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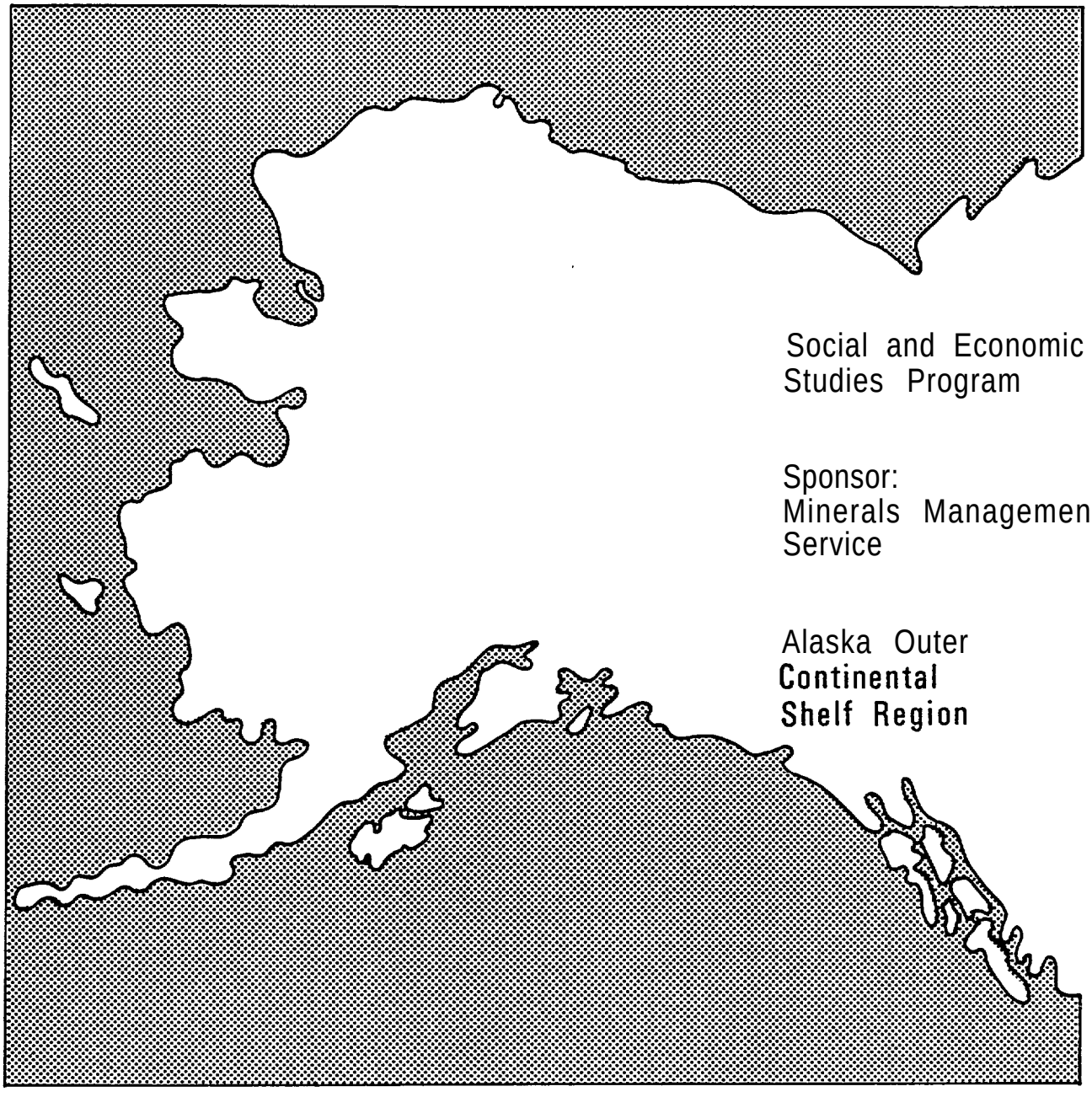

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Alaska Outer Continental Shelf Region

Diapir Field Anchorage Impacts Analysis

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ALASKA OCS SOCIAL AND ECONOMIC STUDIES PROGRAM

DIAPIR FIELD

ANCHORAGE IMPACTS ANALYSIS

Prepared For

MINERALS MANAGEMENT SERVICE

ALASKA OUTER CONTINENTAL SHELF REGION

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NOTICE

Alaska OCS Social and Economic Studies Program
Diapir Field Anchorage Impacts Analysis

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ABSTRACT

The purpose of this study is threefold: (1) to update earlier baseline descriptions of the Anchorage region; (2) to revise the community impact assessment methodology to be applied to the Anchorage region; and (3) to assess the community impacts on the Anchorage region through the year 2010 of a basecase growth forecast and of a scenario for production of 3.0 billion barrels of crude oil from the Diapir Field OCS Sale #87.

The assessment methodology stresses the long-term management capability of the Anchorage region to absorb future population growth. The methodology evaluates the critical physical, institutional and fiscal constraints to management of growth. Accordingly, the baseline description is keyed to the physical, institutional and fiscal resources that indicate the community's long-term capability to accommodate population growth.

The findings of the Anchorage region baseline description and the impact assessment methodology were then applied to population growth forecasts developed for the basecase and for Diapir Field Sale #87 by the Institute of Social and Economic Research (ISER) under contract to the Minerals Management Service to assess community impacts.

The chief findings of the overall study are that the Anchorage region, historically and currently, has demonstrated a very resilient capacity to accommodate rapid economic and population growth; that State expenditure of petroleum revenues accounts for much of the region's recent growth; that heavy State transfer payments to local government and other development aids (e.g., subsidized housing loans) largely account for the region's past capacity to accommodate growth without severe fiscal stress or disruption or deterioration in the quality of community facilities and services.

The ISER forecast of future basecase growth trends assumes a sharp drop in State petroleum revenues from the 1982 peak, accompanied by dwindling State and local government fiscal resources and by a growth rate well below the rate the region has experienced over the past three decades. As a result, the growth management issues for the Anchorage region are foreseen to take a new twist. Growth management will become less an issue of urgent physical development to accommodate headlong growth and more a matter of reallocating limited funds, revising priorities and cutting back community facilities and services to a level that the municipality can sustain. The ISER basecase forecast anticipates that State general fund revenues and expenditures will fall below one-third of the 1982 peak. ISER anticiaptes that the State will need to reimpose personal income taxes, eliminate subsidy programs and transfer all permanent fund earnings into the general fund. The" State will have to reduce expenditures drastically, including municipal assistance transfer payments, thereby shifting a larger share of the fiscal burden of local government to local taxpayers. Municipalities will, in turn, face a need to raise local tax levies to offset the loss of State assistance while paring down local government services.

The petroleum scenario for Diapir Field OCS Sale #87 does not add measurably to the region's population. The scenario accounts for about 10,500 new residents, added gradually over a twenty-five year period. The scenario's main growth impact comes at a time when the region's rate of growth is slowing. For that reason, the scenario may buffer the private sector's transition to a more moderate growth rate. The assessment does not foresee noteworthy stresses on the region's physical and institutional resources related to Sale #87. However, it is expected that Sale #87 will have a marginally adverse impact on the municipality's fiscal standing, already expected to be straitened under the basecase scenario. This adverse impact arises because Sale #87 does not augment the Anchorage region's property tax base and other taxable assets in proportion to the relatively minor sale-induced population growth forecast for the region.

I. ANCHORAGE COMMUNITY BASELINE

INTRODUCTION

This baseline description is the first chapter in an assessment of impacts on the Municipality of Anchorage of the proposed Diapir Field OCS l-ease Sale #87. This chapter is an update of the detailed baseline inventories previously prepared for the Anchorage region for assessment of earlier proposed OCS lease sales. Much of the detailed descriptive material published in the earlier baseline studies is still valid and is not repeated here. On the other hand, after the earlier studies, some significant new data sources (e.g., 1980 U.S. Census) have become available and some new economic and demographic trends have become evident. Meanwhile, the Municipality has also completed a number of milestone reports that resolve long-term development planning and policy issues that were under study at the time of earlier baseline descriptions. This added data base has been considered for the baseline update.

This report departs from previous baseline studies in another key way. The baseline description and the forecasting methodology take a more long-range and more general approach to impact assessment for the Anchorage region than earlier reports. These changes are part of a continuing effort to refine and improve the impact assessment process originated under the Alaska OCS Socioeconomic Studies Program (now Social and Economic Studies Program).

Previous Anchorage OCS impact analyses provided highly detailed, up-to-date baseline descriptions and specific quantitative impact projections. The present report aims to provide a baseline description and assessment methodology that is more economical in detail, more oriented to long--term trends and more interpretive of past events and future prospects.

The baseline inventory is not meant to be encyclopedic, but selective of key community features that, in conjunction with the forecasts, will highlight potential community development problems. The object of the assessment methodology is to equip assessment analysts with 'a tool to compare impacts on critical features of the community with the capacity of the community to-absorb these incremental impacts. It is not meant to generate definitive and quantitative' forecasts of specific impacts as a basis for planning or decisions about mitigation measures.

The rationale for conducting an assessment of impacts at Anchorage, some 800 miles from the Diapar Field lease sale area, rests on Anchorage's central role in the administrative, governmental, financial, distributive and communications sectors of the State's economy.

The rest of this chapter is organized into three sections, dealing in turn with the Municipality of Anchorage's population and economy, infrastructure and growth management capacity.

POPULATION AND ECONOMY

Population

Current population data for the Anchorage region are available or forthcoming from a number of sources. Most important current documents are the Anchorage Annual Planning Information, April 1982, an annual publication of the Alaska Department of Labor, and the Alaska Population Overview 1981, also issued by that department. The municipality also updates its annual population estimates for municipal planning and revenue-sharing purposes. The methodology employed by the municipality to estimate population is presented in Appendix A. Summary tapes of the findings of the 1980 U.S. Census are available through the Research Section of the Anchorage Municipal Planning Department.

Between 1970 and 1980, the population of the Anchorage region grew by 38 percent, from 126,385 to 174,431 persons. As can be seen by reference to Table 1 and Figure 1, population growth was concentrated in south and east Anchorage and in the Eagle River-Chugiak areas. Generally, the older neighborhoods in the central area showed little population change, while the two military bases, Fort Richardson and Elmendorf Air Force Base, showed substantial population losses, falling from a combined population of 24,031 persons in 1970 to 17,346 in 1980.

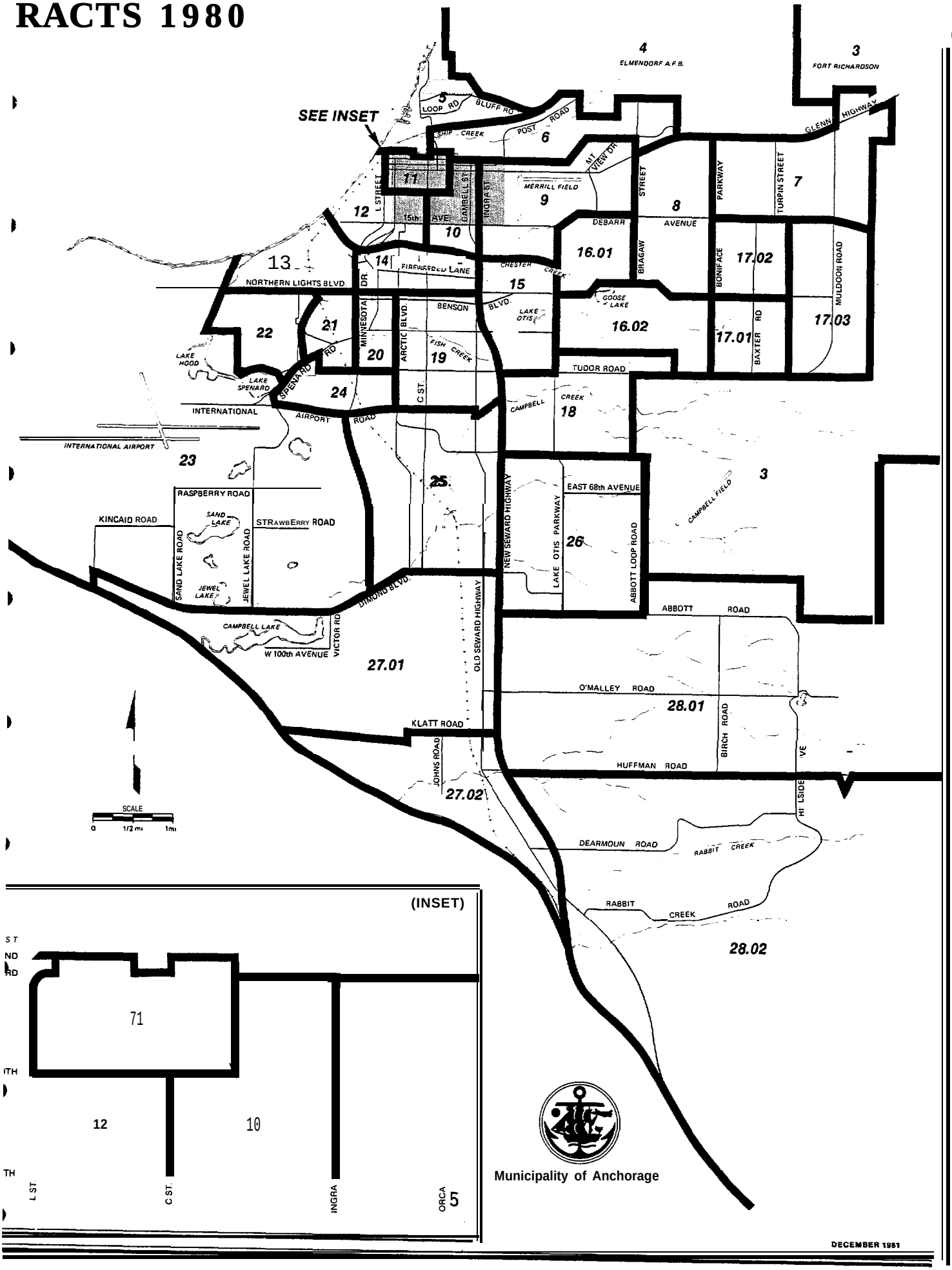
Table 1
ANCHORAGE POPULATION BY CENSUS TRACT
1970 and 1980 .

Tract		1980 Population	1970 Population	Percent Change 1970 to 1980
1.00	Chugiak	5,330	2,851	87
2.00	Eagle River	7,528	7,528	153
3.00	Fort Richardson	8,157	10,751	24
4.00	Elmendorf AFB	9,189	13,280	31
5.00		1,707	3,378	49
6.00		5,505	5,522	---
7.00		9,428	7,060	34
8.00		7,649	5,153	48
9.00		5,195	3,845	35
10.00		2,972	3,369	12
11.00		1,131	2,118	47
12.00		3,766	4,248	11
13.00		3,363	3,183	6
14.00		4,682	5,021	7
15.00		5,581	4,696	19
16.01		3,867	3,559	9
16.02	Anchorage	3,824	1,482	158
17.01	Bowl	3,978	975	308
17.02		4,763	3,844	24
17.03		7,875	3,123	152
18.00		5,260	3,054	72
19.00		3,115	1,776	75
20.00		3,201	4,322	26
21.00		3,703	4,481	17
22.00		4,008	2,748	46
23.00		11,113	4,199	165
24.00		3,339	3,366	1
25.00		4,951	3,076	61
26.00		3,501	1,876	87
27.01		7,053	1,044	576
27.02		5,601	1,461	283
28.01		7,464	2,321	222
28.02		5,756	1,889	205
29.00	Turnagain Arm	876	310	183
Anchorage Bowl		143,351	96,212	49
Municipality of Anchorage		174,431[1]	126,385	38
Average Persons Per Household		2.74	3.39	

Source: U.S. Bureau of the Census, 1980 and 1970.
Municipality of Anchorage Planning Department

NCHORAGE CENSUS RACTS 1980

Figure 1



Municipality of Anchorage

DECEMBER 1981

Table 2 illustrates the changes in the main demographic traits (sex, age, race, education and poverty status) in the region's population between 1970 and 1980.

Economy

This overview of the Anchorage regional economy is framed with a specific and limited purpose in mind: to identify features and trends that would serve as good signposts to the future performance of the region's economy, particularly in response to employment and economic stimulus from the proposed Diapir Field OCS Lease Sale #87.

In contrast to earlier Anchorage economic baseline studies prepared under the Socioeconomic Studies Program (Technical Report #48, Volumes 1 and 2, and Technical Report #61), the approach adopted here intentionally stresses trends rather than description of the status quo. It focuses on broad patterns of economic change and continuity rather than momentary variations.

The composition and dynamics of Anchorage's regional economy are decidedly different from the national economy. Some comparative analysis is useful for diagnosing the distinctive strengths and weaknesses of the region's economy and how it behaves in relation to the state and national economies. This comparative perspective yields a better sense of how

Table 2
ANCHORAGE POPULATION CHARACTERISTICS
1970-1980

	1970	1980	Percentage Change 1970 to 1980
Total	126,385	174,431	38
Male	66,085	90,467	37
Female	60,300	83,964	39
Age			
0-19	53,880	61,091	13
20-44	54,173	85,996	59
45-54	11,772	15,399	31
55+	6,560	11,945	82
Race			
White	114,637	148,650	30
Black	5,223	9,258	77
American Indian	4,866	8,953	84
Eskimo and Aleut			
Asian or Pacific Islander	896	4,043	351
Other	750	3,527	370
Spanish Origin[1]	1,195	5,222	337
Number of Persons Completed High School	53,950	74,862	39
Persons in Poverty			
Age 16-64	N/A	8,332	---
All Ages	11,414	14,611	28

[1]Spanish Origin: not inclusive; persons of Spanish origin may be of any race.

Source: U.S. Bureau of Census
Alaska Department of Labor; Research and Analysis

Anchorage's economy and labor market will fare in a competitive, dynamic, open economy.

INTRODUCTION

At the outset of the 1970's, Anchorage's regional economy differed in some gross ways from national patterns. The public sector, especially the federal government, dominated employment. Development capital was scarce. Manufacturing was nil, The regional economic multiplier was low, reflecting the primitive state of the secondary or nonbasic economy. Average personal incomes were high, as was the cost of living. The region's workforce was young and male. Unemployment was chronically high, with extreme seasonal fluctuations in employment levels and workforce size. For many transients and many jobs, September's "termination dust" signaled the end of the annual work round.

Some of these gross disparities reflected the loose structure of a frontier economy poised in readiness for the rapid growth that came during the 1970's. Some reflected more permanent differences in Anchorage's economic assets and functions relative to the rest of the nation. A decade later, some of these disparities have vanished or moderated as Anchorage's economy matured. Some persist as reminders that Anchorage and Alaska still form distinct sub-economies within the larger national economy. It is useful to review some of the changes in the region's economic status compared to the rest of the state and nation.

EMPLOYMENT BY ECONOMIC SECTOR

After a decade of prosperity, publicity and progress (and better transportation and communications), Anchorage and Alaska are far more closely enmeshed with the national and world economies as producers/consumers and as labor markets. The State's prosperity, and Anchorage's in turn, is keyed to national and international markets for its commodities (mainly oil and gas and fish and wood products) and its strategic location for national defense. Alaska and Anchorage are popularly seen as dependent on imported goods and services but, in actuality, Alaska now enjoys an extraordinarily favorable "balance of trade," thanks mainly to its mammoth crude oil exports. Alaska stands first among the states for the per capita dollar value of its exports. Any event that altered this status (e.g., production stoppage, soft markets, adverse federal tax policies) would shake the foundation of the State and region's private and public economic sectors.

Part of the reason for citing these changes is to provide a longitudinal frame of reference for putting hypothetical impacts of new OCS-related development in perspective. The popular touchstone for appraising the effects of large-scale economic development projects is the trans-Alaska oil pipeline construction project. However, it is arguable whether that unique event is a true touchstone. That project enlarged and transformed Anchorage's economy so that in many ways Anchorage has outgrown its vulnerability to the most adverse aspects of the boom-bust cycle of growth. Indeed, due to the distinctive composition of its economy and

the mobility of its workforce, as it has evolved in response to past irregularities, Anchorage may be more adaptable to and less disrupted by substantial economic fluctuations than most cities of similar size.

In the rest of this subsection, sectoral employment data will be analyzed to identify basic trends and features of the Anchorage regional economic structure. Changes in employment by economic sector over time mirror changes in the economic structure of the region. Comparison of regional employment patterns with national norms indicate areas of relative strength and weakness in a regional economy.

Table 3 compares the distribution of total employment by industrial sector for the Anchorage region in 1970 and 1980. Overall, average annual employment grew by 87 percent, from 41,995 in 1970 to 78,688 in 1980. Not all sectors of the economy grew evenly. The strongest growth was in the services sector (166 percent), followed closely by finance, insurance and real estate (F.I.R.E., 160 percent) and mining (159 percent). State and local government employment (107 percent), transportation, communications and utilities (103 percent) and trade (93 percent) each grew at a slightly faster rate than overall employment, while manufacturing (71 percent) and construction (59 percent) grew slightly slower. Employment by the federal government, which was the region's dominant employer in 1970, hardly grew at all (2 percent) and by 1980 was outranked in importance by three other sectors.

Table 3
DISTRIBUTION OF EMPLOYMENT, BY SECTOR
Anchorage Region, 1970 and 1980

Industrial Sector	1970		1980		Percent Increase 1970-1980
	Number	Percent	Number	Percent	
Mining	958	2.3	2,481	3.2	159
Construction	3,514	8.4	5,584	7.1	59
Manufacturing	1,018	2.4	1,742	2.2	71
Transp./Com./Util.	3,907	9.3	7,920	10.1	103
Trade	8,617	20.5	16,635	21.1	93
F.I.R.E.	1,980	4.7	5,151	6.5	160
Services & Misc.	6,455	15.3	17,026	21.6	166
Federal Government	9,509	22.6	9,678	12.3	2
State/Local Govt.	6.037	14.4	12,880	15.9	107
TOTAL	41,995	99.9	78,688	100.0	87

Source: Alaska Department of Labor

These data indicate a number of broad changes in the region's economy. First, the overall share of public sector employment has shrunk, while the private sector has expanded and diversified. The fastest growth sector was services, which accounted for nearly 30 percent of all job growth as it became the leading employment sector. This growth signifies the maturation of Anchorage's economy and consolidation of its role as service center for most of the state. The growth of state and local government employment reflects the assumption of broader governing responsibilities by state and local governments, including transfer to them of some former federal functions. Also of particular note is that mining (which in Anchorage mainly comprises petroleum industry office workers) and manufacturing continue to account for a very small share --

about five percent -- of the region's employment. Anchorage has not yet developed any industrial economy of significance.

Table 4 compares the distribution of employment by sector for the Anchorage region and the nation as of 1980 by means of a location quotient. The distribution pattern and the location quotient reflect the economic activities that are distinctive to Anchorage's economy, compared to the national economy. The main differences are in governmental employment and manufacturing. Despite its relative decline over the past decade, the public sector remains the foremost employer in Anchorage, whereas it ranks fourth nationally. On the other hand, manufacturing, at 2.2 percent, is the smallest employer in Anchorage, but, at 22.4 percent, is the most important single source of employment nationally.

Other significant structural differences show up in construction and transportation. The reasons for these differences relate mainly to Anchorage's stage of development and the state's geography. Anchorage's rapid physical growth (homes, office buildings, infrastructure) accounts for its strong construction industry compared to more stable, developed regions of the country. Its farflung geography and distribution system and its extraordinary reliance on air transport account for a disproportionate share of employment in the transportation sector. Mining is relatively more important in Anchorage due to the presence of many oil and gas-related firms, but it is not a large employer in overall terms. In other sectors (trade, F.I.R.E., services), Anchorage is about on par

with the national economy. The outstanding aberration of Anchorage's economic structure is the weakness of its manufacturing sector.

Table 4
DISTRIBUTION OF EMPLOYMENT AND LOCATION QUOTIENT, BY INDUSTRIAL SECTOR, ANCHORAGE AND U.S.
1980

Industrial Sector	Distribution of Employment Anchorage	Us.	Location Quotient[1]
Mining	3.2%	1.1%	2.91
Construction	7.1	4.9	1.45
Manufacturing	2.2	22.4	.10
Transportation	10.0	5.7	1.75
Trade	21.2	22.5	.94
Wholesale	5.1	5.8	.88
Retail	16.1	16.7	.96
F.I.R.E.	6.8	5*7	1 . 1 9
Services & Misc.	21.4	19.8	1.08
Government	28.2	17.9	1.58
Federal	12.3	3.2	3.84
State	6.3	3.9	1.62
Local	9.6	10.8	.89

[1]Location quotient calculated as ratio of Anchorage to U.S. percent distribution by sector.

Source: Anchorage Annual Planning Information, April 1982.

Anchorage has essentially bypassed the blue-collar industrial stage of growth on its way to becoming a white- and grey-collar consum-

er/service/techn ical economy. This is consistent with the region's economic assets and functions. The Anchorage region does not possess any advantages of cheap labor, industrial raw materials to process for nearby markets, or low-cost infrastructure that would give it a competitive edge in manufacturing industries. Instead, Anchorage's economy strengths are the administrative, distributive, service and trade functions it has captured as the state's administrative center and gateway.

The tourism and visitor industry has grown steadily over the past decade and has become an important element of the Anchorage region's economic base. Anchorage is the main port-of-entry for airborne visitors to Alaska and a way station for tourists drawn by the state's recreational and scenic attractions. Anchorage International Airport is a stop over for international flights between Europe and Asia. As the state's major city, Anchorage is also host for many meetings and events that bring visitors from other areas of the state. Completion of the new civic/convention center and other cultural facilities to be built, under project 80's will strengthen Anchorage's appeal for these purposes.

The Anchorage Convention and Visitors Bureau estimates that, in 1981, Anchorage had 700,000 visitors who spent $233 million locally and generated a local payroll of $58 million. Although tourism-related employment is not separately tallied in Tables 3 and 4, most of the economic impact of this industry is reflected in the service, retail trade and transportation sectors.

As noted above, direct employment in the petroleum industry is minor in the Anchorage region, but direct employment is only part of the picture. Anchorage is about 800 miles from Prudhoe Bay and will be even more remote from arctic offshore lease areas. Distance limits Anchorage's direct industrial employment in oil and gas field operations. The region's present ties to North Slope operations suggest the pattern of the future. Three economic connections stand out. First, Anchorage is the permanent place of family residence for many North Slope oilfield workers. Second, as the managerial headquarters for oil firm operations in Alaska, Anchorage counts a growing number of employees in the mining sector (see Table 3). Third, in its specialized capacity as the state's entrepot and managerial center, Anchorage performs many support functions for North Slope oil and gas operations. Many of these functions are quite closely tied to the oil and gas industry - some 300 oilfield service and supply firms are listed in the 1982 Anchorage telephone book. Thus, despite its distance from field operations, Anchorage already has a big stake in the North Slope oil patch. Furthermore, these oilfield-related functions will continue to collect in Anchorage as the level of oil and gas operations in western and northern Alaska rises.

COMPOSITION OF WORKFORCE

The current occupational composition of the Anchorage region's labor force is presented in Table 5. As shown in that table, the Alaska Department of Labor's most recent forecast (1981 to 1986) of occupational

employment for Anchorage region does not project any major shift in composition of employment-opportunities by general occupational category. The forecast does see some minor shift toward officers and managers, service workers and sales personnel and away from technicians and craftsmen, operatives and laborers. The demand outlook for clerical and professional skills is expected to be stable.

Table 5
ESTIMATED EMPLOYMENT BY OCCUPATION
ANCHORAGE, 1981 and 1986

Occupational Group	Estimated Employment 1981	1986	% Increase
Officers & managers	8,301	10,371	25
Professionals	11,748	14,576	24
Technicians	3,801	4,536	19
Service workers	11,332	14,453	28
Crafts, operatives, laborers	19,735	23,903	21
Clerical	20,632	25,685	24
Sales	5,459	6,980	28
TOTAL	81,008	100,504	24

Source: Occupation Employment Forecast, Alaska Department of Labor, September, 1981.

UNEMPLOYMENT AND SEASONALITY

Historically, Anchorage has shown strong seasonal fluctuations in workforce size, employment levels and unemployment rates. This seasonality has steadily diminished over the years, although it is still noteworthy. As Anchorage's economy has grown and diversified,

it has become less seasonally dependent on the construction, fishing, pining, and timber industries.

The elasticity of the region's labor pool is a key factor in the region's adaptability to economic fluctuations. The readiness of outside workers with salable skills to move to Anchorage for work helps the regional labor market adjust to economic accelerations without disruptive labor shortages and wage inflation. Conversely, the tendency of unemployed members of the transient workforce to meet hard times by leaving Anchorage for other job markets buffers downturns in employment.

In fact, workforce and employment data for the past decade show that before and during periods of job growth, Anchorage's workforce expanded rapidly through an influx of jobseekers frequently in excess of actual job openings. Later, during the downturn, shrinkage in the workforce lagged behind shrinkage in employment. This lag suggests that unemployed transient workers stayed in the region after the economic opportunities that drew them to the region have faded.

