
5.0 Strategic Planning for Freight Transportation

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■ 5.1 Overview of the Strategic Planning Process for Freight Transportation

Brief History

Strategic planning had its origins in corporate planning in the 1960s and 1970s "...as a tool to systematically assess the probable impacts of increasing competition and growth – as well as to accommodate social, environmental, and public policy pressures – on the viability of [corporate] business."¹

Firms in the transportation field frequently initiated strategic planning programs in the early 1980s as a result of competitive pressures and the dramatically changing environment brought on by deregulation.^{2 3} It "evolved from other planning and management processes in recognition that organizations must operate in complex, uncertain, and fast-changing environments."

Because of the highly competitive environments in which they operate, firms have not often documented in specific terms the procedures and products of their strategic planning processes. As a result, the process has tended to take on a somewhat different character and form in each firm, tailored to specific conditions and management styles. In fact, the success of strategic planning can be gauged to a significant degree by the extent to which the process has been adapted to meet the particular needs and conditions of the organization.

As this has happened in the private sector, the emphasis has shifted from "strategic planning" to "strategic management" and the definition of the

¹ *Strategic Planning and Management Guidelines for Transportation Agencies*, NCHRP Report 331, Foreword by Staff of TRB, December 1990.

² Bruce Allen, "Introduction," *Strategic Planning and Freight Issues and Research Needs*, Transportation Research Circular Number 294, September 1985, page 4.

³ Kathleen E. Stein-Hudson and Bruce D. McDowell, "Applying Strategic Planning in the Transportation Sector," *TR News*, July-August 1985, page 21.

process has become more general. In today's practice, strategic planning may be seen as a part of a strategic management process that involves all levels of management. In fact, a firm may successfully use strategic management without having a document called a "strategic plan." In larger firms there has been a tendency to shift from emphasis on a centralized strategic planning group to fewer or no strategic planners and emphasis on strategic thinking throughout the organization.

Experiences with strategic planning and management in the public sector is relatively limited and not extensively documented.⁴ In the late 1970s, strategic planning was first introduced into the public sector in the field of transportation by the Port Authority of New York and New Jersey, which adopted it as a management tool and established an Office of Strategic Planning. Beginning in the early 1980s, various forms of strategic planning were initiated under crisis management situations in several state and metropolitan transportation agencies, brought on by the recession, sharply reduced revenues, and difficulties with legislatures. Often top level management changes have brought in people who initiated strategic planning processes.

The TRB Circular referenced above is one of only three known documents that deal with the application of strategic planning or management to freight transportation in the public sector. The second is a report on a workshop on applications in the maritime industry, which provides little additional information relating to the analysis of freight transportation demand in the public sector.⁵ The third is the case study appended to this chapter, involving strategic planning for the San Francisco Bay Area Seaport Plan.

Outline of the Generic Strategic Planning Process

As practiced by large corporations since the 1960s, strategic planning has emphasized:⁶

- Preparation of overall mission and goals statements;
- Scanning and analysis of the external environment to anticipate market forces significant to future success;

⁴ A survey of state DOTs by Illionis, reference on page 15 of NCHRP Report 331 (op. cit.), found that only about a dozen of them understood and applied "...strategic management principles, processes, and benefits...."

⁵ *Maritime Transportation Strategic Planning*, Transportation Research Circular 392, March 1992.

⁶ Stein-Hudson, op. cit. pages 20-21.

- Inventory and evaluation of the organization's internal strengths, weaknesses, and resources;
- Formulation, evaluation, and selection of strategies, using available resources, to take best advantage of external opportunities and internal strengths; and
- Implementation and control of the strategic plan.

George T. Lathrop, TRB's Chairman of the Strategic Management Committee, has provided a similar outline for the generic strategic planning process for both the public and private sectors, breaking the above five steps down into the following seven steps, along with the questions each of the steps is intended to answer:⁷

1. Examination of the mission of the organization:

- What are we trying to accomplish?
- Where are we now; how successful are we in achieving our mission?
- Where do we want to be in five years? Do we need to change our mission?
- How do we define success? How do we know when we get to where we want to be?

2. Environmental scanning:

- What are the economic, social, technological, demographic, and public policy trends and how will they affect our mission and organization?
- How will these trends effect the demand for our services?
- Who else can provide the services or alternatives to them?
- What are the competing demands for the same resources?
- What will happen to the cost structure in providing future services; will there be major changes in technology or production methods?
- Where will future financing come from?

3. Market analysis:

- Who are our "customers," and how are their needs changing?
- Are there new markets or special markets that we should serve?
- What alternatives exist for those who use our services and facilities? How well are they serving our customers?
- What are our customers' goals; how do they define success? How do we provide services to help them achieve their goals?

⁷ George T. Lathrop, "Overview of Strategic Planning," *Transportation Research Circular 392*, op.cit., pages 11-12.

4. Strengths and limitations of our organization:
 - What are the key factors that have made our organization successful? Will these key factors lead to success in the future?
 - What are the weaknesses and strengths of our organization and of other agencies serving the same clientele? What factors keep us from being more responsive to our customers' needs?
 - What are the cultural and institutional constraints of our organization?
5. Shareholder analysis (constituency analysis):
 - How will changing our services, our goals, and the structure of our organization affect those who share with us in the current support of our agency and its activities?
 - Do our shareholders have multiple, diverse, and sometimes conflicting goals and objectives? How can we best provide services to such diverse groups?
6. Analysis of threats and opportunities (scenario building):
 - How should we act or react to changes that may occur in the demand for our services, in the cost of our services, and to changes in technology? What are our strategic alternatives?
 - What are current trends that need to be exploited now?
 - What dangers exist if we delay making changes?
 - Are there activities that we should drop, combine, or add? What will be the impacts on our supporters, the markets we serve, and our employees?
7. Critical issues and strategies:
 - What are the top critical issues that have surfaced as a result of our strategic management process?
 - What strategies and options do we have to respond to these critical issues?
 - What are the risks and benefits to the organization and to the shareholders of the proposed scenarios?
 - What losses can the organization sustain?
 - Where is there substantial pain in the organization that warrants making changes?
 - How do we coordinate the strategic plan with the budget process?
 - How do we coordinate changes in our activities with continuing demands for ongoing services?
 - How do we cope with limited resources?

Chapter Three of NCHRP Report 331 is "Guidelines for the Successful Institution of Strategic Management in Publicly Funded Transportation

Agencies." These guidelines are summarized in Exhibit 5.1. The four stages of *strategic management* are similar to the steps outlined above for *strategic planning*, but differ in the following ways:

1. They are intended to be general guidelines rather than specific steps, because of the need for strategic management to be adapted to the specific conditions and needs of each agency.
2. They are written specifically for public sector transportation agencies, as distinct from private firms, recognizing the important differences between their environments (described in the next subsection).
3. They do not specifically include development of a strategic plan as envisioned in Terry Lathrop's steps above, but they go beyond these steps to encompass the implementation of an ongoing strategic management system in Stages III and IV.

