WEST COAST CORRIDOR STUDY INTERIM REPORT

JANUARY 1976

Prepared in response to Section 13 of the Amtrak Improvement Act of 1974

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16. Abstract

This interim report was prepared in response to the High Speed Ground Transportation Act as amended by Section 13 of the Amtrak Improvement Act of 1974 providing an early and realistic understanding of the magnitude and scope of the intercity transportation needs of the West Coast States. The findings include the following: (1) the problems are primarily State and local in character and are largely confined by differing demographic, geographic and travel characteristics to three distinct segments: the southern one-third of the corridor from Tijuana, Mexico to Sacramento, California, the northern one-third from Eugene, Oregon to Vancouver, Canada, and the middle one-third between Sacramento, California and Eugene, Oregon; (2) Statewide intermodal transportation planning should be encouraged to achieve a balanced transportation system in the area, and conserve energy resources; (3) the tentative economic social and environmental costs of advanced technology rail passenger systems outweigh the benefits to be achieved based upon population growth rates and the location of that growth, and (4) the study should be completed by each of the States reporting to the Secretary of Transportation, the results of in depth studies of their individual portions which will become the basis for the Final Report.

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INTRODUCTION

The Legislation

This interim report was prepared in response to the High-Speed Ground Transportation Act, as amended by Section 13 of the Amtrak Improvement Act of 1974. A final report is due January 30, 1977. The Amendment required that the Secretary of Transportation investigate and study the social advisability, technical feasibility, and economic practicability of a high-speed ground transportation system between the cities of Tijuana in the State of Baja California, Mexico, and Vancouver in the Province of British Columbia, Canada, by way of the cities of Seattle in the State of Washington, Portland in the State of Oregon, and Sacramento, San Francisco, Fresno, Los Angeles, and San Diego in the State of California.

The legislative report accompanying the amendment adds significantly to an understanding of the thrust of the study. According to the legislative history, the focus would be on a "comprehensive study of the future transportation needs of the entire West Coast and various alternatives for meeting the needs." Also, the legislative history clarifies that the analysis of route patterns should be flexible, since "there is no intent to require any specific routing between those population centers." It is clear that the intent of the amendment is that the study be directed toward major transportation issues affecting the West Coast States and not confined to an analysis of advanced high-speed technology systems. (S.Rep 93-1015) This interim report has laid a base for the fulfillment of statutory requirements specifically dealing with the matters contemplated by the Act

from information generated by the State planning effort described herein and from information otherwise available to or acquired by the Department.

Implementation

The West Coast Corridor Study, assigned by the Secretary to the Federal Railroad Administration (FRA), was designed by FRA as a study to provide an early and realistic understanding of the magnitude and scope of the intercity transportation needs of the West Coast States. Working with designated transportation planners from each of the three state governments and utilizing the services of a team of consultants, FRA developed the study objectives and specific tasks consistent with the intent of the Act. This report to the Congress is based on the insights gained as a result of that study and the close working relationship among state and Federal representatives.

The specific objectives of the study were to:

- Review the goals, objectives, and policies of the Federal, state, regional and local agencies that may have an interest in a transportation study of the West Coast Corridor;

- Identify, establish the location of, and determine the scope, format, and content of all data from Federal, state, and local sources relating to transportation, physical, and socio-economic characteristics of the West Coast Corridor which bear on intercity movement of goods and people;

- Develop an inventory of relevant data and a bibliography of reports relating to West Coast Corridor transportation;

- Identify specific sub-elements and/or city-pairs within the West Coast Corridor based on social, environmental, economic, demographic, and geographic characteristics as well as on existing and forecasted travel patterns;

The study objectives were translated into four(4) work tasks briefly summarized in the following paragraphs:

1. The first task was identification of goals, policies, and objectives of various public and private agencies and organizations concerned with inter-city transportation on the West Coast. The identification began with a review by the study team of all published statements of policy relating to intercity transportation by the States of Washington, Oregon, and California, as well as a review of similar documents published by regional and local agencies and citizen groups. Informal views were also solicited through discussion and interviews with policy-level representatives of statewide and regional councils of governments, transit operators, private carriers, and city and county officials. This review of published goals and informal policy views provided regional and localized views on the general questions of improved intercity transportation for the West Coast states.

2. The second major element in the study included the review and documentation of existing data pertaining directly or indirectly to intercity transportation. Similar to the review

of goals, objectives, and policies in task one, this investigation consisted of both reviews of published materials and interviews with agency representatives. A detailed bibliography of written reports and other published materials was prepared by a consultant. In addition, a listing was made of various sets of data which statewide or regional agencies either have in their possession or can obtain for future contract work.

Another aspect of the data inventory effort was the development of a transportation inventory, documenting existing and planned highway, airline, bus and railroad facilities within the corridor. This inventory of transportation facilities was used for preliminary evaluations of the potential for such facilities to accommodate projected demands for movement of people and goods. Rather than developing detailed mile-by-mile inventories of fixed facilities, the purpose of this effort was to determine whether such inventories exist and to pinpoint their location and utility.

The final aspect of the data work included an assessment of data deficiencies. In order to determine what additional information would be needed for future studies of the West Coast Corridor, data were reviewed for adequacy, availability and format to determine their usefulness and compatibility for any future studies.

3. The third major work element of the West Coast Study involved the development of an overview of Corridor characteristics, including geology, topography, population, environment, existing transportation facilities, and passenger and freight demand. Based on these broad types of charateristics, groupings of relevant sub-elements within the three States were proposed in order to conduct discrete analyses of transportation problems and opportunities.

4. The fourth task in the study consisted of the selection of the additional study data based on the assessments of need and the adequacy and availability of existing data. On the basis of reports of the first three tasks, as well as the input on the part of the three States and other agencies concerned, FRA has elected a course considered suitable for the complete study.

Summary of Findings and Recommendations

1. Existing and future transportation problems are primarily state and local in character and are largely confined to three distinct segments by differing demographic, geographic and travel characteristics. These are:

- Tijuana, Mexico, to Sacramento, California;
- Sacramento, California, to Eugene, Oregon,
- Eugene, Oregon, to Vancouver, Canada

2. Comprehensive, statewide transportation planning should be encouraged to achieve balance in intercity and interstate transportation services and in energy conservation.

3. Based on the population growth rate and location of that growth as expected by the three West Coast States, the economic, social and environmental costs of new technology passenger systems, such as track levitated vehicles, outweigh the benefits to be achieved.

4. While the Act requires the Secretary of Transportation to undertake the comprehensive study of transportation alternatives in the West Coast states, the initial study has clearly identified that the study alternatives are those which a state would analyze and review in its regular internal transportation planning activities. Therefore, it is the Secretary's intention to complete the study of the West Coast Corridor by allocating funds presently appropriated ($500,000) to the three states for the purpose of providing the Secretary with multimodal analyses of transportation alternatives within their jurisdictions. Emphasis is to be placed on those markets not previously studied and in which currently there is heavy travel. The results from the analyses will be incorporated by the Secretary in his final report to Congress.

THE CORRIDOR

GEOGRAPHICAL AND TOPOGRAPHICAL CHARACTERISTICS

The States of Washington, Oregon, and California and the specific cities defined in the legislation comprise the West Coast Corridor as shown in Figure 1. This figure illustrates the approximate highway mileage via interstate highway between each city pair. Highway mileage was chosen for this illustration because it generally falls between air mileage and the more circuitous rail mileage.

As shown in Figure 1, the longest gap between the cities specified in the legislation is 583 miles between Portland and Sacramento. The closest major city-pair between Oregon and California is Eugene and Sacramento, which are 472 miles apart. North of Eugene, the widest separation between city-pairs is 145 miles between Portland and Tacoma. Within California, the largest gap between urban areas is the Interstate 5 (I-5) route between San Francisco and Los Angeles, approximately 380 miles.