This pattern of labor mobility has some positive and some negative features. It gives the regional labor market access to a large labor force pool during times of rapid expansion. By the same token, it helps sustain high unemployment rates through good times and bad. Finally, it perpetuates the existence of a relatively large transient population group whose demographic and social traits are decidedly different from the permanent resident population.

INCOME AND INFLATION

Personal income levels in the Anchorage region are substantially above national levels, although the ratio has varied widely with the economic fluctuations of the past decade (see Table 6). In 1970, per capita personal income in Anchorage was $5,195, about 33 percent above the national average. This differential fell slowly until the stimulus of the pipeline construction boosted Anchorage income to a peak level of 71 percent above national levels. After completion of the pipeline, Anchorage's income advantage declined again. In 1980, Anchorage's per capita income stood at $14,266, or 50 percent above the national figure. For the future, it seems sure that the differential in income levels between Anchorage and the nation will persist, but to an unpredictable degree. Past events suggest the differential will be sensitive to major changes in the level of regional economic activity.

The cost of living, like incomes, is higher in the Anchorage region than for the nation's cities as a whole (see Table 7). Over the past decade, the trends for the Anchorage and national cost of living paralleled income trends. That is, in the first years of the decade, the gap in the cost of living between Anchorage and the' rest of the country was closing. This trend reversed when the pipeline project heated up Anchorage's economy and accelerated inflation. More recently, the Anchorage rate of inflation has again fallen behind the national rate. Overall, during the 1974-1981 period, the cumulative rise in the consumer price index (CPI) for Anchorage closely matched the rise in the average for the nation's cities.

Table 6
PER CAPITA PERSONAL INCOME
ANCHORAGE, ALASKA AND U.S.
1970-1979

	Anchorage	Us.	Anchorage as Percent of Nation
1970	$5,195	$ 3,893	133
1971	5,470	4,132	132
1972	5,632	4,493	125
1973	6,050	4,980	121
19.74	7,383	5,428	136
1975	10,006	5,861	171
1976	10,466	6,397	164
1977	11,430	7,026	163
1978	11,839	7,810	152
1979	12,200	8,706	140
1980	14,266	9,511	150

Source: Anchorage Annual Planning Information, April 1982; Survey of Current Business, U.S. Department of Commerce, Bureau of Economic Analysis, April, 1982.

Table 7
CONSUMER PRICE INDEX
ANCHORAGE & U.S. CITY AVERAGE
1974-1981

Year	Anchorage	U.S. City Average
1974	133.9	147.7
1975	152.3	161.2
1976	164.1	170.5
1977	175.0	181.5
1978	187.5	195.4
1979	207.0	217.4
1980	228.2	246.8
1981	246.5	272.4
Percent Change 1974 to 1981	+ 84.1	+ 84.4

Source: Anchorage Annual Planning Information, April 1982.

The CPI is a composite economic index that expresses the average price movement of many consumer items. In recent years, as Table 8 shows, there were large differences in how fast various classes of consumer items rose in price in Anchorage. Between 1974 and 1981, the relative cost of medical services and food grew faster than the overall index, housing and transportation rose about as fast, and other items rose more slowly. However, these generalities gloss over the differential effects of inflation on different income and social groups. Historically, low income families have been hurt more by Anchorage's high cost of living because a large share of their expenditures is committed to essentials,

while middle and upper income families have a large share of discretionary income. Similarly, inflation is usually thought to hurt low income and fixed income groups like the aged, whose incomes do not rise as fast as general inflation.

Table 8
ANCHORAGE CONSUMER PRICE INDEX
BY CATEGORY OF EXPENDITURE
1974-1981

	Anchorage January to January Index								
Category	1974	1975	1976	1977	1978	1979	1980	1981	1982
All Items	125.6	142.9	158.8	169.4	179.2	198.1	218.2	240.1	253.6
Food & Beverage	133.9	161.0	171.9	176.8	192.4	235.4	253.5	271.3	281.9
Housing	124.9	138.3	162.4	171.1	177.3	196.4	217.4	239.8	249.1
Apparel & Upkeep	122.6	134.3	139.6	156.3	153.9	158.0	166.4	184.1	186.5
Transportation	114.8	127.9	140.7	166.0	168.4	183.8	210.6	239.5	261.5
Medical	139.4	161.2	180.0	199.5	223.5	244.6	264.6	298.1	334.8
Entertainment	123.6	139.6	148.1	160.6	168,9	190 .1	200.1	207.7	239.6
Other	115.9	137.2	141.0	153.6	168.3	186.7	202.9	217.4	226.6

Source: U.S. Department of Labor; Bureau of Labor Statistics

The future direction of incomes and the cost of living in Anchorage compared to the rest of the nation will be the outcome of many conflicting trends that are virtually impossible to anticipate.

INFRASTRUCTURE

This section describes the basic infrastructure of the community. Subjects addressed include land use, housing, community facilities and services and transportation. The data was obtained partly from published sources and partly from interviews with the public officials who are listed in Appendix C.

Since the purpose of this impact analysis study is to assess the effects of changes which may occur as a result of the Diapir Field OCS lease sale, and since those effects may not materialize for another ten years, the report focuses on the general ability and capacity of Anchorage to absorb growth and respond to fluctuations in the level of economic activity. Thus, rather than describing the existing infrastructure and service systems in detail, the report appraises in broad terms the ability of the public sector to manage Anchorage's growth.

Land Use

This section is divided into three parts: existing land use patterns; future land use patterns; and development constraints. In an overall perspective, metropolitan Anchorage has encountered rapid growth over the past few decades. This growth has consumed large amounts of land within the Anchorage area in order to satisfy the cumulative demands for residential, commercial and industrial development, and public improvements. This growth has placed great burdens on the physical environment, fiscal resources and public utilities and services systems.

Continuing economic and population growth over the next ten to twenty years will place even greater demands upon the remaining land reserve.

The Municipality of Anchorage encompasses approximately 99,000 acres of land exclusive of military reservations and state parklands. About 60,000 acres are located within the Anchorage Bowl. Another 35,000 acres are in the Eagle River/Chugiak area, with the remaining 4,000 in the Turnagain/Girdwood area.

EXISTING LAND USE

Current land use patterns in the Turnagain Arm/Girdwood area are predominantly rural with large-lot residential development. The notable exception to this pattern is Alyeska ski resort, which has produced a high density recreational area that serves the Anchorage population. Limited commercial activity is located in the Girdwood area, and future commercial activity is also apt to be concentrated at Girdwood.

Today, the Eagle River/Chugiak/Eklutna area is a distinct satellite community which has certain characteristics in common with suburban subcommunities within the Anchorage area. The area remains predominantly rural, though increasingly residential. Three uses - residential, public, vacant - dominate the Eagle River/Chugiak/Eklutna area. Residential use is the most widespread. In Eagle River, commercial land use has generally been concentrated in a strip fashion along both sides of the Old Glenn Highway and along the north end of Eagle River Loop Road.

Commercial activity primarily serves local demand. Employment in the area approximates 7 percent of the local population; most of the labor force works in the Anchorage area. Currently, approximately 20 percent of the Eagle River/Chugiak area is developed. However, the area is experiencing very rapid development pressures as residential expansion spills over from the Anchorage Bowl. The Eagle River area is an extremely attractive location for new construction, as vacant developable land is still available within commuting distance from Anchorage.

In 1980, the Municipality of Anchorage conducted a land use and vacant lands inventory of the 60,000 acres in the Anchorage Bowl to determine how much undeveloped or uncommitted land remained, where it was located, and how it was currently classified. The findings of that analysis, summarized in Table 9, indicated that about 54 percent of the land in the Anchorage Bowl was developed. About half of this acreage -- 16,000 acres -- is developed or committed to public lands and institutions. This includes such large holdings as the Anchorage International Airport, university lands, and the Campbell Airstrip tract. Residential use accounted for 41 percent of the developed land. Commercial uses accounted for 4 percent and industrial uses totaled 5 percent of the developed land.

Table 9
ACREAGES AND PERCENTAGES OF DEVELOPED AND UNDEVELOPED
LAND BY LAND USE CATEGORIES
Anchorage, 1980

LAND USE CATEGORIES	DEVELOPED LAND By Actual Use		DEVELOPED LAND By Zone District		UNDEVELOPED LAND (BY ZONE)	
	Acres	Percent	Acres	Percent	Acres	Percent
Single Family	10,759	33	8,012	25	10,051	37
Two Family	764	2	1,304	4	1,079	4
Multiple Family	1,986	6	3,775	12	2,769	10
Commercial	1,300	4	1,297	4	1,137	4
Industrial	1,444	5	1,608	5	2,395	9
PLI	16,092	50	14,179	44	2,420	9
Unrestricted	N/A	N/A	2,170	6	7,505	27
TOTALS	32,345	100	32,345	100	27,356	100

Source: Land Use and Vacant Land Analysis of the Anchorage Bowl

Undeveloped lands comprised 46 percent -- about 28,000 acres -- of the total land available in the Anchorage Bowl. Slightly over one-half of the undeveloped land is zoned for residential uses. Another 4 percent was zoned for future commercial uses, 9 percent for industrial uses and 9 percent for public uses. The remaining 27 percent is classified as "unrestricted" and currently remains unzoned.

The 1980 study found considerable discrepancy between actual use and current zoning status. Twenty-two percent of the developed lands within the Anchorage Bowl were committed to uses that were inconsistent with

the current zoning. Most of that developed land was zoned for residential use, but was developed below the densities and housing types allowed under the zoning ordinance. In particular, single family use was common within two-family and multi-family zones. Overall, about half of the developed land zoned for two-family and multi-family development was actually used for single family development.

As for other uses, the 1980 study found that the developed commercial and industrial acreage about equalled the amount zoned for such use. Commercial development was concentrated in two core areas -- the central business district area and midtown -- with strip development along major arterials such as the Old Seward Highway, Muldoon Road, Spenard Road and Dimond Boulevard. Industrial development is primarily concentrated in the Ship Creek/port area, in the warehousing district adjacent to the Anchorage International Airport, and along the corridor of the Alaska Railroad south of International Airport Road.

A prime factor influencing future land use patterns and population densities is the location of undeveloped land. If the Anchorage Bowl were bisected by International Airport Road, 83 percent of the undeveloped land would be located in the southern half. The vast majority of residential and industrial undeveloped lands falls in the southern section, while 64 percent of the undeveloped commercially zoned land rests in the northern section. Therefore, it is clear that most of the residential development on vacant lands will occur in the southern half of the

Anchorage Bowl, while new commercial developments will be more evenly divided between the two sectors.

FUTURE LAND USE

In recent years the Municipality of Anchorage has expended considerable energy and resources in developing tools to guide the timing and location of future growth, the type and intensity of growth, and the public services necessary to accommodate it through its planning process. Comprehensive plans and land management tools such as zoning were adopted in 1979 for the Eagle River/Chugiak area. The Turnagain Arm community plan was adopted in 1980. Both plans were designed to guide the growth of those two areas of the Anchorage community by directing land use patterns, residential density and locations of commercial, industrial and public uses.

For the Turnagain Arm community, the comprehensive plan dedicates about 85 percent of available land (some 3,000 acres) to recreation and open space. This is principally due to the unsuitability for development of the steep slopes along Turnagain Arm compared to their appeal for recreation. Fourteen percent is dedicated to residential development, while commercial and industrial uses are each assigned to about 1 percent of the available land.

In Eagle River, 25 percent of the land has been assessed to be undevelopable due either to steep slopes or wetland conditions. The

remaining developable lands (26,000 acres) are classified in the comprehensive plan as follows: large lot and residential use -- 54 percent; public uses, such as schools -- 15 percent; commercial use -- 4 percent; and industrial use -- 2 percent.

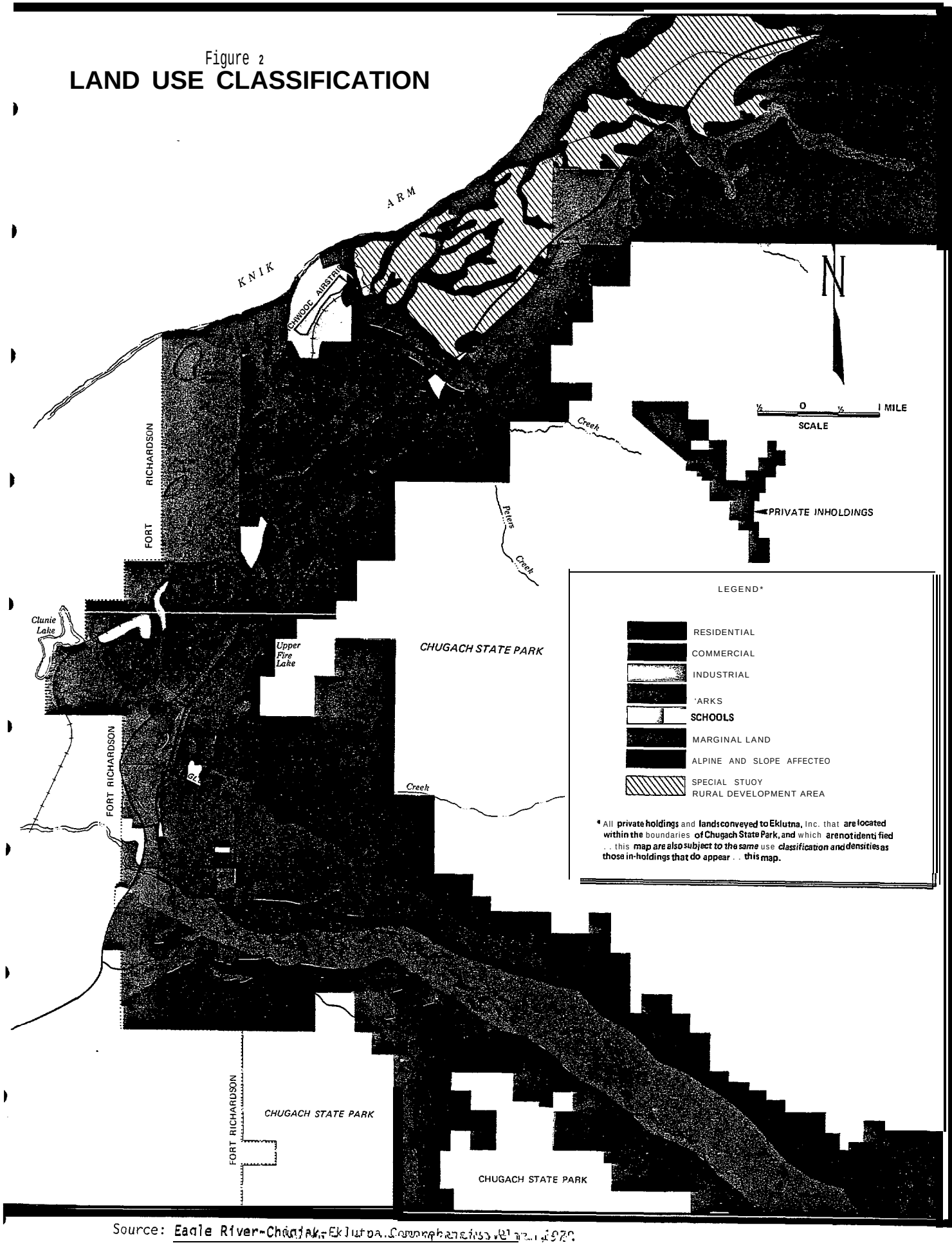
For each community, plan implementation calls for the development of public services such as water and sewer lines to the expanding residential areas. It is clear that, with upgraded utilities, the Eagle River area will grow fast as a bedroom community for Anchorage's workforce. The proposed future land use plan for Eagle River is depicted in Figure 2 and for Girdwood Valley, the most settled area of Turnagain Arm in Figure 3.

In 1980, the Municipal Planning Department began a major update of the Anchorage Comprehensive Development Plan. The plan revisions were adopted by the municipal assembly in August 1982. The plan has three major elements: 1) major functional systems to support urban development; 2) desired patterns of urban growth; and 3) implementation.

The functional systems element of the comprehensive plan describes the strategic factors that most shape the form of physical development. These factors include a) the environment, b) transportation, c) parks and open space, and d) energy. The element addressing patterns of urban growth has two important features, First, the land use classification and residential intensity maps graphically present the land use and den-

Figure 2

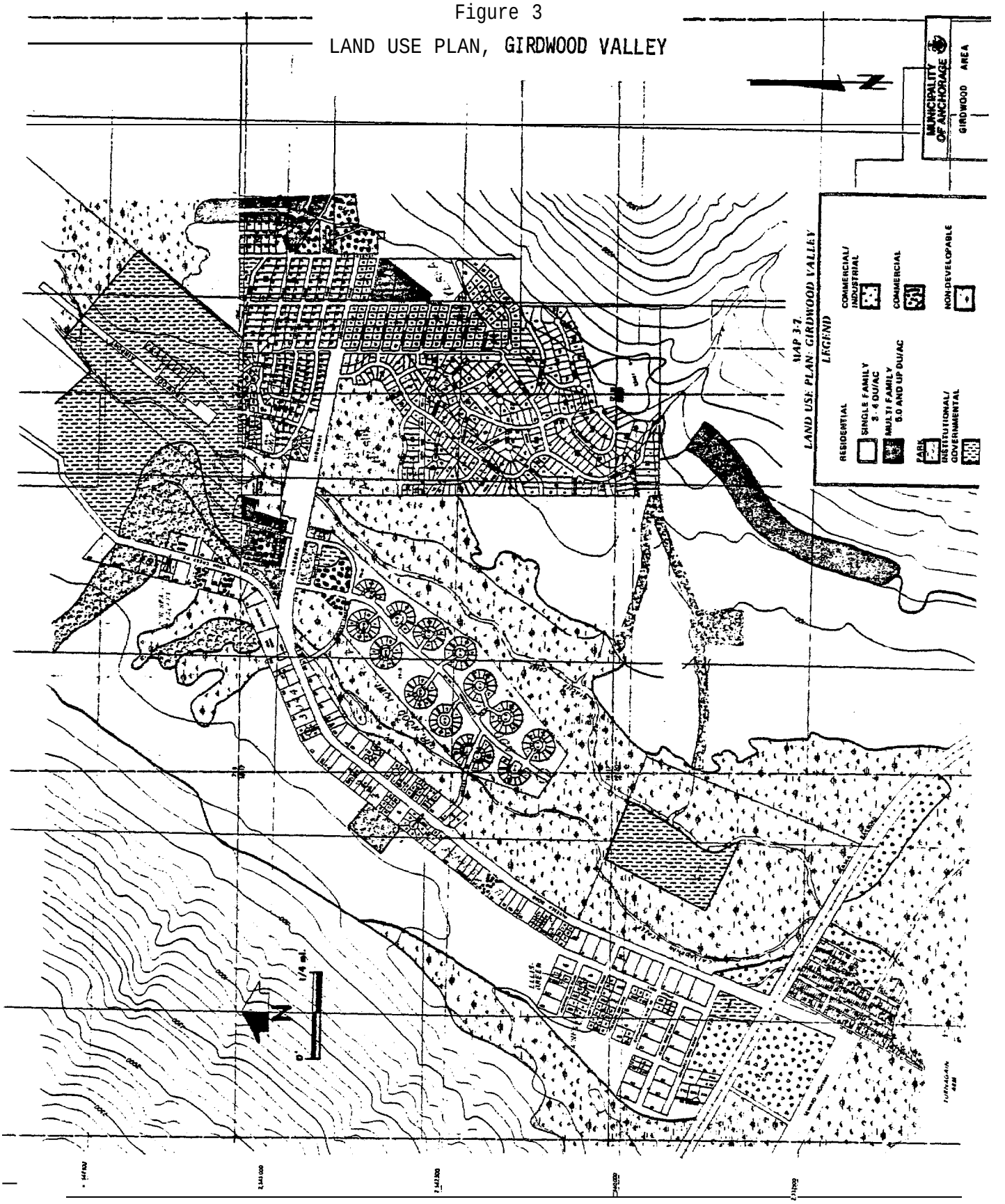
LAND USE CLASSIFICATION



Source: Eagle River-Chugiak-Eklutna Comprehensive Plan, 1970

Figure 3

LAND USE PLAN, GIRDWOOD VALLEY



Source: Turnagain Arm Comprehensive Plan, 1979.

sity patterns which reflect how the community aims to organize space for recreation, living and working. Second, the land guidance system sets out means to manage urban growth. These means include both conventional subdivision and zoning controls and more innovative forms. The final element identifies implementation measures to carry out the recommendations of the comprehensive plan. Major implementation measures include adoption of the plan map; adoption of additional studies undertaken as part of the comprehensive plan (e.g., Official Streets and Highway Plan, Wetlands Management Plan, and Hillside Wastewater Management Plan); establishment of an urban development plan to solve immediate land use problems; and development of a plan review process to update the plan regularly.

The land use map and the residential intensity map appear as Figures 4 and 5. The land use map reflects some basic municipal policies about future commercial, industrial and residential land use:

- Commercial

  The plan strongly supports development of mutually complementary downtown and midtown areas, with supporting community commercial centers in east, south and west Anchorage.

Figure 4

PROPOSED LAND USE MAP, ANCHORAGE BOWL

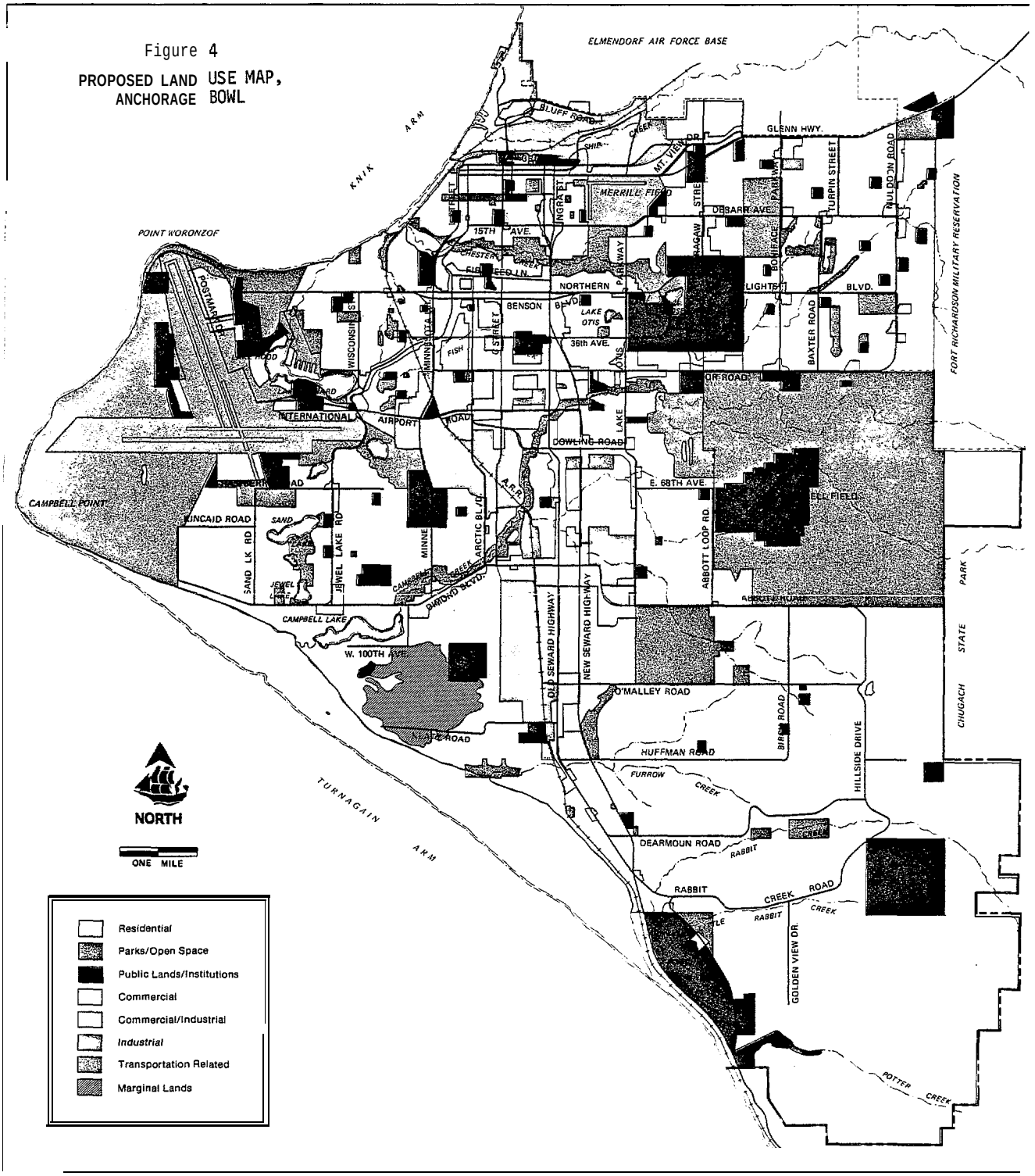
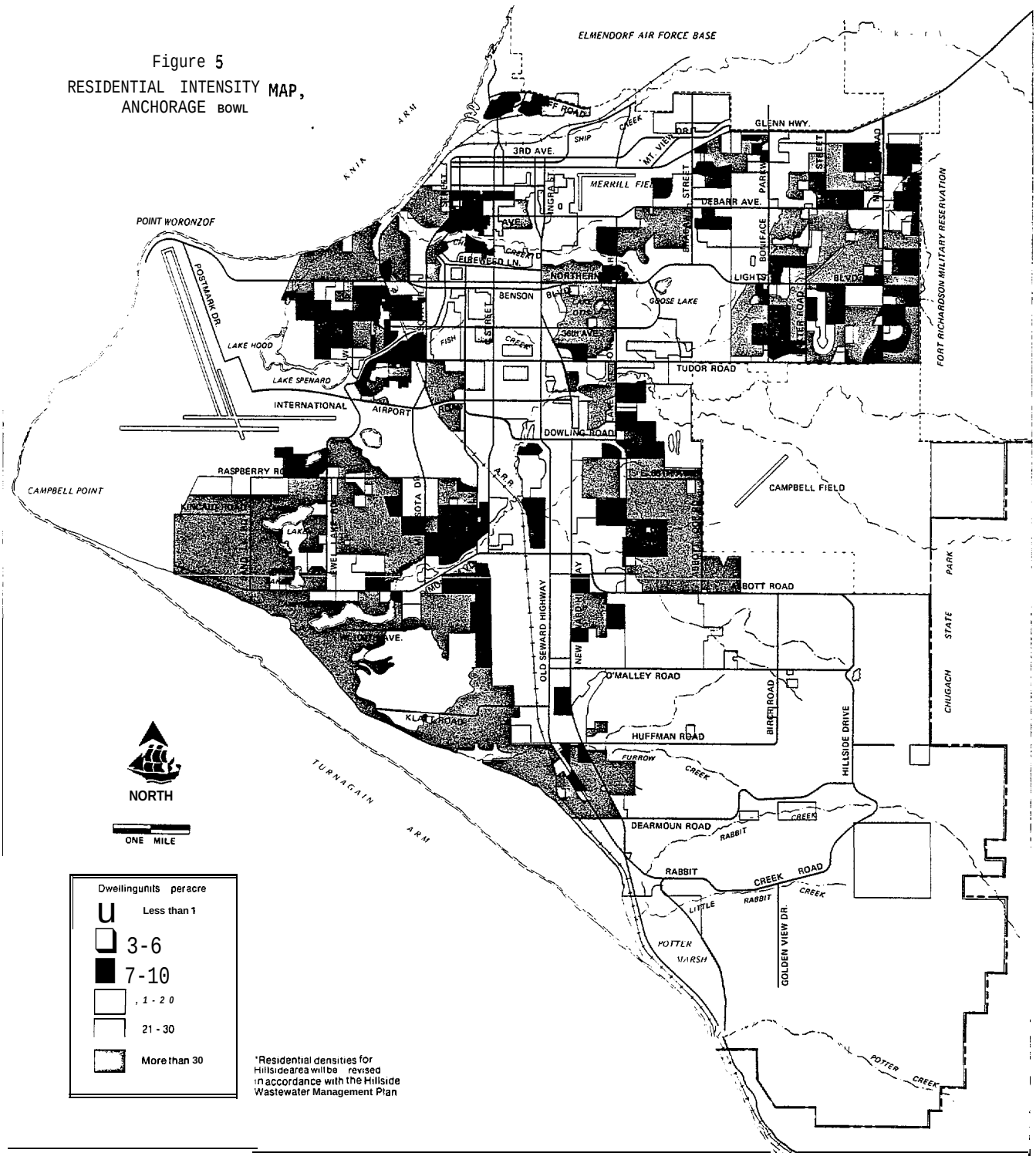


Figure 5
RESIDENTIAL INTENSITY MAP,
ANCHORAGE BOWL



- Industrial

  The plan supports industrial growth in the Ship Creek industrial area, at the International Airport and Merrill Field, and along the Alaska Railroad in central and southern Anchorage.

- Residential

  The plan favors more multi-family housing development in central areas of the community, particularly Fairview, Mountain View, Spenard and Muldoon.

The residential intensity map also reflects a major pol icy issue that was resolved by the adoption of the comprehensive plan. That policy issue is the location and density of future residential development. Land use policies attempt to balance the needs for additional multi-family housing with the need to provide as much single family housing as practicable. Multi-family housing is favored for vacant and underused parcels in the central areas currently zoned for multi-family use and' adjacent to major open space amenities.

Finally, the land use plan sets the need for and location of future public improvements. Specifically, the number, type and phasing of public facilities required to implement the land use plan should be incorporated into the municipal capital improvement program.

The municipality has the governmental powers to direct growth. Through its recent planning activities, the municipality has formulated a long-term land use plan that will address future growth needs, if implemented.

DEVELOPMENT CONSTRAINTS

The major physical constraints to development in Anchorage have been swamps, slopes and unstable soils. The municipality, as part of the development of the comprehensive plan, has addressed these physical constraints with specific topical plans. In 1981 the municipality adopted the coastal management plan to provide a framework for decisions affecting critical coastal resources.' In 1982, the municipality adopted the Anchorage Wetlands Management Plan. This plan designates areas of wetlands protection, conservation and development. It also recommends land management practices to protect and control development of wetlands. The wetland management program covers some 8,000 acres of vacant land, of which 3,500 was found developable with sound construction practices. Additionally, in 1982 the municipality adopted the Hillside Wastewater Management Plan. This plan deals with the issues of on-site and community sewage systems in relation to land use, and provides an integrated geographic assessment of the 20,000 acre Hillside area in the Anchorage Bowl . Most of these lands are still undeveloped and unzoned. Decisions about expansion of the community sewer system sets a clear direction for the future residential pattern of the Hillside area. The

municipal capital improvement program proposes installation of a sewer system to the Hillside area beginning in 1983.

Earthquake hazards are a final consideration in Anchorage's development. Anchorage is rated as a high-risk earthquake zone. To date, the local government has not adopted planning standards to address this hazard. As a result, earthquake damage potential is still not a major land use planning constraint, although earthquakes may destroy property from time to time.

In summary, the land use supply around Anchorage can physically accommodate. growth for the 20-year time horizon of the comprehensive plan. The municipality has shown a strong commitment to guide future community growth and appears prepared to deal with most development constraints in a constructive manner that protects environmentally sensitive areas and encourages sound development in suitable areas.

Housing

The foremost impact of community growth is on the supply and cost of housing. Anchorage has a history of residential housing shortages and surpluses. The course of the Anchorage housing market during the 1970's can be summarized as follows. Supply and demand were reasonably balanced until 1973, as new construction during 1970-72 exceed growth in housing demand. The start-up of pipeline construction changed a housing surplus in early 1974 to a housing shortage in late 1974. This shortage

continued to early 1977. The rapid increase in housing stock continued well past the pipeline's completion. When an oversupply first reappeared in early 1978, residential construction was still at an all-time high. By 1979, the market softened, creating a severe imbalance of supply over demand. By the end of 1980, the surplus of units was cut substantially. There was a slight shortage of single-family units, but the overall balance was still surplus. As the Alaskan economy picked up in 1981 and immigration accelerated again due to recession conditions outside, supply and demand for owner-occupied units became better balanced. However, by the fall of 1981 and through the first three quarters of 1982, demand for rental units had overridden supply again.

Figure 6 illustrates the annual growth rate of the residential housing stock in areas of the Anchorage Bowl between 1975 and 1981. Overall, the Anchorage Bowl area (excluding Eagle River/Chugiak and Girdwood) attained a 5.15 percent annual growth rate and an overall increase of 26.1 percent between 1975 and 1981. This figure gives some insight into the pace and geographic pattern of new construction in the past five years. The most consistent growth occurred in southeast and southwest Anchorage.

Between 1970 and 1981, the composition of Anchorage's housing supply changed as shown in Table 10. The most significant change was the increased share of multi-family housing between 1975 and 1981. In 1975, multi-family units represented 30.4 percent of the total and single family units constituted 47.7 percent of the total available housing. By

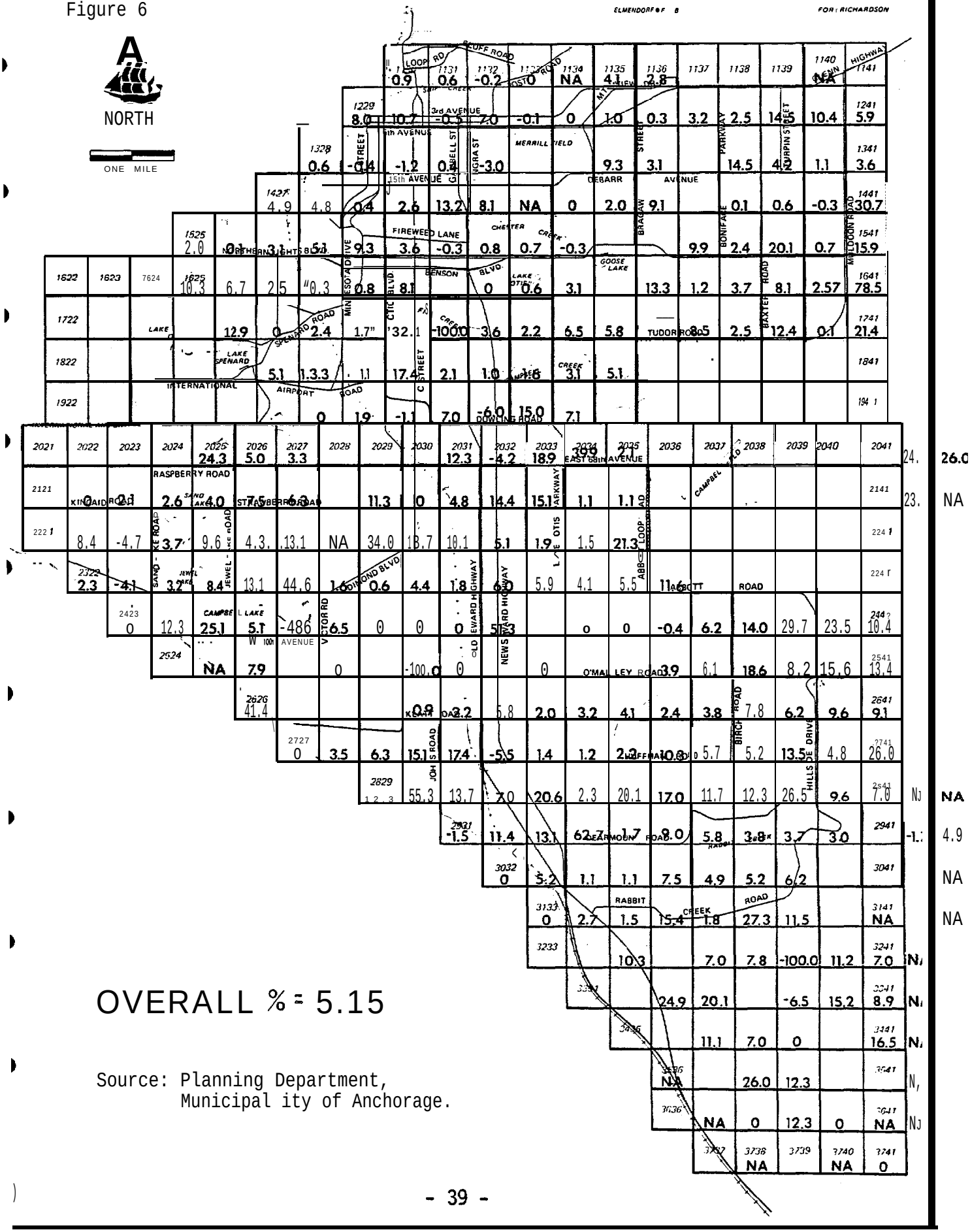
1981 that distribution had shifted so that multi-family had increased to 35.0 percent and single family units had declined to 43.2 percent of the total. This trend is anticipated to continue through the 1980's as Anchorage becomes more urbanized.

Future residential land use will develop with a high density profile in those inner-city subcommunities which currently house older, single family residences. By 1995, it is expected that those areas will experience redevelopment with multi-family dwellings replacing the older, single family homes. Areas ripe for redevelopment include the land between the central business district and the Northern Lights commercial strip, portions of Spenard, Fairview and Mountain View, and some areas within the central business district. The communities located in the more peripheral areas of the Anchorage Bowl will probably continue to develop at lower residential densities, with a predominance of single family dwellings. These communities include Muldoon, Sand Lake and Abbott-O'Malley-Hillside areas.

The 1980 census found that 56.5 percent of Anchorage's dwellings were owner-occupied and 43.5 percent renter-occupied. The ratio between owner occupied and renter occupied housing will continue to favor owner occupied, particularly while the State of Alaska subsidizes home mortgage rates through the Alaska Housing Finance Corporation.

ANCHORAGE AREA 100 SCALE GRID SYSTEM

Figure 6



OVERALL % = 5.15

Source: Planning Department,
Municipal ity of Anchorage.

Table 10
ANCHORAGE BOWL HOUSING STOCK
BY STRUCTURE TYPE
1970-1981

YEAR	SF	%	DX	%	MR	%	MH	%	TOTAL	%
1970	14,211	45.7	3,199	10.2	9,280	29.8	4,464	14.3	31,154	100
1975	21,208	47.7	3,924	8.8	13,501	30.4	5,863	13.1	44,496	100
1976	22,283	45.6	4,168	8.5	16,001	32.7	6,500	13.2	48,952	100
1977	23,466	44.6	4,528	8.6	17,680	33.6	6,976	12.4	52.650	100
1978	24,441	43.8	4,898	8.7	19,603	35. 1	6,936	12.2	55,878	100
1979	25,417	44.2	5,086	8.8	20,071	34.8	7,024	12.3	57,598	100
1980	25,535	42.8	5,702	9*5	2?,164	35.4	7,339	12.3	59,740	100
1981	26,020	43.2	5,906	9.8	20,984	35.0	7,237	12.0	60,147	100

SF-Single Family
DX-Duplex
MF-Multi-Family Owner Duplex
MH-Mobile Home

Source: Municipal Planning Department, Research Division (February 24, 1982)

In summary, the housing stock of Anchorage has fluctuated between shortages and surpluses over the past decade in response to changes in economic conditions. This pattern will probably be repeated in the next decade as the market tries to balance supply and demand.

Community Facilities and Services

EDUCATION

The Anchorage School District, governed by the elected Anchorage School Board, is responsible for providing public elementary and secondary educational services in Anchorage. In January 1982, the school district issued its Ten-Year Capital Improvements Program: Analysis and Recommendations (CIP). The information and analysis below is based primarily on the CIP and on interviews with planning staff at the Anchorage School District.

The Anchorage School District is, by far, the dominant educational system in the region. Private schools have, in the past five years, doubled their enrollments and now account for about 5 percent of total elementary and secondary enrollment.

In contrast to many other local government functions, the gross level of services provided by the Anchorage public school system has been relatively unaffected by the past decade's growth. Between 1940 and 1970, local school enrollments grew by three-fold to four-fold every ten years. However, over the most recent decade (from 1972 to 1981), total school enrollment actually declined by 6 percent, from 39,735 in 1972 to 37,357 in 1981. During this latter period, Anchorage's total population grew from 144,215 to 187,761 persons. Thus, school enrollments fell

from 27.6 percent of the total population in 1972 to only 19.9 percent in 1981. The steepest drop occurred during the peak years of pipeline-induced growth (1975-1977) and the enrollment ratio thereafter remained fairly stable at about 20 percent of total population.

The flat school enrollment ratio of recent years coincided with some basic shifts in the demographic composition of Anchorage's population, a decline in enrollment at schools on the military bases and the enrollment growth of private schools. These factors all worked together to depress public student enrollment, but from most recent data it appears they have run their course and that the school enrollment ratio has stabilized at 19 to 20 percent of total population.

The relative stability of overall enrollment figures for the past decade masks a substantial geographic shift in school-age population from central city neighborhoods to newly developing suburban areas. In recent years, sustaining the neighborhood school concept in the face of residential population movements, rather than overall enrollment growth itself, has been the troublesome school facility planning problem.

The CIP presents a ten-year program for school improvements and an inventory of the condition of existing school plan facilities. It also sets out the educational service standards on which the proposed improvements program was based.

The CIP adopts the intermediate base population forecast developed by the Institute of Social and Economic Research in the report South Central Alaska's Economy and Population, 1965-2025: A Base Study and Projection, issued in January 1979. That report envisioned a population of 247,662 for Anchorage by 1990 and 275,424 by 1995.

The future school population forecast was derived on the premise that public school student enrollment would stabilize at slightly below the present level of about 20 percent of total population. The CIP presents a ten-year forecast of school population by year and grade level. The school population forecast is also distributed by geographic subareas and thus can be used to locate new facility and expansion requirements for those neighborhoods which will absorb the brunt of the next decade's residential growth. In this regard, it is helpful, too, that the municipal planning department maintains and annually updates a complete inventory of housing units by location and housing type. This inventory provides an excellent data base for monitoring geographic population trends so that timely decisions can be made about future school site acquisition. In the past, the process of site acquisition has frequently been time-consuming and delayed school construction plans.

Based on the detailed student enrollment forecasts, the report develops a ten-year capital improvements program for new school construction and for additions, improvements, renovations, maintenance and other improvements to existing school plant.

As part of its financial plan, the CIP recommended a bond issue of $67,175,000 for urgent construction, additions and renovations. This bond proposal was approved in spring 1982. The financial plan also proposed a legislative request program of about $118,000,000 to implement the rest of the ten-year building program.

In assessing the capacity of the Anchorage School district to adjust to school population increases, it is pertinent to note that the school district has traditionally had strong financial and program support from the Anchorage community. To date, its local bond issues have been uniformly successful. The level of financial support provided by the State of Alaska has risen steadily. State funds now account for about 80 percent of the District's operating budget (see Table 11) and for reimbursement of 60 to 90 percent of local district debt service payments. It seems likely that, so long as the State of Alaska is fiscally able, local education will hold top priority for state financial assistance to local government. However, the 1983 legislature has proposed major changes in the method of calculating school foundation program payments for operating assistance and reduced appropriations for school debt service reimbursement by 30 percent below the previous year. As state oil revenues decline, educational assistance, as well as other programs, will be affected by state budgetary constraints.

Table 11
ANCHORAGE SCHOOL DISTRICT
OPERATING REVENUES, BY SOURCE
FY 1982-1983

Source	Amount	Percent
State	$133,300,650	79.7
Local	33,579,085	20.1
Federal	65,000	--
Other	260,000	0.2
TOTAL	$167,204,735	100.0

Source: 1982 Annual Operating Budget, Municipality of Anchorage.

In view of the current status of its planning program, recent passage of a large school bond issue, and the history of legislative and municipal financial support for educational programs, it appears that the school district is generally well prepared to implement its CIP and thereby accommodate the growth needs of the-coming decade. The principal problem may be a shift of a greater share of the financial burden of local education to local tax payers, if state grant assistance is not maintained at recent high levels.

PUBLIC SAFETY

The following analysis of public safety functions is based mainly on interviews with senior administrative staff of the Anchorage Police Department, Alaska State Troopers and the Anchorage Fire Department.

Police Protection

Law enforcement services within the municipality are provided primarily by the Anchorage Police Department (APD). Its area of jurisdiction extends north to the Knik River Bridge, including the Eagle River/Chugiak area, and to the south to Dowling Road and southwest along the New Seward Highway to Potter Marsh, including Oceanview. The Alaska State Troopers have jurisdiction from Dowling Road south on the east side of the New Seward Highway, including the Hillside area and extending south along Turnagain Arm to Portage.

Of the two agencies, APD serves the more populous service area. The department has a full complement of officers and services, including traffic control, investigatory, administrative, and technical services. The department seeks to maintain a minimum of 1.8 sworn officers per 1,000 population.

The Alaska State Troopers are more limited in personnel and other resources. They are primarily responsible for highway patrol and law enforcement for the area outside municipal police jurisdiction. The

troopers provide investigatory support to APD with manpower and equipment. The troopers also are responsible for transporting criminals. The ratio of trooper manpower to population is .67 officers per 1,000 population, or less than half the coverage maintained by the APD.

Anchorage Police Department. The ability of the APD to respond to demands of service made by growth depends primarily upon its funding levels and the rate of growth experienced.

State municipal assistance grants, revenue-sharing and direct legislative appropriations have been primary funding sources. However, in 1983, local tax-supported increases in personnel accounted for an $8 million rise in the local operating budget. Public support for police services is strong. In this regard, it is relevant that public safety was given high priority during the pipeline construction project, when rapid population growth and turnover raised public concern about criminal activity.

The rate of population growth affects how the department allocates its resources and how effectively it copes with new demands. Steady growth can be accommodated through advance planning for increased services. Rapid growth, however, overruns planning, and service expansion is governed by reaction and crisis management. Rapid growth in one area of the city may mean services are cut elsewhere to meet new demands.

While the Hillside area is now served by the AST, surburbanization and rising concern about police protection is elevating interest in establishing an APD service area. At present, it is expected that the Hillside area will join the APD service area within the next few years in order to obtain a higher standard of police services. The primary impact upon the department will be an increase in personnel (approximately 60) and a substation facility. Further service area extensions are not expected.

The department plans to construct a new headquarters building. The municipality received a direct appropriation grant from the state for site selection, but construction is contingent upon additional state grant funds.

The department's technical capabilities are being upgraded with the installation of a new computerized dispatch system. The system is expected to keep pace with demand in a flexible manner.

Alaska State Troopers. The Alaska State Troopers is a state agency mainly supported by state funds. The agency's ability to meet the demand of population growth depends on funding levels. Historically, rapid growth periods have been dealt with by directing existing resources to areas of greatest need. That practice means officers are on call on a 24-hour basis during periods when the AST is short-staffed.

The first priority of the AST is to respond to life-threatening situations. Property offenses are given second priority and nuisance calls are given lowest priority.

Currently, the AST patrols the Hillside area on a "to and from traffic accident" basis. According to an AST representative, the impetus to upgrade police protection in the Hillside area will come with the rise in minor offenses and nuisance problems rather than from a rise in major crimes. City police are better staffed to handle routine police services and nuisance calls, while the Troopers must be primarily concerned with crime rather than nuisance response. Therefore, acquisition of the Hillside area by APD would not adversely affect the Troopers, but would release officers for other duties.

Fire Protection

The service area of the Anchorage Fire Department (AFD) includes the entire Anchorage bowl and Eagle River. The area north of Eagle River is serviced by Chugiak Volunteer Fire Department. The Girdwood area is serviced by the Girdwood Volunteer Fire Department. The area along Turnagain Arm from Potter to Girdwood is not in a fire service area and is served on an "as available/reimbursable" basis by the AFD.

The AFD service area has ten fire stations in the bowl and one in Eagle River. With the construction of a proposed station for the mid-Dimond

area, it is expected that fire stations can provide coverage in the bowl to saturation point. Anticipated completion for the Dimond station is 1985.

The siting pattern for stations assumes that Anchorage's existing land use pattern will persist, with high density, high value development concentrated in the downtown/midtown area and low density rural residential growth in south and east Anchorage. The primary response area of each station is about five miles square. In the downtown area, service areas overlap considerably, whereas in the less populated areas the service areas are contiguous. AFD statistics show an average 3.5 minute response time to fire calls.

AFD does not anticipate needing further fire station locations after the Dimond station is built. Additions to the service area outside the bowl area may come with consolidation of the four volunteer units at Chugiak. However, the Girdwood unit will likely remain volunteer for many years due to limited population in its service area.

Currently, the AFD service area has an ISO rating of 3 for hydrant areas and 6 for nonhydrant areas. This situation is judged satisfactory. An upgrade to class 1 or 2 rating would be costly with little offsetting insurance savings. The 6 rating is the highest a nonhydrant area can attain.

Despite a relatively high ISO rating, AFD fire protection has several significant deficiencies. The primary deficiency in urban areas is periodic low water supply and pressure for firefighting purposes. The AFD would have a problem if more than one major fire occurred at a time of short water supply. The solution is increased water storage capacity.

In addition to inadequate water supply, the lack of hydrants in the south Anchorage area poses a problem. The department has increased its tanked water supply and reduced its average response time to four minutes for the area. Despite these efforts, the upper Hillside area remains vulnerable, especially in the winter, due to poor road conditions and high winds. For reasons discussed in the land use and utilities sections of this report, public water supply with hydrants is not planned for most of the south Anchorage area nor for the upper Hillside area.

Traffic planning and engineering can also affect the quality of fire protection services. Heavy traffic flow patterns can curtail AFD response time, with risk of loss of life and property. A good surface transportation system that permits speedy travel at times of emergency is thus a continuing major concern for the department.

The ability of the department to meet the demands of growth depends on funding to add personnel and equipment to match growth. Dense areas and

high property values require more personnel and fire company equipment. Low density areas require emergency response units and fire stations, since response time becomes a critical factor.

Funding sources for the department are a mixture of local property taxes, state revenue sharing and direct legislative appropriations. If state support were decreased, the burden would shift to local taxpayers.

RECREATION

The recreational analysis is based on information gathered from interviews with senior administrative staff of the municipal Parks and Recreation Department, municipal physical planning department and Alaska State Parks planning section. In addition, current municipal planning documents were used, including the Anchorage Park, Greenbelt and Recreation Facility Plan and the revised 1982 Anchorage Bowl Comprehensive Development Plan.

Many private and public organizations and agencies providing recreation and leisure activities within the municipality and adjacent areas, but the principal providers are the municipal, state and federal governments. The focus of each of these agencies differs in scale and proximity to Anchorage.

The municipal system focuses on recreational opportunities close to home and operates with the smallest land base. The basic components of the

municipal system are neighborhood, community and large urban parks, complemented by connecting greenbelt corridors. Within this system, the greatest need is for neighborhood and community parks, for the least amount of acreage is committed to local parks. According to the Facility Plan, adequate distribution of these parks and timely acquisition of land are the principal problems in creating a better park system in Anchorage.

Availability of new parklands and funds are key constraints for the municipal park system. Residential expansion increases recreational land requirements but decreases the availability of potential park sites. Recreation and open space opportunities are limited also by increased density patterns of development. Parkland needs compete with other land uses (e.g., housing, industry, schools).

The rate of growth critically affects local parks development. With constant rate of growth, the municipality can adequately meet demand. However, with rapid residential expansion, local park acquisition and improvement tends to lag and competition with other land uses becomes more acute.

Unlike the neighborhood park system, the greenbelt and linear park system is not so directly keyed to residential growth. The greenbelts are based more on environmental, social and recreational values, including protection of wetlands, woodlands and stream corridors. These areas lend themselves to linear recreation pursuits, e.g., jogging, biking,

cross-country skiing. The goal of the municipal park system is to have neighborhood and community parks connected to schools and recreation facilities through these corridors. This kind of unified system is difficult to attain due to the amount of acreage required, timing of acquisition in the face of rapid development and competing land use values.

The critical constraint in both the park system and greenbelt/linear park system is land acquisition. Land acquisition is a slow and expensive process. Since Anchorage does not have a subdivision ordinance requiring park dedication, land must be purchased. Federal land conservation funds for parklands acquisition are no longer available. However, the municipality has obtained state funds for purchase of parklands and has not had to depend upon park bonds in recent years. State revenues are now seen as the major source of funds for park development for the next decade. If state funds were unavailable, then the municipality would have to rely more on its own fiscal resources, primarily bonding, to finance parks.

As for large tracts of open space, the municipality owns or is scheduled to receive a number of areas (Section 16, Kincaid Park, Campbell Airstrip, Point Campbell) that are well located and well suited for diverse recreational uses.

For Anchorage residents, Chugach State Park is the principal scene of close-to-home year-round wilderness recreation activities, including backpacking, hiking, skiing and snowmobiling. Land' acquisition, except

for access corridors, is not a concern at this level, since existing parklands can meet projected demand adequately. According to the 1982 Comprehensive Plan, "with regard to large urban and regional parks within the municipality, the land reserves are adequate to meet current and future needs to a saturation level of 330-340,000 in the bowl."

The major concerns for Chugach State Park are the construction of park amenities and improvements and securing access. With increase in population, park use will intensify and heavier use necessitates improvements to conserve the quality of the resource base and to counter the threat of degradation from overuse. This is a state responsibility.

The second major inhibition to meeting increased demand is poor public access. Large portions of the park perimeter are inaccessible due to lack of access. A few small parcels block key access points. Purchase of these parcels is expensive and legislative appropriations have not been forthcoming. Land exchanges are another means of resolving this problem. In any case, failure to improve access will eventually lower the quality of recreational opportunities afforded by Chugach State Park.

On a broad scale, plentiful and varied recreational opportunities exist within a five-hour drive in either direction from Anchorage. This area encompasses Denali National Park, Denali State Park, Chugach State Park, Kenai National Moose Range, Chugach National Forest and the recreational assets of the Matanuska-Susitna and Kenai Peninsula Boroughs, Kachemak

Bay and the Prince William Sound area. Opportunities include a major ski resort, a wide variety of wilderness environments, water-oriented activities, and hunting and fishing opportunities. The vastness of these areas and their wealth of recreational resources are in little danger of being depleted in the near or distant future.

HEALTH

Health systems information is derived from interviews with municipal, regional and state health planners, and regional and municipal health system planning documents, These documents include Health Systems Plan 1982-1986 developed by a private health planning corporation for a regional service area and the recently adopted municipal, Anchorage Health Systems Plan 1982-1984. Both documents provide health status data, describe health issues and services", and specify goals and objectives for health care. Further background information on Anchorage health system and services is presented in Technical Report No. 48, Vol. 1, Gulf of Alaska and Lower Cook Inlet Petroleum Development Scenarios Anchorage Socioeconomic and Physical Baseline.

In assessing health problems and their impact on health services, demographic and socioeconomic factors are key elements. The Anchorage service area population differs from the national population. In 1980, it was a young population with 85 percent under 44 years of age (70 percent U.S.). This statistic indicates a high proportion of youth, young adults and childbearing-aged persons, but a relatively small share of

senior citizens. Anchorage also has a significant number of Alaskan Natives and military personnel. In addition, Anchorage is a medical center for most of the state, serving a population generally similar to its own, but with a larger share of Alaskan Natives.

The health concerns of the region reflect its youthful and relatively healthy population. A comparatively low rate of annual physician visits per capita -- 3.7 for Anchorage versus 5.0 nationally in 1978 -- and low level use of in-patient care facilities indicate a relatively high standard of health. Primary use of the health system is on an out-patient basis.

Usage of the hospital care system is linked to the high rate of accidental injuries; degenerative diseases, principally heart disease and cancer; a high birth rate; and communicable diseases. High incidence of suicide, homicide, domestic violence, accidents and divorce rates indicate mental health and overlapping substance abuse problems.

The region's health care system offers health and medical services that are superior to the typical scope of care available in comparable communities in the U.S.

Partly due to its function as a regional center, Anchorage has achieved a high ratio of health care providers to population. Residents no longer routinely seek care "outside." Over time, the arrival of more med-

ical professionals, particularly in specialty fields, and a greater variety and sophistication of services has increased reliance on local care.

Today, Anchorage meets or exceeds the recommended ratio of 1:2,000 primary care physicians per population. By that ratio, the present supply of physicians will meet projected population demand to year 2000. On the other hand, as noted above, a substantial share of Anchorage's medical manpower is dedicated to the care of nonresidents. Also, the physician population has been increasing proportionate to population growth and that trend is likely to continue.

Medical manpower shortages do exist in certain specialty areas, notably in obstetrics, pediatrics, dentistry and optometry. Failure to attract new or relocating physicians is attributed to limited opportunities for practice and lack of clinic facilities. Shortages in semiprofessional personnel exist as well.

A variety of existing medical facilities provide acute care, long-term care and residential care.

Providence Hospital is a 250-bed acute care hospital and serves as the major referral center for much of Alaska. The medical staff consists of both primary care physicians and specialists in almost all fields of medicine and surgery. The hospital provides a wide range of services

including an n-bed in-patient psychiatric care unit. Technical services are supported by modern diagnostic equipment. The occupancy rate as of' June 1982 for Providence Hospital was 87 percent, with the average length of stay 5.9 days. Occupancy rate is well over the federal government standard of 80 percent for short stay hospitals.

The second private provider of acute care for the community and region is Humana Hospital. Formerly Alaska Hospital, Humana Hospital is a 199-bed facility with a full complement of primary care physicians and specialists providing a wide range of services supported by modern diagnostic equipment. Unlike Providence Hospital, Humana Hospital has not had consistently high occupancy rates. The 1981 occupancy rate was 43.5 percent with an average length of stay of 4.6 days. One hundred fifty-seven beds are currently being used for acute care. Twenty-one beds are in temporary use for the chemical dependency unit and the remainder are in use as office space for that unit. The occupancy rate for the chemical dependency unit is 89 percent with an average length of stay of 27.4 days.

Federally-operated facilities include Elmendorf Air Force Hospital, with 145 acute care beds for military personnel and their dependents, and Alaska Native Medical Center, serving as acute care and referral center for Alaska Natives, The 170-bed facility had an occupancy rate of 76 percent in 1981 with an average length of stay of 8 days.

Long term care facilities are Nakoyia Health Center, Pioneer Home and Hope Cottage. Nakoyia provides 216 beds for skilled nursing and intermediate care and is currently operating at a high occupancy rate. The state's Anchorage Pioneer Home provides residential and nursing care for senior Alaskans with 15 years residency. The recently constructed nursing wing adds 100 beds to the existing supply of 100 residential beds. The Pioneer Home has traditionally been fully occupied. The 105-bed Hope Cottage, which provides residential care for persons with developmental disabilities, had a 96 percent occupancy rate in 1979.

Alaska Psychiatric Institute is a state-operated in-patient care center with 200 beds and an occupancy rate of 77 percent in 1980. However, now that "criminally insane" patients who were previously cared for outside have been returned to Alaska, the institution is used to capacity.

According to South Central Health Planning and Development, Inc., the existing supply of acute care beds will not be sufficient for projected population growth beyond 1985. Several private entities have offered proposals to meet the projected need.

Providence Hospital, which has experienced consistent and increasingly high occupancies, proposed an addition of 160 beds for medical/surgical care, intermediate and cardiac care, in-patient psychiatric care, and a new rehabilitation unit. The certificate of need issued by the Alaska Department of Health and Social Services, allowed an 80-bed expansion and construction is due to commence in the summer of 1983 with completion of remodeling and expansion in 1986.

Humana Hospital proposed a new addition of 80 beds for its acute care and rehabilitation wing. The addition will mainly address maternal and child health care needs through obstetrics and newborn services. A certificate of need was submitted for review in September 1982. A certificate was awarded for 40 beds and construction will begin in the summer of 1984 and be completed by the end of 1985.

The Lake Otis Hospital, Inc. held a certificate of need for a 125-bed acute care facility. This certificate was in dispute for many years due to legal questions involved in its issuance. The certificate was withdrawn by the Alaska Department of Health and Social Services in 1982.

In 1983, Charter Medical Corporation requested and received a certificate of need for an 80-bed specialty hospital. The proposal is for an in-patient psychiatry care unit (40 beds) and chemical dependency unit (40 beds). Construction will begin in the summer of 1983.

Raleigh-Hills Corporation is proposing to renovate the 101-bed Careage House, currently closed, to become a 40-bed chemical dependency unit. Renovation is pends receipt of certificate of need approval. The state has appropriated money for a 12-bed mental health care facility to provide intermediate and custodial care in Anchorage. Plans are being formulated for a pilot 12-bed domiciliary to provide transitional care for mental health patients. Long range plans are for several such facilities.

Proposed hospital expansion plans indicate that growth impact will be primarily absorbed by private sector providers. No major changes in the military hospital situation is anticipated. However, Alaska Native use of private facilities may increase if federal Indian Health Service programs are cut back. Also, the present Alaska Native Medical Center is in need of renovation or replacement. Plans have been submitted by the federal government for a new 170-bed hospital. Site locations being considered are the present site and federal land at Goose Lake. Implementation of plans depends upon federal funds and no date has been set for construction.

Long term need assessment indicates that existing facilities are oriented toward acute care but the region's principal need is for long-term, intermediate, residential and transitional care. Substance abuse is also a major problem which needs to be addressed in terms on in-patient care, transitional care and follow-up out-patient care.

Compared to national norms, per capita health care expenditures in Alaska are high (see Table 12). Federal (except medicaid and medicare) and state governments contribute far more in Alaska than elsewhere. Because of Alaska's small elderly population, medicare and medicaid expenditures are below national averages.

Table 12
PER CAPITA EXPENDITURES FOR DIRECT HEALTH CARE SERVICES
BY MAJOR SOURCE OF FUNDS
U.S.[1] and Alaska

	Alaska	United States
Direct Payments[2]	$283.56	$248.06
Third Party Payments		
Private Health Insurance	166.58	203.43
Medicare	28.12	111.74
Other Federal	275.88	50.90
Medicaid	52.66	82.35
Other State/Local	131.31	46.68
TOTAL	$938.11	$743.16

[1] Source: Health Care Financing Review, Summer 1979. P.26. Preliminary Estimates for 1978.
[2] For Alaska, this figure includes some undetermined third-party payments (such as Teamster Health payments).

SOCIAL SERVICES

This section is based on interviews with social services administrative staff of municipal and state agencies and social service department representatives of the University of Alaska. A summary description of social services presented in OCS Socioeconomic Studies Program Technical Report, No. 48, Vol. 1, is not repeated here.

Social service programs can be grouped into two categories, income assistance and special group programs. Medical assistance programs which relate to social service such as medicare, medicaid and general relief medical are dealt with under health care.

Income assistance programs include supplemental security insurance, adult public assistance programs (aid to elderly), aid to blind and aid to disabled, unemployment insurance, food stamp program, longevity bonus, workmen's compensation, and aid to dependent children. These are public programs funded chiefly by the federal government with substantial state support. These programs are mandated by law and are available to all who qualify.

The second group of social programs provides services to special population groups such as the handicapped, elderly, abused persons, unemployed, underemployed and foster care children. The delivery system is a mixture of public agencies and private providers operating in part or in whole under government contracts. The life of many of these programs is uncertain, as authorizations and funding levels fluctuate in response to budget crises and shifts in public attitudes.

Assessing the future status of social service programs is difficult because there are few reliable indications of future service levels. Unlike most other community services such as utilities or transportation, social service budgets are usually not dominated by facility construction. Social service programs tend to involve administration of

payments or personal services to clients rather than construction and operation of capital facilities.

Too, the delivery system is a very diverse array of public and private providers serving special groups. Because of these diverse missions, coordination among providers is often poor, and long-term planning is fragmented.

Finally, public and government support for social service programs is fickle. Today, it appears there is a major trend in motion to reduce governmental, especially federal, commitments to social programs. The final outcome of this shift is uncertain, but it seems clear that, in a budget pinch, social programs are visible and vulnerable.

For a number of reasons, then, it is risky to trust that the present performance of the social service system will persist. Because of its diversity, the collection of social service agencies finds it especially difficult to plan in coordinated, comprehensive terms. The lack of fixed fiscal and program commitments embodied in major facilities makes it easy to scant planning and to deviate from plans, especially when public support wavers.

In conclusion, the prognosis for the future depends less on baseline conditions, and more on future public attitudes and fiscal capability. The matter of general fiscal capability is dealt with elsewhere, but the

tenor of future public attitudes and values about social programs is for the most part indeterminable.

UTILITIES

The following subsections appraise the status of the Anchorage region's basic utility systems: water, sewer, power, communications and solid waste disposal. In addition to the reports cited in the text, reference is made to the previous SESP baseline studies for the Anchorage region for fuller background details. The divergent population projections for water and sewer utilities demand forecasts and for the basecase scenario (See Chapter III) can be explained by the fact that the projections were prepared at different times for different purposes.

Water

Water supply review is based on published documents cited in the text and on interviews with planning and administrative staff of public and private water utilities. Documents referred to in this section include Metropolitan Anchorage Urban Study, Volumes I and II, Eagle River Water Resource Study, Wastewater Facilities Plan for Anchorage, Alaska, Eagle River-Chugiak-Eklutna Comprehensive Plan, and the Hillside Wastewater Management Plan. Additional reference can be made to previous SESP baseline studies.

A variety of systems supply water within the municipality, including municipal, military and private utilities, and individual on-site systems. The principal supplier is the municipal water utility, Anchorage Water and Wastewater Utility (AWWU). Its public service area encompasses the former City of Anchorage area and the surrounding area. The public system, which is fully interconnected, is supplied in roughly equal proportions by surface water drawn from Ship Creek and groundwater wells.

The remaining urban area is served by numerous subdivision water systems. Many of these systems have been consolidated under Central Alaska Utility, Inc, (CAU), a certificated private utility. CAU relies solely on wells. Its fully-interconnected system services a 25 mile square area in south Anchorage and isolated areas of east Anchorage, including Lake Otis and Muldoon, Abbott-O'Malley and Rabbit Creek-Hillside areas.

The Eagle River/Chugiak area has a number of individual subdivision well systems that are small yield, not exceeding 100-200 gallons per minute (gpm). CAU has consolidated four such systems. The military reserves are served by a separate system.

The balance of the water supply in low density rural residential areas in the Anchorage Bowl and Eagle River-Chugiak is from individual on-site wells. The remainder of the municipality, notably Girdwood, also relies on individual on-site wells. Erratic groundwater supplies impose

serious local constraints on residential development densities, especially in the Hillside area.

Ship Creek has historically been the primary source of water for the Anchorage Bowl. With development of supplemental groundwater resources, surface water now accounts for less than one-half of water production. Water is diverted from a dam owned by the military and operated jointly by the military and municipality. The high runoff period for Ship Creek is from May to November, with the cold-weather months characterized by low flow.

Water from the Ship Creek dam supplies two treatment plants located on the military reservation. The military and AWWU own and operate their respective plants.

Distribution of surface water is through public mains, which are fully connected to service public service area. The military system is separate, but interties with public system at Government Hill for mutual backup. The CAU system is self-interconnected, except for isolated areas. CAU wants to establish is seeking a tie-in such as the military has with the public utility.

Outside the bowl, distribution systems are generally limited to subdivision systems. However, CAU has consolidated and interconnected several subdivision systems in the Eagle River area.

Table 13 shows the sources of water supplied in the Anchorage Bowl as of 1977. Total water production for the Anchorage Bowl was 24.6 million gallons per day (mgd). Of that total, the public utility produced 17.2 mgd, surface water accounted for roughly one-half. From its wells, CAU produced 5.0 mgd. Private wells produced 2.4 mgd. Military production was 5.1 mgd, nearly all from Ship Creek.

Table 13
WATER PRODUCTION CAPACITY
ANCHORAGE BOWL, 1977
(million gallons per day)

	AWU	CAU	Military	Private Wells	Total
Anchorage Bowl					
Wells	8.2	5.0	0.6	2.4	16.2
Ship Creek	9.0		4.5		13.5
					29.7

Source: Metropolitan Anchorage Urban Study.

Anchorage consumption patterns are unusual for a community of its size. Commercial, institutional and industrial use accounted for only 12 percent of total 1980 consumption. The balance was domestic use. This trend is reflective of Anchorage being principally an administrative and transportation center, rather than industry-based.

Water demand forecasts based on requirements of the major utilities in the bowl indicate that the additional water requirement will be 13.5 mgd

by 1985, 23.4 mgd by 1990, 34.6 mgd by 1995, 45.4 mgd by 2000. By 2025, the requirement will reach 81.5 mgd (see Table 14). This forecast assumes that the economic structure of Anchorage will change little with regard to industrial activities compared to its population. The relation of per capita consumption to per capita residential use should remain unchanged except for undeterminable effects of conservation measures.

Table 14
PROJECTED POPULATION AND WATER DEMAND
ANCHORAGE BOWL AND EAGLE RIVER/CHUGIAK

	Population Projection		Demand (mgd)	
Year	Anchorage Bowl (Incl. Mil.)	Chugiak Eagle River	Total	Increase Over 1977
1977	184,000	.....	29.7	------
1980	205,775	15,854	33.8	4.1
1985	267,610	26,317	43.2	13.5
1990	317,934	38,160	56.1	23.4
1995	376,652	57,622	67.3	34.6
2000	431,000	76,000	78.1	45.4
2005	481,000	94,000	90.3	57.6
2010	524,000	108,000	99.2	66.5
2015	558,000	118,000	106.1	73.4
2020	587,000	127,000	112.1	79.4
2025	596,000	130,000	114.2	81.5

Source: Metropolitan Anchorage Urban Study.

AWWU staff report that by 1981 daily consumption had risen to about 25 mgd. Water storage capacity is 15 mgd, a third of which is held in reserve for fire flow, and the remainder held for peak demand periods.

During periods of peak summer demand this storage capacity is inadequate. Conversely, low surface water flow in winter taxes underground reserves, which are near the limit of their sustained yield. Given. the present demand scenario and capacity of present facilities, the Anchorage bowl has a serious short-term water supply problem. At time of peak use and low storage levels, the utilities have already had to urge curtailment of consumption. The Eagle River/Chugiak area is to have supply problems by 1990.

The immediate solution is to develop water storage and decrease use. The short-term solution is expansion of the treatment facility. Development of a major new water source is the long-term solution.

For the Anchorage Bowl, the immediate solution is expanded water storage and treatment capacity and conservation measures to reduce consumption rates.

Several short-term solutions have been examined, The preferred solution involves expansion of the present treatment facilities plus better maintenance of Ship Creek reservoir and a larger diversion pipeline to increase its effective storage capacity. This will permit increased use of excess summer flow. The AWWU proposes an $8.5 million project to be completed in two years. The proposal awaits funding approval in the State FY84 capital budget.

To augment these expansion plans, additional groundwater sources may need to be developed by public and private utility. With these sources, basic water supply should be adequate until 1990.

The Eagle River Water Resource Study has addressed the matter of long-term water resource development. That study evaluated four alternatives and recommended Eklutna Lake as the least expensive, most environmentally sound and quickest long-term solution to the region's water supply needs. The proposed Eklutna Lake project is within public lands and the surrounding area has been selected by Eklutna Village Corporation. Eklutna Lake is the site of a 30,000 kw hydroelectric power development project. Water flows through a connecting tunnel from the lake to a power station on the Glenn Highway 35 miles north of Anchorage. Three water supply schemes for Eklutna Lake were examined. The preferred alternative is a river diversion tailrace scheme that would divert river water from below the power plant. Water would be treated at plant to be constructed near Eklutna village and pumped through a 33-mile underground pipeline to Anchorage, serving all communities in between.

This proposed project would take six years to construct at an estimated cost of $150 million. The project could supply an additional 70 mgd to meet demand forecasts for the next 30 years. Beyond that time, additional water resources will be required. Thus, if the Ship Creek treatment plant. is expanded and the Eklutna water project is constructed, Anchorage will have an adequate supply of water for its utility systems beyond 2015. The installation of a distribution system to deliver water

to consumers is not expected to present any noteworthy technical or finance problems.

Expansion of facilities and development of additional water supplies will be costly. Traditionally, state and federal grants and revenue bonds have been used as funding sources for such projects. The municipality received a $13.7 million appropriation from the 1982 state legislature for planning and design of the Eklutna project, but no construction funds have as yet been forthcoming. The proposed Ship Creek project is also unfunded. The 1983 legislature appropriated 22.5 million dollars for construction of the Eklutna project.

With reference to on-site water supplies, as previously mentioned, groundwater resources are approaching natural sustained yield limits. In the face of fixed and limited water supplies for rural residential areas, there is an apparent need for land use planning. Development proposals must consider the availability and extent of the resource and on that basis set allowable development standards. Close coordination with wastewater disposal programs is required to maintain water quality.

To summarize, Anchorage's short-term water resource problems can be managed if current proposed expansion plans, including development of groundwater resources, are undertaken in a timely fashion. However, even a short delay in Ship Creek expansion could result in serious water shortage problems. The crucial step is project funding.

Sewer

The Anchorage region uses two basic methods for wastewater treatment and disposal: on-site septic systems or a combined sanitary waste sewer collection and treatment system. In general, the choice of an appropriate system depends on land use patterns and densities in relation to the suitability of local soils and conditions to provide on-site waste treatment without adverse effects on water supplies or public health. Residential and commercial land uses are the main sources of wastewaters. Anchorage has very few industries that discard process wastewaters into the sanitary waste system.

Even so, there do not appear to insuperable physical or technical constraints to continuing development in the Anchorage Bowl or satellite settlements stemming from wastewater treatment problems. The nettlesome obstacles stem from inconsistent land use planning and a failure to resolve the lifestyle, political and fiscal conflicts in which the technical solutions are enmeshed.

The Municipality of Anchorage is now at the final stage of a prolonged and intensive series of wastewater, Jand use and related planning studies that will set policy guidelines and planning standards for future wastewater treatment programs. The remainder of this section is based on the findings and recommendations of those studies and interviews with municipal utility officials.

At present, there are three areas in the Anchorage region which are served by the sanitary sewer system: the Anchorage Bowl Sewer Service Area, the Eagle River Sewer Service Area and the Girdwood-Alyeska Sewer Service Area. The rate bases for the three systems were recently consolidated to establish a uniform rate schedule. However, due to the topographic conditions and distances that separate the three systems, they will probably maintain separate facilities for the foreseeable future. Outside the service areas, low density development and on-site septic systems prevail.

Two recent planning reports provide a current and comprehensive overview of existing and planned improvements to the Anchorage Bowl"'s wastewater treatment systems: the Hillside Wastewater Management Study and the Wastewater Facilities Plan for Anchorage, Alaska: Anchorage Bowl Study Area. The latter study projected wastewater loads and flows for treatment facilities for the Anchorage Bowl throughout the year 2005. This study used the ISER population forecasts, which are widely used by the municipality for planning purposes, and was coordinated with other municipal community planning studies. Table 15 displays the ISER total population forecast for the municipality through 2000, plus the Wastewater Facilities Plan's estimate of population in the Anchorage Bowl service area and the share of that population to be served by wastewater collection and treatment facilities.

According to those estimates, about 276,000 persons -- 87 percent of the Municipality's population -- will live in the Anchorage Bowl by the year

2000 and an increasing share of that population -- 257,300 persons or up to 93 percent -- will fall within the Anchorage Bowl Sewer Service Area by the year 2000. The study also estimated that the saturation population for the service area ranged between 350,000 and 550,000 persons, depending on the policies maintained by the municipality for residential densities, open space provision, wetlands conservation and similar land use issues.

Table 15
POPULATION FORECASTS
ANCHORAGE BOWL SEWER SERVICE AREA

	Municipality of Anchorage	Anchorage Bowl	
Year	Total Population	Total Population	Sewered Population
1985	231,487	189,500	167,100
1990	247,662	218,300	197,200
1995	275,424	247,200	227,200
2000	318,366	276,000	257,300

Source: Wastewater Facilities Plan for Anchorage, Alaska, June 1982.

The Wastewater Facilities Plan presented recommendations for treatment facility improvements adequate through 2005 and design capacity recommendations for principal sewerage interceptors through 2025.

Because of the crucial connection between future land use patterns and densities and wastewater disposal methods, future land use plans are a critical element for effective planning for and management of future

wastewater disposal requirements. The Hillside Wastewater Management Study examined land use and wastewater management problems in the fastest growing area of the region. The Anchorage Wetlands Management Plan (revised February 1982) mapped wetlands in the Anchorage urban area and proposed a wetlands management program.

Comprehensive land use plans have also been completed and adopted for the Eagle River-Chugiak-Eklutna area (1979) and the Turnagain Arm area (1979). Each of these plans addressed the relation between future land use and public improvements needs for their respective areas. The Eagle River and Girdwood-Alyeska Sewer Service Areas have each recently completed major sanitary facility projects. The treatment plant at Girdwood, completed in 1978, has a design capacity to serve about 8,000 persons with extensions to the existing collection system, or nearly five-fold the current peak seasonal population. The Eagle River treatment plant was upgraded in 1981 and is designed to serve nearly 24,000 residents. Thus, both of these service areas are now equipped with the basic facilities to absorb substantial residential growth, with some additional investment in collection systems.

As noted above, the long-term outlook for successful wastewater management depends heavily on planning and political considerations: namely, the local government's success at implementing an effective planning strategy to guide the orderly evolution of land use patterns and at devising programmatic and financial plans for wastewater facilities that are politically acceptable to service area residents. In the past, the

municipality, like many local governments, has not upheld consistent land use planning standards to rationalize the conflicting influences of land developers, uneven density patterns, large-lot suburban homeowners and advocates of low-density residential living averse to funding wastewater improvements that would impose the double penalty of higher taxes and higher densities.

Also important for the performance of wastewater systems will be the quality of environmental analysis and engineering design on which land use and facility programming decisions are based.

If the land use plans and wastewater treatment plans recently concluded are implemented, then the Anchorage region should be able to handle its wastewater disposal problems satisfactorily, so long as it is able to marshall the required financial resources. Traditionally, federal and State grant assistance has funded the major share of wastewater treatment facilities. The local government's share of debt service payments for sanitary wastewater system improvements, along with the operating costs, are met from real property taxes levied upon property owners in the service area. For the near future, diminished federal grant assistance for wastewater systems may delay or limit system expansion, unless State fund assistance expands to absorb a larger share of capital improvements.

Power

The subject of electric power supply for the Anchorage region can "be conveniently divided into two sub-topics: power generation and power distribution.

At present, power generation facilities are owned and operated by the Chugach Electric Association (CEA), the Municipal Light and Power (ML&P) utility and the Alaska Power Authority (APA). The CEA is the region's dominant power supply. In addition to generating power for its own distribution, CEA also supplies bulk power to ML&P, to the Matanuska Electric Association and to Kenai Peninsula electric utilities. The ML&P generates its own basic power supply. Both CEA and ML&P rely on gas-fired turbines fueled with Cook Inlet natural gas. The APA sells its hydroelectric power output to other distributors. The two military bases also generate and distribute their own electric power; those two minor systems are not further discussed here. The various systems in the region are linked by a region-wide power grid which provides backup capacity.

In recent years, this system has supplied electricity to the region's consumers at rates below national average, thanks mainly to the availability of inexpensive natural gas. In the future, this relative advantage may diminish markedly when Cook Inlet gas supplies dwindle and if

natural gas prices rise. There are varying opinions about when and how severely these changes in the long-term supply and price of Cook Inlet natural gas will begin to adversely affect power generation costs.

In any case, concern for the supply and cost of future electric power is widespread in southcentral Alaska. Indeed, few public issues have been studied more intensively than the long-term electric power demand and supply options for southcentral Alaska. An abundance of studies (see bibliography) have developed many demand forecasts and considered many supply alternatives, including the Susitna dam system and other hydro-power projects; large-scale coal-fired steam plants; Knik Arm tidal power generation; continued reliance on Cook Inlet gas supplies; and other innovative schemes.

The range of choices is wide, the financial and environmental comparisons are complex and the technical and regulatory issues are challenging. The final selection of the preferred long-term power generation system(s) still pends. Whatever system is chosen, any major new projects will have long lead times - up to ten years after the decision to proceed - before power is produced to meet the region's needs. In the meantime, it will be relatively simple to install additional gas or oil generator units to meet incremental growth in power demand, although these units may not provide the most economical long-run power supply. Eventually, it is plausible that the high public priority placed on low-cost electric power combined with a variety of technically feasible projects to meet future power needs will result in steps to deliver power at rates that will be competitive with national averages.

In summer 1982, the Alaska Power Authority decided to proceed with construction of a high-voltage intertie transmission line linking the interior and southcentral Alaska power markets. This project, scheduled for completion about 1985, will increase the flexibility and effective reserve capacity of power generation systems for both regions. For the long run, the intertie will also be used to deliver electric power to interior Alaska from any major new regional generation system such as the Susitna dam complex.

The distribution of electric power to Anchorage region consumers is handled by the CEA and ML&P and, in the Eagle River-Chugiak area, by the MEA. The general operations of these utilities are adequately described in previous baseline studies and is not repeated here.

In general, the design, construction and maintenance of local distribution systems are routine business and should not in themselves be expected to present any noteworthy technical problems to the utilities.

However, it is noteworthy that CEA is presently undergoing some organizational turmoil attributed to past managerial decisions about capital improvements and utility finances. These decisions have reportedly seriously jeopardized the financial standing of the utility, impairing its ability to meet its debt service obligations without substantial rate increases and checking its capacity to borrow for any needed future capital improvements. (Anchorage Daily News, August 12, 1983, October 26, 1982, April 24, 1983). The Alaska Public Utilities Commission approved a substantial temporary rate increase in 1982 and further increases may prove necessary in the near future. Meanwhile, the utility is examining

major organizational and program reforms to restore its financial standing.

Communications

In the Anchorage region, local telephone service is provided by the municipal Anchorage Telephone Utility (ATU), except in the Eagle River-Chugiak area, which is serviced by the Matanuska Telephone Association (MEA). Alascom, Inc. provides the long distance service. The ATU is operated as a municipal enterprise and is one of the nation's few municipally-owned telephone utilities. MEA is an REA cooperative and Alascom is a private utility firm. All are regulated by the Alaska Public Utilities Commission.

On the whole, the communications utilities are well-equipped with modern facilities, well managed and adequately financed, The utilities have more than doubled their service levels over the past decade with a minimum of difficulty. They appear well situated to handle future expansions.

The key utility, the ATU, is in very good financial condition with its AAA bond rating to fund future system growth and modernization. Recent Federal Communication Commission decisions affecting the allocation of toll revenues and deregulation of telephone equipment may adversely affect the rate structure of the telephone utilities. Periodically, there have been some uneventful local discussions of sale of the ATU to a

private firm, but so long as the ATU continues to provide reasonable service at reasonable rates, that change does not seem likely.

Solid Waste

Solid waste collection services are provided by the Municipality of Anchorage, a number of commercial firms and, on the military bases, by the bases' own sanitation departments. Municipal and private collection services are certified and rate-regulated by the Alaska Public Utilities Commission.

The Municipality of Anchorage operates sanitary landfill sites for disposal of solid wastes. The Merrill Field sanitary landfill site is the present destination for the Anchorage Bowl's refuse. Solid waste collected from Girdwood and other Turnagain Arm communities are also trucked to Merrill Field or Kenai Peninsula landfill sites. It is expetted that the capacity of the Merrill Field landfill will be exhausted by 1986. The Municipality is now studying sites for a new sanitary landfill operation. In 1980, the municipality put in operation a new solid waste shredder plant. After some serious initial operational problems, the shredder has now been restored to use. By reducing the disposable volume of processed solid waste, the shredder will extend the useful life of landfill sites by about one-third.

Additional landfill sites are maintained at Eagle River and on the military bases. While these existing sites may become exhausted, there are

many potential new sites for future use, although the selection of a landfill site is nearly always a matter of controversy.

The municipal ity and military bases have recently completed a study of the feasibility of boiler combustion and resource recovery as alternative methods of refuse disposal. That study concluded that the burning of solid waste as a supplementary fuel for power generation is not now competitive in cost with other power generation alternatives. The study also found that the range and volume of resource materials potentially recoverable from Anchorage solid waste is limited and that expanded recovery efforts would not be cost-effective.

At present, there are no facilities for disposal of hazardous or toxic wastes in the Anchorage region or anywhere else in the State. Such wastes are exported elsewhere for processing and disposal and there are no plans to alter this practice.

In general, the most significant physical or environmental limitations on the Anchorage region's capability to manage its future solid waste disposal problems rests with finding an acceptable and capacious site for a sanitary landfill.

TRANSPORTATION

In Anchorage, the provision of transportation facilities is a joint responsibility shared by the state and local government. The Federal

Highway Act of 1962 requires all urbanized areas to have a comprehensive, continuing and cooperative transportation planning process. To this purpose, the Anchorage Metropolitan Area Transportation Study (AMATS) was established, through a joint operating agreement between the State of Alaska and the Municipality of Anchorage. AMATS coordinates planning, 'funding, construction and maintenance of roads, a transit system and airports. This section will describe the AMATS process and highlight some of the plans for the future development of the Anchorage road transportation system.

There are five major participants in the AMATS decision-making process: the Policy Committee, the Technical Advisory Committee, the Citizens' Advisory Committee, the Planning and Zoning Commission, and the municipal assembly. The AMATS Policy Committee is responsible for adopting the necessary documents to continue eligibility for federal highway and transit assistance. The Technical Advisory Committee makes recommendations to the Policy Committee on technical issues while the Citizen's Advisory Committee comments on transportation policy issues. The Planning and Zoning Commission is also advisory to the Policy Committee, providing recommendations on land use and transportation issues. The Assembly has the final municipal authority to implement local elements of AMATS plans and programs; consequently, it advises the Policy Committee on the major plan documents.

To address the air quality planning issues, representation has been included on the Policy and Technical committees from the Alaska Department

of Environmental Conservation (ADEC) and Anchorage Southcentral Clean Air Authority Pollution Control Authority (AAPCA).

The Policy Committee is composed of the mayor, the Commissioner of the Department of Transportation and Public Facilities (DOT/PF) and one member of the Anchorage Assembly. These three persons decide annually what will be built, where, by whom, with which funds, by adopting the "Transportation Improvement Program" (TIP), the three-to-six year transportation capital improvement program (CIP) for the Anchorage area. The mayor makes sure that the TIP projects are reflected in the municipal CIP and the Commission of DOT/PF does likewise for the state CIP. The state legislature and the municipal assembly must adopt their respective capital improvements programs and both bodies have generally approved the AMATS projects.