The guidelines in NCHRP Report 331 include several pages of discussion of the major issues involved in each of the four stages, the steps involved in implementing the guidelines under each stage, and the types of products and benefits of each guideline.

The American Association of Port Authorities (AAPA) published a planning guide for the port industry in 1988.⁸ The guide offers the following explanation of strategic planning:

One of the most important differences between strategic planning and other forms of port planning is its emphasis on understanding the changes taking place in the organization's internal and external environment. The strategic planning process involves an in-depth evaluation of the current status, likely trends, and potential changes as applicable to a particular port environment. The objective is to create a strategy that can take advantage of opportunities and counter threats by enhancing the port's strength and mitigating its weaknesses. To this end, then, the process examines such issues as public image, labor relations, organizational performance, political environment, community support, and human resource development, which are issues not normally addressed in a port's shorter range service and capital plans or long range plans.

⁸ American Association of Port Authorities, *Strategic Planning: A Guide for the Port Industry*, Alexandria, Virginia, 1988, pp. 3-4.

Exhibit 5.1 Summary of Guidelines for Strategic Management

Primary Stages/Guidelines	Objectives
<p>Stage I. Identifying the Need for Strategic Management</p> <p>A. Determine the current status of strategic management in the agency.</p>	<p>To assess (a) the extent to which strategic management is already in place, (b) the potential buy-in of the chief administrative officer and other senior managers, (c) whether it would be appropriate to introduce basic management changes at this time, and (d) what probable actions might be undertaken to improve strategic management processes.</p>
<p>Stage II. Establishment or Enhancement of Key Strategic Management Elements</p> <p>B. Define the agency's businesses.</p> <p>C. Develop plans for implementing strategic management initiatives.</p>	<p>To establish a clear and proper definition of the agency's businesses based on an accurate understanding of the present and a realistic vision of the future.</p> <p>To provide a comprehensive course of action to move the agency from the existing management system to the establishment or enhancement of critical strategic management elements.</p>
<p>Stage III. Integration of the Key Elements into a Functioning System</p> <p>D. Ensure that the agency mission statement and goal structure are in place.</p> <p>E. Obtain chief administrative officer and senior management commitment to the strategic management process.</p>	<p>To establish a clearly understood and articulated mission statement for the agency, supplemented by goals and specific objectives for each major operating unit.</p> <p>To ensure an active leadership role by the chief administrative officer and senior management and thereby institutionalize the strategic management process in dealing with day-to-day operational matters.</p>
<p>Stage III. Integration of the Key Elements into a Functioning System</p> <p>F. Establish a clearly understood division of responsibility for strategic management implementation, including the selection of implementation managers or facilitators.</p> <p>G. Develop an accurate information base and maintain its timeliness.</p>	<p>To provide guidance to all managers and organizational units as to their roles and responsibilities in implementing the strategic management process.</p> <p>To work toward the evolution of a consistent agency-wide information system which provides timely and accurate information for management decision making.</p>
<p>Stage IV. Ongoing Use and Refinement of the Strategic Management System</p> <p>H. Monitor the strategic management system.</p> <p>I. Develop a reward and recognition program.</p>	<p>To provide continuous feedback so that senior management will know where adjustments are needed and to ensure that strategic management initiatives stay in step with the management needs of the agency.</p> <p>To encourage exemplary performance from individuals and organizational units.</p>

The major shortcoming of the available references on the strategic planning and management process is that they do not provide any guidance that relates specifically to freight transportation or freight demand.

Differences Between the Public and Private Sector Contexts

Although there is general agreement that the strategic planning and management process developed in the private sector is transferable, and should be more widely used in the public sector, there is also wide recognition of the fact that there are important differences in the decision-making environments that must be taken into account in implementing the process. Michael Meyer summarizes these differences as follows:⁹

- Public agencies operate under intense public scrutiny and political review.
- Public-sector decision making, by its political nature, is less direct and more complex than that of private organizations.
- Agency mandates are often set by law, and it is difficult to set new goals or move in new directions without legislative action.
- Agency executives have less control than do their private-sector counterparts over the resources available to their organizations, which makes implementation of strategic decisions more difficult.

A similar summary of these differences is presented in Exhibit 5.2.

These and other differences are discussed in Chapter Two of NCHRP Report 331.

■ 5.2 Role of Demand Information and Forecasts

Freight demand plays no more than a small role in most of the strategic planning and management applications that have been documented in the literature, particularly in the public sector. In the private sector there is often more analysis of demand; however, the emphasis is usually on profitability and market share, with demand receiving only implicit or secondary attention. A few exceptions to these generalizations are summarized below.

⁹ According to Stein-Hudson, *op.cit.*, page 21.

Exhibit 5.2 Summary of Differences in Strategic Planning between the Public and Private Sectors

Issues	Public Sector	Private Sector
Public scrutiny	High	Low
Political pressure	High	Low
Decision making	Diluted, slow	Focused, fast
Major changes	Legislature	CEO, board
Resource control	High	Low
Human resources	Civil service and labor contract	Labor contract

San Francisco Bay Area Seaport Plan

One of the best examples that has been documented of strategic planning for freight transportation is the recent strategic assessment of the adequacy of sites to meet forecasts of demand, prepared for the San Francisco Bay Area Seaport Plan.¹⁰ As described in detail in the case study presented in Section 5.4, the San Francisco Bay Area seaport planning involves forecasts of freight tonnage through the port of various types including containers, consideration of changes in the efficiency of throughput and various contingencies, and development of recommendations on strategies to deal with environmental issues and to build a consensus that balances regional and local needs.

Based on the experience in developing the San Francisco Bay Area Seaport Plan and other port-related work done by members of this research team, some general guidelines can be offered. A key objective of such planning is to ensure appropriate and balanced development of port assets within the context of, and complementary to, the broader regional or statewide intermodal framework. This requires:

- Analyses and forecasts of both foreign and domestic freight with origins, destinations, or transfer points within the port hinterland;
- An assessment and forecast of technology to facilitate the efficient handling, transfer, and storage of freight;
- Development of a conceptual plan which addresses the needs of multiple users, various types of freight, and intermodal linkages; and
- Consideration of additional freight that could be attracted to the port if certain facilities and services were added, expanded, or improved.

In a monograph entitled "Considering Strategic Planning for Your Port?," Professor Thomas J. Dowd offers further insight into the port strategic planning process.¹¹ He states that a port which limits itself to project planning and budgeting is destined in the long run to be "reactive." Broadening its planning spectrum to include strategic business planning enables a port to be "proactive," meaning it is better equipped to manage risk and make informed decisions. For this purpose, a port must have data and information about its operations, its customers, its markets, and its community, as well as a firm understanding of its mission and its business.

¹⁰ Peter B. Eakland and Marc Roddin, "Strategic Assessment for the 1994 Update of the San Francisco Bay Area Seaport Plan," paper prepared for presentation at the December 7-9, 1994 TRB National Conference on Intermodalism.

¹¹ Thomas J. Dowd, *Considering Strategic Planning for Your Port?*, Sea Grant Program, Seattle, Washington, 1987.

Strategic Motor Freight Planning Model for the Chicago Area

A truck freight flow simulation model was developed and demonstrated for use as a strategic planning tool by the Chicago Area Transportation study. The model was designed to test a range of options involving the following three components:¹²

1. The clustering of for-hire freight terminals with zones of high accessibility to truck service demands;
2. The channelization of daily heavy truck flows on truck networks; and
3. Potential expansion of the Chicago motor carrier commercial zone to enlarge the area of service exempt from economic regulation.

Exhibit 5.3 is a flow chart of the model showing inputs on the left side and modeling steps on the right. A unique aspect of the model was that the traffic assignment module could limit trucks of a given size to designated links of the network. Another unique element was the terminal accessibility module, which used "a synthesis of the graph theoretic and spatial interaction modeling approaches to accessibility measurement." Outputs of the model define major truck service areas, miles of primary truck service routes, and system congestion measures. Maps of the service areas and primary truck routes are shown in the published report for a demonstration run of the model.

Freight Flow Databases for Statewide Strategic Freight Transportation Planning

At least two states, California and New Jersey, are in the process of developing and applying large-scale freight databases, along with software systems designed to permit a wide variety of analyses of intermodal flows at different levels of aggregation. Although these database development projects, which both involve large contractor development efforts, have been undertaken primarily in response to ISTEAs intermodal transportation management system (ITMS) requirements, they offer the potential for use as part of strategic planning and management systems for freight transportation. In fact, many of the intended uses of these systems are central to the purposes of strategic planning and management for freight transportation. Because all states are developing ITMSs in response to ISTEAs requirements, there is a potential for future widespread use of these systems for strategic planning and management purposes.

¹² "Strategic Motor Freight Planning for Chicago in the Year 2000," *Transportation Research Record 920: Trucking and Intermodal Freight Issues*, 1983, pages 45-48.

Exhibit 5.3 Mathematical Model for Strategic Motor Freight Planning for the Chicago Area.

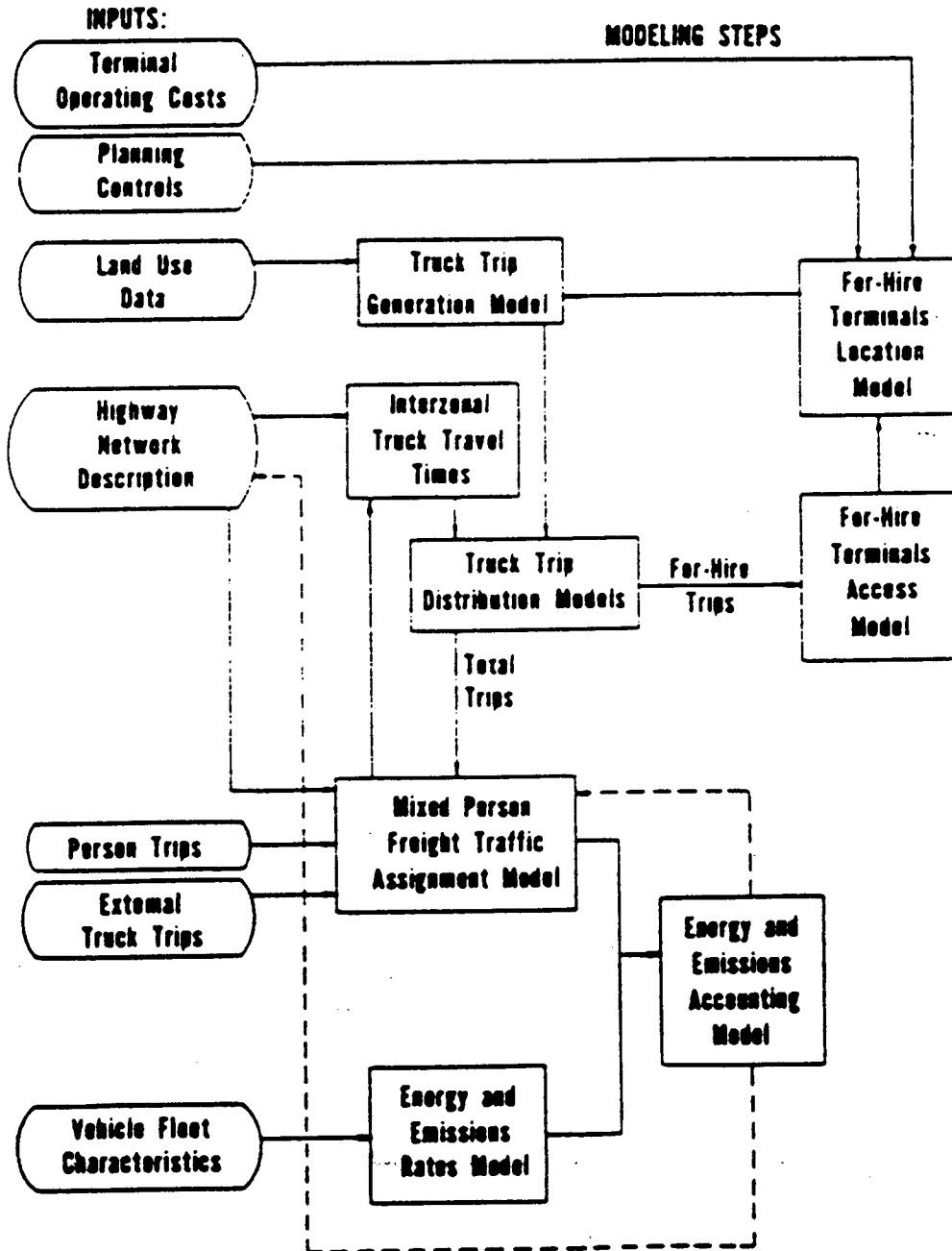


Exhibit 5.4 is a flow chart that provides an overview of the California ITMS, developed by a Booz Allen team for the California Department of Transportation (Caltrans).¹³ Note that it is designed to accommodate private sector and MPO inputs and project data reflecting changes in the STIP, and that it is designed to provide outputs in terms of system performance measures, maps and graphs, mode shift summaries, and various types of what-if analyses, in addition to more detailed applications such as STIP evaluations and corridor analyses.

When fully implemented, the California ITMS database will contain a current inventory (supply measures) of major intermodal transfer facilities and corridors of statewide significance, measures of demand on the intermodal facilities and major corridors, and transportation system improvements and major projects in the STIP. Most of these data are being assembled in the new integrated database from various modal planning databases that have been or are being developed as part of other projects.

Performance measures to be estimated by the California ITMS include both passenger and freight measures of impacts in the following types:

- Mobility;
- Environmental;
- Financial;
- Safety;
- Economic; and
- Quality of life.

Exhibit 5.5 shows the general relationships between the performance measures and the freight data being developed for the California ITMS.¹⁴

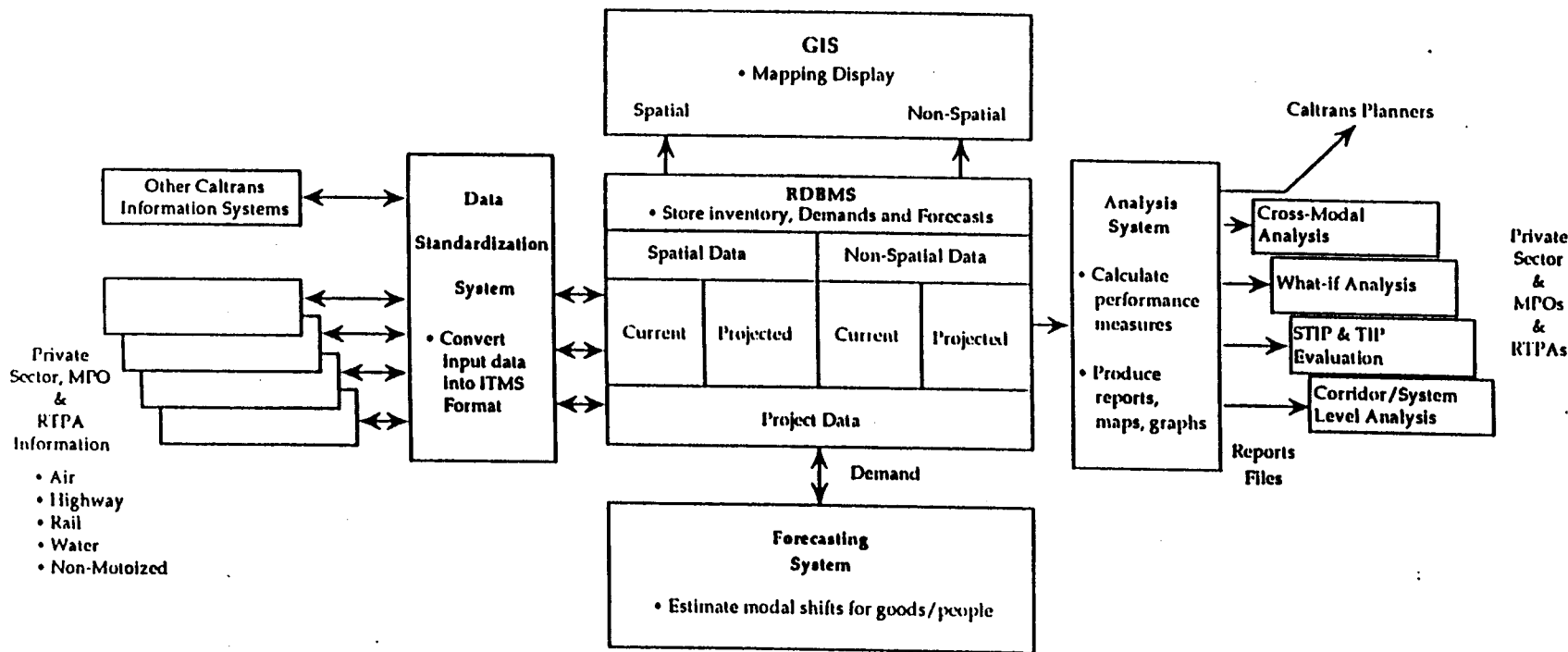
New Jersey's Goods Movement Database and Goods Movement Information System has recently been developed by DRI/McGraw-Hill and is intended to be used by NJDOT for a variety of types of strategic planning applications.¹⁵

¹³ Booz Allen & Hamilton, et. al., *Final Study Design Report, California Intermodal Transportation Management System (ITMS)*, submitted to the California Department of Transportation, June 1993, page. 5.

¹⁴ Slides prepared by Booz Allen Team as part of a progress report presentation to Caltrans' ITMS Advisory Committee, October 22, 1993.

¹⁵ DRI/McGraw-Hill, *New Jersey Department of Transportation Goods Movement Information System, User Documentation, Draft, Updated December 2, 1994.*

Exhibit 5.4 California ITMS Study Design Report – ITMS General Flowchart



Relationship of Performance Measures and Data Needs Matrix

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FREIGHT MOVEMENT							
Performance Measure Group	Measure	Formula	Data Needed by Modal Source				
			Highway	Pipeline	Air	Rail	Water
Mobility	Mobility Index	Ton Miles/VMT x Average Speed Container Equivalents / VMTx Average Speed	Volume, Ton Miles Speed, Containers	Volume, Ton Miles Speed, Containers	Volume, Ton Miles Speed, Containers	Volume, Ton Miles Speed, Containers	Volume, Ton Miles Speed, Containers
	Lost Time	Actual time - Theoretical time	Actual Speeds, Posted speeds	N/A	N/A	Theoretical travel time, actual travel time	N/A
	V/C Ratio	Demand / Capacity	Highway demand & capacity	N/A			
Financial	Cost to Service Providers	AEC / Ton mile	Basis, Depreciation, interest, life expectancy, operating costs, capital costs, ton miles	Basis, Depreciation, interest, life expectancy, operating costs, capital costs, ton miles	Basis, Depreciation, interest, life expectancy, operating costs, capital costs, ton miles	Basis, Depreciation, interest, life expectancy, operating costs, capital costs, ton miles	Basis, Depreciation, interest, life expectancy, operating costs, capital costs, ton miles
	User Cost	Average cost / Ton Mile	Fuel, operator, maintenance costs	Fuel, operator, maintenance costs	Fuel, operator, maintenance costs	Fuel, operator, maintenance costs	Fuel, operator, maintenance costs
Environmental	Pollution	Pollution / ton mile	HC, CO, NOX, PM10, ton miles	HC, CO, NOX, PM10, ton miles	HC, CO, NOX, PM10, ton miles	HC, CO, NOX, PM10, ton miles	HC, CO, NOX, PM10, tons miles
	Fuel Consumption	Fuel consumed / ton mile	Fuel consumed, ton miles	Fuel consumed, ton miles	Fuel consumed, ton miles	Fuel consumed, ton miles	Fuel consumed, ton miles
	Green House Emissions	CO ₂ / ton miles	CO ₂ / ton miles	CO ₂ / ton miles	CO ₂ / ton miles	CO ₂ / ton miles	CO ₂ / ton miles

* Container Equivalents and/or TEU (Trailer Equivalent Units)

N/A - Not Applicable

Relationship of Performance Measures and Data Needs Matrix

(Page 4 of 4)

FREIGHT MOVEMENT								
Performance Measure Group	Measure	Formula	Data Needed by Modal Source					
			Highway	Pipeline	Air	Rail	Water	
Economic	Avg. Jobs supported per year	Capital Costs Useful Life	operating expenditures, capital costs, useful life, employment multipliers	operating expenditures, capital costs, useful life, employment multipliers	operating expenditures, capital costs, useful life, employment multipliers	operating expenditures, capital costs, useful life, employment multipliers	operating expenditures, capital costs, useful life, employment multipliers	operating expenditures, capital costs, useful life, employment multipliers
		Annual + Operating Costs						
GSP Impacts								
	Cost of pollution, accidents, fatalities and lost time per ton mile		Avg wage; posted speed, actual speed, accidents, fatalities; cost/accident; cost/fatality & cost of air pollution, ton miles	Avg wage; posted speed, actual speed, accidents, fatalities; cost/accident; cost/fatality & cost of air pollution, ton miles	Avg wage; posted speed, actual speed, accidents, fatalities; cost/accident; cost/fatality & cost of air pollution, ton miles	Avg wage; posted speed, actual speed, accidents, fatalities; cost/accident; cost/fatality & cost of air pollution, ton miles	Avg wage; posted speed, actual speed, accidents, fatalities; cost/accident; cost/fatality & cost of air pollution, ton miles	Avg wage; posted speed, actual speed, accidents, fatalities; cost/accident; cost/fatality & cost of air pollution, ton miles
Safety	Accidents	Accidents / ton mile	Accidents, ton miles	Accidents, ton miles	Accidents, ton miles	Accidents, ton miles	Accidents, ton miles	Accidents, ton miles
Quality of Life	Availability	Frequency			Schedules	Schedules	Schedules	
	Restrictions		Weight restrictions, height restrictions, width restrictions	N/A	Weight restrictions	Double-stack constraints, width restrictions	N/A	

* N/A - Not Applicable

- Statewide transportation planning
- Intermodal management system
- Facility investment planning
- Corridor capacity evaluation

The database contains county-to-county flow measures within New Jersey and county to more aggregate areas for all internal to external flows. The database contains six dimensions: mode (10), commodity (4-digit STCC), origin-destination (60 x 60 areas), shipper type, annual tonnage, and type of data. The database contains potentially 10 million cells of data. Efforts have been made to capture intermodal origin-to-destination flow information in the database. It was developed using many public and proprietary data sources.

The information system is designed to be very user friendly by providing the ability to display the data in a variety of different types of tables, maps, and graphics using simple menus.

■ 5.3 Examples of Other Strategic Planning Experience in State DOTs and MPOs

This section is intended to summarize experience from state DOTs and MPOs in utilizing strategic planning or strategic management in some form.¹⁶ In general, the available documentation of this experience does not provide information relating specifically to freight transportation, demand data, or forecasts.

In 1982, the Pennsylvania Department of Transportation (PennDOT) became one of the first transportation agencies to initiate either a *strategic planning* or *strategic management* process. As in the case of several agencies used as case studies for the NCHRP strategic planning project cited at the beginning of this chapter, strategic management was initiated at PennDOT as the result of a crisis. At PennDOT, which was found to have one of the most advanced case studies in its application of strategic management, this effort was begun in an attempt to revive the sagging credibility of the Department and to obtain sufficient funding from the legislature to meet its mission. Without a new approach to funding sources in its internal operations, the umbrella department was essentially doomed and in danger of being disbanded.

¹⁶This section draws heavily from Chapters One and Two of NCHRP Report 331, op. cit.).

At the Port Authority of New York and New Jersey, the financial crisis of the 1970s in New York portended lower finances for the Authority in the foreseeable future. Again, something innovative was needed to help the Authority ensure the best allocation of the limited funds it would have available to meet its multimodal responsibilities. In subsequent years, a variety of similar efforts to develop strategic plans and management systems have been undertaken by other port organizations.

Interestingly, in several case studies conducted for the NCHRP project, although a crisis was the genesis of what ultimately became a strategic management process, the initial efforts were not called "strategic management." They were fairly simple efforts to establish some realistic goals and objectives in light of the situation being faced and to plan programs and activities to meet those goals and objectives. This process later embraced strategic planning and management, as in the case of the New Jersey DOT.

The Virginia Department of Transportation also began its effort in the late 1980s as the result of a rather sudden turn of events. Its situation is unique among the case-study organizations in that the crisis it faced was how to spend effectively the nearly 400 percent increase it was to receive in state funding. For Virginia DOT senior management, it was essential that the additional funds be efficiently and effectively used to meet the extensive transportation needs in the state.

The Connecticut Department of Transportation, in initiating its strategic planning process in 1985, settled on the following definition, characteristics, and benefits for strategic planning, "...a management process that helps an organization *make critical decisions* about where to target its efforts and how to allocate its resources...." [Its central thrust is] "...to develop strategic thinking, and ...to foster strategic decision-making by leaders, and, in turn, by line managers and offices responsible for turning agency goals into results...." [It differs from traditional forms of planning because] "...[s]trategies determine *general directions*, whereas plans ultimately result in specific products...."

The Department adopted the motto "off the paper and into the flow" to connote the management aspects of the process.

The New York State Department of Transportation has developed, documented, and implemented a strategic management process referred to as Goal-Oriented Management. The rationale cited is "...to create a management style that combines a clear sense of purpose with direct lines of authority and clear performance goals at each level of management." This process includes four principal components: (1) an improved orientation towards goals as a means to focus service delivery, (2) various strategic planning activities, (3) performance measures on a unit and individual basis, and (4) direct connection to the budgeting process.

The New York State Department of Transportation makes the following interesting distinction between strategic goals and operational goals: (1) Strategic goals have fundamental and pervasive impact on the organization's performance of its mission; most departmental goals are strategic goals; (2) Operational goals are generally important but are not directly and fundamentally related to the organization's mission. Departmental guidelines make these distinctions:

Strategic	Operational
Fundamental change in definition of organization's role or the way it does business	Concerned with how to improve what is already being done
Long-term impact	Day-to-day focus
Important to upper management	Not a priority of upper management

The primary rationale for differentiating between the two is to determine the level of management attention in the agency.

Some agencies, such as the Arizona Department of Transportation, have linked the budgeting process to strategic planning and management. ADOT refers to its methodology as the (5-year) Strategic Budget Process. This linkage allows for the prioritization and allocation of construction and operating funds based on the strategic evaluation of operating program issues vis-à-vis construction requirements. The intent is to allocate available resources to achieve the desired objectives and results more systematically and thoughtfully. Benefits are that (1) management takes a longer view of budgetary issues, (2) more levels of management interact on the budget, (3) there is an increased impact of rational policy making on the allocation of resources, and (4) there is a more intense and repeated focus on key strategic issues in the budgeting process.

The California Department of Transportation (Caltrans) prepared a legislatively mandated draft transportation plan in 1993, consisting of three elements: policies, strategies, and recommendations. Among many other items, the Policy Element proposes that the final version of the plan set such system performance objectives as "increased flow of goods to and through California seaports and airports" of specified percentages in

tonnage and value and "reduced goods distribution costs due to travel time" of a specified percentage.¹⁷

The policy element of Caltrans' draft plan contains three policies:¹⁸

1. Promote the economic vitality of California by providing for flexibility in choice and mobility of people, goods, services and information.
2. Transportation decisions will provide all Californians with a safe, convenient, reliable transportation system.
3. Transportation decisions will protect the environment and promote energy efficiency while improving mobility.

Each of the three policies is followed by a few "objectives" and each of the objectives has a "strategy" and several "actions" intended to accomplish the strategy. Although none of the objectives is formulated in language dealing uniquely with freight transportation, the very first objective (improve the economic competitiveness of the State through transportation activities) is primarily a freight transportation objective, as demonstrated by the following excerpts:

Strategy:

California must develop an efficient intermodal goods movement system to improve its competitive position in the international economy. That system must be able to move goods reliably between the United States and other nations, between California and other states, and within California itself, with maximum efficiency and minimal delay...In making transportation decisions, we must give greater consideration to all the freight modes, including intercity truck, rail, air, pipelines and maritime shipments. We must plan for increases in international trade volumes, with an emphasis on border crossings with Mexico. We need to support technological and operational innovations such as just-in-time inventory and shipping practices.

Actions:

Simplify Public Permits and Approval Processes: ...continue efforts to create a streamlined, clearly-defined, uniform multi-agency review and permit procedure.

¹⁷California Department of Transportation, *California Transportation Plan: Policy Element*, Discussion Draft, Sacramento, February 1993.

¹⁸Pete Wilson, et.al., 1993 *California Transportation Plan: Final Draft*, Sacramento, March 30, 1994, Chapter 2.

Develop a Statewide Goods Movement Strategy: The Governor and the Secretary of the Business, Transportation and Housing Agency will establish a task force to develop a comprehensive statewide goods movement strategy.¹⁹

Foster Technological and Operations Innovations: ...shipment and intermodal transfers of containers, automated vehicle identification and container classification systems, advanced weigh-in-motion systems and toll collection systems, and alternative vehicle propulsion systems.

Improve Delivery to End Users: ...identify specific governmental and private actions to allow more efficient delivery of products to end users.

Develop International Border Infrastructure: Caltrans will establish a partnership...to address the...determination of infrastructure needs; and the development of short-, medium- and long-range plans to meet those needs.

Develop International and National Trade Corridors: ...identify existing and emerging surface and air trade corridors, and transportation subsystems that will facilitate goods movement between the United States, Pacific Rim, Canada and Mexico including use of advanced technologies to improve productivity of international ports of entry.

Another important freight-related action in the Caltrans plan, also supporting the first policy, is the following:

Expand Automated Commercial Vehicle Operations: ...improve goods movement safety, size and weight standards compliance, as well as fleet management and efficiency. Advance technologies for weigh-in-motion, automatic vehicle identification, special vehicle permitting and records-sharing between agencies enabling a truck to be registered only once for each load....

¹⁹ Such a task force force has since been established and is actively pursuing a detailed recommendation on this strategy (one of the three major recommendations in the plan).

■ 5.4 Case Study: Strategic Assessment for the San Francisco Bay Area Seaport Plan

This case study describes a strategic assessment used to develop the 1994 update of the San Francisco Bay Area Seaport Plan, a primary purpose of which was to designate adequate sites to meet forecast marine freight volumes through 2020.²⁰

The Bay Area Seaport Plan focuses on seaport facilities available for the handling of public cargo. Included are facilities that handle containerized, break-bulk, neo-bulk, dry bulk, and non-petroleum liquid bulk freight. The San Francisco Bay also handles a significant volume of petroleum products to serve both oil refineries and distribution facilities of major oil companies. However, these facilities are private and were not included as part of the Seaport Plan analysis.

The Development of the Seaport

Maritime shipping has been a major contributor to the San Francisco Bay Area economy since the mid-1800s. San Francisco was the first major seaport on the West Coast. The Gold Rush boom, followed by the development of good regional and intercontinental rail connections, continued to favor the area as a major seaport. San Francisco remains the major break-bulk terminal in the Bay Area, but the demand for this category of freight has declined in recent years. The development of shipbuilding and naval supply activities during World War II further contributed to both civilian and military seaport development in the area. Rapid population growth, the development of deepwater vessels, and the need for significant backland area enabled the Long Beach-Los Angeles port complex to overtake and surpass the Bay Area. The Port of Oakland solidified its role as a major West Coast port with the advent of containerized cargo in the 1960s and now has virtually the same tonnage as the Port of Seattle in a battle to claim the runner-up spot to Long Beach-Los Angeles. The Bay Area ports currently are maintaining their share of West Coast marine freight traffic (approximately 20 percent), but they lost share to both Pacific Northwest and Southern California ports in the late 1980s when the Port of Oakland experienced difficulty in obtaining dredging permits for deepening its approach channel.

²⁰ This case study is a synopsis of a paper prepared for a December 1994 TRB conference on intermodal transportation entitled "Strategic Assessment for the 1994 Update of the San Francisco Bay Area Seaport Plan," by Peter B. Eakland, CCS Planning and Engineering, and Marc Roddin, Metropolitan Transportation Commission.

In addition to Oakland and San Francisco, which historically have been the major seaports in the Bay Area, there are three additional seaports that have handled dry cargo. Richmond was converted from a navy shipbuilding facility into a port that handles a combination of liquid bulk, break-bulk, and neo-bulk cargo. The Port of Benicia handles car shipments and petroleum products, and the Port of Redwood City primarily handles dry bulk products.

Institutional Framework

All seaport activities in the Bay Area are constructed and implemented at the local level, either by local governments or private companies. Of the seaports that were active in 1993, all were owned by local governments except for two that were privately owned, Benicia and Encinal Terminals. The latter ceased its maritime operations in 1993 because it lacks the deepwater access and good rail connections to compete effectively for container freight and because of excess capacity in the Bay Area for break-bulk cargo.

At the regional level, it was recognized in the 1960s that a need existed for regulatory control of shoreline development if the Bay's natural resources were to be adequately protected while accommodating additional water-related development required to maintain the economic vitality of the region, jobs, and the quality of life for its residents. The Bay Conservation and Development Commission (BCDC) was established by the State of California to develop a comprehensive Bay plan and to regulate all dredging and filling of the Bay. Through the Seaport Plan, BCDC in conjunction with the Metropolitan Transportation Commission (MTC), the regional transportation planning organization, is mandated to designate adequate sites and land access to meet forecast long-term freight demand.

The balancing of supply and demand has differed for the development of each of the three Seaport Plan planning efforts in 1982, 1988, and 1994. For the initial plan, in 1982, the focus was on *both* the demand and supply aspects of port planning. In 1988, the emphasis was on revising the forecasts. In 1994, the emphasis has switched back to site designations. Difficulty exists in providing the desired capacity, given the industry need for an economy of scale in containerized port operations, even though the berth requirements are less than in previous plans and military sites are becoming available for civilian uses.

Description and Evaluation of Issues

A strategic assessment was made early in the process to ensure that all major issues were identified. Seven issues were identified: (1) assessing validity of traffic forecasts; (2) trends in the operation and management of

the maritime industry; (3) establishing capacity assumptions for facilities; (4) future role of current civilian seaports; (5) establishing potential for military bases to meet future civilian seaport needs; (6) addressing the need for interim uses for undeveloped sites, and (7) addressing intermodal regulations.

Each of the seven issues is discussed below.

1. Validity of Overall Bay Area Traffic Forecasts

The latest regional forecasts were made in 1986 as part of the first update of the Seaport Plan. Subsequent traffic data has indicated that actual traffic has followed the forecast closely. The conclusion reached early in the process was that the existing forecasts are adequate for the development of the current update. Nevertheless, there is some concern about the ability of the area to maintain its current share of traffic until 2020. Both the Southern California and subsidized Pacific Northwest ports have ambitious development plans underway and do not face several of the constraints facing long-term seaport development in the Bay. On the other hand, worsening traffic congestion in Southern California and the resulting air quality problems and mitigation measures could result in diversion of some intermodal cargo from there to the Bay Area.

Another aspect of freight forecasts is imbalance between import and export cargo. Currently, Bay ports have larger export than import tonnage, in part due to smaller channel depths and a larger population base in Southern California.

Exhibit 5.6 presents a summary of the 2020 forecasts used for both the 1988 and 1994 updates. Overall tonnage is forecast to increase by 30 million metric tons, with containerized freight accounting for 81 percent of the increase. In percentage terms, overall tonnage is forecast to increase by 249 percent and containerized freight by 316 percent. Break-bulk freight is expected to grow by 196 percent but to continue to maintain its small three percent share of overall freight. The increase in break-bulk freight is expected to be easily accommodated.

Because of these forecasts, the emphasis in the 1994 update was on identifying sites for the handling of containerized freight. Not only are the demands less for other handling categories, but also their land requirements and development costs are less.

2. Trends in the Operation and Management of the Maritime Industry

The maritime industry is highly competitive in terms of both rates and overall door-to-door transit time from shipper to consignee. The continuing emphasis is on changes in operations that can reduce overall

Exhibit 5.6 San Francisco Bay Area Freight Forecasts by Commodity Type

Freight Category	Freight Throughput (1,000 metric tons)		Growth Percent 1990-2020	Percent of Total Freight		Percent of Total Growth 1990-2020
	1990 ¹	2020		1990	2020	
Container	7,824	32,567	316%	64%	76%	81%
Break-bulk	387	1,146	196%	3%	3%	2%
Neo-bulk (iron & steel, automobiles, and newsprint)	1,138	2,217	95%	9%	5%	4%
Dry bulk	2,406	5,988	149%	20%	14%	12%
Liquid bulk	522	983	88%	4%	2%	2%
Totals	12,277	42,901	249%	100%	100%	100%

¹ Actual except for liquid bulk, which is from 1986 forecast.

Source: 2020 forecasts and 1990 liquid bulk figures from Manalytics, *San Francisco Bay Area Cargo Forecasts to 2020*, San Francisco, 1986.

costs. The past decade has seen major changes in operations, including several analyzed in the plan update process. These improvements, which include dredging as well as vessel and shoreside equipment purchases, have required significant capital investments. They require an increased scale for port operations to be most cost effective. Ideally, new investments in capacity should be adjacent to existing facilities in order to contribute to this economy of scale. Otherwise, site designations may be unattractive to maritime, stevedoring, or warehousing companies and remain undeveloped. Although it was relatively easy to document changes in the maritime industry in the past 12 years, trying to accurately look into the future and forecast additional changes is more difficult. Current trends will continue, but certainly the gains in productivity will be more limited. Many possible changes that would increase throughput tonnage at a port would also increase overall operating costs and, thus, are unlikely to be implemented.

3. Establishing Overall Seaport Supply Assumptions

As in most long-range transportation planning studies, the goal of the update was to develop supply to meet the forecast demand. The demand side of the equation was relatively simple to address, given agreement that the most recent forecasts continue to be valid for long-range planning purposes. The supply side was more difficult to address, in part because of the uncertainty of changes in maritime operations and investments.

For the 1994 update, the initial needs assessment was based on average capabilities of active seaport facilities. However, the capabilities used no longer were based on existing throughput tonnage, but rather on capacities. Capacities first were calculated using techniques developed for the Maritime Administration. The process involves calculating the capacities of each component in the overall process of transferring and moving freight within a cargo terminal. Backland storage proved to be the critical constraint for all container berths in the Bay Area. For the Port of Oakland, the average is about 30 acres per berth. Overall, the land would have to be increased by over 60 percent at the port to eliminate backland as a constraint at all of its container terminals. Problems in adding new bay fill make it difficult to add to the capacity of existing seaport facilities.

A utilization factor of 80 percent was applied to the capacities in recognition of the fact that facilities are unable to operate at capacity throughout the year. The average throughput per container berth in the Bay Area has increased 36 percent from 1982 to 1994, a 2.6 percent annual average increase. A one percent annual increase in capacity through 2020 equates to an additional 30 percent increase in capacity. Given current practices in port planning and operations, it is doubtful that this level of improvement can be achieved. The increase in capacity achieved over the past decade reduced overall costs, but no clear consensus exists as to what extent further increases in capacity can continue to contribute to decreases in costs.

As in the two previous plans, the average capabilities per berth were used to establish the total number of berths required to meet forecast needs. As the Port of Oakland handles most of the area's containerized freight, its statistics closely approximate those for the Bay Area. Between 1982 and 1994, there has been a decrease in existing berths for three of the four handling categories (container, break-bulk, and neo-bulk) and no change in the fourth category (dry bulk). Even for containers, which experienced a significant growth in traffic, there has been a small decrease in active berths (2), made possible by greatly improved efficiencies.

Because of the increases in average capacity and the 1988 changes in forecasts, only 24 new containerized berths are forecast to be needed, a significant 68 percent increase from the 1982 figure. This forecast assumes that new berths, on average, will handle 80 percent of the current average capacity of container facilities, and that the average backland required is at least 30 acres per berth.

4. Future Role of Current Civilian Seaports

The planning process had to assess the extent to which existing seaport facilities could meet forecast future needs. This could be done in one or more of the following ways: (1) converting non-container berths to container berths; (2) adding new berths on vacant land or land containing interim uses; (3) increasing the capacity of existing container berths by eliminating current, critical capacity constraints.

The difficulty in this process is the required balancing act between regional and local needs. In addition to Oakland, the only current ports handling containerized freight are the Ports of Richmond and San Francisco. At the latter two ports, there are local pressures to reclaim land for other uses that has been or could be reserved for future seaport development. The Port of San Francisco has lost container terminal tenants within the past year to both the Port of Oakland and the Port of Richmond, and uncertainty exists as to when or if the downward trend in tonnage passing through the port can ever be reversed.

The overall number of vessel calls to the area actually decreased from 1988 to 1993, but the throughput tonnage increased as the size of ships increased significantly.

5. Potential for Military Bases to Meet Future Civilian Seaport Needs

The potential of Bay Area military bases for use as civilian seaport facilities has been recognized, but until 1993 there was no indication when such uses would be feasible. It has been assumed that, if made available, military base sites would be simply transferred to the inventory of designated seaport sites to meet long-term freight forecasts. The actual process for deciding the potential for civilian seaport development proved

to be considerably more complicated. Despite the unique opportunity to reserve potential seaport capacity to meet long-term needs, the actual designations will be less than the total sites that have been found to be technically feasible.

In the future, a significant number of military bases with either seaport facilities or the potential for seaport facilities will be transferred to civilian control either through leases or the base closure process. The bases could be divided into three groups: (1) the Naval Supply Center in Oakland, which could be developed almost immediately because it adjoins the Port of Oakland; (2) Treasure Island, which was eliminated from consideration early in the screening process because of its poor land access and lack of existing deepwater access; and (3) the remaining sites that have a mixture of opportunities and constraints. For these sites, areas were identified that had adequate backland, good land access, and access to deep water.

Conceptual layout plans were developed for container terminals on four bases with a total of 32 berths. Then additional factors were considered, including adjacent and current land uses, environmental constraints, and institutional factors, as well as the extent of needs that could not be met at existing facilities.

6. Interim Uses for Undeveloped Sites

The Seaport Plan allows for interim uses at designated sites on which seaport development is not yet economically feasible. Because interim developments must be readily displaceable when the need for seaport facilities occurs, local governments have had little success in attracting revenue-generating activities to underutilized lands within areas given a seaport priority. Local governments, seeking developments that both generate revenue and create jobs, are viewing seaport designations increasingly as burdens rather than future opportunities. BCDC has recognized that it needs to provide more flexibility in order to promote local interest in maintaining seaport site designations.

One option might be to allow a variety of commercial or perhaps light industrial uses with the enforceable legal commitment to vacate the site when needed for maritime development but no sooner than 15 years. The legal mechanisms to implement and enforce this concept have yet to be developed.

7. ISTEA Legislation

MTC is developing an Intermodal Management Plan, and MTC views the Seaport Plan as providing important input to the preparation of the freight element of this plan. Connections between marine terminals and rail terminals have become increasingly important with increased long-distance tonnage passing through West Coast ports. From 1982 to 1994,

the proportion of marine containers being transported by rail has increased from 15 to 40 percent.

Development of Recommendations

At the beginning of the update process, the need for future berths was expected to be lower because of increased capabilities of berths and the opportunity to add a significant number of military base sites to the available inventory of sites. The only issue, it seemed, would be to make a choice of which sites would be deleted. However, a combination of the recognized need to focus additional capacity in and adjacent to existing port developments, especially for containerized freight, and the staunch opposition of local governments to accept new site designations, and even to retain existing site designations where there is no active seaport activity, has made it difficult to set aside the capacity to meet future needs.

A total of 24 new berths are required to meet the projected need for 49 container berths in 2020. This requirement is expected to be met with a combination of new proposed berths and proposed conversion of bulk berths to container berths at Oakland (3 berths) and Richmond (8 berths), and additional berths recommended to be provided at the Naval Air Station in Alameda.

The recommendations will be given a review on several levels. First, some fine-tuning of the technical analysis will be required. It has become apparent that the capabilities of new sites will differ significantly from the average berth capabilities used to develop the preliminary recommendations. It is likely that this refined analysis will result in the need for additional capacity.

Second, an environmental assessment will be prepared that assesses the impacts of the proposed site designations on the natural environment. Potential problems exist with toxic contamination, wetlands, and endangered species; but it is not expected that environmental issues will be a fatal flaw in the development of seaport facilities on sites that have been recommended for development.

Finally, an institutional assessment will be made that considers the local willingness to have land designated for port development. The area does not have a regional port authority. Even though seaport sites take into account regional needs and are adopted by a regional agency, there is no regional authority to implement the elements of the Seaport Plan. It is assumed that market forces will develop the need for facilities, that maritime companies will choose to locate in or adjacent to port areas that currently have substantial infrastructure capabilities, that the facilities are economically feasible to develop and operate, and that local governments will provide the institutional leadership in the development of the ports. Local governments understandably are placing an emphasis on near-term

economic development activities that generate revenue and create jobs. These goals are particularly important in communities that must replace thousands of jobs and associated revenue (including multipliers) that will be lost when military bases are closed in the next two to three years. These communities must be shown that the long-term, regional need for additional seaport capacity outweighs local needs; and also that community needs are being considered and that no community will be asked to provide more than its "fair share" of seaport sites.

The major challenge facing implementation of the Seaport Plan will be obtaining a consensus that balances regional and local needs. This issue eclipses the significant environmental issues regarding bay fill and dredging that remain.