Figure 2 illustrates the significant topographic features within the West Coast Corridor. Two major north/south chains of mountains run almost the length of the Corridor, decreasing in size toward the extreme southern end. Along the Pacific Ocean, the Coast Range extends from Puget Sound south to the Los Angeles Basin. The Cascade Range runds through the center of Washington and Oregon and extends into Northern California. The

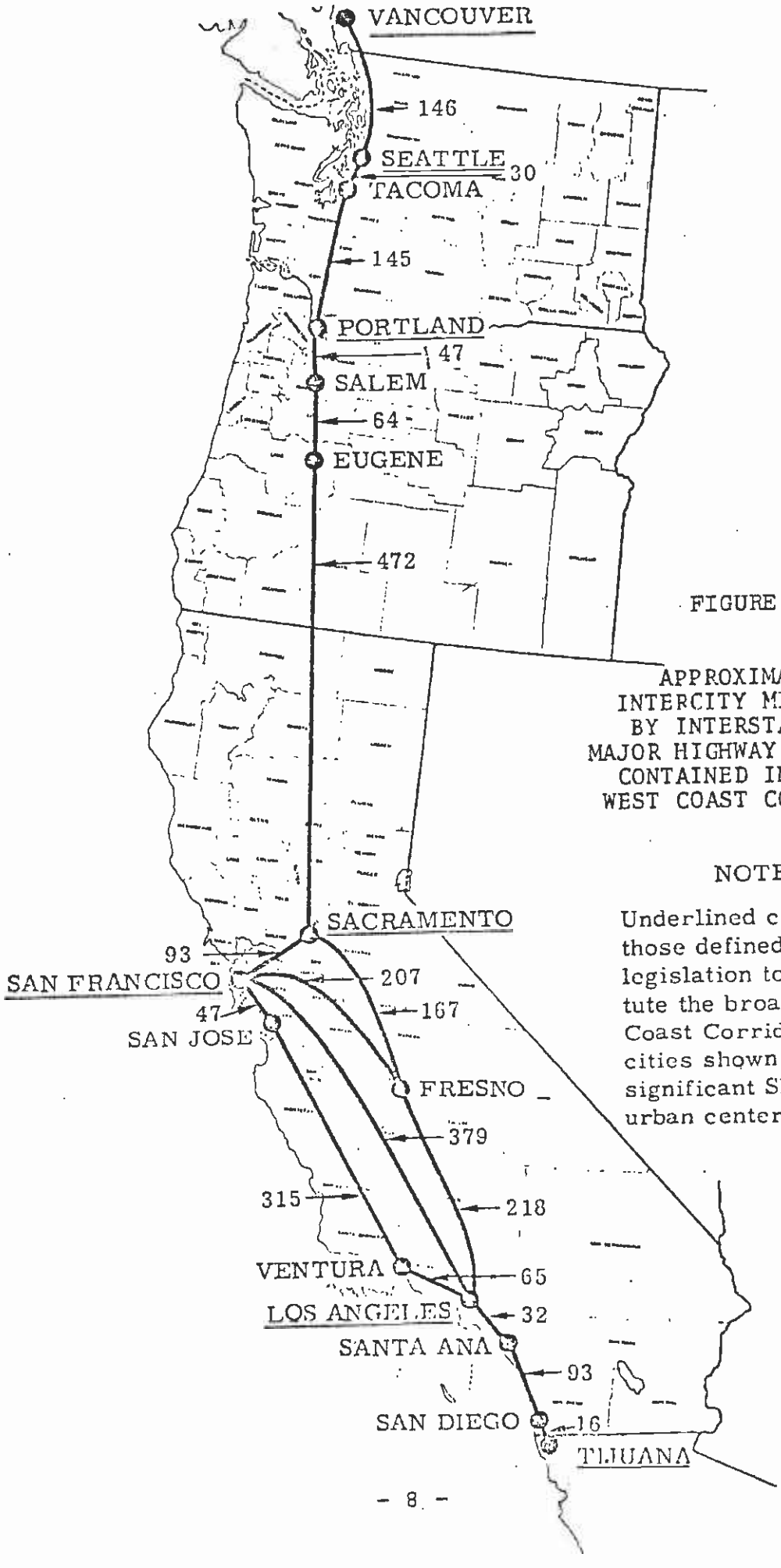


FIGURE 1

APPROXIMATE INTERCITY MILEAGES BY INTERSTATE OR MAJOR HIGHWAY OF SMSAs CONTAINED IN THE WEST COAST CORRIDOR

NOTE:

Underlined cities are those defined in the legislation to constitute the broad West Coast Corridor. Other cities shown represent significant SMSAs or urban centers.

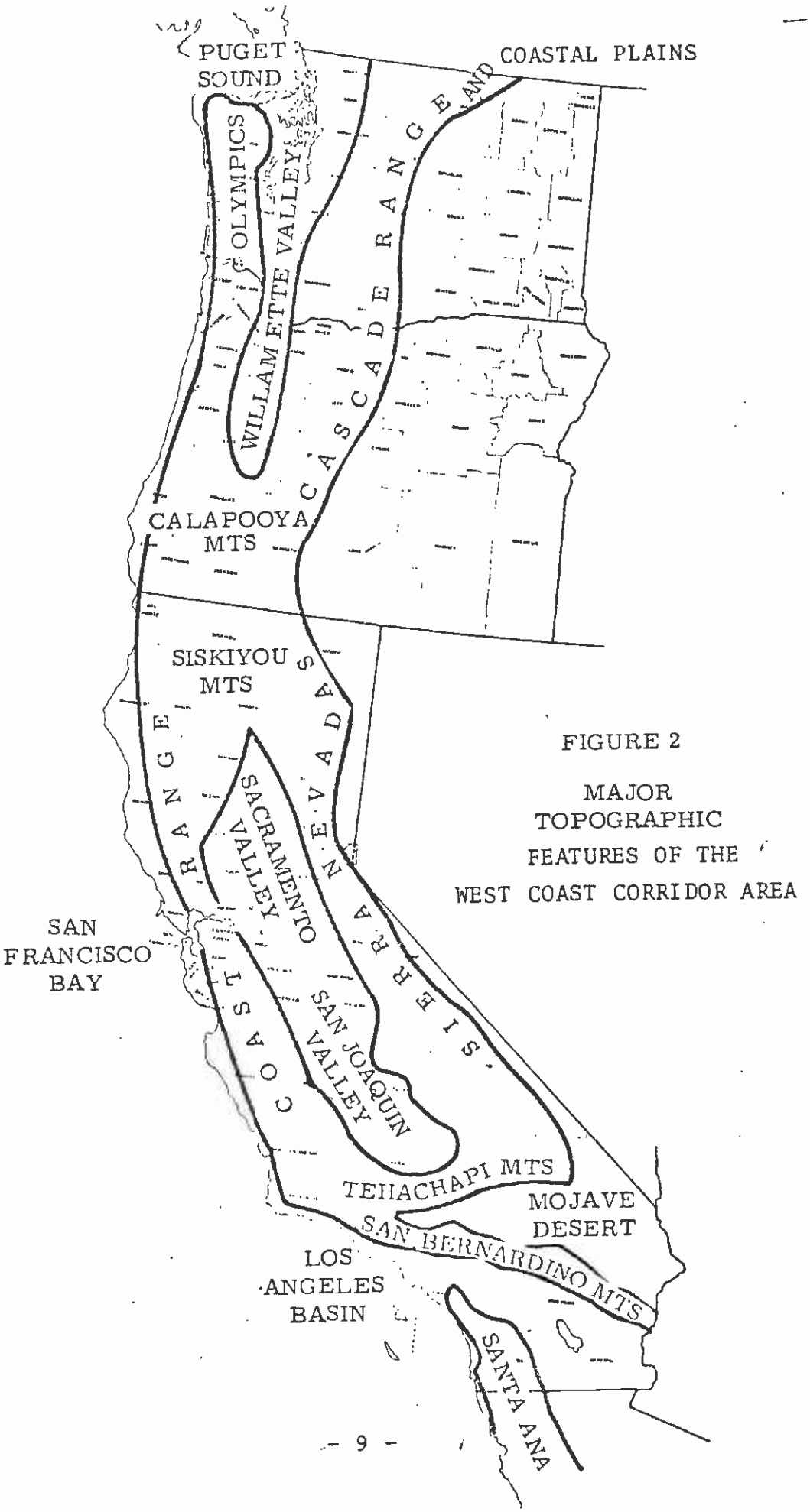


FIGURE 2

MAJOR TOPOGRAPHIC FEATURES OF THE WEST COAST CORRIDOR AREA

Sierra Nevada Range begins and extends south along the eastern edge of California to the Mojave Desert. Thus, in topographic terms, the West Coast Corridor is bounded roughly by the Coast Range on the west and the Cascade/Sierra Nevada range on the east.

The two major north/south mountain ranges are connected by east/west ranges at two points. Along the California/Oregon border, the Coast Range and Cascade range are connected by the Siskiyou Mountains. A similar situation exists in Southern California where the Tehachapi Mountains join together the Coast Range and the Sierra Nevadas. Both of these east/west mountain ranges cut off and isolate fertile, relatively flat valleys or river basins from each other. It is in these valleys that extensive development has occured.

POPULATION CHARACTERISTICS

Population in the West Coast Corridor is concentrated in the Puget Sound Basin, the Willamette Valley, the San Francisco Bay area, the Sacramento and San Joaquin Valleys (which together comprise the Central Valley), and the Los Angeles/San Diego Basin.

The major population centers in the West Coast Corridor are located in the valleys and on the coastal plains formed by the Cascade and Coast Ranges. The relative size, in terms of population, of the counties and Standard Metropolitan Statistical Areas (SMSA) is illustrated in Table 1.

Table 1

West Coast SMSA Populations
By Center City and Total SMSA

		Within City	SMSA
1.	Los Angeles-Long Beach	3,174,694	7,032,070
2.	San Francisco-Oakland	1,077,235	3,109,519
3.	Seattle	584,453	1,421,869
4.	Anaheim-Santa Ana-Garden Grove	445,826	1,420,386
5.	San Diego	696,769	1,357,854
6.	San Jose	445,779	1,064,714
7.	Portland	382,619	1,009,120
8.	Vancouver, B.C.	408,108	980,000
9.	Sacramento	254,413	800,592
10.	Fresno	165,972	413,053
11.	Tacoma	154,581	411,027

Counties included in the West Coast Corridor by this study were generally those intersected by the major north-south highway and railroad routes and those that are part of SMSAs along the West Coast Corridor. Figure 3 compares graphically the 1970 population of the counties and SMSAs comprising the corridor.

Seven of the top 11 Corridor SMSAs are in California. The Bay area (San Francisco and San Jose SMSAs with 4.2 million combined population) and the Los Angles Basin (Los Angeles and Anaheim SMSAs with 8.5 million combined

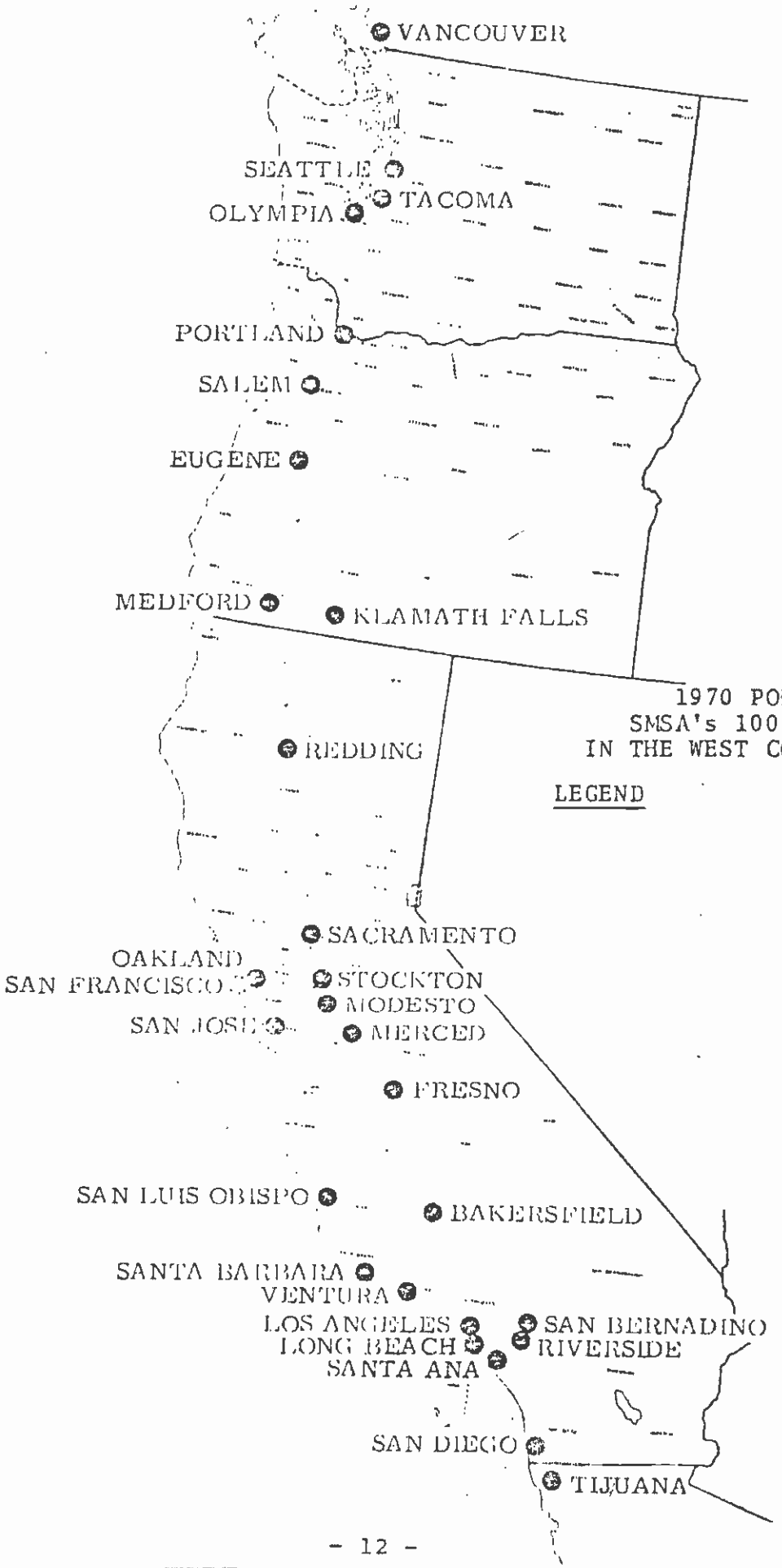


FIGURE 3

1970 POPULATION IN
SMSA's 100,000 OR LARGER
IN THE WEST COAST CORRIDOR AREA

LEGEND

100,000

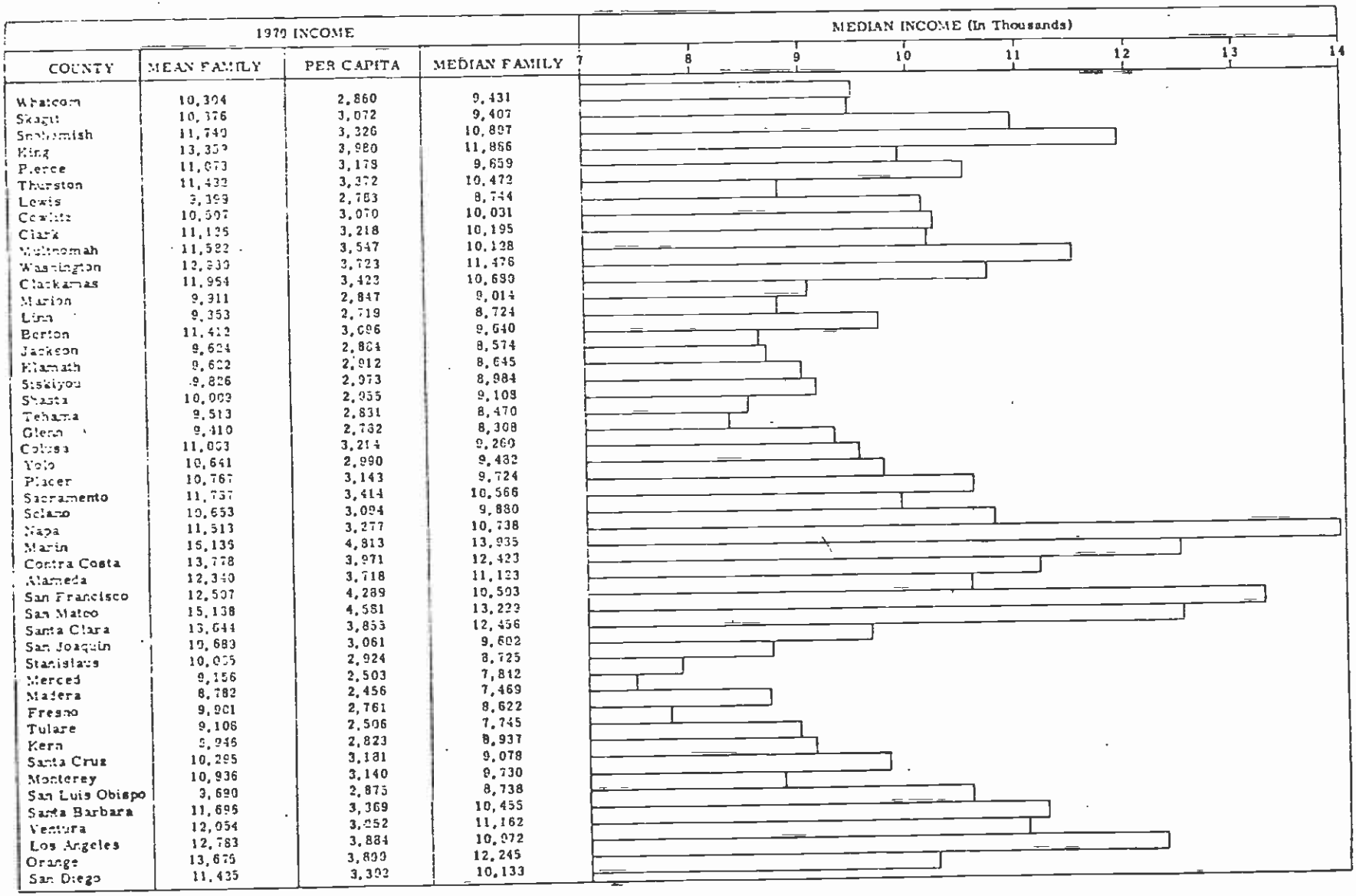
500,000

1,000,000

10,000,000

population excluding Riverside and San Bernardino counties) dominate with the San Diego SMSA third with 1.4 million population in 1970. In the Pacific Northwest, the Seattle SMSA predominates with a 1.4 million population, followed by the Portland SMSA with a 1.0 million population in 1970. An important conclusion, apparent in Figure 3, is the lack of a strong population center in a 500-mile segment between the Eugene SMSA and the Sacramento/San Francisco area. Historically, this has been a result of the rugged topography in this portion of the Corridor. These counties are predominately rural with an economic base centered around agriculture and the forest products industries. Within this segment in Oregon, the Cities of Grants Pass, Medford, and Ashland have a combined population of only 53,241. Within California, the largest cities in this segment of the corridor are Redding (16,659) and Chico (19,580). While these two cities are part of several multicity complexes, even these complexes are relatively small. They are Redding/Enterprise/Anderson (33,637), Chico/Paradise (34,119), and also Yuba City/Marysville/Linda (31,070).

Another important characteristic of the population which influnces transportation demand is the distribution of income among the communities comprising the West Coast Corridor. Figure 4 illustrates the relative income for each of the counties along the Corridor in terms of mean family income, per capita income, and median family income for 1970.



COUNTY	MEAN FAMILY	PER CAPITA	MEDIAN FAMILY
Whatcom	10,304	2,860	9,431
Skagit	10,376	3,072	9,407
Snohomish	11,740	3,326	10,807
King	13,359	3,980	11,866
Pierce	11,073	3,178	9,659
Thurston	11,432	3,372	10,472
Lewis	9,399	2,783	8,744
Cowlitz	10,507	3,070	10,031
Clark	11,135	3,218	10,195
Multnomah	11,522	3,547	10,138
Washington	12,830	3,723	11,476
Clackamas	11,954	3,423	10,690
Marion	9,311	2,847	9,014
Linn	9,353	2,719	8,724
Benton	11,412	3,096	9,640
Jackson	9,624	2,804	8,574
Klamath	9,622	2,912	8,645
Siskiyou	9,826	2,973	8,984
Shasta	10,009	2,955	9,109
Tehama	9,513	2,831	8,470
Glenn	9,410	2,782	8,308
Colusa	11,003	3,214	9,260
Yolo	10,641	2,990	9,482
Placer	10,767	3,143	9,724
Sacramento	11,737	3,414	10,566
Solano	10,653	3,094	9,880
Napa	11,513	3,277	10,738
Marin	16,136	4,813	13,935
Contra Costa	13,778	3,971	12,423
Alameda	12,340	3,718	11,123
San Francisco	12,507	4,289	10,503
San Mateo	15,138	4,581	13,229
Santa Clara	13,644	3,853	12,456
San Joaquin	10,683	3,061	9,602
Stanislaus	10,055	2,924	8,725
Merced	9,156	2,503	7,812
Madera	8,782	2,456	7,469
Fresno	9,901	2,761	8,622
Tulare	9,106	2,506	7,745
Kern	9,946	2,823	8,937
Santa Cruz	10,295	3,181	9,078
Monterey	10,936	3,140	9,730
San Luis Obispo	9,690	2,875	8,738
Santa Barbara	11,695	3,369	10,455
Ventura	12,054	3,252	11,162
Los Angeles	12,783	3,884	10,972
Orange	13,675	3,890	12,245
San Diego	11,435	3,302	10,133

FIGURE 4

MEAN, PER CAPITA, AND MEDIAN FAMILY INCOMES BY COUNTIES ALONG THE WEST COAST CORRIDOR FOR THE YEAR 1970

AIR QUALITY AND ENVIRONMENTAL CHARACTERISTICS

One of the major environmental impacts of intercity transportation in the West Coast Corridor is its effect on the status of air quality in in the corridor. Although the development of any new major intercity transportation system will have significant impact on the inducement of growth, land use and other such physical characteristics, the existing systems primarily impact upon air quality. Figure 5 illustrates the air quality maintenance areas (AQMA) defined for the three West Coast states. The primary pollution source is auto emmissions (primarily an urban problem), although there are significant heavy industry point sources in the Los Angeles Basin and in the Portland and Tacoma areas that contribute to reduced air quality. Major air quality problems exist in the Coastal Cities of Los Angeles, San Diego, San Francisco, Portland and Seattle, where hills or mountains on the inland side of the urban areas prevent dispersion of emmissions pushed inland by offshore breezes.

Intercity transportation has but a small impact on the total level of air pollution in the region. Intercity travel volumes are quite small in relation to the total level of travel, which consists primarily of local trips. In terms of passenger miles of travel (PMT), intercity trips by all modes between the 19 major urban areas included in the West Coast Corridor are equivalent to only about 18 per cent of total passenger

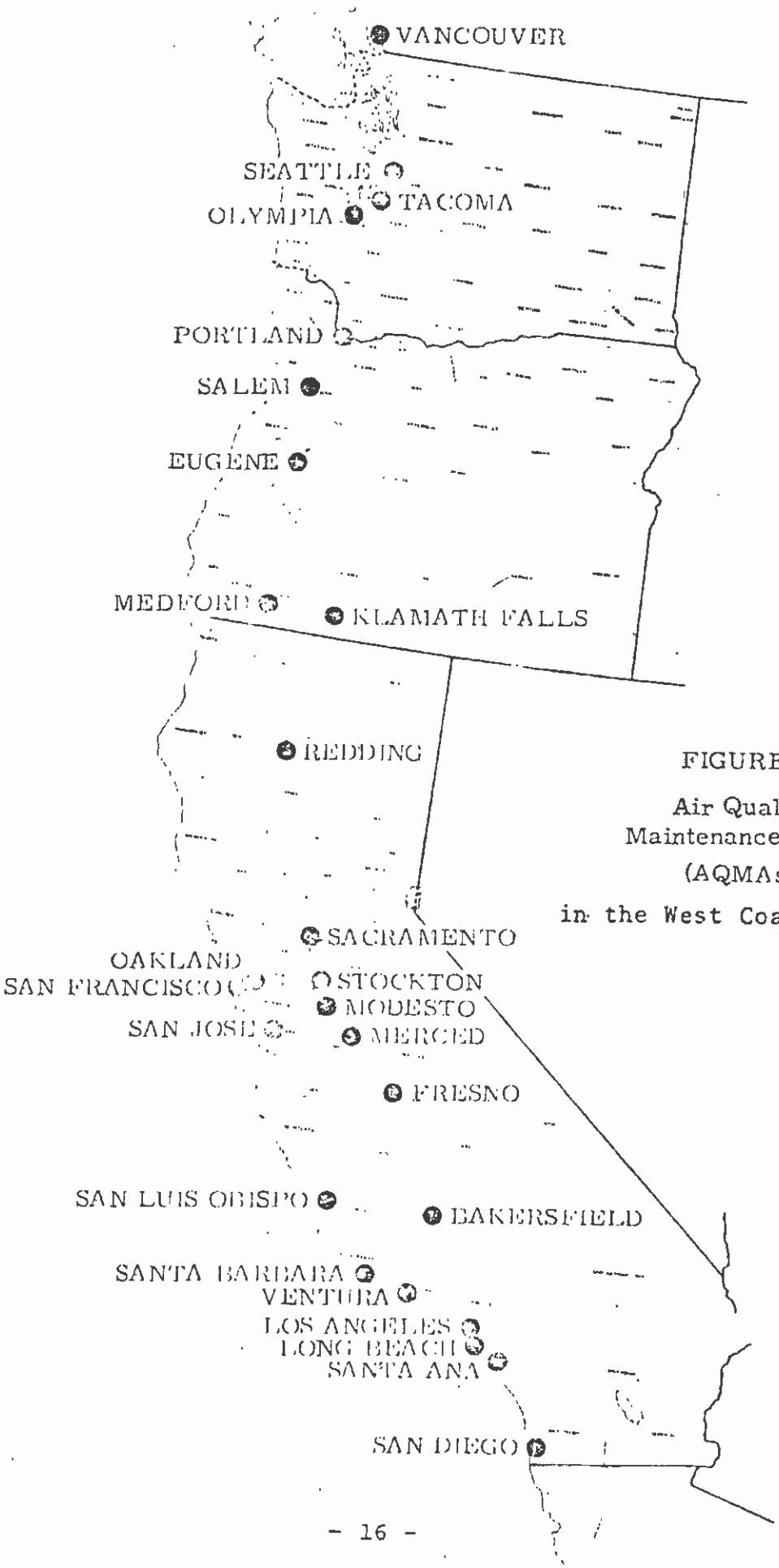


FIGURE 5

Air Quality
Maintenance Areas
(AQMAs)
in the West Coast Corridor

miles of travel by auto in the three States.[1] When air, bus, and rail passenger-miles are included in the total PMT estimates, the percentage for all intercity trips is estimated to be about 15 percent of total travel.

EXISTING INTERCITY TRANSPORTATION FACILITIES, ROUTES AND VOLUMES

This section presents an overview of the existing highway, rail, and air fixed facilities within the West Coast Corridor. Various types of transportation services make use of these fixed facilities: private automobiles, trucks, and buses on the highway system; local and through freight and intercity passenger trains on the rail system; and intrastate and interstate commercial carriers as well as general aviation in the air system.

Highway Facilities

The major highway routes serving intercity travel (defined for this study as travel between metropolitan centers separated by a distance of at least 50 miles) along the West Coast Corridor are shown in Figure 6. This figure also shows existing lanes for each segment of these highway routes. The primary intercity route is I-5, which extends from the Mexican border near Tijuana to the Canadian border near Vancouver (except for a short, uncompleted section in California between Stockton and Sacramento), and

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[1] Based on vehicle miles traveled estimates from Highway Statistics 1970 (FHWA) and national auto occupancy factor of 1.9 from Nationwide Personal Transportation Study (FHWA).

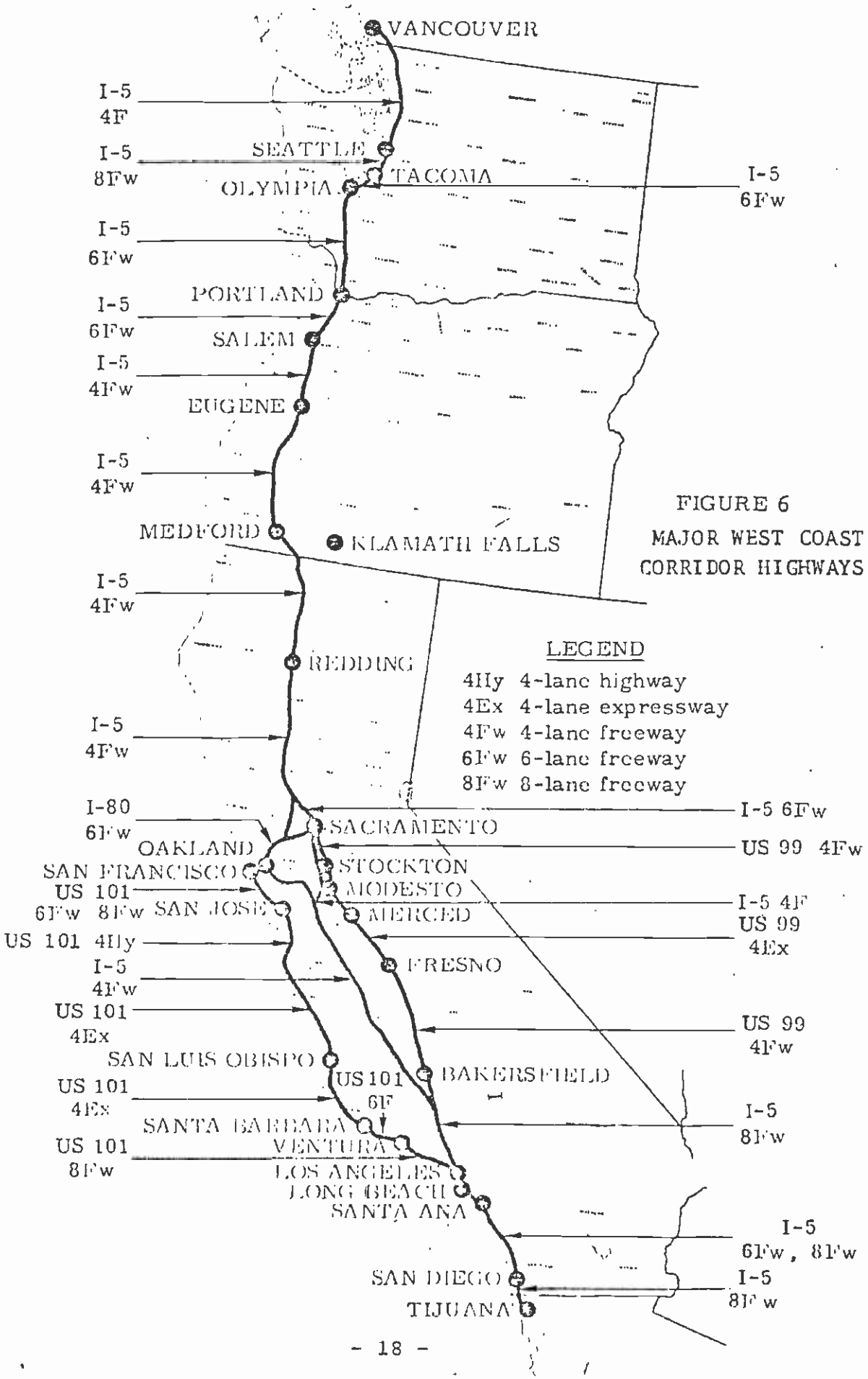

FIGURE 6
MAJOR WEST COAST
CORRIDOR HIGHWAYS

passes directly through the major metropolitan areas of San Diego, Los Angeles, Sacramento, Portland and Seattle. In California, substantial intercity Corridor travel is also served by three other major Corridor highways: U.S. 101, a coastal route connecting Los Angeles and San Francisco; U.S. 99, which connects the communities of Stockton, Modesto, Merced, Fresno, and Bakersfield with Los Angeles; and Interstate 80 which links San Francisco and Sacramento.

Rail Facilities

The existing main line rail facilities shown in Figure 7 are primarily single track lines; the only significant sections of double track are Everett to Portland, Sacramento to Oakland, and within the Los Angeles urban area. Complementing the main line rail facilities are secondary routes which exist in the West Coast Corridor between Portland and Los Angeles. The numbers of Amtrak passenger trains utilizing the main rail lines are shown in Figure 8. No new facilities are known to be planned.

Lines carrying the heaviest traffic are either double track or have Centralized Traffic Control on single track. Steep mountain grades must be negotiated on the Southern Pacific main lines between Eugene and Chemult, between Black Butte and Dunsmuir, and between Bakersfield and Mojave. Shorter sections of severe grade on the Southern Pacific Siskiyou Line between Eugene and Black Butte, on the Coast Line north of San Luis Obispo, and north of Burbank impose very slow speeds on train operations due to

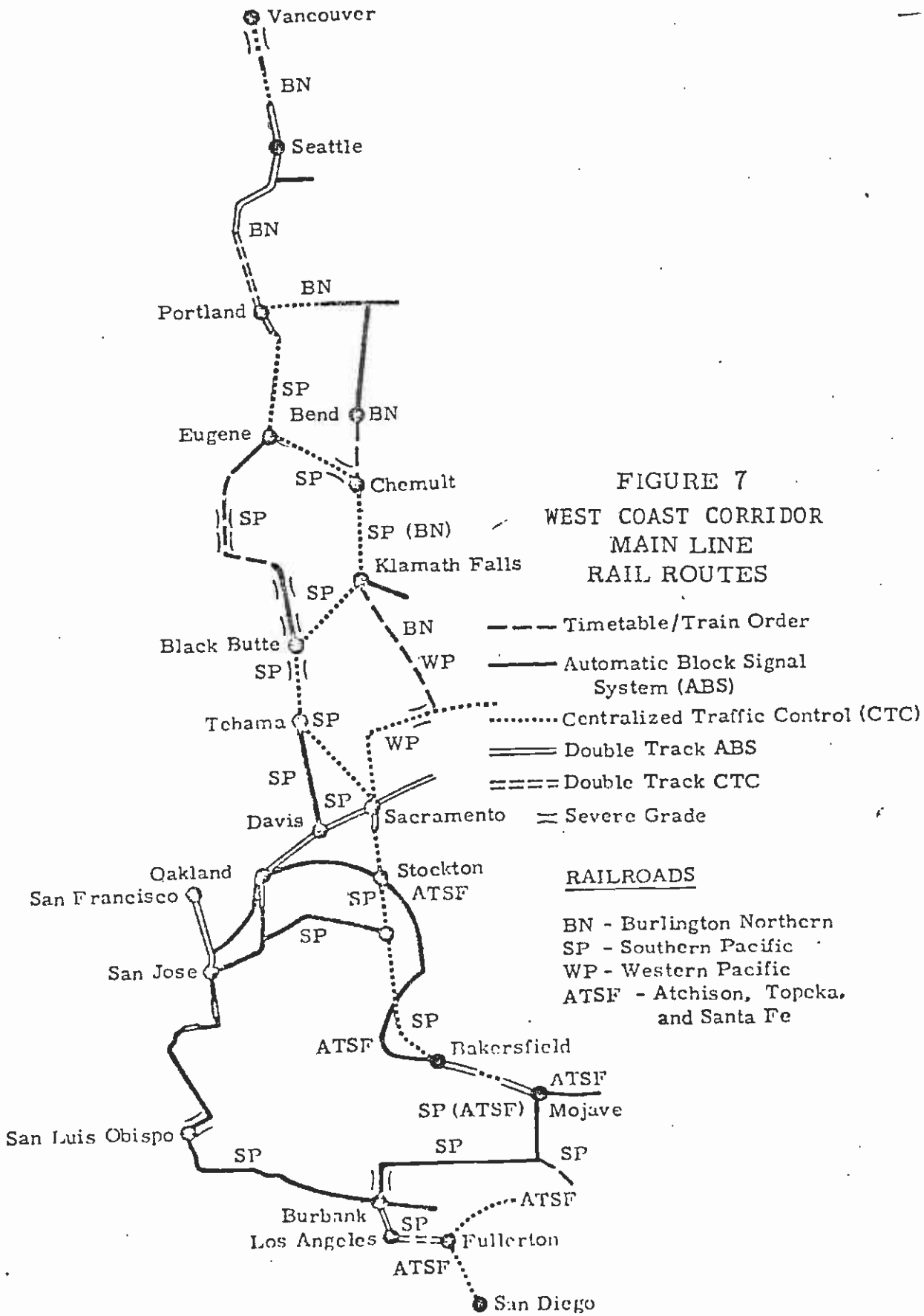

FIGURE 7
WEST COAST CORRIDOR
MAIN LINE
RAIL ROUTES

FIGURE 8

PRESENT AMTRAK SERVICE LEVELS (Daily Round Trips) ON WEST COAST CORRIDOR

..... connecting bus or commuter rail service

▭ transfer required

SCHEDULE	ROUND TRIP
Vancouver-Seattle	1
Seattle-Portland	2
Seattle-Los Angeles	1
Oakland-Bakersfield	1
Oakland-Sacramento	1
Los Angeles-San Diego	3

both safety considerations and curvature of the track. There are fifty tunnels along the Amtrak route between Seattle and Los Angeles, and there are dozens of others on the secondary lines.

Air Facilities

Air facilities in the West Coast Corridor consist of a number of commercial, general aviation, and combined-use airports serving a variety of air travel demands and a vast range in numbers of operations and passengers. The most significant of the Corridor air facilities are listed in Figure 9, This figure provides estimates of passenger and aircraft utilization of Corridor airports for 1974. The Los Angeles International Airport is by far the largest in terms of both passengers served and commercial air carrier operations. In terms of total operations, the Santa Ana Airport in Orange County is first; however, the majority of operations at this airport consist of general aviation. The largest market for air travel in the Corridor is between Los Angeles and San Francisco. In fact, this air corridor is the most heavily traveled in the country in terms of air passengers. Commercial aviation as a means of travel between cities in the Corridor decreases in importance with decreasing distance between city pairs. Thus, important city pairs for air travel in the West Coast Corridor include the following:

1. Los Angeles - San Francisco

2. Los Angeles - Seattle

Rank By Enplanements	Airport	1974 Enplanements (000)			1974 Operations[c] (000)		
		Interstate Carriers[a]	Intrastate Carriers[b]	Total	Air Carrier	Others	Total
1	Los Angeles International	9,007	4,259	13,266	342.5	118.2	460.7
2	San Francisco International	6,118	3,290	9,408	268.2	65.1	333.3
3	San Diego, Lindbergh	1,302	1,996	3,298	70.2	120.6	190.8
4	Seattle - Tacoma International	7,854	--	2,854	106.5	54.4	160.9
5	San Jose Municipal	261	1,825	2,086	50.2	364.9	415.1
6	Oakland International	333	1,643	1,976	55.7	287.3	343.0
7	Hollywood Burbank	137	1,625	1,762	30.0	184.1	214.1
8	Portland International	1,510	--	1,510	75.3	107.7	183.0
9	Sacramento Metro.	472	901	1,373	32.5	64.7	97.2
10	Santa Ana, Orange County	--	1,058	1,058	27.1	578.4	605.5
11	Ontario International	319	441	760	31.1	97.3	128.4
12	Fresno Air Terminal	305	--[d]	305	14.1	200.1	214.2
13	Long Beach, Daugherty Field	--	280	280	5.8	539.1	544.9
14	Monterey Peninsula	235	--	235	10.1	85.9	96.0
15	Santa Barbara	143	--	143	6.7	190.7	197.4
16	Eugene, Mahlon Sweet	137	--	137	8.1	124.8	132.9
17	Bakersfield, Meadows	94	--	94	5.6	125.9	131.5
18	Medford	94	--	94	5.9	120.6	126.5
19	Stockton Metro	30	--[d]	30	7.8	126.5	134.3

a. Source: Airport Activity Statistics of Certificated Route Air Carriers, 12 months ended December 31, 1974, Civil Aeronautics Board and USDOT/ FAA .

b. Source: Intrastate Air Passengers Origin and Destination Report, Form 5011, State of California Public Utilities Commission, Transportation Division, 1974.

c. Source: FAA Air Traffic Activity, Calendar Year 1974, U.S. Department of Transportation, Federal Aviation Administration.

d. Enplanements for these areas are not contained in (b). They do have a significant volume of enplaments on intrastate carriers (specifically PSA); however, the numbers are not readily available.

FIGURE 9: EXISTING WEST COAST CORRIDOR AIRPORT ACTIVITY (1974)

3. Los Angeles - Portland

4. San Francisco - Portland

5. San Francisco - Seattle

Data for utilization for air travel between West Coast Cities and Vancouver were not obtained.

TRAVEL DEMAND

Intercity travel has been defined for purposes of this study as that between major cities in the Corridor (primarily SMSAs) about 50 or more miles apart, although selected smaller cities have been included in certain areas for comprehensiveness. On this basis, it is estimated that approximately 70 million one-way intercity person trips were made in 1973 along the West Coast Corridor. As shown in Figure 10, the distribution of these trips is concentrated in the upper and lower thirds of the Corridor and reaches its highest concentration toward San Deigo, where it approaches 30 million trips per year. Only about 8 million of 70 million total person-trips are interstate and about 8 million are international.

Although relatively little information is available about intercity travel in much of the Corridor, it is generally possible to make some estimates of travel between cities, especially city-pairs with longer distances between them, using relatively reliable air carrier data collected by the Civil Aeronautics Board and the California Public Utilities Commission. Air travel volumes were used with estimated modal shares developed, using

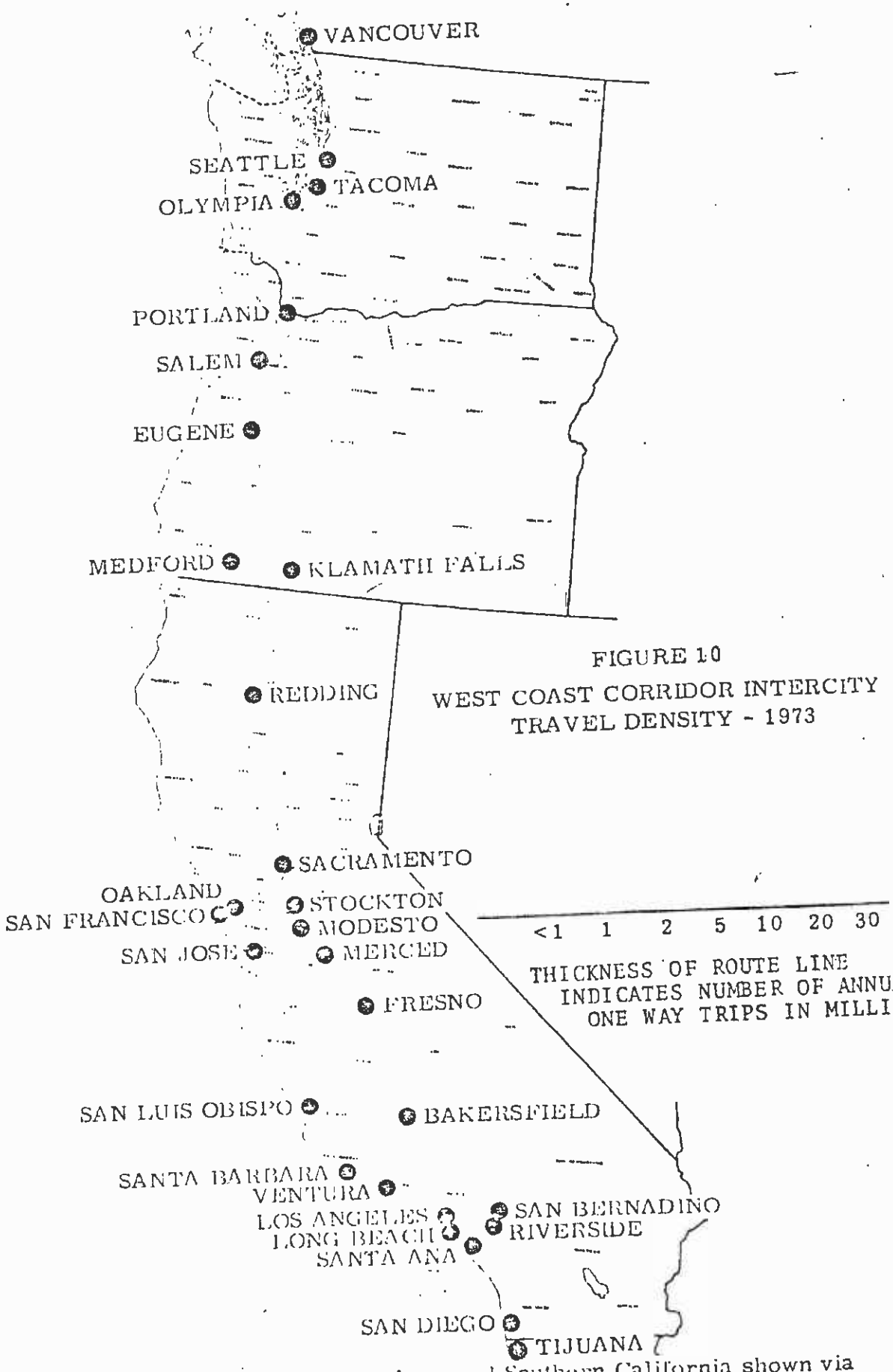

FIGURE 10

WEST COAST CORRIDOR INTERCITY TRAVEL DENSITY - 1973

NOTE: All travel between Bay Area and Southern California shown via the San Joaquin Valley regardless of the actual route travelled.

a modal split model and the relative travel impedance (trip time, cost, frequency of service) of available modes to estimate total travel between each major city-pair in the Corridor. Travel estimates, especially for shorter city-pairs are supported by data from several available intercity studies.

Based on estimates, a ranking of city-pairs by volume was prepared and is shown in Table 2. The largest city-pair by far is Los Angeles-San Diego with over 20 million person-trips a year. (It is also the city-pair with the largest travel volume in the country). Second is Los Angeles-San Francisco with about 8 million passengers a year.[1/] However, four of the eight largest city-pairs are in the northern and southern portion of the Corridor. The largest city-pair between the northern and southern portion of the Corridor is Seattle/Tacoma-San Francisco with about 600,000 travelers per year. It is the task of intercity rail to capture a significant share of these markets to produce a viable rail system.

Table 3 presents the same set of city-pairs by passenger-miles of travel. On this basis, the city-pairs from Los Angeles to both San Francisco and San Diego rank equal, while Seattle/Tacoma-Portland moves to third place in the West Coast Corridor volume ranking.

The largest city-pair in this ranking to connect both northern and southern cities in the Corridor is Los Angeles-Seattle/Tacoma, which ranks fifth.

[1/] In all these estimates, Orange County (Santa Ana) has been separated from Los Angeles for analysis within California. San Francisco estimates San Jose and the East Bay area.

TABLE 2: IMPORTANT CITY PAIRS BY VOLUME

More than 5 million travelers per year

Los Angeles - San Diego
Los Angeles - San Francisco

3 to 5 million travelers per year

San Francisco - Sacramento
Portland - Salem
Santa Ana - San Diego
Seattle/Tacoma - Portland
Seattle/Tacoma - Vancouver, B.C.

1 to 3 million travelers per year

Portland - Eugene
Los Angeles - Santa Barbara
Los Angeles - Sacramento
San Francisco - Santa Ana

0.5 to 1 million travelers per year

San Francisco - San Diego
San Francisco - Seattle/Tacoma
Eugene - Salem

0.3 to 0.5 million travelers per year

Los Angeles - Seattle/Tacoma
San Francisco - Portland
San Francisco - Fresno
Los Angeles - Bakerfield
Los Angeles - Fresno
Portland - Vancouver, B.C.
Los Angeles - Portland

0.1 to 0.3 million travelers per year

Seattle/Tacoma - Salem
Los Angeles - Vancouver, B.C.
Sacramento - Santa Ana
San Francisco - Eugene
San Francisco - Vancouver, B.C.

TABLE 3: IMPORTANT CITY PAIRS BY PASSENGER MILES OF TRAVEL

About 2.5 billion passenger-miles per year

Los Angeles - San Francisco
Los Angeles - San Diego

300 to 600 million passenger-miles per year

Seattle/Tacoma - Portland
Los Angeles - Sacramento
Los Angeles - Seattle/Tacoma
San Francisco - Seattle/Tacoma
San Francisco - San Diego
Seattle/Tacoma - Vancouver, B.C
San Francisco - Santa Ana
San Francisco - Sacramento
San Diego - Santa Ana

100 - 300 million passenger-miles per year

Los Angeles - Portland
San Francisco - Portland
Los Angeles - Vancouver, B.C.
Portland - Eugene
San Francisco - Vancouver, B.C.
Los Angeles - Santa Barbara
Portland - Salem
Portland - Vancouver, B.C.
Seattle/Tacoma - San Diego

DIFFERENCES BETWEEN THE WEST COAST CORRIDOR AND THE NORTHEAST CORRIDOR

The West Coast Corridor differs significantly from the Northeast Corridor in geography, demographic distribution, population and spatial arrangement. The Northeast Corridor is a true megalopolis with solid, densely populated, contiguous counties stretching for 450 miles from Boston to Washington. It consists of more than 23 percent of the total U. S. population on approximately two percent of the Nation's land surface. The Corridor, as it is defined in the Department of Transportation's Northeast Corridor Report, omits large portions of the States of New York, Massachusetts, Pennsylvania, and Maryland because only small portions of these States are impacted by the Corridor transportation spine. It does include the eastern segments of those states and the entire States of New Jersey, Rhode Island, Connecticut, Delaware and the District of Columbia. The terrain is relatively flat, whether the right-of-way is above or below the fall line of the Piedmont.

The West Coast Corridor, as designated in the legislation, is 1500 miles long. Stretching from Vancouver, Canada, to Tijuana, Mexico, it is sparsely populated for much of its length, and travel demand diminishes as travel time and distance between city-pairs increase. The terrain is rugged: a rail line or highway must traverse the imposing east-west mountain ranges -- the Tehachapi, the San Bernardino, and the Siskiyou Mountains -- making the operating costs and the construction costs of new high-speed

ground facilities extremely expensive. Even if the entire States of Oregon, Washington and California were to be included in the West Coast Corridor, this huge Corridor area would contain barely 12 percent of the Nation's population and 323,846 square miles, 9 percent of the total United States land area.

Tables 4 and 5 show the 1970 SMSA population and the density per square mile of the central city portions and non-central city portions of the largest West Coast Cities. The Northeast Corridor contains 9 large cities along the spine of the railroad, none with less than 500,000 inhabitants in the Standard Metropolitan Statistical Area (SMSA). Several of the West Coast Corridor's 11 largest SMSAs are quite small compared with the largest SMSAs in the Northeast Corridor with respect to both total population and population per square mile.

The two largest metropolitan areas on the West Coast, San Francisco/Oakland and Los Angeles/Anaheim, are almost 400 miles apart with almost no sizeable population concentrations in between. The middle section between Sacramento and Eugene, with almost nothing in the way of transportation generators except for scenery and the lumber and agricultural industries, is 472 miles long. The dispersion of cities along the spine of the Northeast Coast is much smaller; none of the 8 largest cities is more than 100 miles from another large city.

Table 4

Population and population density of Northeast Corridor Cities

City	SMSA population (thousands)	POPULATION PER SQUARE MILE in central cities	POPULATION PER SQUARE MILE outside central cities
Boston	2,754	8,595	1,513
Providence	911	5,550	778
New Haven	745	4,267	830
New York	11,529	26,252	1,993
Newark	1,857	15,164	2,179
Philadelphia	4,818	15,164	838
Wilmington	500	6,231	364
Baltimore	2,071	11,568	534
D. C.	2,861	12,321	919

Table 5

Population and population density of West Coast Corridor Cities

City	SMSA population (thousands)	POPULATION PER SQUARE MILE in central city	POPULATION PER SQUARE MILE outside central city
Vancouver (Metropolitan Area)	980	1882	
Seattle/Tacoma	1,833	6,353	202
Portland	1,009	5,780	175
Eugene	213	5,194	30
Sacramento	801	5,679	161
San Francisco/ Oakland	3,110	11,037	497
San Jose	1,065	2,629	33
Fresno	413	6,147	42
Los Angeles/Anaheim/ Santa Ana	8,452	4,200	1,115
San Diego	1,358	3,579	163

Metropolitan Area of Vancouver is 535 square miles. This number is necessary to compute population per square mile since Canadian data do not indicate a split between central city and outside central city as is done in U. S. data.

ANALYSIS

As a result of the consultant's analyses of population growth and traffic growth, certain transportation problems in the West Coast Corridor are expected to be significant by the year 2000. These analyses are summarized in the following paragraphs.

The continuing redistribution of population in favor of the Pacific Coast region presents transportation problems for two of the major segments of the West Coast Corridor. In the South, between Tijuana/San Diego and Sacramento, the population forecast is for an increase of 38 percent in the next 25 years which will produce more congestion in this segment's intercity transportation system. Given relatively stable petroleum supplies, the high cost of a rail solution to these congestion problems would probably be prohibitive because of the distances and terrain features which would have to be traversed. On the other hand, if another severe petroleum shortage occurs, there could be a substantial increase in the diversion of auto travel to rail, requiring the addition of passenger trains on existing rights-of-way and creating major capacity conflicts with freight traffic. Under this severe petroleum shortage scenario, an expansion of rail facilities might be desirable and feasible. Therefore, in either case, problems and potentials of this segment need to be evaluated. Other local problems are air quality, environmental protection, and the conservation of energy.

In the north between Eugene, Oregon, and Vancouver, British Columbia, the density of freight traffic makes adding more Amtrak trains difficult.

The heavy population growth (projected to increase by more than 50 percent by the year 2000), a possible petroleum shortage, and the fact that terrain in the Northern segment is more conducive to construction of rail or high-speed facilities, and of sufficient concern to make a study of potential rail ridership in this segment worthwhile.

In the third segment between Eugene, Oregon, and Sacramento, California, the topography is the most difficult (through the Cascades, Sierra Nevada, and Siskiyou Mountains) and the distances between population centers, the greatest. The need for detailed study of intercity transportation alternatives in this extremely large geographical area is of lesser importance. Bus, auto, rail, and air capacity in the middle segment are so great relative to prospective demand that a full analysis does not appear warranted.

Advanced High Speed Systems

If population growth takes place as expected by the states and if energy supplies conform to the present estimates and forecasts, costs involved in the building and operation of a high-speed (200 or more miles per hour) ground transportation system substantially outweigh the benefits to be achieved therefrom. A demonstration of a system of advanced technology is questionable in our view. Such a system is not far enough along to be available for studies of system feasibility and application for Corridor services. Significant technological innovation would be required to achieve economically a high-speed ground transportation alternative between Tijuana and Vancouver.

Although problems exist in the West Coast Corridor, they do not appear to be of a magnitude critical enough to warrant the tremendous research and capital investments necessary to create such a system. Even when projected for many years, the density of travel demand on all but a few scattered segments does not warrant the expenditure of land, money (estimated to be in excess of $15 billion),[1/] and energy which would be necessitated as a result of the development of such a high-speed ground system. Given the present state of development of advanced high-speed ground technology, the significant topographic impediments in much of the West Coast Corridor, and the geographically dispersed local origin/destination patterns of intercity trips within the metropolitan areas, the level of travel demand would not warrant further development of such advanced systems for purposes of application to this corridor. Therefore, this study alternative is not to be included in the next phase. However, it should also be noted that rejection of this alternative does not preclude study of high-speed conventional rail service at speeds of 80 to 125 mph.

CONCLUSIONS

1. The intercity transportation problems which can be foreseen and identified are essentially state and local in character and will require state and local solutions.

1/ Using unit costs described in Technological Characteristics of Future Intercity Transportation Modes, Technical Report No. 6, by Peat Marwick, Mitchell & Co., et. al., for NASA and U. S. Department of Transportation August, 1975.

2. It is appropriate to consider the region in terms of 3 segments: Tijuana, Mexico, to Sacramento; Sacramento to Eugene; and Eugene to Vancouver, British Columbia. Demography, geography, and travel forecasts dictate primary attraction be attributed to the southern and northern segments with less detail necessary for the middle segment.

3. Significant transportation problems can be forecasted for two of the segments; Tijuana to Sacramento and Eugene to Vancouver. Therefore, further study on these areas should be emphasized. However, the problems of the two segments are different and the respective states are at different stages in their effort to deal with these problems.

4. Uncertainty regarding the magnitude of future transportation problems in the segments exists primarily because of the inability to forecast the likelihood and intensity of potential fuel shortages. If stable supplies of petroleum are available, rail improvement or new technology costs would be much higher than the sum of social, environmental and economic benefits.

As a result of these conclusions, it is recommended that Federal assistance be provided to the States from the existing West Coast Corridor study appropriation to provide data and analyses required for the submission of a final report to Congress by the Secretary, with the study emphasis to be placed on the southern and northern segments.

ADDITIONAL STUDIES

The following summary of the study designs for the Southern and Northern segments is presented in more detail in the consultant's report.

Southern Segment

The Southern segment (San Diego/Tijuana to Sacramento) is characterized by substantial intercity travel volumes. The bulk of this intercity travel is accommodated by private auto and commercial air modes. Private auto travel predominates in the San Diego-to-Los Angeles and San Francisco-to-Sacramento segments where average daily volumes are in the range of 50,000 vehicle trips. Commercial air travel within the Corridor is heaviest in the Los Angeles-to-San Francisco segment where daily air passenger volume averages 16,000 person trips.

The significant existing congestion in travel facilities within the Corridor consists primarily of highway congestion within the urban areas and ground access congestion at airports. These deficiencies are due more to urban travel than to intercity travel. Although diversion of Corridor intercity travel from auto and air to common-carrier ground modes can be expected to have little effect on relieving these deficiencies, a good rail transportation mode may have significant impact on reducing pressure for additional regional airports and, in the event of limited energy availability, such diversion might become a necessity to conserve energy. Therefore, this study is designed to identify existing and project

future intercity freight and passenger demands and develop short-range and long-range improvement programs for intercity transportation facilities and services within the California sub-corridor to serve these demands in an energy-efficient and cost-effective manner.

Study Objectives

Generalized goals and objectives for the segment studies were developed in the consultant's report. Specific problem areas which should be addressed in the Southern segment are detailed in the study outline in that report. In summary, to be addressed are:

- A consistent and comprehensive data base should be developed. for example, a zonal structure covering all three States should be developed which is compatible with the zonal structures of the individual States, and any new data collected should be coded to this structure. Variables in the data base should include stratified origin and destination trip tables, population, and other key variables.

- Existing travel patterns and traffic volumes should be identified and future patterns forecast. Important travel submarkets should be identified.

- Strategies to improve the energy efficiency of the air mode (especially between San Francisco and Los Angeles) and the automobile, such as increased load factors, should be examined.

- Near term improvement programs should be developed to make the bus and rail modes more attractive, particularly in the lower mileage markets such as Sacramento-San Francisco and Los Angeles-San Diego, including improvements to:
  - terminals
  - intermodal coordinated service;
  - marketing and information availability;
  - frequency of service;
  - travel time;
  - travel comfort and on-board serivces.
- Access and terminal capacity should be improved at the major airports within the Corridor, especially San Francisco and Los Angeles International Airports.
- Substitutions for intercity travel (e.g. communications) should be developed wherever possible.
- A detailed analysis of future capacity requirements should be performed for key route segments and terminals; passenger-freight interference problems should be studied.
- Short and medium term right-of-way improvement programs should be developed for major routes.

The study design presented is similar to that proposed for the Northern segment to ensure that the two studies proceed in a coordinated manner.

At the same time, however, the study design must recognize the unique characteristics of the Southern segment. These special characteristics include strong local agency involvement in the intercity planning process and a well-developed planning effort underway by the California Department of Transportation and other State agencies.

Northern Segment

Intercity travel volumes of moderate magnitude occur in the Northern segment between Vancouver, British Columbia, and the Southern end of the Willamette Valley at Eugene, Oregon. The dominant mode of intercity travel is the private automobile; air travel is a distant second; intercity bus and rail volumes are small. While travel volumes in the California markets substantially exceed those found in the Northwest, several Pacific Northwest city-pairs experience the same range of total intercity travel demand (3 to 5 million travelers per year) as in the San Francisco-Sacramento market. The largest volumes are experienced between Portland and Salem (4.2 million passengers annually) and Seattle/Tacoma to Portland (3.7 million annual passengers). The Eugene to Salem total volume is substantially less (about 0.5 million trips per year).

As in California, the major intercity transportation problem is highway congestion on the urban sections of intercity facilities. There are also potential rail congestion problems due to joint trackage rights by three railroads over the double-track line between Portland and Seattle, and numerous speed restrictions within enroute municipalities. Diversion of

intercity highway traffic volume would not substantially reduce the urban highway congestion that results primarily from urban trips, but there would be energy savings if the number of intercity auto trips could be reduced through increased vehicle occupancy rates or shifts to more energy-efficient modes.

Several unique factors affect the study design for the development of intercity improvements in the Pacific Northwest. The most obvious problem is the need for the two States of Washington and Oregon to develop a coordinated planning effort. Additionally, because a department of transportation does not exist in the State of Washington, the efforts of several State agencies must be coordinated. Finally, the strong public sentiment for growth management expressed in the Pacific Northwest must be considered in any analysis of intercity transportation improvement alternatives.

Study Objectives

The specific transportation problem areas which should be addressed in the Pacific Northwest study are similar to those listed previously for the Southern segment study.

Middle Segment

The combination of few travel-generating points and substantial existing intercity transportation capacity in the middle segment between Eugene,

Oregon and Sacramento, California, is persuasive that detailed study of alternatives in this segment is not warranted. Sufficient analysis of facilities, demographic and market data was accomplished in the initial study by FRA's consultants to incorporate this area into the final report. However, the Southern and Northern segments will generate additional travel and traffic flow data to, through and from the middle segment. Such data will be useful in completing the study and the final report to Congress.

Timing of the Segment Studies

Development and negotiation of contracts between the Federal Railroad Administration and the three State Governments for implementing these two study designs and procurement of consultants by the States to perform the studies may require up to six (6) months to accomplish. Completion of the tasks outlined in the study designs will require an additional period of time. Therefore, it will be difficult to complete the study by the date specified in the Act, January 30, 1977. If an extension should be required, the appropriate committees will be notified, at which time a progress report will be provided along with a request for an extension.

FEDERAL AND STATE ROLES

The States of California, Oregon and Washington have been involved in every step of the West Coast Study as it has progressed. This approach is considered appropriate for a study of this type in view of the fact that the primary transportation impacts, both costs and benefits, accrue directly to the States and the localities within them. These considerations, coupled with the availability of Federal Transportation planning funds through existing (FHWA, UMTA, FAA and FRA) programs of the Department of Transportation, led the Department to conclude that the primary responsibility for continuation of the West Coast Corridor Study should rest with the States. The Department is interested in fostering and encouraging statewide, comprehensive, multi-modal transportation planning and in providing improved tools for energy conservation through the proper development and utilization of balanced transportation systems. Therefore, the Department will use the existing appropriation of $500,000 for the West Coast Corridor Study to assist the States in the development of the data and analyses required for the submission of the Department of Transportation's final report on the West Coast Corridor Study to Congress.