacts.

- Military: These are active, generally naval, military installations that could be considered for commercial port development if and when such facilities are declared surplus and made available by the military. As such, these installations could be considered as a reserved pool of near-term modernization sites. The reasoning behind this classification: these sites, as military installations, have already experienced environmental and land-use impacts and ground access demands greater than, or equal to, those that would be experienced if they were developed as commercial port terminals.[51]

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[51] Seaport Plan, p. 16.

There are two major exceptions to the above-noted conclusion, however. Almost 40 percent of the Bay Area channel maintenance dredging done by the Corps of Engineers is done to keep the Mare Island Strait Channel open at a 35-foot depth, due to heavy silt deposits from the Napa River. Given this silt volume and the resultant dredging costs, the Mare Island Naval Yard sites are excluded, except for shallow-draft port activities where dredging requirements would be minimal.[52] The Port Chicago Naval Weapons Center is excluded due to the presence of existing, extensive marshlands adjacent to the site. However, port activities which would not infringe on the marshland could be allowed.[53]

A full listing of the sites, including Seaport Plan site identifiers and the corresponding port site identifiers used in this report, is included in the Appendix, Table A1.

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[52] Seaport Plan Final Technical Report, pp. 162-163.

[53] Seaport Plan, p. 39.

Part of the purpose of this report is to summarize what the <u>Seaport Plan</u> and its support documents say, particularly in regards to ground access, and to note where, in our analysis, additional data or recent events may modify the report's conclusions. The commerce forecasts and ground access/conveyance analyses, will be discussed separately in those sections so named later in this report. When considering the potential port sites and the <u>Seaport Plan</u> analyses in general, however, these notes should be considered:

1. The focus of this (Caltrans) study is over a 20 year time horizon, with emphasis on the present and near-term (i.e., present day to 1990) conditions and problems. Given that the expected berth demand can be met through the identified near-term development sites (see Table Four) only these and the active port terminal sites are shown in the study maps (i.e., Figures Two through Seven).

2. Based on our analysis to date, and based on information not available or not fully available to MTC/BCDC during the preparation of the <u>Seaport Plan</u>, we believe the classification of three sites should be changed. First, in their final analysis, the MTC/BCDC study staff excluded a Santa Fe Railroad intermodal yard site, along the west side of the Santa Fe Channel at the Port of Richmond. This potential near-term port terminal development site was excluded because of its indicated use at the time of

the study.[54] However, since then, Santa Fe has announced it will curtail operations at its Richmond yard facilities, reducing them to a storage operational mode, if its proposed merger with the Southern Pacific Railroad is approved. As a result, this yard in all likelihood would be declared surplus, as it only serves as a backup to Santa Fe's main intermodal yard facility along Garrard Boulevard. Thus, we believe it is reasonable to include it as a near-term port terminal development site. It is identified on figure 5 as site 24 (Seaport Plan technical studies site identifier 31B).

Second, we have included the Oakland Army Terminal as near-term development sites (Seaport Plan sites 49A and 49B). At the present time, the Port of Oakland is using the facility on a short-term lease basis. Based on discussions with Port of Oakland officials, it appears a long-term lease, that would allow the redevelopment of this facility into a modern port terminal, will probably be successfully negotiated between the U.S. Army and the Port of Oakland. Thus, these sites are included in our analysis.

Finally, we have excluded the Seaport Plan's site 52A (East) in Oakland as a near-term development site. Presently, this site is occupied by the Union Pacific Intermodal Yard. Since its incorporation by Union Pacific's Oakland Railroad, this former Western Pacific facility has seen an increased volume of traffic,

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[54] Seaport Plan Final Technical Report, p. 163.

Table Four

PORT TERMINAL SITES/POTENTIAL BERTHS COMPARISONS

Original Levels-As Presented in the Seaport Plan	
Near-Term Development Sites:	18 sites, 35 potential berths
Long-Term Development Sites:	3 sites, 8 potential berths
Total:[1]	21 sites, 43 potential berths
Revised Levels (1980 Base Year)[2]	
Near-Term Development Sites:	21 sites, 40 potential berths
Long-Term Development Sites:	3 sites, 8 potential berths
Total:[3]	24 sites, 48 potential berths

Berth Demand Forecast[4]

1985: -1(surplus) 1990: 11 2000: 30

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1. Does not include the 24 military sites identified in the Seaport Plan.

2. As revised, the Oakland Army Terminal sites #49A and #49B, and the Richmond Santa Fe Intermodal Yard site #31B are included in, and the Oakland Union Pacific Intermodal Yard #52A (East) is excluded from the terminal sites/potential berths inventory. Oakland's Howard Terminal (2 berths) and the second berth at Richmond Container Terminal #3, are also included, as they were not in active use in the 1980 base year of the study.

3. As revised, there are an additional 22 military sites that could be developed as commercial port terminals if surplused by the military.

4. This is a summary of the "baseline" berth demand forecast from Table Two. These totals do not include the excess number of breakbulk berths included in that forecast.

as a result of UP's increased marketing of intermodal freight services. Further, the land area available to Union Pacific is very limited in this part of the Bay Area. Thus, it seems unlikely that the railroad will sell, nor will the port obtain (directly or through its eminent domain powers) this site for port terminal facilities development.

The result of these changes are shown in Table Four. As revised, 42 of the 48 berths could be built to handle container cargos (or 34 of the 40 available berth spots at the near-term development sites).

3. The Seaport Plan assumes that existing ship repair and industrial operations identified as port terminal development sites could be easily shifted from these waterside locations. Although considered by the plan preparers and reviewers in the screening of the port development sites, the operators actual ability to move may be a significant stumbling block, given Bay Area land values, noise and hazardous wastes environmental concerns, and the operators' needs for waterside access. This is also true for those operations with either heavy capital investments, or large, extensive "Bay" operations, such as the Richmond Shipyard (Seaport Plan site 29A/D), or Leslie Salt (Seaport Plan site 62A).

4. Changes in terminal operations, and ship sizes and configurations, as well as the deepening of port water access channels, may proceed faster than the plan estimates.

5. Interregional port competition (e.g., Ports of Los Angeles/Long Beach versus the Bay Area ports) was not extensively evaluated in the Seaport Plan. A significant factor when landbridge traffic is considered, this competition may be seriously affecting the volume of container cargos moving through the Bay Area ports. This topic is addressed further in reference to commodity volume forecasts and conveyance trends later in this report.

6. Both the cargo forecasts and the site analyses were done from a regional perspective. However, port development will more likely occur where port development financial resources are obtainable, developable lands are available, and where the port access networks (channels, roads, rail services) are good. In reviewing the relative positions of the ports today, these factors together may work in favor of the larger ports (Oakland and San Francisco), over the other ports, in their further development. These same factors will also support the continuing specialization of the ports in particular cargo segments and/or waterside industry functions.

B. Commerce Trends and Analysis

In the beginning of this chapter, we said that ground-access demand is made up of a complex net of interacting factors. In the previous section, we began by describing the hub where the two factor groups of ground-access demand, commerce trends and conveyance patterns, met--the development and operation of the marine port terminals.

In this section we will cover the first major factor group--waterborne commerce demand. In the first subsection, a brief overview of waterborne commerce measurement and classification, and commerce generation factors, will be presented. Second, we will present and review the MTC/BCDC Seaport Plan commerce forecasts. Finally, we will review post-forecast data and trends, and explore how these patterns might affect port ground access demand planning.

1. Waterborne Commerce - General Considerations

When looking at waterborne commerce, several description and data problems arise. Waterborne commerce is classified by most U.S. government agencies using the "Commodity Classification for Domestic Waterborne Commerce". This system, developed by the U. S. Office of Management and Budget, breaks commerce up into two-digit, four-digit, and seven-digit commerce descriptive classification categories. This system is the basis on which waterborne commerce statistics are compiled by the Bureau of the Census. These statistics, in turn, are analyzed and combined with domestic waterborne commerce movements information, and are reported in a simplified form in the Waterborne Commerce of the United States, published annually by the U.S. Army Corps of Engineers.[55] However, depending on the audience, governmental agencies, the ports, and other interested parties collect and report waterborne commerce information in other ways as well.

There are several reasons for this. One is the sheer complexity of the noted classification system. For example, the Corps two-digit system is divided into 30 commodity groupings; its four-digit system is subdivided under these groupings into 159 discrete commodity pigeonholes (see Appendix Table A3). Another reason is

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[55] See for example, U. S. Army Corps of Engineers (Waterborne Commerce Statistics Center), Waterborne Commerce of the United States: Calendar Year 1981. U.S. Government Printing Office, Washington, 1983. Part 4 is a Pacific Coast, Hawaii, and Alaska review, Part 5 is the national summary.

the differing cargo measurement systems. Internationally, cargo is measured in numbers of commercial tons (technically, metric tons). Some ports, and the Maritime Administration in its reports, use long tons. However, the measure used by the Corps in its reports is short tons. Since shipping tariffs are based on weight and/or bulk, revenue tons are most easily reported by the ports. The use of revenue tons, however, causes particular analysis problems, because it is almost impossible to independently convert revenue tons to some other weight measurement. When containers are discussed, given their relatively standard sizes, TEUs (twenty-foot equivalent units) are used as an easy representation of container cargo volumes in the consideration of terminal design, ship frequency and size. Units of cargo (e.g., number of autos imported) are generally not reported in port operation summaries.

There is also a question of cargo classification. Cargo falls into two basic groups, dry and liquid. Dry cargos (our area of concern) are further divided into two groupings, general cargo and dry bulk. The method of shipping is incorporated into these groupings, thus general cargos move in containers, in discrete units as breakbulk, or in specialized, single cargo carriers as neobulk (e.g., autos). Further, "containerized" shipping has taken several forms, including containers, truck trailers (carried most commonly on "Ro-Ro" ships) and on barge units (LASH).

Finally, there is a question of origin-destination, for the terms export and import are not fully descriptive of what is actually occurring. For example, take a commodity being shipped from Yokohama to London, and which uses the United States rail system as a "landbridge" from the Pacific to the Atlantic Ocean. For cargo measurement purposes, in this case, an import statistic is generated at the U.S. port of entry, and an export statistic is generated at the U. S. port of departure, even though no consumption or use of the commodity takes place. Domestic cargos include shipments to Alaska and Hawaii, as well as between a harbor's or river's individual ports (known as internal transfers or shipments).

To produce a Bay Area cargo forecast, including a review of historical trends, the Corps contracted with two firms, Recht Hausroth & Associates (RHA), of San Mateo, California, and Temple, Barker & Sloane (TBS), of Lexington, Massachusetts. It became the task of these two firms, with the assistance of a technical advisory committee composed of BCDC, Corps, MTC, and various port representatives, to produce a logical, simple description of these complex patterns, one historical, one projectional. It is on their analysis and forecasts that the Seaport Plan is based.[56]

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[56]Recht Hausrath & Associates and Temple, Barker & Sloane, Inc., San Francisco Bay Area Forecast (San Mateo, California, June, 1981). Prepared for the U. S. Army Corps of Engineers, San Francisco District.

In their analysis, the above descriptive and data issues were addressed in the following ways:

a. The consultants focused on the means of cargo movement and on the major shipping market groupings, both for their descriptive qualities and for their presentation simplicity. This decision resulted in a four-group, 18-element dry cargo forecast and descriptional analysis.

b. Short tons were selected as the common denominator/descriptor of cargo volumes, and are used in all forecasts and analyses. However, because it reflects more accurately the demand for terminal facilities and the required ground-access network capacity, separate container cargo revenue ton forecasts were also produced.

c. Given the volumes and complexity of commerce data and commerce flow/demand, the consultants segregated their analysis into three review tiers, corresponding to the level of detail and review given by them in preparing the forecasts. Thus, while Bay Area cargo flows were reviewed in detail, Pacific Coast and particularly U.S. flows were reviewed to a much lesser extent. The review of these other two tiers was limited to answering one basic question: What do the trends and forecasts for these two areas say and portend for future Bay Area cargo flows?

d. To get around the problem that containers generally are a mode of shipment, rather than a cargo themselves, the analysis of container cargo was conducted in two ways. First, the level and possible growth in container cargos were reviewed, by trade route and port area. Second, they pinpointed the ability of particular commodities to be containerized. This latter review was based on TBS' analysis of container cargo potential, produced in connection with hearings before the U.S. Maritime Subsidy Board. These two reviews were key elements in the preparation of the container cargo forecasts included in the Seaport Plan.

e. In their simplification process, the term "container" was used broadly. Thus, under this classification, both the movement of containers and truck trailers (viewed as containers with chassis attached) are included. This is not a problem, because for the West Coast trades, container movements are the predominant and the increasing share of total containerized shipping. Truck trailer shipments are generally limited to Hawaii only, and LASH shipping has virtually disappeared from the Bay Area ports.

Although the different classification systems and the range of data sources are many and diverse, when compared to the factors that determine the volumes of world trade, they are simple in nature. Arbitrarily, these factors could be grouped as those of an economic nature (economic strength, currency valuation, trade limitations, and transportation network state), a geographic nature (from climate to topography); and of a social nature (development pattern, population). Their role and their prominence can also be described and understood from at least three different perspectives: internationally, nationally, and regionally. These type of factors will be referred to as the cargo forecasts are reviewed. For a brief narrative discussion of these factors, the reader is encoraged to see the International Trade Factors discussion in the Appendix.

2. Bay Area Cargo Forecasts Review

During the course of the development of the Seaport Plan, essentially six basic forecasts of Bay Area cargo flows were developed by consultants for MTC/BCDC. During the same period, three forecasts were also developed by the U.S. Army Corps of Engineers and released in September 1976.[61]

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[61] U.S. Army Corps of Engineers, San Francisco Bay Area In-Depth Study: Waterborne Commerce Projections and Commodity Flow Analysis, (San Francisco, September 1976).

The last three consultant forecasts were developed by the consultants noted above (TBS/RHA), and are the projections used in the Seaport Plan and reviewed in this report.

TBS/RHA's three forecasts are presented in Tables Five and Six. Table Five is the "baseline", or "most likely" forecast of future cargo flows, and is the basis for the BCDC marine terminal permit system. Table Six shows the alternative high and low forecasts. In addition, a separate set of forecasts, based on the same assumptions and future event scenarios, but using revenue tons rather than short tons, was prepared for container cargos. These container revenue ton alternative forecasts are shown and compared with the container short ton forecasts in Table Seven.

Of the 18 forecast elements, it appears that four--containers (foreign), auto imports, iron and steel imports, and grain exports--are particularly noteworthy for our discussion. For it is these that are forecast to experience significant growth through the year 2000. Although coal exports is not a forecast element (it is included in the "Other Bulk" forecast category), considerable discussion did occur in the early 1980's about it becoming a major West Coast export. Thus, in the discussion below, it will be these five commodity/cargo flow forecasts that will be reviewed.

Table Five

MTC/BCDC SAN FRANCISCO BAY AREA CARGO FORECAST

(Dry Cargo - 1,000's of Short Tons)

	1978	FORECAST			
		1985	1990	2000	2020
CONTAINER[1]	5,009	8,260	12,065	19,610	49,020
Foreign Container	3,883	7,010	10,720	18,085	47,065
Domestic Container	1,126	1,250	1,345	1,525	1,955
BREAK BULK	486	465	440	425	320
Foreign Breakbulk	486	465	440	425	320
Domestic Breakbulk	---	---	---	---	---
NEO-BULK	1,476	1,679	1,964	2,304	3,209
Autos - Imports	278	365	445	540	800
- Exports	62	62	62	62	62
- Domestic	64	64	64	64	64
Iron & Steel-Imports	714	820	1,010	1,225	1,805
-Other	103	103	103	103	103
Newsprint - Imports	250	260	275	305	370
- Other	5	5	5	5	5
DRY BULK	2,465	2,735	2,845	3,110	3,930
Grain - Exports	276	595	690	930	1,680
- Other	95	105	120	145	215
Iron & Steel Scrap	564	450	450	450	450
Coke	283	300	300	300	300
Sugar	828	830	830	830	830
Salt	164	200	200	200	200
Other Bulk[2]	255	255	255	255	255
TOTAL, BASELINE FORECAST	9,436	13,139	17,314	25,449	56,479

[1] Includes the majority of LASH and RO/RO cargoes; LASH cargo is not expected to increase. LASH and RO/RO cargoes other than those included in the container forecast are included in the other cargo categories. For example, automobile RO/RO cargo is included in the neo-bulk forecast.

[2] Includes limestone, cement, coal, and miscellaneous tonnages of scrap, coke, sugar, and salt.

Source: Seaport Plan, p. 11. Original source: San Francisco Bay Area Cargo Forecast, U.S. Army Corps of Engineers, San Francisco District, prepared by Recht Hausrath & Associates and Temple, Barker & Sloane, Inc., June 1981

Table Six

MTC/BCDC SAN FRANCISCO BAY AREA ALTERNATIVE CARGO FORECASTS

(Dry Cargo - 1,000's of Short Tons)

	1978	FORECAST			
		1985	1990	2000	2020
HIGH FORECAST					
CONTAINER[1]	5,009	8,960	13,720	23,510	60,030
Foreign Container	3,883	7,575	12,115	21,455	56,660
Domestic Container	1,126	1,385	1,605	2,055	3,370
BREAK BULK	486	480	450	445	420
Foreign Breakbulk	486	480	450	445	420
Domestic Breakbulk	---	---	---	---	---
NEO-BULK	1,476	1,789	2,219	2,574	3,524
Autos - Imports	278	390	500	610	905
- Exports	62	62	62	62	62
- Domestic	64	64	64	64	64
Iron & Steel-Imports	714	890	1,180	1,395	1,975
-Other	103	103	103	103	103
Newsprint - Imports	250	275	305	335	410
- Other	5	5	5	5	5
DRY BULK	2,465	3,435	8,680	9,035	10,080
Grain - Exports	276	665	890	1,200	2,100
- Other	95	115	135	180	325
Iron & Steel Scrap	564	600	600	600	600
Coke	283	350	350	350	350
Sugar	828	950	950	950	950
Salt	164	300	300	300	300
Other Bulk[2]	255	455	5,455	5,455	5,455
TOTAL, HIGH FORECAST[3]	9,436	14,579	24,949	35,439	73,944
LOW FORECAST					
CONTAINER[1]	5,009	7,351	9,876	15,146	37,035
Foreign Container	3,883	6,225	8,750	14,020	35,910
Domestic Container	1,126	1,126	1,126	1,126	1,126
BREAK BULK	486	395	330	320	310
Foreign Breakbulk	486	395	330	320	310
Domestic Breakbulk	---	---	---	---	---
NEO-BULK	1,476	1,574	1,679	1,809	2,109
Autos - Imports	278	320	335	370	450
- Exports	62	62	62	62	62
- Domestic	64	64	64	64	64
Iron & Steel-Imports	714	770	860	955	1,175
-Other	103	103	103	103	103
Newsprint - Imports	250	250	250	250	250
- Other	5	5	5	5	5
DRY BULK	2,465	2,350	2,430	2,630	3,260
Grain - Exports	276	500	580	780	1,410
- Other	95	95	95	95	95
Iron & Steel Scrap	564	400	400	400	400
Coke	283	250	250	250	250
Sugar	828	700	700	700	700
Salt	164	150	150	150	150
Other Bulk[2]	255	255	255	255	255
TOTAL, LOW FORECAST[3]	9,436	11,755	14,435	20,030	42,825

1 Includes the majority of LASH and RO/RO cargoes; LASH cargo is not expected to increase.

2 Includes limestone, cement, coal, and miscellaneous tonnages of scrap, coke, sugar, and salt. The high forecast also assumes development of a coal exporting terminal and a limestone importing facility.

3 Since the level of container trade depends partly on the shift of break bulk to container, the high container forecast was combined with the low break bulk forecast and the low container forecast with the high break bulk, to calculate the total of the forecasts.

Source: Seaport Plan, p. 12. Original source: San Francisco Bay Area Cargo Forecast, U.S. Army Corps of Engineers, San Francisco District, prepared by Recht Hausrath & Associates and Temple, Barker & Sloane, Inc., June 1981

Table Seven

CONTAINER CARGO FORECASTS: SHORT TONS vs. REVENUE TONS

CONTAINER SHORT TON FORECAST
FOREIGN AND DOMESTIC CARGO
(thousands of short tons)

	1978	% Growth	1985	% Growth	1990	% Growth	2000	% Growth	2020
Baseline	5,009	7.4%	8,260	7.9%	12,065	4.9%	19,610	4.7%	49,020
High	5,009	8.7	8,960	8.9	13,720	5.5	23,510	4.8	60,030
Low	5,009	5.6	7,351	6.1	9,876	4.4	15,146	4.6	37,036

CONTAINER REVENUE TON ESTIMATE
FOREIGN AND DOMESTIC CARGO
(thousands of revenue tons)

	1978	% Growth	1985	% Growth	1990	% Growth	2000	% Growth	2020
Baseline	8,850	8.4%	15,573	8.6%	23,523	5.3%	39,582	4.9%	102,594
High	8,850	9.7	16,866	9.6	26,682	5.9	47,245	5.0	124,730
Low	8,850	6.6	13,847	6.8	19,233	4.8	30,619	4.8	77,839

Source: San Francisco Bay Area Cargo Forecast, p. 151.

The review format follows the following pattern for each commodity/forecast element:

- Forecast and annual compound growth rate (in thousands of short tons), 1978 through 2000.[62]
- Significant assumptions and event scenarios.
- Forecast review and analysis.

Except where noted below, the review is of the baseline forecast, and is founded on MTC/BCDC's Seaport Plan Final Technical Report, pages 28-52, and on the San Francisco Bay Area Cargo Forecast, prepared by TBS/RHA.

a. Containerized General Cargo-Foreign Trade

- Forecast and growth rate (thousands of short tons):

  1978: 3,883 (historical data); 1985: 7,010 (8.8%); 1990: 10,720 (8.9%); 2000: 18,085 (5.4%).

- Specific assumptions and event scenarios:

  - 85 percent of this growth through 1990 is on Trade Route 29, that runs between the Pacific Coast ports and the Pacific Basin countries of

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[62] As noted previously, the time horizon for this study is through the year 2000. This is done in recognition of the extreme difficulty of predicting cargo flows and/or ground access demands beyond a 15-20 year time period.

Japan, Taiwan, Korea, Hong Kong, China, and the other nations of the Far East.

- Through 1990, this trade is projected to grow at a 9.5 percent annual rate, similar to that experienced over the last 20 years. Between 1990 and 2000, this rate is projected to drop to around 5.5 percent annually.

- Because of the development of mini-landbridge and micro-landbridge cargo movements, the Pacific Coast's share of U.S. Far East trade is projected to grow at rates of approximately one percent per year.

- Trade with non-Far East countries is projected to grow at a 3.6 percent annual rate throughout the period. This trade, currently 51.4 percent containerized (the other 48.6 percent moving as breakbulk), is projected to become 64 percent containerized by 1985, 72 percent by 1990, and 82 percent by the year 2000.

- The Bay Area's share of Pacific Coast tonnage share is projected to remain at the late 1970s' level (about 30 percent of the total container trade).

- Forecast review and analysis

The continuation of the dramatic growth in U.S./ Pacific Coast-Far East trade, and the continued acceptance of containerization in general cargo international trade, are the recurring themes in TBS/RHA's forecast. It is founded on the assumption that trade along Trade Route 29 (i.e., the route between the Pacific Coast and the Far East), will continue to grow at the same historical rate through 1990 as between 1959 and 1977 (9.5 percent annually). Its implications are that U.S. foreign trade will be increasingly dominated by this trade between the Far East countries and the U.S. Pacific Coast, and that domestic goods production, as a percentage of total U.S. goods consumption, will continue to decline.

Whether in fact these trends will continue (and only moderate after 1990), is open to conjecture. If based on the apparent relationship between U.S. GNP and U.S.-Far East containerized imports, a growth rate of 7.5 percent to 1990, and 5.9 percent between 1990 and 2000 would be used for a Bay Area cargo flow forecast.[63] This assumes a 6.0

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[63] San Francisco Bay Area Cargo Forecast, pp. 56-57.

percent growth rate in U.S.-Far East import trade to 1990 (4.9 percent, 1990-2000), and a Pacific Coast import cargo share of this trade moving from 63.9 percent in 1977, to 71.9 percent in 1985, 76.9 in 1990, and 84.4 in the year 2000. The TBS/RHA low forecast of 7.5 percent growth rate to 1990 (5.0 percent between 1990 and 2000) is based in large part on this analysis. Increases in Peoples Republic of China-U.S. trade could argue for these baseline levels. But despite the rosy pictures painted by many, the report points out that at least for U.S. exports, China's development status, and intense competition from other Pacific Basin countries, will limit China's demand for U.S. products. Finally, although Pacific Coast share of Far East containerized imports was only 63.9 percent in 1977, the overall share when including exports was 73.8 percent, which suggests again that the forecast growth may be high, particularly in the 1985-1990 period.

As noted previously, corresponding containerized cargo revenue ton forecasts were produced. These indicate growth rates higher than the short ton forecasts for total overall containerized cargo (see Table Seven). Much of this difference is due to the general increasing volume, or "cubic," of cargo in comparison to weight. At the same time however, some of this increase is due to changes, not only in the type of cargo, but in the tariff on which shipping charges and customs fees, and thus the calculation of revenue tonnage, are based. Nevertheless, the significance of these higher growth rates is that the 1990 level of terminal demand may be 10 percent higher than what would be indicated by the short ton forecast (i.e., nine berths instead of eight), and 14 percent higher (i.e., 29 berths instead of 25) by the year 2000.[64]

Finally, this "commodity" forecast, as well as the others in the overall forecast, are very sensitive to the assumption that the Bay Area share of Pacific Coast container cargo volume will remain the same. The report points out that, for example, if in 1990 the Pacific Coast baseline foreign container cargo forecast was met, but the Bay Area share dropped from the 1978 level of about 30 percent to around 24-25 percent, the net result would be Bay Area cargo volumes only equaling the

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[64] San Francisco Bay Area Cargo Forecast, p. 152.

low container cargo forecast. The same result would occur if the Bay Area cargo share fell to 23 percent in the year 2000, all other conditions being equal.[65]

b. Auto Imports

- Forecast and growth rate (thousands of short tons):

  1978: 278 (historical data); 1985: 365 (4%); 1990: 445 (4%); 2000: 540 (2%).

- Specific assumptions and event scenarios:

  - U.S. auto demand will grow at about two percent annually, after a slow recovery from the depressed 1980-82 recession levels.

  - Over the long term, import market share will return to about 20-22 percent of the market. However, Pacific Coast receipt share of the import market will grow from 44 percent in 1978, to 56 percent in 1990, as Japanese manufacturers increasingly dominate the import marketplace.

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65 San Francisco Bay Area Cargo Forecast, p. 71.

- U.S. auto maker resurgence, Japanese voluntary import restraints, and some domestic production of foreign vehicles together will restrain import's share of the U.S. auto market.

- Bay Area share of Pacific Coast imports will stabilize and hold steady at 16.4 percent.

- Forecast review and analysis

This forecast assumes that despite what many people believe is a saturated, mature auto market, Americans will continue to demand autos at a rate double the current and 1970's population growth rate of around one percent per year. It further suggests that the Japanese will continue to increase their penetration in the West Coast auto market.

To some extent, this forecast is more volatile, being very sensitive to political pressures and manufacturer decisions. Further development of U.S. domestic auto plants by the Japanese "big four" (Toyota, Nissan, Honda, and Mazda), the success of the General Motors/Toyota venture in Fremont, and of the General Motors "Saturn

Project"[66] would argue for this forecast, or even lower import growth rates. Such reduced levels could approach the low forecast growth rates of two percent to 1985, one percent thereafter. The same would occur with the passage of "domestic content" legislation, requiring a certain percentage of each passenger car's parts to be American-made. Increasing importation by American manufacturers, and/or more aggressive marketing by Japanese and other foreign manufacturers, could substantially raise import levels to growth rates similar to the high forecast (five percent growth to 1990, two percent thereafter). Mexican manufacture of U.S.A.-bound vehicles, such as that planned by the Ford Motor Company, will also influence both the level of import share of the American market, as well as the Pacific Coast/Bay Area import volumes. Nevertheless, the key questions for the Bay Area on this issue are, "How will the U.S. auto market grow, particularly for imports?", and "Can the Bay Area maintain its share of Pacific Coast imports?".

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[66] See Amal Nag, "To Build A Small Car, GM Tries to Redesign Its Production System," Wall Street Journal (May 14, 1984), pp. 1, 18.

c. Iron and steel imports

- Forecast and growth rate (thousands of short tons):

  1978: 714 (historical data); 1985: 820 (4.8%, years 1983, 1984, and 1985 only); 1990: 1,010 (4.3%); 2000: 1,225 (1.9%).

- Specific assumptions and event scenarios

  - The U.S. Western steel market will return to its prerecession demand levels and then will grow at approximately two percent per year.

  - All Western market growth will be captured by imports through 1990, raising the steel market import share from 43 percent in 1978, to 52 percent in 1990. Higher import market shares will only be limited by the combination of import restraints and tariffs.

- Forecast review and analysis

  The continued decline of the American steel industry, with the substitution of foreign imports, is the theme of this forecast. Under it, imports capture an increasing share of the Western steel market, defined by the steel industry as those states west of the Rocky Mountains. But unlike the auto forecast, it describes an industry that at least in the short to mid-term, remains relatively unresponsive. Here again, the main question mark is the predicted demand growth rate. However, at least here, the growth rate is more in line with the predicted future growth rate of these western states.

d. Grain Exports

- Forecast and growth rate (thousands of short tons):

  1978: 276 (Historical data); 1985: 595 (a six percent growth rate from a 1979 level of 420 thousand short tons); 1990: 690 (3%); 2000: 930 (3%).

- Specific assumptions and event scenarios:

  - The abnormally high export volume experienced in 1979 is maintained, and continues to grow at six percent annually, almost double the U.S. overall grain exports forecast. After 1990, export growth continues at a rate only slightly above the U.S. forecast.

- Most of the shipments will be from topping off activities by bulk grain ships at the Port of San Francisco, after initial loading at the Port of Sacramento or the Port of Stockton.

- Forecast review and analysis

In previous forecasts, generally there has been a strong historical record or pattern by which TBS/RHA was able to build a forecast of future events. In the grain export area however, such a record did not exist, and thus uncertainty is the theme of this forecast.

In the absence of a historical trend, TBS/RHA assumed that the record export volumes experienced in 1979 would be the start of a long-term trend, and thus forecast the significant grain export volume growth noted above. Even their low forecast does not significantly differ from these assumptions, again using a 420,000 ton base, by which a three percent annual growth rate to the year 2000 was applied.

It also appears that the use of the 420,000-ton base was overly optimistic as a basis of a long term trend. The forecasted record level was 16 percent higher than the previous record set in 1975, and 61 percent higher than the average for the previous six years.[67] In part, this level was supported by record corn exports to the Far East, although previously corn had not been a significant Bay Area grain export.

To put these comments into perspective, one needs to look at the role the Bay Area plays in the grain export marketplace. Currently, the Bay Area plays a supportive role to the ports of Sacramento and Stockton, acting as a topping-off place for ships which, due to 30-foot access channels, cannot fully load at these ports. In terms of volumes, Northern California as a whole plays a fairly minor role in Pacific Coast and U.S. grain export trade. For example, during the period 1973-1978, Northern California share of Pacific Coast trade ranged from 8.8 to 14.2 percent; of U S. grain export trade, the figures were far lower at 1.1 to 1.7 percent.

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[67] San Francisco Bay Area Cargo Forecast, p. 103.

This is true even though Northern California's share of the California waterborne grain export trade ranged from 50 to 80 percent during the same period.[68] During this period, the Bay Area contribution ranged from 20 to 30 percent of that trade.

Grain export levels generally are very volatile, for they are subject to country specific crop successes or failures, current economic cycles, and the value of the U.S. dollar against other currencies. Given these factors, the Bay Area grain export trade will probably remain in its current supportive role, dependent on the uncertainties of the grain trade and on the size of ships that serve it.

e. Coal

- Forecast and growth rate (thousands of short tons):

  1978: 0; 1985, 1990, and 2000: 0

- Specific assumptions and event scenarios:

  - West Coast ports' terminal coal capacity will be sufficient large so that coal will move through the Bay Area ports only under the highest demand scenarios.

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[68] San Francisco Bay Area Cargo Forecast. p. 104.

- Environmental concerns will constrain any construction of coal export facilities in the Bay Area, further diverting possible coal trade to other ports.

- Forecast review and analysis

No exports. This is the simple conclusion of TBS/RHA's analysis. Their forecasts are based on the assumption that U.S. coal export demand will grow at best slowly, at least in the near term, and that sufficient facilities will exist on the West Coast to move the expected export volumes of coal. This conclusion seems supported by recent events, as summarized in an article published last year in Business Week.[69]

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[69] "A Gritty Future for U.S. Coal Exporters," Business Week, February 27, 1984, pp. 57-60.

3. Recent Commerce Trends Analysis

In this review of the TBS/RHA's forecasts, four conclusions can be drawn:

- From a comparison standpoint with other forecasts of Bay Area cargo flows, most of the forecasts appear fairly conservative and solidly based.

- Patterns through 1982 (and in some cases, 1983), suggest that the forecasts were reasonably on target when reviewed from the perspective of the impact of this nation's (and the world's) recession, and the rise in value of the dollar against other world currencies.

- The main exceptions to these conclusions are the forecasts for the movement of containers and for the export of grain, the first a victim of the loss of Bay Area cargo share, the second the victim of grain trade fluctuations.

- Yet even when the forecasts are adjusted to reflect recent patterns, the projected increases in cargo volumes are still significant, including a 121 percent increase by the year 2000.

Let's look at these four conclusions in detail, one by one. Fortunately for comparison purposes, several Bay Area cargo forecasts have been prepared over the past several years. Three are notable for comparison sake. The first two were mentioned previously, one being the first set of consultant forecasts for MTC/BCDC, the other set being those prepared by the Army Corps of Engineers, and released in September 1976. Like the TBS/ RHA forecasts, these two have a three-step forecast format, including a high, a medium or baseline forecast, and a low forecast. Generally, overall cargo growth rates are somewhat similar to the year 2000, with TBS/RHA's forecast total cargo volumes being lower, since they were able to forecast from a historical database that included more recent information (1978). They do differ, mainly in their view of container/breakbulk volumes (TBS/RHA assume a much greater shift of cargo from breakbulk to container shipment modes), and in their forecasts of dry bulk cargos (with TBS/RHA predicting much lower dry bulk growth).

The third Bay Area cargo forecast was included in an analysis of port development opportunities for the Port of Redwood City, prepared by Williams-Kuebelbeck and Associates, Inc. under contract to the port.[70] A summary of their forecast is presented in Table Eight.

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[70] Williams-Kuebelbeck and Associates, Inc., Development Program for the Port of Redwood City (Redwood City, June 1981).

Table Eight

WILLIAMS-KUEBELBECK SAN FRANCISCO
BAY AREA CARGO FORECAST (excerpts)
(in thousands of short tons)

Category	1982	1985	1990	2000
Containers	7,108	8,109	9,783	13,793
Break Bulk	677	742	809	1,054
Neobulk	1,672	1,791	1,800	2,017
• Iron/Steel Imports	(824)	(892)	(769)	(761)
Dry Bulk	4,960	7,095	12,381	20,742
• Grain Exports	(496)	(903)	(2,164)	(5,795)

Source: Williams-Kuebelbeck and Associates, Inc., Development Program for the Port of Redwood City, June 1981, pp. 3-31, 3-36.

Their forecast, when compared to the TBS/RHA's, appears to differ in several respects. First, they forecast much lower container volumes in 1990 and in 2000, in part through their projection of a much slower shift of breakbulk cargos to containers. Measured together, their forecast of container and breakbulk volumes is 1.4 percent higher than TBS/RHA's 1985 forecast, but lower in 1990 and in 2000 by 15.3 and 25.9 percent respectively. Further, their forecast for these two categories is 4.8 percent lower than the TBS/RHA low forecast for the year 2000. Such slower projected container growth could be due to lower assumptions for Bay Area container cargo share, world and national economic growth, or both (assumptions not stated in their report).

Although the assumptions are not well documented, these lower forecasts could be significant. However, for most categories, their forecasts are higher. Neobulk cargo volumes are projected slightly higher, even though they predict a plateauing and then a slow decline in the volume of steel imports, on the assumption that the domestic steel industry will become more competitive through productivity improvements.[71] The greatest differences are in the dry bulk and grain export categories. The dry bulk category, in general, is projected to grow 6.8 percent annually through 1985, 11.8 percent annually between 1986-1990, and at a 5.3 annual rate between 1990 and the year 2000. This is from a base significantly higher than that shown in the TBS/RHA report. The grain exports component is projected to grow from a 1979 base of 380,000 at a 15.6 percent annual rate to 1985, 19.1 percent annual rate between 1986-1990, and at a 10.4 percent annual rate between 1990 and 2000, with corn being the main export grain commodity.

Part of these differences may be questions of "apples and oranges" between the two forecasts. Indeed, some

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[71]Williams-Kuebelbeck and Associates, p. 3-46.

commodity shipments might have been classified as dry bulk by Williams et al., and container by TBS/RHA (fertilizer imports was the most obvious example found in our review). The higher dry bulk base is partly due to Williams et al, counting almost 800,000 annual tons of internal Bay shipments of sand and gravel (TBS/RHA did not). Nevertheless, some of the components of the dry bulk forecast seem high. Coal exports for example are projected to grow from zero in 1978 to 249,000 tons in 1982, and up to 7,778,000 tons by the year 2000.[72] Iron and steel scrap exports are forecast to grow in the same period 75.7 percent to 1,393,000 tons by the year 2000[73], compared to the TBS/RHA level forecast of 450,000 tons throughout the forecast period. In light of the data presented in TBS/RHA's report, it seems appropriate to disregard at least the dry bulk portion of the Williams et al., forecast.

Finally, there is the question of the TBS/RHA grain export forecast. We have asserted that in general, their forecast seems optimistic (ignoring for the moment at least the forecast noted above). Yet, when one looks at other forecasts, that is not necessarily so. For example, we reviewed a more recent national forecast which looks at

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[72]Ibid., p. 3-47.

[73]Ibid., p. 3-46.

some of the same data for similar grain exports. This forecast, produced as part of a 1982 U.S. Department of Agriculture (USDA) study of the U.S. agricultural products transport system, is shown below in Table Nine:

Table Nine

ANNOTATED U.S. 1982 AGRICULTURAL EXPORTS FORECAST (excerpts)
(in millions of short tons)

Commodity	1979 (actual)	1983	1985	1990
Wheat, Wheat Flour	35.1	54.0	54.3	58.4
Feed Grains (e.g., corn)	66.6	77.6	86.6	109.8
Soybeans (beans, meal, oil)	30.5	38.1	38.4	45.3
Cotton	1.6	1.7	1.8	1.8
Rice	2.7	(not forecast)		

Source: USDA, Office of Transportation. Annotated with 1979 historical data, the base year of the TBS/RHA grain exports forecast, from USDA's *Agricultural Outlook*, December 1981, p. 15.

Using the annotated 1979 data as the base year, the following increases, 1985 over 1979 volumes were predicted: Wheat = 54.7 percent; feed grains = 30.0 percent; soybeans = 25.9 percent; and cotton = 12.5 percent. (The latter two are presently not significant Bay Area *bulk* exports.) These compare with TBS/RHA's expectation of a 41.7 percent growth in grain exports from the Bay Area during the same period.

These comparisons suggest that the TBS/RHA forecasts were conservatively based, and compare favorably with other forecasts produced during the same period. Only the grain exports forecast appears somewhat optimistic.

Recent cargo volume trends tends to support these conclusions. At the same time, they also highlight the sensitivity of the forecasts to changes in any of the forecasts assumptions. The most important trends, displayed in Tables Ten (Cargo/Container Flows) and Eleven (Bay/U.S. Area Grain Exports) suggest two differing patterns. The first pattern of a slightly slower, more erratic growth than the Seaport Plan baseline forecast has been exhibited by three categories: Trade Route 29 Container Trade, Auto Imports, and Iron and Steel Imports.

The slower growth in the trade route cargos, and steel imports particularly, are in line with the expected trade depressant effects of the 1981-1983 recession both here and abroad. Thus, growth in line with the forecast projections is still a reasonable, if optimistic, assumption, as the U.S. and other world countries continue to rebound from that period. In mid-1984, a textiles trade agreement was also negotiated with the People's Republic of China, the absence of which resulted in a restriction of U.S./China trade during 1982 and 1983. Its existence should bolster trade growth of both containerized and dry bulk commodities (particularly grains) between these two countries along this trade route.

Table Ten

CARGO/CONTAINER FLOWS: 1978-1983
(In Thousands of Tons)

Category	1978 (From Forecast)	1979	1980	1981	1982	1983	Percent Annual Change	1985 Forecast (Growth Rate)
Containers (revenue tons)								
• Bay Area	8,850	9,410	9,658	9,001	10,555	10,637	3.7%	15,573 (8.4)
• California	21,054	23,079	25,280	25,251	28,244	32,832	9.3%	--
• Pacific Coast	28,819	31,004	34,961	35,286	38,698	45,429	9.5%	--
• Cargo Share - Bay Area/ Pacific Coast (%)	30.7	30.4	27.6	25.5	27.3	23.4	-5.3%	30.0 (-)
Containers-Trade Route 29 (short tons)	10,395	10,422	12,456	13,593	14,143	N/A*	7.9%	19,621 (9.5)
Auto Imports (short tons)	278	252	316	280	262	N/A	-1.5%	365 (4.0)
Iron & Steel Imports (short tons)	714	662	775	736	595	N/A	-4.5%	820 (2.0) (4.8% 1983 1984, 1985)

*N/A = Not Available

Sources: Container tonnage, area specific: Pacific Maritime Association, "Tonnage: Port by Calendar Quarter (Period Ending 6/30/84)", PMA Research, 10/1/84. Container Tonnage, Trade Route 29: U.S. Maritime Administration (Office of Trade Studies and Subsidy Contracts), Containerized Cargo Statistics: Calendar Year 1982, February, 1984, p. 75. All others: U.S. Army Corps of Engineers, Waterborne Commerce of the United States, Part 5-Pacific Coast, Alaska and Hawaii, Calendar Years 1979, 1980, 1981, 1982 (preliminary report).

Table Eleven

BAY AREA / U.S. GRAIN EXPORTS: 1979-1983
(in thousands of short tons)

	1979 BAY / U.S.[1]	1980 BAY / U.S.	1981 BAY / U.S.	1982 BAY / U.S.	1983 BAY / U.S.	Percent Annual Change, 1979-1982 BAY / U.S.
Wheat	221.5 / 35,101	297.7 / 40,394	118.9 / 47,317	141.3 / 49,962	NA[2] / 41,103	-13.9 / +12.5
Coarse Grains[3]	240.5 / 67,723	150.7 / 79,844	12.7 / 77,709	10.4 / 65,160	NA / 60,221	-64.9 / -1.3
• Corn	(238.8 / 58,400[4])	(148.2 / 68,787)	(11.8 / 66,491)	(7.6 / 55,561)	(NA / 52,758)	(-68.3 / -1.6)
Rice	100.6 / 2,685	163.1 / 3,310	33.6 / 3,553	25.9 / 3,260	NA / 2,549	-36.4 / +6.7
Soybeans[5]	.6 / 30,519	1.0 / 36,095	2.7 / 30,083	2.7 / 36,606	NA / 31,890	+65.1 / +6.3
TOTAL, BAY AREA	563.2[6]	612.5	167.9	180.3	NA	-31.6

1 Federal fiscal year, October through September

2 NA=Not available

3 Includes corn, oats, barley, sorghum, and rye

4 Estimated

5 Beans, meal, oil

6 TBS/RHA estimate used for the forecasts was 420,000 tons.

SOURCES: Bay Area data: U.S. Army Corps of Engineers, Waterborne Commerce of the United States, Part 5-Pacific Coast, Alaska and Hawaii, Calendar Years 1979, 1980, 1981, 1982 (prelimary report). U.S. data: U.S. Department of Agriculture, Agricultural Outlook, December, 1982, p. 13; June, 1984, p.16.

Auto import volumes have followed this same pattern, with record volumes being experienced in 1980, but otherwise remaining fairly equal to or slightly below 1978 levels. This pattern can be accounted for by both the "voluntary" import restrictions on Japanese auto imports, and the general depressed state of the U.S. auto market. If these assumptions are correct, then as the market improves and the "quotas" are increased, Bay Area volumes should increase likewise.

Bay Area container trade and grain exports fall into the second pattern, a pattern of significantly slower growth, or, in the case of grain exports, a significant volume decline. In both cases, a significant change in a forecast assumption is the reason. In the first case, TBS/RHA predicted Bay Area container cargo volume, as a percentage of Pacific Coast container trade, would remain at about the 1978 level, with the foreign trade share at about 30 percent.[74] Instead, this share has fallen significantly, continuing a trend that started in the early 1970s. Further, while this drop of share may be

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[74] San Francisco Bay Area Cargo Forecast, pp. 68, 69, 73.

arrested and actually be slightly reversed, the net result will probably still be Bay Area container cargo volumes only approximating the low, revenue ton container cargo forecast, as displayed graphically in Figure Seven.

This conclusion is reached based on considerable corroborative evidence. As can be seen in Table Ten, this loss of share has occurred while Trade Route 29 volumes have continued to rise. As a whole, the Pacific Coast share of U.S./Pacific Basin trade has risen from 73.8 percent in 1977 (67.2 percent of imports), to 78.1 percent in 1982 (73.0 percent of imports), based on U.S. Maritime Administration container cargo statistics.[75] Most of this volume loss has been to the Southern California ports of Los Angeles and Long Beach, as their share of overall Pacific Coast container trade has risen from 43.8 percent in 1977 to 48.6 percent in 1983, based on Pacific Maritime Association statistics.[76]

Some industry analysts and observers maintain that this shift is part of the economic cycle which has favored

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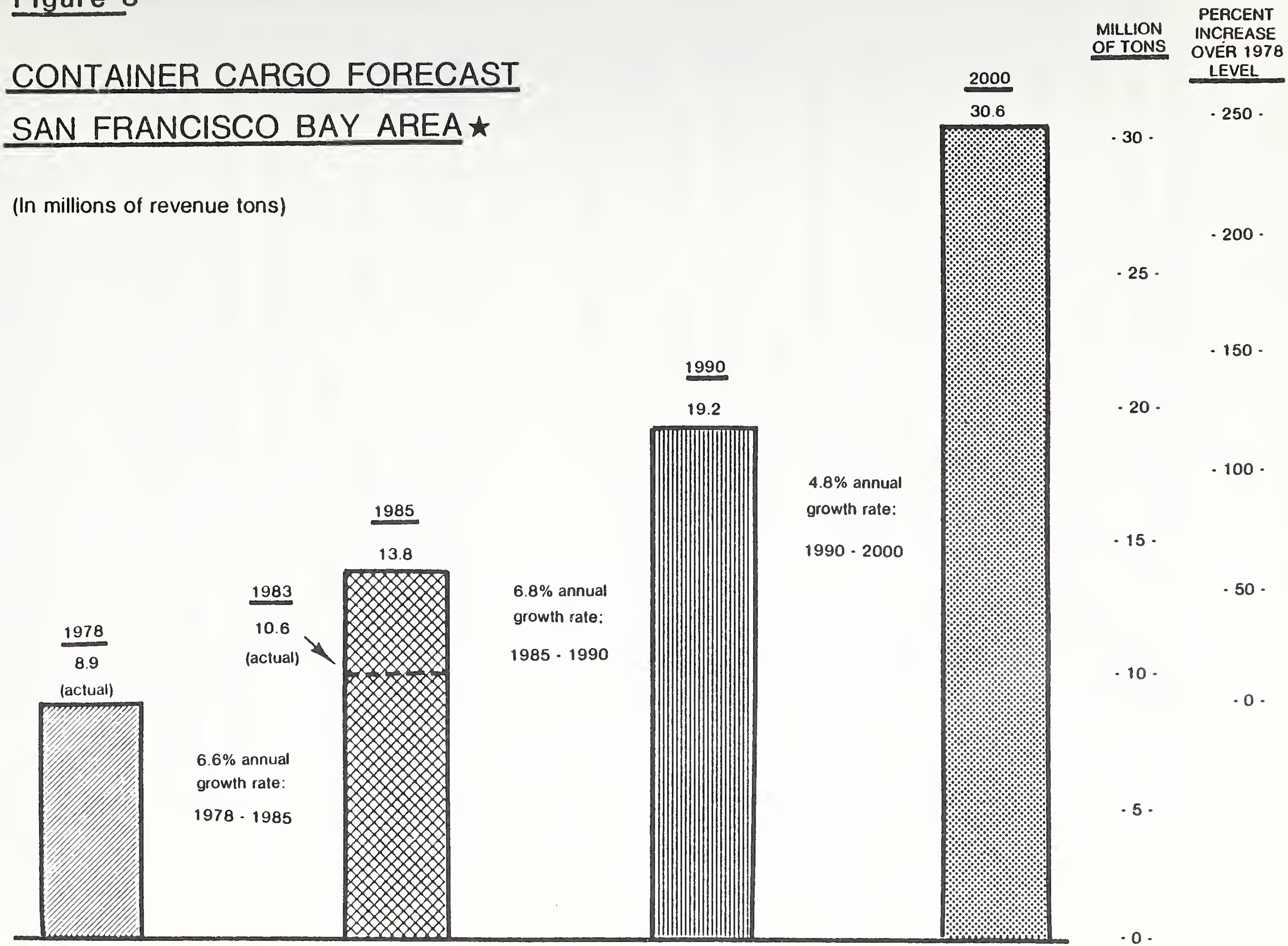
[75] U.S. Maritime Administration (Office of Trade Studies and Subsidy Contracts), Containerized Cargo Statistics: Calendar Year 1982, February, 1984, pp. 33, 59, 75.

[76] Pacific Maritime Association, "Tonnage: Port by Calendar Quarter (Period Ending 6/30/84) ", PMA Research, 10/1/84.

Figure 8

CONTAINER CARGO FORECAST
SAN FRANCISCO BAY AREA ★

(In millions of revenue tons)



★ Developed from Seaport Plan Final Technical Report, p. 40

imports significantly over exports, to the disadvantage of the export-oriented Bay Area ports, during the last two years. They argue that as Pacific Basin countries' economies improve, and as the value of the dollar falls, the pendulum will swing back in the Bay Area ports' favor. This is a reasonable argument, and indeed may stem the decline in Bay Area cargo share. However, if one just focuses on exports only, the result (loss of market share) is still the same. According to an analysis of preliminary foreign oceanborne general cargo data for 1983, while Pacific Coast export volume actually grew 1.1 percent, Bay Area volume actually dropped 8.3 percent. With this decline, Bay Area share of the Pacific Coast export trade dropped from an already low 22.4 percent in 1982, to a 20.3 percent in 1983.[77]

This loss can be attributed to many factors. Some may be linked to the deepening of channels, such as to the Port of Los Angeles. Some can be traced to improvements in the ground-access systems serving other Pacific Coast ports. For example, improvements in intermodal rail services probably contributed to the Pacific Northwest ports capturing the biggest gains in both export and import volumes in 1983. With the overcapacity being experienced on the

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[77]Jim McDonald, "Multiple Problems Confront Trans-Pacific Trade Routes," WWS/WORLD PORTS, XLVII (February/March, 1984), pp. 35.

Pacific trade shipping ocean lines (at least westbound), and with the continued deregulation of the transportation industry, these lines (i.e., carriers) are seeking efficiency improvements that also affect market share. Looking at the depths of channels, the availability of port facilities, and the efficiency of the ground-access networks serving those facilities, shipping lines are selectively focusing their operations on certain key, "load center" ports. Thus, for example, events such as use of 4000+TEU (twenty-foot equivalents) container ships (the largest serving the Bay ports has a capacity of 3000 TEU's), over 100 acre terminals, and 45 foot channels, are contributing to the improved competitiveness of the Port of Los Angeles.[78]

Over time, some of this lost Bay Area container cargo share will be recovered, as the Bay ports market their facilities and services, provide the necessary up-to-date facilities, obtain deepened harbor access channels, and seek improvements to the ground-access networks. But, based on the evidence cited, we believe both ground-access planning, and container terminal development, should be based on the low container revenue ton cargo forecast.

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[78]See the Jim McDonald article and the February/March, 1984 edition of WWS/World Ports for a fuller discussion of these trends.

The second case, noted at the beginning of this subsection, dealing with Bay Area grain export trade is more complex. In the year TBS/RHA were preparing their forecast (1979), the Bay Area was experiencing record grain export volumes. In fact, the final 1979 volume was 34 percent over their 1979 forecast of 420,000 tons, 52 percent over the actual 1978 level. This trend continued into 1980, when the volume even exceeded the 1985 baseline forecast level of 595,000 tons by three percent. These trends reversed abruptly in 1981. The 1981 volume was just 167,900 tons, and was not only 60 percent lower than the forecast "base" of 420,000 tons, but 51 percent lower than the average for the eight previous years of 342,300 tons per year.

When viewed in light of the events that caused these changes, and in the context of the Bay Area port's role as a peak demand server ("peaker") in the grain export trade, the results become more understandable. In 1979 and 1980, the combined effect of the partial U.S. embargo of grain exports to Russia, increase Chinese demand for grain, and low U.S. dollar levels, spurred grain exports from the West Coast ports. The Bay Area ports responded by playing the "peaker" role. For example, traditionally the Bay

Area ports do not export corn. Yet in 1979 and 1980, corn was a major Bay Area grain export.

As West Coast grain demand leveled off, and as more permanent, less costly shipping arrangements were made with other West Coast ports, including Sacramento and Stockton, Bay Area grain exports fell sharply. For example, in the same year that Bay Area exports dropped over 72 percent, grain exports from Sacramento and Stockton were up 23 percent, according to U.S. Army Corps of Engineers waterborne commerce records.[79] Only in 1982 did West Coast (and Sacramento/Stockton) grain exports fall, in response to sizable reductions in grain imports by almost all the Pacific Basin nations and Latin America. In that year, export of cereals and cereal grains from the West Coast to China fell 90 percent; those to Japan fell 44 percent. The overall West Coast drop was 33 percent.[80] Grain exports dropped 51 percent,

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[79] Waterborne Commerce of the United States, Calendar Year 1980 (New Orleans, 1982), pp. 11, 13; Calendar Year 1981 (1983), pp. 9, 11.

[80] Port of Oakland (Research Department), Foreign Trade: Oakland-San Francisco Customs District & U.S. West Coast, January-December 1982 (Oakland, April, 1983).

however, from the Delta ports of Sacramento and Stockton.[81] Nevertheless, U.S. exports of the three major Bay Area grains, wheat, corn and rice, actually rose 4.2 percent.

However, even this national trend reversed in 1983. U.S. exports of these three commodities fell 11.4 percent, as record harvests were experienced in China (and near records in Russia), as Australia reentered the grain export trade (after a disastrous 1982 drought), and as the U.S. dollar continued to rise in value against other currencies. Yet West Coast cereals and cereal grains exports did recover somewhat from their depressed 1982 levels, recording a 21 increase, with major increases in exports to Asia (except China).[82] This West Coast recovery did not include the Bay Area, if mirrored correctly by the statistics of the Port of San Francisco. In 1983, their volume of dry bulk cargo (over 99 percent export grain) amounted to just 41,700 tons.[83] Thus, based on previous patterns, overall Bay Area exports may total less than 100,000 tons when all

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[81]Waterborne Commerce of the United States: Calendar Year 1982 (preliminary data, Northern California), pp. 13-14.

[82]Port of Oakland (Research Department), Foreign Trade: Oakland-San Francisco Customs District and U.S. West coast, January-December, 1983, (Oakland, April, 1984.

[83]Gary Green, Maritime Department, Port of San Francisco, phone conversation, July 18, 1984.

data is in, which would be the lowest total since 1972. Preliminary indications suggest that this pattern again held in 1984, particularly affecting the West Coast, due to record rice sales by Thailand, high dollar values, and the market price-support effects of U.S. government-financed grain production cutbacks.[84]

Given these recent trends, what grain export volume levels should be used in planning for port facilities? Earlier we stated that the running average for the eight years prior to 1981 was about 342,300 tons. The 10-year average, counting the low 1981 and 1982 volumes, drops down to 308,600 tons per year. While, as noted, a three percent growth for U.S. grain exports is possible over the long term based on USDA estimates, the deepening of access channels to the Ports of Sacramento and Stockton could virtually erase grain as a major Bay Area export. Indeed, this thought has been expressed orally by Port of San Francisco officials, and technically in their plans to close down the San Francisco Grain Terminal sometime in the 1990s, as they expand container operations at their San Francisco Container Terminal-South.

It is not one of the intents of this study, however, to propose an alternative forecast. Nevertheless these

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[84]Analysis of the change in trade patterns based on USDA Agricultural Outlook periodical, and particularly the March 1981, March 1982, January/February 1983, and June, 1984 editions.

factors together suggest that even the low forecast may be high. On this basis, and given the fact that the Bay Area ports will continue to be called upon periodically to play a grain export "peaker" role, future port grain facilities planning should probably be based on the <u>low</u> grain export forecast.

C. Conveyance Trends and Analysis

In the previous sections, we reviewed the Bay Area cargo flow expectations, and MTC/BCDCs analysis of where and how much port terminal berth development should occur. In reviewing ground-access demands, these analyses tell us, at least from a regional sense, how much cargo will move through/on the Bay Area's highway and rail transportation systems. Before the full picture can be seen, however, one further area should be reviewed--the means and trip ends of cargo movement. This includes the patterns and determinants of ocean transport, mode split, and the origin or destination of U.S. mainland location cargo. These patterns will be discussed below. However, since it has affected virtually all movements of cargo, the deregulation of the freight transport industry will be discussed first.

1. Freight Transport Industry Deregulation

When MTC/BCDC's consultants were conducting their ground access analyses in the late 1970's and in early 1980, the movement to deregulate the freight transport industry was still largely in its discussion phases. Only the air cargo industry deregulation bill had been passed. Since then, three major federal deregulation bills have been enacted: the Motor Carrier Act of 1980 (Public Law 96-296), the Staggers Rail Act of 1980 (Public Law 96-448), and the Shipping Act of 1984 (Public Law 98-237). The actual effect of these laws and the implementing regulations (or the deletion of regulations as the case may be) is still uncertain, but all indications are that they are instigating fundamental, far-reaching changes in the freight industry and in the movement of freight. In most reviewers opinions, the effects so far have been positive, although the conclusion depends on the reviewer's perspective, whether they be a shipper, receiver, or carrier, large or small in size, and whether their own interests have benefited, been hurt, or been unaffected.

The changes being wrought by transport industry deregulation have been many and diverse. Some are direct results; more are the result of other events and trends that were impacted by deregulation. For simplicity sake, the changes can be organized into three groups: Marketing, Service, and Structural Changes.

Marketing Changes

- Price Competition: As deregulation substantially increased the freedom of carriers to raise or lower rates, price has become one of the primary, dominant marketing tools, at least equal in importance to the level and quality of services, and carrier recognition. The effect, however, has varied. On heavy freight volume routes, and in the movement of full truckload shipments, the competition is more intense, and thus the price reductions have been the greatest. On the other hand, on low volume routes, with less than truckload shipments or with "captive" shippers (i.e., those served by a single carrier) at times the opposite has been true. This, together with the lack-of-knowledge environment some shippers face given the rapid changes in freight rates, has led to some demands, particularly by captive coal and grain rail shippers, for some reregulation of the freight industry, or at least a narrower interpretation of the meaning and intent of the deregulation acts by the Interstate Commerce Commission. A good example of competition-induced price changes has been in the fall of tariffs for the movement of waterborne commerce, including those between the U.S. and the Far East along Trade Route 29. While reducing the cost of trade, some industry representatives claim that this competition as it is aggressively being practiced, could be negative in the long-run. They believe the resulting reduced profit margins may diminish both the quality and quantity of services, equipment, and carriers for the movement of freight in the years ahead.

- Increases in Contract Services: One of the outgrowths of the deregulation environment has been the desire by carriers and shippers alike to reduce some of the uncertainty in the shipping process, including in the rates charged, services provided, and cargo volumes handled. This desire, and generally reduced administrative requirements, has led to an increased use of individualized contract agreements. A fairly common occurrence in the port industry (ocean carriers often guarantee a port that certain minimum volumes will be put through a terminal facility, in exchange for a lower overall wharfage lease rate), this practice is now becoming more common, particularly between shippers and railroads. This may become the practice for ocean liner carriers as well. In its review of the Shipping Act of 1984, the consulting firm of Temple, Barker and Sloane, Inc. had these comments:

> With the passage of the Shipping Act, ocean carriers are now permitted to negotiate on an individual basis with shippers and (to) develop joint services with competitors. As a result, ocean carriers will exercise increasing control over the door-to-door routing of international cargos.[85]

However, the increase in contract services can restrict, to a certain extent, both the availability of rate/shipment information, and possible market place interaction and competition. Given the efficiency effects however, on balance, the impact will probably continue to be positive.

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[85]Letter, Michael L. Sclar, Vice President, Maritime Group, Temple, Barker & Sloane, June 28, 1984.

Service Changes

- Specialization: This is the key word which describes the service changes brought on by deregulation. These changes have been fostered by two objectives: "To get a competitive edge," and "To improve the time and cost efficiency of operations." The changes in equipment are the most obvious examples:

  - Ocean carriers have been changing over to fully-- dedicated, cellularized container ships, which serve very large, load-center ports.

  - With the authority to use larger trucks on certain designated routes, authorized by the federal Surface Transportation Assistance Act of 1982 (Public Law 97-987), trucking lines are switching to larger trucks. For "doubles" operations, the switch is to 102-inch wide, 28-foot trailers; for "semi" operations and some "piggyback" (trailer on flat car or TOFC) movements, the switch is to 102-inch wide, 48-foot trailers.

  - Railroads are making substantial investments in new intermodal equipment (such as Santa Fe's experi- mental A-Stack Container Car), more fuel-efficient locomotives, and dedicated single car type, unit trains. On the other side of the ledger, the role of the boxcar and the caboose is in decline, rail line abandonments have increased, and service frequency has changed in a manner similar to that noted above (possibly less services for the small shippers and towns across America).

- Intermodalism: In terms of the actual movement of cargo, this is where the biggest changes are taking place. Simply put, intermodalism is the movement of cargo by two or more modes, used to capitalize on the inherent efficiency advantages of each transportation mode.

  For reasons of both efficiency and growth potential, this multimodal movement of cargo is being pursued aggressively, particularly by the railroads. The growth in intermodalism can be seen in two areas. One area is in the growth of TOFC (trailer-on-flat-car or "piggyback") and COFC (container-on-flat-car) services. Under these concepts, the railroads provide the "wholesale," line-haul service, and trucking companies provide the "retail" local pick-up and delivery service.

Its significance in modern freight transportation trends can be seen in several ways. One can look at the general growth in intermodal services, trains, and traffic on the U.S. railroads or at their investment programs. For example, the CSX Corporation, which includes the old Chessie System and Seaboard Coast Line Railroads in the Eastern United States, is proceeding with a $1 billion, six year intermodal investment program, including new railroad cars, its own truck trailers, and intermodal yards.[86] One can look at the reductions in freight travel time. For example, in a recent speech by Lawrence Cena, President and Chief Executive Officer, Atchison, Topeka and Santa Fe Railway Company, he noted that by boxcar it generally takes 14 days to move a load of wine from the producer in the California "Central Valley" to a customer in New York City. Intermodally, by "piggyback", it takes only six days.

"Landbridge" services is the other main area in which the growth in intermodalism can be seen. Under this concept, the U.S. rail system is used as a "bridge" for the movement of waterborne commerce, as an

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[86]Robert Roberts, "Hay Watkins: He Acted While Others Talked About the Complete Transportation Company," Modern Railroads, January, 1984, p. 20.

alternative to shipping cargos through the Panama Canal. Using the Pacific Coast ports as a frame of reference, the bridge may be between two foreign countries (landbridge), between a foreign country and the U.S. East or Gulf Coast port area (mini-landbridge), or between a foreign country and an U.S. inland point (micro-landbridge).

The significance of this development can be seen in at least two ways. In an analysis conducted by the Port of Oakland, 1982 Asian mini-landbridge traffic accounted for 22.7 percent of Bay Area commerce imports and 21 percent of West Coast imports.[87] It can be seen in the operation by American President Lines of three, exclusive "linertrains," transporting containers between the Ports of Los Angeles, Seattle, Chicago, and New York. Indeed, some observers, including the Port of Los Angeles, predict that eventually 90 percent of all East and Gulf Coast originating or destined Far Eastern cargos will move by mini-landbridge.[88] Whether that will occur or not will depend both on rail transport system

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[87] Port of Oakland, Liner Trade Analysis, Pacific Basin Countries: Calendar Year 1982 (Oakland, July, 1983), p. 42.

[88] Port of Los Angeles, Port of Los Angeles 1980 Annual Report (Los Angeles, 1980), p. 6.

improvements, and on the rates established for this service, versus all water movement via the Panama Canal. Even if this trend is viewed conservatively, it seems clear that intermodalism will continue to grow, offering ports and shippers alike speedier and less costly movement of cargos.

Structural Changes

- Company Mergers and Intergration: For many observers of the U.S. freight transportation scene, it is here that the biggest fundamental changes fostered by freight transportation deregulation are taking place. The changes are most noticeable in the rail industry. Beginning in 1980, several major mergers have either occurred, or have been submitted for review. These include the mergers of the Union Pacific, Missouri Pacific, and the Western Pacific; the Chessie System and the Seaboard Coast Line (forming the CSX Corporation); the pending merger of the Southern Pacific and the Santa Fe; and the proposed sale of Conrail to at one time 14 different bidders, including the CSX Corporation and the Norfolk Southern Railroad.[89]

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[89] Don Byrne, "Bids Ranging from $1 to $7.6 billion listed by DOT in Conrail Purchase," Traffic World, June 25, 1984, p. 10.

From a structural sense, freight carriers are also becoming more intermodally oriented. Many railroads have formed, bought, or expanded trucking operations, or cooperated with ports in developing new intermodal container transfer facilities. The CSX Corporation is a good example. Since its formal creation in 1980, it has formed a new trucking firm (Chessie Motor Express), and has merged with Texas Gas Resources Corporation, incorporating Texas' natural gas pipelines and its barge company (American Commercial Lines), with CSX's two main railroad divisions.[90] These type of changes should be positive, for the ports, as long as they are served by multiple modal service providers.

- Industry Composition Changes: Closely related to the changes noted above, this deals more with the size and number of firms that are in the marketplace. Depending on the outcome of the SP/Santa Fe merger proposal, and the Conrail "governmental" sale, the U.S. rail market may soon be dominated by just seven or eight major carriers.

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[90] See the Robert Roberts article, previously cited, for additional details.

On the motor carrier side, a different pattern has occurred. As a result of much easier industry entry requirements, combined with a good profit potential through direct competition for freight with established, unionized carriers, thousands of new, generally nonunionized firms have entered the trucking industry. In testimony before the U.S. Congress in late 1983 by the U.S. General Accounting Office (GAO), the number of carriers under ICC jurisdiction increased 43 percent between 1980 and 1982, to over 25,000. During the same period, quoting the Traffic World testimony summary, "...a modestly large number of carriers have gone bankrupt or (otherwise) ceased operations...."[91] Noting that most of these were unionized, the GAO noted that "(t)onnage for these general freight carriers fell by 40 percent between 1970 and 1982."[92] Meanwhile, shippers (except perhaps small ones, or those located in small towns) enjoyed a bonanza, with rate reductions averaging

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[91]"GAO Says Motor Carrier Act of 1980 Putting Downward Pressure," Traffic World, CXCVIII (January 30, 1984), p. 41.

[92]Ibid., p. 42.

10-20 percent, and with some reductions as high as 40 percent.[93] Here again, ports and the movement of cargo has in general benefited, by having a greater number of carriers available to carry cargos at less cost.

As noted earlier, not all of the above changes are primarily deregulation-caused. The U.S. and world-wide recession has played a big role in the restructuring of the motor carrier and ocean shipping industries. Nor are the changes over, particularly mode share changes in the movement of cargo. But the result, at least in the short-run, seems to be continued reductions in freight movement travel times, stable or declining freight rates, and continued shifting in cargo movement modes. What these changes mean for the Bay Area ports in general, and the ground-access system in particular, is addressed in the following sections.

2. Ocean Transport and Bay Area Ports Considerations

When considering port ground-access, at first glance it may seem unnecessary to review trends in ocean transport. Yet the volume of cargo moving through a port, or a region's ports, is not

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[93] *Ibid.*, p. 41.

simply a supply and demand, origin and destination consideration. For beyond a certain land side distance point, it may be, all other factors being equal, just as advantageous to a ocean carrier to dock its ship at one port or another, or, for its implications in this study, one region's ports versus another.

Still, if ocean shipping patterns were fairly static, it probably could be taken as a given in the overall ground-access demand equation. Yet, as noted previously in this report, ocean shipping has not been static and, in fact, has gone through a revolution in the last 20 years. Much of this revolution has been fueled by the demand for increased efficiency in shipping operations. For our purposes, two issues, both tied to improved efficiency, are important for our consideration: Load centers, and channel deepening.

The concept of load centers is simple, but its implications are far reaching and thus politically sensitive. The concept is that as ocean carriers seek to reduce costs, and get higher percentages of open-ocean operation from their ships, they will confine their operations to fewer and fewer ports-of-call, relying on the ground transporatation network for more of the cargo movement trip. This is particularly true on the heaviest cargo volume routes, but can even be true on the lower volume routes if the major cargo generators/receivers are not physically remote. Its acceptance is being influenced by the strength of local area cargo supply and demand, the overall volume of trade between major areas (export, import, and total), and the rates shippers charge to move more cargo greater distances.

This concept's use however demands much of the ground facilities. The terminals must be larger to handle greater volume movements per ship as less ports are called upon, and as ships get progressively larger. The land-side networks must be stronger, not only so that cargo can be moved at higher peak volumes, but greater distances as well.

The influence of the load center concept can be seen in some of the changes in West Coast and Bay Area port operations. For example, as a group, the West Coast ports are acting more and more frequently as "load centers" for cargo bound for East Coast, Gulf Coast, or inland points (i.e., through mini- and micro-landbridge cargo movements). Some of the Bay Area ports have identified themselves as "export" cargo load centers, as the final Pacific Coast ports-of-call for ships before they go onto Pacific Basin locations. Conversely, the growth in imports, and the positive changes in travel time and freight rates brought on by deregulation, probably have contributed to the defacto load center development of the Los Angeles/Long Beach ports over the Bay Area ports.

As this concept is implemented, obviously some ports and areas will benefit, while others will be relegated to secondary support roles, acting as feeders to the load center ports. Thus, from a competitive position, ports are very sensitive about this concept, particularly when governmental activities influence its implementation. Nor is it clear how fast the concept will develop, or whether for the West Coast ports, it has already been fully implemented. For example, last year Mr. James O'Brien, Deputy Executive Director, Port of Oakland, spoke on this subject before a shipping symposium in Haifa, Israel. In his remarks, he indicated that ocean shipping container capacity oversupply, export/import cargo volume imbalances, and domestic political and national defense reasons would restrain, in his belief, the development of load center ports.[94] Yet overall, based on both empirical and statistical evidence, it appears it will be more a question of how fast, not whether or if, the Bay Area will have one or more of its ports as members of the load center "club."

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[94]Port of Oakland, "Oakland Official Sees Crises for Ports," Port Progress, May/June, 1984, pp. 6-7.

One critical element in the development of load center ports is the width and depth of shipping channels. Yet their depths vary fairly widely. According to Table 12, they average approximately 35-feet in the Bay Area (except the Port of San Francisco), but are much deeper both in the Pacific Northwest and Southern California. The channels that serve the Bay Area ports are shown in Figure 8.

In terms of current and near-term container terminals and container cargos growth, it is probably safe to assume container operations will be focused on the area's three largest ports: Oakland, Richmond, and San Francisco. Yet for the first two, their existing shallow channels puts them at a disadvantage in the competition for West Coast container cargos, thus restricting both their growth in their container cargo volumes, and in their associated local ground-access demands. How significant is this disadvantage? Estimates prepared by the Corps of Engineers indicate that with channels at 43-feet, 41.2 percent of Oakland Inner Harbor foreign container movements would

Table Twelve

SELECTED WEST COAST PORTS-MAIN CHANNELS MINIMUM DEPTHS[1]

PORT	DEPTH (in feet)
San Francisco Bay Ports (Channel(s))[2]	
• Main Entrance Channel (San Francisco Bar Channel)	55
• Alameda-Encinal Terminals	35
• Benicia (Pinole Shoal Channel)	35
• Oakland (Oakland Bar, Outer Harbor, and Inner Harbor Channels)	35
• Redwood City (Redwood City, San Bruno Shoal Channels)	30
• Richmond (Southampton Shoal, Richmond Inner Harbor Channels)	35
• San Francisco (main channel along waterfront)	40+[3]
Other California, Pacific Coast Ports	
• Long Beach	55[3]
• Los Angeles	45[3]
• Portland	40[4]
• Sacramento	30[5]
• Seattle	60+[4]
• Stockton	30[5,6]

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[1]Defined at the mean of lower low water tide level (MLLW). Does not include actual water depths alongside piers, and in certain local channels which, in some cases, may be significantly less.

[2]Seaport Plan Final Technical Report, p. 197

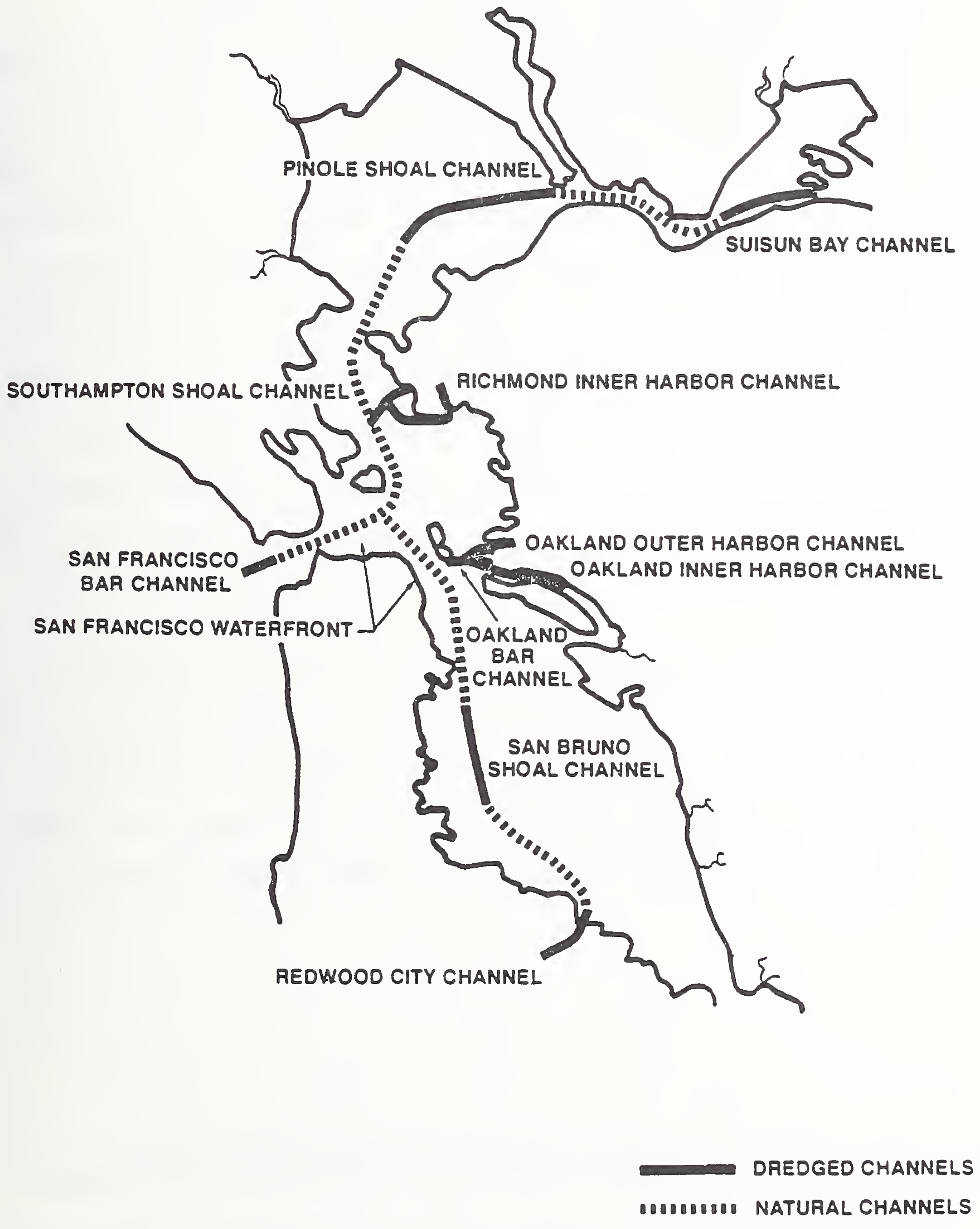
[3]Ed O'Neill, Program Development Office, South Pacific Division, U.S. Army Corps of Engineers, phone conversation, 7-30-84. At the Port of San Francisco, actual channel depths are considerably deeper, but rocks and small shoals effectively limit water depths to approximately this level.

[4]Ports of the World 1979, 32nd Edition, Benn Publishing, Ltd., London, 1980, pp. 716, 723.

[5]U.S. Army Corps of Engineers, The Ports of Sacramento, Stockton, Pittsburg and Antioch, California, Washington, 1975, pp. 2, 40.

[6]Currently, the main channel is being dredged under contract by the U.S. Army Corps of Engineers to 35 feet.

Figure 9
SAN FRANCISCO BAY DEEPWATER CHANNELS



Source: Seaport Plan, p. 42

be carried in ships drafting greater than 35-feet by 1996.[95] For example, the Port of Los Angeles has claimed that 35-40 percent of the world's container vessel fleet could not use its old 35 feet deep channels.[96] (Note: "Could not" should be interpreted as without tidal time delays and/or without light loading of the container vessels). Fourth-generation container ships now being introduced by the major ocean carriers, are also a concern. The American President Line's new C9 class, 2500 TEU ships, or United States Line's 4400+ TEU container ships now under construction, have, for example, maximum load depth requirements of 41 and 44 feet respectively.[97]

These trends suggest the possibility of a distinct disadvantage for the Bay Area ports. There is nevertheless some debate whether these existing depths will be an actual deterrent to the future growth in Bay Area cargo volumes for some of the same reasons used

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[95] U.S. Army Corps of Engineers, San Francisco District, Oakland Inner Harbor Draft Feasibility Study and Environmental Impact Statement (San Francisco, July, 1983), p. B-6.

[96] Jim McDonald, "Multiple Problems Confront Trans-Pacific Trade Routes," WWS/World Ports, XLVII (February/March, 1984), pp. 35.

[97] Jeff Fuller, Division of Naval Architecture, U.S. Maritime Administration, phone conversation, July 30, 1984.

against the movement toward load center ports. Some argue that ocean carriers will continue to accept certain shipping delays to wait for sufficient tide levels, in exchange for being able to directly ship Bay Area originating and destined cargos. Others believe that trade patterns will support ports that are limited to 35-foot channels. For example, according to Cheng Ben "Peter" Wang, President, Encinal Terminals, generally shallow port depths in the Far East will limit the trend to ships requiring much greater channel depths. For Encinal Terminals, this conclusion is vital to its operations, since the Alameda Tubes, between Oakland and Alameda under the Oakland Inner Harbor Channel, limit the depth of the channel section serving Encinal Terminals to a maximum of 35 feet.

Finally, and most importantly, there is the possibility of channel dredging. Under existing funding, by contract, the U.S. Army Corps of Engineers will be dredging the Southampton Shoal Channel and the approach to the Richmond Long Wharf, from the existing 35 feet to a new depth of 45 feet. Actual work on this project began early in 1985, and should be completed by early 1988.[98] This past year, after years of negotiations and false starts, two bills, HR 3678 and its more limited Senate counterpart, S 1739, proposed to fund as joint federal/local cost sharing propositions several Northern

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[98]Ed O'Neill, Program Development Office, South Pacific Division, U.S. Army Corps of Engineers, phone conversation, 6/8/84, and Port of Richmond, "Harbor Approach Dredging Contract Awarded," Port Profiles, Winter 1985, p. 2.

California channel deepening projects. These included the Oakland Outer Harbor Channel from 35 to 42 feet, Oakland Inner Harbor Channel from 35 to 43 feet, the Richmond Inner Harbor Channel from 35 to 41 feet, and the Sacramento River Deepwater Ship Channel from 30 to 35 feet. Even though HR 3678 did pass the House of Representatives, Congress did not enact a final bill during its 1984 session.

Even if a bill is enacted during the 1985 session, it will still be the late 1980's at the earliest before the first of these channel dredging projects can be completed. Until then, some further retardation of Bay Area ports cargo volumes and port development may occur.

3. <u>Cargo Transport Mode Split</u>

As can be expected, the area where the effects of deregulation are being felt the most is in the way cargos move to and from the Bay Area (i.e., mode split). However, unable to forecast the effects of deregulation and other trends, the forecasters assumed existing mode split patterns would continue into the future. Today, changes to these patterns can already be seen. However, without additional study, a statistically sound, alternative Bay Area modal split forecast cannot be made at this time.

Let's look at the existing patterns, and how they are/may be changing. The existing and future projected patterns of mode split and origin/destination were analyzed and forecast by Wilber Smith and Associates, as part of their ground- access analysis for MTC/BCDC.[99] These conclusions in turn were based on the U.S. Department of Commerce, Bureau of the Census report, Domestic and International Transportation of U.S. Foreign Trade, (Washington, 1976), and on analysis conducted under subcontract by Williams-Kuebelbeck and Associates. These conclusions, for all dry cargos except neo-bulk (as a category), are shown in Table 13. In this analysis, and in the origin/ destination analysis following, neo-bulk cargos were included with breakbulk cargos, thus introducing a potential minor weakness in their conclusions.

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[99] MTC/BCDC's Working Paper #12, Ground Access Analysis (Berkeley, November, 1980), prepared by Wilbur Smith and Associates.

Table Thirteen

PERCENT MODE SPLIT FOR BAY AREA WATERBORNE COMMERCE

Place of Origin/Destination	Container		Break Bulk[1]		Dry Bulk		
	Rail	Truck	Rail	Truck	Rail	Truck	None[2]
BAY AREA	5%	95%	5%	95%	5%	45%	50%
OUTSIDE OF BAY AREA							
Northern California	5	95	5	95	10	90	0
Central and Southern California	5	95	5	95	55	40	5
Other Pacific States	50	50	5	95	--	--	--
Mountain States	60	40	65	35	--	--	--
Other	60	40	50	50	--	--	--

[1] Includes neo-bulk.

[2] "None" indicates that the mode of transport was neither truck nor rail; examples in this category includes cargos that remain at the port for on-site processing, or cargos that are transported by pipeline or barge.

Source: Adapted from MTC/BCDC's Ground Access Analysis, p. 12-28.

Regardless of this potential weakness, three distinct patterns should be noted. First, not surprisingly, truck transport is the primary mode of cargo movement to and from both Bay Area and California origins and destinations. The second pattern to note is that surprisingly, the railroads still carry five percent of Bay Area port cargos to and from Bay Area locations. Finally, as of 1976, trucks carried a significant share of Bay Area port cargos to or from destinations east of the Pacific States, including 40 percent of all container cargos.

Before looking at future trends, two items should be noted regarding this mode information. First, even though the railroads carry a significant share of overall Bay Area port cargos, virtually all first or final movements between the ports and the rail yard are by truck. Thus, these estimates understate the role trucks play in the movement of Bay Area cargos. Second, although based strictly on rail yard capacity, nevertheless the analysis projects that the rail container traffic is split 52 percent Southern Pacific, 39 percent Santa Fe, and nine percent Union Pacific.[100] This intra-railroad share has significant implications for the ground access

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[100] MTC/BCDC's Ground Access Analysis, p. 12-63.

analysis as we shall see, for the evaluation of the possible effects of the Santa Fe/Southern Pacific merger on the Bay Area in general, and for the cities of Oakland and Richmond in particular.

Looking toward the future, it is likely that the three identified patterns of mode share will see the most significant changes, driven for the most part by the aforementioned post deregulation changes in the transport industry. Lower truck freight rates, together with the rail companies' preference to concentrate on line-haul, rather than local transport, are cutting further into rail's share of local (Bay Area) cargos. For California locations other than the Bay Area, the trend will probably hold true as well.

But as transport distances increase, the trends are shifting in the opposite direction. These changes are being driven by such rail industry changes as: increased emphasis on specialized intermodal services; expedited, run-through trains on single-line routes, more competitive rates; and improved, more specialized and better maintained rolling stock, yards, and rights-of-way. Examples of the latter include the development of specialized intermodal yards, such as those intermodal container transfer facility yards being developed at the Port of San Francisco and close to the ports of Los Angeles and Long Beach. It appears these changes are causing significant increases in the rail share of Bay Area cargos to and from points outside of California. Evidence for this pattern change comes from a sample of rail data for California-serving railroads. In 1983 for example, Southern Pacific's intermodal shipments increased 24 percent in 1983 over 1982 levels.[101] From 1980 through 1982, traffic going through Western Pacific's former intermodal facility in West Oakland, now operated by Union Pacific, increased 25 percent from pre-merger, 1980 levels.[102] While much of these increases were in nonport related intermodal traffic, they are still significant in mirroring the changes that are taking place, particularly when it is noted that these changes were achieved despite a recessionary economic period.

Not all of the future changes can be directly traced to the effects of deregulation. Some observers, including in the transportation industry, believe that Japanese production styles, which accept small

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[101] Port of Oakland, "Southern Pacific: Great Growth Potential in Oakland," Port Progress, May/June, 1984, p. 3.

[102] Port of Oakland, "Union Pacific System: Better, Faster Service to Oakland, Port Progress, November/December, 1983, p. 2.

"in-process" inventories of parts and assembly pieces, will have a much greater role in American manufacturing. In terms of the transportation networks however, this trend might shift more cargos from rail to trucks, as shipments become smaller and more frequent. In terms of port trade, these changes could suggest a shift to the smaller, 20-foot containers, rather than the larger sizes.[103]

To summarize, changes to cargo movement mode shares are taking place. Magnitudes of change as high as 15 percent is possible for the movement of containers between the Bay Area ports and origins/destinations east of the Pacific Coast states. Yet for the time being, we can only speculate on what the changes might be and their magnitudes.

4. Cargo Origins and Destinations

In contrast to the possible changes that could occur in the modal share in mode of cargo transport, major shifts in the origin and destination of Bay Area port cargos are not anticipated, and probably will continue to follow the trends in employment and population.

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[103]Based on Robert Butler, "Changed Traffic Carrier Concepts Urged to Cope in Transport Future," Traffic World, CXCVIII (March 5, 1984), pp. 21 - 24.

Tables 14 (for exports) and 15 (for import) present the existing (1976) patterns of origin/destination of Bay Area cargos, as best understood by MTC/BCDC's consultants. Looking at containers, 36 percent of containerized exports originate in the Bay Area, while 49 percent of containerized imports are destined for Bay Area locations. For breakbulk cargos, the figure is much higher for imports (at 88 percent), while dry bulk exports are slightly more concentrated in the Bay Area than dry bulk imports (93 versus 83 percent).

Within the Bay Area, Oakland/Alameda predominates as the origin of Bay Area container exports (47 percent of all Bay Area exports), while San Francisco and Oakland areas fairly equally share the overwhelming share of Bay Area container imports (59 percent of the Bay Area totals). As expected, San Francisco predominates in terms of breakbulk imports (particularly newsprint, a neobulk cargo included under this category, and coffee), while Solano (for grain), West Contra Costa/Northern Alameda, and San Mateo have the preponderant share of Bay Area dry bulk exports (74 percent).

Turning to the future, the consultants assumed these patterns would change in concurrence with changes in Bay Area subarea and county employment.[104] Under this assumption, and using late 1970's employment projections,

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[104] MTC/BCDC's Ground Access Analysis, p. 12-24.

Table Fourteen

ORIGINS OF BAY AREA EXPORTS
(1976)

Origins	Container	Break Bulk	Dry Bulk	Liquid Bulk
	Percent Distribution By Place of Origin			
BAY AREA				
San Francisco	6%	5%	3%	10%
San Mateo County	0	0	22	0
Santa Clara County	5	10	0	0
Southern Alameda County	2	3	0	0
Oakland/Alameda	17	13	3	0
West Contra Costa/Northern Alameda Counties	1	3	24	70
Central and Eastern Contra Costa County	1	2	18	20
Marin/Sonoma/Napa Counties	4	0	0	0
Solano County	0	0	23	0
Subtotal-Bay Area	36%	36%	93%	100%
OUTSIDE OF BAY AREA				
Northern California	7%	29%	2%	0%
Central and Southern California	18	14	5	0
Other Pacific States	2	5	0	0
Mountain States	8	7	0	0
Other	29	9	0	0
Subtotal-Outside of Bay Area	64%	64%	7%	0%
Total	100%	100%	100%	100%

Source: MTC/BCDC's Ground Access Analysis, p. 12-19.

Table Fifteen

DESTINATIONS OF BAY AREA IMPORTS
(1976)

Destination	Percent Distribution By Place of Destination			
	Container	Break Bulk	Dry Bulk	Liquid Bulk
BAY AREA				
San Francisco	14%	40%	11%	38%
San Mateo County	8	2	0	23
Santa Clara County	6	6	0	0
Southern Alameda County	4	8	0	0
Oakland/Alameda	15	18	23	0
West Contra Costa/Northern Alameda Counties	1	4	10	14
Central and Eastern Contra Costa County	0	6	12	0
Marin/Sonoma/Napa Counties	1	1	0	0
Solano County	0	3	27	0
Subtotal-Bay Area	49%	88%	83%	75%
OUTSIDE OF BAY AREA				
Northern California	4%	2%	3%	25%
Central and Southern California	11	6	2	0
Other Pacific States	2	2	0	0
Mountain States	1	1	12	0
Other	33	1	0	0
Subtotal-Outside of Bay Area	51%	12%	17%	25%
Total	100%	100%	100%	100%

Source: MTC/BCDC's Ground Access Analysis, p. 12-20 they predicted Santa Clara County container volumes would almost double between 1976 and the year 2000, rising from five to nine percent for exports, and from six to 11 percent for imports. The major decreases would be seen in San Francisco (from six to four percent for exports, from 14 to 11 percent for imports) and Oakland/Alameda area (two percent share drop in each category). However, this could be affected by the operation of the General Motors/ Toyota assembly plant in Fremont. All other changes for all other Bay subareas and cargo groups are relatively minor. No changes were projected in Bay Area share of cargos, in terms of origin/destination only.[105]

This doesn't mean some offsetting changes could not take place. The shift of U.S. trade with the Far East to the Pacific Coast ports may raise the share of the "other" locations slightly. Offsetting this could be the general loss of Bay Area cargo share in general, as the Southern California and possibly the Pacific Northwest ports capture a greater share of landbridge traffic. Northern California's share could rise, at the expense of such areas as Santa Clara, as this area of the state rapidly expands. Overall though, the patterns will probably approximate those estimated in the report.

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[105] _Ibid._, pp. 12-21 thru 12-23.

D. Chapter Conclusions

- Twenty-one sites are available for "near term" port development. At these 21 sites, 40 new berths could be developed, up to 34 for container cargo operations, at least six for noncontainer cargo operations.

- Of these 40 berths, based on the MTC/BCDC baseline forecast for the year 2000, 30 would be needed for new port terminals. Of these 30 berths, five would be needed for neobulk cargos, 25 for container cargos. Of this latter amount, through the end of 1983, two are already in operation, and three have already been permitted, including the first two under the Seaport Plan.

- The waterborne commerce forecasts were prepared by Recht Hausrath & Associates and by Temple, Barker & Sloane, Inc., for the U.S. Army Corps of Engineers and MTC/BCDC. Generally, they are based on 1978 and older historical data, and trends in existence or foreseeable in 1979, 1980, and in early 1981.

- However, based on historical data currently available for the intervening years since the forecasts were made, both the container cargo and the grains export forecasts appear to be too high. Possible reasons: The loss of Bay Area container cargo share to other West Coast ports in the former, a volatile trade environment in the latter. Thus, the forecasted growth in volumes will more likely equal the levels shown in their respective <u>low</u> forecasts.

- Based on this evidence, using 1978 as the base, the following cargo volumes are appropriate for estimating both terminal (berth) demand and ground access systems demand and impact for the years 1985, 1990, and 2000:

  - 1978:
    - Containers: 8,850,000 revenue tons (5,009,000 short tons).
    - All other cargos: 4,427,000 short tons.

  - 1985:
    - Containers: 13,847,000 revenue tons (7,351,000 short tons).
    - All other cargos: 4,784,000 short tons.

  - 1990:
    - Containers: 19,233,000 revenue tons (9,876,000 short tons).
    - All other cargos: 5,139,000 short tons.

- 2000:
  - Containers: 30,619,000 revenue tons (15,146,000 short tons).
  - All other cargos: 5,689,000 short tons.

Even with these lower volumes, containerized cargo revenue ton volumes will grow almost 250 percent over 1978 levels, and overall short ton cargo volumes will grow over 120 percent over 1978 levels. As a result the Bay Area ground access systems will be significantly impacted in the years ahead.

- However, these increased volumes would require only 21 new terminal berth facilities, 16 for container cargos, and five for neobulk cargos, to handle these projected cargos through the year 2000.

- Today, cargo movement within California to and from the Bay Area ports is primarily by truck. For example, trucks carry 95 percent of all container and breakbulk cargos between the ports and the Bay Area and California locations. Only beyond California do the railroads carry a significant share of Bay area cargos, handling 60 percent of all container cargos bound for or coming from states east of the Pacific Coast.

- However, these patterns are being affected by the deregulation of the freight transport industry. Generally, a greater percentage of Bay Area and California cargos are now being transported by trucks. On the other hand, a much greater percentage of U.S. mainland states cargos (i.e., outside California) is being carried by the railroads (at least in the line haul segments of their movement). But the exact magnitude of these and other changes cannot be projected with any certainty at this time.

- The only pattern that seems fairly fixed is the split of U.S. mainland origins and destinations of these cargos, Bay Area, versus California, versus the U.S. It is only within the Bay Area itself that changes are likely, with greater percentages of cargos moving to and from the growing counties and subcounty sections within the Bay Area.

In summary, what do these conclusions mean? Figure Nine is an attempt to summarize these findings, in terms of the 1985 cargo flow forecasts. Like previous figures and tables in this report, this figure only covers the movement of dry cargo in foreign and domestic trade. It is also based on past mode split patterns (i.e., those predicted/estimated for the late 1970's). Thus, focusing on the rail movement, the U.S. "47 states" rail share is probably too conservative, while the Bay Area rail share is probably too optimistic.

Figure 10

BAY AREA CARGO MODAL SPLIT

(MTC's Consultants' Assumptions)

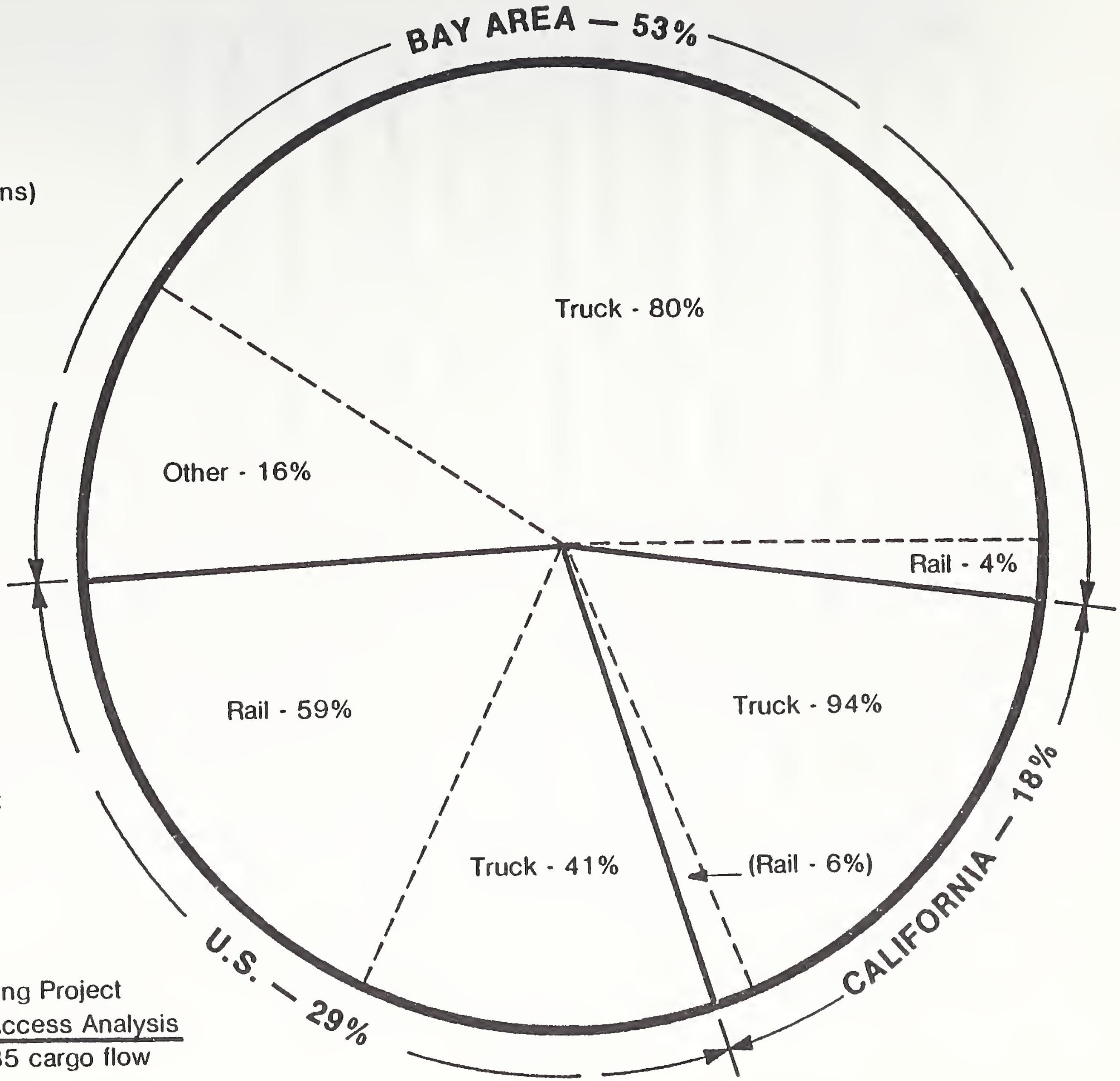
Overall Modal Split

- Truck: 71%
- Rail: 20%
- Other — Pipeline, barge, or on-site use: 9%
- Total, All Movements: 100%

Overall Cargo Volume Split

- Exports, Domestic Shipments: 59%
- Imports, Domestic Receipts: 41%
- Total, All Shipments: 100%

Basis: MTC/BCDC Port Planning Project Working Paper #12, Ground Access Analysis (Berkeley, 1980), and the 1985 cargo flow forecasts identified in this report.



But the figure's primary message is clear: The Bay Area is presently the source or destination for 53 percent of Bay area port cargos, and trucks are expected to carry 71 percent of all cargos to and from these ports. As a whole, this distribution/split will change slowly, favoring both the rail mode and U.S. origins and destinations, as container cargos increasingly dominates Bay Area port trade. Yet the Bay Area as a cargo source or destined location, and trucks as a mode of shipment, will continue to dominate, at least for the foreseeable future.

With these changes, will the Bay Area port ground-access systems be ready to handle the expected future volumes of freight? How are they handling them now, from both a capacity and an operational perspective? What is being done by those involved to address these problems? What could be done in the future? These are the topics for the final two chapters of this report.

V. BAY PORT GROUND ACCESS PROBLEMS

In the preceding chapters of this report, we have identified the San Francisco Bay Area ports and their current and/or potential facilities, the volumes of cargo that may be destined to them, and how those cargos are moving to or from identified U.S. mainland origins and destinations. We have also discussed how these mode patterns (i.e., shares) may be changing. With this background, we now turn to the main focus of this report. In essence, are the Bay Area ports ground access transportation systems capable of handling these projected volumes, by location, by mode? Are they being properly planned, designed, and operated to move both current and future cargo volumes identified herein in an efficient matter between the ports and the cargos' origins and destinations? What are their current operating status? How might they operate in the future?

The purpose of this chapter is to try to address these questions, through a overview of the work done by others to date. It is not intended to present new traffic analyzes or projections, long-range master plans, or specific project funding or operational recommendations. Rather, the presentation of this information is designed to provide a framework within which technicians and decision makers alike may logically proceed with additional research, operational modifications, and/or project funding or development decisions.

This chapter is divided into three sections. The first section reviews the MTC's ground access analysis assumptions, approach, and conclusions. The second looks at the current and potential ground access problems at each individual port. The third and final section briefly reviews the regional access systems problems which affect the ports collectively. With the stage set in this chapter, the final chapter will discuss how these problems are being addressed in the activities of involved organizations, including those of three primary entities: the Metropolitan Transportation Commission, Caltrans, and the California Transportation Commission.

A. MTC's Ground Access Analysis - A Review

MTC's ground access systems examination was a carefully constructed analysis, designed to look at both present and future port access problems. The analysis was done by MTC, with extensive consultant assistance from the firm of Wilbur Smith and Associates (with subcontractual assistance from the firms of Jefferson Associates and Williams-Kuebelbeck and Associates). The work is reported in detail in the two MTC/BCDC ground access specific port planning project working papers, and on pages 129-135 and 202-241 of the Seaport Plan Final Technical Report.[103] This review will look at three items:

- What were the basic assumptions and approach used in the analysis?
- Were there any problems encountered in the analysis?
- What did it conclude and recommend?

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[103] MTC/BCDC's Working Paper #11, Ground Access to Bay Area Ports: A Transportation Systems Management Approach (Berkeley, September 1980), prepared by Wilbur Smith and Associates and Jefferson Associates.

MTC/BCDC's Working Paper #12, Ground Access Analysis (Berkeley, November 1980), prepared by Wilbur Smith and Associates.

1. Analysis Assumptions and Approach

MTC's port access analysis went through several steps. Generally, the analysis first focused on existing port terminal ground access conditions. Then, future conditions were estimated and analyzed, based on the ports' 1980 plans for port operations and terminals expansions (these are listed in the Appendix, Table A4). This provided a picture of potential direct port terminal traffic flow for the year 1990 under the high cargo flow forecast, and for the year 2000 under the low cargo flow forecast. In the conduct of the analysis, two basic questions were foremost in the eyes of the study teams:

- How suitable is the transportation network in accommodating port-related traffic?

- What is the impact of existing port-related traffic on the transportation network? What is the likely future impact?[104]

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[104]Based on Seaport Plan Final Technical Report, p. 203.

From this base, a series of decisions were made which guided the actual ports' ground access analysis. These are listed and reviewed below:

- The analysis focused on both total daily and peak hour vehicle and truck volumes. The decision to look at total vehicle volumes was extremely important, for except in isolated cases, truck traffic, let alone port-related truck traffic, comprises a very small portion of the total daily (or peak hour) traffic volumes.

- Of the two daily peaks, it was the afternoon peak hour on which the analysis concentrated, for it is at this time that both general and port-related employee and truck traffic volumes are at their highest. The significance of this decision derives from two facets of port-related traffic. First, port terminal auto trips represent approximately 60 percent of all marine terminal vehicular trips at a typical container terminal.[105] Second, unlike most general truck trips, port-related truck trips do not seem to decrease as much during the peak hour, a probable result of normal ship/railroad schedules and trucker/shipper operating practices.[106] If anything, current efforts by ocean carriers to cut in-port times may encourage this trend, at least for ship departures.

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[105] MTC/BCDC's Ground Access Analysis, pp. 12-15.
[106] Seaport Plan Final Technical Report, p. 208.

- In terms of roadway capacity and operating condition, Level of Service "D" was selected as the minimum acceptable operating condition, and was the basis for all roadway analysis.[107] At this level of service, roadway flow conditions (operations) are somewhat unstable, vehicle movement is at or below roadway signed speeds, and roadway capacity has been nearly reached. From a qualitative sense, this Level of Service (LOS) occurs at volume capacity ratios approximately in the range of .81 to .90 (with 1.00 equaling roadway design capacity).[108]

- Future port terminal traffic volumes were based on the consultant's estimate of the number of vehicle trips that would be generated per ton of cargo (see Table 16). As can be seen, for a container terminal, their estimate was .28 auto trips, and .17 truck trips, per revenue ton daily, with 83 percent of those truck trips coming between 8:00 a.m. and 5:00 p.m. The peak hour figures were .019 and .017 respectively. If the "container freight station" (location where a multicustomer container is filled or emptied) is off the terminal site, the truck figures drop to .12 daily, .018 at peak hour. However, no change in the number of auto trips was noted.[109]

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[107] Seaport Plan Final Technical Report, p. 208.

[108] Environmental Science Associates (for the City of Alameda, Encinal Terminals Master Plan Environmental Impact Report (Draft) (Foster City, California, October 1982), Figure E-3.

[109] MTC/BCDC's Ground Access Analysis, pp. 12-15.

Table Sixteen

TRAFFIC GENERATION FACTORS
PER REVENUE TON THROUGHPUT
AVERAGE WEEKDAY 8:00 AM - 5:00 PM

	Container Terminal On-Site CFS (1)	Container Terminal Off-Site CFS (1)	Break-Bulk Terminal
Peak-Hour			
Auto Trips	0.019		0.016 (2)
Truck Trips	0.017	0.018	0.019
Total Trips	0.036		0.035
8:00 AM To 5:00 PM			
Auto Trips	0.15		0.11 (2)
Truck Trips	0.14	0.10	0.16
Total Trips	0.29		0.27
24 Hour			
Auto Trips	0.28		0.12 (2)
Truck Trips	0.17	0.12	0.18
Total Trips	0.45		0.30

(1) Container Freight Station

(2) May underestimate actual traffic since not all longshoreman related auto traffic could be isolated during the traffic generation counts.

Source: MTC/BCDC's Working Paper #12, Ground Access Analysis, Berkeley, November, 1980, prepared by Wilbur Smith and Associates, p. 12-15.

To simplify the analysis of future port ground access demand, they assumed that all container freight stations would be on-site in the container terminal complex. This assumption might cause the estimates for total truck demand to be overstated, based on a review of current and proposed container terminal operations. However, this is not an actual problem, for even when a "container freight station" is offsite, most of the time it is still within the general vicinity of the port, or at least in the region. Thus, the traffic is still terminal-related. Further, besides daily peak periods, there are terminal operations peaks (generally just before the departure of a container vessel), and seasonal peaks (generally in the fall before the holiday season). Thus, the actual daily volumes used for the estimates are acceptable, and peak hour volumes are probably slightly understated.

Finally, as a part of the study, a sensitivity analysis was conducted. For this analysis phase, it was assumed for 1990 that:

- Traffic generation would be 25 percent greater than anticipated;

- Ten percent more traffic would be distributed in the heaviest direction; and

- The rail mode share of container cargos would double from an estimated 25 percent to 50 percent.

Under these conditions, only two local access routes would be further adversely affected beyond projected operating conditions in the main analysis: Army Street in San Francisco, and Seventh Street in Oakland.[110] Since the analysis was completed, additional development has been announced and/or is now underway, i.e., the expansion of both the San Francisco Container Terminal-North, and the Southern Pacific Railroad's West Oakland Yard. Thus, given this development, it is likely these effects will actually be seen.

Although not critical, there were some minor problems encountered in the review of MTC's ground access analysis. At some locations, the roadway capacity data were incomplete (traffic volumes shown, no volume/capacity information shown, or vise versa; existing or future volumes shown, but not both). At others, the access routes are not clearly identified, such as to Encinal Terminals from High Street/South Oakland area. A problem encountered in MTC's analysis (and in some of Caltrans' work), is the lack of reporting peak hour truck volumes. Both daily and peak hour truck volumes are necessary for this type of analysis, given the potential for truck traffic to significantly affect roadway capacity and operations. Rail-derived truck trips volume estimates may also be a problem.

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[110] Seaport Plan Final Technical Report, pp. 222-224.

Quoting from the consultant's report, "For each port site, truck travel to and from the rail yards was distributed in direct proportion to the daily yard capacity (emphasis added).[111] Actual volumes are unknown.

Finally, MTC/BCDC assumed general traffic peak hour volumes on the port area roadways would remain constant, due to origin, destination, and mode shifts, the results of existing roadway congestion and energy price and availability constraints. However, substantial nonport-related growth (such as around the Port of Redwood City) could modify some of the analysis, and possibly affect some of the conclusions of the study.

Despite these slight problems, the analysis provides a strong framework for further analysis of port access networks structure, current and projected problems, and proposed or planned solutions. These are the areas that will be discussed in the following analysis of the conditions at each port. But first, let's look at what MTC/BCDC concluded and recommended, and see what we might draw from their conclusions.

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[111]MTC/BCDC's Ground Access Analysis, p. 12-27.

2. MTC/BCDC's Analysis Conclusions and Recommendations

In developing proposed solutions to the identified problems, there was a general emphasis on first seeking low-cost, easily implemented Transportation System Management (TSM) solutions. In addition, all solutions had to pass the following basic test: any action proposed must have either a positive or at least neutral effect on both goods movement and ground transportation systems efficiency.[112]

The actions identified and recommended by MTC/BCDC are listed in the Appendix, Tables A5 through A7. In developing these lists, the Seaport Advisory Committee, MTC/BCDC, and the consultants wished to indicate who would be responsible for each action, when it should be done, and how important the action was to the Seaport Advisory Committee. Thus, the actions are split into three groups -- those of a regional interest, those of a local interest, and those of interest to and under the control of the goods movement industry.

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[112] Seaport Plan Final Technical Report, p. 226.

Within the Regional Concern category, actions are identified as either short range (those which should be accomplished within five years), or medium range. In terms of priority, the projects are termed either desirable, more desirable, or most desirable. Most desirable is defined as:

> projects that mitigate the growth of port-related traffic; or projects where congestion materially reduces accessibility to a port and, from a regional perspective, significantly impedes the flow of goods.[113]

As applicable, these recommended actions are discussed under the individual port discussions following this subsection. Overall, to implement all noted short range actions, MTC estimated an investment would be needed exceeding $15 million (in 1979 dollars), exclusive of the Knox Freeway.[114]

In reviewing MTC's ground access analysis and conclusions, a few overriding conclusions stand out. Looking at the regional system first, the specific contribution of port-related trucking to total regional network system demand, is relatively insignificant. For the state highway system, generally, ports account for one to two percent of the total freeway traffic in the vicinity of a port, and 10 to 15 percent of the truck traffic.[115] Total truck traffic accounts, on the average, for approximately five to ten

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[113] Seaport Plan Final Technical Report, p. 238.

[114] Seaport Plan, p. 20.

[115] Seaport Plan Final Technical Report, p. 205.

percent of total highway traffic volumes, the exceptions being the Nimitz Freeway at High Street (12.7 percent), and Hoffman Boulevard in Richmond at Garrard Boulevard (23.0 percent), both along State Route 17.[116] Port-related truck traffic at this latter location is also 25 percent of the total truck volume, due to trucks moving to and from the Santa Fe's Richmond Intermodal Yard facilities.[117] Therefore, except possibly at these locations, solutions to port access problems are neither independent, nor can they be divorced from, solutions to the region's broader problems of insufficient capacity along such routes as State Route 17, Interstate 80, and U.S. 101.

Thus, building upon the observations noted above, the region and the State must first improve the efficiency of the ground access network. Two means are by:

- Convincing commuters to use high occupancy vehicles (HOV's) of all types; and

- Convincing commuters and shippers alike to shift at least some of their peak hour vehicle trips away from the peak periods, thus spreading out and reducing the peak hour traffic volumes.

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[116] California Department of Transportation (Division of Traffic Engineering), 1982 Annual Average Daily Truck Traffic on the California State Highway System (Sacramento, June 1983).

[117] Seaport Plan Final Technical Report, p. 218.

Both of these approaches can be pursued by concentrated educational and marketing techniques, both direct (ridesharing, transit marketing) and indirect (preferential parking programs, building permit or zoning changes, etc.). In some cases, physical plant improvements which enhance the efficiency of the network, are also appropriate. These include such items as ramp meters, auxiliary lanes and HOV lanes. Finally, given their cost and environmental impacts, general roadway capacity expansions must be considered last.

Progress made in improving the efficiency of the regional transportation system will help the local networks as well. But, in addition, the solutions should also include changes to port terminal operations (hours of operation, location of container freight stations, etc.). Further, they should include cooperative efforts by all affected parties in making improvements in multi-jurisdictional local access routes, such as those to Alameda/ Encinal Terminals from Oakland, or from Interstate 80 to Maritime Street. Finally, actions taken by the railroads to improve the efficiency of their operations, as long as the transportation services impacts are positive, or at least neutral, should be supported. This is particularly true of joint port/railroad development of intermodal container transfer facilities, which will improve the efficiency of rail, highway and port operations alike.

B. Port - Specific Problems

1. Port of Alameda - Encinal Terminals (Figures 11 and 12)

In the port descriptions earlier in this report, Encinal Terminals/Port of Alameda was described as unique in at least two respects. First, Encinal was the first port to receive port terminal development permits from BCDC under the Seaport Plan. Second, Encinal's ground access involves residential streets, a pair of tubes under a water channel, and a complex highway access route on its southeast side. Whether these access characteristics will restrict the terminal's development cannot be fully determined at this time, and will depend in part on how other ports improve and simplify their own access networks.

For ease of discussion, we will address the networks in the following order: Immediate terminal access (Buena Vista Avenue), local area access (Webster Street on the west, Palm/Fruitvale Avenues on the east, to Oakland and State Route 17), and rail access. To further aid this discussion, all traffic statistics and volume/capacity estimates for the port's local streets and regional access routes are displayed in Table 17. For this port review, current and future conditions (i.e., with the construction and operation of an enlarged Encinal Terminals complex) will be reviewed concurrently.

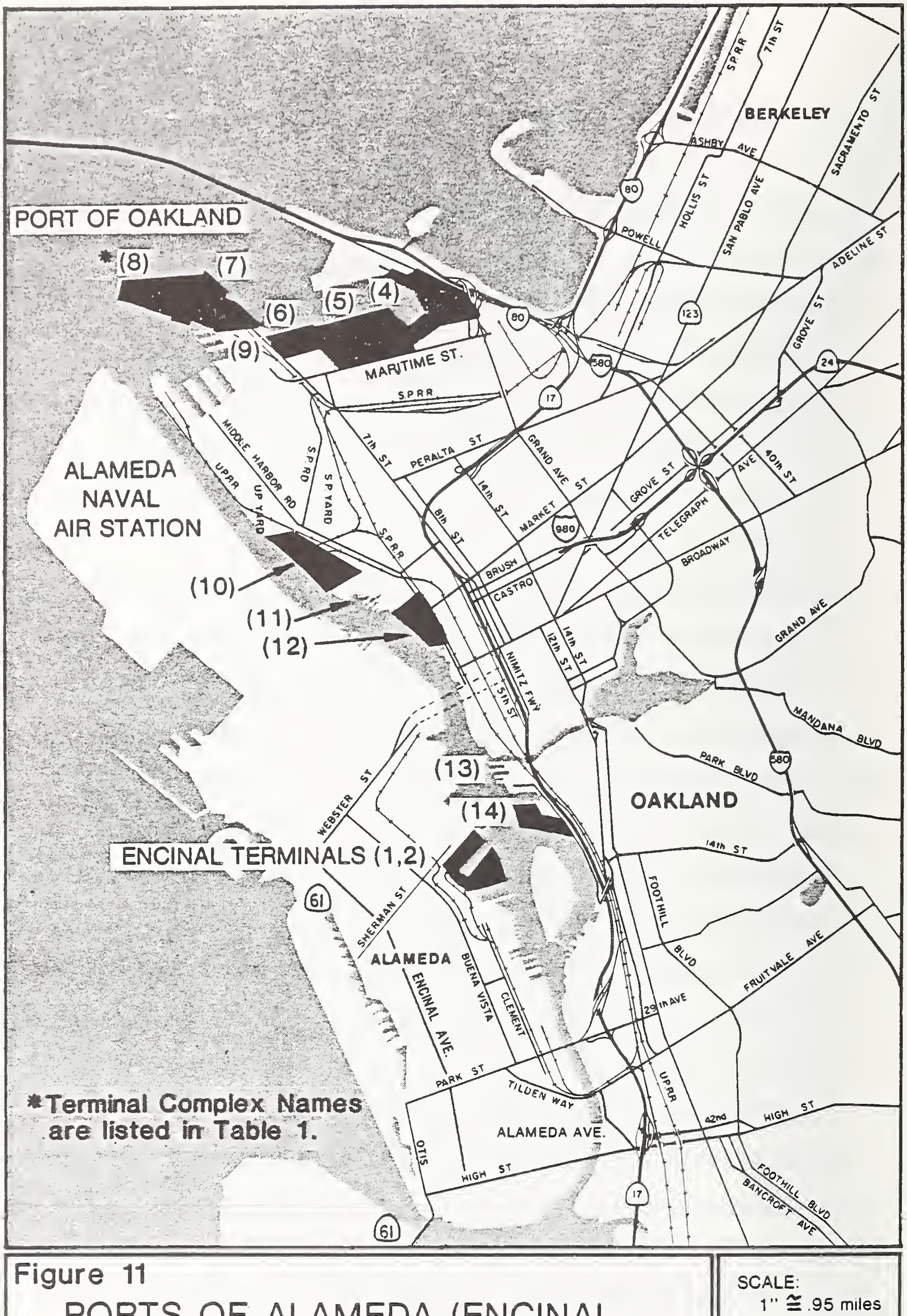

Figure 11

PORTS OF ALAMEDA (ENCINAL TERMINALS) AND OAKLAND

Adapted from Seaport Plan Technical Report

Table Seventeen

PORT OF ALAMEDA-ENCINAL TERMINALS ACCESS ROUTES: VOLUME/CAPACITY DATA

ROADWAY AND LOCATION	EXISTING CONDITIONS[1]					FUTURE INCREASES[2] PORT-RELATED TRAFFIC VOLUMES				
	GENERAL TRAFFIC		V/C	PORT RELATED TRAFFIC		AUTOS		TRUCKS		V/C RATIO
	ADT	Peak Hour	Ratio	ADT	Peak Hour	Daily	Peak Hour	Daily	Peak Hour	Increase[3]
Local Streets										
Buena Vista (in the vicinity of Encinal Terminals)[4]	11,000	930	.49[5]	1,260	102	610	41	370	37	.05[5]
Local Area Access Routes										
Webster/Posey Streets Tubes (State Legislative Route 260, State Sign Route 61)	51,000 (1983 data)[6]	5,100	.93	220	25	1,250	145	640	60	.02
Park Street	30,650	3,020	.99	130	15	1,240	90	280	30	.01

[1]MTC/BCDC's Ground Access Analysis, Appendix Figure A-2 (existing volumes), Figure A-8 (volume/capacity ratios), and Figure A-14 (port-related traffic). Figures are for conditions in the late 1970's, except where indicated.

[2]MTC/BCDC's Ground Access Analysis, Appendix Figure A-19 (port-related traffic) and Figure A-24 (volume/capacity ratio changes). Numbers are for conditions to be expected upon the full development and operation of the Encinal Terminals complex.

[3]Shows the impact of direct port-related traffic only. The impact of increases in nonport-related traffic was not measured or assessed.

[4]Except for the "general traffic" data, all other figures for Buena Vista Avenue are derived from Environmental Science Associates (for the City of Alameda), Encinal Terminals Master Plan Draft Environmental Impact Report (Foster City, California, October, 1982), pp. 9, 70, and Appendix Figure E-6; and Environmental Science Associates, Encinal Terminals Master Plan EIR: Response to Comments (Foster City, California, January 18, 1983), pp. 37, 38.

[5]This projected volume to capacity ratio is at the estimated most critical point, at the intersection of Buena Vista and Grand Avenue (approximately one-half mile east of the terminals).

[6]As these volumes have grown significantly since the late 1970's, the most recent 1983 numbers are shown, taken from Caltrans' 1983 Traffic Volumes, p. 179.

Buena Vista Avenue: Buena Vista Avenue is the immediate roadway access route to Encinal Terminals. From Buena Vista, direct access into Encinal Terminals can be made at the main gate at Entrance Road, or through the western gate, which serves the existing container terminal, two blocks west off Sherman Street.

According to the analysis conducted both by MTC/BCDC and by the environmental consultants for the Encinal Terminals expansion project, from a capacity standpoint, few roadway congestion problems on this facility are being experienced, or will be experienced in the future. However, concerns of a noncapacity nature could arise as operations at Encinal Terminals expand. Currently, Buena Vista is a two-lane connector, which runs through an area with a mix of both residential and commercial development. At present, truck traffic is fairly light, averaging nine percent of the overall traffic volume.[118]

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[118] Environmental Science Associates, Inc. (for the City of Alameda), Encinal Terminals Master Plan Draft Environmental Impact Report (Foster City, California, October, 1982), p. 9.

As port operations expand though, both port-related auto and truck volumes will increase considerably. According to the Encinal Terminals Master Plan EIR, port-related volumes are projected to rise approximately 80 percent. Peak terminal operational day volumes, however, are projected to be 25 percent higher.[119] There was also some debate in the comments to the DEIR over whether the estimates were actually understated by 25 percent[120]

In any event, these increased volumes could concern residents living along or near to Buena Vista about the volume of traffic generally, and trucks specifically, along this roadway. Vehicle noise impacts may be part of that problem, for the report indicates that, using a Community Noise Equivalent Level Scale, noise levels could rise from the current 65 to 70 decibels, to 75 decibels with the project and other cumulative development impacts.[121] Together, these impacts may result in

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[119]Environmental Science Associates (for the City of Alameda), Encinal Terminals Master Plan EIR: Response to Comments (Foster City, California, January 18, 1983), p. 38.

[120]In its comments on the draft EIR, the Port of Oakland believed the conversion factor used to convert revenue tons to short tons, for the trips generation analysis, should have been "2", rather than "1.5." As such, the number of trips could be understated by 25 percent. Nevertheless, the consultant felt that their conversion assumption was appropriate for the traffic analysis. Ibid., pp. 37, 38.

[121]Encinal Terminals Master Plan DEIR, pp. 47, 49.

demands for some limiting of truck movement along Buena Vista, and/or operations at Encinal Termnals, particularly during the evening hours, to reduce traffic volumes along Buena Vista and vehicle noise intrusion into neighborhood residences.

<u>Local Area Access</u>: From a port-access standpoint, both the eastern and western local area access routes are deficient at this time, although for different reasons. Webster Street is the western and main present port area approach route. This north-south street links the western area of Alameda to Oakland via the Webster/Posey Street "tubes" (also known as the Alameda Tubes), and is the main access route to the Alameda Navel Air Station and associated naval facilities. Signed as State Route 61 (Legislative Route 260), this route currently operates at capacity at peak hour, with increases projected due to the growth of port operations in the range of two to five percent, (depending on roadway location).

Access to or from the tubes on the Oakland side is also quite congested. This situation particularly affects trucks turning to or from the "tubes" and either State Route 17 or the Port of Oakland, with the worst location being the right-turn movement from the Posey Tube (Harrison Street), onto southbound Seventh Street toward southbound State Route 17.

On the Alameda side, a project underway since the late 1970's will relieve some of the congestion on Webster Street. A bypass roadway, Patton Way, is being built in phases that, when completed, will carry traffic away from Webster Street and the congestion caused by traffic generated by the College of Alameda and the Alameda Navel Air Station. It will also link to a planned, privately financed extension to Atlantic Avenue which, when built, will provide direct access to the west end of Encinal Terminals at Sherman Street (specifically to the two container terminal wharves of Berth Five). Being designed and constructed for the City of Alameda by Caltrans, the first phase should go to construction bid early in 1985.[122] All three roadway phases are presently slated for completion by January, 1987, with a total estimated project cost of $9,156,900.[123]

The easterly local access routes are more complex (see Figure 12). For those trucks originating or destined for South Oakland, Park Street, connecting to 23rd or 29th

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[122] California Department of Transportation (District 4), Status of Projects, November 20, 1984, p. 95.

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[123] Patton Way Price Tag Passes $9 Million Mark," Alameda Times Star, April 27, 1984, p. 1.

Figure 12

CITY OF ALAMEDA - ENCINAL TERMINALS: EAST ACCESS

Avenue on the Oakland side, can be used. It is currently operating at capacity at peak hour. Freeway access onto State Route 17 or southbound off State Route 17 is available. But for trucks heading northbound on State Route 17, exit must be made at High Street, for the 29th Street exit is virtually unsuitable for large trucks. Upon exiting, a labyrinthine street pattern must be followed for three-quarters of a mile to reach Encinal Terminals. The pattern: Off State Route 17 at the High Street exit, left under 17, right to Alameda Avenue, left on Fruitvale Avenue over the Miller-Sweeney (Fruitvale Avenue) Bridge and onto Tilden Way, and finally right onto Buena Vista Avenue. Of this routing, the High Street/ Alameda Avenue and the southbound State Route 17/High Street Interchange (five approaches in all) is particularly complex.

According to the MTC consultant's analysis, the impact of the Encinal Terminals growth should be very minimal on street volumes in this area. But access/egress improvements are needed. The City of Oakland, under Federal Aid Urban roadway funding, began in the fall of 1984 to realign the above noted junction.[124] However, no other improvements are being planned, although the Seaport Plan studies and the DEIR both referred to the need for

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[124] I. Jeeva, City of Oakland, Office of Public Works, phone conversation.

improved access, preferably via a northbound off-ramp/ southbound on-ramp for State Route 17 traffic at Fruitvale Avenue.

Rail Access: Rail access to the Encinal Terminals complex does exist, but its utility is limited. Presently, the city-owned Alameda Belt Line Railroad runs alongside, and into the terminal complex, from the south edge of the terminal proper. But the trackage through eastern Alameda involves a slow, on-street, right-of-way along Clement Avenue until almost the Southern Pacific Railroad's Fruitvale Railroad Bridge, where the traffic is transferred to the Southern Pacific Railroad. With this situation, and the close proximity of the Southern Pacific's and Union Pacific's West Oakland railroad yards, together with restrictions on the Belt Line's operations, virtually all of the terminals' rail-mode traffic is and most likely will be trucked to and from these railroad yards.

2. Port of Benicia (Figure 13)

At the present time, ground access is the least congested at two of the Bay Area's ports: the Port of Benicia, and the Port of Redwood City. For Benicia, based on projected near-term development possibilities, the direct local port ground access system should remain uncongested, although some improved roadway signing might be desirable.

Several routes provide access to the port. Direct local roadway access is provided by Bayshore Road, via the Industrial Road interchange from Interstate 680, from the east and north, and from Military Highway via the East Fifth Street interchange from Interstate 780, from the west. Access to the port from the south is via Interstate 680 over the Benicia-Martinez Bridge, from either the Fifth Street or the Bayshore Road interchanges. Rail access is provided by the Southern Pacific Railroad.

MTC's analysis of local roadway volumes for this port shows that both current and future projected port-related traffic volumes can be handled without undue congestion.[125] Existing and projected port-related roadway volumes are shown in Table 18.

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[125] MTC/BCDC's Ground Access Analysis, pp. 12-7.

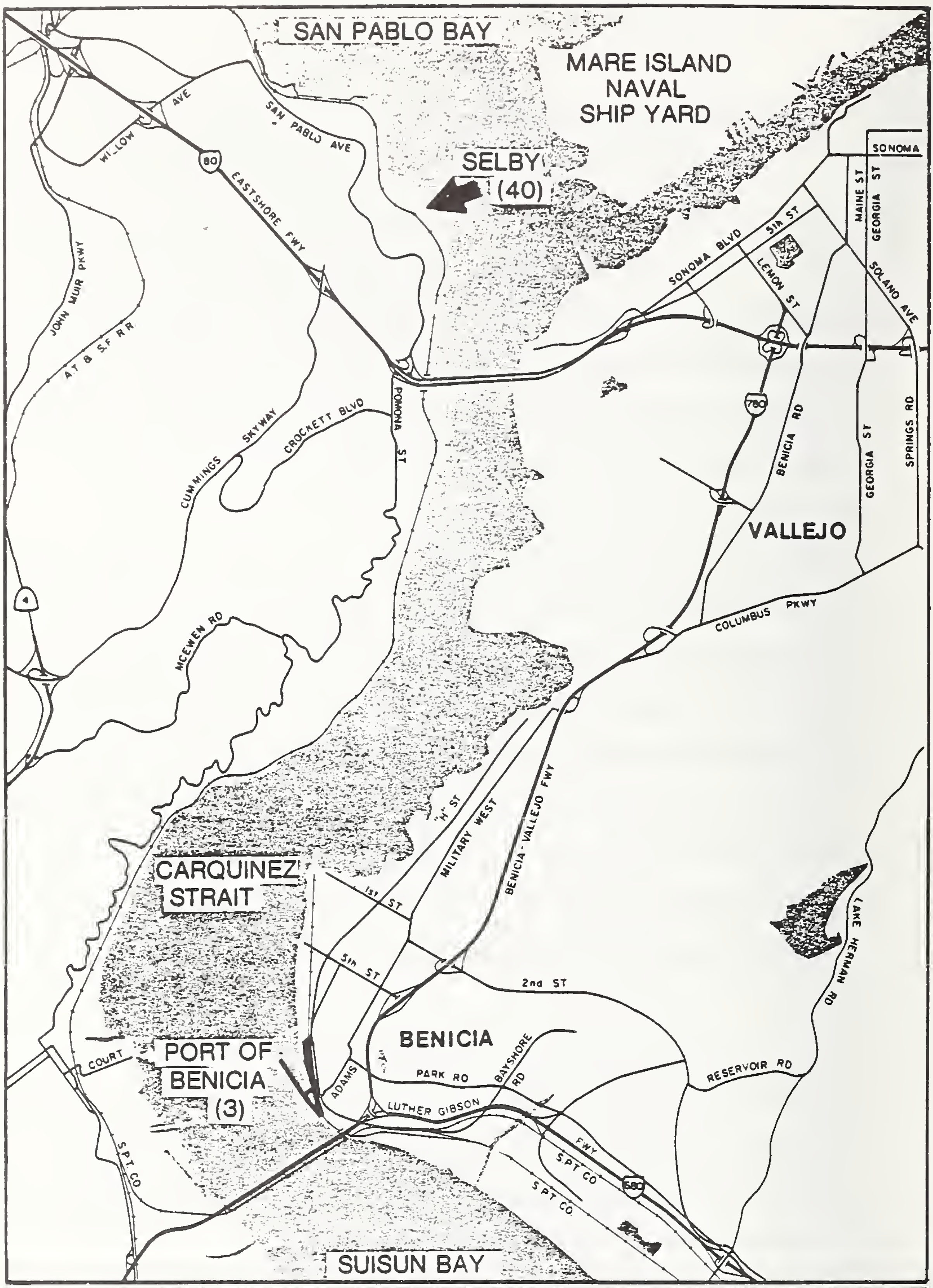

Figure 13
PORT OF BENICIA AND SELBY SITE

Adapted from Seaport Plan Technical Report

SCALE: 4
1"≅ .95 miles
N →

Table Eighteen

PORT OF BENICIA ACCESS ROUTES: VOLUME/CAPACITY DATA

ROADWAY AND LOCATION	EXISTING CONDITIONS[1]					FUTURE INCREASES[2] PORT-RELATED TRAFFIC VOLUMES				
	GENERAL TRAFFIC			PORT RELATED TRAFFIC		AUTOS		TRUCKS		
	ADT	Peak Hour	V/C Ratio	ADT	Peak Hour	Daily	Peak Hour	Daily	Peak Hour	V/C RATIO Increase[3]
Local Streets										
Adams Street/Military West Blvd.	N/A[4]	2,480	N/A	70	10	N/A	N/A	N/A	N/A	N/A
Bayshore Road/H Street	N/A	N/A	N/A	60	10	4,970	330	3,690	325	N/A
5th Street	N/A	2,390	.11	290	70	1,070	70	1,560	150	.12
Regional Access Routes	(1983 data)[5]									
Interstate 680-at the Benicia/ Martinez Bridge	55,000	6,200	1.08	70	20	490	30	1,430	140	.03
Interstate 680-northeast of the I680/I780 interchange	25,500	3,450	.61	30	10	450	30	390	40	.03
Interstate 780-west of Benicia	22,000	2,450	.43	70	30	1,990	110	820	80	.03

[1]MTC/BCDC's Ground Access Analysis, Appendix Figure A-5 (existing volumes), Figure A-11 (volume/capacity ratios), and Figure A-17 (port-related traffic). Figures are for conditions in the late 1970's, except where indicated.

[2]MTC/BCDC's Ground Access Analysis, Appendix Figure A-22 (port-related traffic) and Figure A-27 (volume/capacity ratio changes). Numbers are for conditions to be expected in approximately 1990.

[3]Shows the impact of direct port-related traffic only. The impact of increases in nonport-related traffic was not measured or assessed.

[4]N/A: Not available.

[5]As these volumes have grown significantly since the late 1970's, the most recent 1983 numbers are shown, taken from Caltrans' 1983 Traffic Volumes, p. 195.

Regional access to the port is good, with one exception: Interstate 680 over the Benicia-Martinez Bridge at peak hour. Based on Caltrans' latest traffic volume report, the roadway volumes on this bridge exceed desired roadway capacities at the peak hour. However, the port's contribution to the bridge traffic is very small, equaling less than four-tenths of one percent at peak hour, according to the MTC consultant's analysis.[126] Even with full near-term development, the increased traffic demand due to port operations would only affect the bridge volume/ capacity ratio by about three percent. Total volumes along Interstate 680 to the south are almost as high, but as noted, current or projected port-related traffic is very small. Interstate 680 north of the bridge and Interstate 780 are relatively uncongested, and are not projected to be significantly affected by any near-term development of the port. These conditions may change significantly, however, as southern Solano County develops in the future.

According to MTC's analysis and a recent review of the port site, signing for port access and of local truck routes appears somewhat limited. This should be improved to enhance the movement of vehicles to and from the port area, particularly as the port develops in the future.

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[126]MTC/BCDC's Ground Access Analysis, p. 12-58.

3. Port of Oakland (Figure 14)

Being on the leading edge of containerized shipping has both blessed and cursed the Port of Oakland's ground access system. The port has had the foresight and the funds to make improvements to the system as development proceeded. But demand has kept pace with supply. If the port is to maintain its containerized shipping advantage, not only against other Bay ports but other West Coast ports as well, improvements to its ground access system must continue.

In this section, we will address first the status of the port's ground transportation network, including areas of port success, as well as difficulty, in improving the network. Then we will look at what the future might hold for it. As is the norm in this chapter, all traffic statistics and volume/capacity estimates for Oakland's local streets and regional access routes are displayed in Table 19.

Local Access Routes - Current Status: The local access routes can be split into two groupings. The first grouping is those which serve for the most part as the immediate port terminal access roadways. The second grouping is those which serve as more general, multiuse, local access roadways. The first grouping of roadways can

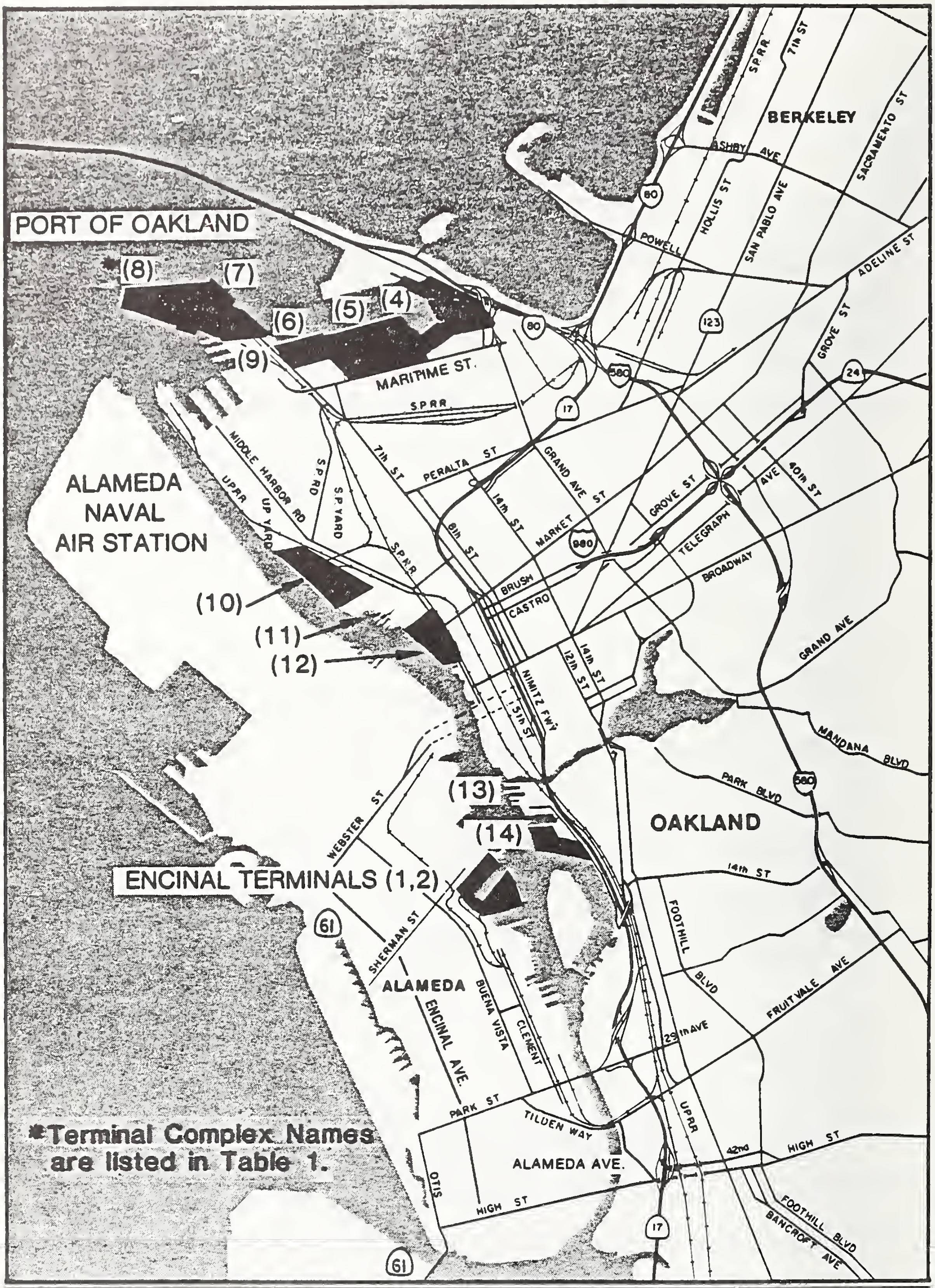

Figure 14

PORTS OF ALAMEDA (ENCINAL TERMINALS) AND OAKLAND

Adapted from Seaport Plan Technical Report

SCALE:
1" ≅ .95 miles

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Table Nineteen

PORT OF OAKLAND ACCESS ROUTES: VOLUME/CAPACITY DATA

ROADWAY AND LOCATION	EXISTING CONDITIONS[1] GENERAL TRAFFIC ADT	/ Peak Hour	V/C Ratio	PORT RELATED TRAFFIC ADT	/ Peak Hour	FUTURE INCREASES[2] PORT-RELATED TRAFFIC VOLUMES AUTOS Daily	/ Peak Hour	TRUCKS Daily	/ Peak Hour	V/C RATIO Increase[3]
Local Streets										
Maritime Street	10,640/	940	.46	2,620/	260	1,345/	90	815/	80	.09
Middle Harbor Road	6,250/	910	.65	1,720/	150	0/	0[4]	350/	40[4]	.03[5]
Seventh Street (at the vicinity of the Seventh Street Terminals complex)	5,330/	530	.50	5,330/	530	670/	45	410/	40	.08[5]
Seventh Street (near the Southern Pacific Yard, at Peralta Street)	18,390/	1,580	.93	5,820/	485	930/	130	940/	90	.24
Regional Access Routes	(1983 data)[6]									
Route 17 (downtown Oakland)	143,000/	12,800	1.11[5]	3,860/	350	980/	70	1,040/	110	.02
Route 80 (San Francisco-Oakland Bay Bridge)	215,000/	19,400	1.36[5]	3,030/	290	1,415/	120	3,510/	290	.03
Route 80 (north of the I/80/I580/17 interchange near Powell Street)	237,000/	21,300	1.31[5]	3,990/	390	390/	40	1,630/	185	.01

[1]MTC/BCDC's Ground Access Analysis, Appendix Figure A-2 (existing volumes), Figure A-8 (volume/capacity ratios), and Figure A-14 (port-related traffic). Figures are for conditions in the late 1970s.

[2]MTC/BCDC's Ground Access Analysis, Appendix Figure A-19 (port-related traffic) and Figure A-24 (volume/capacity ratio changes). Numbers are for conditions to be expected in approximately 1990.

[3]Shows the impact of direct port-related traffic only. The impact of increases in nonport-related traffic was not measured or assessed.

[4]Volume numbers are those for Southern Pacific Road, which feeds in directly to Middle Harbor Road. No estimates for Middle Harbor Road specifically were provided in the consultants' work.

[5]Estimated, based on interpretations of Caltrans and MTC's consultants' data.

[6]As these volumes have grown significantly since the late 1970s, the most recent 1983 numbers are shown, taken from Caltrans' 1983 Traffic Volumes, pp 40, 88. The effect of this change is to highlight the need for both increases in vehicle occupancy and mode shifts, and capacity improvements.

be characterized not only as relatively uncongested and well maintained, but also, in general, are located where the port can exert significant influence on the roadways' design and operation. These immediate access roadways, Maritime Street, Middle Harbor Road, and Seventh Street also have another characteristic in common: they all have been or are being improved. Seventh Street was improved and lengthened with the construction of the Seventh Street Terminal Complex. Middle Harbor was improved when its Adeline Street connection, originally a surface crossing of the Southern Pacific trackage, was bridged with an overpass, funded by a federal Economic Development grant, along with city and port funds.

Maritime Street is the latest example of this effort. The City of Oakland, in cooperation with the U.S. Army and the port, is reconstructing Maritime Street. Included in the reconstruction will be new signal systems, turning lanes, and a new direct connection to Seventh Street.

Immediate port terminal roadways are not totally without problems however. The entrance to the American President Lines and U.S. Lines Terminals (site 10 on Figure 14) is on Ferro Street, via Middle Harbor Road. This street also is the main entry to Union Pacific's Intermodal Yard. Further, Ferro Street crosses the Union Pacific's Oakland Yard's trackage as well.

With fairly limited truck queuing space at the terminal entry gates, congestion occasionally occurs. The Market Street entrance to the Charles P. Howard Terminal (site 12) is also occasionally blocked by trains on both the SP and UP mainline tracks, entering and leaving their respective yards.

As you move away from the immediate vicinity of the port terminals, or to roadways that are under the control of others besides the city, you encounter the second group of facilities. Here, a different situation is apparent. Three examples illustrate this: Seventh Street (by the Southern Pacific Yard, Peralta Street, and the main post office); Southern Pacific Road; and the West Grand Avenue/Interstate 80 interchange. Seventh Street is by far the most congested local port roadway. At the peak hour, the roadway in this area is operating near capacity (at a V/C ratio of .93), with almost 31 percent of the traffic volume port-related. The congestion, in large part, is due to the existence of several major traffic generators in the area. These include: the Southern Pacific West Oakland Yard; the main Oakland post office; the West Oakland BART (Bay Area Rapid Transit) Station; as well as numerous industrial, warehousing, and shipping operations in the immediate vicinity, the most prominent of which, of course, is the port. The street is also congested by trucks parked to pick up various items at retail stores along Seventh Street. Since the approval of the Seaport Plan, the only improvement has been the installation of parking meters to control long-term auto and truck parking, according to city officials.[127]

Southern Pacific Road is a special case. Its right-of-way is jointly owned by the City of Oakland and the Southern Pacific Railroad, the latter the majority owner. It is a designated FAU route, but it is maintained by the Southern Pacific. Although mainly used by Southern Pacific for its operations, it also serves as a connector between Maritime and Seventh Streets, and Middle Harbor Road. Substandard in design and in pavement condition, it is important to both port and railroad interests, as they seek to expand their operations, and as the port seeks to improve the local and regional access to its operations. Negotiations between the port and the railroad have continued for some time regarding its future ownership and operation, but to date, this situation remains unresolved.

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[127] I. Jeeva, City of Oakland, Office of Public Works, phone conversation, 8-29-84.

A different problem exists with the West Grand Avenue/ Interstate 80 interchange. For entry to the port area (chiefly by Maritime Street), or for entry onto westbound Interstate 80, the interchange works reasonably well. But for those leaving the port area toward the south, such is not the case. As currently designed, truck movement is possible only onto eastbound Interstate 80 or eastbound Interstate 580, the latter entrance onto the inside (fast lane) of this freeway. No entry from Interstate 80 onto State Route 17 is available, and even the ability to use Interstate 580 is very limited, due to truck weight restrictions east of Grand Avenue in Oakland. Thus, southbound trucks are required to use city streets, such as Seventh Street to either the Adeline Street entrance or the Broadway entrance to southbound State Route 17 in downtown Oakland.

Both the City of Oakland and the port have proposed a new southbound entrance to allow direct southbound State Route 17 access. According to city officials, Caltrans has responded by saying it was not needed, for once the Interstate 980 section in downtown Oakland is completed, trucks will be able to take eastbound Interstate 580 to southbound Interstate 980 to southbound State Route 17.[128]

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[128] I. Jeeva, City of Oakland, Office of Public Works, phone conversation, 8-29-84.

Yet, public opposition to this truck routing because of noise could result in this option being foreclosed. Further, plans by Caltrans to construct an High Occupancy Vehicle (HOV) lane, which would be just south of Interstate 80 at the West Grand Avenue interchange, as part of the Interstate 80/180 Operational Improvements project, probably would foreclose any opportunity to construct the City of Oakland's proposed on-ramp structure.[129]

Local Access Routes: Future Prognosis: Turning our attention to the future conditions on the local access network, again we see Seventh Street, by the Southern Pacific Yard, being the most affected. It has the greatest projected increse in peak hour volume, with only Maritime Street exceeding it in the projected increase in overall total port-related traffic volume. While some of this traffic can be traced to the development of the Carnation/Albers Mills-Kaiser Steel Yard site at the Seventh Street Terminals complex (site 9 on Figure 14), the continued increase in container movements to and from the Southern Pacific's West Oakland Yard, will also be a significant future traffic generator.

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[129]California Department of Transportation (District 4), Final Environmental Impact Statement, Interstates 80/180 Operational Improvements in Alameda and Contra Costa Counties (San Francisco, February 1984), Volume 1, p. 146.

The potential impact of this latter item is only now becomming apparent. If approved as proposed, the Southern Pacific/Santa Fe merger will affect the port's ground access system in at least two ways. First, increased rail traffic on SP's main line south of the yard will cause further delays for trucks moving in or out of the port's Howard Terminal. Second, as the West Oakland Yard facility is expanded, and as Santa Fe's Richmond Yard facility operations are reduced, additional port and nonport-related auto and truck traffic will be experienced on the port's roadways. For example, Seventh Street may see the full 39 percent increase in roadway volume, an impact figure derived from the previously mentioned port access impacts sensitivity analysis (see pp. 160-161).[130]

Regional Access Routes: As with most of the ports in the Bay Area, the regional access network serving the Port of Oakland is operating at or above capacity. Like its sister city across the Bay, the heavy daily and peak volumes are the result of the city's location, situated as gateways to the areas they serve. Like San Francisco, the percentage of port-related traffic on these roadways is relatively small (the highest being 2.7 percent of both peak hour and total traffic along State Route 17).

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[130] Seaport Plan Final Technical Report, p. 223.

Alternative access routes to the port area are relatively few, and are limited to local roadways. Though future increases in port-related traffic are projected to be relatively small, overall roadway volume increases are expected to be substantial. Port responses to these problems may lie in diverting/encouraging rail mode freight movements, and through port and city support of state and local efforts to improve the efficiency of both the highway and the transit system networks.[131]

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[131]The present and future operating conditions along these regional access routes, and the actions being planned and/or proposed to improve their operation, are discussed in section C later in this report.

4. Port of Redwood City (Figure 15)

As noted earlier, of all Bay Area ports, two, the Ports of Benicia and Redwood City, have relatively uncongested and smooth operating port ground-access systems. For the Port of Redwood City, given its probable future development, this situation will probably remain this way for the forseeable future.

The ground-access network serving the Port of Redwood City is relatively simple. The local access roadway is Seaport Boulevard (formerly known as Harbor Boulevard, a name which still appears on many maps of the area). Access to Seaport Boulevard from Redwood City proper is provided by Woodside Road (State Route 84) and U.S. 101. While the main north-south regional access route is U.S. 101, alternative access is also available from Interstate 280, via the Woodside Road interchange. Access to the "East Bay" is provided by State Route 84, over the Dumbarton Bridge, and connecting to U.S. 101 about two miles south of Seaport Boulevard. Rail access is provided by the Southern Pacific Railroad, over a single spur track connected to its main north-south peninsula line.

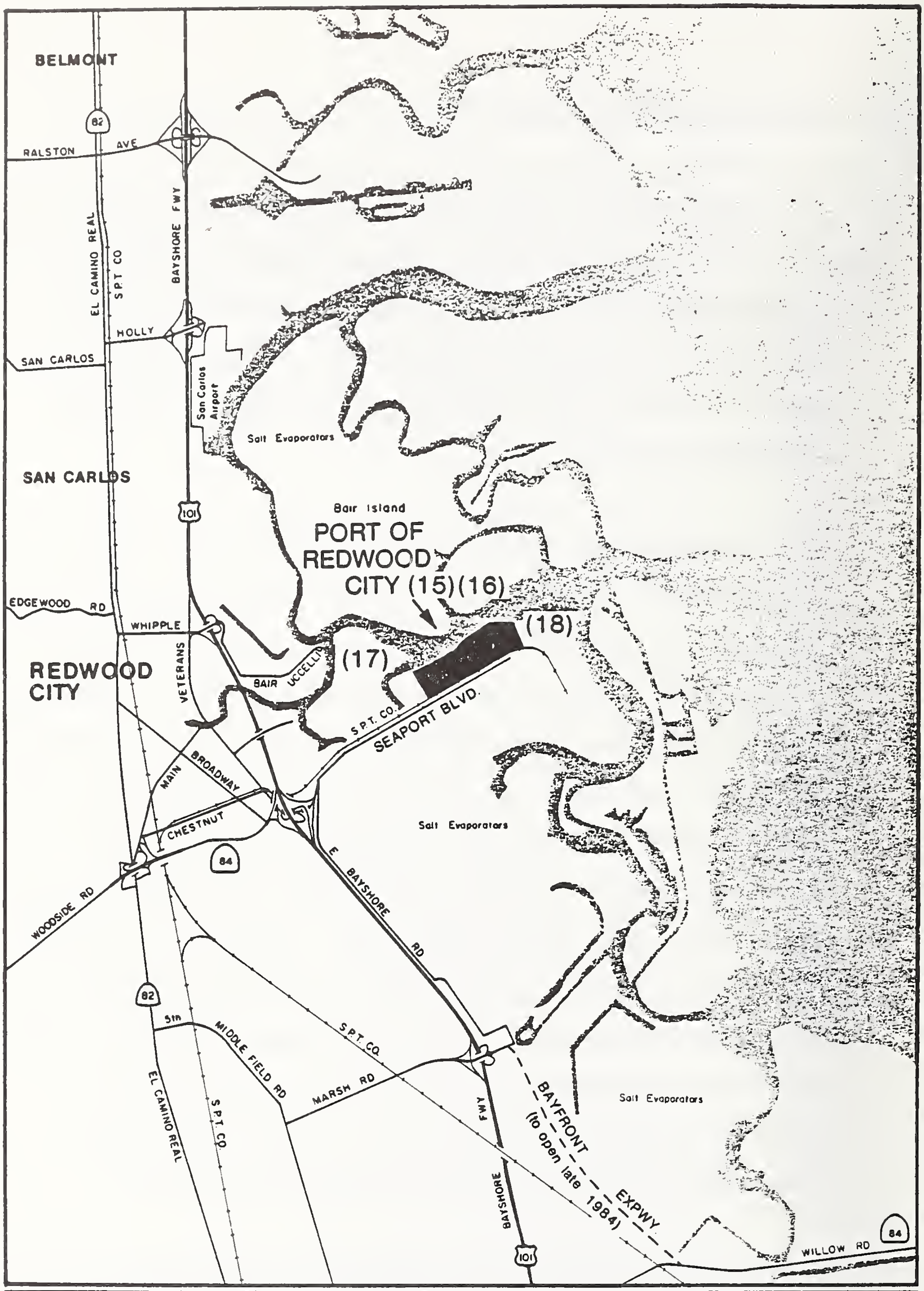

Figure 15

PORT OF REDWOOD CITY

Adapted from Seaport Plan Technical Report

Table 20

PORT OF REDWOOD CITY ACCESS ROUTES: VOLUME/CAPACITY DATA

ROADWAY AND LOCATION	EXISTING CONDITIONS[1] General Traffic ADT / Peak Hour	EXISTING CONDITIONS[1] V/C Ratio	EXISTING CONDITIONS[1] Port Related Traffic ADT / Peak Hour	FUTURE INCREASES[2] Port-Related Traffic Volumes: Autos Daily / Peak Hour	FUTURE INCREASES[2] Port-Related Traffic Volumes: Trucks Daily / Peak Hour	V/C RATIO Increase[3]
Local Streets						
Seaport Boulevard	5,900 / 580	.30	600 / 80	930 / 60	565 / 60	.05
Regional Access Routes	(1983 data)[4]					
Woodside Road-State Route 84 (Legislative Route 114)	43,000 / 4,700	1.48	170 / 20	120 / 5	5 / 0	.00
Dumbarton Bridge-State Route 84	22,300 / 2,450	N/A[5]	N/A / N/A	N/A / N/A	N/A / N/A	N/A
U.S. 101 (just south of the Woodside Road, Seaport Boulevard interchange	133,000 / 12,600	1.24	120 / 20	390 / 25	80 / 10	.00
U.S. 101 (north of the Whipple Avenue interchange)	149,000 / 14,100	1.40	200 / 20	375 / 25	480 / 50	.01

[1]MTC/BCDC's Ground Access Analysis, Appendix Figure A-4 (existing volumes), Figure A-10 (volume/capacity ratios), and Figure A-16 (port-related traffic). Figures are for conditions in the late 1970's, except where indicated.

[2]MTC/BCDC's Ground Access Analysis, Appendix Figure A-21 (port-related traffic) and Figure A-26 (volume/capacity ratio changes). Numbers are for conditions to be expected in approximately 1990.

[3]Shows the impact of direct port-related traffic only. The impact of increases in nonport-related traffic was not measured or assessed.

[4]As these volumes have grown significantly since the late 1970's, the most recent 1983 numbers are shown, taken from Caltrans' 1983 Traffic Volumes, pp. 94, 119, 133.

[5]N/A: Not available

As a local access route, Seaport Boulevard is basically uncongested (see Table 20). But on the other hand, two of the regional access routes, U.S. 101 and Woodside Road, are quite congested. However, as their port-related volumes are very small, the overall impact on the port is quite insignificant. For example, on U.S. 101, port-related traffic equals less than two-tenths of one percent of the total peak hour traffic in this area.[132]

However, Woodside Road (State Route 84, Legislative Route 114) has a special problem, which is common to many areas, though perhaps in different ways. One of the ways to improve traffic flow is through traffic signal timing techniques. The most advanced systems are generally controlled by a central computer, with sensors that tell the system such things as the volumes of traffic, length of queues of traffic at a signal, traffic speeds, etc. Such a system then adjusts the timing of the traffic signals based on these indications, according to some preset traffic flow relationships, to optimize the flow of traffic.

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[132]MTC/BCDC's Ground Access Analysis, p. 12-58.

Such a system is being installed by Redwood City for its some 50 signal system. However, this system does not include those signals along Woodside Road, which are under the jurisdiction of Caltrans. These latter signals operate with different equipment, and are not interconnected, neither to each other nor to, some central traffic flow optimization system. To improve traffic flow to the port area, as well as through Redwood City, these signals should be fully synchronized.

The other portion of State Route 84 (over the Dumbarton Bridge) is also going through a transition. Although formerly congested at peak hour, the full operation of the new bridge and its associated westerly approach roads should improve the situation considerably. The rail system serving the port is also going through a transition. But since the changes are of a region-wide concern, they are discussed under the Regional Problems section later in this chapter.

In addition, Redwood City, together with the port, has been pursuing two efforts to improve the port area ground-access facilities. As noted in the Seaport Plan, the city is planning to expand Seaport Boulevard from a two-lane to a four-lane facility. As part of this project, the city previously had applied to Caltrans for Federal Railroad Administration Local Rail Service Assistance Program funds to relocate the Southern Pacific trackage from the northern to the southern side of Seaport Boulevard.

The city has also been proposing for several years to extend the Dumbarton Bridge Marsh Road access route (also known as the Bayfront Expressway) from its present terminus at Marsh Road, to Seaport Boulevard near the Woodside Road/U.S. 101 interchange. This was last requested in 1983. However, given the direct port-related traffic volumes, the projected capacity and traffic volumes expected on the Marsh Road access route, and with the presence of an existing connector (East Bayshore Drive), this project appears unjustified on a strictly port-access, port-development, basis.[133]

Looking toward the future, increases in direct port-related traffic volumes are not projected to be significant. There are two reasons for this. First, if the three near-term development sites are (or were to be)

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[133] For more information regarding this project, the reader should refer to, California Department of Transportation, Feasibility Study of Extending the Westerly Approach of the Dumbarton Bridge to the Woodside Road Interchange on Route 101, Sacramento, November 1980.

developed as noted in the Seaport Plan reports for dry and neo-bulk commodities handing, direct port-related volumes would increase only 14 percent.[134] Second, because of the port's location, its shallow water access channels, and competition from other Bay Area ports, port development is likely to proceed slowly, with full development of the port's near-term development sites not occurring until the early 1990s at the earliest. However, as nonport traffic volumes may increase significantly due to industrial development of the port area, the port ground-access capabilities status should be reviewed periodically.

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[134] MTC/BCDC's Ground Access Analysis. pp. 12-71.

5. <u>Port of Richmond</u> (Figures 16 and 17)

In its ground-access analysis, MTC/BCDC described the ground access to the Port of Richmond in somber terms. This view was based on the existing roadway congestion and truck volume conditions along Hoffman Boulevard (State Route 17), as well as the port's expectation of explosive growth in container volumes. However, with the construction of the Knox Freeway (to be designated Interstate 580), as well as significant changes in the growth assumptions, the ground access to this port should be much better than was originally projected.

The changes underway at the Port of Richmond were noted in the descriptive section dealing with the port earlier in this report. They included a considerable slowdown in the port's expansion, and the virtual closing of Santa Fe's Richmond freight yards. Together with the Knox Freeway, these changes will yield:

- Reduced truck movement on the regional access routes.

- Greater capacity and improved operating speeds on, and generally, easier access to the port areas from/to, these regional access routes.

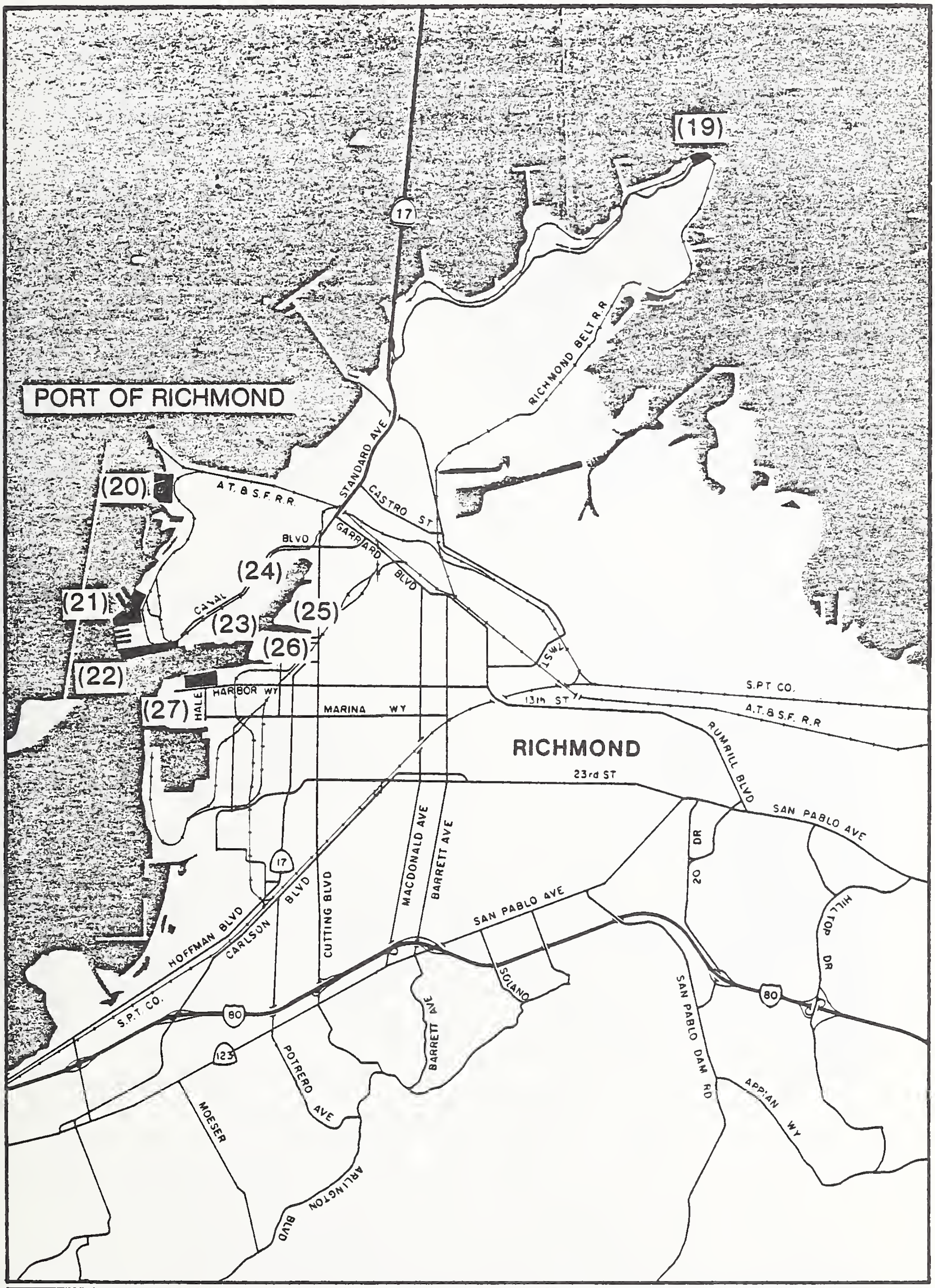

Figure 16

PORT OF RICHMOND : EXISTING NETWORK

Adapted from Seaport Plan Technical Report

SCALE:
1" ≅ .95 miles

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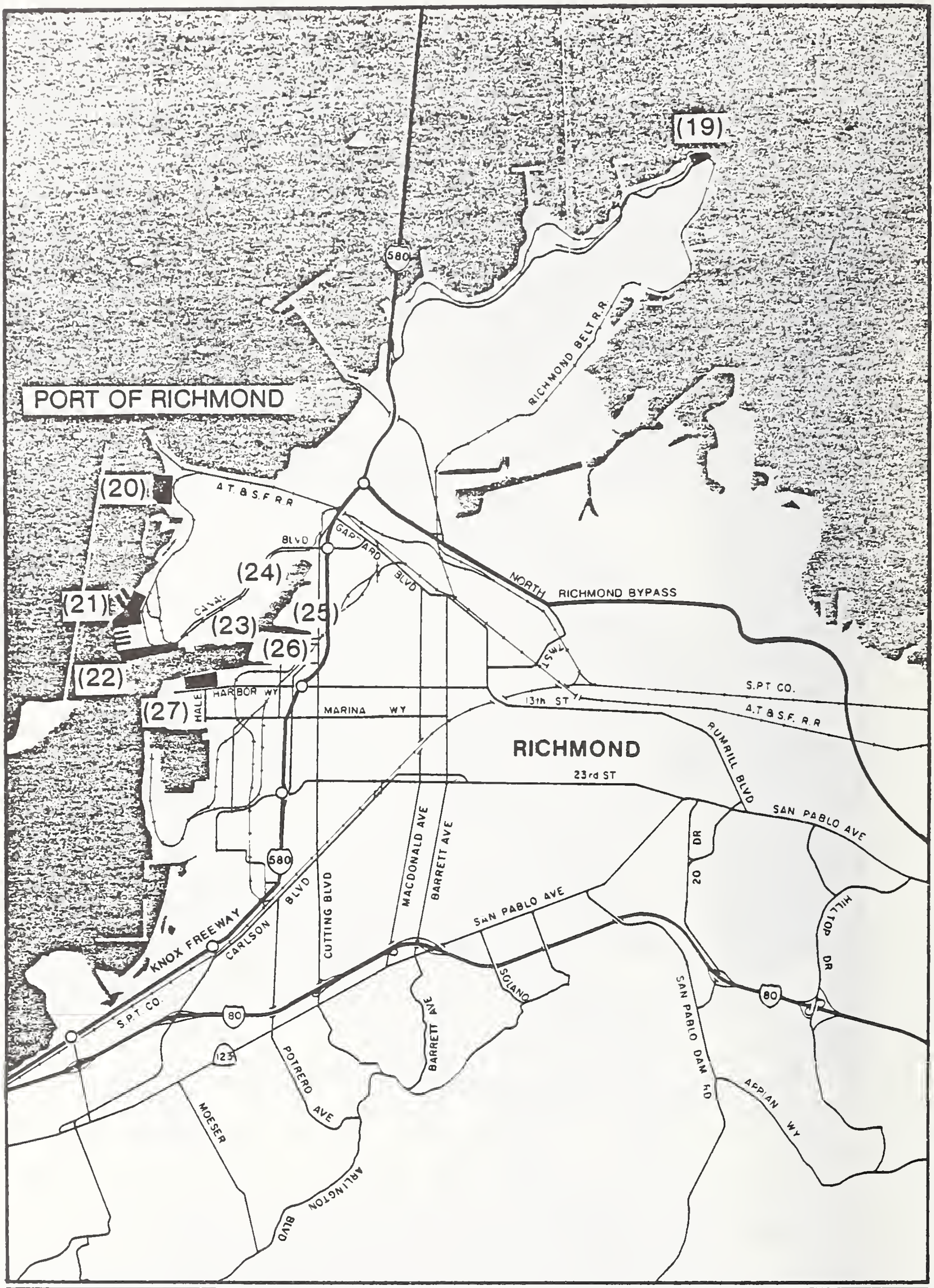

Figure 17

PORT OF RICHMOND : PLANNED NETWORK IMPROVEMENTS

Adapted from Seaport Plan Technical Report

SCALE:
1" ≅ .95 miles

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O PLANNED 580 INTERCHANGES

- Slower increases in roadway volumes on the primary local access routes, Harbor Way and Canal Boulevard.

Until the actual changes occur, congestion, at least on the regional access routes, will remain. Further, construction-induced congestion temporarily may further impede regional route access to the port area. Finally, circumstances could change such that the Santa Fe unit of the Santa Fe/Southern Pacific Corporation may choose to leave the Richmond yard facilities open indefinitely. Thus, let's look at the existing conditions, note how the port area will be served by the new Interstate 580, and identify what other developments that could affect access to the port.

Existing Conditions: The existing roadway network is shown in Figure 16; roadway volumes are shown in Table 21. As can be seen from a volume standpoint, the local street access network is generally uncongested. Since these numbers were for traffic conditions in the late 1970's, current conditions on Canal Boulevard are better, as Santa Fe's intermodal operations have been shifted from a site along Canal Boulevard to the main yard (entry to which is at the junction of Garrard Boulevard and the northern terminus of Canal Boulevard).

Table 21

PORT OF RICHMOND ACCESS ROUTES: VOLUME/CAPACITY DATA
EXISTING CONDITIONS

ROADWAY AND LOCATION	GENERAL[1] TRAFFIC ADT/PEAK HR.	V/C[2] RATIO	PORT-RELATED[3] TRAFFIC ADT/PEAK HR.
Local Streets			
Canal Blvd. (south of 17/Cutting Blvd.)	7,000/ 800	Not Reported	Not Reported[4]
Cutting Blvd. (near access from south-bound Interstate 80)	16,300/ 1,450	Not Reported	510/ 50
Harbour Way (south of Hoffman Blvd.)	2,800/ 390	.33	610/ 60
Regional Access Routes			
State Route 17-Cutting Blvd. section	44,500/ 4,650[5]	1.03[6]	2,360/240
State Route 17-Hoffman Blvd., east of 23rd Street	39,500/ 3,950[5]	.99[6]	2,205/230
Interstate 80-North of Cutting Blvd.	131,000/13,800[5]	1.13[6]	510/ 50

[1] MTC/BCDC's Ground Access Analysis, Appendix Figure A-3.

[2] Ibid., Appendix Figure A-9.

[3] Ibid., Appendix Figure A-15.

[4] Most of the traffic on this roadway is port related.

[5] 1983 traffic volumes from Caltrans' 1983 Traffic Volumes, pp. 40, 88.

[6] Estimated, based on Caltrans and MTC's consultants' data.

Turning to the regional access routes, the table indicates that traffic conditions along this roadway are quite congested, partly due to numerous truck movements. Trucks, both through and local, comprise 23 percent of State Route 17 traffic at Garrard Boulevard (by the Santa Fe Yard).[135] While signing on State Route 17 to the port's facilities is good, truck movements from westbound State Route 17 (Hoffman Boulevard) to southbound Harbor Way are impeded, as the turn must be made from the inside lane, without the benefit of a left-turn signal. As Richmond's container facilities continue to develop, this could become an even more serious problem, and could warrent rechannelization and modified signaling, at least as interim measures, until the Knox Freeway (Interstate 580) is completed.

Rail access to the port area appears adequate, being directly served by the Santa Fe, with the tracks of the Southern Pacific close by. As noted in the description section in Chapter II, a proposal did exist at one time to build an intermodal container transfer facility east of the present container terminal. However, given the port's slow development, that proposal has at least temporarily

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[135] Caltrans, 1982 Average Daily Truck Traffic, p. 40.

been shelved. Regional rail service to the port might suffer if Santa Fe actually closes its yard, as part of its merger with the Southern Pacific. At the minimum, line-haul train assembly and dispersal time would increase over current conditions, as rail cars would have to be taken to Southern Pacific's yard in Oakland. Yet the actual amount, or the overall impacts of the merger on the Port of Richmond cannot be determined at this time.

Regional Access Improvement Projects: Two major highway projects, one beginning construction this year, the other still proposed, will improve both regional and local access to the port. They are the John P. Knox Freeway (Interstate 580), and the proposed North Richmond Bypass. These planned facilities are shown graphically in Figure 17. The Knox Freeway itself will be a six-lane facility, generally along the present alignment of Hoffman Boulevard. In the area close to the port itself, the facility will be north of Hoffman, depressed 10-15 feet below ground level, with overpasses for surface streets elevated approximately 10 feet above ground level at the highest point to provide necessary clearances over the freeway lanes. As the Knox Freeway approaches the Sante Fe Yard however, the design changes to an elevated facility, on a combination of fill and structure.

Of the interchanges planned for the Knox Freeway, two will serve the port directly, and two may have an indirect impact. The two serving the port directly will be the Harbor Way/Cutting Boulevard interchange, and the Canal Boulevard interchange. Of these two, the former is noteworthy for its proposed design. As planned, the interchange can be characterized as a diamond/loop hybrid, approximately .8 of a mile in length. The westbound offramp is of particular interest for port access considerations, as vehicles will have to make an approximately 135 degree turn from the main axis of the off-ramp onto Cutting Boulevard, and then make another right turn onto Harbor Way. Nevertheless, Caltrans district staff have assured it is being designed in such a way that "oversized" trucks will not have major problems in making the turns or have portions of their trailers "off-track" (shift off the main roadway lanes) in their use of the offramp. Eastbound entry will be made directly from Harbor Way, from a normal diamond leg, 90 degree turn entrance.[137]

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[137]Interstate 580 discussion based on California Department of Transportation (District 4), Interstate 180 Final Environmental Impact Statement-Hoffman Corridor (San Francisco, June, 1981), Volume 1, pp 49, 55, 56, 65, 66, and phone conversation with K. Takahashi, Caltrans District 4 project Development Branch, 9/6/84.

Once full development of the Richmond Container Terminal complex occurs, the Interstate 580/23rd Street interchange may be used as part of an alternative route to the port area, in lieu of the Harbor Way/Cutting Boulevard interchange. The other Interstate 580 interchange that may be of importance to the port's operations will be the Castro Street interchange, for it will be the entry to the North Richmond Bypass.

The North Richmond Bypass is a proposed four-lane expressway which would be financed through federal, state, county, city, and private funds. It would carry truck and auto traffic from the Richmond/San Rafael Bridge and the west Richmond industrial areas, around North Richmond residential development, to Interstate 80, north of Hilltop Drive, a distance of approximately 7-1/2 to 8 miles, depending on final roadway alignment. The junction with Interstate 80 will be at a new Atlas Road interchange, that will be funded at least in part by the federal government, through Caltrans, as part of the Interstates 80/180 (now 580) Operational Improvements Project.[138]

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[138] Caltrans, Final Environmental Impact Statement, Interstates 80/180 Operational Improvements, pp. 45-66, and phone conversation with Roy Nakadegawa, Richmond Public Works Department, 9/6/84.

Neither of these projects will come cheaply or immediately. Interstate 580 proper (i.e., not including its interchange with Interstate 80) is being built in six main construction units (and 17 total projects), the first of which went into construction in February, 1985, and with the last unit not expected to be fully completed until at least September, 1989.[139] Total project price tag is currently estimated at $226 million (see Table 26). The completion of the North Richmond Bypass is estimated by city officials to be at least 10 years away, with a price tag of at least $15 million (not including the Atlas Road/Interstate 80 interchange).[140] Overall however, with even just the Interstate 580 project, ground access should improve to the degree necessary for the port's development to continue.

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[139]Phone conversation, K. Takahashi.

[140]Phone conversation, R. Nakadegawa.

6. Port of San Francisco (Figure 15)

The characteristics of the ground access system of the Port of San Francisco are similiar to those of the Port of Oakland. The differences are that San Francisco`s ground access network is slightly more complex, is generally older, and its regional access network is more congested. At the same time, the Port of San Francisco as more to gain than the Port of Oakland by making improvements to its ground access network, as its ability to attract shipping lines would be greatly improved.

The following discussion is separated into three main parts. As is this chapter's pattern, significant local access problems are discussed first, local rail access issues are discussed second, and regional access issues are discussed third. Within the local access subsection, the discussion is split to separately address the three main geographical areas of the port: The Northern Waterfront, the Middle Waterfront, and the Southern Waterfront. Finally, for the technical information regarding existing and projected roadway traffic volumes and volume/capacity levels, Table 22 is provided.

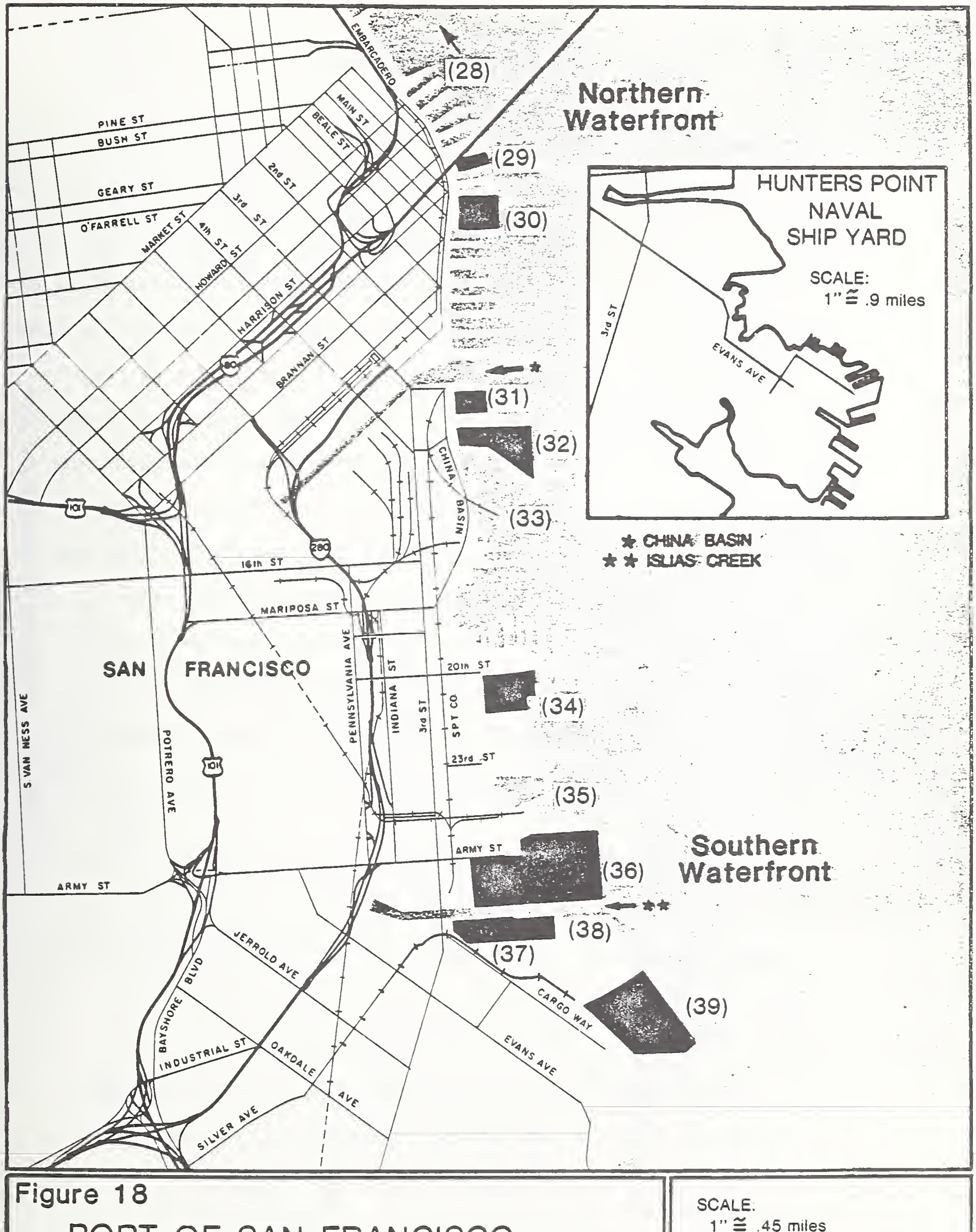

Figure 18

PORT OF SAN FRANCISCO
(active piers north of the Bay Bridge not shown)

Adapted from Seaport Plan Technical Report

Local Access Issues

Northern Waterfront: As noted in Chapter III, the Northern Waterfront has a constricted local and regional access system. In this area, the main local access route is The Embarcadero, which runs along the land-end stub of the piers. In portions of the street and the median runs the downtown end of the tracks of the port-owned San Francisco Belt Line Railroad, although presently only Piers 15-17 generate any significant rail traffic. To reach or leave the waterfront, all traffic, including trucks, must travel on downtown city streets, from the Embarcadero Freeway (State Route 480) or Interstate 80/U.S. 101. Traffic using Interstate 280 is only slightly better off, in having the industrial area streets available to The Embarcadero, just south of Interstate 80/San Francisco/Oakland Bay Bridge approach.

This constricted access system has contributed to the decline in cargo-related maritime operations in this area. Together with high local area property values and other conditions, these problem leads many parties, including some Port of San Francisco officials, to believe large-scale cargo operations in this area will cease in five to ten years. However, given the dynamic

Table 22

PORT OF SAN FRANCISCO ACCESS ROUTES: VOLUME/CAPACITY DATA

ROADWAY AND LOCATION	EXISTING CONDITIONS[1] GENERAL TRAFFIC ADT / Peak Hour	V/C Ratio	PORT-RELATED TRAFFIC ADT / Peak Hour	FUTURE INCREASES[2] PORT-RELATED TRAFFIC VOLUMES AUTOS Daily / Peak Hour	TRUCKS Daily / Peak Hour	V/C RATIO Increase[3]
Local Streets						
Army Street	15,740/ 1,740	.48	2,670/ 340	2,970/ 230	2,810/ 290	.29
Cargo Way	N/A[4]	.10	650/ 90	5,260/ 365	3,255/ 330	.16
Third Street at Embarcadero	N/A[5]	1.19	300/ 40	0/ 0	0/ 0	-0-
Third Street (near Pier 70 and Todd Shipyard)	14,760/ 1,560	.42	890/ 110	270/ 20	440/ 40	.14
Regional Access Routes	(1983 data)[6]					
Interstate 80 - Seventh/Eighth Streets Interchange	202,000/ 18,100	1.59[7]	440/ 55	1,090/ 80	2,060/ 255	.02
Interstate 280 (between Army Street and Route 101)	71,000/ 6,400	.68[7]	980/ 120	760/ 50	690/ 70	.02
U.S. 101 (North of Army Street)	235,000/ 16,500	1.50[7]	1,610/ 200	1,490/ 100	2,060/ 255	.02
U.S. 101 - Third Street Interchange	168,000/ 16,000	N/A	N/A	N/A	N/A	N/A

[1]MTC/BCDC's Ground Access Analysis, Appendix Figure A-1 (existing volumes), Figure A-7 (volume/capacity ratios), and Figure A-13 (port-related traffic). Figures are for conditions in the late 1970s.

[2]MTC/BCDC's Ground Access Analysis, Appendix Figure A-18 (port-related traffic) and Figure A-23 (volume/capacity ratio changes). Numbers are for conditions to be expected in approximately 1990.

[3]Shows the impact of direct port-related traffic only. The impact of increases in nonport-related traffic was not measured or assessed.

[4]Not available.

[5]While the data supplied in all other blocks was for this location on Third Street, the "General Traffic" volume data was for a location approximately three blocks south, south of the terminus of Interstate 280. As reporting such data would be misleading, it is not reported here.

[6]1983 volumes from Caltrans, 1983 Traffic Volumes, pp. 88, 120, 183.

[7]Estimated, based on Caltrans and MTC's consultants' data.

nature of waterborne commerce movement, this is not a certainty. For this reason, port officials are quite concerned about possible developments that could significantly affect access to the waterfront area, and thus its maritime and commercial space development potential. During the late 1970's, after considerable public opposition, plans for the completion of Interstate 280 to a junction with Interstate 80/State Route 480 were dropped. However, the federal funds for the highway's completion were reserved for possible substitute project(s).

The study developed to evaluate possible project alternatives has been the "Interstate 280 Transfer Study." To date, it has received considerable public interest, including that of port officials, because of the concept of using part of the funds to tear down either a portion or all of the Embarcadero Freeway. But in the project scoping draft environmental impact statement/report, actually eight project alternatives are being considered, of which only five would involve a partial or total demolition of the freeway. At least four of the alternatives would involve some transit services improvement projects, including one in which the San Francisco Metropolitan Railway ("Muni") would use The Embarcadero's Belt Line tracks for a new light rail line.

The port has been concerned about the study and the possible project alternatives for three reasons. First, under those alternatives that would involve the demolition of a portion or all of the Embarcadero Freeway, it is likely that a considerable amount of traffic would be shifted to The Embarcadero roadway. According to Caltrans 1983 traffic counts, traffic volumes on the Embarcadero Freeway, close to the Clay and Washington Street connection, amount to 81,000 ADT, 8,100 at peak hour.[141]

Second, the port is concerned that any proposal to use the Belt Line trackage would limit the ability of that line to move freight, even during its current normal nighttime operating hours. This concern is partly in response to the projections made by the operator of Piers 15-17, who believes it will soon be generating 160 boxcars of cargo per month.

Third, given that six of the alternatives would involve major construction, the port is concerned that selection of one of these alternatives would result in traffic delays, detours, and the like, that would further constrict and limit access to its properties. Together, these actions could handicap present port operations, the

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[141] Caltrans' 1983 Traffic Volumes, p. 191.

port's ability to attract new cargo business, and at least in the short term, its ability to commercially developed its properties.

The project alternative selected, the port's marketing prowess, and the passage of time may tell how the port will ultimately be affected by the results of the study. The port's (and its terminal operators) skill in attracting cargo and commercial business to these piers could offset any negative effects. However, depending on the alternative selected, that marketing effort could become more difficult as the selected project is implemented. Time could also be a mitigating factor, for as more time passes before action is taken, the less impact the action could have on maritime operations, if predictions about the decline of maritime operations in this area are accurate. As it is, it could take at least three to five years before any major project is implemented, given the time required to complete additional environmental analyses, to secure the necessary project agreements, and to conduct the actual design work for the project.[142]

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[142] Interstate 280 information derived in a phone converation with Bill Chastain, Caltrans District 4, 9/10/84. Port comments are from a meeting with port officials 5/1/84.

Middle Waterfront: When compared with the Northern Waterfront, the Middle Waterfront's ground access is more straightforward, and is not unduely congested. The only notable problems are roadway congestion along Third Street (north of the China Basin/Mission Creek Channel), and limited freeway access. In the latter case however, it is possible that access to/from at least Interstate 280 will be improved, through the construction of new freeway terminus ramps, as part of the project(s) to be recommended from the I-280 Transfer Study.[143]

The greatest impact on the area's ground access system might come from area redevelopment by the City and County of San Francisco, and by the Southern Pacific Development Company (now a unit of the Santa Fe/Southern Pacific Corporation). In the former case, the city has been studying plans to expand the existing marina in and around the China Basin/Mission Creek Channel. There also have been some discussions about the construction of a new stadium in the area, which might result in improvements in the street system that would serve both the stadium and the port's piers.

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[143]Bill Chastain, phone conversation, 9/10/84.

The Southern Pacific Development Company`s Mission Bay Project is closer to actual development. This project could ultimately involve 126 acres of high density office/commercial/residential development, adjacent to the 4th and Townsend "CalTrain" (Caltrans Peninsula Commute Service) station. Quoting from the recently released five-year plan for CalTrain, "According to the company`s preferred alternative, this project would (ultimately) include 6,900 housing units and 18 million square feet of office space."[144] Again, how this proposed project might affect the port is uncertain, both because of changes to the local street system, and perhaps more importantly, by the scaling back or closure of the Southern Pacific's Mission Bay Yard.

Southern Waterfront: Most of the port's present operations, however, are within its Southern Waterfront. This is reflected in the percent of trucks making up the traffic on Third Street around the port's terminal facilities. While trucks only make up two percent of the traffic volume near the junction of Third Street and The Embarcadero, and only seven percent alongside the Todd Shipyards (near Pier 70), they make up 24 and 20 percent

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[144]California Department of Transportation (District 4), Cal-Train Peninsula Commute Service 5-Year Plan: 1984-1989 (San Francisco, June, 1984), p. 16.

of the traffic volume at the intersections of Third Street with Army Street and Cargo Way, respectively.[145]

It is here that the San Francisco's most serious port access problems exist. The current entrance to the San Francisco Container Terminal-North is from Army Street. However, this entry way has numerous problems. At present, looking toward the terminal, a truck must first negotiate a congested Third and Army Street intersection, cross the main tracks coming out of the Union Pacific yard, and then contend with trucks parked at right-angles to the street which serve industries along the roadway. Once at the terminal itself, truck queuing lanes are very limited. As a result, at peak terminal hour traffic volumes, trucks queue up onto Army Street proper, partially blocking the entrances to both the terminal and the local industries.

As part of the port's plans to convert and substantially expand operations at the formerly-known Army Street Terminal (Pier 80), several ground access changes are being made. The most significant of these is the construction of a new main terminal gate and a series of truck queuing lanes at the northwest corner of the

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[145] Seaport Plan Final Technical Report, p. 206.

terminal complex. Trucks would still be required to traverse Army Street, and then make two 90 degree turns to reach the terminal`s new main entrance. Movement along Army Street would be facilitated by rehabilitation of the street itself, including restriping of the roadway as a four lane facility. To accomplish this, trucks serving industries along Army Street would be required to park parallel to the roadway. As a concession to the property owners however, truck parking at right angles to the street would be allowed after 3:00 p.m.

This is at best a temporary solution to a difficult problem. With both Islais Creek Channel on one side, the Union Pacific Yard facility on the other, and the industries in the middle, this solution may have to suffice, until the port can purchase additional property for a more direct terminal access route.

Rail Access

Given its location, and the area`s development, rail access to most of the port's facilities has been a problem. Recently this has become more critical, as more cargo and particularly, more containers move by rail. Given the nature of the area's and the port's rail facilities, containers have had to be trucked to the Oakland/Richmond rail yards. Part of the problem has been older trackage, with tight curves which could not handle the larger rail cars.

This situation was particularly true for the trackage leading to the San Francisco Grain Terminal (Pier 90) and toward Piers 94-96, which, in terms of degree of curvature, involved two reversing 15 degree curves, and a 26 degree curve. In fact, even with the use of smaller cars, this location has been the site of numerous minor train derailments over the last few years. A comprehensive project to improve this access was proposed by the port and Caltrans twice (in 1980 and 1982) for Federal Railroad Administration Local Rail Service Assistance Program Funds. Although given high priority by Caltrans, particularly in 1980, the project was not funded.[146]

In 1984, as a joint project between the port and the Southern Pacific Railroad, costing between $3.5 and $4.5 million in port funds, these problems are being slowly addressed. With this project, the 26 degree curve will be eliminated, nearly a mile of new track will be laid, and a new Intermodal Container Transfer Facility is being constructed (see Figure 19).[147] The facility, which

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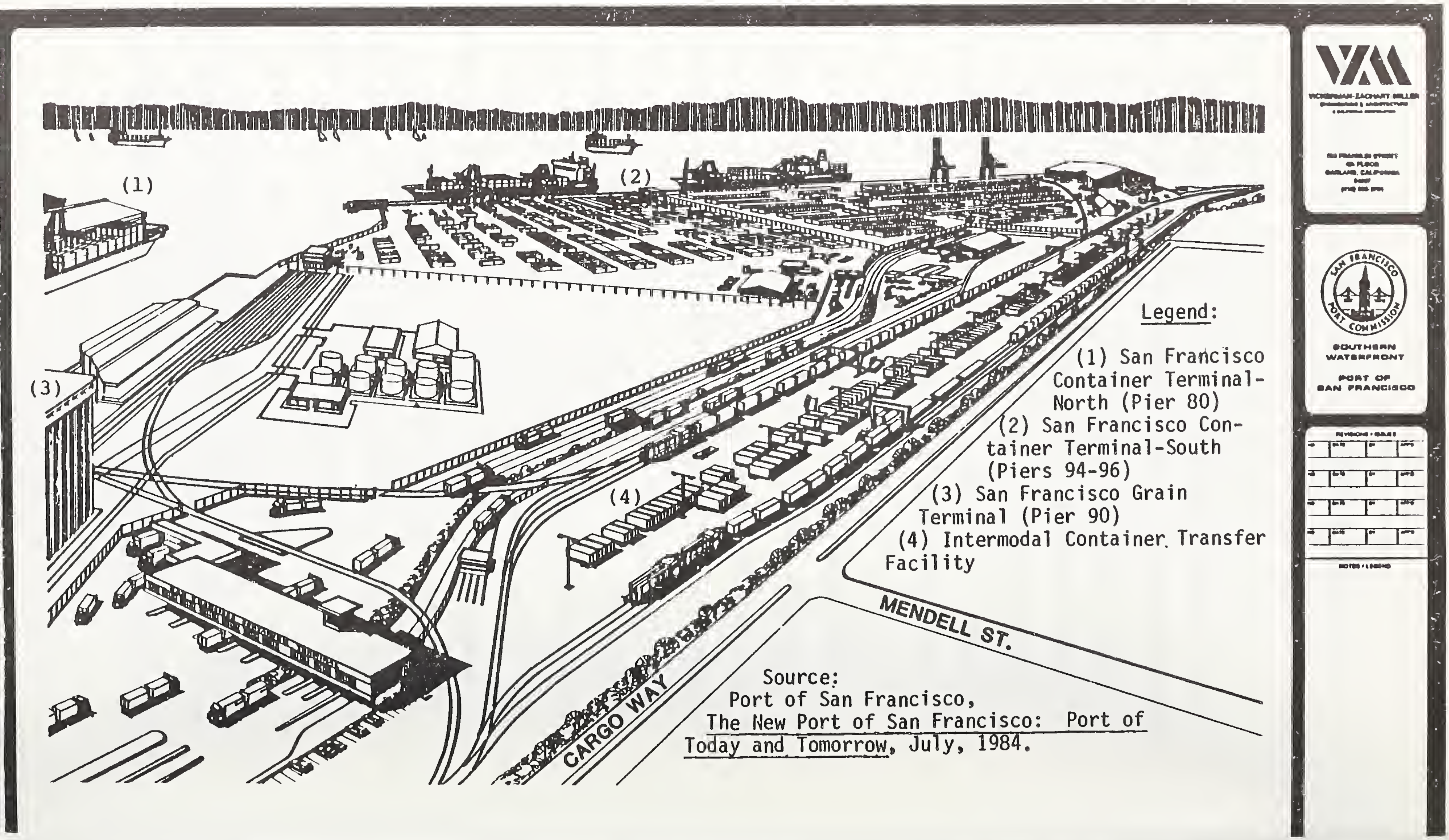
[146]Department of Transportation (Division of Mass Transportation), 1982 California State Rail Plan (Sacramento, February, 1983), pp. 84-86, 92, 94.

[147]Carl Nolte, "SP to Rebuild Railroad Link to S.F. Port," San Francisco Chronicle, April 18, 1984, pp. 26, 27.

Figure 19

PORT OF SAN FRANCISCO'S PLANNED INTERMODAL CONTAINER TRANSFER FACILITY



opened last October, is next door to the San Francisco Container Terminal-South, and currently has a 20 car capacity.[148] Ultimately, it is being designed to handle two 50-railcar unit trains per day.[149] But a problem could arise if the present infrequent main-line freight service (comprising just one through freight train per day as of last summer[150]) is not improved by the Southern Pacific Railroad. This regional rail access issue will be discussed in greater depth in the subsection dealing with the Santa Fe/Southern Pacific merger.

Regional Access

There are currently two main problems affecting regional access to the port. As can be seen from Table 22, with the exception of Interstate 280, the routes are quite congested. Given their design and construction, access to or from these facilities can also be a problem for "oversize" trucks. As part of the Surface Transportation Assistance Act of 1982, semi-trailer trucks were allowed,

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[148] Port of San Francisco, "Direct Rail Service to San Francisco," Wharfside, May, 1984, p. 6.

[149] Port of San Francisco, "On-Dock Container Transfer Facility is Key to Intermodal Growth," Wharfside, July/August, 1984, pp. 2, 3.

[150] Elmer Hall, Rail Operations Branch, Caltrans District 4, phone conversation.

with trailers reaching up to 48 feet long, five feet longer than under old rules (thus the term "oversize").

The problem is that these "oversize" trucks are unable to use some of the main interchanges leading to the port's facilities. This is because as the truck turns, it "offtracks" (moves off) away from the main roadway surface. For some ramps, this might cause a possible collision with some of the physical structure of the interchange.[151] This is particularly true for the Army Street interchange on U.S. 101, the main access route for trucks coming west and south to the port's main container terminal facilities.

Over the past year, Caltrans District 4 and the City and County of San Francisco have been working to identify an acceptable alternative routing. Caltrans has proposed a route that would require trucks coming from the East Bay (Oakland, Fremont, etc.) to exit from Interstate 80 at Fifth Street in downtown San Francisco. From here, they would be directed onto Harrison Street (paralleling Interstate 80), left at Sixth, and then south to the Interstate 280 entrance at Brannan Street. From here, Interstate 280 would be taken southbound to its

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[151] John van Berkel, Caltrans Division of Transportation Operations, Sacramento, meeting, 7/3/84.

interchange with Army Street, which can handle oversize trucks. Trucks leaving the container terminals area for the East Bay would follow a similar routing, Interstate 280 to Sixth Street, to Bryant Street, and then right to the Fifth Street entrance to Interstate 80.[152]

The port is concerned about this proposed routing for two reasons. First, the route is somewhat indirect and complex (although no more so than some of the existing access routes to the port's various terminals). Second, signing for the port itself could be confusing, depending how this route for oversized trucks is actually signed, when combined with signing for general Port of San Francisco access. At this time, the issue remains unresolved. However, as further increases in the size and weight of trucks are considered, it is likely this issue will keep surfacing, both here and at other California ports.

Other improvements to the regional access system are possible. For example, the City and County of San Francisco has been proposing for some time the

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[152]Lynn Miller, Caltrans District 4 Office of Operations, phone conversations, 7/3/84, 4/8/85.

construction of a new Interstate 280 interchange at/near to Islias Creek, at a location approximately one-third of a mile south of the existing Army Street interchange. Such an interchange would provide a more direct regional access route to the port's San Francisco Container Terminal-South complex and the Hunter's Point Naval Ship Yard. It could also serve as the terminus for the proposed State Route 230/Hunter's Point Expressway. At this time, it has been categorized as a locally-funded project in the 1984 State Transportation Improvement Program (STIP),[153] in accordance with the California Transportation Commission's interchange construction funding policies.

This project may help. But overall, the congestion of these regional access routes may be the most difficult ground access problem the Port of San Francisco must deal with as it tries to expand its cargo operations in the years ahead.

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[153]California Department of Transportation (Division of Highways and Programming), 1984 STIP (5-Year State Transportation Improvement Program), Sacramento, July, 1984, p. 89.

C. <u>Regional Problems</u> (Figure 17)

In the previous section, we focused our attention on primarily the local access situations of each of the Bay Area ports. Regional access issues were addressed only on the periphery, mainly as they pertained to the physical access links (i.e., interchanges) between the local and the regional highway networks.

The focus of this section is just the opposite, as it looks at the performance of the regional access network, in terms of existing and projected traffic volumes, proposed improvement projects (as identifiable in the public record), and other pertinent information. The intent of the section is two-fold. First, this section reviews the regional port ground access network from a ports' perspective. Second, particularly for those outside the regional transportation system developer/operator environment, this section provides a basic overview of the regional access problems and the possible solutions being discussed or implemented, if known and if applicable. The projects being programmed, planned, and/or constructed are listed in Chapter Six, with Table 25 listing those programmed regionally by MTC, and Table 26 showing those programmed at the state level by the California Transportation Commission.

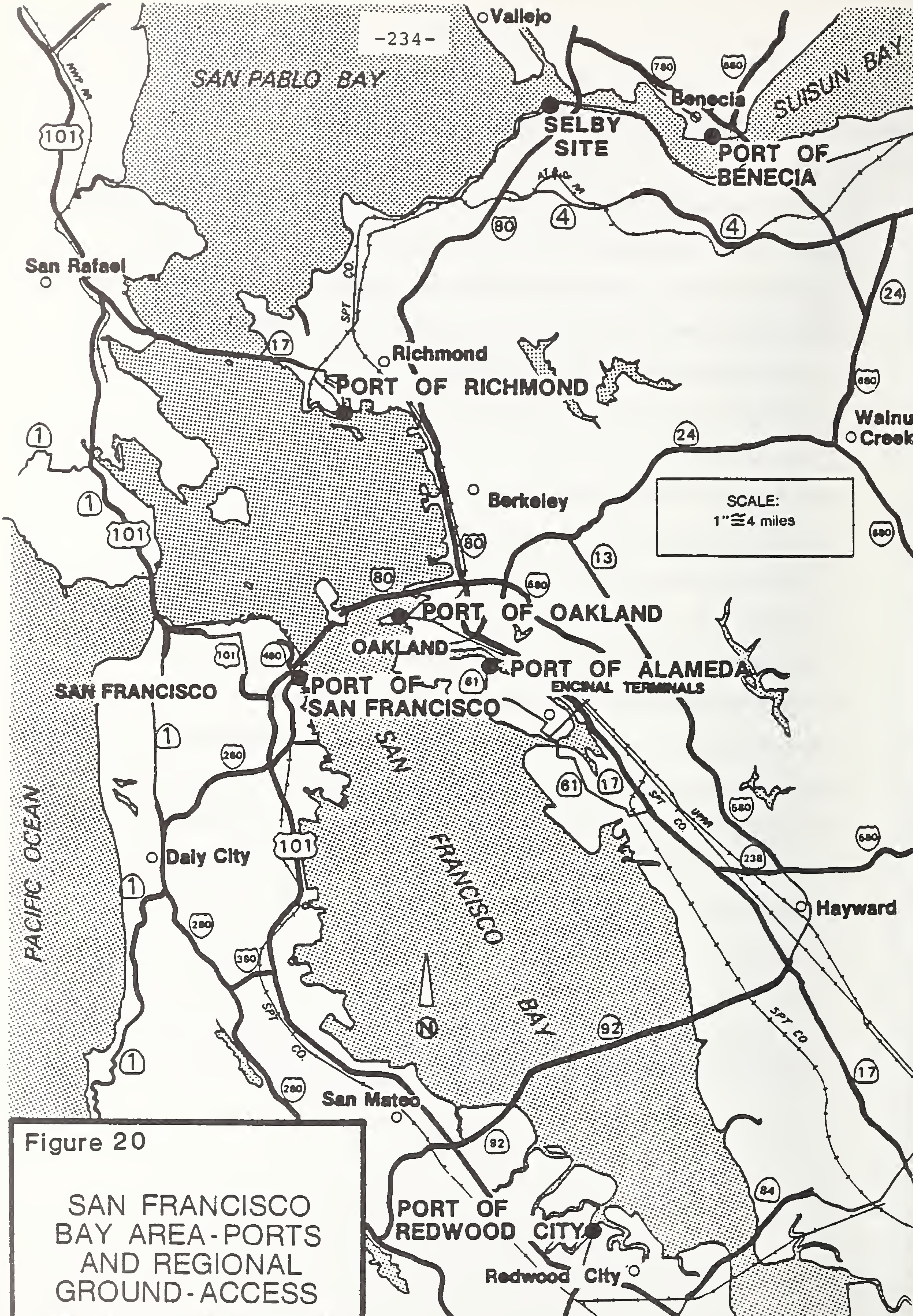

Figure 20

SAN FRANCISCO BAY AREA - PORTS AND REGIONAL GROUND - ACCESS

To put the information in the following subsections in perspective, two sets of general observations should be noted. The first set pertains to the regional highway system; the other to the region's rail system:

<u>Regional Highway System Observations</u>

- Generally, the ports are constrained by the same regional access problems that face all other Bay Area highway system users. In terms of port-related traffic volumes however, considering both autos and trucks, the ports' direct impact on this network is relatively light.

- Improving the efficiency of the highway network is the first option in trying to solve these problems. Alternatives for increasing capacity, either on the network itself, or via an alternative (e.g., on a rail transit line), are being considered only after most, if not all, system efficiency improvement options have been reviewed and/or implemented.

- The continued development of the Bay Area, particularly of commercial complexes in downtown San Francisco, along the "Peninsula", and in the Santa Clara Valley will significantly limit the ability of government to improve on or solve the region's port access/highway capacity problems. This constraint is not only financial in nature, it is physical/ environmental as well, given the area's geography and previous development history. San Francisco is especially notable in this respect, given forecasts of employment growth on the one hand, and the city's geography and previous intensive development history on the other.[154]

Region's Rail System Observations

- The railroads serving the Bay Area are being significantly affected by the deregulation changes outlined in the previous chapter.

- At the same time, the composition of freight being moved to and from the Bay Area in general is changing, away from heavier, industrial, capital-goods items, to lighter industrial and consumer goods items. This is occurring in a physical environment where opportunities to make changes is basically limited to the area within their historical rights-of-way.

- Together, these two circumstances are forcing the line-haul railroads that serve the region into a more

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[154] For example, according to figures cited in the MTC Regional Transportation Plan, 1983 edition, p. 8, San Francisco net employment is projected to rise by 66,700 (13.7 percent) between 1980 and 1995.

wholesale-transportation-provider role (with some notable exceptions), and as a corollary effect, are stimulating certain key operational and capital plant changes that have already occurred or are on the horizon.

These observations should be kept in mind in the following review of the area's regional port-access problems.

1. The Nimitz Freeway and Other Major Highways

Of the Bay Area's regional highway access problems, those with the Nimitz Freeway are probably the best known. But there are others as well. Access problems on four major routes are the most significant to port interests. The four routes of concern:

- The Nimitz Freeway (State Route 17/Interstate 880);
- The Eastshore Freeway (Interstate 80);
- The John T. Knox Freeway (to be designated Interstate 580); and
- The Bayshore Freeway (U.S. 101).

a. The Nimitz Freeway (State Route 17/Interstate 880)

"Pray for me. I drive the Nimitz." So goes one bumper sticker describing at least one person's view of this freeway. In the eyes of many Bay Area citizens however, the opinion is well founded.

A recent article in the San Francisco Examiner paints an interesting picture of this facility. A varied roadway 41 miles long, it has the second highest average daily traffic volume in the Bay Area at 133,900 ADT (only the Bayshore Freeway-U.S. 101 has more at 153,900 ADT), and the highest average percentage of trucks on the region's freeway system at 10 percent. Its surface, which varies in width from four lanes in northern Santa Clara Valley to eight lanes in much of Alameda County, is in fairly poor shape. The article cites a December, 1982 Caltrans report which stated that 45 percent of the roadway was in poor condition.[155]

Caltrans reports similiar conditions in its analyses, albeit from a more objective sense. As noted in Table 23, virtually the entire highway in Alameda County

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[155] Patricia Yollin, "Nimitz Freeway-The Nemesis of Commuters", San Francisco Examiner, April 8, 1984, pp. B1, B5.

Table 23

TRAFFIC AND VOLUME/CAPACITY CHARACTERISTICS: NIMITZ FREEWAY

STATE ROUTE 17/INTERSTATE 880

Location	Existing Conditions			Future Conditions (1995)		
	ADT	Peak Hour	V/C Ratio	ADT	Peak Hour	V/C Ratio
Alameda/Santa Clara Line (Dixon Lane Road)*	88,000	6,900	1.0	117,000	13,400	1.4
Junction, State Route 238 (Washington Avenue)*	188,000	14,200	1.0	216,000	19,400	1.1
High Street	184,000	13,500	0.9	208,000	18,600	1.5
Embarcadero Connection (Oakland)	191,000	14,200	1.0	217,000	18,500	1.5

*Future conditions assume the concept of adding one additional mixed flow lane in each direction by 1995.

Source: California Department of Transportation (District 4), Route Concept Report: State Route 17/Interstate 880 (Draft), San Francisco, May, 1984 currently operates at capacity. In an recent analysis, Caltrans reported, "The interchanges along this segment are heavily congested and have numerous accidents. These might be caused by the short weaving sections and tight ramp geometrics. Ramp traffic frequently backs up onto the mainline."[156]

However, this situation is projected to get worse, particularly in the southern section of the corridor. Table 23 notes that, despite the addition of one additional mixed flow lane (i.e., a general purpose lane that can be used by all same-directional traffic) in each direction, by 1995 the volume/capacity ratios could approach 1.5 in the worst parts of the corridor.

A recent study by MTC pinpoints one of the main reasons for this conclusion. Because of employment growth in the Santa Clara Valley, coupled with high residence costs, a significant percentage of the Santa Clara County work force will live in Alameda County. As a result, daily work trips crossing the Alameda/Santa Clara County line are projected to double, from 78,000 per day in 1980, to 144,400 per day by the year 2000.[157]

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[156] California Department of Transportation (District 4), <u>Route Concept Report-State Route 17/Interstate 880</u>, (San Francisco, Francisco, October 1984), p. 17.

[157] Metropolitan Transportation Commission, "State Approves $110 Million in Bay Area Highway Projects," <u>Transactions</u>, June/July, 1984, p. 1.

Recognizing these problems, Caltrans has proposed a series of projects totaling at present $268 million, ranging from roadway reconstruction, to the addition of both auxilary and new mixed-flow lanes.[158] Many of these projects were included in the recently adopted <u>1984 State Transportation Improvement Program</u> (see Table 25). This was possible in part because of Caltrans success in getting State Route 17 designated as "non-chargeable interstate," and thus eligible for this category of federal highway funds.

But by themselves, these improvements will not be enough. Caltrans has pointed this out by stating, "The highway facility cannot be expected to accomodate all of the anticipated demand. Improvements in all modes will be necessary in order to adequately provide for the transportation needs in this corridor."[159] As a result, other alternatives need to be considered, a conclusion that is apparent in virtually all examinations of port regional highway access system problems in the Bay Area. Thus in the Nimitz' case, specifically, such transit improvements as the proposed BART Fremont/South Bay extension, and/or general improvements in bus services, and/or other enhancements are required, in

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[158] Metropolitan Transportation Commission, "Fremont-South Bay Bus/Rail Link Studied," <u>Transactions</u>, June/July, 1984, p. 2.

[159] <u>Route Concept Report</u>, p. 18.

addition to the noted highway projects. Such improvements would improve regional port access, by shifting person trips (and thus vehicle trips/automobile traffic) off this facility. Thus, from a port access sense, these types of improvements need to be supported.

b. Eastshore Freeway (Interstate 80)

Compared to the Nimitz Freeway, the Eastshore Freeway is not considered to be quite as much of a problem. Compared to the Nimitz Freeway, the traffic volume is considerably less once north of the Interstate 80/State Route 17 (Hoffman Blvd) interchange in Richmond (see Tables 19 and 21 for statements of current and projected traffic volumes). The percentage of trucks of the total traffic volume is also less, averaging 9.2 percent betweem the Bay Bridge Toll Plaza and the Interstate 80/State Route 17 interchange in Richmond, dropping off from that as you move northward.

Nevertheless, the high volume of traffic on this freeway (with 42 percent moving to or from the Bay Bridge and San Francisco[160]) currently results in serious congestion,

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[160] California Department of Transportation (District 4), Final Environmental Impact Statement, Interstates 80/180 Operational Improvements in Alameda and Contra Costa Counties, Volume I, (San Francisco, February, 1984, p. 174.

and is projected to become worse unless the corridor's transportation systems are improved. According to the final environmental impact statement for the Interstates 80/180 Operational Improvements Project, overall daily volumes in this corridor are projected to grow from 29 percent (near the Powell Street interchange in Emeryville, just north of the Port of Oakland), to 60 percent (south of the Carquinez Bridge), between 1980 and 2005. At the peak hour, the percentage increases range from 36 to 78 percent.[161] Given these conditions, and the importance of this link in moving cargo between the ports, the nearby rail yards, and points east, improvements to this route are vital to the ports' interests.

Two types of solutions are being formulated, one by Caltrans for Interstate 80 itself, and one by the applicable transit districts, in response to this expected increase in corridor traffic volume. Caltrans is proceeding with a $172.7 million operational improvements project involving both Interstate 80, and a short portion of the new Interstate 580-John T. Knox Freeway in Richmond. As planned, the dual roadway project would involve 11.8 miles of High Occupancy Vehicle (HOV) lanes, several miles of additional mixed-flow lanes, auxilary lanes, and connectors, and 17 modified, reconstructed, or new

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[161]Interstates 80/180 FEIS, Volume II, p. 267.

freeway interchanges (only one being new). Between the Nimitz and the Knox Freeway junctions, the major improvements are two new HOV lanes. One would be a eastbound lane, which would run from the west side of the West Grand Avenue interchange (by the Bay Bridge Toll Plaza and the Port of Oakland), to the Ashby Avenue interchange. It would also tie into the planned Interstate 580 reversible HOV lane, heading east from the same location. The other would be a 1.6 mile southbound HOV lane on the Knox Freeway (Interstate 580), from a point north of the planned Central Avenue interchange to Interstate 80.[162]

Currently, the possible transit improvements in this corridor are still being identified. At least initially, it appears that AC Transit, the local bus transit service provider, will provide express bus service over the San Pablo/Pinole HOV lane to the existing Richmond BART line. In the long term, BART is studying an extension of this line from its present terminus in downtown Richmond to Route 4 in Hercules. However, given limited available funds for Bay Area rail transit starts and extensions, it is unlikely this line will be operational before the year 2000.[163]

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[162] Interstates 80/180 FEIS, various pages.

[163] Ibid., p 48.

c. John T. Knox Freeway (Interstate 580)

When the Seaport Plan was prepared, this freeway was listed as the highest regional access improvement priority. Likewise, the Regional Transportation Plan identifies it as the highest priority regional transportation system project.[164] Discussed since the 1950's, it is both an integral part of the plans to redevelop the southern portion of the City of Richmond, and to improve the access to the Port of Richmond and the industries in this area that serve maritime interests.

The Knox Freeway is fully described in the section dealing with the Port of Richmond's access problems (Chapter V, section B5). For more details regarding this $226 million, 17-project undertaking, the reader should refer to that section. Final freeway completion is not anticipated until 1989.

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[164] Regional Transportation Plan, p. 34.

d. Bayshore Freeway (U.S. 101)

As one of the consequences of the continued office, commercial, and industrial development of the San Francisco Peninsula and San Francisco itself, the Bayshore Freeway (U.S. 101) is now one of the most heavily traveled freeways in the state. An eight-lane facility north of Redwood City (six lanes between Mountain View and Redwood City), traffic volumes are currently fairly high along the entire route. At the present time, the section with the highest traffic volumes and congestion is between State Route 92 in San Mateo and downtown San Francisco (see Table 24). Within this section, roadway design capacity is frequently approached or exceeded during the peak hour.

These heavy volumes are projected to increase significantly in the years ahead, because of additional commercial development in San Francisco and along the Peninsula itself. For example, according to MTC's Peninsula Route 101 Study Report, some 50 office and industrial projects, totaling some 22,000,000 square feet of commercial space, are planned for construction over the next 20 years between (approximately) Candlestick Park in San Francisco, and Mountain View in Santa Clara

Table 24

U.S. 101 TRAFFIC CHARACTERISTICS

Location	Average Daily Traffic Volume	Peak Hour Volume	Percent Trucks
South junction, State Route 237-Mountain View-Alviso Road Interchange (north side)	135,000	12,900	6.4
Woodside Road (State Route 84, Legislative Route 114) (south side)	133,000	12,600	7.6
Junction, State Route 92 (north side)	187,000	17,700	6.5
San Francisco Airport (south side)	181,000	17,200	7.7
San Francisco, Third Street	168,000	16,000	5.5
Junction, Interstate 280, Alemany Boulevard Interchange (north side)	224,000	15,700	4.4
Junction, Interstate 80 (south side)	230,000	16,100	4.1

Sources: California Department of Transportation, 1983 Traffic Volumes (Sacramento, 1984), pp. 119-120, and California Department of Transportation, 1982 Annual Average Daily Truck Traffic on the State Highway System, (Sacramento, June, 1983), pp. 149-150.

County. Traffic generated by this development alone could be in the range of an additional 134,000 evening commute hour work trips, a 27 percent increase over 1980 levels.[165, 166]

Several studies in recent years have been conducted to assess the volume of growth in this West Bay/Peninsula Corridor, and to identify and examine possible solutions to the corridor's problems. On the highway side, the most recent has been the Peninsula Route 101 Study Report (1984 edition), previously cited. It recommends operational improvements similiar to those planned for Interstate 80 between the Carquinez Bridge and the San Francisco/Oakland Bay Bridge, i.e., auxiliary and HOV lanes, ramp metering, etc. But it also recommends further development and promotion of alternatives to travel in single-occupant vehicles, e.g., ridesharing and transit services. It also recommends that local jurisdictions seriously consider some limitations on their approval of further development, in light of the corridor's existing and forecasted transportation system problems.

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[165]Metropolitan Transportation Commission, "Committee Reviews Plan for Relieving Highway 101 Congestion," Transactions, December/January, 1984, p. 2.

[166]Metropolitan Transportation Commission memorandum, Nancy Hammond to "Work Program and Plan Review Committee," December 3, 1982.

The transit focus is based, in part, on the realities that dictate the area's responses to these regional access problems: high levels of existing development, coupled with restricted highway right-of-way, limits the amount of additional new mainline freeway that can be constructed. The transit response has also been influenced by the history of transit availability in the corridor, including the Peninsula Commute Service, as well as the corridor's narrow breadth. Taken together, transit alternatives are thus receiving increased focus as solutions to at least some of the corridor's transportation problems.

At the present time, transit improvements development is underway on two fronts. From a planning side, the Peninsula Mass Transit Study is underway, with one of its major objectives being the review of rail alternatives, including "light-rail," Peninsula Commute Service enhancements, and/or the possible extension of BART into the corridor. Mandated by Senate Concurrent Resolution 74, this study is scheduled to be completed by March, 1985.[167]

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[167]Metropolitan Transportation Commission, "Peninsula Mass Transit Study Launched," Transactions, June/July, 1984, p. 2.

From an operations standpoint, considerable investments are being made to enhance the corridor's transit services, most notably by the San Mateo County Transit District (SamTrans), and by Caltrans on its "CalTrain" Peninsula Commute Service. In the former case, resulting, in part, from the institution of a 1/2 cent transit support sales tax in July, 1982, the bus fleet is being expanded, and the level of services is being improved.[168] For CalTrain, several improvements are already underway or are being proposed for this 47 mile, 26 station, heavy rail commuter service. At the present time, both new cars and locomotives are on order, the first of which are scheduled to be put into service in the Spring of 1985.[169] As this equipment arrives, the number of trains will be expanded, to 52 by 1986, with up to 60 possible, given previous Southern Pacific operating history.[170]

The importance of improvements to this service in relieving U.S. 101 congestion can be seen in figures reported in the <u>CalTrain Peninsula Commute Service 5-Year</u>

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[168] <u>Regional Transportation Plan</u>, p. 24.

[169] California Department of Transportation (District 4), <u>CalTrain Peninsula Commute Service 5-Year Plan: 1984-1989</u> (San Francisco, June, 1984, p. 61.

[170] Based on <u>Caltrain Peninsula Commute Service 5-Year Plan</u>, p. 51, and phone conversation with Elmer Hall, Caltrans District 4, 6/26/84.

Plan. Currently, 75 percent of its ridership is carried during the regular commute hours, with about 70 percent of these riders either beginning or ending their trips in San Francisco[171] This is being achieved even though Caltrain's San Francisco terminus is at the Southern Pacific's 4th and Townsend Station, approximately one mile southeast of the central business district.

Caltrans has proposed extending the line to the Transbay Transit Terminal in downtown San Francisco, where significant increases in ridership could be expected. With 68 percent of downtown employment within one mile walking distance of the Transbay Terminal, Caltrans believes ridership could be increased from a weekday level of 13,600 passengers (as of 1981), to nearly 30,000 by the year 2000, using figures generated from the Interstate 280 Transfer Study.[172] If a somewhat similar extension in San Jose is achieved, and as general improvements in intermediate stations and bus transit service connections are made, less notable but still significant ridership increases could occur on this line.

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[171] Caltrain Peninsula Commute Service 5-Year Plan, p. 37.

[172] Ibid., pp. 88-89.

This is not to say this is the only corridor improvement opportunity. On the contrary, such options as BART system extensions and light-rail lines, in addition to CalTrain enhancements, are being studied. Nor are the main capacity addition options strictly transit oriented. For example, Caltrans District 4, as part of its System Planning work, has conceptually explored the idea of adding an additional mixed-flow lane in each direction in the San Mateo section of the Bayshore Freeway. But even if this idea proves infeasible, operational improvements noted previously could be implemented.

To summarize, it appears opportunities do exist to alleviate some of the Bayshore's current and projected congestion problems, and thereby improve port-access. Given the nature of the corridor, it is likely that any overall corridor transportation system improvements plan will include some mix of highway and transit capacity increases, plus increased marketing of transit services and ridesharing opportunities. But the extent to which capacity increases can be realized will depend on both multi-agency cooperation, and on possible improvements in transportation's financial picture.

2. Rail Access and the Southern Pacific/Santa Fe Merger

Turning to the regional rail access system, a different situation appears. Unlike the highway system, not only is the rail system under private ownership and operation, but in general is in reasonably good shape.

Some problems do exist however, and as a result of changing economics and cargo/traffic volumes, several changes are occurring. In this section, three questions will be addressed:

- What are the characteristics of the regional rail access network?

- What are the existing problems? What problems may be forthcoming?

- What might be the effects of the Southern Pacific/Santa Fe merger on rail access to the ports, the ports' operations, and the region as a whole?

a. Rail Access Network Description

The Bay Area ports are currently served by three main-line railroads. These are the Southern Pacific, the Santa Fe (more formally known as The Atchison, Topeka, and Santa Fe), and the Union Pacific Railroads. Of these three, the Southern Pacific is the most prominent, directly serving all of the Bay Area ports except Encinal Terminals.

The Southern Pacific Railroad's Bay Area network is comprised of two main lines radiating from its West Oakland Yards, plus several connectors and/or branch lines. Of the two main lines, its most important is the Oakland to Martinez line, which carries the bulk of its traffic to and from the Bay Area. At Martinez, this main trunk line splits, with one leg heading east and south through the San Joaquin Valley, the other north and east toward Sacramento, Reno, and the Pacific Northwest. Its other main line extends to the south from Oakland toward Los Angeles, connecting with the San Francisco Peninsula Branch Line at San Jose. The most important connector in this network is the line running between Redwood City and Tracy via Newark and Livermore. Overall, the Southern Pacific Railroad system extends north to Portland, east to Ogden (where it interlines with the Denver and Rio Grande Western), and to the south to Texas and Louisiana.

The Santa Fe and Union Pacific networks are less extensive. From its terminus in Richmond, the Santa Fe trackage runs near Martinez and then east and south to the San Joaquin Valley. In addition, it technically possesses trackage rights" (right of passage) over the Southern Pacific tracks between Richmond and Oakland, and does operate a small TOFC (trailer-on-flat-car) yard in San Francisco (east of Piers 50-54). Its system network connects California with the southwest and up to Chicago, via Barstow and Albuquerque.

The smallest of the three (at least in terms of port-related volumes), the Union Pacific entered the Bay Area in 1982 with its merger with Western Pacific. Its system trackage extends southeastward from its Oakland yard, parallel to tracks of the Southern Pacific's to Newark, then east through Livermore, Stockton, up to Sacramento, and to the Midwest. Like Santa Fe, it does operate a small storage yard in San Francisco, with external car movements provided under a services agreement with the Southern Pacific.

b. Rail Access Network Problems

The rail access network problems are generally not unique to the Bay Area, and are similiar to those faced by other railroads across the country. Only the San Francisco Bay itself adds certain additional constraints, which are common to those faced by planners of the regional highway network as well.

Rail network problems can be grouped into two broad categories. In one group are those problems caused by changes in the rail carrier's marketplace. In some areas, traditional markets, such as heavy, basic industries (e.g., steel) are dying out; others are being converted to other land uses (e.g., from growing crops to growing subdivisions). But many of the new markets and/or industrial developments either cannot be served by rail, or are currently being best served by trucks. As a result, freight volumes and functional relationships have been changing, as railroad's national share of freight shipping has fallen, from 64 percent in 1944 during World War II, to 36 percent in 1982, according to one industry spokesman.[173] In the other group are those problems related to the railroads physical operating environment.

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[173]Speech, Lawrence Cena, President and Chief Executive Officer, Atchison, Topeka, and Santa Fe Railroad, April 29, 1984.

As development occurs near their rights-of-way, train speeds, grade crossing accidents, and grade crossing delays assume greater importance. On the other hand, to compete effectively, faster train services must be implemented. As part of the deregulatory-induced efficiency changes, mergers are also occurring, which may offer most, but not all, shippers better access, rail services, and rates.

Information on the exact extent of these problems on specific lines is difficult to obtain, given the private enterprise makeup of virtually all railroads. Today, government's role generally, and Caltrans' role specifically, at least in regards to freight movement, is quite limited. Thus, most of the readily available specific information about rail access problems comes from either indirect sources, or from instances where rail and highway interests (and networks) interface. For instance, readily compiled information about train volumes and crossing problems is available from applications for grade separation funds submitted to the California Public Utilities Commission each year. The 1984 list included 73 applications for funds, 20 of which were for Bay Area locations, including six in the cities of Fremont and Hayward, six in the City of Pittsburg and adjacent

Contra Costa County area, and five in San Mateo along the Southern Pacific's San Francisco/San Jose Peninsula Branch Line.[174]

The problems along the Peninsula Branch Line are fairly well known to Caltrans personnel, due to their involvement with the "Peninsula Commute Service". In addition, this line also illustrates some of the responses being made by the railroads to the above-noted problems. On this line, the decline of heavy manufacturing in San Francisco, and the railroads inability to make significant inroads into the "high technology" cargo market in the Santa Clara/"Silicon Valley" area, have resulted in significantly reduced levels of freight handled along this line. Low tunnel heights, and tight radius curves at many of the remaining industries, restrain the use of its most modern freight car rolling stock.

Southern Pacific's responses can be seen in several of its actions, including in train scheduling, yard operations, and track closures. As recently as the early 1960's, Southern Pacific use to run five through freight

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[174]California Public Utilities Commission (Transportation Division), OII 83-10-01, Late-Filed Exhibit No. 4, Supplement Report: Separation of Grades Priority Study (San Francisco, April 27, 1984), Table 1.

trains to and from San Francisco a day on this line, plus five "locals". Today, the total is two (with only one through train to San Francisco). According to to its merger plan with Santa Fe, its Oakland Yard handles 1025 cars, and its San Jose yard handles 386 cars a day, but its San Francisco Mission Bay Yard handles just 112 cars per day. Santa Fe however handles just 13 cars per day at its San Francisco yard.[175] For some of the same reasons, it also closed, in late 1982, its Dumbarton Railroad Bridge, which was the most direct connection between the Peninsula and the East Bay and points east. As a result, all train movements must move through San Jose.[176] Finally, although the continued development of the Peninsula Commute Service may help in the efforts to improve the regional highway network in this corridor, at some point this development will conflict with the provision of rail freight service in the corridor.

These issues are of particular concern to the Port of San Francisco. It believes one of the critical elements in its future success is the movement of containers by rail

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[175] Santa Fe Southern Pacific Corporation, Rail Merger Application, Interstate Commerce Commission Finance Docket No. 30400 (Chicago, March, 1984), Volume 5, pp. 14, 30.

[176] Elmer Hall, Rail Operations Branch, District 4, phone conversation, 6/26/84.

directly from its new intermodal container transfer facility. However, if shippers perceive that movements east will be infrequent, compared with either to other Bay Area and/or Pacific Coast ports, the port will be less likely to attract the necessary shippers and cargo volumes to make the facility viable.

Further, this is the same type of competitive service concern that is expressed by the other major ports in the region regarding rail services. It is for this reason that the Southern Pacific/Santa Fe Railroads merger proposal is of such interest to the ports. The basic elements of that proposal, and in what ways it may impact the Bay Area, is discussed next.

c. The Southern Pacific/Santa Fe Railroads Merger Proposal

This proposed merger is the latest of a series of mergers proposed and/or granted since 1980 that has brought on the rail era of "mega" railroads. A combined Southern Pacific/Santa Fe system would fit well into this category. It would be comprised of 25,600 miles of track located in 15 different states, and would be the third largest in the United States (behind the Burlington Northern and the CSX systems). The proposed merger would create a combined three billion rail car-mile railroad operation, run by 58,000 employees, with an annual revenue of $4.5 billion.[177]

This merger was formally proposed to the Interstate Commerce Commission on March 23, 1984, by the Southern Pacific/Santa Fe Corporation, which in turn was formed offically in December, 1983 by the merger of the Southern Pacific Company and Santa Fe Industries Corporation. In that corporate merger, it was required to keep the railroad companies separate unless and until the Interstate Commerce Commission reviewed and approved a railroad merger application. The railroad merger proposal, in turn, follows an attempt by the Southern Pacific Company to buy Santa Fe during the spring of 1980 (i.e., before the passage of the "Staggers Act). Review of the merger application by the Interstate Commerce Commission is expected to take approximately two years before any final decision can be expected.

The applicants lists several actions that would be taken in molding the two railroads into a merged system, and

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[177]This discussion, except where otherwise noted or more specifically identified, is based on the Santa Fe/Southern Pacific Corporation Rail Merger Application, a speech by Lawrence Cena of Santa Fe Railroad (previously cited), and information obtained from various trade publication articles.

have estimated what some of the effects of the mergedsystem might be (over pre-merger conditions). Let's look at them briefly, from a national, California, and Bay Area perspective.

National Actions and Anticipated Results

- Would require three years to consummate after Interstate Commerce Commission approval of the merger.

- Would require $145 million in new capital investments to effectively merge the systems.

- This cost would be offset by a savings of $665 million in capital expenses over the period, and $220 million in operating costs.

- These savings would be realized, in part, by the abandonment of 160 miles of track, and from the cut of 1130 mainly administrative personnel.

- 24 new or revised intermodal trains or train schedules would be instituted. However, movement of traffic over the Southern Pacific's Sierra Nevada line (also known as the "central cooridor") through the Ogden Gateway (i.e., to the

Union Pacific or to the Denver and Rio Grande Western) would drop an estimated 20 percent westbound, and 25 percent eastbound, through their or other carriers actions.

- Because of its improved competitiveness, the applicants believe 25.1 billion annual gross ton miles of traffic would shift from other railroads to this system. Of this shift, the Union Pacific Systems would lose the greatest amount, approximately 42.8 percent of that total.

- The applicants also believe significant amounts of traffic would also be shifted from trucks to the new system. The two truck routes most affected would be those between Los Angeles and Houston; and betweem the Bay Area and New Orleans.

California Actions and Anticipated Results

- All California freight traffic bound for points east generally of the Mississippi River would be shipped via the Santa Fe line through Barstow.

- In light of the drop of traffic being interlined with either the Denver and Rio Grande Western or with Union Pacific Railroads, traffic on the Southern Pacific "Sierra Nevada" line is expected to be reduced 22.6 percent.

Bay Area Actions and Anticipated Results

- As part of its capital improvements plan, the joint system would spend $19.8 million to moderize and expand Southern Pacific's West Oakland Yard. Most of the improvements would be focused on expanding the TOFC/COFC facility. Under the merger plan, these improvements would be completed by the second year after the merger is approved.

- With this action, as noted earlier in this report, Santa Fe's Richmond Yard would be all but shut down. Santa Fe's existing line from Richmond to Martinez would also be abandoned, in favor of Southern Pacific's trackage. Yard operations remaining at Richmond would be limited to local rail service for Richmond customers, and storage functions.

- On the main Southern Pacific line north of Oakland, average train volumes would more than double from 11 to 23 trains per day. However, the applicants estimate maximum daily average crossing time delay would only increase from 15.9 to 20.4 minutes, as average train speeds would be increased. From an average tonnage perspective, the volume along this line would increase only 33 percent, reflecting the predominance of TOFC/COFC traffic on the Santa Fe system. Line volumes south of Oakland to San Jose however would drop 34.5 percent.

The reaction of competiting western railroads to the proposal has been strong and extensive. Union Pacific, who has the most to lose in the merger of its two primary competitors, tried originally to delay the corporate merger. Failing in this attempt, it has requested the Interstate Commerce Commission to condition any merger approval by requiring the new company to provide trackage rights to Union Pacific, including on the present Southern Pacific's trackage between Colton and Lathrop (via Barstow), and between Sacramento and Oakland. It argues that by obtaining these rights, its competitive position would be less aggrieved by the merger.

The conditions requested by the Denver and Rio Grande Western Railroad are even more extensive. Under their conditions request, they would either be granted trackage rights or fee ownership of the Southern Pacific trackage between Ogden, Utah, and Roseville, California and Klamath Falls, Oregon. It would also granted trackage rights over the Southern Pacific system from Roseville to Oakland, San Jose (via Hayward), and up to Sunnyvale. Their argument, similar to that of Union Pacific, is that by obtaining these conditions, competitively, it would not be as badly hurt by the merger, since their ability to receive and obtain West Coast freight traffic would be maintained (and in fact notably improved).[178]

The Bay Ports' official reactions have been generally quite cautious. In written comments submitted by both the Port of Oakland and the Port of San Francisco, the merger concept is supported. But both indicate concern about the possible reduction in competitive services and resulting future rate structures. The Port of San Francisco, which has requested to formally participate in the merger application review proceedings, is very concerned over the reduced use of the Southern Pacific Sierra Nevada line (Ogden Gateway) route. It believes that without protective conditions, the merger would result in higher intermodal cargos charges and travel times, both singularly, and in comparison to intermodal cargo movements from/to the Southern California ports.[179]

The Port of Oakland also raises this concern, but from a different perspective. It believes that currently, Bay Area mini-landbridge and micro landbridge cargos are at a

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[178]"UP System, KCS, D & RGW Weigh in With Proposals For Rights Over SFSP," Traffic World, Volume 199, July 30, 1984, pp. 49-50.

[179]Frederick L. Shreves, II (of Hill, Betts & Nash for the Port of San Francisco), Finance Docket No. 30400, Comments of the Port of San Francisco, Washington, June 4, 1984.

freight rates disadvantage with the Southern California ports. It believes that with the loss of rail freight competition with the merger, this situation would be further exacerbated. Nor does it believe that Union Pacific's current indirect services to the Southwest (e.g. to Houston), nor alternative truck services, are or would be sufficient competition to a merged Santa Fe/Southern Pacific operation. As a result, it believes it is possible that the Port of Oakland (and the Bay Area ports) could be put at a further rates and services disadvantage.

Citing the Staggers Act provision against unreasonable transportation services discrimination (including against a port), the Port of Oakland calls upon the Interstate Commerce Commission to condition the approval of the merger, and/or obtain assurances from the applicants, so that the port's interested would be protected. The conditions (or assurances, as appropriate) requested: that the rates for intermodal traffic between the port and east/southeastern points be equalized, vis-a-vis the Southern California ports; and that "competitive levels of service" be maintained, including, if necessary, the maintenance and marketing of rail services using the Ogden gateway.[180]

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[180] James J. O'Brien and Denver J. McCracken (Port of Oakland), Finance Docket No. 30400, Comments of the Port of Oakland, Oakland, May 25, 1984.

As in the previous ground access sections, the possible impact of the merger on the Bay Ports is both local and regional. Reviewing the local impacts first, of the Bay Area ports, it appears the Port of Oakland stands to benefit the most from the merger. With Santa Fe operations moved to Oakland, drayage time and costs probably would be reduced. Further, it is possible that the port would have greater flexibility in the movement of its cargos by rail. However, these advantages may be offset by major increases in truck traffic on the port's roadways, both port and non-port related, moving to the SPSF yards. Given that the port possesses the most congested local access roadway currently, this impact could seriously affect the port's competitive position.

The merger's impacts on the Port of Richmond could just be the opposite of the Port of Oakland's. Drayage requirements would probably increase, as former Santa Fe cargos would have to be transferred first to the railroad companies combined yard in Oakland. Through the closure of the Santa Fe yard, truck traffic using the local access network would be less. However, since a solution to its truck traffic congestion problem along Hoffman Boulevard/State Route 17 is already being implemented (i.e., the Knox Freeway, Interstate 580), the actual positive impact would be negligible. But perhaps most importantly, shippers may react adversely to this perceived further degradation of the port's capabilities. Indeed, this may have already occurred in the movement of the port's last container line to the Port of Oakland. Nevertheless, in the long run the change in freight operations in the Richmond area might actually provide the port with additional opportunities to develop and expand in the future, particularly in regards to the development of intermodal container transfer facilities.

The merger's possible impact on the Port of San Francisco is unclear. Conceivably, the port could be a recipient of improved rail services (e.g., the application does list the shift of one Ogden to Oakland train to a new terminus in San Jose). But since the port is already at a time (and perhaps a drayage rates) disadvantage in comparison with the Port of Oakland, its competitive position is more sensitive to any changes in rates or rail services, not just to and from the Bay Area, but to the Bay Area's freight yards and along the Southern Pacific's Peninsula Branch Line as well. These considerations are of particular importance to the port now, as it is aggressively trying to capture increased volumes of intermodal traffic through its newly-opened intermodal container transfer facility.

From a regional aspect, the impact of the merger on these and other Bay Area ports will depend in large part on how the new company rates and provides services between the Bay Area ports and eastern points, versus those provided to ports in Southern California. Indeed, in both the above noted public statements, as well as in private conversations, this was the ports' greatest concern. They expect, that under any scenario of merger approval, both train speeds and frequencies will increase to a greater numerical extent for traffic between Southern California and the East than for Bay Area traffic. They also fear that without protective conditions, on many routes and cargos, there would be little effective competition to temper the ability of a Southern Pacific/Santa Fe Railroads combine to reduce services and/or increase rates.

The "Rail Transportation Policy of the United States" (Title 49 of the United States Code Annotated, Section 10101a), as cited by the Port of Oakland, requires that the Interstate Commerce Commission must consider in its proceedings means to achieve:

- ...effective competition among rail carriers and with other modes,...

- ...reasonable rates where there is an absense of effective competition...(and)

- ...to prohibit predatory pricing and practices, to avoid undue concentrations of market power and to prohibit unlawful discrimination.[181]

It will be on this basis that representatives of one or more of the Bay Area ports may argue for the conditioning of any approval of the merger of the Southern Pacific and the Santa Fe Railroads. It is also likely that they will support the moves made by both the Denver and Rio Grande Western and the Union Pacific to get at least some of the above noted trackage rights. The potential for a stronger local, regional, and national rail system through this merger exists. But the likihood of that occurring is by no means assured. The shape and characteristics of that improved system, and the sum effect of the merger on the Bay Area ports, must still be determined.

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[181]Comments of the Port of Oakland, p. 1.

3. Bay Area Naval Port Development

The effect of the buildup of United States naval operations in the San Francisco Bay Area on commercial port operations, and their ground access systems, will probably be slight. Much of the growth is in naval ship "homeporting", maintenance, and repair activities, at facilities generally separate from the port's operations. In this respect, the ports are fortunate.

Yet, based on discussions with state, regional and port personnel, some minor impacts could occur. The greatest direct port development impact could come from the encroachment by U.S. naval operations upon current or planned port operations areas, particularly around the west end of the Port of Oakland, and at the southern end of the Port of San Francisco. However, this is not expected to be a major problem. The greatest impact on the ground access system may be on the access routes leading to the eastern end of the San Francisco/Oakland Bay Bridge and the Treasure Island Naval Base. Here, the planned increase in naval operations, and a corresponding increase in commuting naval personnel living in the East Bay, would affect the regional port access network. Again however, the direct port access impacts should be slight. Nevertheless, the growth in naval operations should continued to be monitored for their possible implications for Bay Area ports development and operations.

VI. PORT ACCESS PROBLEMS RESOLUTION

Given the range of ground access problems facing the ports, how are these problems being addressed? What are the forums where the issues are being identified, alternatives evaluated, and solutions found? Who is involved? This section will touch upon the answers to these questions, with particular emphasis on the regional and state response to these problems by three organizations: the Metropolitan Transportation Commission (MTC), the California Department of Transportation (Caltrans), and the California Transportation Commission (CTC).

But first, the resolution of port access problems needs to be put into perspective. The most important, pressing, and well-known problems of the ports are those which affect their immediate operating environments, i.e., problems on their local access (streets and roads) networks. It is also at this level normally that solutions to these problems can best be found, through the involvement of local governments, private organizations, and the ports themselves. However, given the diversity and uniqueness in the local process, and the emphasis of this report itself, the following material does not attempt to address this process as a separate topic.

Not all port access problems, nor the solutions to them, however, are necessarily at this level. On the problem side, there are those problems on the regional network which, although occasionally under local control, are most commonly under State/Caltrans control. There are also those which are of regional and/or statewide significance (either singularly or cumulatively), are under multiple jurisdictions' interests, and/or whose solutions are tied to the use of funding under regional and/or state control. Finally, the involvement of MTC and the two primary state agencies, Caltrans and the CTC, is mandated by federal and state statutes, which define the agencies planning and project funding roles, and Caltrans' design, construction, and system operational roles.

The nature of the problems' causes, effects, and solutions also defines a network of responsible parties that goes beyond a simple listing of the ports, local governments, MTC, and Caltrans. Much of this complexity comes from actions that directly do not cause a problem, but indirectly can substantially affect a port's ground access system. For example, the decisions of the U.S. Army Corp of Engineers (and Congress for that matter), regarding how and to what extent a waterside access channel might be dredged, could seriously impact the land-side access system, by creating an environment favorable (or unfavorable) to further port development and operations. Thus, the list of responsible parties is much larger than one would first imagine. If one groups them into categories, some of the more prominent parties would include:

- Private Organizations: Certain ports, ocean carriers, terminal operators, railroads, trucking firms, shippers, lobbying and public education organizations.

- Local Government and Special Districts: Cities, counties, transit carriers, most ports.

- Regional Government: Association of Bay Area Governments (ABAG), Metropolitan Transportation Commission (MTC), San Francisco Bay Area Air Quality Management District, San Francisco Bay Conservation and Development Commission (BCDC).

- State Government: Air Resources Board, California Transportation Commission, California World Trade Commission, Department of Boating and Waterways, Department of Economic and Business Development, Department of Transportation (Caltrans), Water Resources Control Board.

- Federal Government: Army Corps of Engineers, Department of Transportation (including the Federal Highway Administration and the Maritime Administration), Environmental Protection Agency, military services.

Further complicating this problem/solution network is the intertwining of these organizations' roles, due to both federal and state statutory requirements, and the local versus headquarters structure of these state and federal organizations. Their structural arrangements range from skeletal offices, such as the Maritime Administration's office in San Francisco, to fully functional action units, such as Caltrans' San Francisco-District 4 office.

These factors together illustrates the need for a holistic, comprehensive approach to the identification, analysis and solution of current and anticipated port access problems. This comprehensive approach must be grounded on the recognition of the complexity of the above described actor/forum network, and thus the need for extensive, on-going communications among all parties involved. Finally, as previously demonstrated throughout this report, this approach must include all three time dimensions (past, present, and future), and must address the short, intermediate, and the long term aspects of a problem and its possible solutions.

It is from these perspectives that the following material is presented, to foster the understanding that may lead to the resolution of port access problems by port, local, regional, and state interests.

A. The Regional Response: The Metropolitan Transportation Commission

At the regional level, MTC has the most direct responsibilities for the improvement of the port ground-access network. This role with respect to maritime activities is defined in both federal and state statutes. Section 1607(a), Title 49, United States Code Annotated, declares it to be in the national interest to "...encourage and promote the development of transportation systems embracing various modes of transportation in a manner that will serve the States and local communities efficiently and effectively." It also directs the states and the regions to conduct a planning process that considers all modes of transportation and to "...be continuing, cooperative, and comprehensive to the degree appropriate based on the complexity of the transportation problems." State law is more specific, by requiring that the planning result in "...the achievement of a coordinated and balanced regional transportation system, including, but not limited to, mass transportation, highway, railroad, <u>maritime</u>, and aviation facilities and services..."(California Government Code Section 65080, emphasis added).

These statutes require MTC's direct involvement in the planning and provision of an adequate port ground-access system. This involvement is primary manifested in its long-range transportation planning and analysis; and in its project funding programming recommendations.

1. Long-Range Transportation Planning and Analysis

Under this classification comes the transportation planning efforts of MTC to both predict the future state of the region's transportation systems (and their problems), and to lay out a set of policies, actions and a financial plan to improve and maintain the operation of the region's various transportation systems. This activity is expressed in two ways. From a general, region-wide sense, it is expressed in MTC's annual update of the state-required Regional Transportation Plan. In a specific sense, it has been expressed in MTC/BCDC's development and implementation of the Seaport Plan, which also serves as one input document into the Regional Transportation Plan.

As stated in the general discussion of port development planning earlier in this report, it is MTC's and BCDC's policy to keep the Seaport Plan current and useful as a transportation system planning document. From an action standpoint, this is accomplished through ongoing MTC/BCDC staff work, and through the activities of the MTC/BCDC Seaport Planning Advisory Committee. According to its Overall Work Program, MTC staff's current activities include: the monitoring of waterborne cargo forecasts; review and coordination of port ground access facility improvements; and, the review of land use decisions as they affect port development. Work products include: issues review and action by the Seaport Planning Advisory Committee; and staff and committee recommendations on possible improvements to the region's transportation systems as they may affect port access.[182]

2. Project Funding Programming Recommendations

The programming of funding for transportation system improvements is probably the most visible and sensitive role of the regional and state transportation agencies. For through this process exists perhaps their greatest ability to affect the adequacy of the ground access system over the short to intermediate time period. However, as it is presently structured at the state and federal level, at the onset it must be viewed as a four party process, involving local input, MTC and Caltrans analysis and recommendations, and CTC adoption of a final set of programmed projects.

Generally speaking, programming is the identification and selection of projects that are to be funded from federal, state and local sources. In this role, MTC acts as a matchmaker, matching up the region's project needs and priorities, with the limited anticipated available funding. Actual project

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[182] Metropolitan Transportation Commission, Overall Work Program for Planning Activities in the San Francisco Bay Area (San Francisco, April, 1984), p. 2B-11.

implementation, if funding is approved, is done either directly or under contract by Caltrans, or in like fashion by the region's counties, cities, and/or transit districts.

The process involves the development of two documents, quite similar in name, intent, design, and content, which are used to actually request federal and/or state funding for a project. At the regional level, the document is called the Regional Transportation Improvement Program (RTIP), which serves as an input document to the CTC's State Transportation Improvement Program (STIP). The federal equivalent is simply called the Transportation Improvement Program (TIP). The RTIP lays out to the CTC the region's project funding recommendations over a five-year funding period. These recommendations are in turn considered by Caltrans in its analyses, and the CTC in its final review and approval of the STIP. The TIP lists to the U.S. Department of Transportation those projects where federal funding eligibility is being sought, including those in the adopted STIP. Both documents are based on extensive project priority analyses and public hearings, and both take up to 18 months to prepare.

Both the RTIP and the TIP carry many of the same projects and project information. Both documents list all major highway rehabilitation, operational improvement, safety, and new capacity projects that are recommended to be undertaken

Table 25

MTC 1985-89 TRANSPORTATION IMPROVEMENT PROGRAM (TIP)
PORT GROUND ACCESS RELATED LOCAL ROADWAY PROJECTS

Lead Agency(s) Roadway Iden.	Description	Fund Year	Costs ($000)	Estimated Completion Date
City of Alameda				
Patton Way	Construct new street between Lincoln Avenue and Webster Street. Includes overpass over Webster Street.	1983-84	7,400	1987
(Only a portion of this project is shown. Previously committed FAU funds-$2.5 million)				
City of Benicia				
Military West	Widen north half of Military West between West Fifth and West Third Streets.	1984-85	53	N/A
City of Oakland				
High Street	Revise intersection of High Street and Alameda Avenue.	1983-84	1,253	1984
City of Richmond				
North Richmond By-Pass	Construct two-lane bypass from/on Castro Street to Parr Boulevard.	1985-86	2,424	1988
(Only a portion of the total project is shown and programmed at this time for construction.)				
City and County of San Francisco				
Embarcadero	Reconstruct roadway from Broadway to North Point Street	1984-85	1,181	N/A
Townsend Street	Resurface roadway, Division Street to Embarcadero	1984-85	243	N/A

Source: Based on Metropolitan Transportation Commission, 1985-89 Transportation Improvement Program (Berkeley, September 1984), and conversations with local officials. All costs are shown in escalated dollars.

during the five year time period of the document. Major is generally defined as those projects costing over $250,000. The TIP also includes those local roadway projects that the region wishes to undertake with Federal-Aid Urban categorical funds. Mass transit capital improvement projects may be included in either or both documents, depending on the projects' funding sources. A summary of the local roadway projects for the federal fiscal years 1985-1989 that may directly affect local port-access is listed in Table 25. Projects affecting the state highway system are discussed in the following section, and are shown in Table 26.

Port involvement in this process can come in numerous ways. Initial port contact regarding a port-access problem can best be made with the city and/or county public works or traffic engineering departments where the port is located. After this initial contact, or as appropriate, contact with MTC or with Caltrans District 4 follows. Regardless of the actual nature of the problem, early identification of the specific problem or concern is most important, so that sufficient time is available to conduct any required analyses, to identify alternative solutions, and to submit them for consideration, far in advance of the RTIP/TIP completion deadlines. Through this early contact, port concerns can be given a full hearing.

B. The State Response: The California Department of Transportation and the California Transportation Commission

The responsibilities of the state and its agencies (Caltrans and the CTC) regarding port access are similiar to MTC's, differing mainly in terms of frame of reference and extent. Indeed, the same general federal planning requirements apply to the state as well as to MTC. But its overall role is somewhat broader. The California Government Code, Section 14030(a) requires the department (i.e., Caltrans), to support the CTC in developing a "...comprehensive balanced transportation planning and policy for the movement of people and goods within the state." Section 14030(b) continues this thought by requiring the department to coordinate and assist, if requested by either the public or the private sector, "...in strengthening their development and operation of balanced integrated mass transportation, highway, aviation, maritime, railroad, and other transportation facilities and services..." (emphasis added). Both roles are also affected by the federal government requirement that the state give due consideration to those projects which provide direct and convenient public access to the ports, as part of its consideration of projects to be submitted for federal funding assistance.[183]

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[183] United States Code Annotated, Title 23: Highways, section 105(g).

From an operational sense, Caltrans is responsible for the design, construction, operation, and maintenance of the State Highway System (and other transportation system units the Legislature may designate). However, it is expressly not authorized to "...assume the functions of project planning, designing, construction, operating, or maintaining maritime or aviation facilities without express prior approval of the Legislature..." (California Government Code Section 14030(d)).

Under this legislative umbrella, the CTC and Caltrans function to provide, among other things, adequate port access. The California Transportation Commission is an independent commission, and is the primary state transportation policy body within the state's executive branch. Its duties include: the adoption of the STIP; the approval of state capital projects construction; the review, recommendation (to the Governor and/or the Legislature) or adoption, as appropriate, of state transportation policies; and, the review of Caltrans budget and the adequacy of state transportation funding. The department functions in the capacity as the transportation systems planner, designer, builder, and operator, primarily of the State Highway System, and as a reviewer of the overall performance of the transportation systems in the state. In carrying out its role, it also develops and carries out certain state transportation policies, and/or recommends them for adoption by the CTC and others.

Because of these responsibilities, Caltrans and the CTC are extensively involved in port access provision. Chief among the ways Caltrans is involved is in its design and construction of modifications to existing highways, or of new highways. Here, roadway design and construction decisions can directly affect the adequacy of a port's ground access system. The plans for the construction of the John T. Knox Freeway near the Port of Richmond, and the Interstate 80 Eastbound HOV Lane near the Port of Oakland, are cases in point. Roadway maintenance, rehabilitation, and system operational activities can also impact the ports, by affecting the operating characteristics of the system.

Of the roles of Caltrans and the CTC, two are particularly important, in their ability to significantly impact the future adequacy of the ports' ground-access systems. They are the department's long-term planning efforts, and the development of the State Transportation Improvement Program.

1. <u>Long-Term Planning Efforts</u>

These efforts fall into two categories. In the first category are those whose time horizons are intermediate to long term in nature, and that address certain specified topics. These include such items as corridor studies, special route analyses (such as the recent one dealing with possible improvements to State Route 17, between State Route 238 and

U.S. 101), and special analyses such as this report. These efforts also include the identification of long-range socio-economic trends and resultant transportation system impacts that will bear on the overall adequacy of the state's transportation systems. For example, according to the Department of Finance, California population between 1983 and the year 2000 is projected to rise 25 percent, from 25.2 million, to 31.4 million. However, according to Caltrans' estimates, when other trends are taken into account, vehicle miles of travel is projected to rise 46 percent during the same period.[184]

Under the second category falls the department's System Planning Process and related efforts, formally reinstituted statewide with the onset of the current administration. The initial products of the System Planning Process are forecasts of the future performance nature of the State Highway System, given projected levels of travel demand and available transportation capital funding.

Essential to the process is the identification of the service function, or "route concept" of each route segment of the

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[184]Based on Department of Finance Report No. 83 P-1, Projected Total Population of California Counties, July 1, 1980 to July 1, 2020 (Sacramento, September 1983), and estimates derived from California Department of Transportation (Division of Transportation Planning), California Motor Vehicle Stock, Travel and Fuel Forecast for the 1985 STIP Fund Estimate and the Statewide Transportation System Plan (Sacramento, August 1984), pp. 11, 34.

state highway system. This concept is expressed in terms of a "Level of Service" that the highway segment in question should provide to a user. Level of Service in turn is a measure of the operating performance of a roadway, defined by such factors as highway physical characteristics, traffic volume, typical operating speeds, freedom to maneuver, and roadway safety. Factors such as whether the highway serves as a urban or rural route, and its level of intercity users and truck movements, are also considered in the assignment of a highway's "route concept." From this point, the specific levels of travel demand ten years hence on each segment are identified, deficient route segments (i.e., those which will fail to provide their specified level of service) are pinpointed, and the system improvements that could be achieved given several alternative state highway funding levels are considered.

The initial product of this planning is a statement of what service levels could be expected by the motoring public from the State Highway System in 1995 (for this year's report), given various future alternative funding levels. Two initial responses to the released product has already occurred. First, the means to integrate the product's findings into the department's STIP project recommendations development process are currently being examined. Second, the report, together with other work in the department and elsewhere, is inducing a reassessment of the transportation funding apparatus, and the nature and function of the state's transportation system and its components.

As the System Planning Process evolves, it is likely that a greater consideration of such issues as mass transportation alternatives, goods movement demand, and anticipated changes in the state's economy and transportation technology will occur. This will require greater levels of regional and local input into the process and the required analyses. As a result, the ports will have opportunities to provide input on their perceptions on future port ground access demands, problems, and alternative solutions. As this planning occurs, the abilities of the port's ground access system, and particularly of the regional access network, to serve future port access demands, will be more comprehensively defined, understood, and addressed.

2. State Transportation Improvement Program (STIP)

The state highway project funding programming process can be viewed as being two-faceted. Earlier in this chapter, we looked at the regional level; at MTC's input into the process through its submission of its RTIP. Alongside, starting 18 months prior to its adoption by the California Transportation

Commission, the state agencies' preparation of the five-year State Transportation Improvement Program begins.

In its preparation, Caltrans and the CTC work closely together. For example, Caltrans prepares for and recommends to the CTC, for its adoption by November 15 of each year, the "Fund Estimate." The Fund Estimate is a projection of the amount of funds that will be available for new projects in the upcoming STIP for each region, given the updated costs of the projects in the most recently adopted STIP, and the funds required for Caltrans' operations, maintenance, and other activities. Similarly, by March 1 of each year, Caltrans makes its project recommendations for the STIP to the CTC and the regions in its Proposed State Transportation Improvement Program (PSTIP).

The PSTIP's preparation is similar to the preparation by the urban regions' of the RTIP's, and in many cases, relies on the same kind of information and public input. However, as it precedes the RTIP's, the PSTIP is used by the regions as one of the input documents in their final preparation and adoption of their RTIP's. Caltrans' project recommendations, as included in the PSTIP, are the result of a detailed process that includes the consideration of numerous factors. At the forefront are the projects identified in the current STIP, and the project funding priorities spelled out by the

Legislature, which requires maintenance, rehabilitation and reconstruction projects on the existing state highway system to be given first priority. Also considered are such items as highway performance/condition levels, overall project costs, funding category allocations, and minimum state region and county expenditure levels. As time passes, the weighing of the results of the System Planning Process also will become an increasingly important factor as Caltrans prepares its STIP recommendations.

The final adoption of the STIP in June, like the Fund Estimate noted before, is the responsibility of the CTC. In this adoption process, the CTC compares Caltrans' proposals with those in the RTIPs, with the aid of a "comparison report" prepared by Caltrans. It also considers rural area comments on the PSTIP (i.e., for those areas where a RTIP is not required), other public comments and input, as well as its own staff recommendations. The STIP as adopted conforms to the RTIPs, except where the CTC finds "...that there (a) is an overriding statewide interest as determined by the commission, (b) are insufficient funds available to implement the program (outlined), or (c) exists conflicts between the regional transportation improvement programs (California Government Code Section 14530).

Table 26

1984 STIP (STATE TRANSPORTATION IMPROVEMENT PROGRAM)

PORT GROUND ACCESS RELATED MAJOR HIGHWAY PROJECTS

County Route & Project #	Description	Fund Year*	Costs** ($000)	Estimated Completion Date
Alameda County				
SR 17- 15	(I880) Fremont & Union City at SR 262 to 0.2 miles S of Alvarado-Niles Rd.: Roadway reconstruction.	1985/86	19,200	1987
SR 17- 23	(I880) Thornton Ave. to Tennyson Rd.: NB auxilary lane/ramp metering.	1988/89	1,969	TBD
SR 17- 32A	(I880) Alquire Rd to Industrial Parkway: Roadway reconstruction.	1984/85	1,913	1985
SR 17- 33A	(I880) Industrial Parkway to SR 92: SB auxilary lane/ramp metering.	1988/89	1,872	TBD
SR 17- 34A	(I880) Tennyson Rd. to SR 92: NB auxilary lane/ramp metering.	1988/89	1,470	TBD
SR 17- 34B	(I880) SR 92 to A St.: SB auxilary lane/ramp metering.	1988/89	2,272	TBD
SR 17- 34C	(I880) SR 92 to Washington Ave.: NB auxilary lane/ramp metering.	1988/89	7,491	TBD
SR 17- 38A	(I880) A St. to Marina Blvd.: SB auxilary lane/ramp metering.	1988/89	4,837	TBD
SR 17- 43A	(I880) Marina Blvd. to Davis St.: NB auxilary lane/ramp metering.	1988/89	2,028	TBD

Table 26 (con't)

County Route & Project #	Description	Fund Year*	Costs** ($000)	Estimated Completion Date
SR 17- 53	(I580) I80/I180 interchange: Interchange modification.	1986/87	47,031	1989
I 80- 66A	East end of San Francisco/Oakland Bay Bridge to Ashby Ave.: Eastbound High Occupancy Vehicle lane.	1987/88	39,000	1990
I 80- 66B	I80/I580/SR 17 interchange to S of University Ave.: High Occupancy Vehicle lane, additional lane.	1986/87	29,953	1989
I 80- 67A	Powell St. to Gilman St. and I980 at post mile 1.4: Ramp and roadway reconstruction.	1984/85	298	1985
I 580-152	Peralta St. to 0.9 miles east of San Francisco/Oakland Bay Bridge: High Occupancy Vehicle lanes and ramp revision.	1988/89	24,168	1990
Contra Costa County				
SR 17-232	I580-Central Ave. interchange: Interchange reconstruction.	1987/88	7,000	1988
SR 17-208	I580-S of Bayview Ave. to S of 47th St.: Freeway construction.	1984/85	686***	1986
SR 17-209	I580-S of 47th St. to Garrard Blvd.: Freeway construction.	1984/85	45,417	1987
SR 17-266	I580-23rd St. to Castro St.: Freeway construction.	1985/86	38,824	1988

Table 26 (con't)

County Route & Project #	Description	Fund Year*	Costs** ($000)	Estimated Completion Date
SR 17-267	I580-Cutting Blvd. to Garrard Blvd.: Freeway construction.	1986/87	34,554	1989
SR 17-268	I580-Canal Blvd. to Toll Plaza, Richmond/San Rafael Bridge: Freeway construction.	1986/87	43,870	1989
San Francisco				
US 101-595	Paul Ave. to Army St.: Develop auxilary lane.	1984/85	2,227	1985
San Mateo County				
US 101-693B	0.4 miles S of Woodside Rd. to Whipple Ave.: Roadway resurfacing.	1986/87	937	1987
US 101-701	Broadway to Colma Creek (portions there of): Roadway reconstruction.	1986/87	2,342	1988
US 101-709	South San Francisco Overhead to the San Francisco County Line: Roadway reconstruction.	1984/85	3,156	1985

Abbreviations and Footnotes:

*The fund year shown is the last year of the STIP period where the project is programmed funds.
**Amount allocated during/in the actual STIP period. Other funds may have already been allocated.
***Most of this project was programmed in prior fiscal years (i.e., before this STIP period).

Ave.=Avenue	Blvd.=Boulevard	I=Interstate	N=North	NB=Northbound
S=South	SB=Southbound	SR=State Route	St.=Street	TBD=To Be Determined

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Source: California Department of Transportation (Division of Highways & Programming), 1984 STIP (5-Year State Transportation Improvement Program), Sacramento, July, 1984, supplemented with information supplied by Caltrans District 4 staff.

As adopted by the CTC, the STIP spells out programmatically what highway construction projects Caltrans intends to implement. Like the RTIPs, it only shows project-specific allocations to those projects with a cost of over $250,000. Those with a lower cost are lumped together under a separate allocation for such "minor" projects. It also contains the fund allocations for toll bridge projects, local assistance projects in nonurbanized areas, and state-funded general aviation projects. Funding for mass transit projects which is subject to CTC approval, such as funds for Caltrans' San Francisco Peninsula Commute Service, is also included. The projects included in the 1984 STIP that may directly or indirectly affect San Francisco Bay ports ground access are listed in Table 26.

It should be remembered, however, that as a programmatic document, the STIP can only show what projects the State *intends* to implement, including their locations, descriptions, and projected costs. Changes in the amount of federal and state funds available for projects, environmental conditions, design studies, and actual project costs may affect if, when and how a project will be built. Nevertheless, the STIP still represents the State's intent to improve California's transportation system.

C. The Question of Funding...

The process exists for the state, the regions, local entities, and the ports, among others, to maintain and improve the San Francisco Bay region's port ground access network. However, the financial resources available to maintain the existing system, let alone make significant improvements, are severely constrained. Yet, how significant is the problem? How can the ports, and other interested parties, respond? These are the questions that are addressed in this report final section of the report.

1. The Dimensions of the Problem

This funding constraint question affects both the local and regional access networks, as well as the transit systems that could relieve some of the traffic demand pressure on both. Since the 1970's, many local governments have been experiencing a significant annual shortfall in the funds required to maintain their existing city street and county road networks. The reasons for this are two-prong. On the resource side, federal and state roadway funds that are allocated to local governments have been relatively stable, except in 1982 and 1983 when both federal and state fuel and vehicle fees were increased. Meanwhile, due to the passage of Proposition 13 in 1978, and the resultant increased competition for local funds, available local funds for city streets and county roads have declined over the last several years, when adjusted for inflation. On the expense side, roadway maintenance and construction costs have risen at rates above that for the economy as a whole, while in growing areas, the demand for new or improved facilities has continued. Taken as a whole, these problems have led to postponements in required new roadway construction, rehabilitation, and even in routine and preventative maintenance work.

Conditions on the regional highway network are significantly better, thanks in part to the previously mentioned increases in both the federal and state highway revenues. However, because of the same inflationary pressures and the current methods of financing transportation, similar problems are developing. Meanwhile, federal and state transit funding has been declining, in part due to the continuing efforts by the federal government to reduce or eliminate transit operational subsidies, and in part due to the structure of the state's transit funding mechanism. Further, current proposals put forth by the federal government, even if modified significantly by Congress, will lead to further operational fund cuts, and in sizable reductions in capital funds required for new transit equipment and facilities.

The magnitude of these problems have been estimated by several entities, including by MTC and Caltrans. According to a MTC study published in 1981, the annual region-wide shortfall (i.e., the annual shortage of funds required for an adequate preventative maintenance program) in fiscal year 1980/81 amounted to $101 million. The same report estimated that in 1981 $300 to $500 million would be required to restore those roads impacted by recurring maintenance funding shortfalls to an acceptable condition.[185] In a recent Caltrans analysis, the statewide annual preventative maintenance funding shortfall has been conservatively set at $840 million.[186]

On the regional access system, no preventative maintenance funding shortfall exists at the present time. However, according to the CTC's 1985 STIP Fund Estimate, statewide there is a projected $763 million shortfall in the state funds required to sustain existing 1984 STIP commitments, and to match all available federal highway funds expected to be available for the 1985 STIP.[187] In reaching a similar

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185 Metropolitan Transportation Commission and Alameda County Public Works Agency, Determining Bay Area Street and Road Maintenance Needs (Berkeley, August, 1981), as cited in California Department of Transportation (Division of Transportation Planning), Assessment of Resource Requirements for California City Streets, County Roads and State Highways (Sacramento, August 31, 1984), p. 58.

186 Ibid., p. v.

187 California Transportation Commission, 1985 STIP Fund Estimate (Sacramento, December 14, 1984), Exhibit A-2, p. 2.

conclusion in its draft System Planning report, Caltrans also indicated that even with significantly increased revenues, the level of service provided to users by the state highway system, particularly in urban areas, will decline by 1995.[188]

2. The Problem Solutions: Local Responses and Funding Options

These funding constraint dimensions lead to two conclusions regarding the maintenance and improvement of the ports' ground access systems. First, given present circumstances, in many cases the regional and local roadway networks will continue to deteriorate, at least in terms of the level of service provided to network users. Many of the necessary transportation network improvements required may be either delayed or postponed indefinitely. Second, because of these funding restraints, the ports, maritime interests, and other interested parties may have to intervene on behalf of these networks. Part of this intervention could include working with local, regional, state, and federal representatives on how and to what extent the transportation revenue base might be restructured. But given existing conditions and the current political climate, a greater financial participation

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[188]California Department of Transportation (Division of Transportation Planning), California State Highway System Plan Report (draft) (Sacramento, October 1984), p. iii.

by the ports and associated maritime industries may also have to take place.

Participation by the ports in financing port ground-access system improvements is not new. For example, recently the Port of Oakland participated in the funding of the reconstruction of Maritime Street, which serves its Outer Harbor terminals. At the same time, because of changes at the state and local level, opportunities for port and private financial involvement are also increasing. For example, under recent policy adopted by the California Transportation Commission, the cost of a new freeway interchange or interchange improvements that benefits primarily local interests must be borne or at least shared by those local interests. Depending on the level of the local cost-sharing, a necessary project can be programmed for construction, and/or its date of construction can at times be moved forward.

Funding contributions for this and other types of local and regional access system projects can be in many forms, and can come from several sources. The funding contributions can come in the form of direct cash grants, loans (in certain select cases), or in donated property (e.g., rights-of-way) and/or in-kind services. Funding sources available to the ports for such contributions can include normal ongoing revenues sources (wharfage fees, commercial property rentals income, etc.), as well as port revenue bonds (for capital improvements). Special assessment districts, such as the Richmond Redevelopment District, can also be established and/or used to raise funds to pay for necessary improvements to the local and regional port access networks.

In summary, the means and procedures do exist to maintain and improve the San Francisco Bay Area ports ground-access network. But with the complexity of the problems, solutions, and funding constraints, the maintenance and improvement of that network will require a combined effort, financially and otherwise, of the ports, and other private and public interests, at the federal, state, regional, and local level.

APPENDIX A

TABLES APPENDIX

Table A1

PORT TERMINAL SITE LIST IDENTIFIERS CROSS-REFERENCE

This table lists the port terminal site identifiers used in this study, cross-referenced to those used in the MTC/BCDC Seaport Plan (pp. 31-32). It is provided that the discussion of the port terminal site discussions in the two reports can be cross-referenced.

TERMINAL AND SITE NAME	ACCESS STUDY REFERENCE	SEAPORT PLAN REFERENCE
PORT OF ALAMEDA-ENCINAL TERMINALS		
Active Public Terminals		
Encinal Terminals, Berths 1 to 4	1	55D(E)
Encinal Terminals, Berth 5	1	55D(W)
Near-Term Development Sites		
Encinal Terminals, Berth 5	2	55D(W)
PORT OF BENICIA		
Active Public Terminal		
Port of Benicia	3	14A
Near-Term Development Site		
Port of Benicia	3	14A
PORT OF OAKLAND		
Active Public Terminals		
Outer Harbor		
Bay Bridge (Oakland Army) Terminal:		
Berth 10	4	49A
Berth 11	4	49B
Berth 12	4	49C
Berths #4-6, 8, 9		
- Sea Land Terminal, Berths 8 and 9	5	49D
- Public Container Terminal, Berth 6	5	49E
- Neptune Orient Lines Terminal, Berth 5	5	49E
- Maersk Line Terminal, Berth 4	5	50A
Oakland Container Terminal, Berth 2	6	50B
Seventh Street		
Matson Terminal	7	50D
Seventh Street Public Container Terminal	8	50E, 50F

TERMINAL AND SITE NAME	ACCESS STUDY REFERENCE	SEAPORT PLAN REFERENCE
Middle Harbor/Inner Harbor		
U.S. Lines Terminal	10	52B
American President Lines Terminal	10	52C
Howard Container Terminal	12	52E, 52F
Ninth Avenue Terminal	14	53D
Near-Term Development Sites		
Outer Harbor		
Bay Bridge (Oakland Army) Terminal (see note 1)		
Berth 11	4	49B
Berth 12	4	49C
Seventh Street Complex		
Carnation/Albers Mill-Kaiser Steel Yard	9	50C, 51A
Middle Harbor/Inner Harbor		
Western Pacific Mole-East	see note 2	52A(E)
Schnitzer Steel	11	52D
Ship Repair Area	12	53C
PORT OF REDWOOD CITY		
Active Public Terminals		
Port of Redwood City Wharves 1 and 2	15	62E
Port of Redwood City Wharf 3	15	62D
Port of Redwood City Wharf 5	15	62C
Near-Term Development Sites		
Port of Redwood City Wharf 4	16	62D(W)
Leslie Salt Terminal	17	62A
Ideal Cement	18	62F
PORT OF RICHMOND		
Active Public Terminals		
Richmond Terminal #4	19	25B
Richmond Terminal #1	20	28A
Levin Metals	21	29A
Richmond Terminals #5, 6, 7	22	29B
Arco Tanker Dock	23	29C
Union Oil Tanker Dock	23	30A
Texaco Wharf	25	32B
Parr Bulk Commodity Wharf	26	32C
Time Oil Wharf	26	32D
Richmond Terminal #3	27	33A

TERMINAL AND SITE NAME	ACCESS STUDY REFERENCE	SEAPORT PLAN REFERENCE
Near-Term Development Sites		
Richmond Shipyard #3/Levin Metals	21	29A/D
Santa Fe Channel-Northwest Site	24	31A(N)
ATSF Intermodal Yard	24	see note 3
Richmond Terminal #3:		
- North of existing terminal	27	33A(N)
- South of existing terminal	27	33A(S)
PORT OF SAN FRANCISCO		
Active Public Terminals-Limited Term		
Piers 15/17	28	39A
Piers 27/29	28	38A
Pier 26	29	42C
Piers 30/32	30	42B
Active Public Terminals		
Pier 48	31	43A
Mission Rock Terminal (Pier 50)	32	43B
Pier 70	34	45A
San Francisco Container Terminal-North (Pier 80)	36	46A, 46B, 46C
Pier 90 (San Francisco Grain Terminal) and Pier 92	37	47A
San Francisco Container Terminal-South		
- Pier 94	39	47B
- Pier 96	39	47C
Near-Term Development Sites		
Pier 52 to 64	33	44A
Pier 70	34	45A
Western Pacific Railroad Ferry Slip	35	46D
Pier 94-North	38	47B(N)
SELBY		
Active Public Terminals		
None		
Near-Term Development Sites		
Selby	40	12D/E

Note 1: This study recommends this site be considered as a near-term port terminal development site, even though it is under military control. See page 75.

Note 2: This study recommends this site not be included as a near-term port terminal development site. See pages 75, 77.

Note 3: This study recommends this site be included as a near-term port terminal development site. See pages 74, 75.

Table A2

MTC/BCDC SEAPORT PLAN REFERENCE DOCUMENTS

Metropolitan Transportation Commission, Regional Transportation Plan for the Nine County San Francisco Bay Area.

Metropolitan Transportation Commission, Regional Port Planning Project, Phase I, Report and Appendices, October 1977.

Metropolitan Transportation Commission & San Francisco Bay Conservation and Development Commission, MTC/BCDC port planning project, Phase II working papers:

- Working Paper #1, User's Manual for Data Base, July 1978.
- Working Paper #2, Petroleum Terminal Analysis, July 1978.
- Working Paper #3, Harbor Capacity Analysis, July 1978.
- Working Paper #4, Overview of Economic Impact Analysis Relevant to Regional Port Planning, July 1979.
- Working Paper #5, Channel Deepening Analysis, September 1978.
- Working Paper #6, Identification of Feasible Marine Terminal Sites, February 1979.
- Working Paper #7, Environmental Analyses for Potential Marine Terminal Sites, May 1979.
- Working Paper #8, Land Use Compatibility Analysis, July 1980.
- Working Paper #9, An Investigation of Marine Terminal Site Selection by Steamship Lines: A Case Study of the San Francisco Bay Area, February 1980.
- Working Paper #10, Analysis of Future Demand for Marine Terminal Facilities, May 1981.
- Marine Terminal Traffic Generation Manual, June 1980.
- Working Paper #11, Ground Access to Bay Area Ports: A Transportation Systems Management Approach, September 1980.
- Working Paper #12, Ground Access Analysis, November 1980.
- Working Paper #13, Evaluation of Marine Terminal Sites: Composite Site Grouping, July 1980.
- Working Paper #14, Evaluation of Military-Owned sites, July 1981.

Metropolitan Transportation Commission & San Francisco Bay Conservation and Development Commission, MTC/BCDC Port Planning Project, Final Technical Report, April 1982.

Metropolitan Transportation Commission & San Francisco Bay Conservation and Development Commission, San Francisco Bay Area Seaport Plan, December, 1982.

San Francisco Bay Conservation & Development Commission, San Francisco Bay Plan, July, 1979.

U.S. Army Corps of Engineers, San Francisco Bay Area In-Depth Study: Waterborne Commerce Projections and Commodity Flow Analysis, September, 1976.

U.S. Army Corps of Engineers, San Francisco Bay Area Cargo Forecast, June 1981.

U.S. Maritime Administration, Port Handbook for Estimating Marine Terminal Cargo Handling Capability, September 1979.

Adapted from Seaport Plan, pp. 49-50.

Table A3

COMMODITY CLASSIFICATION FOR DOMESTIC WATERBORNE COMMERCE

(as prepared by the U.S. Office of Management and Budget, and used by various federal agencies, including the U.S. Army Corps of Engineers)

Code No.	Item Name
	Group 01-Farm Products
0101	Cotton, raw
0102	Barley and rye
0103	Corn
0104	Oats
0105	Rice
0106	Sorghum Grains
0107	Wheat
0111	Soybeans
0112	Flaxseed
0119	Oilseeds, not elsewhere classified
0121	Tobacco, leaf
0122	Hay and Fodder
0129	Field crops, not elsewhere classified
0131	Fresh fruits
0132	Bananas and plantains
0133	Coffee, green and roasted (including instant)
0134	Cocoa beans
0141	Fresh and frozen vegetables
0151	Live animals (livestock) except zoo animals, cats, dogs, etc.
0161	Animals and animal products, not elsewhere classified
0191	Miscellaneous farm products
	Group 08-Forest Products
0841	Crude rubber and allied gums
0861	Forest products, not elsewhere classified
	Group 09-Fresh Fish and Other Marine Products
0911	Fresh fish, except shellfish
0912	Shellfish, except prepared or preserved
0913	Menhaden
0931	Marine shells, unmanufactured
	Group 10-Metallic Ores
1011	Iron ore and concentrates
1021	Copper ore and concentrates
1051	Bauxite and other aluminum ores and concentrates
1061	Manganese ores and concentrates
1091	Nonferrous metal ores and concentrates, not elsewhere classified
	Group 11-Coal
1121	Coal and lignite
	Group 13-Crude Petroleum
1311	Crude petroleum
	Group 14-Nonmetallic Minerals, Except Fuels
1411	Limestone flux and calcareous stone
1412	Building stone, unworked
1442	Sand, gravel and crushed rock
1451	Clay, ceramic and refractory materials
1471	Phosphate rock
1479	Natural fertilizer materials, not elsewhere classified
1491	Salt
1492	Sulphur, dry
1493	Sulphur, liquid
1494	Gypsum, crude and plasters
1499	Nonmetallic minerals, except fuels, not elsewhere classified
	Group 19-Ordnance and Accessories
1911	Ordnance and accessories
	Group 20-Food and Kindred Products
2011	Meat, fresh, chilled, or frozen
2012	Meat and meat products prepared or preserved, including canned meat products
2014	Tallow, animal fats and oils
2015	Animal by-products, not elsewhere classified
2021	Dairy products, except dried milk and cream
2022	Dried milk and cream
2031	Fish and fish products, including shellfish, prepared or preserved
	Group 20-Food and Kindred Products
2034	Vegetables and preparations, canned and otherwise prepared and preserved
2039	Fruits, and fruit and vegetable juices, canned and otherwise prepared or preserved
2041	Wheat flour and semoline
2042	Animal feeds
2049	Grain mill products, not elsewhere classified
2061	Sugar
2062	Molasses
2081	Alcoholic beverages
2091	Vegetable oils, all grades; margarine and shortening
2092	Animal oils and fats, not elsewhere classified, including marine
2094	Groceries
2095	Ice
2099	Miscellaneous food products
	Group 21-Tobacco Products
2111	Tobacco manufactures
	Group 22-Basic Textiles
2211	Basic textile products, except textile fibers
2212	Textile fibers not elsewhere classified
	Group 23-Apparel and Other Finished Textile Products Including Knit
2311	Apparel and other finished textile products, including knit
	Group 24-Lumber and Wood Products Except Furniture
2411	Logs
2412	Rafted logs
2413	Fuel wood, charcoal, and wastes
2414	Timber, posts, poles, piling, and other wood in the rough
2415	Pulpwood, log
2416	Wood chips, staves, moldings, and excelsior
2421	Lumber
2431	Veneer, plywood, and other worked wood
2491	Wood manufactures, not elsewhere classified
	Group 25-Furniture and Fixtures
2511	Furniture and fixtures
	Group 26-Pulp, Paper and Allied Products
2611	Pulp
2621	Standard newsprint paper
2631	Paper and paperboard
2691	Pulp, paper and paperboard products, not elsewhere classified
	Group 27-Printed Matter
2711	Printed matter
	Group 28-Chemicals and Allied Products
2810	Sodium hydroxide (caustic soda)
2811	Crude products from coal tar, petroleum, and natural gas, except benzene and toluene
2812	Dyes, organic pigment, dyeing and tanning materials
2813	Alcohols
2816	Radioactive and associated materials, including wastes
2817	Benzene and toluene, crude and commercially pure
2818	Sulphuric acid
2819	Basic chemicals and basic chemical products, not elsewhere classified
2821	Plastic materials, regenerated cellulose and synthetic resins, including film, sheeting, and laminates
2822	Synthetic rubber
2823	Synthetic (man-made) fiber
2831	Drugs (biological products, medicinal chemicals, botanical products and pharmaceutical preparations)
2841	Soap, detergents, and cleaning preparations; perfumes, cosmetics and other toilet preparations
2851	Paints, varnishes, lacquers, enamels, and allied products
2861	Gum and wood chemicals
2871	Nitrogenous chemical fertilizers, except mixtures
2872	Potassic chemical fertilizers, except mixtures
2873	Phosphatic chemical fertilizers, except mixtures

Code No.	Item Name
	Group 28-Chemicals and Allied Products
2876	Insecticides, fungicides, pesticides, and disinfectants
2879	Fertilizers and fertilizer materials, not elsewhere classified
2891	Miscellaneous chemical products
	Group 29-Petroleum and Coal Products
2911	Gasoline, including additives
2912	Jet fuel
2913	Kerosene
2914	Distillate fuel oil
2915	Residual fuel oil
2916	Lubricating oils and greases
2917	Naphtha, mineral spirits, solvents, not elsewhere classified
2918	Asphalt, tar, and pitches
2920	Coke, including petroleum coke
2921	Liquefied petroleum gases, coal gases, natural gas, and natural gas liquids
2951	Asphalt building materials
2991	Petroleum and coal products, not elsewhere classified
	Group 30-Rubber and Miscellaneous Plastics Products
3011	Rubber and miscellaneous plastic products
	Group 31-Leather and Leather Products
3111	Leather and leather products
	Group 32-Stone, Clay, Glass and Concrete Products
3211	Glass and glass products
3241	Building cement
3251	Structural clay products, including refractories
3271	Lime
3281	Cut stone and stone products
3291	Miscellaneous nonmetallic mineral products
	Group 33-Primary Metal Products
3311	Pig iron
3312	Slag
3313	Coke (coal and petroleum), petroleum pitches and asphalts, and naphtha and solvents
3314	Iron and steel ingots, and other primary forms, including blanks for tube and pipe, and sponge iron
3315	Iron and steel bars, rods, angles, shapes and sections, including sheet piling
3316	Iron and steel plates and sheets
3317	Iron and steel pipe and tube
3318	Ferroalloys
3319	Primary iron and steel products, not elsewhere classified including castings in the rough
3321	Nonferrous metals primary smelter product, basic shapes, wire castings and forgings, except copper, lead, zinc and aluminum
3322	Copper and copper alloys, whether or not refined, unworked
3323	Lead and zinc including alloys, unworked
3324	Aluminum and aluminum alloys, unworked

Code No.	Item Name
	Group 34-Fabricated Metal Products, Except Ordnance, Machinery and Transportation Equipment
3411	Fabricated metal products, except ordnance, machinery, and transportation equipment
	Group 35-Machinery, Except Electrical
3511	Machinery, except electrical
	Group 36-Electrical Machinery, Equipment and Supplies
3611	Electrical machinery equipment and supplies
	Group 37-Transportation Equipment
3711	Motor vehicles, parts and equipment
3721	Aircraft and parts
3731	Ships and boats
3791	Miscellaneous transportation equipment
	Group 38-Instruments, Photographic and Optical Goods, Watches and Clocks
3811	Instruments, photographic and optical goods, watches and clocks
	Group 39-Miscellaneous Products of Manufacturing
3911	Miscellaneous products of manufacturing
	Group 40-Waste and Scrap Materials
4011	Iron and steel scrap
4012	Nonferrous metal scrap
4022	Textile waste, scrap, and sweepings
4024	Paper waste and scrap
4029	Waste and scrap, not elsewhere classified
	Group 41-Special Items
4111	Water
4112	Miscellaneous shipments not identifiable by commodity
4113	LCL freight
4118	Materials used in waterway improvement, Government materials
4119	Empty containers
9999*	Department of Defense controlled cargo and special category items

*Cargoes exported on Department of Defense controlled vessels (other than goods for the use of U.S. Armed Forces abroad) and non-Department of Defense shipments of military component items (abbreviated SCi) for which commodity detail is not furnished to the Corps of Engineers.

Source: U.S. Army Corps of Engineers (Waterborne Commerce Statistics Center), Waterborne Commerce of the United States: Calendar Year 1981; Part 5: National Summaries, (Washington, 1983), pp. IX-X.

Table A4

ANTICIPATED PORT DEVELOPMENT THROUGH 1985: 1980 MTC/BCDC PROJECTIONS (prepared for ground transportation analysis)

PORT	PLANS FOR MODERNIZATION AND/OR EXPANSION	ESTIMATED YEAR OF COMPLETION	CARGO THROUGHPUT CAPABILITY (SHORT TONS/YEAR
Oakland	• Howard Container Terminal: former breakbulk operation being redeveloped into a two berth container facility having a gross area of 43 acres.	1981	700,000
	• Oakland Army Base - Berths 11 and 12: the port is planning to develop a two berth container terminal on some 50 acres at and adjacent to the Oakland Army Base; the port's goal is to begin construction in 1981.	1983	800,000
	• Kaiser Steel Corporation Yard: the port is planning a one berth, 15 acre container terminal at this site adjacent to the Seventh Street Terminal; active planning and design is expected to begin in 1981.	1985	400,000
San Francisco	• Piers 94/96: the port plans greater utilization of the existing container terminal.	1981	1,650,000[2]
	• Piers 94/96 expansion: the port plans to develop three additional container berths and 75 acres of additional back-up land at this location.	1985	1,650,000
Richmond	• Richmond Container Terminal:		
	Phase I - initial development of one berth	Complete	600,000
	Phase II - add second container berth with one additional container crane and 8 acres of additional back-up land	1981	600,000
	Phase III - add crane equipment (one container crane and yard cranes) and 25 acres of additional back-up land	1982	800,000
	Phase IV - develop two additional container berths; this will complete the 100 acre container complex.	1984	2,000,000
Encinal Terminals	• Berth 6 Relocation: the existing liquid bulk wharf, Berth 6, will be relocated to the northwest side of Alaska Basin at a new wharf facility adjacent to Berth 5; also, the new Berth 6 will join Berth 5 in serving the container terminal.	1983	310,000[3]
	• Berth 4 Modernization: Berth 4 will be modernized to serve break bulk cargoes.	1985	No Increase Over Existing
	• Berth 5 Modernization: Berth 5 will be modernized to better serve container cargoes.	1985	310,000
Benicia	• Expansion: the port tentatively plans to add 3 new berths adjacent to existing berths for general, bulk and container cargoes	1983	480,000[4]
	• Modernization: the port is considering a possible modernization of existing berths and a 50 acre fill behind existing wharf for possible two-berth container terminal.	1985	800,000
Redwood City[1]	• Volume Cargo Distribution Terminal: new 9 acre terminal at existing Berth 5 to handle lumber, paper products and construction materials.	1980[5]	160,000
	• Rehabilitation: Berths 1 and 2 will be rehabilitated in order to facilitate intensified use for cement and cement clinker - 250,000 tons per year.	1980[5]	250,000
	• New Dry Bulk Terminal: a new 8 acre dry bulk terminal, including a ship unloader at new Berth 4, will be developed to handle imported cement clinker to be processed at the port; Berth 4 will be extended to connect with Berth 3.	1982	420,000

[1] Berth 3 will be reconstructed in 1981 but this is not expected to intensify the existing use.
[2] This throughput capability represents full utilization of existing facilities.
[3] This throughput capability is for the container handling facility only.
[4] This throughput capability is for automobiles only.
[5] The port originally estimated completion in 1980; however, at this writing, construction has not yet been initiated

Source: Seaport Plan Final Technical Report, p. 210. Original source: MTC/BCDC Port Planning Project Working Paper #12, Ground Access Analysis (Berkeley, November, 1980), p. 12-59, prepared by Wilbur Smith and Associates.

Table A5

TRANSPORTATION ACTIONS OF REGIONAL CONCERN

AREA	PROJECT	TIME FRAME SHORT RANGE	TIME FRAME MEDIUM RANGE	ESTIMATED COST (1000's of 1979 $)	TYPE OF PROJECT	IMPLEMENTING AGENCY	MTC ROLE	COMMENTS	SEAPORT COMMITTEE PRIORITY[1]
SAN FRANCISCO	1. Monitor land use development and traffic growth in area surrounding Piers 94/96; undertake study when necessary to determine specific improvements required.		X	N/A	Monitor/ Study	City of San Francisco	Coordination/ Participation	A study for the City of San Francisco suggests substantial land use development may occur in the area surrounding this terminal, but timing and magnitude is uncertain.	M
	2. Improve geometrics of rail access to Piers 94/96	X		$2,200	Rail Improvement	Port of San Francisco	Review	Project could reduce truck travel & increase utilization of Piers 94/96. Project previously endorsed by Seaport Committee.	H
OAKLAND/ ALAMEDA	1. Study traffic on Seventh St., Maritime St. & Southern Pacific Road to develop solutions to future congestion in the area caused by Bay Area port growth. As part of a comprehensive investigation of traffic in this area, review: • City of Oakland's study of Maritime St. and incorporate recommendations, as appropriate. • City of Oakland's preliminary plans for improving Southern Pacific Road between 7th St. & Middle Harbor Road, and incorporate as appropriate. • Feasibility of parking controls on 7th Street.	X		N/A	Study	Port of Oakland/ City	Coordination/ Participation	These streets are critical port access routes of regional concern. While the City has studied two streets in this area, comprehensive review of traffic circulation is indicated by the MTC/BCDC Port Planning Project. Previous City studies indicate a cost of over $5 million to improve Maritime Street and Southern Pacific Road.	H

[1] L-desireable; M-more desirable; H-most desirable

[2] Portion or all of roadway not in the Federal-Aid System (either FAU, FAP or FAI)

Source: Seaport Plan Final Technical Report, pp. 230-233

Table A5 (Continued)

TRANSPORTATION ACTIONS OF REGIONAL CONCERN

AREA	PROJECT	TIME FRAME SHORT RANGE	TIME FRAME MEDIUM RANGE	ESTIMATED COST (1000's of 1979 $)	TYPE OF PROJECT	IMPLEMENTING AGENCY	MTC ROLE	COMMENTS	SEAPORT COMMITTEE PRIORITY[1]
OAKLAND/ ALAMEDA (cont'd)	2. Improve turning radii at Harrison & 7th Sts., and provide exclusive lane on Harrison for right-turning vehicles from Alameda.		X	70	TSM	City of Oakland	Review/ Program Funds	Project will help truck turning movements from Alameda. This intersection was identified by the San Leandro Bay Transportation Study as a congestion point. City of Oakland does not believe a significant problem exists at this intersection.	L
	3. Construct segments of Patton Way and Atlantic Ave. extension, Alameda that would serve Encinal Terminals.	X		$7,000-8,000	Road Improvement	City of Alameda	Review/ Program Funds	The City of Alameda is currently planning these projects. The access analysis for the MTC/BCDC port planning project assumed that the segments of these two roads serving Encinal Terminals would be constructed.	L
	4. Maintain truck route designation for Buena Vista Ave., Alameda.	X		N/A	TSM	City of Alameda	---	The City of Alameda has given truck route designation to both Buena Vista Ave. and Clement Ave. The MTC/BCDC port planning project identified a need to make substantial improvements (approx. $6 million) to Clement Ave. if truck route designation is removed from Buena Vista Ave.	M
	5. Provide a left lane & toll booth for trucks at Bay Bridge Toll Plaza.	X		N/A	TSM	Caltrans	Review/ Program Funds	Trucks from the south must cross many lanes of traffic at present. As port activity increases, port-related truck traffic could cause further congestion at the Toll Plaza.	M

Table A5 (Continued)

TRANSPORTATION ACTIONS OF REGIONAL CONCERN

AREA	PROJECT	TIME FRAME SHORT RANGE	TIME FRAME MEDIUM RANGE	ESTIMATED COST (1000's of 1979 $)	TYPE OF PROJECT	IMPLEMENTING AGENCY	MTC ROLE	COMMENTS	SEAPORT COMMITTEE PRIORITY[1]
RICHMOND	1. Develop rail yard at Richmond Container Terminal.	X		$ 2,100	Rail Improvement	Port	Review	Project could reduce truck travel. Project previously endorsed by Seaport Committee.	H
	2. Improve rail access at Meeker Ave. & Hoffman Blvd.	X		N/A	Rail Improvement	Railroads/ Caltrans	Review	Project will improve rail access to Richmond Container Terminal and is part of currently programmed Hoffman Freeway project.	H
	3. Improve Harbor Way[2] to accommodate increased truck traffic from container terminal development.	X		2,500	Road Improvement	City of Richmond	Review	Existing Harbor Way is unsuitable for increased truck traffic resulting from expansion of container terminal. City is currently seeking funding for this project.	L
	4. Construct Hoffman Freeway.	X		100,000	Road Improvement	Caltrans	Review/ Program Funds	Port growth at Richmond and other ports will cause a significant increase in congestion on existing Hoffman Blvd. The Hoffman Freeway will eliminate this problem.	H
	5. Provide temporary solution for westbound, left-turning port traffic from Hoffman Blvd. to Harbor Way. Involves: • Purchase by Caltrans of northwest corner of intersection. • Construction of loop road on property by City to remove left turning traffic from existing Hoffman Blvd.	X		50	TSM	Caltrans/ City of Richmond	Review/ Program Funds	Hoffman Blvd. is an important port access route of regional concern that will exceed its capacity due to marine terminal development at Richmond & other ports. While completion of the Hoffman Freeway will eventually solve the problem, timing of completion is unknown. The proposed interim project would involve early acquisition by Caltrans of property that must be purchased for the Hoffman Freeway.	H

Table A5 (Continued)

TRANSPORTATION ACTIONS OF REGIONAL CONCERN

AREA	PROJECT	TIME FRAME SHORT RANGE	TIME FRAME MEDIUM RANGE	ESTIMATED COST (1000's of 1979 $)	TYPE OF PROJECT	IMPLEMENTING AGENCY	MTC ROLE	COMMENTS	SEAPORT COMMITTEE PRIORITY[1]
REDWOOD CITY	1. Improve Harbor Blvd.[2]		X	$ 2,140	Road Improvement	Port/City of Redwood City	Review	Improvements may be necessary to accommodate trucks, but are not required for capacity reasons.	L
BENICIA	None								
REGION-WIDE	1. Coordinate development of the ground transportation system with proposed port development.	Annual Review		N/A	Coordi-nation	Ports/MTC/Cities/Caltrans	Lead	Proposed port development should be reviewed annually; the adequacy of the ground transportation system should be evaluated; and improvements proposed as appropriate.	H
	2. Encourage port operators, trucking companies, marine terminal operators, and railroads to participate in MTC's Commute Alternatives Program.	X		N/A	TSM	MTC/Ports/Truckers/Marine Terminal Operators/Railroads	Lead	Could help reduce peak period congestion.	H
	3. Develop & distribute Bay Area port access maps, and study adequacy of freeway signing to the ports.	X		N/A	TSM	MTC/Ports/Caltrans/Cities/Truckers	Lead	Coordinating the development of maps, together with a review of signing to the ports would produce a more thoughtful plan that could reduce confusion, energy consumption, and possibly make better use of existing ground transport facilities.	M

[1]L-desireable; M-more desirable; H-most desirable
[2]Portion or all of roadway not in the Federal-Aid System (either FAU, FAP or FAI)

Source: Seaport Plan Final Technical Report, pp. 230-233

Table A6

TRANSPORTATION RECOMMENDATIONS FOR LOCAL ACTION

AREA	RECOMMENDATION	RESPONSIBLE AGENCIES	COMMENTS
SAN FRANCISCO	1. Study loading areas along Army St. for conflicts with port traffic.	Port/City	Trucks at loading areas block Army Street causing congestion and conflicts.
	2. Study the closing of Berry St. east of Third Street.	City	Part of Northeastern Waterfront Plan.
	3. Coordinate among the railroads to devise a solution to railcar switching at Pier 50.	Port of San Francisco/ Railroads	Switching among certain railroads currently impossible.
	4. Study ways to reduce rail/truck conflicts at Illinois and Army Streets.	Port, City & Railroads	Traffic flow is impeded by current conflicts.
OAKLAND/ ALAMEDA	1. Renumber gates at Port of Oakland Terminals.	Port of Oakland	Could reduce trucker confusion & possibly truck travel.
	2. Study southern access/egress to Encinal Terminals, including Fruitvale Ave. interchange, High St. interchange & intersection, and Clement Ave.	Caltrans/City of Oakland/ City of Alameda	Freeway access/egress to Alameda in this area is complicated. Both Clement Avenue and Buena Vista Avenue are currently truck routes. City of Oakland is currently designing improvements to High St. intersection (construction cost over $1 million).
RICHMOND	None		
REDWOOD CITY	1. Rename Harbor Blvd. to avoid confusion with another Harbor Blvd. further north on Rt. 101.	City of Redwood City	Project will reduce confusion; city plans to make this change in 1982.
	2. Study signal timing on major truck routes serving port.	City of Redwood City	
	3. Study relocation of Southern Pacific Railroad access to the port.	S.P. Railroad/ Port	
BENICIA	1. Designate city truck routes.	City of Benicia	Project could reduce unnecessary truck travel.

Source: Seaport Plan Final Technical Report, p. 227.

Table A7

GOODS MOVEMENT RECOMMENDATIONS FOR INDUSTRY ACTION

1. Coordinate shipping schedules among the railroads, steamship lines and trucking companies.

2. Develop queuing lanes for trucks waiting to be processed at marine terminals.

3. Secure and develop land for container leasing companies to share space for equipment.

4. Improve record-keeping procedures for inventory control of containers and chassis at marine terminals and intermodal rail yards.

5. Improve communication between shippers and truckers. This could be accomplished by:

   a. Developing a standardized documentation system for use by truckers to identify what is to be picked up at the marine terminal;

   b. Developing staging areas near marine terminal gates for truckers to communicate via telephone with shipper.

6. Improve the efficiency of the weigh-billing process at entrances to intermodal rail yards.

Source: Seaport Plan Technical Report, p. 228. Generally, those actions which the ports can affect directly are being implemented. Those which would require significant trucking industry cooperation and interaction, are the furthest away from implementation; given both industry members' numbers and competitive considerations.

APPENDIX B

INTERNATIONAL TRADE FACTORS

In the consideration of waterborne trade flowing through San Francisco Bay's ports, it is important to note the factors involved in the generation of that trade flow, for it's the movement and transfer of this trade that leads to the port-related environmental, land-use, and particularly the ground access network impacts in which we are interested.

The factors influencing world trade volumes can be split into two admittedly arbitrary, interrelated groupings, one economic, the other geographical/social. The role of these factors can also be understood from at least three different perspectives, world, national, and/or regional. The most prominent factors are reviewed below:

Economic

- Economic strength: Compared with the other factors, this one is the most critical, for the ability of a nation to import and export rests on the economic strength of the nation itself. Other factors being equal, those countries experiencing positive increases in their output of goods and services (as generally measured by the nation's gross national product or

GNP) will also experience increases in their international trade. In their report, the consultants assumed that the U.S. will experience a 2.7 percent annual increase in its GNP between 1977 and 1990 (2.0 percent annually thereafter), and imply that the Pacific Basin Nations will lead the world in economic growth.[1]

- Currency valuation: Much has been said about the rise in the value of the dollar. As a general rule, as the value of any country's currency changes, the volume of its exports change inversely, and the volume of imports changes directly with the direction of movement in its currency.

However, the case of the change in the value of the U.S. dollar is fairly complex. In an analysis carried in the Los Angeles Times during 1984, it was pointed out that while the dollar has risen in value against foreign currencies by an average of almost 60 percent during the last three and one half years, this was preceded by a fall of the value of the dollar of about 45 percent over the previous decade, with most of that between 1977 and late 1980.[2] Thus, in a monthly

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[1]San Francisco Bay Area Cargo Forecast, p. 55.

[2]Tom Redburn, "Dollar: Too Strong for Its Own Good," Los Angeles Times, March 24, 1984, p. 20.

analysis carried by the U.S. Department of Agriculture's Agricultural Outlook, when weighted by those countries buying U.S. agricultural products, the value of the dollar in April 1984 was actually 5.1 percent less when compared to an April 1971 base value of the dollar (a period when the dollar exchange rate was fairly high and fixed during the Nixon Administration).[3] Finally, its value internationally interplays with other currencies, so that the effect of its rise on U.S. international trade has been relatively insignificant with countries experiencing high inflation (Israel), significantly so with countries with low inflation and/or tight monetary controls (Japan).

Nevertheless, the dollar's recent rise is having a significant effect on Pacific Coast trade trends generally, and those of the Bay Area in particular. Since much of the forecasting for the Seaport Plan was done during a period of weakening dollar values, in a trade environment which was export-biased, the forecasts for individual commodities, and particularly grain, may be too optimistic. This situation is discussed in the main body of this report.

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[3] U.S. Department of Agriculture (Economic Research Service), Agricultural Outlook, June 1984, p. 42.

- Trade limitations: These are factors which restrict the free flow of trade. There are three subgroups:

  - "Financial restraints" include large and continuing negative foreign trade balances, shortage of capital, excessive foreign debt, and the like. Often seen together, they impair a country's ability to import, and burden some countries to export greater levels of their gross national product, even at the cost of damaging a country's long-term economic stability.

  - "Trade restraints", on the other hand, generally restrict the inflow of imports. Indeed, they exist sometimes to prevent the buildup of foreign debt loads now facing many Latin American and African countries. More often than not, though, these limitations, such as tariffs, quotas, or negotiated "voluntary restraints" (with the exporting country) exist to protect industries of the importing country (e.g., the voluntary restraints on the import of Japanese cars to the U.S.).

  - "Subsidies", either in the form of direct price supports, or indirect means such as interest-free trade financing, distort and thus limit trade patterns by giving a country's export commodity (or domestic product) an unfair advantage over what would be achieved under free market conditions. A good example of this is Japan's support of some of its agricultural industries, through both quotas and subsidies, which act to reduce agricultural imports, including those from the U.S.

- Transportation network state: The extent and current operational status of a country's transportation systems influences world trade, by enhancing or limiting the volumes of trade that can be moved over a certain route, at a certain speed, at a certain price. For U.S. ports, the substantial increase in landbridge and mini landbridge cargo volumes has developed, in part due to the increasing ability of the U.S. railroads to move containers as unit trains and/or on express schedules at costs competitive with all water, Panama Canal shipping. On the other hand, many "third world" countries are handicapped by the lack of good highway and rail networks. This problem affects Western countries, though, as well. The lack of rail capacity (cars, line capacity), particularly on the western segments of its rail network, led Canadian growers to turn down grain export orders in 1977/78, and caused the country to lose grain export market share throughout the 1970s.[4]

Geographical/Social

- Development/growth patterns: This is the most prominent of the social factors. This concept essentially says that a country's ability to export, or its propensity to import an array of goods and services, can be explained by its development status and pattern. Further, it holds that there will be corresponding changes in a country's international trade, as its development status changes over time.

  It is held by some that these development patterns can be described as tiers, with countries falling into the tier that most closely describes its development status. Based on several sources, such a tier structure might be described as follows:

  - Undeveloped: Malnutrition, high birth and mortality rates, economically depressed. These are the poorest countries of the world, such as Bangladesh and

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[4]U.S. Department of Agriculture (Economic Research Service), "Canada's New Rail Law: Effects on U.S. Trade," Agricultural Outlook, A097 (April 1984), p. 21.

Somalia. Their imports are dictated by the need to survive, i.e., food and building materials. Their exports are what the land and/or the culture can easily supply, without the help of energy-based technology.

- Resource suppliers: Coal and oil, copper and bauxite. These are the countries, such as Peru, that supply the industrial world with its raw materials. Their imports are dictated by those items needed to produce and refine raw materials. Given their resources, they hold the potential for rapid economic and trade changes, as the price of raw materials swing, and as technology and capital are made available to them.

- Industrial societies: Steel and ships, autos, textiles, and consumer electronics. These are the producer countries, such as those of the Pacific Rim: Japan, Korea, Taiwan, and Hong Kong. They export much of the physical hardware of society, and import both the resources and technologies required for production. They are characterized as booming, upward-moving societies, with low labor costs, rising productivity, and sizable trade surpluses.

- Service/information societies: Aircraft and computers, banking services and medical/scientific research. These include such countries as Sweden, Switzerland, and the United States. These societies exhibit such characteristics as high per capita incomes and education levels, sophisticated technology but aging populations. Despite efforts to the contrary, they find themselves increasingly importing their basic physical hardware, but their exports are their knowledge, services and technologies which are designing, moving, funding, and shaping the world of tommorrow.

While being an over, gross simplification of both the complexity and diversity of world development patterns (indeed, one can argue that most countries are actually in several tiers at the same time), it is nevertheless a good basis for understanding how and why international trade patterns have and will change. Through the concept, such events as the explosive growth in international trade between the nations of the Pacific Basin (including between the United States and Canada, and Japan, Korea, Taiwan, Hong Kong, China and Singapore) is more understandable and less mystifying.

- Population - age, size, growth and distribution: As noted above, the population structure of a nation is important. A nation with a high dependency ratio (i.e., for many countries with this situation, a high number of children supported by those working), for example, will demand greater amounts of goods required for survival--food, building materials, textiles. Countries experiencing high population growth not only need these basics, but on the whole, have less resources to buy (import) consumer and luxury commodities. Those with aging populations, on the other hand, are more likely to demand these kinds of items. Distribution impact on trade becomes important when a nation's population (or a region's population distribution) is in midst of change. For example, at least part of the reason for the growth in mini landbridge cargos, and the shift of trade in general to the Pacific Coast ports, has been the rapid growth of population of many southern and western states, versus the rest of the nation. For another, the population growth in California's central and northern counties bodes well for the continued development of the Bay Area ports.

- Climatic conditions: Although not necessarily a geographical factor that fits into this grouping, these conditions nevertheless play a major role in yearly agricultural trade patterns. For example, excellent weather conditions contributed to near record grain crops in Russia, and record grain and cotton crops in China in 1982, thus reducing their demand for U.S. crops. On the other hand, the continuing droughts in the sub-Saharan and southern regions in Africa in recent years has caused the import demand for grain crops there to remain high overall.

These groupings are but a surface skimming of the factors influencing international trade. Depending on the nation, they can either be playing a significant role (e.g., U.S. economic strength contributing to high dollar values and high import volumes), or insignificant. But it is from the interaction of these and other factors that results in international trade.

APPENDIX C

ABBREVIATIONS AND GLOSSARY

1. ADT: Average Daily Traffic.

2. ATSF: Atchison, Topeka and Santa Fe Railroad Company.

3. BACKLAND: Land-side staging and yarding area needed to support marine cargo transport.

4. BACKLOG: The cost of doing previously postponed and accumulated major roadway reconstruction or rehabilitation projects. (See also SHORTFALL.)

5. BART: Bay Area Rapid Transit.

6. BCDC: San Francisco Bay Conservation and Development Commission.

7. BERTH: The place where a ship lies when at anchor or at a wharf.

8. BREAKBULK: Cargo shipped as separate pieces, such as in bales or in barrels.

9. CALTRANS: California Department of Transportation.

10. CHANNEL DEPTH (See "Project Depth".)

11. CONTAINER (CONTAINERIZATION): The packaging and shipping of goods in standardized boxes or "containers." Typical sizes vary from 10-45 feet in length and are 8 feet wide by 8 feet high. Though typically metal and weather-tight, the use of container skeleton units for the shipment of lumber, bulk liquids, etc. is becoming more frequent.

12. CONTAINER CRANE: A track-mounted crane for moving cargo from ship to pier in a series of forward and back, up and down movements.

13. CONTROLLING DEPTH: The actual depth of a channel available to ships. Measure is calculated on true channel depth, minus shipload distribution and movement settling space, minus an allowance for safe passage of a ship through a channel.

14. DEIR: Draft Environemntal Impact Report.

15. DEMURRAGE: The fee charged a vessel for berthing alongside a dock before or after the time needed for cargo loading or off-loading.

16. DOCKAGE: Docking facilities; charge for docking ships.

17. DRAFT: The depth in water a laden vessel settles to.

18. DRY BULK: Generally loose, flowable cargo (grain, coal, etc.) which is shipped typically in large lots (truckload, carload, shipload, etc.).

19. EIR/EIS: Environmental Impact Report/Environmental Impact Statement.

20. FAU: Federal Aid highway, Urban system.

21. FILL: To create an above-water surface either by placing earth or building a piling- or float-supported platform.

22. HOV LANE: High Occupancy Vehicle Lane.

23. INTERMODAL (INTERMODALISM): A term applied to freight movement by two or more modes, which attempts to maximize the efficiency of movement by using the mode with the greatest modal advantage over a specific origin-to-destination segment.

24. INTERNATIONAL TRADE: Most generally, it is the export and import to and from this country agricultural, manufacturing, and mineral products, and business and financial services.

25. LANDBRIDGE: The concept of using a rail system as a "Bridge" alternative to all water movement of commerce. Concept includes three variaions.

   o Landbridge: The bridging of commerce between two foreign countries (also sometimes lumped in with mini-landbridge).

   o Mini-landbridge: The bridging of commerce between an intermediate port and the cargo's final port origin or destination (e.g., San Francisco, New York)

   o Micro-landbridge: The bridging of commerce between a port and some inland point, where another port is actually closer in loction. (e.g., Los Angeles and St. Louis)

26. L.A.S.H.: Lighter Aboard Ship. A method of shipping using smaller ships or barges loaded aboard larger ships for long distance transfer. The 'lighter', or smaller ship, is then unloaded and proceeds to its destination under its own power. Concept basically has disappeared on the West Coast.

27. LCL: Less than container load.

28. LINER: In shipping terminology a scheduled ship operating between specified ports on a regular schedule.

29. LONG TON: 2240 pounds.

30. LTL: Less than Truck Load.

31. METRIC TON: 2,204.6 pounds.

32. MLLW: Mean Lower Low Water. The average height of low tides.

33. MTC: Metropolitan Transportation Commission.

34. NEO-BULK: Freight shipped in uncontainerized but discrete units (i.e. autos, steel, lumber).

35. NWP RR: Northwestern Pacific Railroad, a wholly owned subsidary of the Southern Pacific Transportation Company.

36. OFF-TRACKING: Phenomenon relating to trailers of oversize (i.e., over 43 feet), semi-trailer trucks, where the rear wheels of the trailer (and thus the main structure of the trailer itself) roll outside the normal curved roadway lane pavement width, onto the roadway shoulders, curbs, and/or into a roadway structure.

37. PACIFIC BASIN: Area of the world whose countries border the Pacific Ocean and associated seas. As referenced to in discussions of international trade, it refers to those Asian/Pacific countries which are involved in significant volumes of international trade, i.e., Japan, (South) Korea, Taiwan, Hong Kong, China, Thailand, Malaysia, Singapore.

38. PACIFIC RIM: Area of the world which most directly fronts the Pacific Ocean proper. As referenced to in discussions of international trade, it includes the most heavily industrialized countries of the Pacific Basin, i.e., Japan, Korea, Taiwan, and Hong Kong. Given the similarity with the definition of the Pacific Basin, these terms are often inadvertently interchanged.

39. PORTPACKER: A track-mounted vehicle used for moving containerized cargo.

40. PROJECT DEPTH: Depth of shipping channel the U.S. Army Corps of Engineers is authorized to create and maintain. Also more generally referred to as simply channel depth.

41. REVENUE TON: Weight/volume ratio used in calculating shipping fees.

42. REVENUE TONNAGE: A measure of cargo most frequently used by ports in reporting their operations. Broadly, it is defined as, "Manifest cargo upon which ocean (operations) revenue is computed." Its computation is based on the following rules:

    a. When ocean revenue is based on (volumetric) measurement, 40 cubic feet is considered one revenue ton regardless of whether ocean revenue was determined on some other measurement basis.

    b. When ocean revenue is based on weight, 2,000 pounds is considered one revenue ton regardless of whether ocean revenue was determined on a long ton basis.

    c. Automobiles are reported on the basis of 40 cubic feet to the revenue ton regardless of how manifested.

    (Definition is adapted from the Pacific Maritime Association 1983 Annual Report, p. 36)

43. ROLL-ON/ROLL-OFF ("Ro/Ro"): Method of cargo transport using wheeled vehicles which are driven and/or rolled onto and off of ships.

44. SHORTFALL: The annual shortage of funds required for an adequate preventative maintenance program. Those projects postponed due to this shortfall results in a backlog of unfunded roadway rehabilitation and reconstruction projects. (See also BACKLOG.)

45. SHORT TON: 2000 pounds.

46. SPT & Co: Southern Pacific Transportation Company.

47. STRADDLELIFT: See portpacker.

48. TARIFF: A fee schedule of rates or charges; duty on imported goods.

49. TEU: Twenty-feet Equivalent Unit. A standard freight industry measure for identifying containers, which is produced by converting container units of 10-45 feet in length, to multiples of 20 feet each, for cargo movement discussion purposes.

50. THROUGHPUT: Volume (weight) of cargo passing through a port terminal.

51. TRAMP: In shipping terminology, a nonscheduled (charter) vessel engaged in commerce transport.

52. TRANSTAINER: A wheeled vehicle used to transport containerized cargo.

53. UP (UPRR): Union Pacific Systems (aka, Union Pacific Railroad, Missouri Pacific Railroad).

54. WHARF: A structure... built along or at an angle to the shore, made to facilitate the receipt and discharge of cargo.

55. WHARFAGE: Handling or stowing goods on a wharf; charge for use of a wharf.

56. WHARFINGER: The operator of a commercial wharf.

57. WPRR: Western Pacific Railroad, now a unit within the Union Pacific Railroad.

(Many of the definitions herein are derived from the Environmental Science Associates, Inc. report entitled, Encinal Terminals Master Plan Environmental Impact Report (Draft), section Appendix XI-H, "Glossary." Permission to use this information in this report is appreciated.)

APPENDIX D

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