The major products of AMATS are:

- Unified Work Program (UWP)

  The UWP specifies, annually, all urban transportation and transportation-related planning activities anticipated within the area during the next year.

- Long Range Element (LRE)

  The LRE establishes corridors for major facilities, transit service areas, and examines fiscal issues. Further, the LRE provides much of the basis for the Official

Streets and Highway Plan. The LRE is reviewed and updated annually, but prepared with a 20-year time horizon in mind.

- Short Term Analysis Plans and Programs (STAPP)
  The STAPP is an evaluation of short-term (l-5 years) needs and provides the basis for operational planning and programming.

- Transportation Improvement Program (TIP)
  The TIP includes all transportation projects which the implementing agencies in the Anchorage area plan to submit to the Federal Highway Administration, the Urban Mass Transportation Administration, the State of Alaska and Municipality of Anchorage for funding obligations during the next fiscal year.

The relationship among these elements is as follows. The UWP provides baseline data and specific study information, such as transit technology, which is necessary as a base for the overall transportation planning. The LRE and the STAPP provide input into the development of the AMATS transportation improvement program, which, in turn, provides the' basis for the state and municipality's capital improvement programs. These are adopted by the state legislature and the municipal assembly. Therefore, projects in the capital improvement programs come from the

TIP, and the TIP projects are drawn from the LRE and STAPP, which contain the justification for the project.

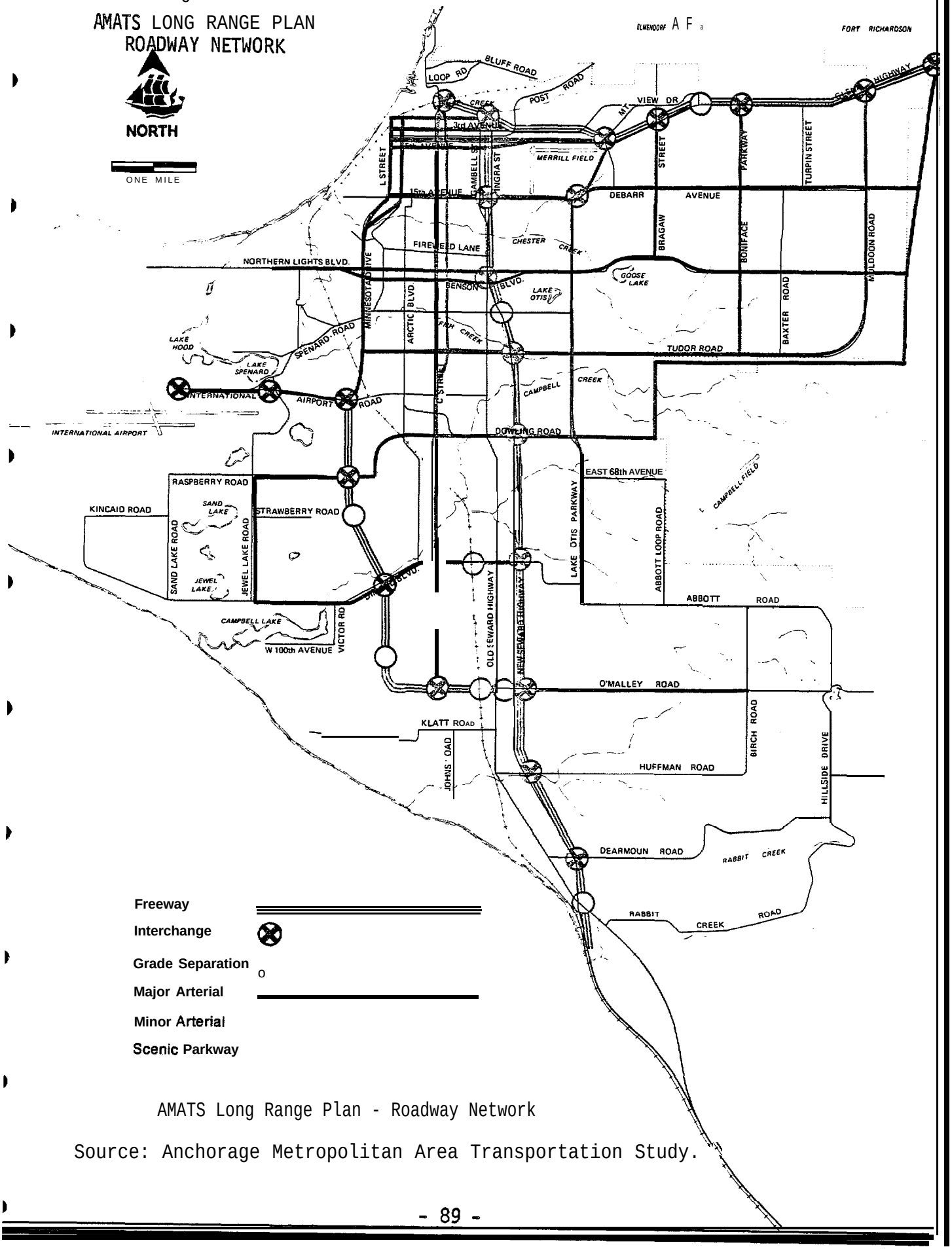
As is evident from the above, Anchorage devotes enormous administrative and financial resources to transportation system planning. Let. us now examine how the implementation has affected the movement of people and goods on major roadways and how future growth will affect the transportation system.

Traffic conditions in Anchorage in August 1982 could fairly be described as very congested. The major north/south corridors, the Seward Highway and Minnesota Drive, are occupied at near capacity throughout most of the day and are particularly clogged during morning, midday and evening rush hours. The east/west corridors, Tudor Road, Benson Boulevard, Northern Lights and 15th Avenue, are similarly overloaded. The Glenn Highway serves as the major access to the central business district from the east; while it is not as severely congested as the Seward Highway, motorists do experience delays during rush hours.

The Long Range Plan Roadway Network is shown in Figure 7. It is planned that access and egress to the central business district and midtown, the two employment centers, will be improved by the development of the proposed roadways. The development of the A/C Street couplet and expansion of Seward and Glenn Highways will enhance traffic flow. However, it is generally accepted that these incremental improvements to the system are unlikely to keep pace with the population growth anticipated during the

Figure 7

AMATS LONG RANGE PLAN
ROADWAY NETWORK



AMATS Long Range Plan - Roadway Network

Source: Anchorage Metropolitan Area Transportation Study.

next 20-year period. Finally, with most major arterials intersecting one another at grade level, it is very unlikely that traffic flow within the community will ever be ?ess than congested.

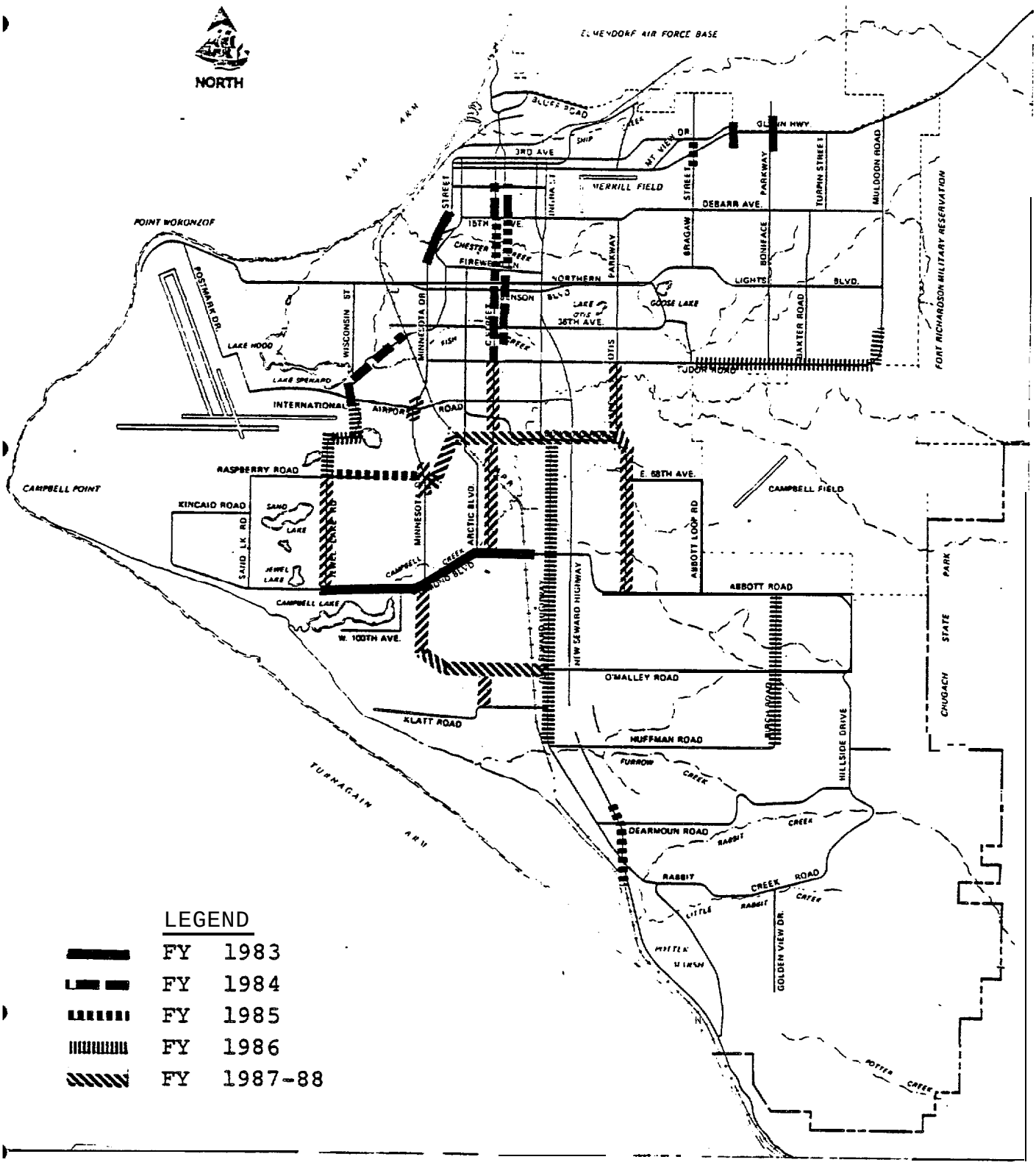
Proposed improvements for the short term are displayed in Figures 8 and 9, which respectively show the anticipated construction programs for 1982-1988 for federally-aided and nonfederally-aided projects.

A positive element of the transportation planning process is the emphasis on the public transit system, which is now the fastest growing system in the country. The municipality is committed to increasing the capacity of the transit system to accommodate more riders. The municipality has scheduled acquisition of 20 to 25 buses a year in 1983 and 1984 and is committed to establish transit corridors and to develop more park-and-ride stations to increase transit ridership and decrease automobile congestion. The design of future roadways is taking dedicated bus lanes into consideration in developing specifications for acquisition. Nonetheless, until economic circumstances dictate, it is unlikely that the majority of current commuters will give up their automobiles in exchange for the transit system.

In conclusion, the transportation system of Anchorage is currently inadequate to meet the demands of vehicular traffic. Alternative modes of transport are being supported through expansion of the transit system and bike trails. However, the community is unlikely to be "able to meet the demand for transportation facilities for some years to come, and

Figure 8

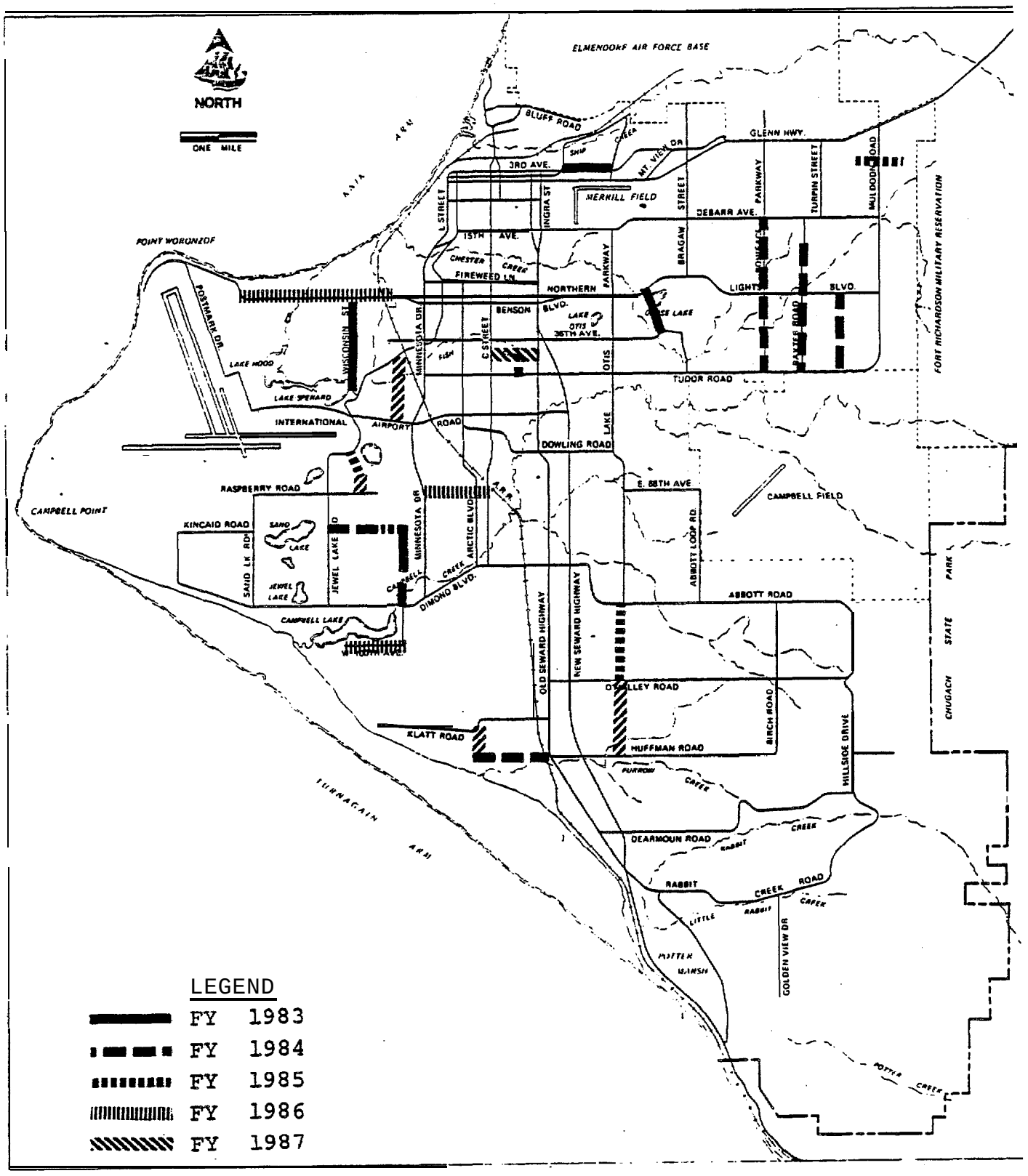
PROPOSED CONSTRUCTION PROGRAM, FEDERAL AID PROJECTS, FY 1983-1988



Source: Anchorage Metropolitan Area Transportation Study.

Figure 9

PROPOSED CONSTRUCTION PROGRAM, NON-FEDERAL AID PROJECTS, FY 1983-1987



Source: Anchorage Metropolitan Area Transportation Study.

even then must reconstruct major roadways to eliminate intersections at grade if traffic flows within the city are to become reasonably efficient.

With reference to marine and air transportation functions, the Municipality of Anchorage holds the responsibility for managing the Port of Anchorage and Merrill Field. Both facilities are operated as enterprise activities, whereby minimal local tax support is provided with the cost of operation being generated by users.

The Port of Anchorage serves as the port of entry for approximately 80 percent of all commodities introduced in southcentral Alaska. The majority of these goods are transported in containerized facilities and then transferred by either truck or rail to the rest of the region. The Port is bounded by lands held by the Alaska Railroad on all sides and in the future must negotiate with the railroad if necessary expansion is to occur.

Within the past year, the Port has studied the feasibility of establishing a bulk loading facility for commodities such as coal or concrete. The viability of such a facility is in serious doubt due both to ice conditions in Cook Inlet during the winter months, and competition from the ice-free ports of Seward and Whittier.

Another potential expansion of the port was studied in terms of developing a small boat harbor. While no decision has yet been made, the primary need appears to be the provision of marine support services such as

marine maintenance and dry dock storage. There is also a public interest in access for recreational boating, but this would be expensive to construct and carry a- significant safety hazard due to dangerous Cook Inlet tides.

Thus, while the future expansion of port facilities in Anchorage remains an unanswered question, the Municipality of Anchorage is currently reviewing proposals and appears to have a process for decision-making which can accommodate future growth.

Merrill Field has the third highest level of operations (take-offs and landings) among U.S. airports. Merrill Field serves only small planes and is currently operating at full capacity in terms of runway usage and leased land for tie-up spaces and aviation support services.

The future of the field appears to be one of continued maximum utilization. No expansion is anticipated due to adjacent land uses prohibiting such growth. Assuming economic conditions remain healthy in Anchorage, the demand for additional small plane facilities will exceed the capacity of both Merrill Field and the state-operated float plane facility at Lake Hood. Outlying facilities will have to be developed and expanded to accommodate the growing demand for small plane facilities.

Municipal Power and Finances

With adoption of its new municipal charter in October 1976, Anchorage became a unified home rule government. The government incorporates the strong mayor concept whereby the mayor serves as the chief executive officer and the n-member assembly functions as a legislature. The mayor does not vote with the assembly, but does hold veto power. A two-thirds majority (8 votes) of the assembly is required to override a mayor's veto. The mayor and assembly members hold three-year staggered terms and the charter prohibits the mayor from serving more than six consecutive years.

The admi,nistration is organized into 17 executive departments grouped into four functions for management purposes: 1) utilities, 2) public safety and health, 3) public works and parks and recreation, and 4) fiscal management and planning.

The municipality exercises areawide power for planning, taxation, education, health, and parks and recreation. Other services such as police protection, road maintenance, and water and sewer services are provided on a service area basis. The "service area concept" allows taxpayers in different districts of the municipality to pay only for those services which they elect to receive. This concept gives taxpayers more control over the services they enjoy and pay for but requires complex budgeting

and accounting systems. The next section will describe the local budget process, the current budget and projections for the future.

The annual operating and capital budgets set forth the financial plan of operation for the municipality. The budget divides into three parts: general government, utilities and capital improvements (see Table 16).

Table 16
MUNICIPALITY OF ANCHORAGE ANNUAL BUDGET
1981 and 1982

	1981 Approved	1982 Approved
General Government	$135,901,940	$148,454,420
Utilities	110,891,240	122,132,470
Capital Improvement	73,151,780	54,283,000
T O T A L	$319,944,960	$324,869,890

Source: 1982 Annual Operating Budget, Municipality of Anchorage.

The general government operating budget covers the operations and maintenance of police, fire, street maintenance, parks and recreation, and other municipal departments that deliver general government services. Approximately half the general government budget is funded by state revenues. Approximately one-fourth is funded by property taxes and the remainder comes from federal revenues and other local sources.

The utilities budget, which covers the operations and maintenance of the municipal light and power, telephone, sewer and water utilities, is financed almost entirely from the sale of utility services. Since utility revenues are derived from user charges and do not come from local taxes, user rates must be scaled to generate sufficient operating funds to meet customer growth.

The capital improvement budget is for the purchase of high-cost, long-lasting assets such as roads, buildings and land. A large portion of this budget is normally financed by sale of municipal general obligation bonds for general government and revenue bonds for utility projects. Property taxes are used to repay general obligation bonds and utility revenues repay the revenue bonds. The costs of operating and maintaining these capital facilities is reflected in operating budgets.

The capital improvement projects which are to be financed by general obligation bond issues must be approved by the voters. In addition, some federal and state grants and miscellaneous local revenue sources are used for capital improvements.

The Anchorage School District prepares a separate annual operating and capital budget which is adopted by the elected seven-member school board. The school budget must then be approved by the municipal assembly because local property taxes support the operation of the school district and the full faith and credit of the municipality are pledged for school district general obligation bonds. The assembly decides only

the amount of the local government appropriation and cannot reallocate monies within the school district budget categories. These programmatic decisions rest with the school board.

Table 16 showed the 1982 municipal budget and Table 17 shows the source of those funds. Local sources other than property taxes are primarily the enterprise funds gathered through user fees from the utilities (electricity, telephone, water, sewer, refuse collection) and incidental fees for health services and some recreation services.

Table 17
MUNICIPALITY OF ANCHORAGE
1982 REVENUES BY SOURCE

Revenue Distribution by Source	Amount	Percentages
Taxes	$32,739,900	10
Local sources other than taxation	180,167,170	55
State revenues	56,973,040	18
Federal revenues	11,419,150	4
Fund balance	6,953,630	2
General obligation bonds	-0-	0
Revenue bonds	36,617,000	11
TOTAL	$324,869,890	100

Source: 1982 Annual Operating Budget, Municipality of Anchorage.

Of particular significance is the state contribution to local revenues. In 1982, 42 percent of local revenues, exclusive of enterprise fund revenues, came from the state revenue sharing and municipal assistance programs. Funding levels for these grant programs (Table 18) is set annually by the legislature. The 1982 appropriation ($55.6 million) was a significant increase over 1981 ($43.8 million), but the 1983 appropriation will be about 25 percent less than 1982. This fluctuation in state support corresponds to changes in the level of state petroleum revenues. Unpredictable revenues complicate long-term fiscal planning for both state and local governments.

Table 18
MUNICIPALITY OF ANCHORAGE
GRANT FUNDS, BY SOURCE
1977-1982

	State Municipal Assistance	State Revenue Sharing	Federal Revenue Sharing
1977	$ 5,637,000	$7,988,000	$4,233,000
1978	5,050,000	8,812,000	5,145,000
1979	5,100,000	9,715,000	6,500,000
1980	5,362,000	8,317,000	6,850,000
1981	26,008,000	17,854,000	6,950,000
1982	40,532,000	15,070,000	9,646 (state eliminated from federal pool)

Source: Municipality of Anchorage, Division of Management and Budget.

The 1982 school district operating budget revenues sources appeared in Table 11. Of the $167 mil 1 ion budget, local revenue sources are only responsible for 20 percent, while state revenues provide 80 percent.

Table 19 shows the expenditure pattern for tax-supported funds, by type of program. Public safety (38 percent) and transportation (23 percent) are by far the most costly services provided by the municipality, together accounting for more than 60 percent of tax fund expenditures.

Table 19
MUNICIPALITY OF ANCHORAGE
1982 BUDGET EXPENDITURES BY PROGRAM
TAX-SUPPORTED FUNDS

Expenditures Distribution By Program	Amount	Percentage
Community Development	$ 8,125,180	6
Environmental Protection	10,491,670	8
Human Development	1,339,570	1
Leisure	16,413,150	12
Public Health	4,930,340	3
Public Safety	51,709,530	38
Transportation	32,189,940	23
Other Services	11,831,210	9
TOTAL	$137,030,590	100

Source: 1982 Annual Operating Budget, Municipality of Anchorage.

Until 1981, capital improvements were traditionally financed by general obligation bonds. Since 1981, direct cash grants from the state have been substituted for bonds, insofar as possible. The 1982 CIP fund source analysis appears in Figure 10 and clearly depicts the municipality's overwhelming reliance on state capital fund grants. The most notable expansion of the state's participation was the 1981 legislature's adoption of S.B. 168, which awarded all local governments $1,000 per capita for capital improvements. For Anchorage, that amounted to over $135 million received over a two-year period. These funds were allocated to large projects such as the convention center, sports arena and performing arts center, as well as many other smaller projects. Future state capital appropriations are anticipated as long as the state continues to have "surplus wealth" from North Slope oil production.

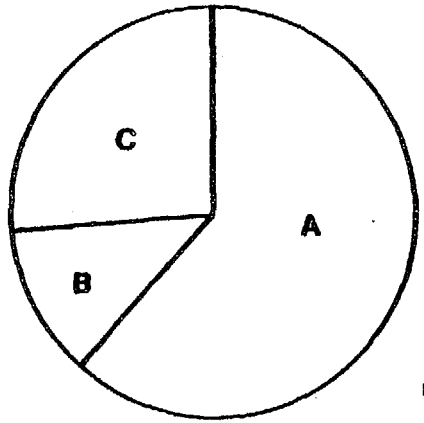
The projected financial requirements of the 1982-87 capital improvements program are presented in Figure 11. Utilities are distinguished from general government because utility bonds are repaid from user charges rather than tax revenues.

The municipality is required by charter to prepare annually a five-year fiscal projection. The projections are not meant to control future fiscal decisions, but the practice does provide insight into potential fiscal problems. Figure 12 displays the projected expenditures by revenue source though 1986. Property taxes are assumed to increase substantially over the next few years, as is the assessed valuation of real property (Figure 13).

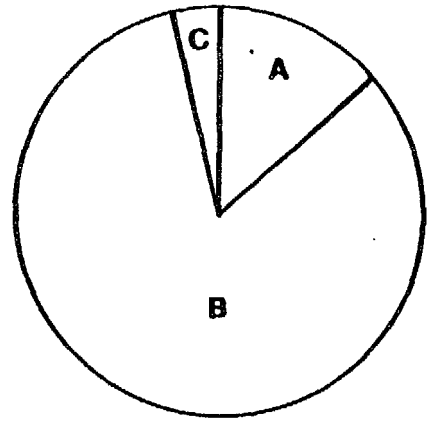
Fi gure 10

1982 CAPITAL IMPROVEMENT' PROGRAM
FUND SOURCE ANALYSIS

A - 62% REVENUE BONDS
B - 12% STATE GRANTS
C - 26% OTHER LOCAL

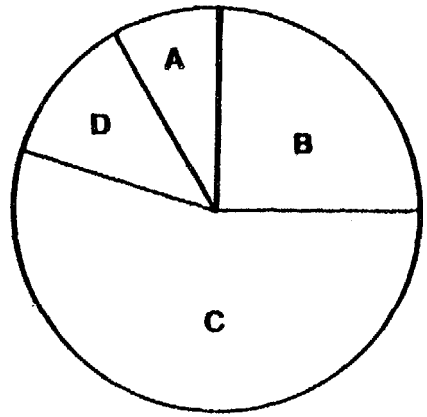


UTILITIES



A - 10% FEDERAL GRANTS
B - 88% STATE GRANTS
C - 20/0 OTHER LOCAL

GENERAL GOVERNMENT



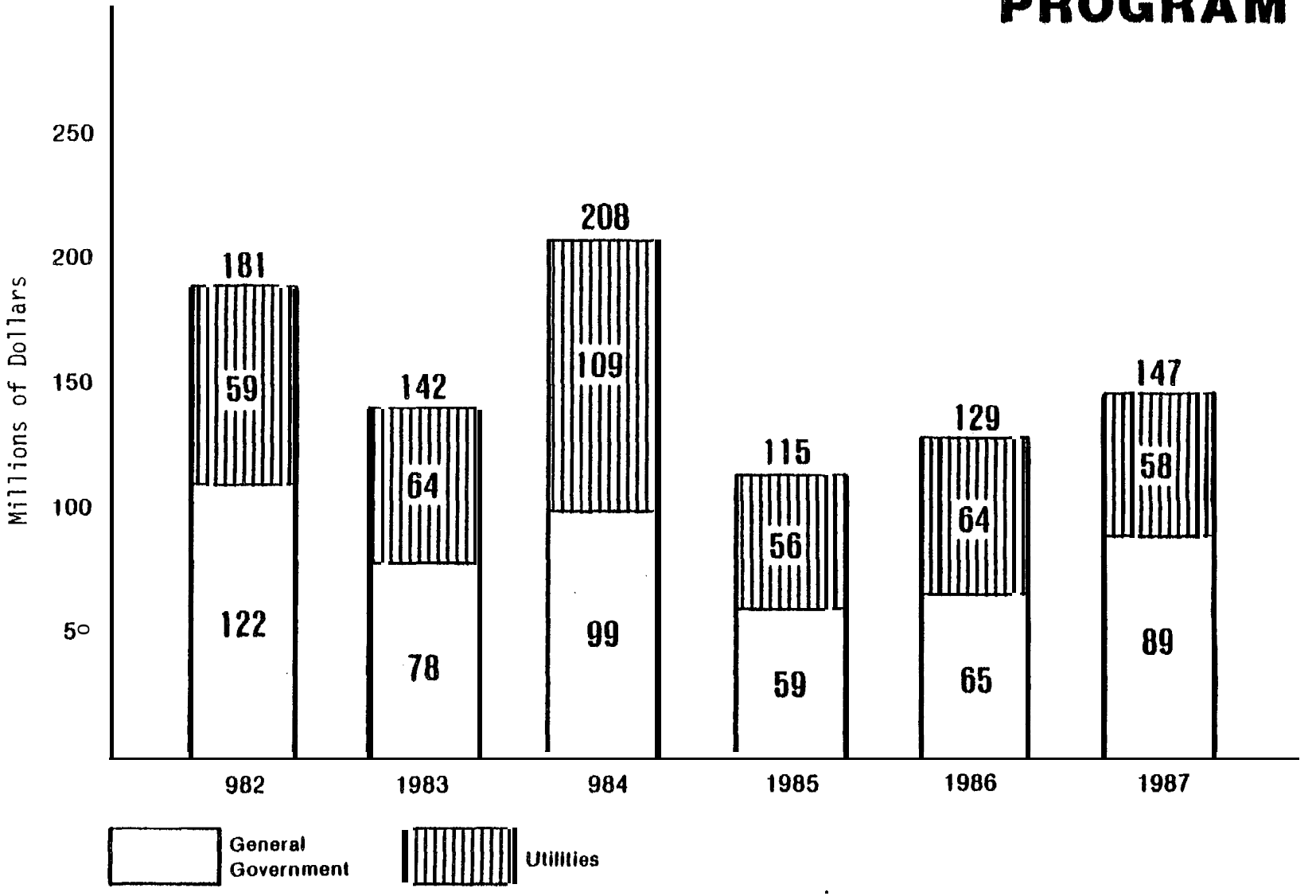
A - 7"/0 FEDERAL GRANTS
1 3 - 20"/0 REVENUE BONDS
C - 63% STATE GRANTS
D - 10% OTHER LOCAL

TOTAL CAPITAL BUDGET

Source: 1982-1987 Capital Improvements Program, 1982 Capital Improvement Budget,

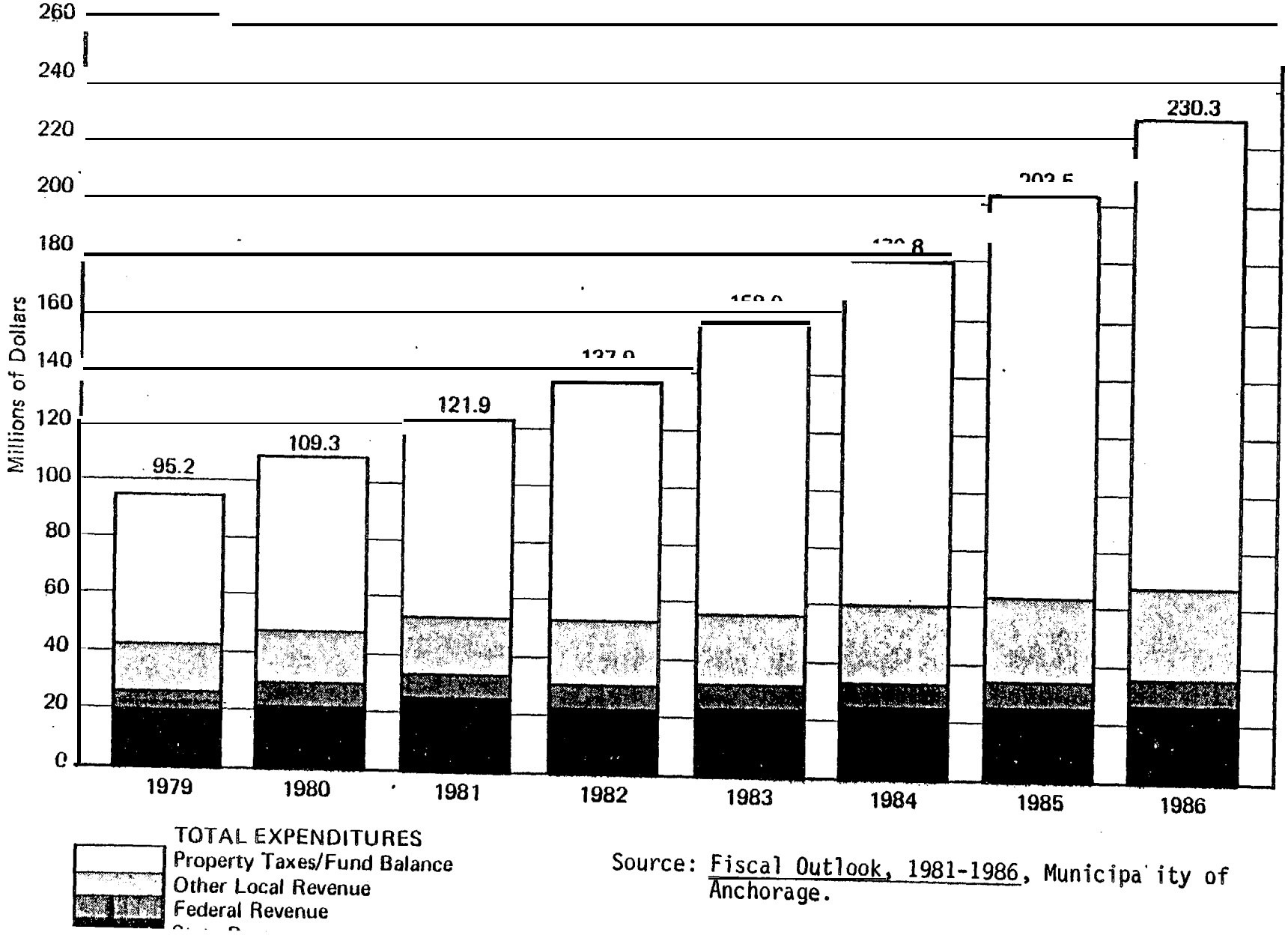
Figure 11

1982 - 1987 CAPITAL IMPROVEMENT PROGRAM

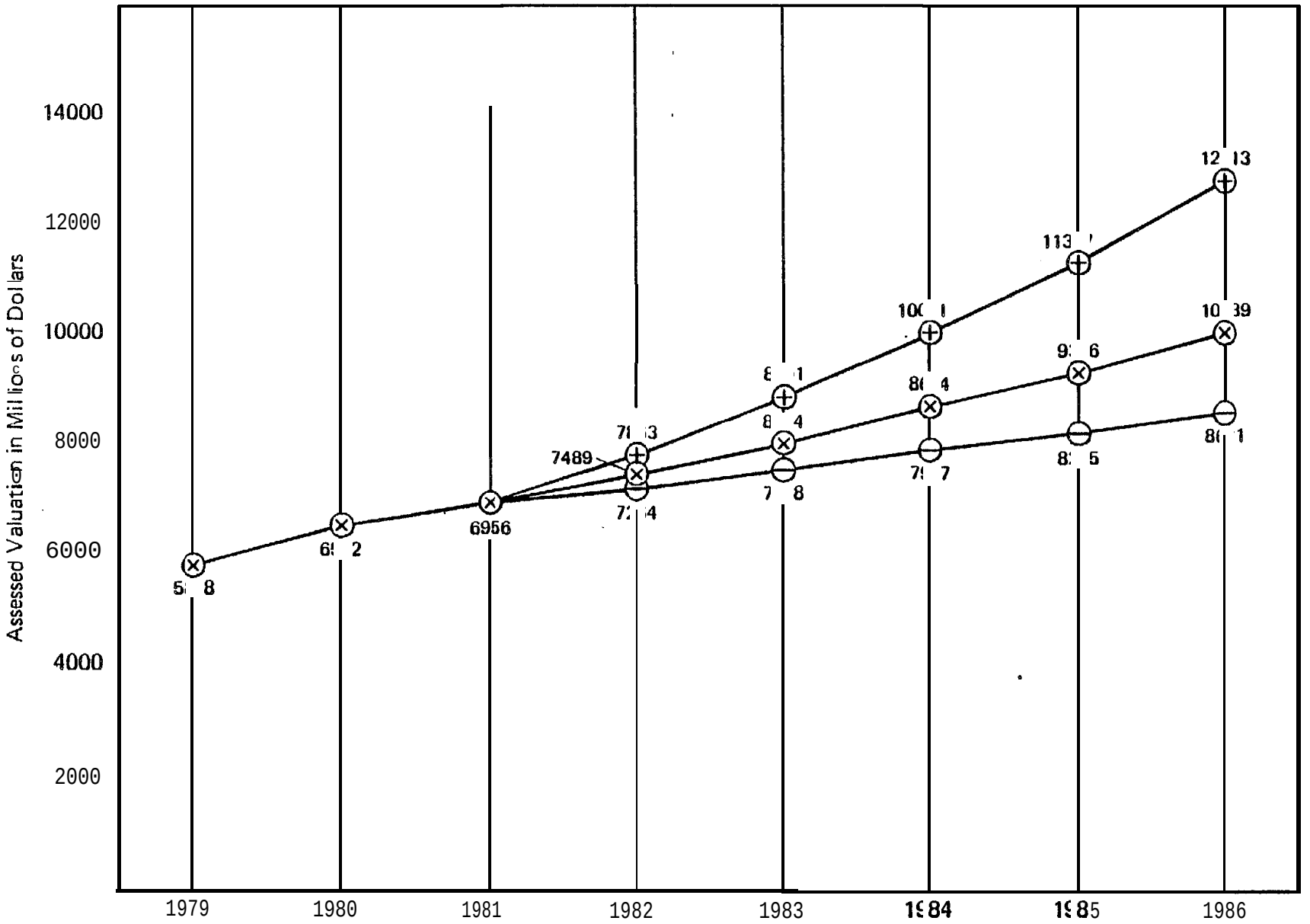


Source: 1982-1987 Capital Improvements Program, 1982 Capital Improvement Budget, Municipality of Anchorage.

Figure 12
PROJECTION OF EXPENDITURES AND
REVENUE FOR ALL TAX SUPPORTED FUNDS
BASE CASE SCENARIO



Source: Fiscal Outlook, 1981-1986, Municipality of Anchorage.



Source: Fiscal Outlook, 1981-1986, Municipality of Anchorage.

Clearly, the ability of Anchorage to manage future growth is dependent upon the local government's ability to provide services such as schools and police protection, and basic infrastructure such as roads, water and sewer services. The Municipality of Anchorage has adopted a posture of encouraging and controlling growth, as shown by its aggressive capital improvement program balanced by stronger land use planning. The success of this strategy depends on the municipality's financial health, which has become increasingly tied to state revenues. Indeed, the municipality cannot sustain from its own revenue sources its current rate of capital improvements and related operational expenses without continued major state support. The conclusion, therefore, is that Anchorage's future capacity to manage growth is heavily dependent on the health of the state's petroleum economy and state government petroleum revenues.

Summary

The 1970's was a decade marked by rapid growth during pipeline construction, then a period of contraction and consolidation and, most recently, a stage of reinvigorated growth. Over this decade, the physical scale and form of Anchorage's manmade environment, as well as the community culture, has been transformed.

The historic capacity of the region to absorb growth suggests that a lease sale with relatively gradual small-scale impacts such as might be expected from the Diapir Field sale would have only marginal impacts on the region, especially in comparison to growth accruing from other stimuli.

Historically, the provision of facilities and services has not advanced in lockstep with population and demand. In private and public sectors alike, decisions to invest in businesses, housing, infrastructure and other elements of the community physical plant often lag or anticipate effective demand. Thus, at different times, there may be excess capacity or serious shortages of individual elements of community infrastructure. The dynamism of the Anchorage real estate market, the fluctuating supply of State funds available for capital projects and the erratic course of the region's growth trend has accentuated the periodic misfit between capacities to absorb growth and actual needs of growth.

In practice, it is questionable to attribute discrete impacts to a marginal increment of growth in a diversified and growing community such as Anchorage. In this regard, the assessment of socioeconomic impacts at Anchorage is very different from smaller rural settlements where specific community impacts of highly visible industrial projects can be more easily isolated. It is plausible that'detectable community impacts at Anchorage attributable to the Diapir Field OCS Lease Sale #87 will be minor.

As demonstrated above, the capability to respond to demands for public services and other infrastructure is dominated by factors unrelated to oil and gas development. For example, the acute shortage of low and moderate income rental housing in Anchorage during the post-1979 economic rebound is best explained not in terms of a lease offering or other development project, but rather by the chilling effect of a soft market, high interest rates and rapid inflation of construction costs.

II. ANCHORAGE ASSESSMENT METHODOLOGY

INTRODUCTION

This chapter describes the methodology that will be employed to assess the socioeconomic impacts on the Anchorage region of the proposed second Diapir Field OCS Sale 87. This methodology will be applied to the updated description of baseline community conditions in the Anchorage region and regional population forecasts provided by the Minerals Management Service for a basecase scenario and for a Diapir Field petroleum development scenario.

The immediate objective of the overall study is to update the Anchorage region community baseline description and to develop an assessment of impacts specifically for the proposed Diapir Sale 87. This chapter on methodology provides a timely occasion to reexamine the assessment methodology employed in earlier Anchorage community impact studies. Based on its experience with previous Anchorage studies and the informational requirement of the EIS process, the Minerals Management Service thought that some adjustments in the earlier assessment methodology were warranted.

Specifically, the Minerals Management Service wanted to develop a methodological approach for Anchorage region assessments that would have the following four features. First, the baseline description should not require frequent updates to retain its utility. Second, the methodology

should not depend on speculative forecasts of future events. Third, the assessment approach should take account of the relative maturity and size of the Anchorage region in evaluating the impact of OCS lease sales upon its economic and population growth. Finally, the assessment methodology should be economical to apply so that it could in the future be applied internally by Mineral Management Service staff. Reflecting these objectives, the study's scope of work directed that a threshold concept be explored as a means to simplify and better attune the process of impact assessment to fit a large, diverse urban region like Anchorage.

There have been two previous Socioeconomic Studies Program (SESP) studies of community impacts on the Anchorage region. They were prepared for the April 1983 St. George Basin Sale 70 and for a set of three earlier sales proposed for the Northern and Western Gulf of Alaska and Lower Cook Inlet.

These initial Anchorage region impact assessments employed a conceptual methodology originated under the SESP to assess socioeconomic impacts upon small, remote, rural communities. This methodology was adapted, with revisions, to the Anchorage region.

The methodology followed a straightforward four-step approach that:

First, compiled a baseline description of community conditions just prior to the OCS lease sale;

Second, forecast future employment and population growth for the basecase (without sale) and OCS development scenarios;

Third, devised per capita standards for provision of community infrastructure and services to translate growth forecasts into quantitative impacts on baseline community conditions; and,

Finally, based on these three steps, calculated and assessed the incremental impact of the proposed OCS lease sale on community conditions.

This same basic assessment procedure has been employed to assess OCS community impacts at small, remote, settlements like Yakutat and Cold Bay and at metropolitan Anchorage; at rural subsistence villages like Kaktovik and St. Paul and at relatively mature industrialized settlements like Kenai/North Kenai.

In the abstract, the logic of this approach is appealingly neat and objective. In practice, some serious flaws at each step have become apparent, at least in application to the Anchorage region. The flaws are due to various causes, but most of all to unfulfilled optimism about the durability of baseline descriptions and the reliability of forecasts. Before presenting the alternative approach proposed for use in the present assessment study, it will be instructive to review

critically the problematic features of the earlier approach. For the most part, the critique presented in the following section recounts criticisms and arguments that are already familiar to MMS staff and others. This review will mainly serve to summarize for the record many of the problems that have emerged about the original methodology. It will provide the background rationale and a natural point of departure for presenting the alternative approach. Also, the review may suggest some remedies that might be incorporated into a revised methodology.

The main conclusion of the review that follows is that the original methodology simply overreached. It sought to assess community impacts with a degree of detail and precision that was not technically feasible and not even needed for the Anchorage region, considering the relative scale of OCS impacts on the community's growth. The method was almost doomed to fall short of its too ambitious goal.

The key theme of the alternative methodology developed in this report is that a more modest and generalized approach to community impact assessment for the Anchorage region is more suitable and fully adequate for the needs of the Socioeconomic Studies Program and for Minerals Management Services's EIS responsibilities. With the advantages of hindsight, it is hoped that this revised methodology will make some improvements or at least some fresh errors, not just perpetuate familiar shortcomings.

The objective of the assessment studies conducted under the SESP, and of

the EIS subsequently prepared for the proposed OCS lease sale, is to satisfy the requirements of Section 102(2)(c) of the National Environmental Pol icy Act of 1969 (NEPA). That act requi res the federal government to prepare an EIS for any proposed "significant federal action". By law and regulation, the scope of the EIS encompasses socioeconomic impacts as well as environmental impacts. As part of the assessment procedure, the EIS is required to identify and assess alternatives to the proposed action.

If taken literally, these NEPA directives pose a riddle for the socioeconomic impact assessment of proposed OCS lease sales. The NEPA scheme assumes a deterministic model of events. That is, under the NEPA scheme, the assessment process requires a knowable proposed action and realistic alternatives with predictable outcomes that can be compared and ranked. While this approach may be well suited for more predictable energy projects such as coal mines, power generating facilities and pipelines, it is less appropriate for oil and gas exploration and other development in frontier areas where reserves and development scenarios are highly uncertain. Unfortunately, the outcome of OCS lease sales is essentially speculative and probabilistic in nature, especially at the time when the EIS is being prepared. The results of OCS lease sales are too unpredictable to fit a simple deterministic model.

This misfit has some paradoxical results for the SESP community impact studies and for the EISs. Because the potential cause of community

impacts - the discovery of producible volumes of oil and gas - cannot be fixed at the time of analysis, the community impacts assessment element of the EIS process has largely resorted to illustrative exercises in hypothetical rather than a realistic evaluation of genuine alternatives.

Very often, the socioeconomic impact analyses and the EIS have belabored long-shot worst-case scenarios (i.e., high-find scenarios) while downplaying the more likely but trivial and uninteresting exploration-only scenarios. Perhaps this emphasis on the worst-case analysis buttressed the EIS and the lease offering decision process against later legal challenges on the grounds that potential adverse community impacts were understated. However, it usually misled and sometimes inflamed the general public unaccustomed to such legalistic/bureaucratic maneuvers. In any case, when impacts under the main scenario and the alternatives do not reflect real choices, the assessment process takes on an imaginary tone. It does not constitute a process of identifying and testing genuine alternatives in order to make major public decisions that account for the real-world consequences of development scenarios.

And finally, the rationale for preparing an impact assessment of an individual OCS lease sale on the Anchorage region must be examined. The rationale maintains that because Anchorage is the commercial center for all of Alaska north of the panhandle, individual development projects like an OCS lease offering must have an important effect on the Anchorage area. However, given the large number of projects that affect

Anchorage, an individual lease offering is like one more footfall in the larger parade of economic development events. From this perspective, community impacts from one lease offering appear as small, often untraceable, incremental effects in the Anchorage area. Hence, the methodologies used to assess larger impacts in remote, rural communities may not be appropriate for application in Anchorage.

In the following section, some of the critical issues in the assessment methodology are discussed. Each of the three premises for the assessment conclusions - the baseline description, forecasts and infrastructure standards - is analyzed in turn.

The final section. outlines an alternative approach proposed for use in the present assessment study. This alternative is designed to compensate or adjust for the methodological limitations identified in the preceding analysis.

REVIEW OF CURRENT ANCHORAGE IMPACT ASSESSMENT METHODOLOGY

In this section, each of the three elements of the assessment methodology (baseline description, scenario forecasts, infrastructure standards) will be critically reviewed.

Baseline Description

The community baseline description is the first step in the conceptual approach to comunity impact assessment. The baseline description of conditions prevailing prior to the OCS lease sale serves as the benchmark against which changes stemming from the OCS sale are measured and assessed. Pertinent community conditions include demographic and economic conditions, the state of community facilities and services, and the governing and fiscal capabilities of local government.

The application of the methodology imposes some critical requirements on the selection of details to be included in the baseline description. Among the most important criteria, the descriptors must be (a) quantifiable; (b) good 1 i near indicators of basecase and development scenario changes; and (c) compatible with the standards used to forecast future growth demands on community facilities and services.

Above all, the baseline description must be timely for comparison with OCS development scenarios. Timeliness is critical because of the lag between the time the baseline description is prepared - perhaps two

years before the sale - and the time of direct employment and population growth effects from the sale - usually starting slowly two-to-three years after the sale. If commercial reserves are found and developed, direct employment and population may not peak until perhaps a decade after the sale. In the only OCS development scenario (discovery and development of large commercial reserves) that is materially relevant to the Anchorage region, the baseline may be a decade or more old by the time the most significant OCS direct impacts arrive.

This criterion of timeliness has proven hard to satisfy, mostly due to Anchorage's dynamic growth patterns. For example, within a recent three year (1979-1981) period, the Anchorage region experienced:

- o reversal in the rental housing supply from glut to extreme scarcity.
- o reversal from construction industry depression to boom.
- o reversal from employment/population loss to rapid growth.
- o shift from pinched municipal finances to bountiful capital improvements budgets supported by with State revenues, quickly followed again by tight municipal budgets.
- o abandonment or indefinite delay of plans for the DOW petrochemical plant, Alpetco refinery, Alaska natural gas transportation system, Pacific-Alaska LNG plant, major bottomfishery development and capital relocation.
- o erratic movements in oil prices and State oil revenues for municipal assistance.

The net result of this dynamism is that important elements of the baseline description are badly outdated by the time OCS development effects materialize.

A possible solution to this problem of the static, dated baseline is the concept of a basecase scenario forecast, a sort of "moving baseline" to envision how the future economy and population might unfold in the absence of the lease sale. The basecase forecasts could be used together with a set of suitable standards to convert future economic change into changes in baseline conditions. In this way, the basecase scenario can produce a more dynamic benchmark against which the OCS development scenarios could be compared -- a definite improvement so long as a trustworthy basecase scenario can be constructed. This issue is taken up in the next section.

Basecase and Development Scenario Forecasts

The second step in the assessment methodology is the development of reliable population forecasts for the basecase and OCS development scenarios. Here, we would like to examine critically some problematic aspects of the basecase and OCS scenario forecasts, each in turn.

BASECASE FORECASTS

Forecasting is an uncertain science designed to deal with uncertain situations. Some margin of forecast error is accepted as a matter of

course. The pertinent issue is whether the probable margin of forecast error is within bounds that leave the forecast useful for the purpose to which it will be put. Reviewing the record of previous basecase forecasts and considering the degree of accuracy required by the assessment methodology, there are good reasons to doubt that forecasting techniques have produced or will produce basecase forecasts whose accuracy matches the requirements of the assessment methodology.

The basecase forecast of future employment and population growth is the bridge from the baseline description of current community conditions to the picture of future basecase community conditions to which OCS development scenarios will be compared. In effect, the basecase forecast is used to synchronize the "moving baseline" benchmark with the OCS development scenario. For success, the procedure requires satisfactorily accurate employment and population forecasts for the basecase and OCS development scenarios. In practice, the basecase forecasts prepared for the Anchorage region have been off the mark, often by large margins within a few years. The basecase forecasts have had to be regularly updated. Partly, these updates reflect improvements in the forecasting model. Mostly, they reflect rapid and surprising changes in the exogenous forces that drive the economy of the State and the Anchorage region.

Dominant among these exogenous forces is the skittish market price of crude oil. Given the State's narrow economic base and its dependency on this single commodity, even small swings in crude oil prices have gross

effects on State revenues and expenditures. In turn, these price changes influence the feasibility and timing of major energy development proposals such as further oil and gas development, the DOW petrochemical plant, the Alpetco refinery, the ANGTS, the Susitna dam complex and other large hydroelectric projects, the Pacific-Alaska LNG plant expansion and coal development. Hopes for all of these energy projects are buoyed by high crude oil prices and depressed by falling prices. Fickle federal tax and development policies for energy commodities add more unpredictability to the State's future economy, as do the national business cycle and national unemployment rates.

Forecasts for Alaska's economy, and for the Anchorage economy as well, are jeopardized by gross uncertainties. This element of surprise will not be mastered by more clever forecasting techniques. In our judgment, this uncertainty practically rules out use of detailed basecase population forecasts in the manner in which they have been used to construct highly specific basecase development scenarios. At best, these forecasts can only provide very approximate boundaries of the likely range of future economic activities and population growth trends.

There is another fundamental practical flaw in a methodology based on comparative analysis of basecase and OCS development scenarios. This flaw can be illustrated by reference to population forecasts in the DEIS for the recent Diapir Field OCS sale #71. For that DEIS, the ISER MAP model was used to forecast basecase and OCS scenario population for the Anchorage region through the year 2000. In round numbers, the MAP model

projected that the Anchorage region would grow by 136,400 persons between 1980 and 2000. The mean OCS scenario would add 7,200 more persons or about 5% over the basecase increment. **Basecase growth dwarfs OCS scenario growth by a ratio of 20:1.** This disproportion suggests three points.

First, the scale of OCS-related growth ensuing at Anchorage from any single OCS sale will be trivial relative to basecase growth accruing from other ongoing events. This disproportion raises doubt about the conventional rationale for a detailed assessment of OCS impacts on the Anchorage region.

Second, the corrective to the problem of the outdated baseline description has turned the assessment exercise upside-down. The basecase scenario is the benchmark for the OCS scenario impact assessment. Constructing and assessing the basecase scenario becomes the principal assessment, task at the expense of assessing the impacts of the OCS development scenarios themselves.

Third, the numerical margin of error for the basecase forecast usually exceeds the peak OCS forecast. In those cases, a methodological approach that relies on pinpointing the marginal impact of an OCS-related growth increment of growth is impracticable.

Finally, the manner in which OCS impacts are felt is very sensitive to relatively short-term fluctuations in the region's economic cycle. An OCS-stimulated economic spurt may be a welcome prop during an economic slump, but an inflationary burden when business and growth are booming. However, it is simply not feasible to foresee such short-term fluctuations in the regional and national business cycle a decade ahead of time. The dynamic economic factors that drive the region's economy preclude basecase forecasts with that degree of refinement.

In sum, we suggest that the basecase forecast might be better used merely to indicate future growth trends in a general way so as to indicate the relative scale of basecase growth compared to existing community size and to OCS-related growth.

OCS DEVELOPMENT SCENARIOS

The forecasting problems inherent in the basecase scenario are compounded in the OCS development scenarios by the uncertainties that surround oil and gas development in general and a single lease offering in particular. The government and corporate estimates of commercial oil and gas reserves for frontier provinces are unavoidably speculative and probabilistic and have often proven wrong. Recall the once shared, now dashed optimism held for the MAFLA, Gulf of Alaska, Baltimore Canyon and Georges Bank provinces, among others. Neither the federal government, which auctioned off what it thought were prime tracts, nor the petroleum industry, which invested billions in purchase and fruitless exploration

of these lease tracts, can claim consistent success in appraising the resource potential of individual frontier areas.

This spotty record is not due to poor guesswork by public or corporate resource experts. Rather, it is the logical outcome of a federal resource development policy that promotes exploration of frontier areas by offering them for lease at a time when public and private knowledge of their resource potential is still very primitive. So long as this policy prevails, it is unlikely that advances in forecasting techniques will significantly improve the reliability of the resource estimates from which the OCS development scenarios for frontier provinces are derived.

In accord with the NEPA requirement that alternatives to the proposed action be assessed, the sale EISS evaluate multiple OCS development scenarios. Typically, the alternative scenarios involve tract deletions, with resource estimates adjusted for the deletions, or delay or cancellation of the sale. Where tract deletions can be correlated with the geography of sensitive environmental resources, deletions may represent real alternatives for environmental assessment. However, it is less clear that tract deletions present meaningful alternatives for assessment of socioeconomic impacts at Anchorage. First, community impacts at Anchorage will vary primarily with overall employment ensuing from the sale, not with minor shifts in the site of distant oil and gas operations. Second, given the speculative quality of pre-sale resource estimates overall, the correlation between tract deletions and future

resource finds is not easily established. Furthermore, the correlation between resource production levels and employment is not fixed, but depends on oil field characteristics that are not known at sale time and, indeed, may not become well known until after some production experience, For instance, the capital investment and manhours per unit of production committed to development of the Kuparuk field is far higher than for the nearby Prudhoe Bay unit.[1/] In sum, as far as socioeconomic impacts at Anchorage are concerned, the alternative OCS development scenarios premised on tract deletions seem arbitrary alternatives for purposes of assessing socioeconomic impacts on Anchorage.

These methodological problems are familiar to analysts who have worked with OCS scenario forecasts. The root of the problems is not the quality of the forecasts themselves (the forecasts may well be as good as can be obtained, given the unruly behaviour of the events they seek to predict), but in taking the forecasts too seriously in the assessment

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[1/] Some measure of the difference in production characteristics between the Prudhoe Bay and Kuparuk fields can be seen in the following figures provided by a spokesman for ARCO:

1. The thickness of the producing sand strata at Prudhoe Bay and Kuparuk is 600 feet and 50 feet respectively.
2. Estimated recoverable reserves at Prudhoe Bay are 9.6 billion barrels; at Kuparuk, 1.5 billion barrels.
3. About 1,000 producing wells are planned for Prudhoe Bay compared to about 1,500 for Kuparuk.
4. Projected on-site capital investment in production facilities, exclusive of pipelines and transportation facilities, is about $15 billion at Prudhoe Bay and about $9 bi 11 ion at Kuparuk.

of potential community impact. In the end, here, as with the basecase scenarios, we suggest that the most sensible solution to these nettlesome forecast problems lies in retreat to a more skeptical and general use of OCS development scenarios in the assessment analysis rather than in seeking to perfect OCS development forecasting techniques beyond what is feasible.

Finally, the assessment methodology tacitly assumes that impacts from basecase growth are distinguishable from effects under the OCS development scenario growth, when in fact it may be ipossible to isolate what effects or impacts are attributable to each scenario. In the Anchorage region in particular, it is difficult in practice to isolate and verify what impacts are accounted for by the basecase and development scenarios respectively. In Anchorage, OCS impacts tend to be much less visible than in rural communities, mostly because of the more diffuse nature of impacts. As shown in Table 20, a comparison of key structural characteristics of the Anchorage community and a paradigmatic rural village shows that they differ in almost every significant respect that is important to community impact assessment. Anchorage's size, maturity and urbanity mask and blunt community impacts that would be visible and acute in a smaller, less developed, rural community.

Infrastructure Standards

Infrastructure standards are the third step in the current assessment

TABLE 20

COMMUNITY IMPACT PARADIGMS FOR ANCHORAGE AND RURAL COMMUNITY

Rural Community	Anchorage
geographically remote	geographically central
small	populous
socially uniform	socially diverse
small, unskilled workforce	large, skilled workforce
narrow economic base	diversified economic base
heavy reliance on subsistence	minor reliance on subsistence
static economy	dynamic economy
renewable resource economic base	managerial/technical/commercial economic base
economically vulnerable to OCS mishaps	insulated from OCS hazards
limited private sector	mature private sector
limited local governing resources	full-fledged local government
minimal infrastructure	modern infrastructure
limited housing market/industry	mature housing market/construction industry
poor communications/transportation	excellent communications/transportation
frontier area for petroleum development	25 years petroleum development experience
onsite OCS industrial facilities	no OCS industrial facilities
onsite direct OCS industrial employment	no direct OCS industrial employment
large scale of impacts	minor scale of impacts
vulnerable to boom/bust cycle	diversified against boom/bust cycle

methodology. This section looks briefly at the infrastructure standards originally developed for the Anchorage region in the "Methods, Standards and Assumptions" Appendix to Technical Report Number 46, Volume 2 and later revised in Technical Report Number 61.

Those infrastructure standards were used in the impact assessment methodology to calculate the incremental demand for basic community facilities and services arising under the base case and OCS development scenarios. Since population change was the fundamental measure of basecase and development scenario growth impacts, the infrastructure standards were formulated in per capita terms. The standards were of two general sorts: normative and empirical.

The normative or prescriptive standards were based on nationally recognized standards of adequacy for specific community services or facilities. Most often, the normative standards of adequacy were endorsed by professional societies and organizations as norms for a desirable quality of service or care. Examples of such norms are the various standards for provision of educational services (x many students per classroom and per teacher) and health services (x many physicians or general care hospital beds per 100,000 population).

Despite the professional or technical blessing that these normative standards carry, they typically express a settled socio-political consensus about the social values the community upholds rather than any truly scientific or objective standard. This is perhaps most clear in

the case of social services, an area in which there is little consensus but plenty of political controversy, with the result that there are few widely accepted norms for provision of social services.

The empirical or descriptive standards were used in cases where accepted national norms were not available or not locally applicable. These descriptive standards were based on current levels or recent trends in local consumption patterns. Here, typical examples are the per capita consumption levels for water, electric power or solid waste disposal space.

In general, our review of these quantitative standards raised no major problems with the definition of the standards or with the values assigned to them, with the exception of local government finances, as discussed below.

Some of the generalized normative standards developed primarily for use in other regions of the nation seem inappropriate for Anchorage. For example, Anchorage's climate, outdoor recreational assets and distinctive lifestyle all justify deviation from national standards for provision of developed recreational facilities.

In addition, there are technical problems with assigning numerical values for some descriptive standards. For example, it is difficult to set trend values for standards that have been highly unstable due to erratic exogenous factors. The uneven revenue and expenditure trends in

the Anchorage municipal government over the past few years is a good example of this problem. Fluctuating state petroleum revenues have resulted in varying municipal assistance grants and transfer payments to Anchorage. In response, local property tax rates have varied greatly during recent years. As a result, over this period, it is hard to find a standard or trend for local tax effort or for local willingness to assume municipal debt to fund community facilities and services.

Despite these problems, the infrastructure standards previously developed seem reasonably valid overall and practicable for translating population growth forecasts into estimates of quantitative increases in demand for different types of population-dependent community infrastructure. The infrastructure standards themselves seem accountable for only a narrow margin of arithmetical error in infrastructural impact forecasts compared to the error prone to arise from basecase and development scenario growth forecasts. For this reason, we do not think that perfecting the infrastructure standards would much improve impact forecasts given the uncertainties of the basecase and development scenario population forecasts to. which the standards are applied.

The overriding problem with the quantitative infrastructure standards is that they are often miscast as the key index of community impacts. This is so for two reasons.

First, in the original assessment methodology, these infrastructure

standards were, at best, good yardsticks that measured a poor indicator of community impact. The methodology generated quantitative population-dependent measures of incremental demand for various facilities and services. But if the population growth forecasts to which the infrastructure standards are applied are as dubious as suggested above, then the community impact assessments derived from these infrastructure standards will be equally dubious.

Second, the decimal precision of the forecasts of infrastructure impacts belied the rough assumptions on which they were based. Lay readers in particular, unfamiliar with how the forecasts were constructed, may mistake this apparent precision for substantive accuracy. Precise infrastructural scenarios, taken literally instead of figuratively, can be very misleading if the reader is not fully aware of the purpose for which they were intended nor of the assumptions upon which they were based.

ALTERNATIVE ASSESSMENT METHODOLOGY

The previous section reviewed some of the principal problems with the assessment methodology employed in previous community impact assessments for the Anchorage region. In this section, an alternative methodological approach will be outlined.

The characteristic feature of the original assessment methodology was its presentation of community impacts as a schedule of quantitative incremental increases in the level of demand for specified community facilities and services. That approach stressed the demand side of the process of community growth. But equally important is the present and future ability of the locale to accommodate population growth. Arriving at some measure of this ability is not simply a matter of matching growth forecasts against existing or future physical facilities and service systems. Rather, it is more a matter comparing growth forecasts with the reserve capacity of the community to absorb growth.

The alternative approach to be presented here looks first at the general long-term management capacity of the community to accommodate growth. Next, it considers the relative growth stress attributable to present growth trends and prospective OCS lease sales and diagnoses possible growth management problems.

This approach can still make analytic use the infrastructure standards to estimate the incremental demand for community facilities and

services. However, these estimates are seen as very approximate measures of the relative magnitude of change in facility and service needs. Then, depending on the community's capability to cope with those needs, conclusions can be drawn about whether the demands are a significant burden on the community and its governing body or easily within the routine response capacity of the community.

By comparison with the earlier methodology, the revised approach is simpler in design and humbler in aim. It is also more realistic about the reliability of forecasts and about the technical limits on detailed impact assessment. Consistent with the updated baseline description of the Anchorage region, it emphasizes long-term trends over momentary states. The standard for community impacts is the community's capacity to manage growth rather than quantitative estimates of growth-related demand for various community facilities and services.

This revised method purposely abstains from the hypothetical detail earlier sought in baseline and scenario impact analyses. Instead, it provides a more strategic assessment of community capability to accommodate the impact of OCS-related growth on the most critical facilities and services. In place of the quantitative infrastructure evaluation used in the existing methodology, this approach identifies constraints on growth management to accommodate varying levels of growth in order to assess the vulnerability of a mature region like Anchorage to adverse growth impacts.

The following subsections discuss long-range constraints on growth at Anchorage and the significance of these constraints at different growth thresholds. They show how these constraints and growth thresholds can be applied to develop a general picture of the community impacts of OCS lease sales on the Anchorage region.

The proposed assessment approach focuses on three aspects of the growth management capacity of the community.

First, it schematically identifies **major physical, institutional and fiscal constraints** on the ability of the community to respond to growth demands for critical community facility and service functions. The data requirements for this scheme comprise the information and analyses presented in the baseline description of Anchorage in Chapter I.

Second, three **threshold levels of growth** (low, moderate, high) are defined, based on the Anchorage region's historic growth experience.

Third, the **significance of impact** of different growth thresholds on individual community service functions is evaluated. This rating is based on data about each service function presented in the baseline description and on the review of the region's success at coping with growth demanads, qualified to reflect any special problems anticipated for

specific functions.

In Chapter III, the actual impact assessment, ISER's population growth forecasts are used to identify potential problems in provision of community facilities anti services for basecase and OCS development scenarios.

Constraints

We have identified three different types of constraints on future provision of community facilities and services that may limit the capacity of Anchorage to accommodate future population growth. These are physical, institutional and fiscal constraints.

PHYSICAL CONSTRAINTS

Physical constraints comprise features of the natural or man-made environment that may hinder the provision of basic community services and facilities. Typical examples might be lack of developed water supplies or reserves of raw land, natural hazard areas and soils unsuited for development (ironically, flood plains and poor soils have given Anchorage much of its prime neighborhood and winter recreation lands). Other examples include surface landforms that distort surface transport patterns, inefficiently designed water and sewer system installations and unfavorable airshed characteristics, etc.

and a State-subsidized housing market have enabled local governments to operate at a financial level that far exceeds their local financial means.

Local public willingness or resistance to new outlays to expand governmental services is very sensitive to how those outlays will be funded. Other factors, such as high bond interest rates for municipal bonds and attitudes of established residents toward expenditures to meet the needs of newcomers, also affect how localities respond to their fiscal limitations. Here, too, services that hold preferential standing in the community's eyes, such as public safety, -or which are heavily supported by transfer payments, such as education, are likely to fare better than recreation or social programs that are popularly regarded as less crucial to or less urgent for the welfare of the community.

Unfortunately, it now appears that the State's fiscal generosity to local governments will prove to be a brief impulse fed by revenue surpluses from momentarily high crude oil prices, and that the amount of municipal assistance lately delivered by the State will not continue indefinitely. In fact, the State's long-term ability to subsidize local governments promises to become an acute fiscal issue, especially since OCS development, unlike oil and gas development on State lands, does not generate significant State or local public revenues to offset the public costs it confers on State and local governments.

the Anchorage area and still are for most rural communities.

Perhaps the most important institutional factor affecting a community's response to growth is the relative priority placed on individual services. If the community esteems education or public safety highly but cares less about social services, then institutional constraints are more likely to retard effective response to growth pressures upon provision of social services.

FISCAL CONSTRAINTS

Fiscal constraints comprise any features of the local government's fiscal situation that might impair or delay its capability to finance improvements and services. It is important to note that the financial security of different services depends greatly on how they are funded. There are many ways to finance the capital and operating expenses of community facilities and services: general property tax revenues, special assessments, service fees or user charges, sales taxes and general obligation and revenue bonds.

Of overriding importance for Alaskan municipalities, including Anchorage, is the extraordinary dependency they have lately developed on transfer payments, especially from the State. These transfer payments in the form of special legislative appropriations for capital projects and municipal assistance, regular State and federal revenue sharing programs, State and federal grant-in-aid programs for specific functions

TABLE 21
GROWTH CONSTRAINTS
ANCHORAGE REGION

Function	Physical Constraints	Institutional Constraints	Fiscal Constraints
Land development	land supply	zoning public lands	land inflation devel. costs
Housing	land supply	mortgage policies zoning	interest rates market balance
Education	site acquisition	federal/state requirements labor contracts	state revenues property taxes
Police	personnel	police/troopers fragmentation	property taxes state revenues
Fire protection	water supply	fire districts volunteer/psi d	property taxes state funds
Recreation	cl imate site acquisition maintenance	overlapping jurisdictions	funding sources
Health	not applic.	certificate of need federal/state requirements	low income groups cost of service
Social Services	not applic.	low priority fragmented delivery	budget priorities federal/state cutbacks
Water	water supply contamination	fragmented systems	state/federal grant funds user-financed
Sewer	land use patterns onsite soils	zoning policy	user-financed devel. costs
Power	reliability energy sources	CEA management CEA/ML&P split	interest rates user-financed
Communications	none	deregulation	user-financed
Solid Waste	landfill site peat disposal hazardous wastes	none	user-financed
Transportation	city form cl imate congestion	fragmentation poor planning road districts	state revenues federal funds property taxes

exceptionally high rate of sustained growth. It is exceeded by just a few underdeveloped nations with extraordinarily high birth rates. Alaska cannot reach or sustain this rate of growth from natural population increase, only with a high rate of immigration of new residents attracted by a favorable economic climate. According to the State demographer's most recent official state population estimates, the Municipality of Anchorage grew by about 26,000 residents between 1980 and 1982. This is equal to a growth rate of better than 7% annually. Were this rate sustained over a long run, Anchorage's population would about double every decade. Anchorage's success at accommodating this phenomenal growth over the past two years suggests a capacity to absorb relatively high rates of population growth, at least for brief periods.

Within the frame of reference of Anchorage's recent growth history, we think these are plausible growth thresholds and analytically useful for distinguishing different intensities of growth.

Significance of Effects

The assessment approach's orientation to constraints on growth management is meant to avoid the artificial analytic problems that arise from focusing on demand increments while overlooking supply considerations. For example, rapid growth may not translate into significant impacts upon community facilities and services, if it can be accommodated without noticeable strain on the physical, institutional or fiscal resources of the community.

When assessing Anchorage regional impacts, quantitative forecasts of the future sale-related demand for infrastructure and services are, by themselves, less meaningful than when used as part of an assessment of the general capacity of the municipality (and other local institutions) to respond effectively.

Some types of growth constraints are more fixed than others. The physical constraints are relatively fixed or at least it is clear what has to be done to relax the bind they put on growth. For example, the Anchorage bowl is popularly thought to be short of land for future community development. However, release of Fort Elmendorf and Fort Richardson military lands for community development, reclassification of the Campbell Airstrip or O'Malley Tracts for residential development, zoning for higher residential densities and construction of a Knik Arm Crossing are some steps that could amplify the capacity of the Anchorage bowl well beyond currently accepted limits.

Institutional constraints tend to be more plastic, but there is still a reasonable degree of continuity in the organization and performance of governing institutions over time. Perhaps the most pertinent point in this regard is that over the past decade Anchorage has demonstrated a remarkable capability to accommodate wild swings in population growth rates almost as a routine matter. It is interesting to note that growth rates that were alarming during the years of "pipeline impact" for fear of overtaxing the community have been absorbed almost as a matter of course during the 1981-1982 growth spurt.

For the Anchorage Municipality, fiscal constraints are the most quantifiable, volatile, worrisome and interesting of this triad. It is a good working hypothesis that the most critical adverse impact on the municipality will be the financial burden of providing for its new residents. This is due mainly to two odd features in the municipality's fiscal structure.

First, local governments in Alaska are not self-supporting. The average local resident costs far more in local expenditures than that resident generates in local public revenues. The deficit is covered or subsidized mainly by the State of Alaska which funds a larger share of local government expenditures than any other state government. The federal government also assists in a minor way to close this revenue gap.

Second, OCS development generates very limited revenues for the State to offset the costs of meeting local growth needs and virtually no local revenues for an offsite local government such as Anchorage. Furthermore, the financial requirements of any Diapir Field Sale 87 growth will peak in the early 1990's by which time all signs are that the State's Prudhoe Bay revenues will be declining steeply and its revenue surplus depleted.

Thus, it appears local governments will become more hard-pressed to fund their own needs, and State government will be ill-equipped to sustain established spending patterns, regardless of OCS-related growth. Of

course, in practice, it will be virtually impossible to distinguish between basecase growth and OCS-related growth. Nevertheless, these growth needs, if met at all, will be met at the expense of other budgetary needs.

If a serious fiscal pinch does arise for local government, it is likely that some facilities and services will be more severely crimped than others. Those services that are readily and customarily self-supported by user charges and revenues bonds (e.g., the municipal power and telephone utilities and other enterprise fund functions) are usually able to pass their increased debt service on to customers. However, those functions (e.g., education, road maintenance, public safety) which rely heavily on local property tax levies and general obligation bonds and State revenue-sharing, municipal assistance, capital grants and other intergovernmental transfers will face severe fiscal constraints.

In general, given the relative growth likely to accrue from basecase and OCS scenarios respectively (recall that for the first Diapir Field sale, the ratio was 20:1), public service functions that are not already problems due to physical or institutional constraints under the basecase are not likely to become problems under the OCS scenario. However, the OCS scenario could have a marginal adverse effect on service functions that are already hampered by fiscal constraints.

It is ironic that the more "successful" the sale is in terms of the prolonged employment and economic and population growth it stimulates,

the more detrimental its effect promises to be on State and local governmental fiscal balances and on the quality of public services and facilities they can afford to provide. This is so because the major part of the State's revenues (and, in turn, a substantial share of local governmental revenues) derive from liquidation of North Slope petroleum reserves. In 1982, petroleum revenues, accruing mainly from North Slope oil production, accounted for 87% of the State's unrestricted general fund revenues. Under present law, OCS lease sales and production do not generate comparable revenues for the State. The Anchorage Municipality will not have tax jurisdiction over any of the on-site industrial plant developed for Sale 87 lease tracts. In other words, State and local public revenues in Alaska will be relatively unaffected by OCS development, but expenditures will still have to grow along with population in order to maintain current standards of public service.

The significance of impact effects upon each community service function at each growth threshold is rated along a continuum as low, medium or high. The relative ranking is a summary conclusion, based on two criteria: (1) the baseline conditions relevant to each function, including local government's performance during the past decade of rapid growth and (2) the growth constraints identified for each function.

Three points about the ranking process need acknowledgement. First, the rankings derive from a systematic but relative and qualitative evaluation by the consultant team of the facts and constraints operative for each function. It was not thought practical or especially useful to

try to abstract a single numerical scale or index of "significance of effects" to encompass the diverse functions, facts and constraints at issue. Such a comprehensive approach would require standardization of many incommensurable factors, thereby losing focus on the essentially qualitative dimensions of growth impacts. Second, the rankings reflect the baseline conditions and constraints prevalent in mid-1983. Changes in baseline conditions or other new circumstances could alter the influence of some growth constraints and, in turn, the evaluation of "significance of effects" at specific threshold levels. Lastly, the evaluation of baseline conditions and growth constraints admittedly entails some degree of subjective judgment, with a chance that other analysts might reasonably arrive at different rankings. Ultimately, such genuine differences are best resolved, if at all, by immediate reference to and debate about the material facts and the influence of growth constraints. In all, it seems methodologically sounder to expose to discussion the differences of opinion that will inevitably arise about the significance of growth impacts.

The results of the rating process are presented in Table 22. A rating of "low" signifies that the analysis of baseline conditions and constraints identified no circumstances likely to impede future performance for that function at established standards of service; thus, the significance of effects was deemed to be minimal. A rating of "medium" or "high" significance of effects reflects a conclusion that the municipality's capacity to accommodate the demands of threshold growth would be moderately or seriously impeded. Here, again, it must

be acknowledged that the distinction between "low", "medium" or "high" significance of effects expresses the consultant team's qualitative judgment based on its analysis of baseline conditions and growth constraints for each function.

The rating results in Table 22 are consistent with the overall finding in the baseline description that the Anchorage region has demonstrated a remarkable capability to respond in most functional areas to the demands of rapid growth and is well positioned to continue that performance. Since 1969, Anchorage has experienced extreme fluctuations in growth rates, including a post-pipeline period of negative growth, before accelerating to the rapid growth of the past two years. In both absolute and relative terms, these growth phases have far exceeded the population growth that is likely to accrue from any single high OCS development scenario. Of course, if simultaneous development took place in several "lease areas, historic growth rates could be exceeded.

Hence, Anchorage's capacity to absorb growth will likely persist for most functions, regardless of future growth rates, so long as State funds are available to supplement local revenue sources. There are a few noteworthy exceptions, most prominently in the area of rental housing, local surface transportation and social services.

A few years ago, during the post-pipeline pause in growth, vacancy rates for the low and middle price rental housing sector reached the range of

TABLE 22
SIGNIFICANCE OF EFFECTS
BY FUNCTION AND GROWTH THRESHOLD
MUNICIPALITY OF ANCHORAGE

Function	Growth Threshold Low (<2% annually)	Moderate (2-4% annually)	High (4%+ annually)
Land development	Low	Medium	High
Housing	Low	Medium	High
Education	Low	Low	Medium
Police	Low	Medium	High
Fire protection	Low	Low	Medium
Recreation	Low	Low	Medium
Health	Low	Medium	High
Social Services	Medium	High	High
Water	Low	Medium	High
Sewer	Low	Low	Low
Power	Low	Low	Low
Communications	Low	Low	Medium
Solid Waste	Low	Low	Low
Transportation	Medium	High	High

Explanation: This Table evaluates the impact (significance of effects) of different threshold growth rates upon the principal public service functions in Anchorage. A "low significance of effects" rating indicates an absence of significant constraints upon the community's ability to manage growth at established standards of service. A "medium" or "high significance of effects" rating indicates increasingly grave or costly physical, institutional or fiscal impediments to municipal growth management efforts.

25% to 35%. Then, with the recent influx of new residents, demand skyrocketed, quickly absorbing the existing inventory. Nonetheless, private investment in new rental construction has been stalled by a combination of inflated construction costs, high interest rates, disadvantageous competition with State-subsidized homeownership mortgage finance programs and condominium conversions. At the same time, public housing programs to construct new public low-income housing have dwindled. As a result, there was a serious shortage of low and middle price rental housing in 1982. It is a noteworthy contrast that other residential and commercial construction boomed at all-time record levels for Anchorage over this same period of inaction in the rental market.

In contrast to most other urban services, local ground transportation in the Anchorage region is beset by a mix of physical and institutional constraints that impede evolution of an efficient transportation system.

The provision of social services is hindered by a number of circumstances: fragmented planning and delivery systems among State and local governments and non-profit entities for social services; the retreat in federal financial and program support for social services; and a lack of community agreement about social service goals and about the institutional and fiscal role that local government ought to assume. There are no signs that these institutional constraints will be removed in the foreseeable future. Indeed, the social service professionals interviewed for background information for the baseline description anticipated that public philosophical and fiscal support for social

service program was declining and that problems in provision of traditional types and levels of services would become more acute. For this reason, the function of social services is expected to be particularly vulnerable to population growth, especially since new residents are thought to require a higher than average level of social services.

It should be stressed that the above generalities about Anchorage's capability to manage growth impacts are limited in scope to provision of the basic community facilities and services itemized in the baseline description. This assessment methodology does not address many important but value-laden and controversial questions about the changes in the social quality and texture of community life brought about by rapid growth. Social impacts such as perceptions of crowding, fear of strangers and diminished sense of community often affect long-time residents and may become manifest in increased deviant social behavior and public demand for stronger police protection and a more severe justice system.

The final step in the impact assessment will implement the conceptual scheme represented in Tables 21 and 22. The population growth forecasts developed by ISER for the basecase and OCS scenarios will be compiled in five-year intervals and categories by the appropriate growth threshold. Then, the forecasts will be systematically compared with the major growth constraints identified in the baseline description and evaluated for the significance of effects or growth impacts for each community

service function. This comparison will identify those features of the local community infrastructure which are likely to be adversely affected at the threshold level of forecasted population growth for the basecase scenario and for the incremental growth attributable to different OCS scenarios. Insofar as it is helpful to the assessment, the population forecasts can also be used in tandem with the quantitative infrastructure standards previously developed to estimate the range of likely future demand for specific facilities and services. However, it is expected that the impact assessment will be formulated mainly in narrative and qualitative terms rather than in strictly quantitative terms.

This approach to community impact assessment is generally applicable to large and small Alaskan communities. However, it ought be stressed that the findings summarized in Tables 21 and 22 fit specific conditions at Anchorage that may not prevail at other locales. The specific material, institutional and financial resources available for growth management vary widely from place to place. Likewise, the profile and scale of growth impacts at a small, remote community where major onshore facilities are to be constructed will be very different than at Anchorage. With adjustments for such local variations, the assessment approach should be transferable to other Alaskan communities.

III. IMPACT ASSESSMENT

INTRODUCTION

This section of the study presents the assessment of impacts of the basecase and Sale 87 petroleum scenario growth forecasts on the Anchorage region, here defined as the Municipality of Anchorage, through the year 2010. The growth forecasts were prepared by ISER for Minerals Management Service in a separate but related study titled "Statewide and Census Division Demographics and Economic Systems, Diapir Field (Sale 87) Impact Analysis".

ISER developed annual forecasts for a basecase and for two Sale 87 petroleum development scenarios. The petroleum scenarios included a low case that assumed production of 2.2 billion barrels of oil 'and a mean case for production of 3.0 billion barrels. Minerals Management Service chose two of these scenarios to be assessed for their impacts on Anchorage: the basecase scenario and the mean petroleum development scenario for production of 3.0 billion barrels. The low petroleum scenario was not assessed.

The chief assumptions of the two scenarios are summarized below.

1. The basecase scenario is ISER's most probable forecast of employment and population growth for the Anchorage region, exclusive of proposed Sale 87 but inclusive of the

cumulative impact of other OCS lease sales. The basecase scenario incorporates many assumptions about national economic variables as well as assumptions about future basic employment levels and State revenues and expenditures. The specific economic assumptions incorporated by ISER into the Sale 87 basecase scenario are presented in Table 23. Reference may be made to the full ISER report for further explanation of the model and the assumptions,

2. The **mean petroleum development scenario** assumes the mean estimate (3 billion barrels) of crude oil production from the proposed sale. It is important to note that the mean scenario is not a true mean or most probable development scenario. Rather, it is a mid-range estimate of crude oil production expected to be achieved, **if producible commercial reserves are discovered.** Since the basecase scenario assumes that the ANGTS will not be built, this petroleum development scenario does not assume natural gas production.

The direct on-site industrial employment for Sale 87 during the exploration, development and production phases was estimated by the Minerals Management Service who provided these estimates to ISER. ISER then applied the MAP model to generate the forecasts of the overall stimulus to

TABLE23 SUMMARY OF BASE CASE ASSIJMH1ONS
FOR MAP MODEL, DIAPIR FIELD (SALE 87) STUDY

ASSUMPTIONS	DESCRIPTION(a)
National' Variables Assumptions	
U.S. Inflation Rate	Consumer prices rise at 6.5 percent annually after 1985.
Real Average Weekly Earnings	Growth in real average weekly earnings averages 1 percent annually.
Real Per Capita Income	Growth in real per capita income averages 1.5 percent annually after 1984.
Unemployment Rate	Long-run rate of 6 percent.
Exogenous Employment Assumptions	
Trans-Alaska Pipeline	Operating employment remains constant at 1,500 through 2010 (TAP.083).
North Slope Petroleum Production	Construction employment developing Prudhoe Bay and Kuparuk fields peaks at 2,400 in 1983 and 1986. Operating employment remains at 2,502 through 2010 for *overall* North Slope production (NSO.082).
Upper Cook Inlet Petroleum Production	Employment declines gradually beginning in 1983 so as to reach 50 percent of the 1979 level (778), or 383 by 2010 (UPC.082).
OCS Development	Exploration employment only for Sales CI, 55, 57, 60, 70, and 83. Development of Sale 71 (Beaufort Sea) lease area results in maximum employment of 1,771 in 1995, falling to long-run operating level of 1,359. Development of Sale 83 results in maximum employment of 3,391 in 1997. (OCS.BFM, OCS.55X, OCS.57X, OCS.60X, OCS.70L, OCS.71M, OCS.60X(+4), OCS.83M).

(a) Codes in parentheses indicate ISER names for MAP Model SCEN_ case files.

North Slope Gas	Tertiary oil recovery project utilizing North Slope natural gas occurs in early 1990s with a peak annual employment of 2,000 (NSO.TRC).
Beluga Chuitna Coal Production	Development of 4.4 million ton/year mine for export beginning in 1990 provides total employment of 524 (BCL.04T(-4)).
Hydroelectric Projects	Employment peaks at over 700 in 1990 for construction of several state-funded hydroelectric projects around the state (SHP.082, SHP.PJH).
U.S. Borax	The U.S. Borax mine near Ketchikan is brought into production with operating employment of 790 by 1988 (BXM.PJM).
Greens Creek *Mine*	Production from the Greens Creek Mine on Admiralty Island results in employment of 315 people from 1986 through 1996 (GCM.082).
Red Dog Mine	The Red'Dog Mine in the Western Brooks Range reaches full production with operating employment of 448 by 1988 (RED. PJH).
Other Mining Activity	Employment increases from a 1979 level of 3,140 at 1 percent annually (OMN.EPH).
Agriculture	Moderate state support results in expansion of agriculture to employment of 508 in 2000 (AGR.PJM).
Logging and Sawmills	Employment expands to over 3,200 by 1990 before beginning to decline gradually after 2000 to about 2,800 by 2010 (FLL.082).
Pulp Mills	Employment declines at a rate of 1 percent per year after 1982 (FPU.082) .
Commercial Fishing-Nonbottomfish	Employment levels in fishing and fish processing remain constant at 1979 levels of 6,323 and 6,874, respectively (TCF.001).

Commercial Fishing-Bottomfish	The total U.S. bottomfish catch expands at a constant rate to allowable catch in 2000, with Alaska resident harvesting employment rising to 733. Onshore processing capacity expands in the Aleutians and Kodiak census divisions to provide total resident employment of 971 by 2000 (BCF.183).
Federal Military Employment	Employment remains constant at 23,333 (GFM.082).
Federal Civilian Employment	Rises at 0.6 percent annual rate from 17,800 in 1983 to 21,042 by 2010 (GFC.082).
Tourism Assumptions	Number of visitors to Alaska increases by 50$000 per year from 630,000 in 1981 to over 2 million by 2010 (TRS .082).

State Revenue and Expenditure Assumptions

Revenues	State revenue projections *are* based upon Alaska Department of Revenue projections published in December of 1982. Oil and gas corporate income tax revenues are projected to grow at a nominal rate of 8 percent per year after 1985. Other petroleum revenues are extrapolated forward to 2010 from the last several years of projections *published* by the Department of Revenue (DOR.5D82) .
Expenditures	State expenditures are at the levels allowed by the recently-pas sed spending limit, with subsidies and capital expenditures equalling one-third of total expenditures. As revenue growth slows, the income tax is reinstated, subsidies are e l iminated, the Permanent Fund dividend program is phased out, and proportional cuts in th e operating and capital budgets are made to keep total expenditures equal to total revenues. Also at that time, all Permanent Fund earnings are transferred to the general fund.

Source: ISER.

employment, population and other variables that Sale 87 direct employment would generate for the State as a whole and for the Anchorage region.

For each scenario, ISER used the MAP model to develop annual forecasts for many variables, including population and employment for the State as whole and for the Anchorage and Fairbanks regions. Total State revenues and expenditures were also forecast through the year 2010. The Anchorage region population forecasts and the forecasts of State revenue and expenditures were used, as directed by the Minerals Management Service, for the Anchorage region impact analysis.

SCENARIO OVERVIEW

An overview of Anchorage's historic and scenario population growth forecasts and of the municipality's fiscal outlook will be useful to establish a comparative perspective for detailed assessment of the OCS development scenarios.

Population Growth

Table 24 shows the historic rate of growth for the Anchorage region over the period 1950 to 1980 and the ISER basecase scenario growth forecast from 1980 through 2010. Comparison of the historic growth trends with the ISER basecase forecast highlights an important change that is expected to take place in the region's growth pattern.

The common impression is that the region's population growth rate accelerated greatly in the 1970's, cresting during the busy years of pipetine construction in mid-decade. This impression is refuted by the figures in Table 24 which show that in relative terms, the region's overall growth rate through the 1970's (38%) was actually well below the rate of the two previous decades (175% and 53% respectively). In absolute numbers, Anchorage population growth in the 1970's (about 48,000 persons) was below the growth experienced in 1950-1960 (52,700) and somewhat above the growth in 1960-1970 (43,600).

In actuality, the entire thirty year period 1950-1980 can be seen as a prolonged stretch of extraordinarily high population growth for the Anchorage region. This growth was sustained by a succession of episodic economic stimuli: national defense expenditures related to the Korean and Vietnam wars and other defense installations, Cook Inlet oil and gas development, post-1964 earthquake reconstruction, the 1969 Prudhoe Bay State lease sale, rising federal domestic expenditures, trans-Alaskan pipeline construction, economic diversification and, most recently, State petroleum revenue receipts and expenditures.

Now, the events that boosted Anchorage's economic expansion since 1970 (indeed, since 1950) are finally losing their impetus. There do not seem to be any events of a similar sort on the horizon. That, at least, is the general premise of the ISER basecase scenario forecast whose assumptions are presented in Table 23. According to the basecase forecast, Anchorage is near the end of this remarkable period of

sustained growth. Its growth rate is expected to diminish abruptly in the mid-1980's, falling to a rate that is still faster than the national average (about 1.1% annually), but much more modest than the region has become accustomed to over the past three decades. **In other words, the pace of basecase growth, which is the benchmark to which the incremental growth impacts of Sale 87 will be added and compared, is expected to be substantially slower than the pace the Anchorage region has had to cope with during the past thirty to thirty-five years.**

The magnitude of this shift in the pace of growth is evident from a closer comparison of historic and basecase forecast population figures. See Table 25. The region's actual population growth during the thirty-year period 1950-1980 was 144,370 persons, an increase of about 480% over the 1950 base population. The basecase forecast of population increase for the 1980-2010 period is 148,188 persons or an increase of about 85% over the 1980 base population. In absolute terms, the growth forecast for 1980-2010 is little more than what actually occurred over the preceding thirty years. In terms of growth rate, the average annual increase from 1950-1980 was 6.1%; the projected average annual increase for the basecase from 1980 to 2010 is 2.1%.

Next, it will be helpful to compare the basecase and petroleum development scenario forecasts.

Tables 26 and 27 illustrate the total and incremental population forecasts developed by ISER for the two scenarios. Table 28 shows the

TABLE 24
ACTUAL AND PROJECTED BASECASE POPULATION
ANCHORAGE REGION, 1950-2010

YEAR	POPULATION	INCREASE OVER PREVIOUS DECADE	% INCREASE OVER PREVIOUS DECADE	AVERAGE ANNUAL % INCREASE OVER PREVIOUS DECADE
1950	30,060			
1960	82,736	52,676	175.2	10.7
1970	126,385	43,649	52.8	4.3
1980	174,431	48,046	38.0	3.3
1990	237,668	63,257	36.3	3.1
2000	273,450	35,782	15.1	1.4
2010	322,619	49,169	18.0	1.7

Source: U.S. Census (1950-1980) and ISER basecase forecast (1990-2010).
Note: In Tables 24-28, Anchorage Region is co-terminous with the 1980 boundaries of the Municipality of Anchorage.

TABLE 25
COMPARATIVE GROWTH TRENDS
HISTORIC PERIOD AND BASECASE FORECAST
ANCHORAGE REGION

	1950-1980	1980-2010
Absolute Population Increase	144,370	148,188
Percent Increase	480%	85%
Average Annual Increase	6.1%	2.1%

Source: U.S. Census (1950-1980) and ISER basecase forecast (1990-2010).

TABLE 26
TOTAL POPULATION
ANCHORAGE REGION
BASECASE AND PETROLEUM DEVELOPMENT SCENARIOS

YEAR	BASECASE SCENARIO	PETROLEUM SCENARIO	CUMULATIVE DIFFERENCE	PERCENT DIFFERENCE
1980	174,431	174,431		
1985	218,558	219,213	655	0.3%
1990	237,688	242,276	4,588	1.9
1995	256,667	262,726	6,059	2.4
2000	273,450	281,329	7,879	2.9
2005	294,154	303,516	9,362	3.2
2010	322,619	333,033	10,414	3.2

Source: ISER, 1983.

TABLE 27
INCREMENTAL POPULATION GROWTH
ANCHORAGE REGION
BASECASE AND PETROLEUM DEVELOPMENT SCENARIOS
1980-2010

YEARS	BASECASE SCENARIO	PETROLEUM SCENARIO	INCREMENTAL DIFFERENCE
1980-1985	44,127	44,782	655
1985-1990	19,130	23,063	3,933
1990-1995	18,979	20,450	1,471
1995-2000	16,783	18,603	1,820
2000-2005	20,704	22,187	1,483
2005-2010	28,465	29,517	1,052
TOTAL	148,188	158,602	10,414

Source: ISER, 1983.

TABLE 28
AVERAGE ANNUAL GROWTH RATE
ANCHORAGE REGION
BASECASE AND PETROLEUM SCENARIOS: 1980-2010

YEARS	BASECASE SCENARIO	PETROLEUM SCENARIO
1980-1985	4.6%	4.7%
1985-1990	1.7	<2.0
1990-1995	1.5	1.6
1995-2000	1.3	1.4
2000-2005	1.5	1.5
2005-2010	1*9	1.9

Source: Derived from ISER forecasts (1983).

b.

average annual growth rate occurring under each scenario.

In essence, these tables demonstrate in different ways that the mean petroleum development scenario will have relatively little impact on the region's future population growth. In absolute terms, the petroleum scenario adds about 10,414 new residents to the region over forecast period, but never amounts to more that 3.2% of the total population. The greatest pulse of Sale 87 impact is felt during the 1985-1990 period, after the basecase growth rate has begun to fall off. In terms of average annual growth rates, the petroleum scenario has virtually no effect. It never adds more than one-tenth of one percent to the annual average growth rate except during the 1985-1990 period when it is expected to lift the average annual growth rate from a basecase 1.7% up to 2.0%.

In sum, the trend and scale of the two scenario forecasts are strikingly similar. Only during the Sale 87 development phase, 1985-1990, does Sale 87 have any noteworthy growth impact. Overall, the Sale 87 scenario augments the growth forecast under the basecase scenario, but the scale of impact is well within a reasonable margin of error for the basecase forecast. For purposes of impact assessment, the two scenarios are virtually indistinguishable.

To conclude this section and before beginning the impact assessment, we would like to summarize three conclusions about the scenario forecasts,

1. The era of sustained headlong growth in the Anchorage area is ending. There are no developments on the horizon, including construction of the ANGTS, to sustain the growth rates that prevailed from 1950 to 1980.
2. Though population growth remains high in absolute numbers, the rate of basecase growth tapers off, stabilizing at about one-third of the 1950-1980 rate.
3. In perspective, the Sale 87 scenario has very marginal long-term growth impact on the region over the basecase. Only during the development phase in 1985-1990 does the Diapir Field lease offering have any noteworthy growth effects.

Municipal Finances

The muncipality's general fiscal status is central to the impact assessment methodology. The municipality's fiscal capacity is partly dependent on the demands of growth, but of late has become increasingly dependent on the State's financial health. As background for the impact assessment, we will review here recent trends in Anchorage municipal finances and the general implication for Anchorage of the fiscal trends associated with the basecase and petroleum development scenarios.

Tables 29 and 30 testify to the municipality's excellent current financial position. In recent years, mill rates have been been falling

TABLE 29
MUNICIPALITY OF ANCHORAGE
REAL PROPERTY TAX RATE, 1978-1982

Year	Real Property Tax Mill Rate[1/]
1978	16.45
1979	13.79
1980	12.06
1981	8.30
1982	7.18

1/ Rate is for the Anchorage Service Area.

Source: Alaska Taxable, Department of Community and Regional Affairs.

TABLE 30
GENERAL OBLIGATION DEBT AS A PERCENT OF ASSESSED VALUATION
MUNICIPALITY OF ANCHORAGE
1972, 1977 AND 1982

Year	G.O. Debt as % of Valuation
1972	10.91
1977	5.02
1982	2.46

Source: Alaska Taxable, Department of Community and Regional Affairs.

steadily as has been the municipality's ratio of general obligation bonded debt to assessed valuation. As Table 29 shows, by 1982, the property tax rate (7.18 mills) had fallen to less than one-half the 1978 rate (16.45 mills). The 1982 property tax rate was lowest among all metropolitan areas west of the Rocky Mountains. Anchorage does not levy a local sales tax.

Likewise, the municipality's ratio of general obligation bonded debt to assessed valuation has falling steeply. As Table 30 shows, this ratio was cut in half between 1972 and 1977, and in half again between 1977 and 1982. In 1982, general obligation debt stood at a very low 2.46 percent of assessed valuation. Thus, its debt service burden has fallen along with mill rates.

These improvements in Anchorage's fiscal position were accomplished during a decade of intensive build-up of community infrastructure to accommodate growth. The municipality not only kept pace with growth, but added or upgraded many facilities, services and added amenities. The municipality was able to achieve this expansion without extensive borrowing and while lowering property tax rates. This was due partly to substantial growth in Anchorage's real property tax base, but mostly to the unprecedented infusion of State financial assistance to municipal operating and capital budgets, especially during the peak petroleum revenue years of 1981 and 1982.

In the MAP model, fluctuation in the world market price for North Slope

crude oil is the single most influential variable affecting State revenues and, in turn, future growth trends for the State and for the Anchorage region. The MAP model forecast employed the Alaska Department of Revenue's December 1982 petroleum revenue projections. Further, the MAP model forecast assumes that State expenditure of surplus revenues will be checked by the spending limit constraints until declining revenues fall below the spending limit. Thereafter, the State is expected to take certain fiscal measures to keep revenues and expenditures in balance. Specifically, the ISER basecase forecast assumed that the State would reinstate personal and corporate income taxes, eliminate most subsidy programs, phase out the permanent fund dividend program and appropriate all permanent fund earnings to the general fund.

(Here, two technical notes are in order. First, it should be noted that the Department of Revenue petroleum revenue forecasts do not necessarily make the same assumptions about future petroleum and other economic development that the MAP model makes; therefore, the two forecasts may not be harmonious. Second, while not viewed as probable, a renewed upward trend in crude oil prices similar to the 1973-1981 price rise has potential to restore economic and population growth to the level of the early 1980's).

Even with these steps to enhance revenues and reduce subsidy and permanent fund dividend appropriations, the ISER basecase forecast projects that 'per capita State general fund revenues and expenditures

will both fall steeply from the 1981-1982 peak. See Tables 31 and 32. Note that there is practically no difference between basecase and Sale 87 petroleum scenarios.

Compared to its recent fiscal good fortunes, these tables signal that the municipality is poised for a radical reversal. The Tables indicate that, over the forecast period, State per capita general fund revenues are likely to fall to less than one-third of recent levels, with general fund revenues falling almost as precipitously. Lacking the revenues surpluses that supported the run-up in municipal assistance appropriations - indeed, short of funds to maintain State government - it is inevitable that municipal assistance will be reduced in order to meet the State government's own operating and capital budget requirements. That means a sharp reduction in the non--local funds that have enabled Anchorage to cut taxes and avoid debt.

Today, compared to a decade ago, or five years ago, the municipality has very low property tax rates and has in reserve very substantial debt capacity and tax potential. However, even if this is true by ordinary financial standards and relative to the municipality's former situation, there may be formidable resistance to reinstitution of more typical tax rates or large-scale borrowing for capital improvements. If so, then the municipality may eventually find itself in severe financial difficulties, even under the relatively low growth rate forecast for the basecase.

TABLE 31
REAL PER CAPITA STATE GOVERNMENT REVENUES
1982$

	PER CAPITA REVENUES	
YEAR	BASECASE SCENARIO	PETROLEUM SCENARIO
1981	9,732	9,732
1985	5,958	5,948
1990	5,742	5,702
1995	4,472	4,572
2000	3,786	3,859
2005	3,371	3,423
2010	3,034	3,065

Source: ISER, 1983.

TABLE 32
REAL PER CAPITA STATE GENERAL FUND EXPENDITURES
BASECASE AND PETROLEUM DEVELOPMENT SCENARIO
1982$

	PER CAPITA GENERAL FUND EXPENDITURES	
YEAR	BASECASE SCENARIO	PETROLEUM SCENARIO
1981	7,313	7,313
1985	7,265	7,263
1990	5,742	5,702
1995	4,472	4,572
2000	3,786	3,858
2005	3,371	3,423
2010	3,034	3,065

Source: ISER, 1983.

BASECASE IMPACT ASSESSMENT

The preceding analysis of population growth trends indicated that there is relatively little difference in the basecase and petroleum scenario forecasts. As a result, because the assessment methodology is keyed to population growth rate thresholds and growth management capacity, there is also little practical difference in the impact analysis for the two scenarios. This is reflected in Tables 33 and 34 which rate the significance of effects to be essentially the same for each scenario according to the thresholds of significance established for the assessment methodology. Since extended analysis of both scenarios would be highly repetitious, only the basecase scenario will be analayzed in detail. Then, the basecase analysis will serve as the benchmark against which the incremental impacts of the petroleum scenario are compared. The assessment of the petroleum scenario will focus on any noteworthy differences between it and the basecase scenario.

The assessment builds on the description of baseline conditions in the Anchorage region developed in the opening chapter and uses the assessment methodology described in the previous chapter. The analysis particularly seeks to identify important physical, institutional or fiscal constraints on the municipality's capacity to respond to forecasted growth. Each functional area of the community is analyzed in relation to its ability to accommodate the population .growth forecast by ISER.

TABLE 33
SIGNIFICANCE OF EFFECTS
BASECASE SCENARIO
MUNICIPALITY OF ANCHORAGE

PERIOD	1980-85	1985-90	1990-95	1995-2000	2000-05	2005-10
AVERAGE ANNUAL GROWTH RATE	4.6%	1.7%	1.5%	1.3%	1.5%	1.9%
FUNCTION						
Land Use	High	Low	Low	Low	Low	Low
Housing	High	Low	Low	Low	Low	Low
Education	Medium	Low	Low	Low	Low	Low
Police	High	Low	Low	Low	Low	Low
Fire Protection	Medium	Low	Low	Low	Low	Low
Recreation	Medium	Low	Low	Low	Low	Low
Health	High	Low	Low	Low	Low	Low
Social Services	High	Medium	Medium	Medium	Medium	Medium
Water	High	Low	Low	Low	Low	Low
Sewer	Low	Low	Low	Low	Low	Low
Power	Low	Low	Low	Low	Low	Low
Communications	Medium	Low	Low	Low	Low	Low
Solid Waste	Low	Low	Low	Low	Low	Low
Transportation	High	Medium	Medium	Medium	Medium	Medium

Explanation: This Table evaluates the impact (significance of effects] of forecast basecase growth rates upon the principal public service functions in Anchorage. A "low significance of effects" rating indicates an absence of significant constraints upon the community's ability to manage growth at established standards of service. A "medium" or "high significance of effects" rating indicates increasingly grave or costly physical, institutional or fiscal impediments to municipal growth management efforts.

TABLE 34
SIGNIFICANCE OF EFFECTS
SALE 87 MEAN PETROLEUM SCENARIO
MUNICIPALITY OF ANCHORAGE

PERIOD	1980-85	1985-90	1990-95	1995-2000	2000-05	2005-10
AVERAGE ANNUAL GROWTH RATE	4.7%	<2.0%	1.6%	1.4%	1.5%	1.9%
FUNCTION						
Land Use	High	Low	Low	Low	Low	Low
Housing	High	Low	Low	Low	Low	Low
Education	Medium	Low	Low	Low	Low	Low
Police	High	Low	Low	Low	Low	Low
Fire Protection	Medium	Low	Low	Low	Low	Low
Recreation	Medium	Low	Low	Low	Low	Low
Health	High	Low	Low	Low	Low	Low
Social Services	High	Medium	Medium	Medium	Medium	Medium
Water	High	Low	Low	Low	Low	Low
Sewer	Low	Low	Low	Low	Low	Low
Power	Low	Low	Low	Low	Low	Low
Communications	Medium	Low	Low	Low	Low	Low
Solid Waste	Low	Low	Low	Low	Low	Low
Transportation	High	Medium	Medium	Medium	Medium	Medium

Explanation: This Table evaluates the impact (significance of effects) of mean petroleum scenario growth rates upon the principal public service functions in Anchorage. A "low significance of effects'' rating indicates an absence of significant constraints upon the community's ability to manage growth at established standards of service. A "medium" or "high significance of effects" rating indicates increasingly grave or costly physical, institutional or fiscal impediments to municipal growth management efforts.

The relatively low growth rates foreseen in the basecase tend to depreciate the importance of physical and institutional constraints. On the other hand, the weakening fiscal condition of the State government and local governments accentuates the importance of fiscal constraints to managing growth impacts as well as for maintaining municipal services for the existing population. This overriding issue dominates the analysis.

With the exception of petroleum development, State expenditures have been the main force promoting, even subsidizing economic growth between 1978 and 1983. With the fattened revenues from production and sale of Prudhoe Bay oil, the State embarked on massive increases in both general operating and capital expenditures throughout the State and in the Anchorage region. Every municipal function analyzed has been directly affected by the State's fiscal policies. The traditional State governmental functions of greatest local importance - public education assistance, health and social services and transportation - have been greatly expanded. State funds have also been provided to local governments to enhance the functions that have historically been the responsibility of local government - police and fire protection, acquisition of recreational areas and expansion of water and sewer facilities.

The fiscal constraints are not likely to be relieved by slower growth. To the contrary, slower growth is in good part a result of cutting back the stream of State public expenditures, including municipal assistance

grants, that fed growth. Over the past decade, Alaskans in general and Anchorage residents in particular have not personally had to bear the costs of growth. In Anchorage, recent expansions of schools, roads, the police and fire protection services, the water system and recreational programs and the number of persons able to purchase homes have all been underwritten by State funds. Even if the State funded no more large-scale capital projects after 1984, the residents of Anchorage are still faced with stepped-up operating and maintenance costs to open and use all the facilities provided "free", with no debt retirement obligations, through State grants. Thus, a critical growth management issue facing the Anchorage region is its residents' willingness to pay more for municipal services and programs.

The population forecasts for the basecase scenario were depicted in Tables 24 through 28. Between 1980 and 2010, the population of Anchorage is forecast to rise from 174,431 to 322,619 persons. Under the assumptions of the MAP model, the most significant period of growth during this thirty year period is between 1980 and 1985 when the growth rate is projected to be about 4.6% After 1985, the annual average growth rate over successive five year intervals tapers off to 1.7%, 1.5%, 1.3%, 1.5% and 1.9% respectively.

To assess the impact of this growth on the existing community, the methodology examined the past capability of Anchorage to accommodate growth and present community conditions. Table 21 summarized the chief physical, institution and fiscal constraints to growth. Additionally,

the significance of effects on municipal functions from different population growth rates was rated as low, medium or high. See Table 22.

Based on the growth constraints and the significant of effects developed in the methodology compared to the basecase growth forecast by ISER, Table 33 was developed to evaluate basecase growth impacts on the Anchorage region. The summary findings of Table 33 are discussed below.

Infrastructure

LAND USE AND HOUSING

Anchorage's capacity to accommodate future growth is significantly dictated by the available land supply, by land use densities and by future overall development patterns. As described in the baseline chapter, only 46% of the Anchorage bowl now remains vacant and available for development, but much of that is marginal land unsuited for development, such as wetlands, steep slopes, or gravel extraction areas. The Anchorage bowl, Eagle River and Turnagain Arm Comprehensive Development Plans set the guidelines for future development which call for higher density residential development around marginal lands and adjacent to the central business district as well as significant low density residential development in Eagle River/Chugiak.

During the study period, the most critical time for the land use development is between 1980-1985. The pressure to accommodate the 4.5%

growth rate during this period is even now apparent from the increased activity of the construction industry within the municipality from 1980-1983. Table 35 depicts the number of building permits issued by the municipality during this period.

TABLE 35
BUILDING PERMITS
MUNICIPALITY OF ANCHORAGE 1980-1983

YEAR	VALUATION	# BUILDING PERMITS ISSUED	% INCREASE PERMITS ISSUED OVER 1980
1980	$154,438,434	1,995	
1981	422,752,126	3,771	68%
1982	562,696,106	5,646	183
1983*	480-550 Million	7,000	251

*Projected.

Source: Municipality of Anchorage.

The pattern of construction has followed the Comprehensive Plan in the redevelopment of older areas near the central business district and development of marginal lands in mid-town and south Anchorage as well as residential expansion in Eagle River. The most important physical barrier to growth (marginal wetlands) appears to have altered development patterns. The Anchorage "norm" of the single family detached home appears to be waning due to high land development costs and decreasing availability of vacant tracts with good soils.

The major social impact of the chief physical constraint to growth (lack of good soils) will be a shift toward higher residential densities in the form of large condominium projects and apartment complexes. For

established residents, this impact usually represents an unwelcome change in the community's character. On the other hand, for newcomers to homeownership, such as the young, the option of condominium or urban townhouse living will be more attractive than renting or commuting from outlying areas.

Beyond 1990, while the land supply in Anchorage may or may not become more plentiful through, for example, transfer of excess military lands or construction of the Knik Arm crossing, the pressure for new land development will subside. The capacity of the community to absorb projected growth through redevelopment at higher densities will ease the bind of limited land supply. In fact, by 2000, the projected rate of growth will have dropped so significantly from the 1980-1985 period that there ought to be no physical constraints to accommodating growth.

The institutional constraints may be reflected in alterations of zoning policies or may be affected by cutbacks in the State's home mortgage program. The basecase scenario assumes an inflation rate of 6.5% annually after 1985 which will result in continuing high market interests rates that reduce the purchasing power of the housing consumer. To compound matters, it is expected that, with falling revenues, there is slim likelihood that State-subsidized loan programs for home mortgage and commercial office space construction will continue.

To the extent that much of the growth of the 1980-1983 period was stimulated and subsidized by State expenditures, the basic dynamic of land development patterns in Anchorage is likely to shift when those funds are cut back. The demand for new housing will slacken in spite of population growth, because potential homebuyers will not be able to afford commercial interest rates or market construction costs. As a result, the ratio of families residing in rental apartments versus owner occupied units may begin to rise over the 1983 level. However, given the inflation assumption, it is also plausible that rental unit construction will lag after 1985, so that low income families may again experience significant difficulty securing affordable rental units.

COMMUNITY FACILITIES AND SERVICES

Education

The overall outlook for the provision of educational services during the study period is good. Even during the first half of the high growth period of 1980-1985, the Anchorage School District has been able to maintain an acceptable student to teacher ratio and construct facilities where new demand appeared in south Anchorage and Eagle River.

The principal constraint to growth has been the difficulty in finding suitable school sites in the areas undergoing residential expansion. This problem has been addressed with State funding. While it is more expensive to develop schools in. areas with poor soils, the capital costs

have been underwritten from 70 to 90% by the State School Debt Retirement Program. Similarly, operating expenses have been underwritten by the State's School Foundation Program. State funds for these programs are anticipated to be reduced in the post-1984 period. Still, the citizens of Anchorage have consistently supported their educational system and are expected to continue their support in the future when the growth impact evolves from medium to low.

Public Safety

The provision of police and fire protection is currently experiencing the highest demands expected within the timeframe of this study. The Anchorage Police Department increased its number of sworn officers in 1983 and has now achieved parity with national standards. Additionally, the fire protection area was expanded in 1983 to incorporate south Anchorage. Two new fire stations were completed in that growing suburban area. The Eagle River area still needs additional fire protection and the needed improvements are scheduled in the municipal 1984 capital improvements program.

ISER forecasts that the population growth rate will decline significantly after 1985. As discussed above, it is expected that the expansion of development into new areas will slow. Still, the operating expenses of the public safety functions are anticipated to grow at an average annual rate of 6-8%. Thus, the main constraint to providing public safety services will be fiscal. State revenue-sharing

and municipal assistance have helped defray the cost of these services, especially since 1978. If these funds decline, it will fall upon local property taxpayers to absorb the difference. As with education, Anchorage residents have traditionally supported appropriations for police and fire protection and are anticipated to continue their support in the future.

Recreation

At present, the primary need for recreation facilities is neighborhood parks in the fast growing residential areas of Anchorage. The main constraint to fulfilling this demand is funds for parklands acquisition, improvements and maintenance. Over the life of the study period, new demand for these facilities peaks between 1980 and 1985 when the growth rate is highest. While the actual population is anticipated to increase by nearly 150,000 persons-during the 30 forecast year period, the rate of growth falls off after 1985, as does the rate of new residential neighborhood development.

During the late seventies and early eighties, the State of Alaska provided substantial grants for parkland acquisition, such as the coastal trail, and for recreational facilities such as the sports arena and the proposed golf course and equestrian facilities. Such State capital grants for recreational projects are anticipated to be significantly reduced in the years ahead.

Traditionally, Anchorage voters have supported parks and recreation bond issues to pay for acquisition of parklands. If the future needs are to be met, it is likely that the municipality will again have to resort to bonding. If voters are unwilling to approve bonds for recreation development, Anchorage will not have adequate recreational capacity to accommodate the population projected much beyond 1995.

However, park maintenance and management is an operating cost that cannot be bonded. Over the long run, the capability of Anchorage to meet its recreational demands is anticipated to become increasingly a matter of funding maintenance and management of parks that are more intensively used' as residential densities climb.

Health

The Anchorage region's capacity to meet future demand for provision of health care services is largely in the hands of private health care providers. The acute care hospital beds necessary to meet short-term (1980 to 1985) demand are planned for completion by 1985, by both Providence and Humana Hospitals. The current high demand for in-patient psychiatric, drug and alcohol related rehabilitation will be met by the development of the Charter Medical Corporation facility.

However, there is no broad regional plan to meet the long--term need for intermediate, residential and transitional care. It is likely that a mix of public and private funding sources will be sought to meet these needs

but, ultimately, development of the needed facilities will hinge mostly on public sector policy and funding support.

The composition of the region's population is expected to become older in the late nineties and early part of the following decade. Thus, health care providers will have to target additional resources to care for the medical needs of the elderly.

Social Services

In contrast to the other community services assessed, social service tend to stress "soft" delivery systems rather than physical facilities. Federal, State and local government policies and funding levels will determine how the social needs of the future population are served. