

chapter 4.1
central puget sound
region

4.1.1 POPULATION

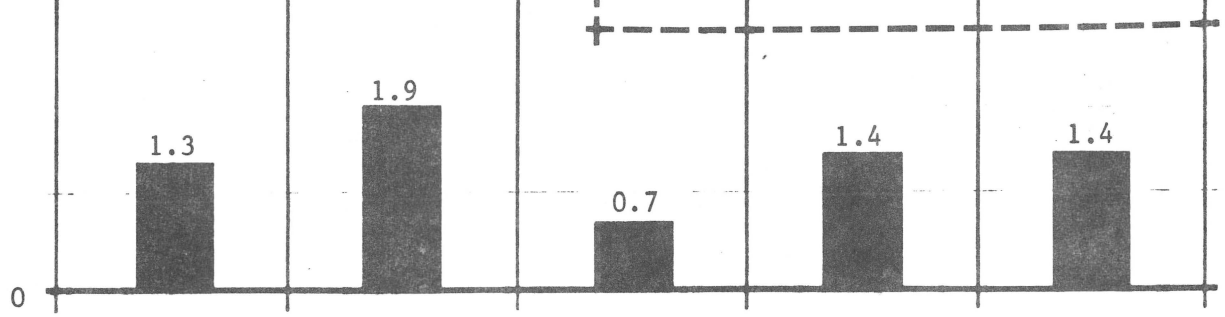
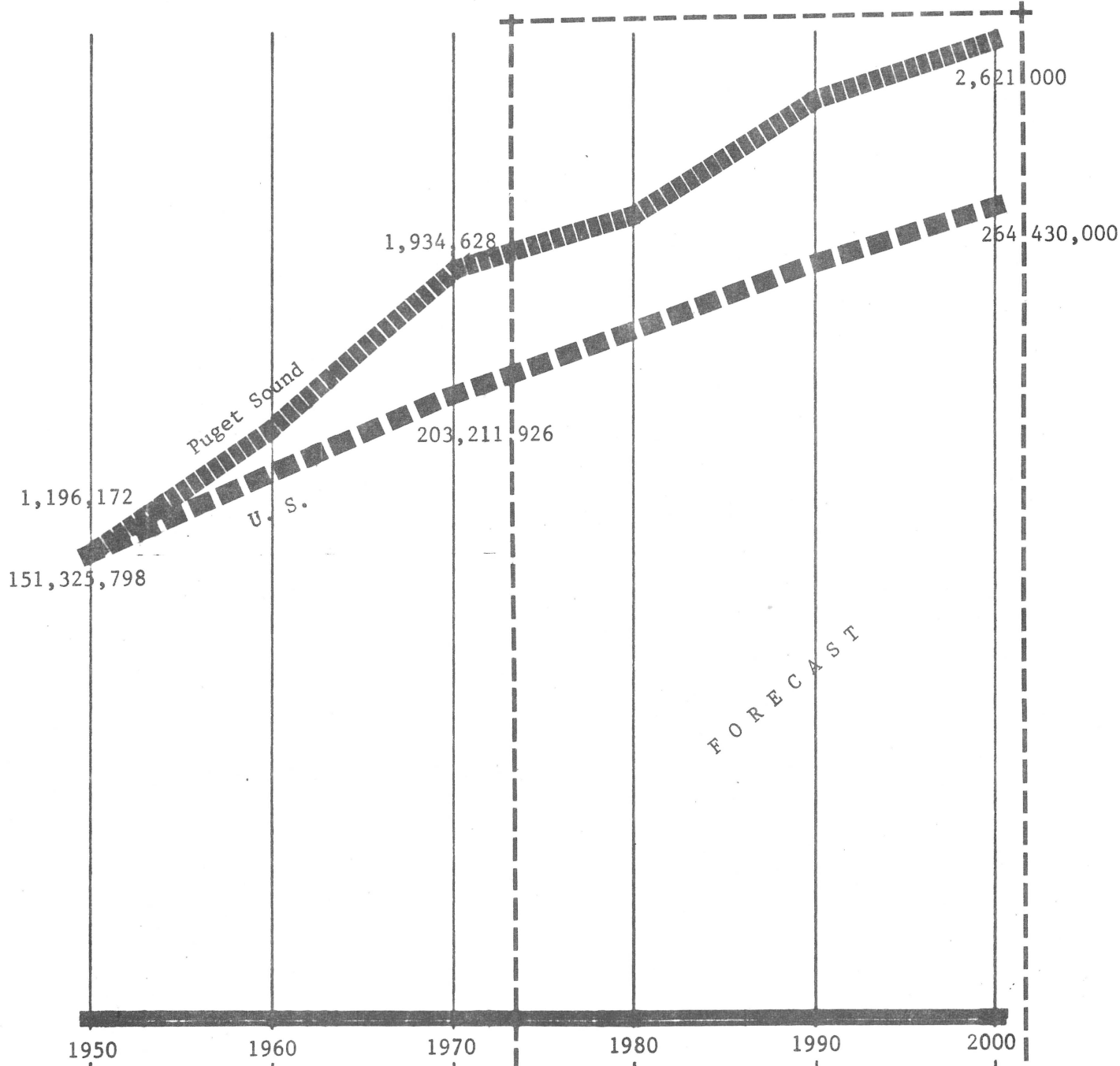
In order to determine adequacy of existing Airport facilities and future facility requirements, as well as future relationships between the Airport facilities and the surrounding communities, it is first necessary to estimate demand for facilities generated by future air traffic volumes. The volume and type of air traffic generated in an area is a reflection of the socio-economic character of that area. Thus, the first step in the development of the Master Plan for Sea-Tac International Airport was to analyze current and projected population and economic growth.

The Central Puget Sound Region is located in the northwestern corner of Washington State. Near the center of this area, which surrounds Puget Sound, is Seattle, the largest city on the West Coast north of San Francisco. Other notable urban areas include the cities of Tacoma, Bellevue, Everett, Bremerton, and Renton. In 1970, the four-county area had 1,934,628 inhabitants, accounting for 56% of the State's population.

The area experienced substantial population growth during the 1950's and 1960's. The average annual rate of growth during the 1950's was 2.4% approximately 1.3 times the national average. The population of the region increased from 1,196,172 in 1950 to 1,512,979 in 1960. The annual rate of population growth was almost double that of the national average during 1965 and 1968. This trend has reversed itself in the 1970's. Future population growth of the region is expected to be more modest relative to the U.S., at least through the present decade.

Forecasts by the State of Washington estimate that the Region's population will increase to approximately 2,074,000 by 1980, some 2,384,000 by 1990 and by the year 2000 will be at the level of 2,621,000. The forecast average annual rates of growth are 0.7%, 1.4% and 1.0%, respectively for the three decades between 1970 and 2000. Compare this with U.S. Census Bureau projections of average annual U.S. population growth during these same forecast periods of 1.0%, 1.0% and 0.7%, respectively, and it appears that the Central Puget Sound Region will resume a more normal growth rate relative to the U.S. after 1980 (see table 4.1.1: 3)

HISTORICAL AND FORECAST POPULATION TRENDS
 Central Puget Sound Region and United States
 1950-2000



Ratio of Annual Rates of Growth: PUGET SOUND/UNITED STATES

4.1.2 ECONOMY

The economic data, analysis and conclusions set forth in this section have been developed for their specific impact on air traffic activity at Sea-Tac. It should not, therefore, be considered as a general economic analysis of the Central Puget Sound Region.

Historically, the economy of the Central Puget Sound Region has been fueled primarily by natural resource-based industries, such as timber, and by import/export trade. Food processing follows lumber and wood in the number of persons employed. However, since World War II, the economic base has acquired an emphasis in the manufacturing fields, including transportation equipment, forest products, ship building, metal fabrication, machinery and particularly the aviation and aerospace fields. Aerospace has emerged as the Region's dominant industry, placing lumber and wood second in importance. The dramatic economic growth of the area between 1965 and 1968 was stimulated primarily by the rapidly expanding aerospace sector which reached its peak in 1969.

The Region also provides a broad range of shipping, consumer, and business and governmental services. The presence of deep water ports in proximity to Alaska and the Orient has lead to considerable import/export trade. Sea-Tac International Airport ranks seventh in the U.S. in air freight volumes and more than one-third of its air freight goes to Alaska, illustrating the importance of the transport link between the Central Puget Sound Region and the oil-rich 49th state. The Region has become the financial and trade distribution center for much of the Pacific Northwest.

Seattle is strengthening its position as the Pacific Northwest's financial and corporate regional administrative office center.

ECONOMIC TRENDS AND FORECASTS:

The effects of the 1969-1970 nationwide economic slowdown were more severe in the Central Puget Sound Region due in large part to the heavy reliance on the aerospace industry as a primary source of employment and income. Decline in aircraft orders coupled with increased labor efficiency in the production of new models created significant job losses at the end of 1968, becoming even more severe the following year. Other sectors of the local economy also suffered during the nationwide slowdown, but with less dramatic impact. Late in 1971, a year after the national economic contraction reached its trough, the local economy bottomed out. Aerospace employment has since been gradually increasing, but it is still far behind 1967 levels.

Between 1965 and 1972, both the economy of the Region and the economy of the United States have become relatively more service (non-manufacturing) than manufacturing oriented. This trend is more amplified in the local area than in the national economy because of its decline in aircraft employment, the Region's dominant industry. Manufacturing employment, excluding aircraft employment, increased in absolute numbers, but decreased as the percentage of total employment over this period. Food and kindred products showed an absolute decrease in employment, due mainly to plant closures in meat products and payroll losses in fish processing. Lumber and wood declined in percentage terms but showed slight improvement in absolute numbers employed over this seven-year period.

During the same period, non-manufacturing jobs increased by 30% and as the percentage of total employment, this sector increased from 63.8% to 71.1%. Wholesale and retail trade expanded rapidly, responding to the stimulus of increased buying power. In the services sector, with a 1972 employment level of 48.5% above that of 1965, growth has been especially rapid in medical and health services. The second largest source of employment growth has been in the government sector, with a 31% increase over the 1965 level (see Table 4.1.2:4)

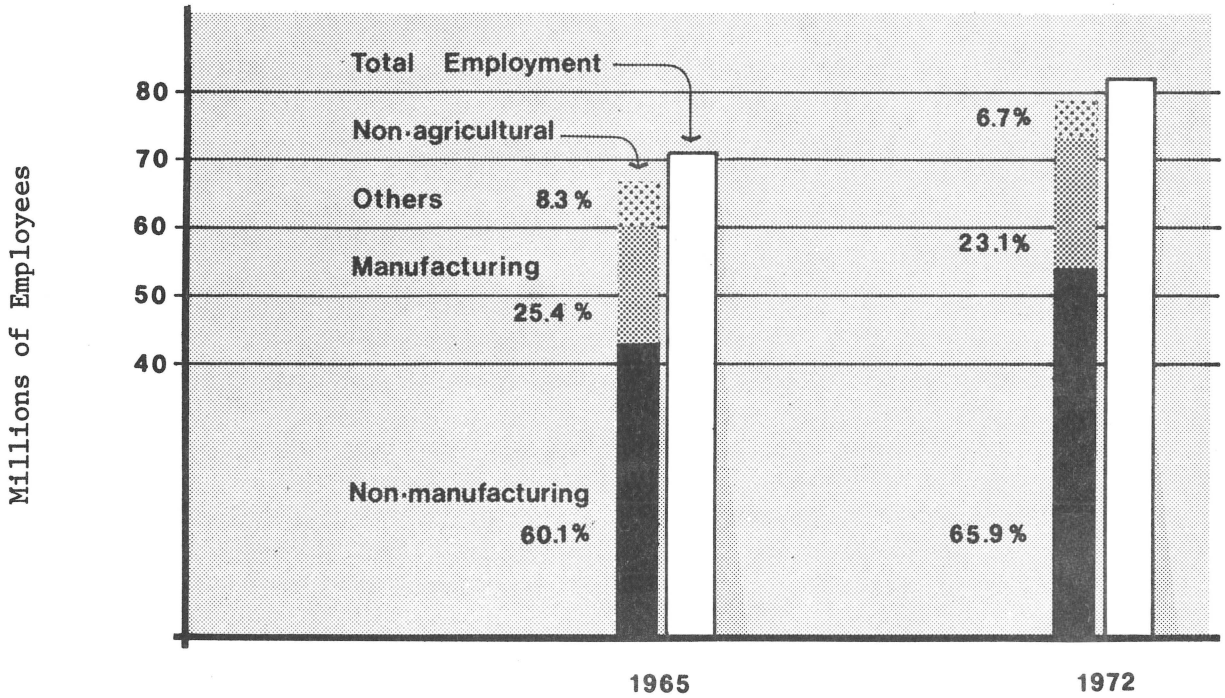
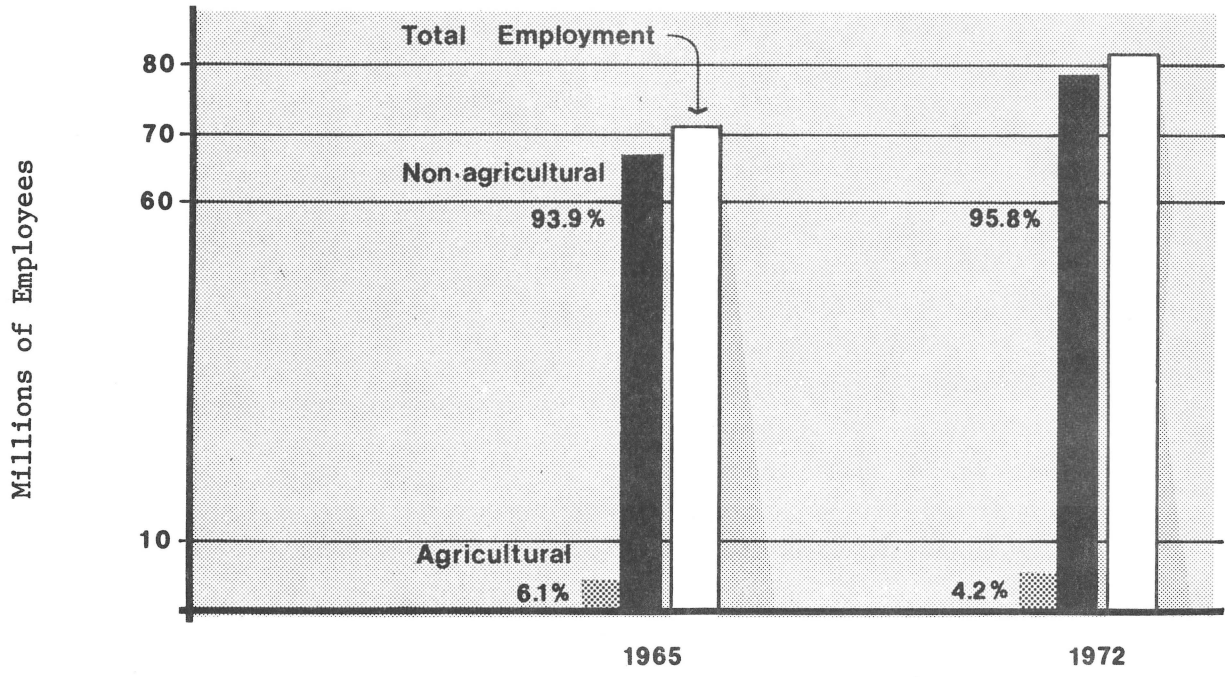
Per capita personal income, during the period of local economic expansion (1965-1968), increased at a faster rate than the national average. This trend was reversed, however, during the period of local economic recession. Local per capita income fell as a percent of the national average, 125% in 1968 to 108% in 1971. (see Table 4.1.2:5)

EMPLOYMENT TRENDS/FORECASTS:

During the 1960's total employment in the Region increased from 526,000 to 701,700 in 1970. The average annual rate of growth during this period was 2.9% or 1.6 times that of the United States. The increase in the percentage of women joining the work force, as well as the impact of the post-war baby boom account for the fact that employment grew at a faster rate than population in the 1960's, both locally and nationally. (see Table 4.1.2:6)

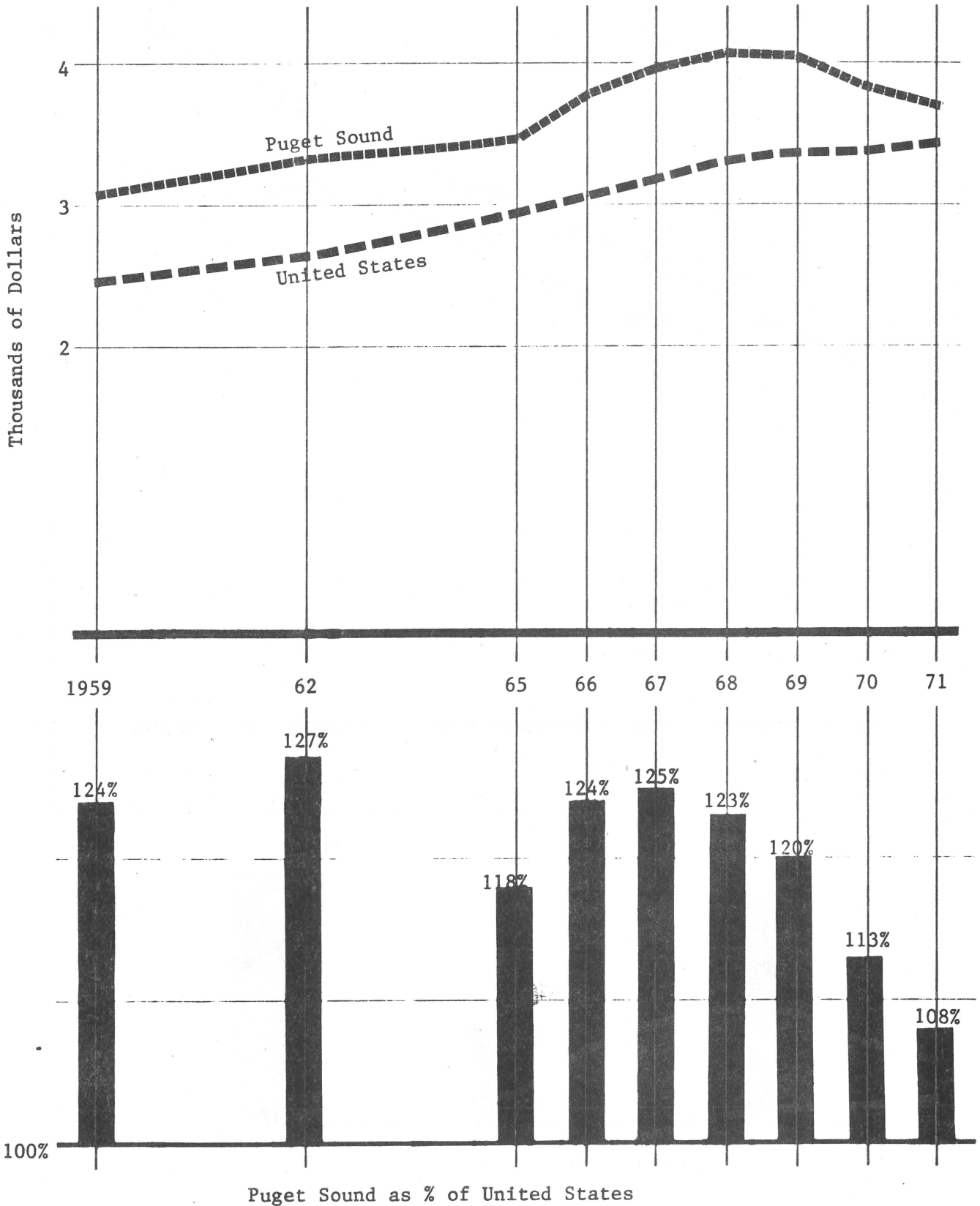
Between 1965 and 1968, locally the unemployment rate fell significantly below that of the national level. This was a period of rapid economic growth for the Region, due primarily to the stimulus provided by the aerospace sector. Then, beginning at the end of 1968, aerospace employment de-

DISTRIBUTION OF EMPLOYMENT
 Central Puget Sound Region^a and United States
 1965 and 1972

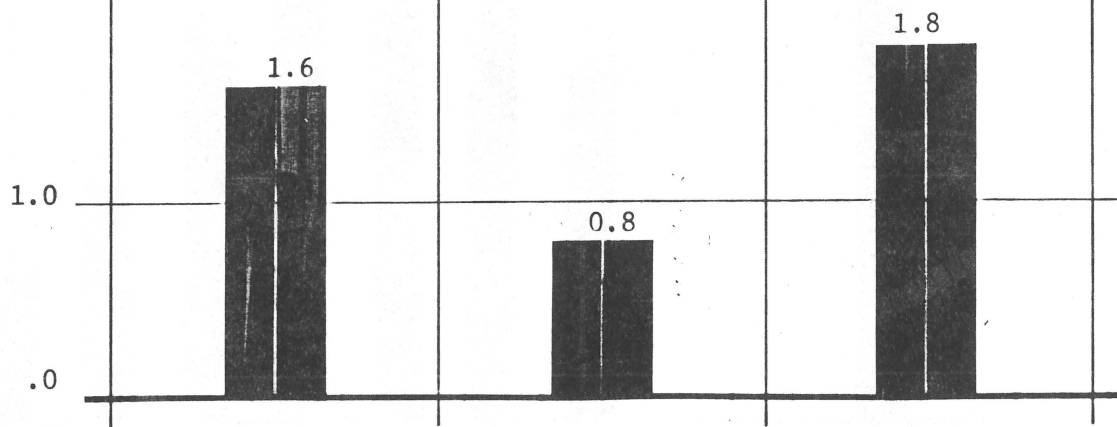
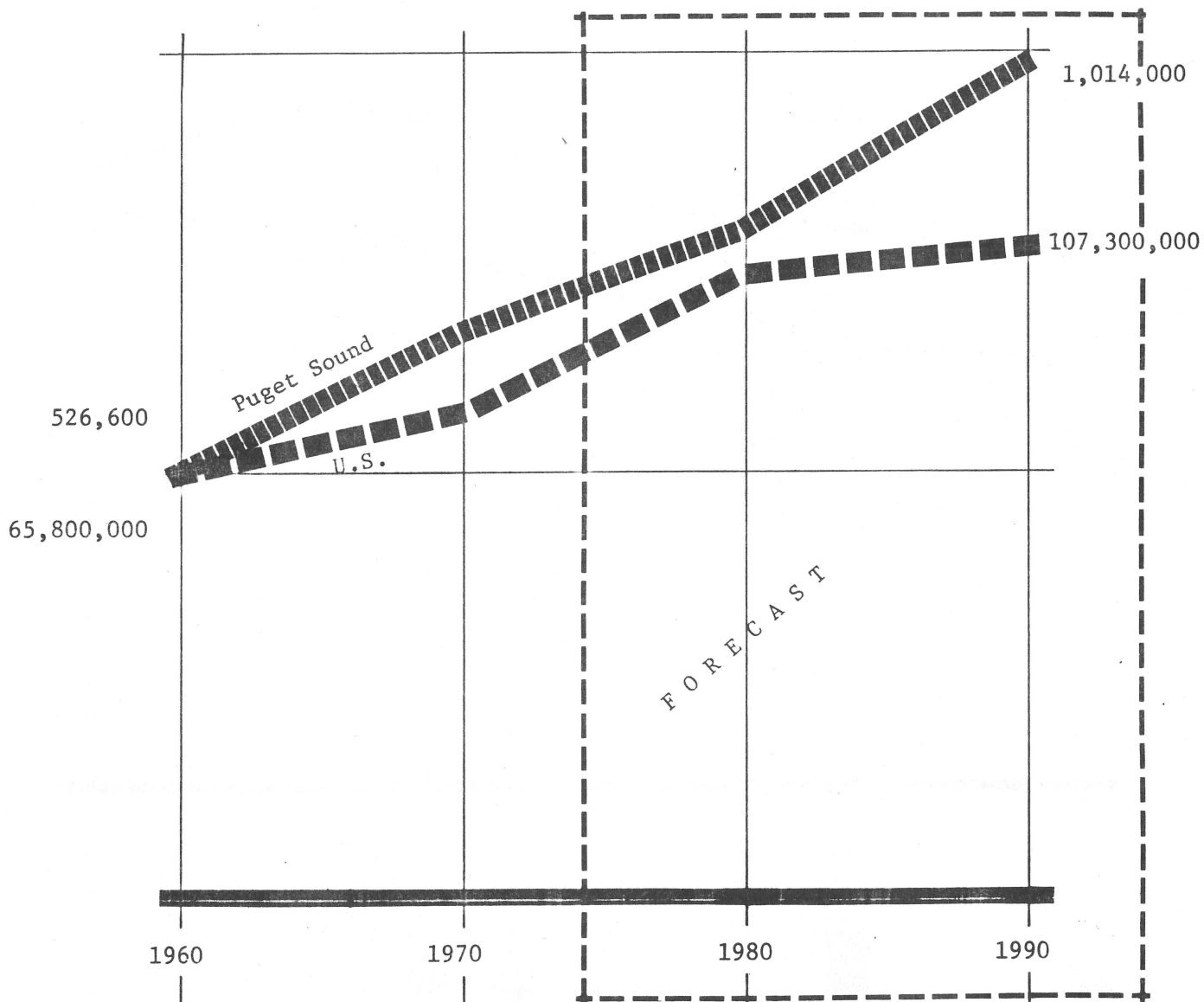


a. Includes King, Kitsap, Pierce, and Snohomish Counties.

PER CAPITA PERSONAL INCOME
 (Constant 1967 dollars)
 Central Puget Sound Region
 Selected Years: 1959-1971



HISTORICAL AND FORECAST TOTAL EMPLOYMENT TRENDS
 Central Puget Sound Region and United States
 1960-1990

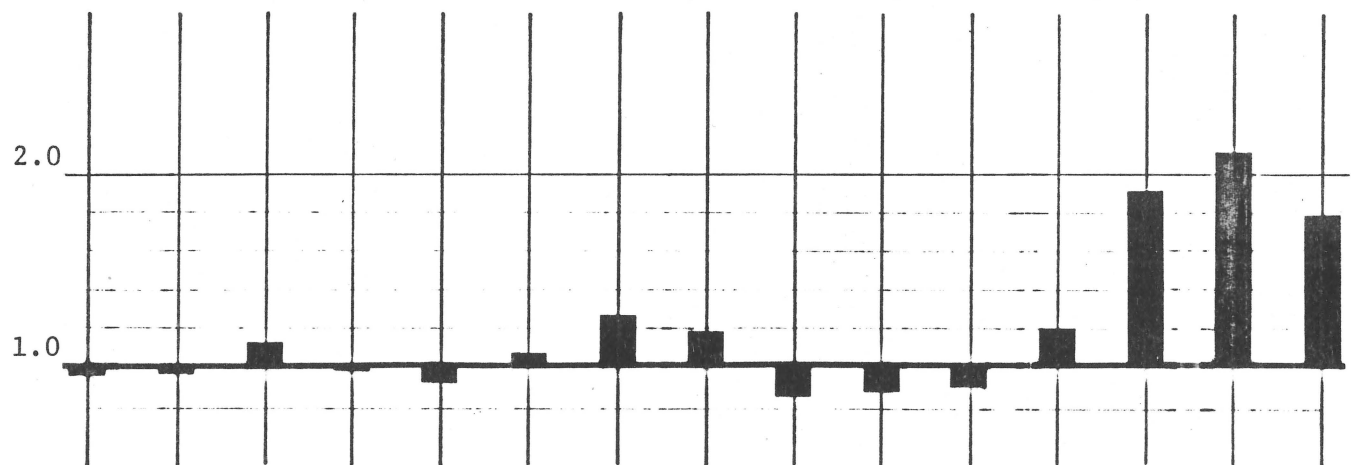
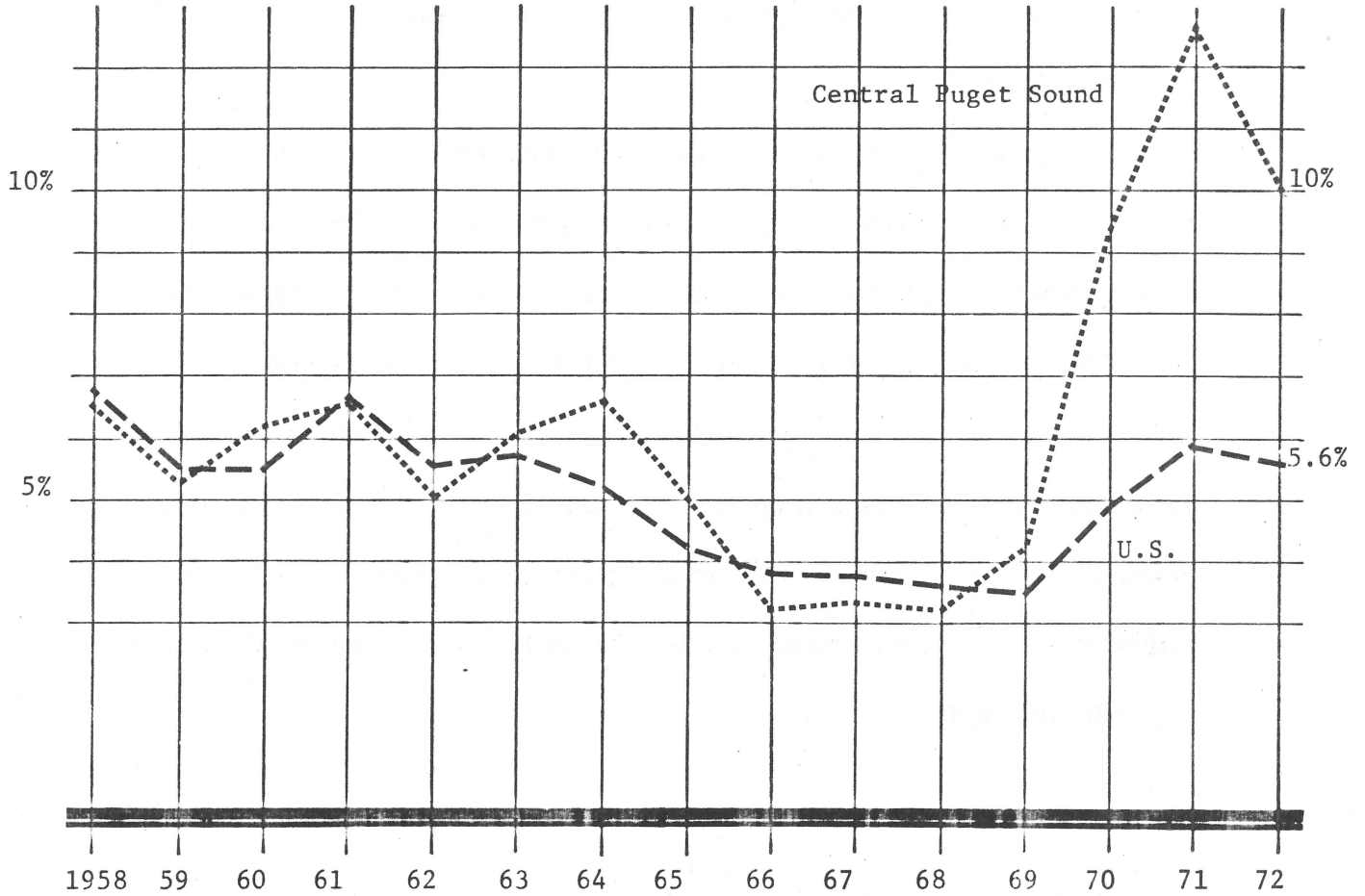


Ratio of Annual Rates of Growth . . . Puget Sound/U.S.

creased by some 70,000. This, accompanied by a national economic slow-down, led to the extremely high levels of unemployment relative to the United States. At one point, the unemployment rate reached approximately 15%, the highest of any metropolitan area in the country. The problem of extensive unemployment still continues although at a much reduced rate. (see Table 4.1.2: 8)

Along the lines of the population forecast, total employment during the 1970's is not expected to increase as rapidly as that of the United States. But during the 1980's, it is expected to return to a more normal rate. The economic recession experienced by the Region between 1968 to 1971 has dampened employment growth in the 1970's. It is estimated, however, that the average annual rate of employment growth for the Region in the 1980's will be almost twice that of the United States. By 1990, it is estimated that there will be some 1,014,000 persons employed in the Central Puget Sound Region.

HISTORICAL UNEMPLOYMENT RATE TRENDS
 Central Puget Sound Region and United States
 1958-1972



Ratio of Unemployment Rates . . . Puget Sound/U.S.

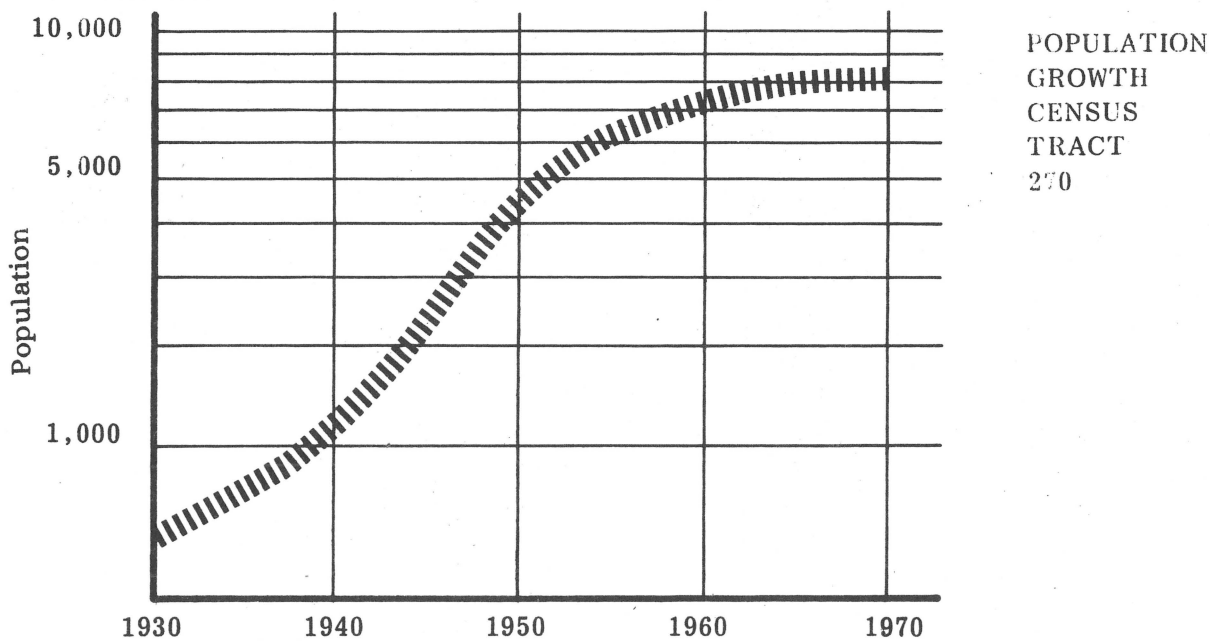
chapter 4.2
community trends
and characteristics

4.2.1 POPULATION & ENROLLMENT

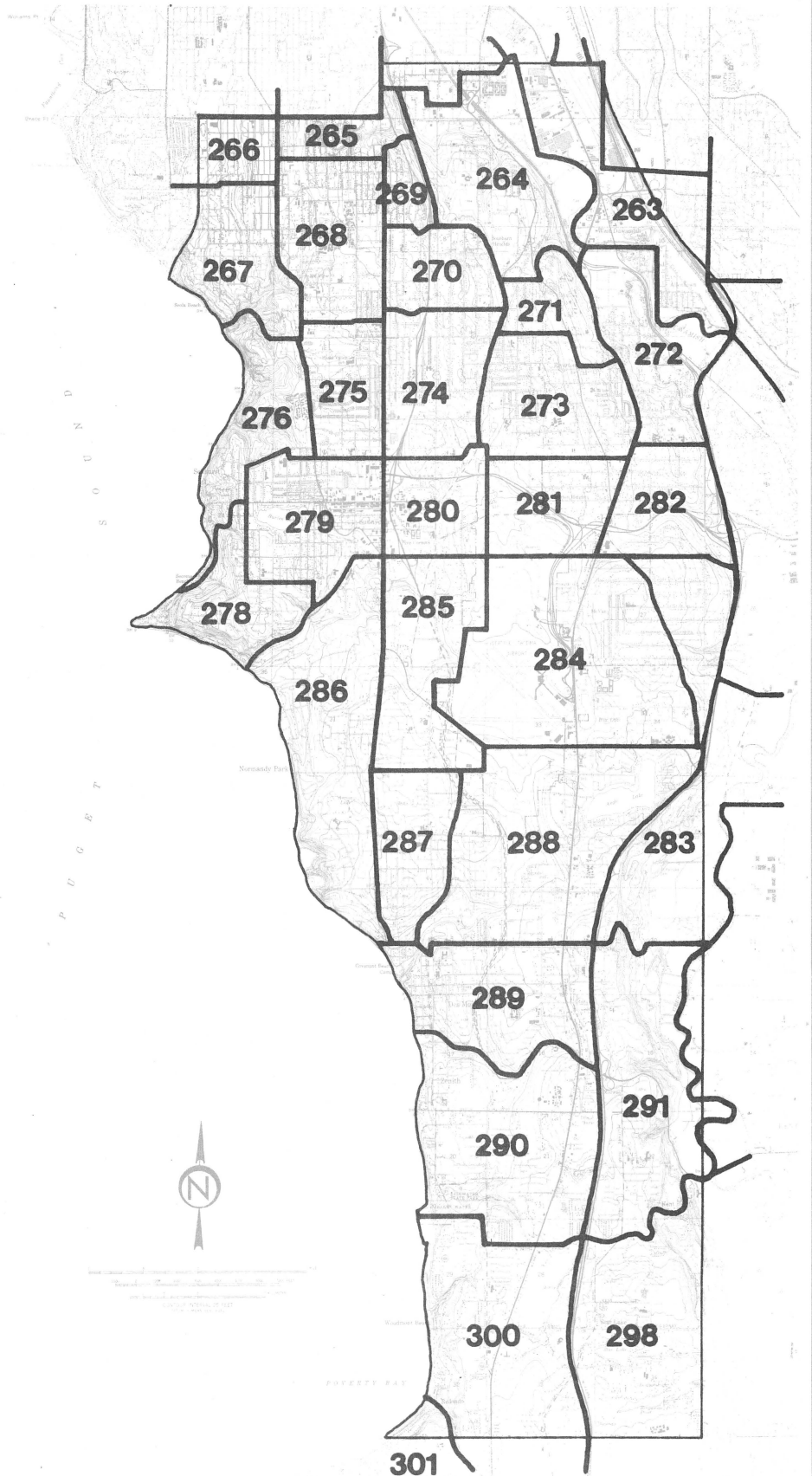
GROWTH TRENDS:

In 1970, the study area contained 137,000 persons, over 110,000 of whom resided within the Highline School District. The cities of Normandy Park and Des Moines, which are wholly contained within the study area, had a 1970 population of 4,202 and 4,099 respectively. Although some additional people live within the small portions of the cities of Seattle, Tukwila and Kent that lie within the study area, the majority of the population is in unincorporated areas.

The portion of the study area north of the Sea-Tac Airport received its greatest spurt of growth during the 1940-50 decade, with a considerable leveling off in the rate of growth occurring thereafter. The growth curve for census tract 270, the Southern Heights neighborhood, shown below, is typical of growth trends in this northern area between 1930 and 1970. A growth curve and 1970 age composition pyramid for each census tract is provided in the Supplement to Technical Report 1, Community Trends & Characteristics, which is available through the Land Use Management Division.



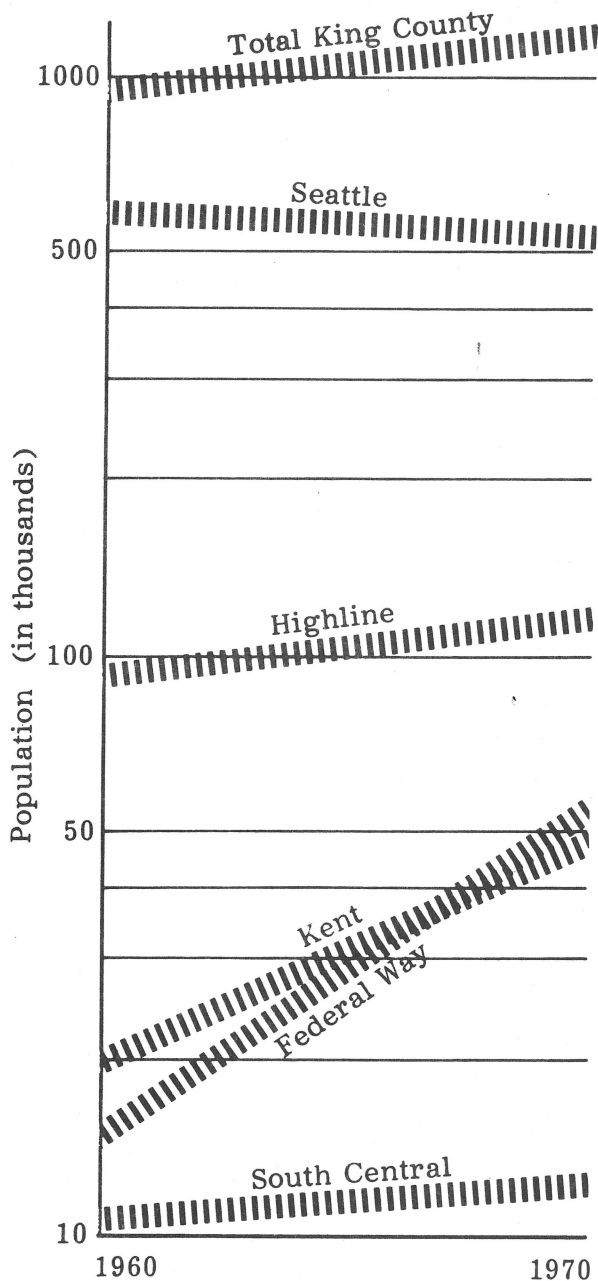
sea-tac communities plan



**1970 census
tracts**



sponsors
**port of seattle
king county**
4.2.1



POPULATION GROWTH
SELECTED SCHOOL DISTRICTS
1960 - 1970

The area to the south of Sea-Tac Airport, particularly that portion within the Federal Way and Kent School districts, has continued to grow at a rapid rate. Chart I shows the relative growth rates of the various school districts in and around the study area between 1960 and 1970.

AGE GROUPS: In the study area, the median age of the population is 25.2 years, compared with the County-wide figure of 25.4 years. The population as a whole average is aging and will continue to do so as this area follows the national trend in lower birth rates. When one compares the 5-year breakdown of the younger age groups, we see that only 9% of the total population is less than 5 years of age as compared to 11%, 12% and 10% in the age groupings of 5 to 10, 10 to 15, and 15 to 20, respectively. In those areas where new homes are still being built and occupied by young families (predominantly the southern portion of the study area) there is still a preponderance of people under 20 years of age (45% to 51% of total population).

This is also true in census tract 265, to the north, occupied largely by the White Center

public housing project, where over half of the total population is less than 20 years of age.

The largest numbers of elderly people (those 65 and over) live in those areas that have housing which serves their particular needs. These areas include the Park Lake Homes - Site 2 public housing project and Kingston Village facilities designed for the elderly (in census tract 268), Bow Lake Trailer Town located east of the airport, and the Des Moines-Zenith area within which large retirement homes are located. Elderly people make up a high percentage of the population (over 15%) in the Riverton-Tukwila area which has many modest, long-established homes where older persons of limited means can still afford to live. Other areas attracting older people are those with large numbers of apartment units such as along Military Road (in census tract 270) and around Seahurst and Burien.

POPULATION DENSITY:

The highest population densities (9 persons per acre and above) occur in the area between 1st Avenue South and Ambaum Way - 16th S. from the Seattle city limits south to Burien, and in the North Hill neighborhood north of the city limits of Des Moines. Although the study area is one of the most urbanized in King County, overall population density is still relatively low. This is due to a variety of reasons, including large areas in steep, unbuildable slopes, poor platting practices which have rendered much land inaccessible, lack of sewers and large areas occupied by non-residential land uses (such as the Sea-Tac Airport and business/commercial districts). Low population density in Normandy Park area is influenced by zoning which excludes small lots as well as multi-family residential units.

MOBILITY:

Mobility of the population near the airport is somewhat higher than the King County Average. While 58% of King County residents moved between 1965 and 1970, nearly two-thirds of the people living in the vicinity of the Sea-Tac Airport did so during the same period of time. The large number of multi-family and other rental units, in this area, which tend to have higher rates of turnover, undoubtedly contributed to this high rate. However, it is likely that the airport exerts some influence on the duration of stay for persons in the area, particularly when other tracts in the study area which are at a distance from the airport, yet have similar owner/renter ratios, exhibit lower turnover rates.

ETHNIC CHARACTERISTICS:

The study area is occupied predominantly by a white population. Only four census tracts (263, 265, 268, and 272 - all north of the airport) have higher than 4% non-white population. The following table shows ethnic enrollment as a percent of total enrollment for each of the school districts represented within the study area as compared to the Seattle School District. On the average, the ethnic enrollment (consisting of Negroes, Orientals, native American Indians, and Latin Americans) is less than one-fifth that of the Seattle School District. The largest group is the one with Latin American Surnames.

ETHNIC ENROLLMENT OF SELECTED SCHOOL DISTRICTS, OCT., 1972

School Dist.	Total Enroll.	Ethnic Enroll.	Ethnic Enroll. as % of Total
Seattle	75,962	17,398	22.9
Federal Way	16,050	485	3.0
Highline	26,496	1,236	4.7
Kent	14,496	521	3.6
South Central	2,243	135	6.0

Source: Intermediate School District No. 110
100 Crockett St., Seattle, Washington
Release No. 7-EE-73

EDUCATIONAL ATTAINMENT:

Median Number of school years completed as of 1970 ranged from a low of 11.65 years in census tract 265 (location of the White Center public housing project) to a high of 12.98 years in Normandy Park. Although the range is not very great, it is significant to note that, of the thirty census tracts lying wholly or partially within the study area, 19, or nearly two-thirds, had a median figure lower than the 12.53 median for the County.

A related factor is the percent of total persons age 16-21 who were high school dropouts (that is, not in school and not graduated). In 1970, this varied from a low of 1.4% in the Gregory Heights area (census tract 278) to a high of nearly 50% in the White Center Heights public housing area (tract 265). Here again, nearly two-thirds of the census tracts represented within the study area had a high school dropout rate higher than the County average of 9.2%.

In general, the tracts with higher median family income levels have

higher median number of school years completed as well as lower dropout rates although there are exceptions to this correlation.

ENROLLMENT CHANGE:

Changes in enrollment in the various school districts within the study area have presented a continuing problem to school administrators. Initially, rapidly increasing enrollments created a need for buying sites and building new schools or adding on to old ones. In the Highline School District, for example, enrollment increased from approximately 9,000 pupils in 1950 to over 22,000 in 1960. The 1960-1970 decade showed a more moderate overall increase, to slightly over 29,000 pupils; however, peak enrollment in excess of 31,000 pupils was reached in 1967. Between 1970 and 1972, enrollment in the Highline District has declined at every school age level with the greatest decline of 14.4% at the elementary level. This decline has been distributed between all except three of the 40 schools within the district.

It is difficult to establish a decisive pattern to the areas of greatest enrollment decline. While three schools that are reported by the Highline School District to be impacted by airport noise (Angle Lake, Riverton Heights and Boulevard Park) have percentage declines of more than 20%, so also do other schools that are not impacted by airport noise. In the case of Angle Lake and Riverton Heights, airport and highway expansion could have affected enrollments.

The South Central School District, with a more stable population and enrollment in recent decades, also experienced an enrollment decline in the 1970-72 period; an additional loss of 6.5% for this district occurred in the fall of 1973. For the Highline District, an enrollment loss of 1.7% occurred.

The Federal Way and Kent School Districts are expected to have a slight enrollment increase of about 2% for the fall of 1973.¹ However, this increase is most likely to occur in those portions of the districts located outside the study area where development potential is greater.

Some enrollment loss will be caused by the possible additional acquisition of some 600 homes by the Port of Seattle in the immediate vicinity of the airport and several others by State Highway Department acquisition for the extension of Sign Route 509.

The Highline School District administration has examined in considerable detail enrollment trends and factors that will affect future enrollment for each school attendance area within the district. On the basis of these studies, enrollment projections for each school have been prepared.² The extent to which these projections are accurate will depend to a considerable degree on public policy decisions regarding land use changes in the area and how fast any such changes actually take effect.

¹Release Dated May 2, 1973, by Intermediate School District #110
²A Master Plan for Highline Public Schools, October, 1972

4.2.2 HOUSING

TYPE AND LOCATION:

Single-family homes predominate within the study area as in the County, representing nearly two-thirds the total housing supply. Nearly two-thirds of all housing units are owner-occupied with probably a majority of owner-occupance occurring in the single-family units. Apartments (multi-family units) have been built at an increasing rate during the past decade and represent an ever-increasing portion of the housing supply. Those areas which have a significant number of multi-family units are located primarily along the major arterials (frequently as buffers between business and single-family residential areas) and in and around Burien. New apartment construction has been particularly heavy in the Glendale-Hilltop neighborhoods (census tract 264), in the Sunnydale neighborhood east of Burien, and in the neighborhoods east of the airport.

Mobile homes represent another significant form of housing. Nearly 2,000 units, over 4% of the total housing supply as compared to 1.9% for the County, are located within the study area. Mobile home courts are located in appropriately zoned areas primarily along Pacific Highway South, although some locations may be found along other arterials such as Ambuaum Way South. The single largest mobile home court in the area is Bow Lake Trailer Town located east of the airport next to Bow Lake; this court has a capacity of 445 units.

Most mobile home courts cater to permanent residents; some have limited facilities for overnight transients, and only a few are entirely transient-oriented. Characteristically, most mobile home courts have fewer

children than found in a comparable number of single-family homes. Some courts simply do not allow children, and space limitations within both dwellings and yards make mobile home courts less attractive to families with children.

Housing to serve particular groups or income levels includes both public housing projects and homes owned or leased by King County Housing Authority as well as private retirement residences and communities. The Housing Authority has seven housing projects as well as 67 leased homes under its jurisdiction within the area. Total units within the projects numbers 1,067. Some are designed for and available only to low-income elderly persons. The greatest supply of housing specifically for the elderly, however, is in retirement homes and communities, many of which have been constructed by quasi-public organizations. There are a total of approximately 1,300 of these units or rooms within the study area, the locations of which can be seen on the accompanying map.

Convalescent or nursing homes, usually considered as medical rather than residential facilities, actually supply relatively permanent housing for those individuals (again usually the elderly) who can no longer be cared for at home or have no place else to go. There are a number of these facilities within the study area; some of the largest include the South Haven Nursing Home with 88 beds, the Olympic Crest Convalescent Center with 60 beds, the Setoma Convalescent Home with 119 beds and the Burien Terrace Nursing Home with 44 beds.

HOUSING VALUE AND RENTS:

The lowest housing values (of owner-occupied units) occurring in the Duwamish Valley areas - neighborhoods of South Park, Riverton and

sea-tac communities plan

**PUBLIC HOUSING (King
County Housing Authority)**

- 1** Park Lake Homes - Site I
545 units
- 2** Park Lake Homes - Site II
165 units
- 3** South Park Courts
254 units
- 4** Riverton Terrace
60 units
- 5** Brittany Park
43 units
- 6** Munro Manor
60 units
- 7** Boulevard Manor
70 units
- Leased homes (not mapped)
67 units

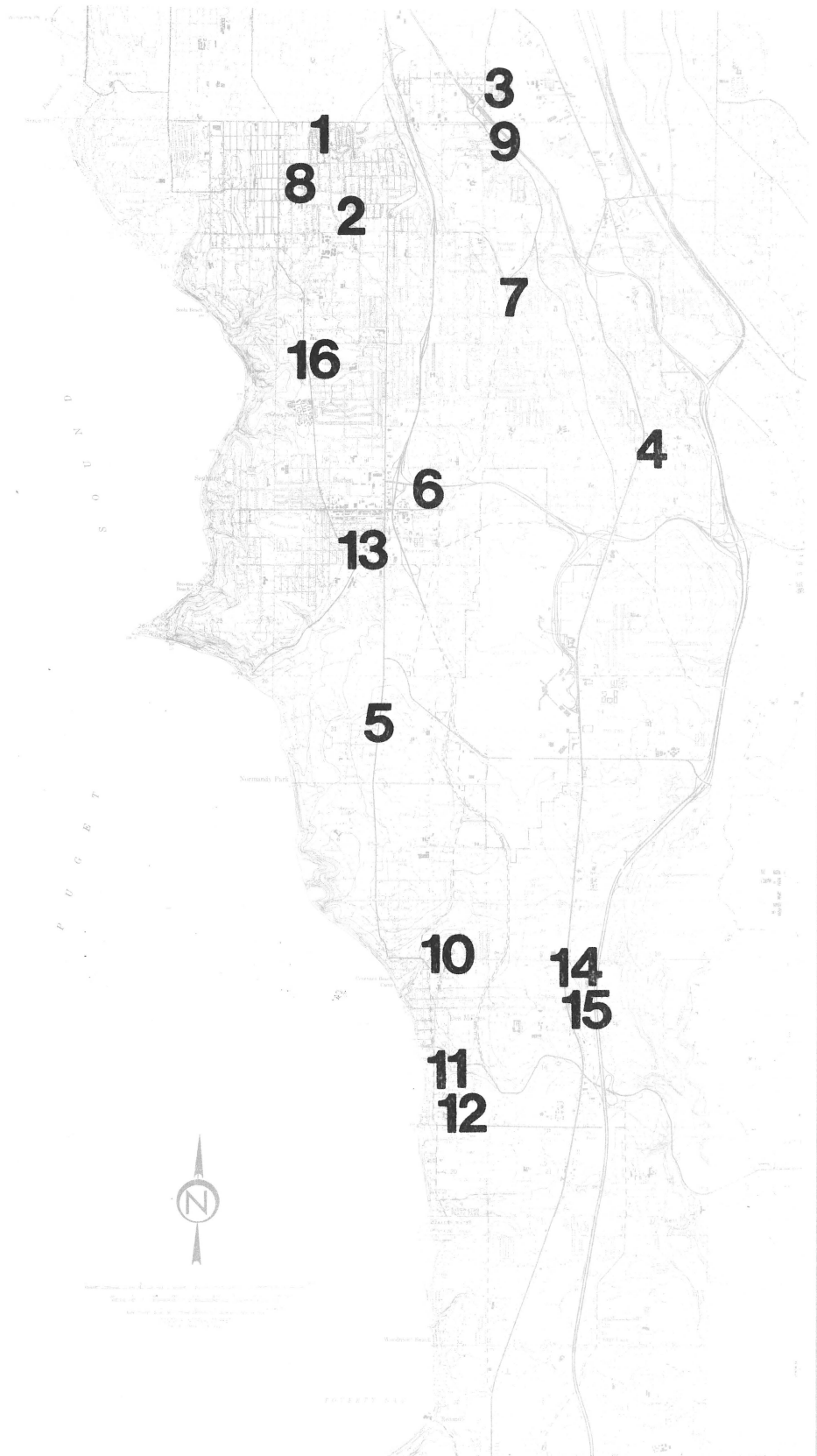
**RETIREMENT HOMES/COMMUNITIES
(Private)**

- 8** Kingston Village
335 units
- 9** Northwest Danish Home
46 rooms
- 10** Wesley Gardens/Wesley Terrace
515 units and rooms
- 11** Judson Park Retirement Residence
187 units
- 12** Masonic Home of Washington
200 rooms

**CONVALESCENT/NURSING HOMES
(More than 40 beds)**

- 13** South Haven Nursing Home
88 beds
- 14** Olympic Crest Convalescent Center
60 beds
- 15** Setoma Convalescent Home
119 beds
- 16** Burien Terrace Nursing Home
44 beds

**location of
public housing,
retirement
residences and
convalescent /
nursing homes**



sponsors
**port of seattle
king county**

Allentown. Generally, values are lowest in the northern portion of the study area; the highest value homes are to be found in the high-amenity view areas along Puget Sound and towards the south where there is the greatest supply of newer housing. Near the airport, values on the west side are generally higher than on the east. Housing values tend to correlate closely with median family income, particularly in those areas with a predominance of single-family homes. In general, there is a close correlation also with age of structure, with older homes being of lower value. This is not true, however, in the Gregory Heights neighborhood, tract 278, which has many older homes and still one of the highest median housing value figures in the study area.

In most tracts, median contract monthly rent was higher than the \$118 median figure for the County. The lower rent areas again are in the north, correlating to a considerable extent with those census tracts having the highest incidence of units built prior to 1940. In 1970, most of the study area commanded rentals in the range of \$120-\$130 per month. This was true in the area surrounding the airport as well as around Burien and south along Pacific Highway South. Highway South. Highest rentals were in those areas with a high percentage of single-family homes (such as Gregory Heights and Normandy Park, tracts 278 and 286, respectively) or where a large number of apartments units with views have been built in recent years (tract 264, overlooking the Duwamish Valley).

HOUSING QUALITY:

In 1968, the King County Department of Planning conducted a field "windshield" survey of housing quality in the unincorporated Highline-

South Central school district areas south as far as the city of Des Moines. This was a part of a total neighborhood analysis survey. Housing quality was rated on a scale of 1 to 4, with 1 representing "Sound" housing units, 2 being "Basically Sound", 3 the "Deteriorated" units, and 4 the "Dilapidated" units. (See Appendix at end of this section for definitions of these ratings). The purpose of the survey was to establish a priority base for housing inspections and enforcement under the provisions of the County's Minimum Housing Code.

In this survey, fewer than 5% of the total housing units were rated as deteriorated or dilapidated for the greater part of the Sea-Tac Communities study area included. It is assumed that the area not surveyed, from the city of Des Moines south, is in this same category of under 5%, since other indices of housing quality, such as age of housing and median housing value, indicate no particular housing problems in this area. Those neighborhoods which had 5% or more housing units rated deteriorated or dilapidated are all located along the north and northeast fringe of the study area and are listed in the following table:

Neighborhoods with 5% or more Housing
Units Rated as Deteriorated or Dilapidated
(ranked in order from worst to best)

Census Tract (see page)	Neighborhoods	% of Total Housing Units
263	Boeing Field, Duwamish	31.2
264	Glendale, Valley View	18.8
272	Riverton, Foster	14.1
282	Thorndyke	11.4
266	North Shorewood	8.6
281	Riverton Heights	7.3
283	Crestview	5.2
265	White Center Heights	5.1

Source: Neighborhood Analysis Survey, King County Department of Planning, 1968

The validity of this data is confirmed by the fact that, in the 1970 census, these areas also tended to have high percentages of older housing as well as low median family income and housing values.

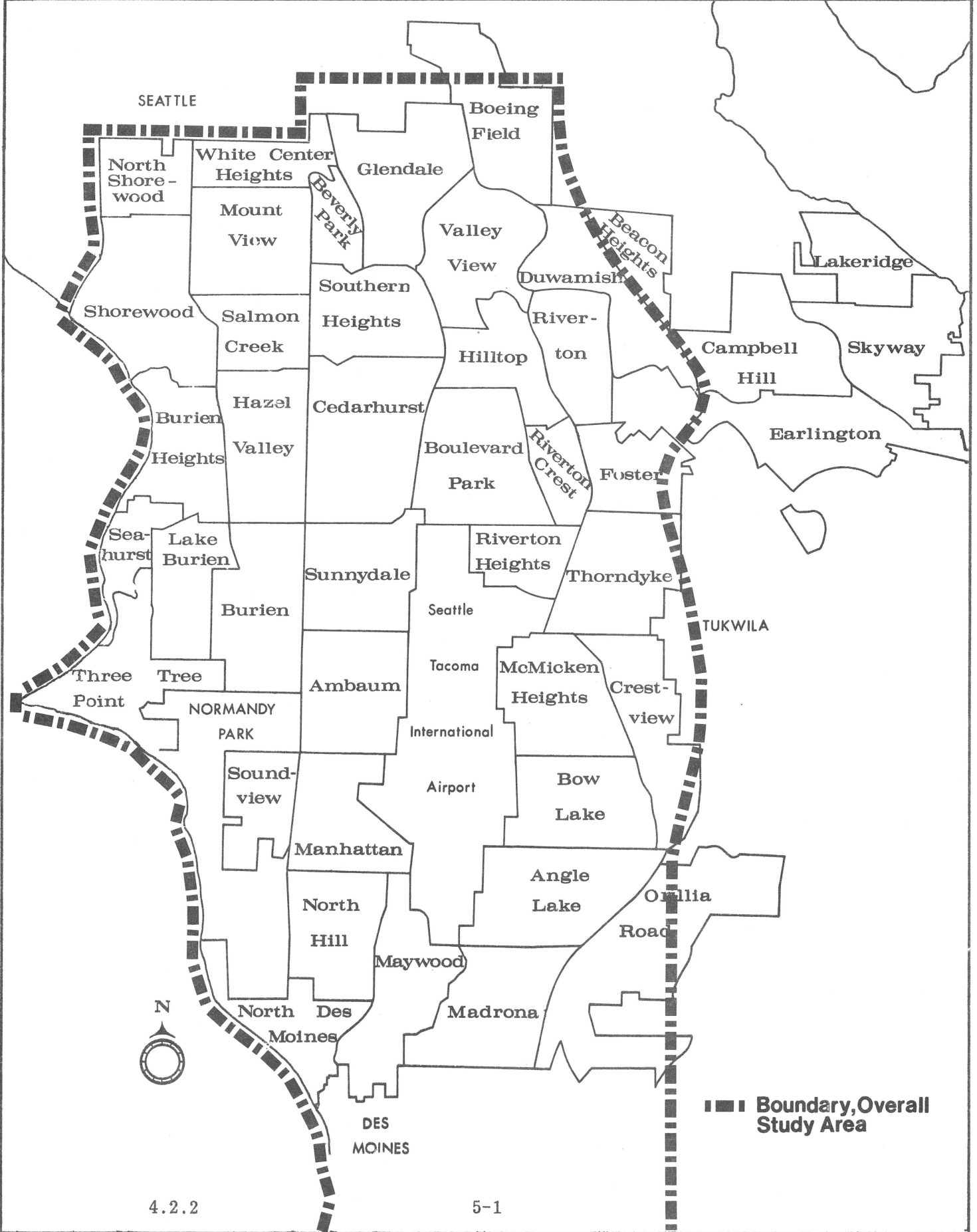
The results of the housing quality survey described above were spotchecked in the field by County staff during the spring of 1973. It was determined that the 1968 results, for the most part, are still valid for overall neighborhood ratings on a percentage basis even though some individual units may have been removed or changed from one rating category to another.

The accompanying map indicates the relationship between the Sea-Tac Communities Plan Study Area and the Highline Neighborhood Study Area. The neighborhoods outlines were the focus for the 1968 analysis and the 1973 update. The detailed data for the 1968 analysis and the 1973 update is provided in Supplement to Technical Report 1, Community Trends and Characteristics, which is available through the Land Use Management Division.

CHANGING HOUSING DEMAND:

The peak year for apartment construction in the area was 1967, when nearly 3,000 units, about three-fourths of the total authorized, were of this

NEIGHBORHOODS IN HIGHLINE STUDY AREA
 KING COUNTY PLANNING DEPARTMENT



--- Boundary, Overall Study Area

type. The impact of rapidly increasing Boeing Company employment from 1965 through early 1969 created a demand for apartments, particularly to serve people newly arriving in the County who were single, without their families, or seeking a temporary place to live until they could find or decide upon permanent housing. This impact is illustrated by data which shows that, in 1960, only 9% of total residential units authorized were multi-family; by 1969, multi-family units represented 77% of those authorized. In 1969, however, the total number of authorized units was only one-third that of the 1967 peak year, reflecting some degree of overbuilding and the start of the employment decline at Boeing that was a major contributor to the subsequent economic recession in the region. Housing construction activity tends to reflect the economic well-being of an area; this is clearly observable in the Sea-Tac Communities area by comparing the peaks and dips of housing activity with the employment picture.

CURRENT MARKET FOR HOUSING:

With unemployment beginning to taper off in the region, the housing market has generally improved. More dwelling units were authorized for construction in King County in 1972 than in 1971, although the total was still only about one-fourth the peak year of 1967. The first quarter of 1973 also had an increase in residential construction activity over the same period for the previous year.

According to a report of the Seattle Real Estate Research Committee published in the spring of 1973, the overall vacancy rate for multi-family units in the Burien-Federal Way area (based on a sample survey) was 5.3% of total units. Although no comparable figure for previous years was given in this report for the same area, there has been a drop in the vacancy rate

in the total Seattle housing market survey area from a high of 11.4% in October, 1970, to 3.9% in April, 1973.

For single-family homes and public housing projects however, the same report states that vacancies increased between April, 1972, and April, 1973; the rate for single-family homes went from 3.12% to 3.88% in this period, a continuation of a steady increase from the low of 0.4% reported for April of 1968. The 9.8% vacancy rate for units in public housing projects represents a 3% increase over the previous year.

The number of homes repossessed by the FHA and VA in the Seattle housing market area has increased steadily since 1970, but the local office of the Department of Housing and Urban Development reports that the rate of repossession is beginning to taper off. Of 5,000 of these homes currently under government jurisdiction, 600 or fewer are within the Sea-Tac Communities study area. Realtors responsible for handling these homes for resale within the study area report that most are in average condition, as compared with others in the County, with a few in poor condition. However, after rehabilitation, the homes are in demand and are being readily sold.

APPENDIX

Housing Condition Definitions

Sound and

Basically Sound: This housing requires no substantial improvement or removal of houses but does require conservation measures and, maintenance to keep the houses in good condition.

Deteriorated¹:

Housing needs more repair than would be provided in the course of regular maintenance. Such housing has one of more defects of an intermediate nature that must be corrected if the unit is to continue to provide safe and adequate shelter.

Dilapidated¹:

Housing does not provide safe and adequate shelter and in its present condition endangers the health, safety, or well-being of its occupants. Such housing has one or more critical defects; or has a combination of intermediate defects in sufficient number or extent to require considerable repair or rebuilding; or is of inadequate original construction.

¹These definitions are identical to those used in the 1960 U.S. Census of Housing.

4.2.3 EMPLOYMENT AND ECONOMY

INCOME LEVELS:

Median family income varies from a low of \$3,600 in census tract 265 (White Center public housing) to \$18,700 in tract 286 (Normandy Park). In general, highest income levels prevail in the bank of residential development overlooking or close to Puget Sound, where view amenities are abundant, and in the more recently developed areas located south of the Airport. Lowest income levels are in the vicinity of White Center and in the northeast portion of the study area, along the slopes facing the Duwamish Valley and on the floor of the valley itself.

As it might be expected, the lower-income areas also have the highest incidence of persons and families receiving public assistance as well as those with a below-poverty level income as reported in the 1970 census. According to the Highline School District, nearly one-fourth of its entire student body who were eating school lunches in the 1972-73 school year received free or reduced price lunches under a program subsidized by the federal government. While the overall study area can be rated as a middle-income area as compared with the County as a whole, there are a significant number of low-income families.

WHERE PEOPLE WORK:

Although the Boeing Company and other valley industries and businesses

provide the principal source of employment for persons living within southwest King County, jobs generated by Sea-Tac Airport provide the chief employment opportunities within the Sea-Tac Communities. More than 15,200 jobs accounting for a gross annual payroll of over \$160,000,000 and \$390,000,000 in yearly business activity in King County are related to the commercial traffic of Sea-Tac International Airport. The breakdown of direct and indirect impact is as follows:

	Jobs	Gross Annual Payroll	Sales And/Or Revenues
Direct	11,297	\$131,385,000	#294,918,000
Indirect	<u>3,921</u>	<u>30,047,000</u>	<u>95,500,000</u>
Total Impact	15,218	\$161,432,000	\$390,418,000

Some 38,000 King County residents and their children presently rely directly or indirectly upon the commercial traffic at Sea-Tac for their livelihood. In view of further substantial increases in activities of the Airport, it is anticipated that its total impact may encompass some 64,000 persons in King County by 1990.

1970 census data for the Sea-Tac Communities reveals that, in all except two tracts, persons employed in the transportation industry (as a % of total employment) is higher than the County figure of 7.0%. In eight census tracts within the study area, over 11% of total employment is in this industry; of these, six tracts are immediately adjacent or close to the airport. This seems to indicate that many people working at or out of the Airport wish to live nearby, a fact also confirmed by the demand for apartment construction in this area within the last decade.

Other major employers are the school districts, with the Highline District alone hiring nearly 2,000 persons in both teaching and non-teaching positions. Highline Community College accounts for another approximately 250 full-time and 200 part-time jobs not including job opportunities for students. Since relatively few industries are located within the study area boundary, other local employment is limited primarily to local business and service activities.

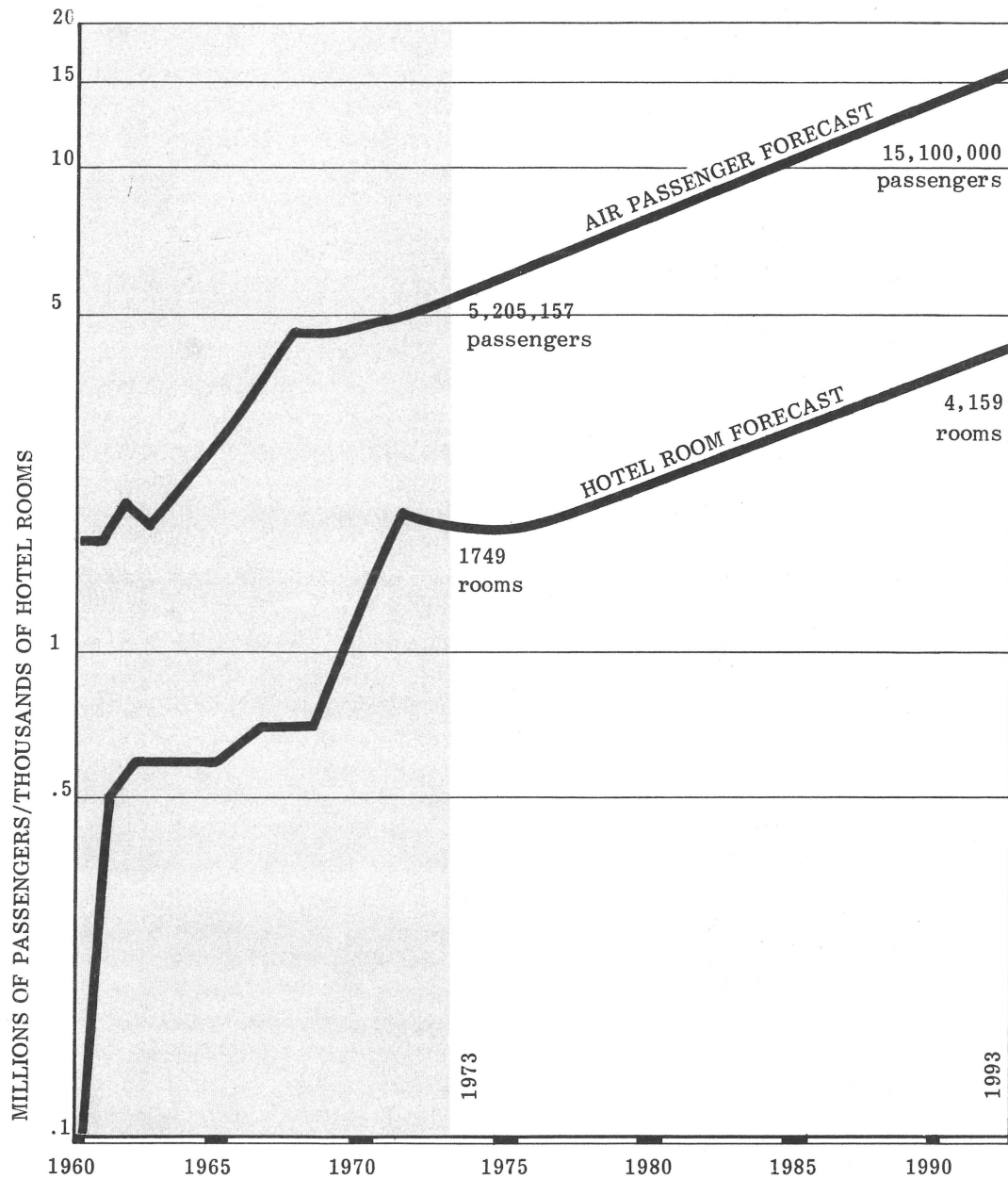
UNEMPLOYMENT:

Without evidence to the contrary, it seems reasonable to assume that the rate of unemployment in the study area follows that of the Central Puget Sound Region (see Table, 4.1.2: 8). From a low of 2.9% in 1968, the unemployment rate (unemployment as a percent of total labor force) increased to a high of 13.0% in 1971; it has been dropping since that time and is expected to continue to decline as the business climate in the region continues to improve.

AIRPORT-RELATED ECONOMY:

Sea-Tac's activity also has an impact on the characteristics of commercial development surrounding the airport. This is evident by the hotel and passenger-related uses located along Pacific Highway South. Growth in land uses related to airport activity can be expected to closely follow the growth in air passengers; this assumption can be illustrated by focusing upon the relationship between the number of air passengers and the number of hotel rooms available in major motor hotel complexes:

RELATIONSHIP OF HOTEL ROOMS TO AIR PASSENGERS



Hotel rooms are used here as an indicator of the expected growth of the airport-related activities, since rooms related most directly to passengers and because the trend of room growth since 1970 could be accurately obtained and plotted. The trend from 1960 to 1973 shows a strong correlation between

rooms and passengers. The lag of room growth indicates the time it has taken for the hotel market to respond to spurts of air passenger growth. Hotel rooms were projected by using the historical mean of 1960-1970 growth and eliminating the high and low values. The air passenger forecast was developed for the plan by Peat, Marwick, Mitchell and Co. (Ref. 4.3.5:3 and 8.0.1:4).

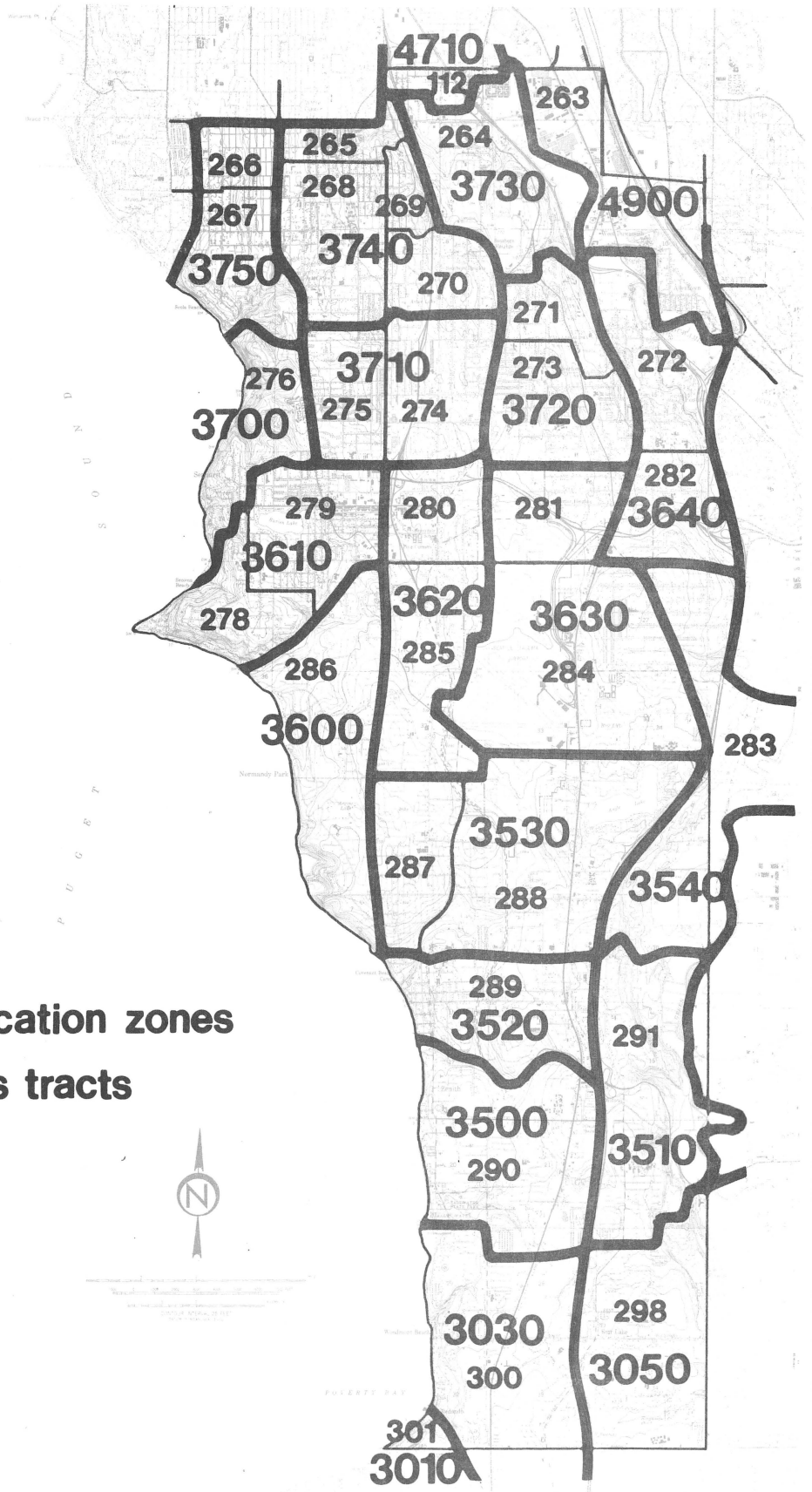
4.2.4 POPULATION FORECASTS

Utilizing local, regional and federal sources of data, the Puget Sound Governmental Conference has developed population forecasts for hundreds of activity allocation zones throughout the four-county region, Snohomish, King, Pierce and Kitsap Counties. The activity allocation zones in the Sea-Tac area for the most part coincide with census tract boundaries, see accompanying map. Where boundary differences do occur, adjustments to the projections have been made.

The Governmental Conference projections were developed for three points in the future, 1980, 1985 and 1995, which do not coincide with projection years of the Sea-Tac Communities study. Therefore, a straight line projection technique has been utilized to adjust the projections to correspond with the forecast dates of the Sea-Tac study, 1978, 1983 and 1993.

To account for and consider the impact of variations in the possible development of the region, the Conference developed three alternative regional development concepts. Although one of the alternatives has been designated as the Interim Regional Development Plan, the other two have not been completely ruled out. Population projections for all three alternatives are presented in the accompanying charts so that the possible impact of the various alternatives on the Sea-Tac Communities area can be considered.

sea-tac communities plan



3610 activity allocation zones

279 1970 census tracts

**1970 census
tracts and
activity
allocation
zones**



sponsors
port of seattle
king county

POPULATION FORECASTS - 1978, 1983, 1993

Activity Allocation Zones	Continuation of Past Trends				Cities & Corridors			Interim Regional Development Plan**		
	<u>1970</u>	<u>1978</u>	<u>1983</u>	<u>1993</u>	<u>1978</u>	<u>1983</u>	<u>1993</u>	<u>1978</u>	<u>1983</u>	<u>1993</u>
3010*	312	367	423	542	367	415	499	370	416	518
3030*	5,740	7,250	8,000	9,580	7,250	8,390	11,450	7,300	8,350	10,650
3050*	4,740	6,410	7,300	9,420	6,410	7,300	9,550	6,410	7,500	10,350
3500	6,642	7,410	8,150	9,800	7,590	8,410	10,750	7,410	8,250	10,300
3510	4,166	4,670	5,030	5,810	4,700	5,200	6,490	4,700	5,200	6,320
3520	6,019	5,930	6,130	6,500	5,930	6,200	7,010	5,930	6,180	6,990
3530	14,863	15,000	15,500	16,800	15,050	15,900	18,400	15,050	15,850	18,000
3540	386	415	445	498	415	425	423	415	457	570
3600	5,864	6,060	6,430	7,420	6,060	6,540	7,800	6,060	6,620	8,600
3610	10,502	10,050	10,100	10,750	10,005	9,900	9,950	10,050	10,250	10,850
3620	6,802	7,185	7,530	8,210	7,185	7,585	9,600	7,185	7,600	8,780
3630	13,029	12,150	11,850	12,250	12,150	12,300	13,800	12,150	12,230	12,850
3640	4,430	5,170	5,750	6,890	5,220	6,000	7,630	5,220	5,980	7,600
3700	4,086	4,890	5,570	6,610	4,940	5,600	6,920	4,940	5,600	6,920
3710	10,509	9,800	9,900	10,600	9,950	10,000	10,850	9,950	9,990	10,700
3720	10,222	9,600	9,670	9,950	9,690	9,890	10,900	9,690	9,810	10,600
3730	4,608	4,700	4,850	5,140	4,700	5,000	5,880	4,700	4,925	5,560
3740	15,629	14,850	15,000	16,050	14,850	15,250	17,000	14,850	15,050	16,350
3750	7,715	7,590	7,615	7,980	7,590	7,765	8,500	7,590	7,760	8,390
4710*	552	679	670	695	679	680	1,530	679	680	750
4900*	<u>1,315</u>	<u>1,348</u>	<u>1,305</u>	<u>1,295</u>	<u>1,355</u>	<u>1,375</u>	<u>740</u>	<u>1,355</u>	<u>1,370</u>	<u>1,490</u>
Total										
Persons	137,000	132,479	138,128	153,115	133,086	141,215	166,717	132,959	140,843	163,373

*Only a part of the AAZ is within the Sea-Tac area.

**Most probable forecast.

EMPLOYMENT

TOTAL EMPLOYMENT FORECASTS

<u>ACTIVITY ALLOCATION</u>	<u>Persons Employed</u>			
	<u>1970</u>	<u>1978</u>	<u>1983</u>	<u>1993</u>
Part of 3010	----	----	----	----
Part of 3030	330	475	642	1,170
Part of 3050	46	68	93	175
3500	850	945	1,110	1,650
3510	142	270	395	740
3520	706	960	1,230	2,040
3530	824	1,110	1,420	2,330
Part of 3540	44	43	47	66
3600	362	500	660	1,120
3610	3,041	3,510	3,990	5,000
3620	1,451	1,630	1,900	2,740
3630	9,443	10,200	10,700	11,800
3640	731	990	1,280	2,140
3700	332	280	300	410
3710	1,140	1,370	1,630	2,330
3720	704	860	1,105	1,995
3730	671	950	1,240	1,950
3740	1,240	1,460	1,750	2,480
3750	643	885	1,130	1,720
Part of 4710	187	191	210	268
Part of 4900	<u>9,492</u>	<u>11,250</u>	<u>12,500</u>	<u>14,300</u>
Sea-Ta Communities				
Plan Study Area	32,379	37,947	43,332	56,424

ALTERNATIVES:

Alternative 1, Continuation of Past Trends: This however, assumes continued improvement in past plans and policies. It is anticipated that under this alternative, market forces within the framework of local controls would create a pattern of scattered growth throughout the county.

Alternative 2, Cities and Corridors: This assumes that new self-sufficient cities and smaller satellite towns would develop in the major regional transportation corridors beyond the cities of Seattle and Tacoma. Burien would be one of those self-sufficient cities. Forecasts for this alternative project more growth for the study area than alternative 1 or 3.

Alternative 3, is a synthesis of local short-range comprehensive plans with adopted regional plans. In this alternative a short-range plan to contain regional growth would be based on the various short-range commitments of local jurisdictions and of the Regional Open Space Plan adopted by the Conference in 1965. The population growth is directed toward previously skipped-over vacant areas around major cities and suburban centers. Development of large vacant areas will be evaluated in terms of regional environmental impact. This alternative has been adopted by the Puget Sound Governmental Conference as the Interim Regional Development Plan. Forecasts for this alternative should be considered "most probable" to occur.

Alternative 1, projects a 1993 County-wide population growth of 359,000 persons (from the 1970 base of 1,159,375) with 16,115 of this increase going to the Sea-Tac Communities area.

Alternative 2, projects 1993 growth at 350,600 persons with 29,717 going to the study area.

Alternative 3, projects 1993 growth at 405,900 persons with 26,373 persons going to the study area.

All three of the alternatives project for the study area a decline in population between 1970 and 1978 of from 4,000 to 4,500 persons. This is primarily in response to a projected regional population decline and indicates a reduced school enrollment in the Highline and South Central school districts. The return of population growth in 1983, correlates with the projected regional economic upturn.

The net outlook for the area according to all three alternatives is for continued population growth.

4.2.5 EMPLOYMENT FORECASTS

The employment forecasts were also developed by the Puget Sound Governmental Conference and adjusted to fit the time frame and area boundaries of the Sea-Tac study.

EMPLOYMENT

TOTAL EMPLOYMENT FORECASTS

<u>ACTIVITY ALLOCATION</u>		Persons Employed			
		<u>1970</u>	<u>1978</u>	<u>1983</u>	<u>1993</u>
Part of	3010	----	----	----	----
Part of	3030	330	475	642	1,170
Part of	3050	46	68	93	175
	3500	850	945	1,110	1,650
	3510	142	270	395	740
	3520	706	960	1,230	2,040
	3530	824	1,110	1,420	2,330
Part of	3540	44	43	47	66
	3600	362	500	660	1,120
	3610	3,041	3,510	3,990	5,000
	3620	1,451	1,630	1,900	2,740
	3630	9,443	10,200	10,700	11,800
	3640	731	990	1,280	2,140
	3700	332	280	300	410
	3710	1,140	1,370	1,630	2,330
	3720	704	860	1,105	1,995
	3730	671	950	1,240	1,950
	3740	1,240	1,460	1,750	2,480
	3750	643	885	1,130	1,720
Part of	4710	187	191	210	268
Part of	4900	<u>9,492</u>	<u>11,250</u>	<u>12,500</u>	<u>14,300</u>
Sea-Tac Communities Plan Study Area		32,370	37,947	43,332	56,424

4.2.6 UTILITIES AND OTHER SERVICES

SEWER:

Sewer service in the area is provided by five sewer districts, four municipal and Sea-Tac Airport. Approximately 65% of the area has sewer service.

Because of the preponderance of the Alderwood Series type soils in this area, there is a high incidence of septic tank failures when sewer services are not utilized. Poor soils also exist in the two problem areas within established sewer districts (McMicken Heights and Star Lake areas) where service is not yet provided. In the Allentown area, in the Duwamish Valley, seasonal variations in the water table affect the septic tank action causing the effluent to rise to the surface rather than percolate into the soil. Where sewer service exists most of the sewage is treated within the area rather than through connection to Metro systems.

Rainier Vista, Val-Vue, Des Moines, and Southwest Suburban sewer districts have service within the proposed noise acquisition areas. Val-Vue is withholding expansion plans within the study area until the Sea-Tac Communities Plan is complete.

WATER:

Fourteen incorporated water districts and three municipalities provide service to approximately 90% of the study area. Other water

service requirements are satisfied by, (a) extended service from a water district beyond the corporate boundary; (b) self-contained systems purchasing water from the City of Seattle (e.g., Sea-Tac Airport); (c) self-contained systems from private wells (e.g., the Masonic Home); and (d) private water companies selling to the public (e.g., Normandy Park Water Company). There are certain small areas that are uninhabited and have no water requirement.

Generally, the water districts in the impact area do not foresee any significant problems. Water District #75 may lose residential accounts on the south side of the Airport; however, they expect to recover this loss of revenue by enlarged service to commercial accounts and some service to the Airport facilities.

OTHER UTILITIES:

Other utilities that service the study area include: two companies providing electric service, one company providing telephone service, one company providing cable TV service, and five companies providing garbage service.

FIRE PROTECTION:

Fire protection is afforded to the total study area except for a small area encompassing Riverton quarry and some adjacent truck farms. This includes nine fire districts for the unincorporated areas

and the City of Normandy Park, four city fire departments, and the Sea-Tac Airport Fire Department. The Seattle Fire Department has a class 2 rating and the other departments or districts are rated lower, from class 5 to class 7. There are 15 fire stations in the study area. Two of the districts, #18 and #23, are totally volunteer districts; however, #18 does utilize a central dispatch with F.P.D. #'s 2, 11 and 1.

At the start of the study, there was a noted deficiency of aid car service about the airport terminal, especially in the motel-hotel areas on the east side. A current status indicates that F.P.D. #'s 2 (Burien), 24 (Angle Lake) and 18 (Riverton Heights) now have aid cars. Further, F.P.D. #'s 23 (McMicken Heights) and 26 (Des Moines) are scheduled for receipt of county sponsored aid cars before the end of 1974. The Port of Seattle is also buying an aid car which is due early in 1975.

OTHER SERVICES:

Police Precinct #4 Headquarters located in Burien serves about 90% of the population in this area with the Kent precinct affording coverage in the southern portion about Redondo. Since the office is located on the second floor, access to the public is not convenient.

Two district Justice courts are located in the area, both in the leased space.

The Southwest District Health Center (Seattle-King County Health Department) services about 90% of the area with the Redondo area being served by the Southeast Center.

City Halls of both Des Moines and Normandy Park are in the study area, with Des Moines just recently moving into a new facility.

Two Jobline centers are located in the study area, one on Highline School District facilities and one in King County Housing Authority facilities.

The Airport Police Department provides airport security at the terminal and surrounding airport property.

4.2.7 TRANSPORTATION AND TRAFFIC

TRANSPORTATION PLANNING FOR KING COUNTY:

The recently published King County Interim Transportation Plan: Focus 1990, (KCITP) provides a forum for a coordinated look at transportation in King County. More than a streets and highways plan, the KCITP also espouses principles and criteria for fixed rail, non-motorized, aviation, and marine transportation.

The study approach involved dividing the County into 26 analysis zones and evaluating each of them in relation to a certain set of criteria. Community-level transportation considerations, such as those identified in the Sea-Tac Communities Plan, will augment the KCITP analysis and contribute to a balanced and integrated transportation plan for King County.

CIRCULATION SYSTEMS:

The planning area bounded by S.W. Roxbury St. to the north, S. 288th St. to the south, Interstate 5 to the east, and Puget Sound to the west, contains Sea-Tac airport and its internal people-mover system, some bicycle routes and pedestrian trails, and portions of the navigable waters of the Duwamish River and Puget Sound. However, the area is primarily auto oriented.

Streets and Highways:

Interstate 5, S.R. 509, S.R. 518 and S.R. 516 form the backbone of the highway network (map 4.2.7:6). Other north-south traffic is served by Pacific Highway S., 1st Ave. S., 16th Ave. S.W.-Ambaum Blvd. S.W., Des Moines Way S. and Military Road S. Other east-west routes include S.W. 106th St., S. 128th St., S. 188th St., S. 200th St., S. 216th St., and S. 240th St.

Existing and forecast vehicular activity levels are depicted on maps 4.2.7:7, 8, 9 and 10.

Significant additions to the highway system are related primarily to the eventual continuation of S.R. 509: the route to S.R. 516 from the present terminus at Des Moines Way S. has been determined; the leg south from S.R. 516 to I-5 will yet be the subject of a route study.

Presently planned interchanges along S.R. 509 are for its intersection with S. 188th St., S. 216th St., and S.R. 516. An interchange is planned for I-5 at S.272nd St.

Additionally, resolution of the south airport access problems will require changes at Pacific Highway South, S. 188th St. and 18th Ave. S.

Metro Transit presently serves the area with north-south routes on 16th Ave. S.W.-Ambaum Blvd. S.W., 1st Ave. S., Des Moines Way S., Pacific Highway S., and Interstate 5. East-west routes operate on S.W. Roxbury St., S.W. 152nd St., S.W. 160th St., S. 223 St. and S. 240th St.

Planned improvements (map 4.2.7:11) include increased local service and express bus service on S.R. 509.

Fixed Rail:

Extensive rail service accommodates the various industrial and manufacturing facilities located in the Duwamish and Kent Valleys. However, there is no similar service to the plateau on which Sea-Tac is located.

The present transit system (busses) is not oriented to rapid rail. Yet, the presence of the airport would make the area prime for service should such a system be developed for the Puget Sound Region.

Sea-Tac Airport is presently operating a people-mover transit system to shuttle passengers between the main and satellite terminals. An extension of that system to the south is planned in order to link up with new development of employee parking and expanded passenger service facilities. A long range possibility is the extension of the people-mover system to other points near the airport or within the community.

Non-motorized:

The King County Interim Transportation Plan: Focus 1990, includes a trail corridor plan, derived from the 1972 Urban Trails Plan. The Sea-Tac Communities Development Plan (Chapter 6.6) refines the corridor schemes for the Miller and Des Moines Creek drainageways.

Other systems for non-motorized travel include designated bikeways, public sidewalks, and footpaths that have attained a common usage. These facilities, as they now exist, are represented on maps 4.2.7: 12 and 13.

Marine:

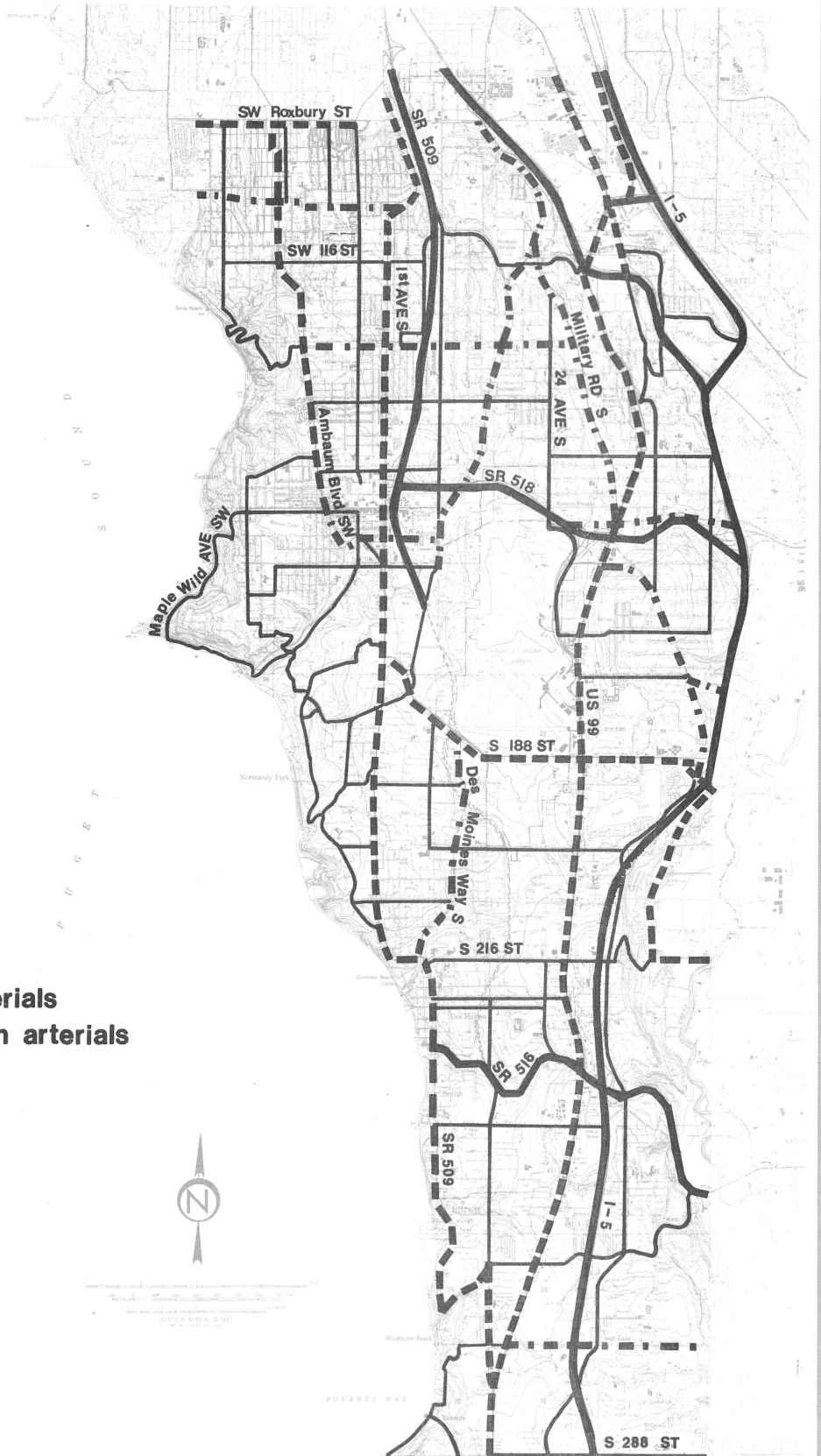
The Des Moines Marina on Puget Sound and the industrial facilities along the Duwamish Waterway reflect marine orientation and circulation. Aside from the possibility of a public boat launch facility, being located on Puget Sound somewhere between Seattle and Federal Way, there are no anticipated additions to the marine transportation systems.

Aviation:

Sea-Tac Airport is obviously a regional transportation facility that provides for general aviation, air cargo, and commercial air carrier traffic. Aviation activity and forecasts are presented in Chapter 4.3 of this plan.

The projected increase in air passengers suggests that persons travelling to and from Sea-Tac will increasingly impact operating capacities of the nearby freeways and arterials. Both the design report for a Pacific Highway South/S. 188th St. interchange and south airport access (Redford Engineers, 1972) and the airport parking and surface access study (The Richardson Associates, 1974) examine future traffic volumes related to air passenger activity. Problems loom for S. 188th St., Pacific Highway S., Interstate 5, the airport freeway and terminal drives, and local community arterials unless adequate provisions are made for south airport access.

sea-tac communities plan



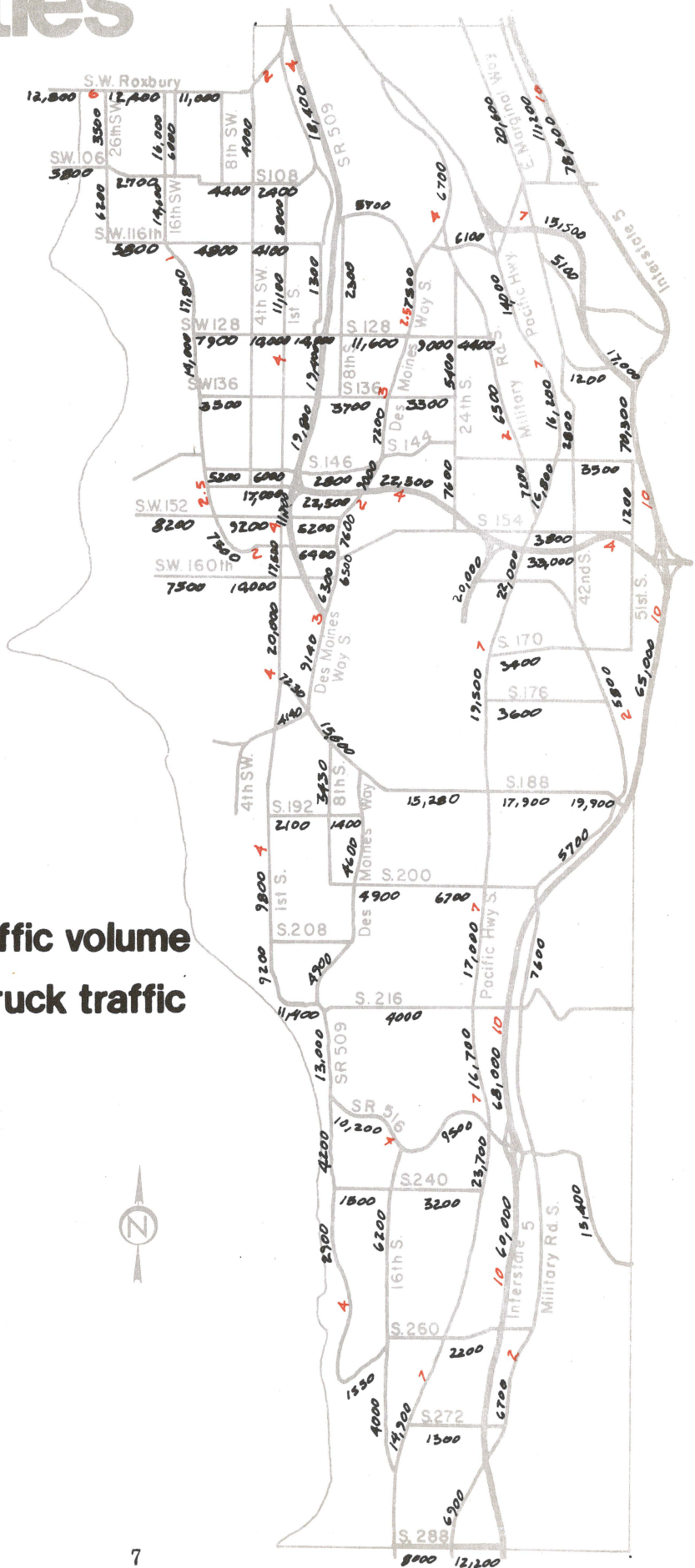
- existing state arterials
- county and city urban arterials
- major
- secondary
- collector

arterials streets and roads



sponsors
port of seattle
king county
4.2.7

sea-tac communities plan



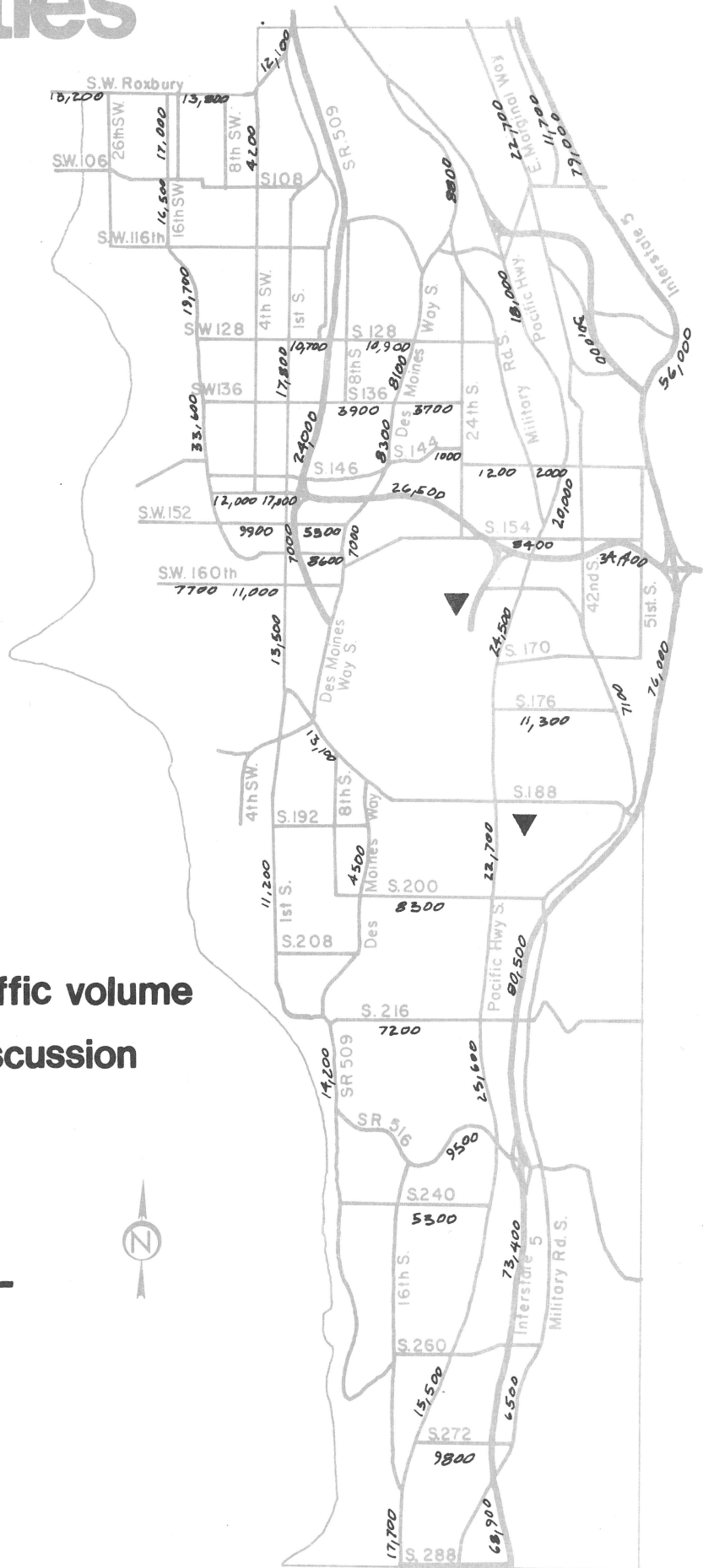
12,345 average daily traffic volume
10.5 estimated % of truck traffic

traffic:1973
routes,volume
and mix-
state and
county
arterials



sponsors
port of seattle
king county
4.2.7

sea-tac communities plan



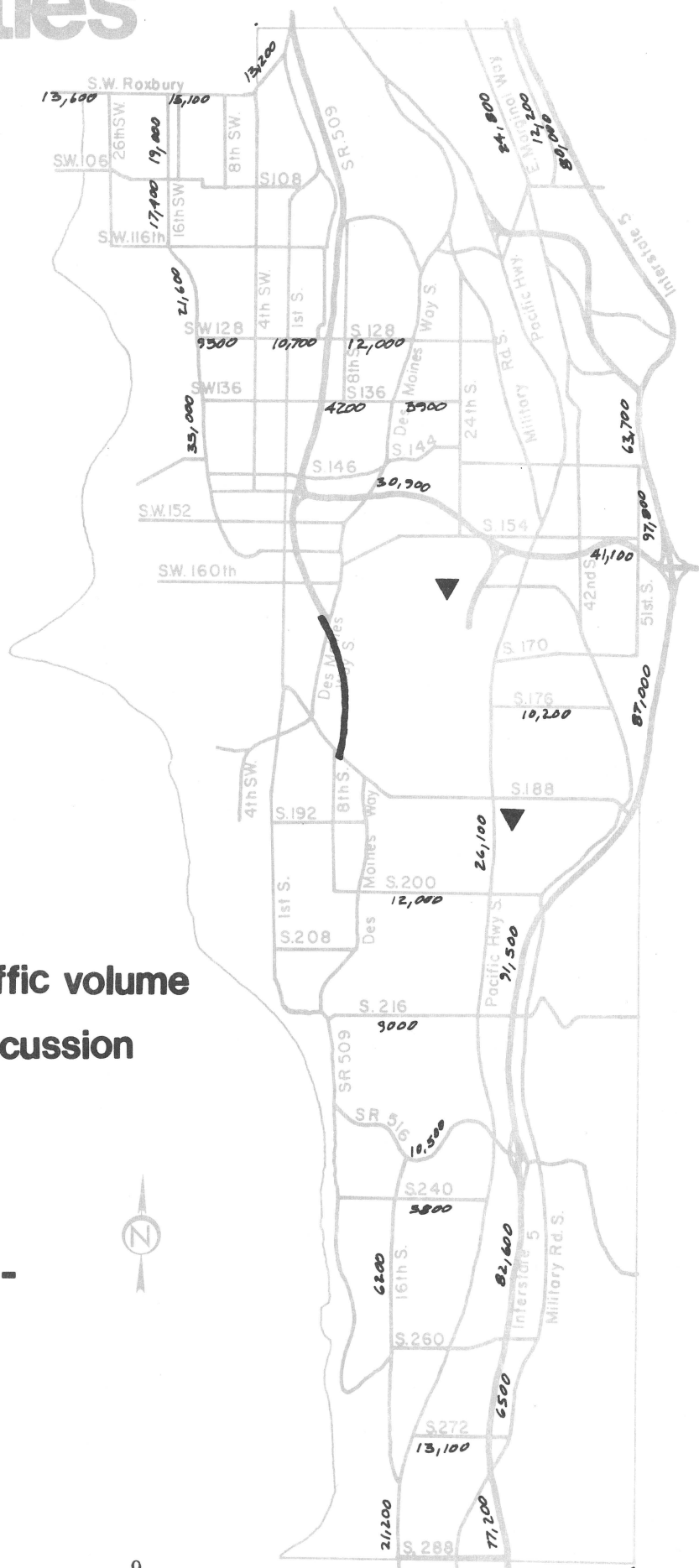
12,345 average daily traffic volume
▼ see 6.6.6 for discussion

traffic: 1978
routes and volume -
state and
county
arterials



sponsors
port of seattle
king county
4.2.7

sea-tac communities plan



12,345 average daily traffic volume

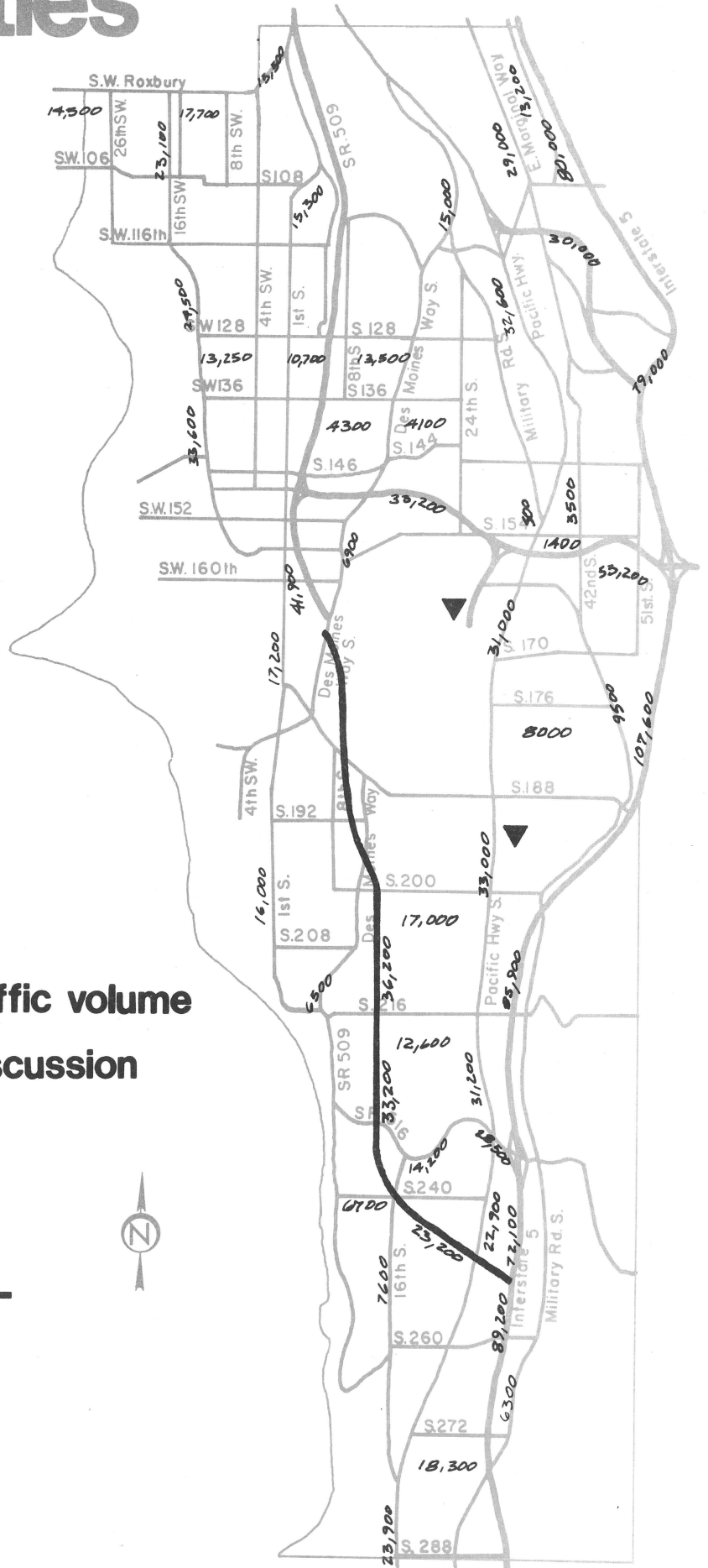
▼ see 6.6.6 for discussion

traffic: 1983
routes and volume -
state and
county
arterials



sponsors
port of seattle
king county

sea-tac communities plan



12,345

average daily traffic volume



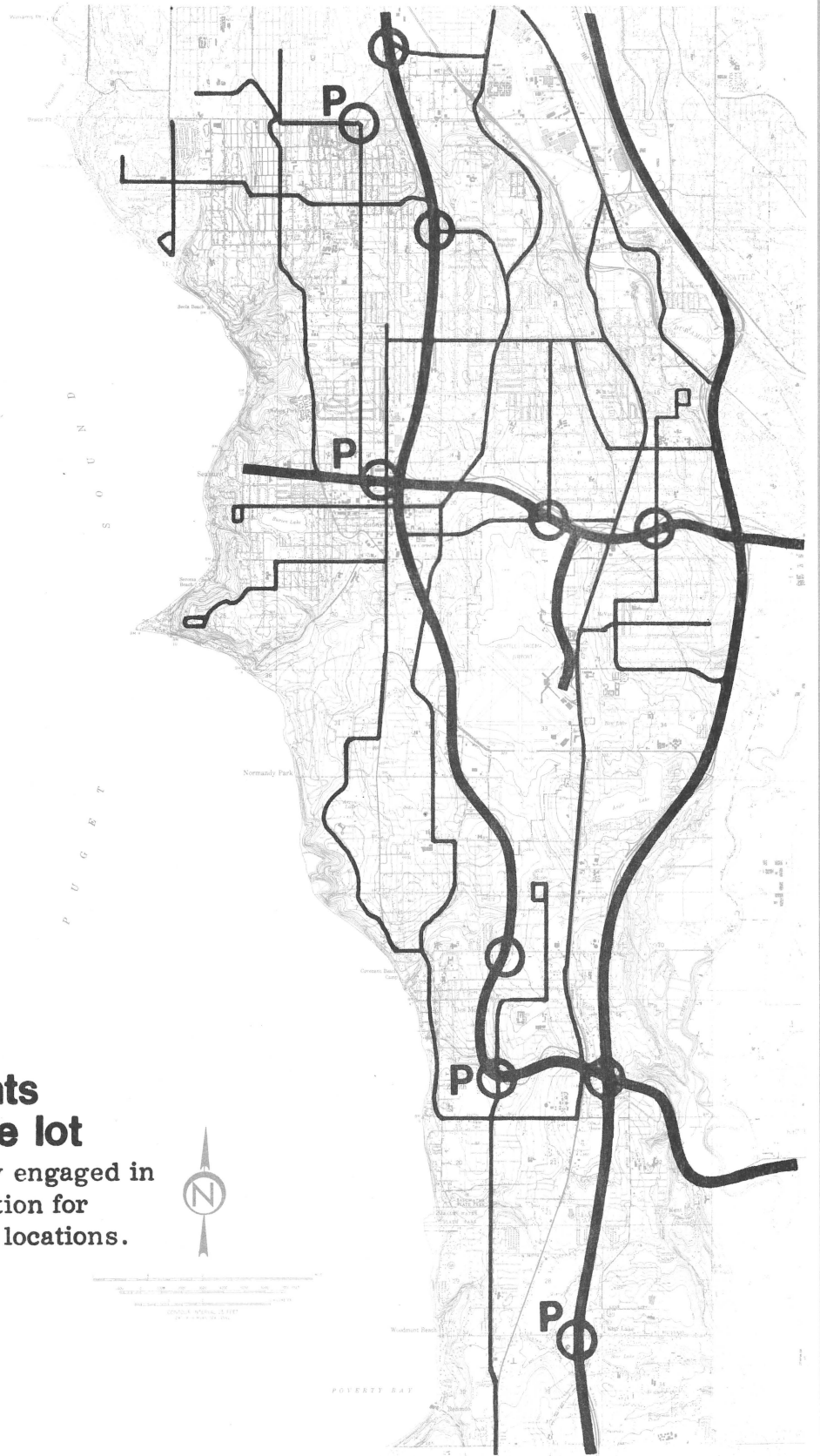
see 6.6.6 for discussion

**traffic: 1993
routes and volume -
state and
county
arterials**



sponsors
**port of seattle
king county**

sea-tac communities plan



- express
- local
- transfer points
- P** park-and-ride lot

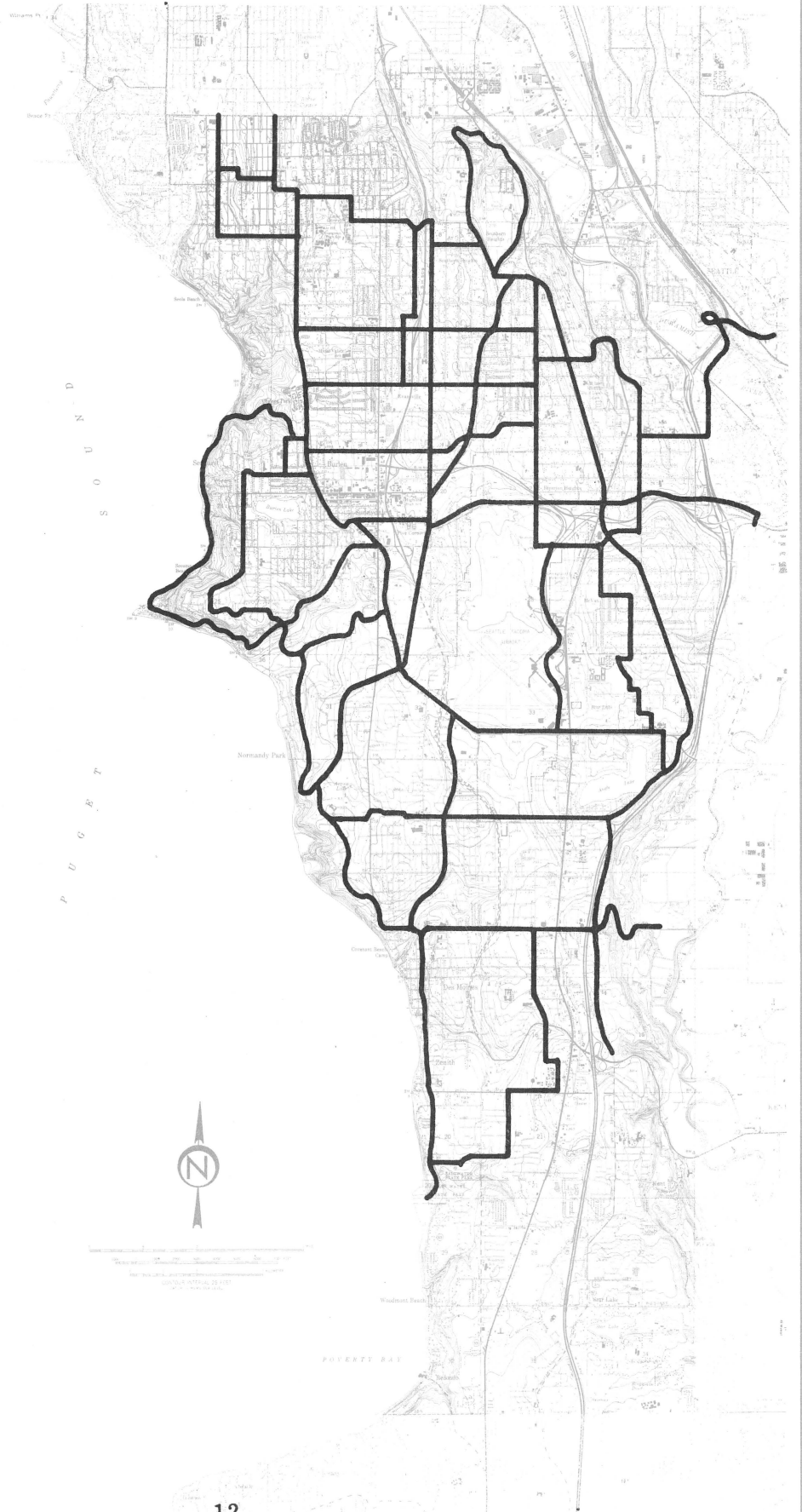
note: Metro is presently engaged in specific site selection for park-and-ride lot locations.

metro service and facilities: 1990



sponsors
port of seattle
king county
4.2.7

sea-tac communities plan

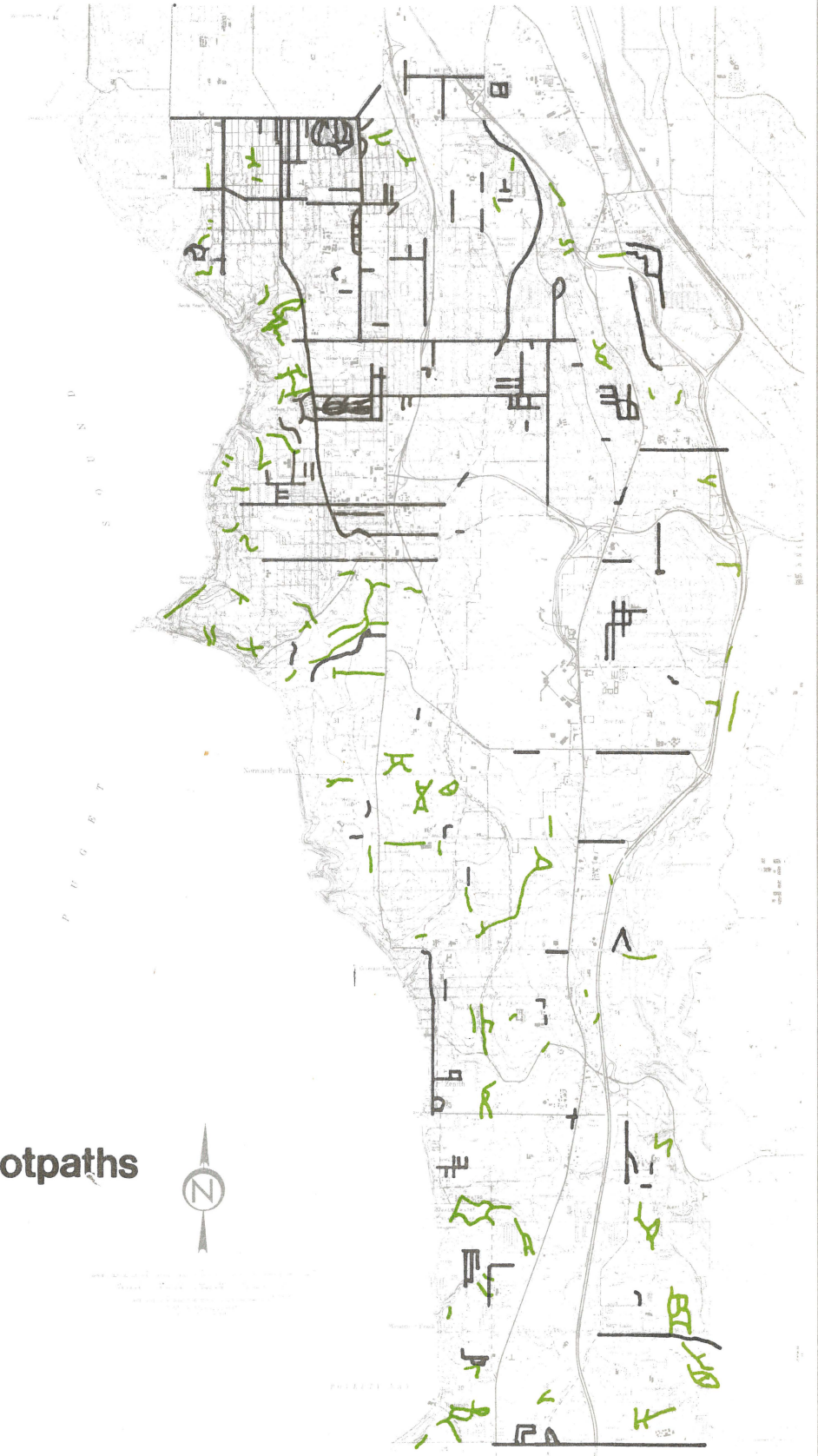


**designated
bicycle
routes**



sponsors
**port of seattle
king county**
4.2.7

sea-tac communities plan



- sidewalks
- trails and footpaths

pedestrian routes



sponsors
port of seattle
king county
4.2.7

chapter 4.3
air traffic activity
and forecasts

4.3.1 SCHEDULED AIR TRAFFIC

AIR TRADE AREA/SEA-TAC INTERNATIONAL AIRPORT:

The geographic region served by an airport is designated as the Air Trade Area, and may be divided into a primary and a secondary area. The Primary Air Trade Area is the geographic region from which the majority of airline passengers is normally generated. It includes the area of concentrated urban population proximate to the airport and a few nearby communities. The Secondary Air Trade Area is the geographic region from which passengers will tend to gravitate to a particular airport, but which lies beyond the urban, heavily populated area.

The Primary Air Trade Area for Sea-Tac consists mainly of four counties, an area otherwise known as the "Central Puget Sound Region," which includes the counties of King, Kitsap, Pierce and Snohomish. (See Map 4.3.1: 2). Approximately 80% of the passenger traffic is generated from this area. The Secondary Air Trade Area extends over two-thirds of the state of Washington. The lower portion of the state, south of Centralia and Chehalis, is served mainly by Portland International Airport.

AIR CARRIER TRAFFIC ACTIVITY:

In terms of air carrier traffic activity (as measured by passenger enplanements at Sea-Tac International Airport), the Central Puget Sound is classified as a large air traffic hub by the Federal Aviation Administration (FAA). A large air traffic hub is defined by FAA as a community

PRIMARY AIR TRADE AREA
Sea-Tac International Airport



enplaning 1.00% or more of the total passengers enplaned on certificated route air carriers in scheduled service in the fifty states and District of Columbia. (See Table 4.3.1:4).

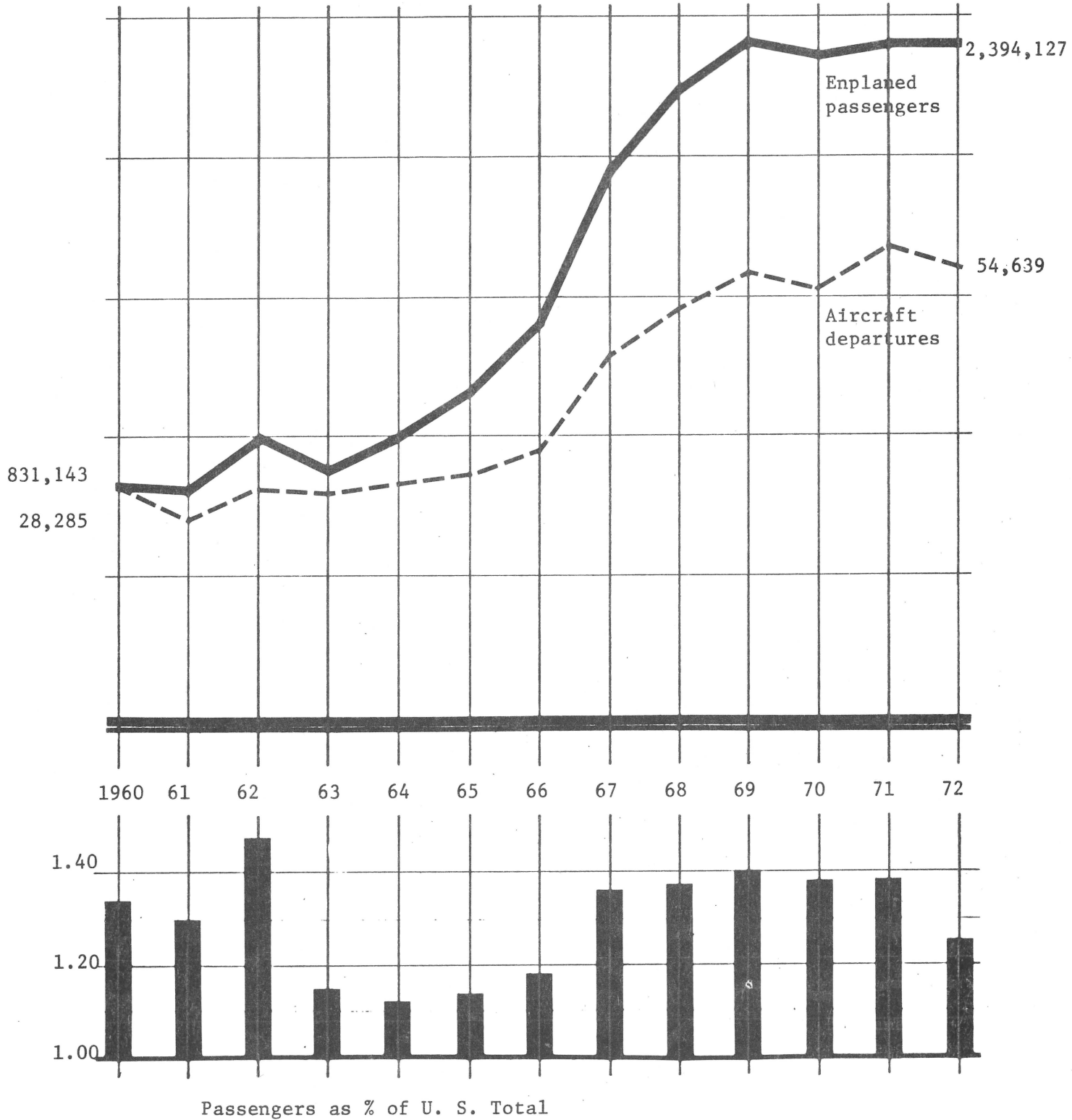
Sea-Tac is currently served by ten certificated route air carriers, two foreign flag carriers and six commuter (scheduled air taxi) airlines.

AIR CARRIER PASSENGER TRAFFIC:

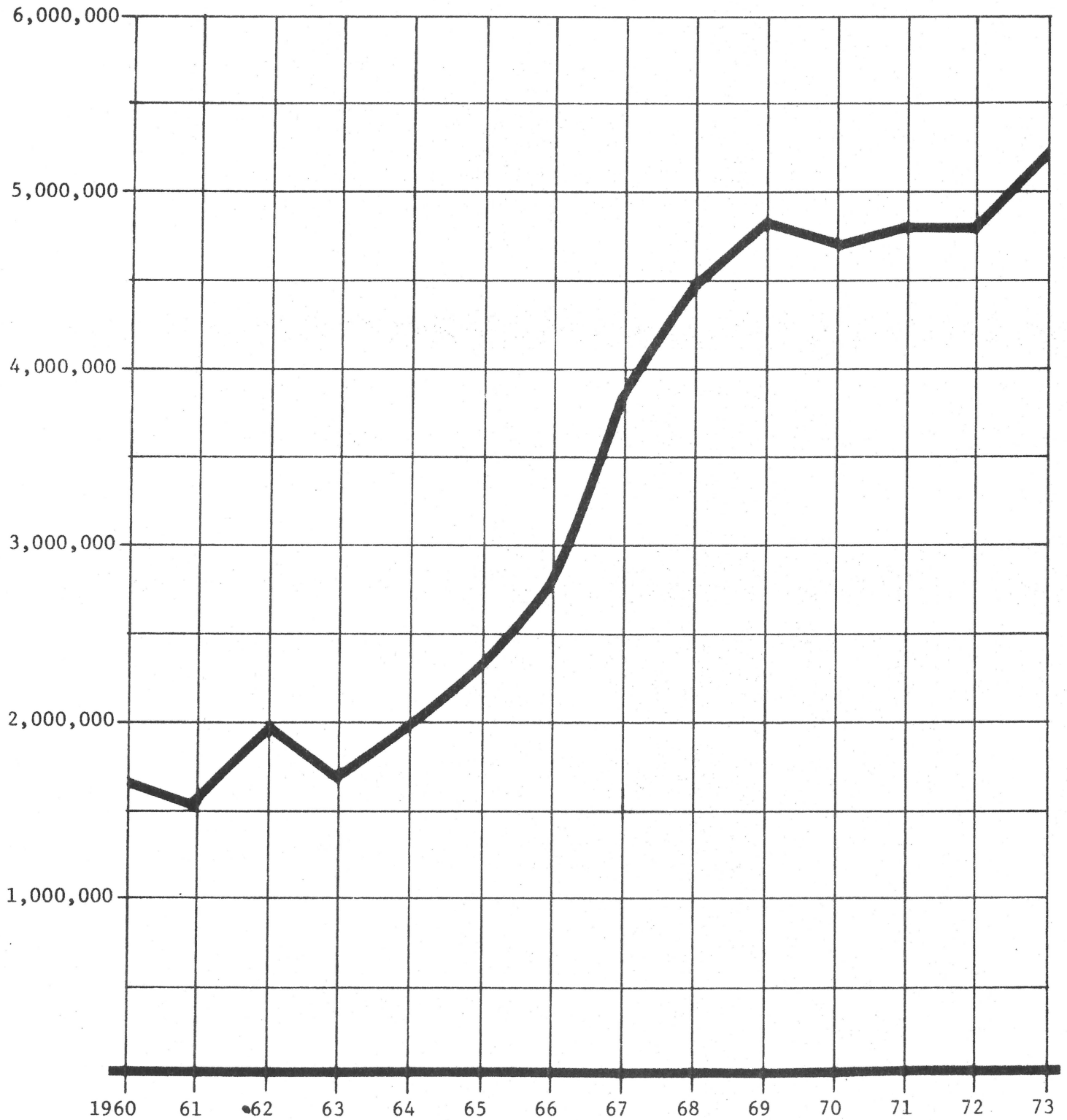
Passenger traffic is the primary activity at Sea-Tac. The total volume of passenger traffic enplaning and deplaning at the Airport in 1973, was 5,205,157 passengers, representing a better than 200% increase over a 10-year period. From 1962 to 1972, annual fluctuations in the levels of passengers ranged from 39% year-to-year increase to 11% year-to-year decline with an average annual rate of growth of enplaned passengers of 9.2%.

Several factors contributed to this surge and decline of air traffic growth from 1962 to 1972. The 1962 bulge in passenger traffic can be explained by the Seattle World's Fair, making this an unusual peak year. During the period of 1966-1969, troop deployment in Vietnam was at its highest level and military transport accounted for a notable portion of passenger air traffic growth during this time. A subsequent military slowdown after 1969 and a rerouting of returning Vietnam veterans through Oakland, California contributed to the decline of air passengers traffic at Sea-Tac. The 1967 over 1966 increase was exaggerated because of depressed 1966 traffic caused by the strike of the International Association of Machinists and related employees during the latter part

AIR CARRIER PASSENGER TRAFFIC
Sea-Tac International Airport
1960-1972



TOTAL AIR CARRIER PASSENGER TRAFFIC
SEA-TAC INTERNATIONAL AIRPORT
1960-1973



of that year. Another factor affecting the air traffic growth pattern was the rise and fall of the aerospace industry. The expanding aerospace sector reached its peak in mid-1968, and then began its rapid decline with 1970 being the most severe year.

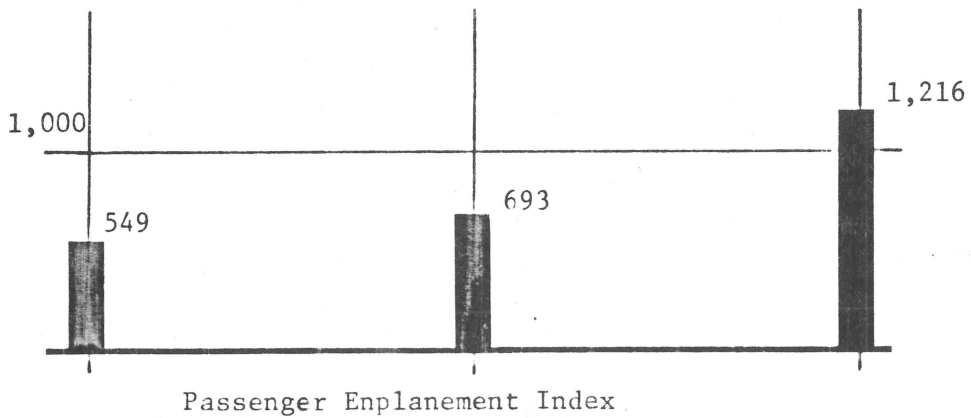
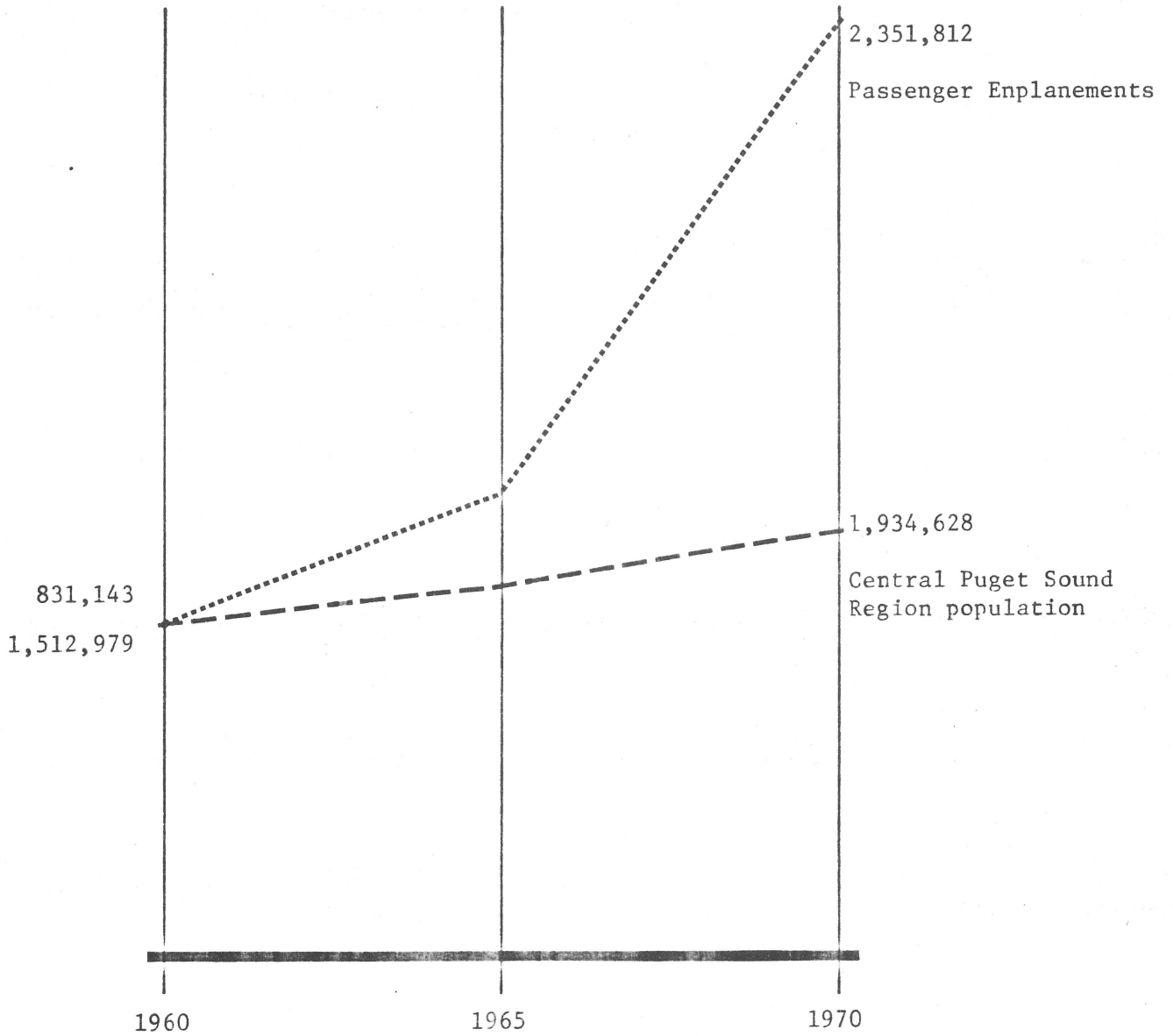
The trend of Sea-Tac International Airport's passenger growth followed the economic cycle of the Central Puget Sound Region. A strong rate of growth of enplaned passengers between 1964 and 1968 accompanied the rapid expansion of the local economy. Volumes during this time period surged from 2,000,000 to 4,000,000 passengers per year. The average annual increase of 500,000 passengers during the boom years declined to 200,000 passengers between 1968 and 1972. The leveling of the growth rate was consistent with national trends, and in part reflected the national economic recession of 1969 and 1970. The local economy, however, did not reach its lowest point until late 1971, and the no-growth situation in passenger traffic at Sea-Tac continued through 1972.

PASSENGER ENPLANEMENT INDEX:

The Passenger Enplanement Index is the number of passengers enplanements per 1,000 population in a given year for a given air traffic market. This Region's Index shows the relationship between the number of passenger enplanements at Sea-Tac International Airport and the population of the Central Puget Sound Region (See Table 4.3.1:).

The Passenger Enplanement Index for this area rose from the 1960 level of 549 to the 1970 level of 1,216. This suggests that the propensity of individuals to travel more than doubled, reflecting higher disposable

PASSENGER ENPLANEMENT/POPULATION RELATIONSHIP
 Central Puget Sound Region



incomes, higher education, increased economic activity, and many other interrelated variables.

The number of annual aircraft departures remained fairly constant between 1960 and 1965, jumped markedly from some 29,554 in 1965 to some 54,055 in 1968 (as did the passenger volumes), and then again, held fairly constant through 1972. The annual percentage change in departures averaged some 5.6% from 1960 through 1972, while that for passengers averaged some 9.2%. The lower growth rate for aircraft operations primarily reflects the increase in the average size of the aircraft and airline fleets.

The average number of passengers enplaned per flight increased from 29.4 in 1960 to 43.4 in 1966, and then remained fairly constant through 1972.

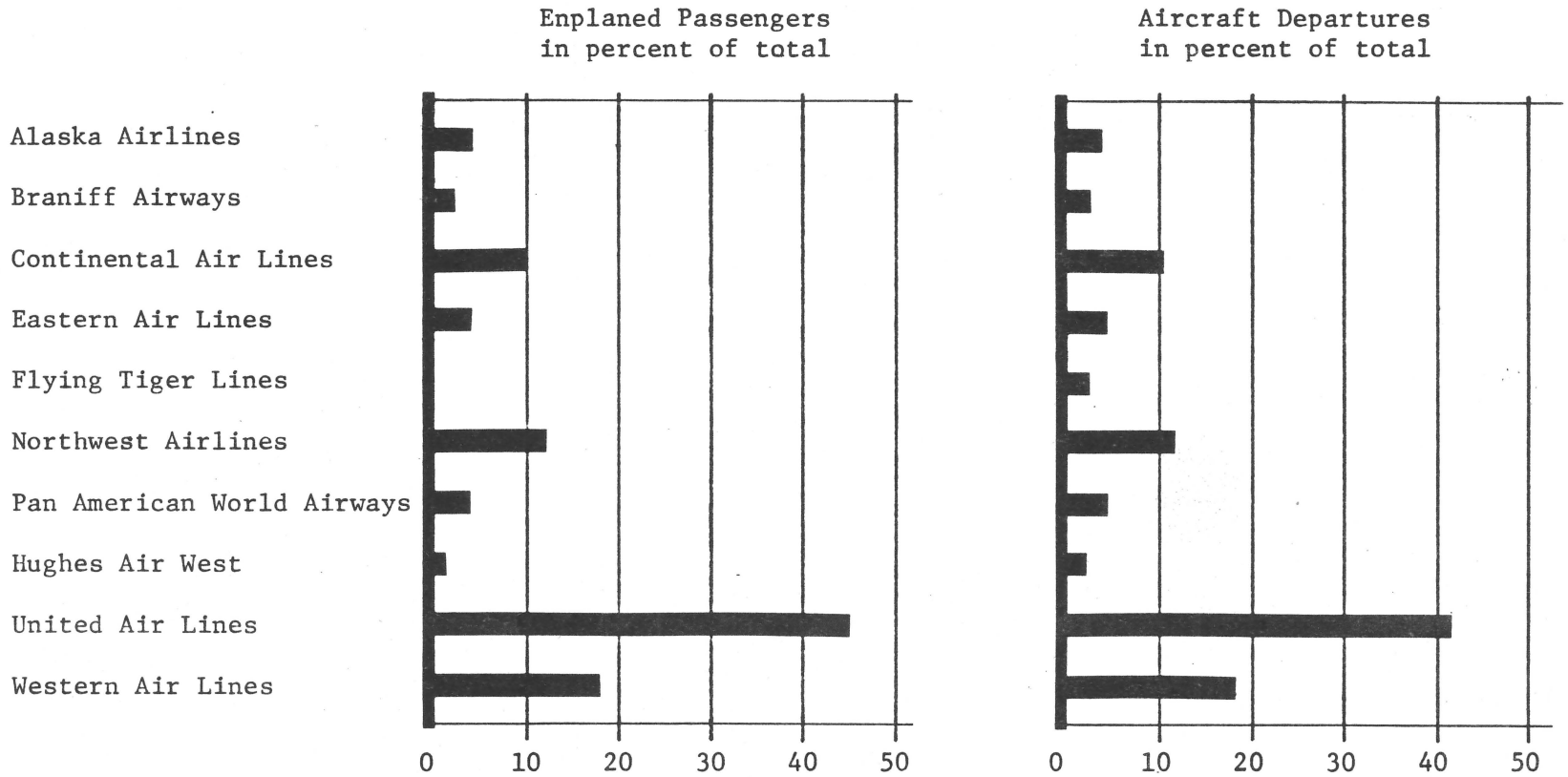
COMPARATIVE PASSENGER ACTIVITY BY CERTIFICATED AIR CARRIERS:

The following table (see 4.3.1: 8) refers to passenger activity by the ten certificated air carriers serving the Airport for fiscal year ending June 30, 1971 (the most recent year reported by CAB and FAA). These ten air carriers are: Alaska Airlines, Eastern Airlines, Flying Tiger Line, Northwest Orient Airlines, Braniff International, Continental Airlines, Pan American World Airways, Hughes Air West, United Air Lines, and Western Airlines. There are also two foreign flag carriers, Pacific Western Airlines and Scandinavian Airline System, and together with the above-mentioned air carriers, they were responsible for almost 72% of total aircraft operations at Sea-Tac in 1972.

COMPARATIVE PASSENGER ACTIVITY BY CERTIFICATED AIR CARRIERS
 For Year Ending June 30, 1971
 Seattle-Tacoma International Airport

4.3.1

8



United Air Lines is the dominant carrier at the Airport, enplaning some 45% of the Airport's total passenger enplanements on approximately 41% of total air carrier aircraft departures. In second position, in terms of both enplaned passengers and aircraft departures, is Western Airlines. Next are Northwest Airlines and Continental Airlines with about 12% and 10%, respectively, of passengers and departures. Collectively, these four carriers account for 85% of total enplanements and 81% of total aircraft departures. The rapid growth of air carrier operations during the 1966-1969 period can be attributed, in part, to the beginning of service by SAS, BI, CAL and EAL at Sea-Tac International Airport. Flying Tiger lines is an all-cargo air carrier.

The introduction of wide-bodied super jets has helped to reduce the number of flights necessary. The average number of passengers enplaned per flight in FY 71 range from 47.0 to 57.4 for all carriers except Hughes Air West, which only enplaned 28.8 passengers per departure. This variance is due to the fact that Hughes Air West operates smaller size aircraft (F-27's and DC-9's) which are more suited to the nature of its route and market structure.

PASSENGER ORIGIN/DESTINATION PATTERNS:

Origin/Destination data are based on actual ticket sales by certificated air carriers and indicate the ultimate points of origin/destination, regardless of whether the passenger makes the entire journey on one aircraft of one airline or changes aircraft and/or airlines one or more times to reach her destination. This information is

based on a 10% sample conducted by the Civil Aeronautics Board (CAB). The cities listed on the Origin/Destination Table for the Seattle-Tacoma area are those which, in 1971 accounted for 1% or more of total Seattle passengers on the survey samples (See Table 4.3.1: 11).

Air traffic patterns are a reflection of the socio-economic ties of an area. In the case of the Central Puget Sound Region, these ties are strongest with the Western States (California in particular), Canada and Alaska.

Historically, California has been the dominant source and destination of Sea-Tac's passenger traffic. San Francisco remains number one, being the ultimate origin/destination point for 14.7% of all passengers in 1968, though declining slightly in 1971 to 12.9% of the total. The Los Angeles area accounts for the second largest amount of Seattle-Tacoma's origin/destination traffic with some 11.6% of total passengers in 1968 and some 10.9% in 1971. Together, these two areas account for nearly 25% of Seattle-Tacoma's origin/destination passengers.

Between 1970 and 1970 the top six cities remained unchanged. The only change within this group was the switching of the fourth and fifth ranking. New York dropped to fifth position, moving Spokane up one notch to fourth place. Portland remained in third place, accounting for 5.4% of Sea-Tac's total origin/destination traffic in 1971.

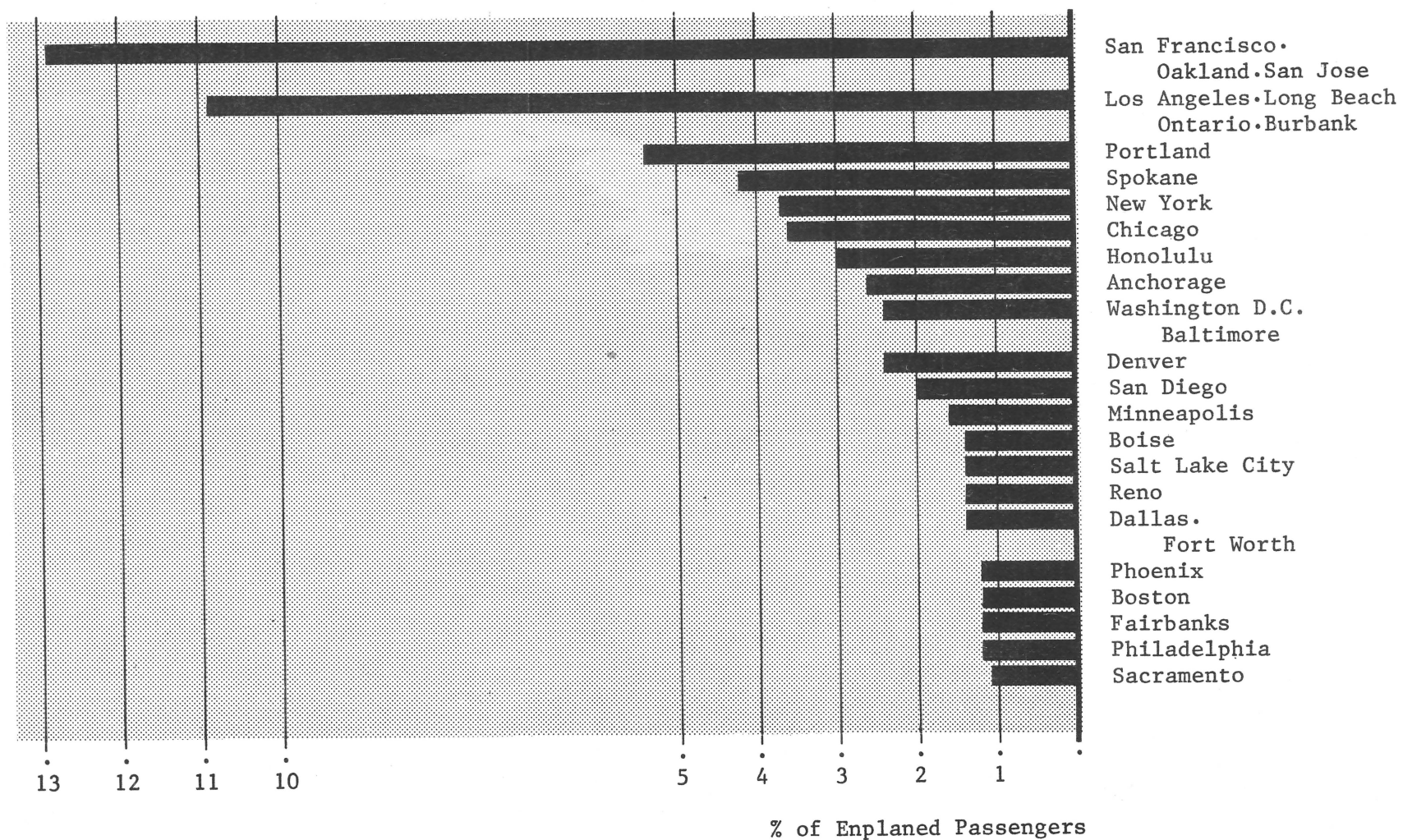
Although the typical flight is of short to medium haul length, Seattle's location in the northwest corner of the United States makes for many air routes that are long haul by nature (See Map 4.3.1:12 and Table 4.3.1:13). Most of the cities listed are at least 1,000 miles distant, but the top four city-pairs accounted for about 1/3 of total passengers in 1971 and they are all within a 1,000 mile radius. Currently, it is estimated that

ULTIMATE PASSENGER ORIGIN - DESTINATION PATTERNS

Seattle-Tacoma
(10% Sample)
1971

4.3.1

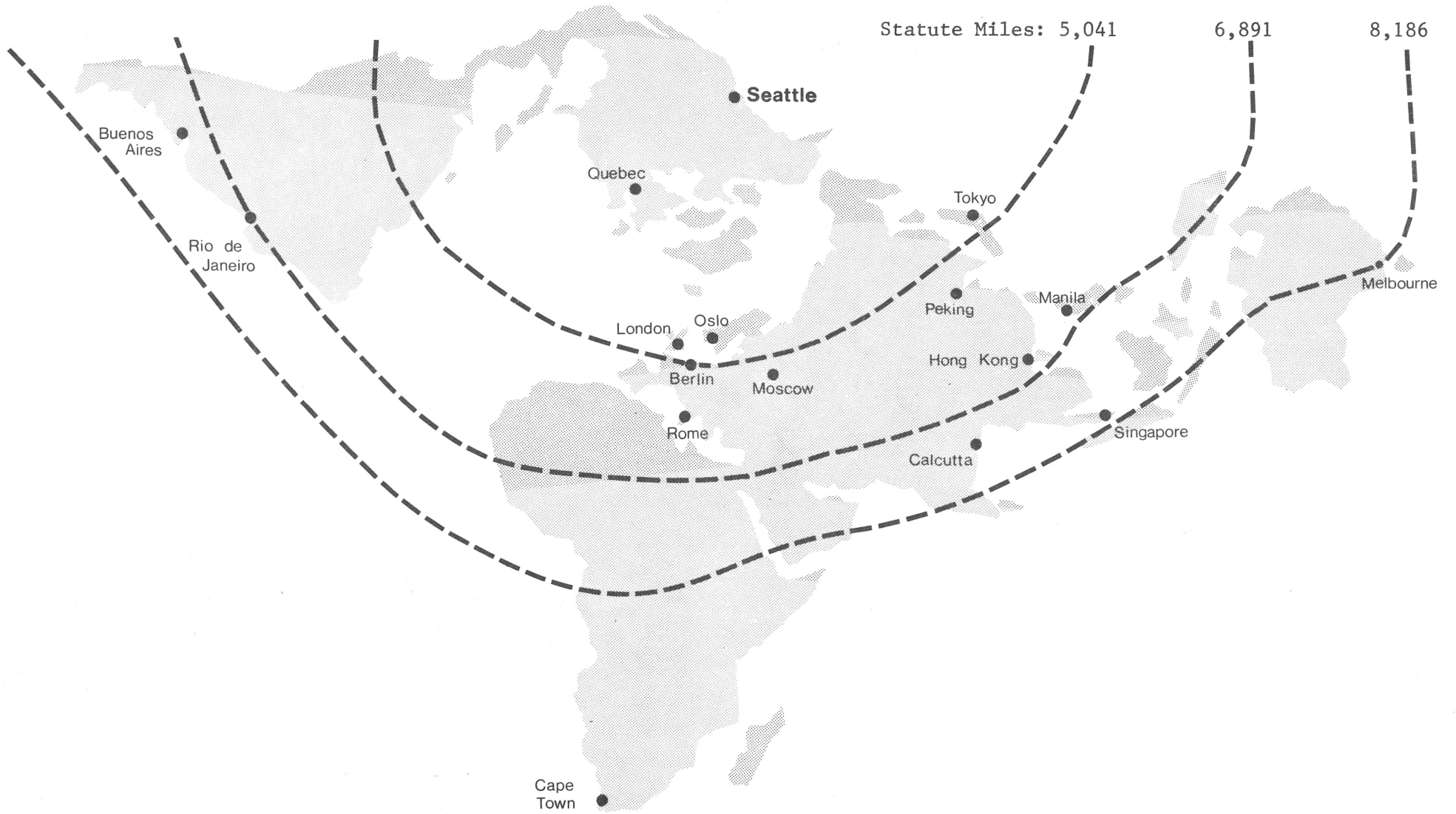
11



LOCATION OF SEATTLE RELATIVE TO MAJOR WORLD CITIES

4.3.1

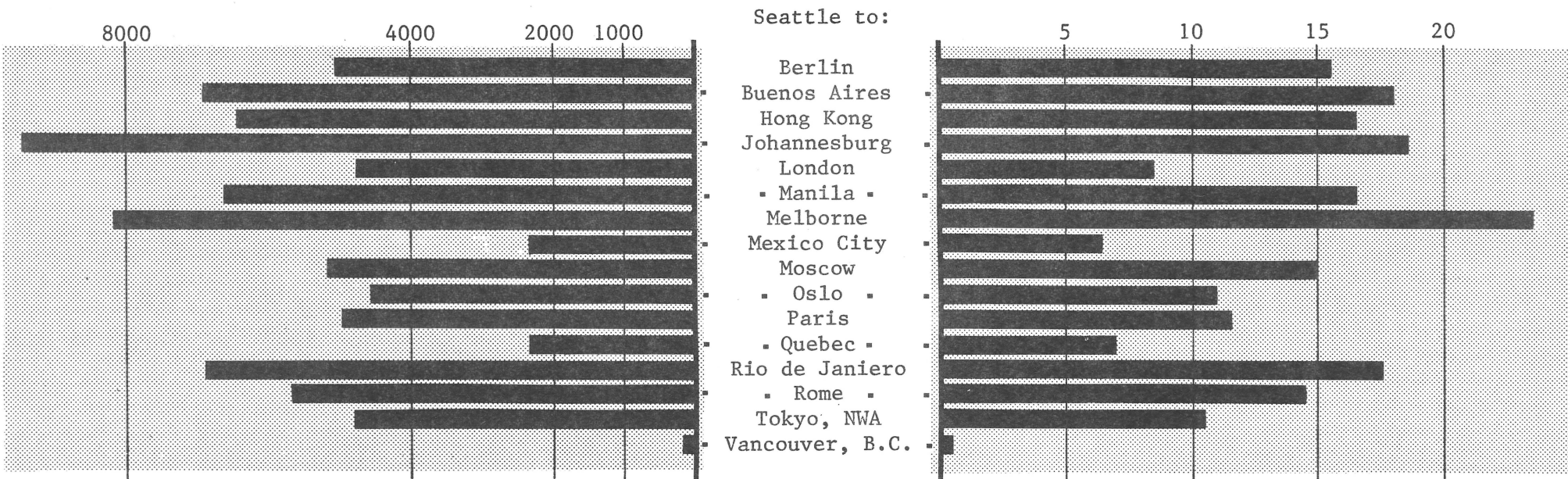
12



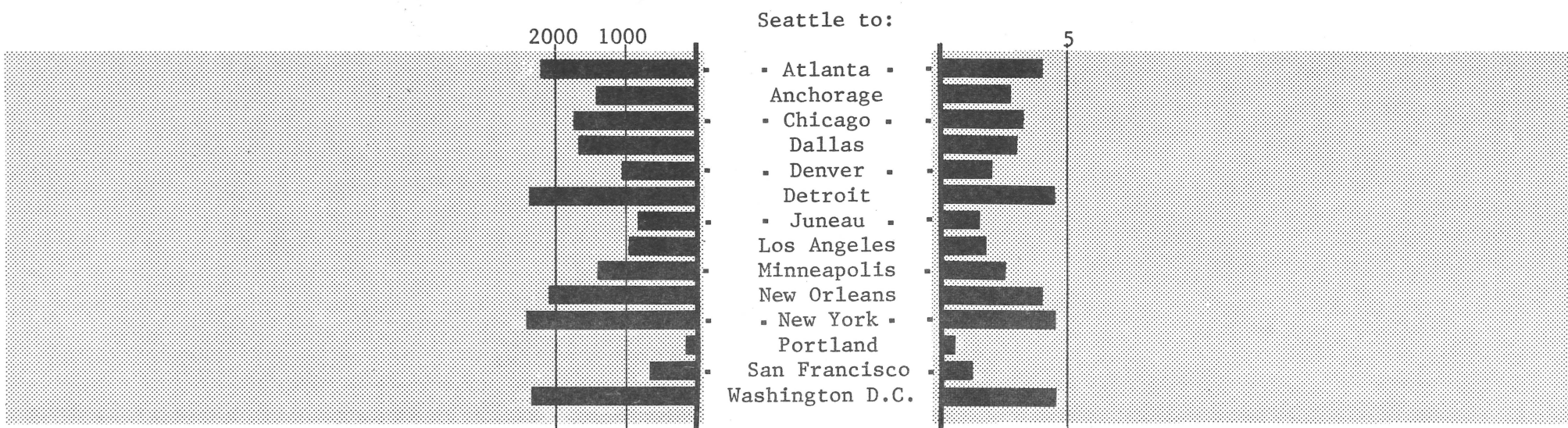
DISTANCE AND FLIGHT TIMES FROM SEATTLE TO MAJOR WORLD CITIES

4.3.1

13



DISTANCE AND FLIGHT TIMES FROM SEATTLE TO MAJOR U.S. CITIES



Distance (statute miles)

Time (hours)

approximately half of all passenger aircraft operations at the Airport involve these four cities.

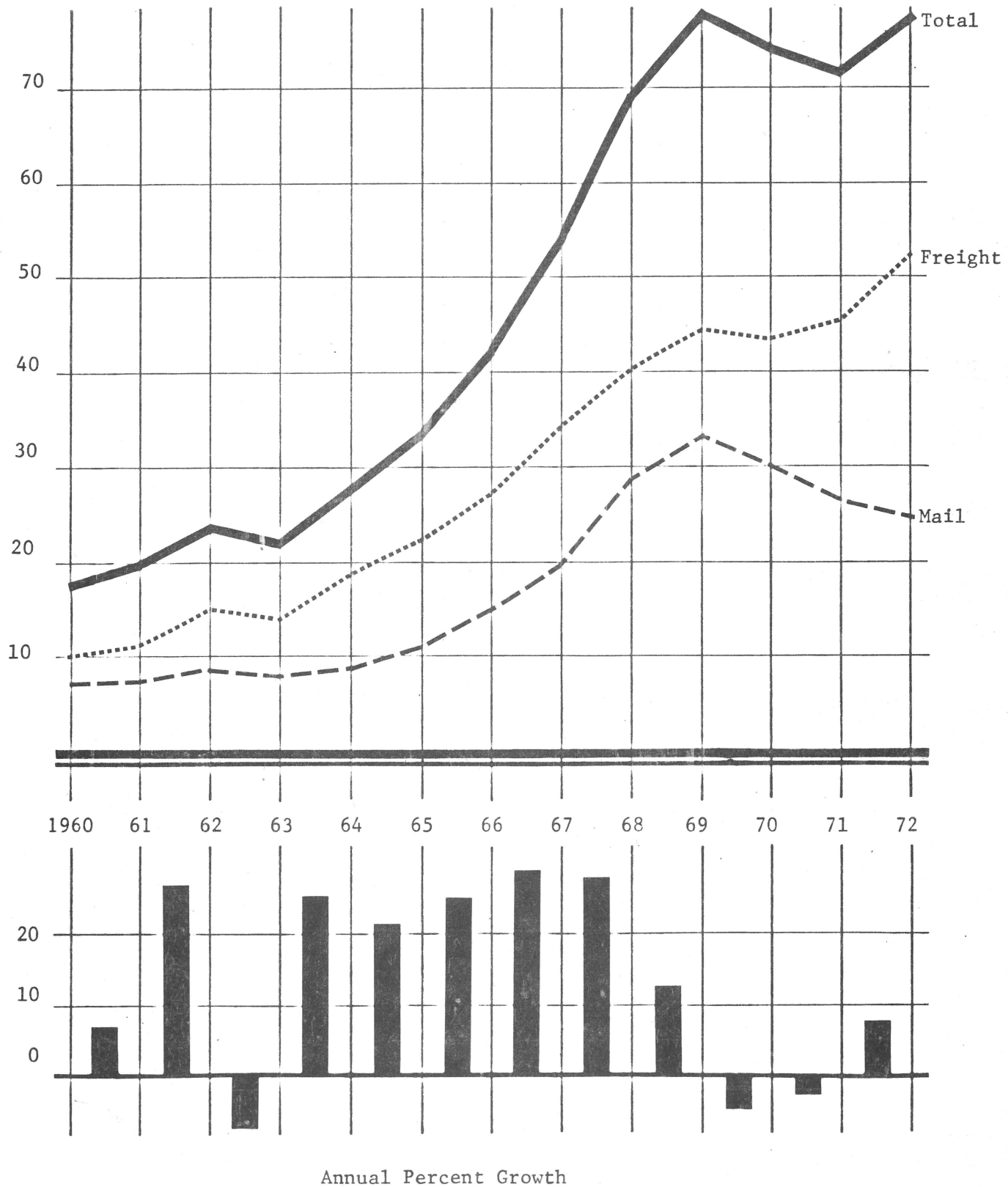
AIR FREIGHT AND AIR MAIL TRAFFIC:

Freight and mail tonnage enplaned at Sea-Tac International Airport in 1972 was more than quadruple that of 1960, increasing from 17,529 tons to 77,062 tons. The average annual growth rate for this period was 13% compared to the United States average of approximately 15% per year (See Table 4.3.1: 15).

The growth pattern of air freight volumes at Sea-Tac reflects the economic trends for the Central Puget Sound Region. A surge in annual growth during the boom years of the local economy was followed by a leveling off of growth during the Region's economic recession years: 1969-1971. Air freight volumes picked up in 1972, along with the improvement in the local economic scene, reaching a level of some 52,352 tons. Sea-Tac presently ranks 12th in the nation in enplaned air freight volumes.

In terms of air mail volumes, Sea-Tac holds 7th place among U.S. hubs. The Western States have traditionally handled twice the per capita rate of air mail. The decision by postal authorities to send all first class mail by air as well as the influx of air mail to and from U.S. Military Forces to Vietnam, led to a large jump in air mail traffic at Sea-Tac during the last half of the 1960's. A subsequent downturn in air mail tonnage between 1969 and 1972 can be attributed in like manner to the partial reversal of this postal policy as well as to the

AIR CARRIER FREIGHT AND MAIL TRAFFIC
 Sea-Tac International Airport
 1960-1972



scaling down of U.S. military involvement in the Southeast Asian war.

Air mail volumes went from a high point of 33,022 tons in 1969 to 24,710 tons in 1972.

4.3.2 COMMUTER AIRLINE (AIR TAXI) ACTIVITY

Six commuter airlines serve Sea-Tac, offering some 41 flights per weekday. Most destinations fall within the Puget Sound Region. Aircraft involved in air taxi service are small in capacity. The largest of the five different types operating out of the Airport is the Britten Norman-Islander with a nine-passenger maximum. The aircraft types which account for 81% of air taxi operations at Sea-Tac -- three kinds of Piper aircraft and the Cessna Skylane -- seat six and four passengers, respectively.

4.3.3 GENERAL AVIATION ACTIVITY

General aviation includes nonscheduled air taxi activity and agricultural, industrial, business/corporate, governmental and miscellaneous aviation activity. Aircraft uses under this category are diverse and too numerous to mention here. The main purpose of much of the general aviation traffic at Sea-Tac International Airport is to make passenger or cargo connections with the scheduled air carriers and to obtain customs clearance for international flights. Sea-Tac is not geared to accommodate large volumes of general aviation traffic. In 1972, itinerant general aviation accounted for only 19,307 or 12.7% of the Airport's total aircraft operations, representing the lowest ratio of general aviation operations to total operations at any air carrier airport in the nation.

Several factors influence the level of general aviation activity at Sea-Tac International Airport. Location seems to be the primary inhibiting factor. Alternative facilities (the primary one being Boeing Field International) to accommodate general aviation demand, are located closer to the Seattle Central Business District and population center. Contrast Sea-Tac's total general aviation operations of 19,307 in 1972 to Boeing Field's 329,000 and this point is well illustrated.

Because of the low general aviation demand for use of Sea-Tac due to its location, minimal services and facilities are available to serve this need. There is only one fixed base operator (FBO) which provides line services, and other services such as major maintenance, aircraft sales and flight training are not offered.

The high volumes of large air carrier jets at Sea-Tac International Airport may tend to discourage joint use of the facility by the smaller, less sophisticated general aviation aircraft.

4.3.4 AIRCRAFT OPERATIONS

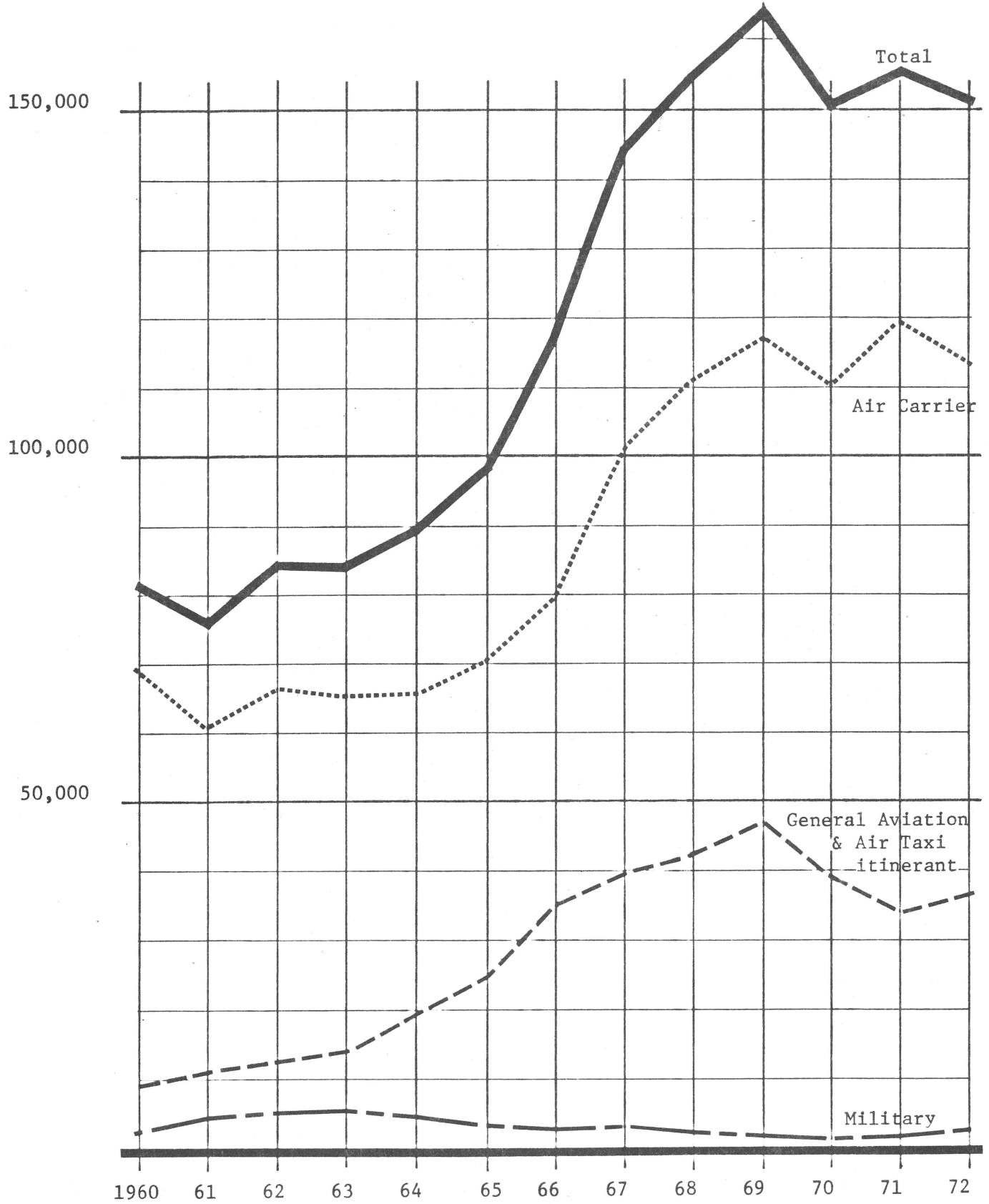
Historical operations based on FAA Tower Data and Airport Management Records for the period 1960-1972 are presented in Table 4.3.1: 2). As of July 1971, FAA Air Traffic Control Towers began to record commuter airline aircraft operations separately from their previous inclusion under general aviation itinerant operations. Thus, in addition to the traditional categories of aircraft operations -- air carrier, general aviation and military -- commuter airline (air taxi) operations are also presented.

Total aircraft operations at Sea-Tac International Airport underwent a slight increase from 81,034 in 1960 to 89,373 in 1964, mushroomed to about 165,820 operations by 1969 and then dropped off to a level of 152,344 in 1972. The historical trend in aircraft operations reflects the expansions and contractions of the local economy during this 13-year period.

Total aircraft operations are dominated by air carrier itinerant operations, which accounted for 72% of the total in 1972. Local air carrier operations, however, have declined from a 1966 high of 14,722 to a low level of 4,353 operations in 1972. This reduction was due to the shift of training operations to Moses Lake, Grant County Airport in order to, among other reasons, reduce the aircraft noise exposure levels at Sea-Tac.

Commuter airlines (air taxi) traffic spurted from 1,000 to over 20,000 operations during the 1960's. After 1967, growth leveled off and then total air taxi operations dropped from a high 1970 level of nearly 23,000 to about 17,000 in 1972.

AIRCRAFT OPERATIONS
Sea-Tac International Airport
1960-1972



From 1960 through 1967, general aviation aircraft operations grew from 8,098 to 24,469, then plummeted to 16,024 in 1970, climbing slowly to 17,229 in 1971 and 19,307 by 1972. General aviation operations represented about 13% of total aircraft operations in 1972 and presently average about 125 per weekday.

Some 2,378 military aircraft operations were recorded at Sea-Tac in 1972, amounting to less than 2% of total aircraft operations. Much of this activity consists of helicopters transporting passengers between local military bases and the Airport to make connections with scheduled air carriers as well as McChord Air Force Base aircraft practicing Instrument Landing System (ILS) approaches.

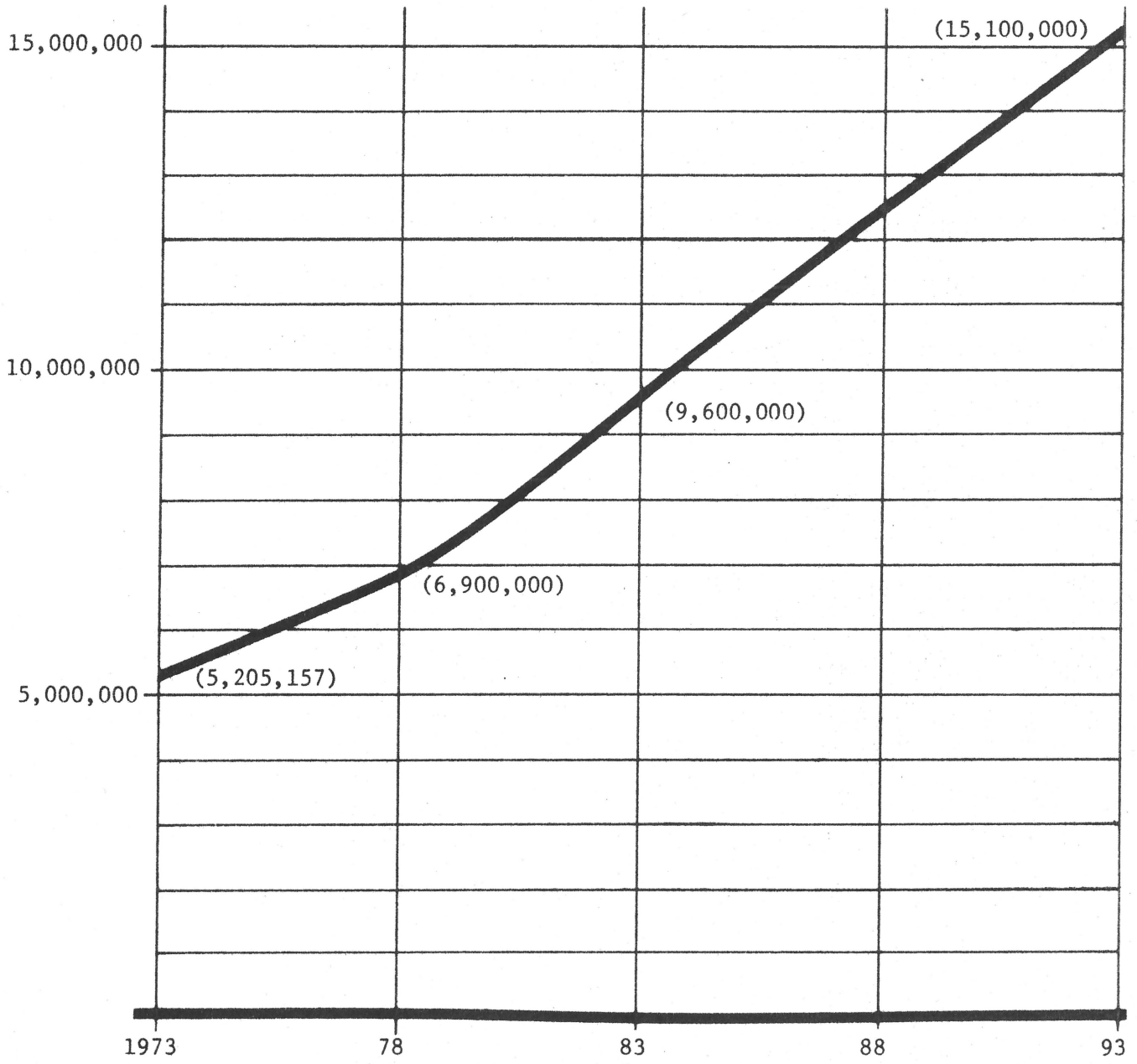
4.3.5 AIR TRAFFIC FORECASTS

The information contained in this section was derived from a report, Aviation Demand Forecast, prepared for the Sea-Tac Communities Plan by Peat, Marwick, Mitchell and Company (See 8.0.1, ref.4). These forecasts of air traffic activity for Sea-Tac International Airport are based on several general assumptions:

1. The forecasts of population and economic variables set forth in this report are reasonable.
2. The historical trends in the relationships between the population and economic variables and the level of air traffic activity will remain relatively unchanged over the forecast period.
3. The level of airline fares will generally increase at the same rate as the price level of other consumer goods and services.
4. There will be no major technological change during the forecast period of similar magnitude to that which occurred during the 1960's when the jets replaced the less efficient piston aircraft.
5. There will not be a national economic recession in 1974.
6. A sufficient level of service will be provided by the airlines to accommodate forecast demands.
7. No major change in the propensity of tourists to visit the State of Washington will occur throughout the forecast period.

The table on the following page presents air traffic forecasts through the year 1993 for Sea-Tac. The methodology used in developing these forecasts is explained in the Aviation Demand Forecast. The following

FORECAST AIR CARRIER PASSENGER TRAFFIC
Sea-Tac International Airport
1973-1993



provides explanatory comments on the air traffic forecast presented in the summary table and are numbered to correspond to the same items listed there.

TOTAL PASSENGERS:

Sea-Tac International Airport's total air carrier passengers are expected to increase from the 1973 level of 5,205,157 to 6,900,000 by 1978; 9,600,000 by 1983; and some 15,100,000 by the year 1993. The annual rates of growth during the forecast period are expected to be much reduced from the rampant growth experienced in the 1950's and 1960's when jets replaced the less efficient piston aircraft. It is unlikely that the favorable economic conditions and the same magnitude of technological breakthroughs which accounted for the unparalleled growth of passenger traffic during the 1960's will be repeated during the forecast period.

PASSENGER ENPLANEMENTS:

Representing half of total passengers for each forecast year, passenger enplanements are expected to increase from their 1973 level of 2,589,016 to 3,450,000 by 1978, 4,800,000 by 1983, and some 7,550,000 by 1993.

SCHEDULED AIR CARRIER DEPARTURES:

Forecasts of all-cargo air carrier departures are based upon responses to the "Airport Planning Questionnaire" (See 8.0.1 ref. 4, appendix D) completed

by most air carriers serving the Airport, and also upon the forecast of enplaned cargo tons.

Average day/peak month all-cargo air carrier departures are forecasted to increase as the percentage of total air carrier departures from some 5.6% of the 165 total in 1973 to about 9% of the estimated 264 departures by 1993. Annual air carrier departures are expected to increase from 56,300 in 1973 to some 60,100 in 1978, 70,300 in 1983 and reach a level of approximately 86,700 by 1993.

ENPLANED PASSENGERS PER DEPARTURE:

The volume of enplaned passengers is forecasted to increase from an average of 49 passengers per departure in 1973 to some 62 by 1978, 77 by 1983, and 98 by the year 1993. These estimates were derived from historical and forecast levels of explained passengers and annual air carrier departures.

AVERAGE SEATS PER AIRCRAFT:

The average number of seats per scheduled aircraft departure is expected to increase from 1973 level of some 132 to 144 by 1978, 165 by 1983 and 202 by 1993. The forecast aircraft mix is given in Section 8.0.1 ref. 4.

BOARDING LOAD FACTOR:

The boarding load factor is the percent of total aircraft seats occupied by enplaning passengers, as opposed to the true load factor which includes

onboard, or through passengers. Forecasts of the boarding load factor for Sea-Tac during the planning period derive from estimates of past and future levels of passengers enplaned per flight during the peak month, and average seats per aircraft. From an estimated 1973 average day/peak month boarding load factor of about 48%, it is expected to rise to some 53% by 1978, 57% by 1983 and reach 59% by 1993.

This rising boarding load factor suggests intensified use of existing service rather than the addition of new service frequencies to accommodate increased demands for air transportation. It is logical to assume that after a certain level of frequency of service is reached, additional flights would provide little or no return to the airlines (theory of marginal diminishing returns).

ANNUAL AIRCRAFT OPERATIONS:

Total aircraft operations are expected to almost double during the forecast period, increasing from 158,131 in 1973 to 170,000 by 1978, 200,000 by 1983, and 252,000 by 1993. This includes air carrier, air taxi, general aviation and military operations. Air carrier operations are forecasted to increase from the 1973 level of 115,445 to 123,000 in 1978, 144,000 in 1983 and reach 178,000 or 72% of total aircraft operations. Military flights which consist primarily of training and maintenance test operations, will hold to a level of 2,000 per year through 1993.

General aviation operations accounted for 22,878 of total aircraft operations in 1973 and is expected to increase to 25,000 by 1978, 30,000

by 1983, and 40,000 by 1993.

Difficulties arise in attempting to accurately forecast commuter airline aircraft operations. This is due to the fact that (1) the air taxi industry is in a state of flux, and, (2) there is very minimal historical information on which to base a forecast (air taxi operations weren't separated from general aviation operations until 1971). So, the estimates of commuter operations are shown to be a compound annual increase of 3% over the 1973 level throughout the forecast period.

ENPLANED CARGO TONS:

Total enplaned cargo tons are forecasted to increase from the 1973 level of 83,915 tons to 141,000 by 1978, 243,000 by 1983 and 698,000 by 1993.

Volumes of enplaned air freight and express are estimated to increase from 62,050 tons in 1973 to 103,000 by 1978, 187,000 by 1983, and 581,000 tons by the year 1993. Enplaned mail volumes are expected to increase at a relatively slower rate, moving from the 1973 level of 22,860 tons to 38,000 by 1978, 56,000 by 1983 and will be at about the 117,000 ton level by 1993.

GENERAL AVIATION BASED AIRCRAFT

No forecasts were made for general aviation based aircraft at Sea-Tac International Airport. There was only one based aircraft at the Airport in 1972 and at present, there are none. It was assumed by the consultant that future levels of general aviation based aircraft will be determined largely by policy decisions made by the airport management.

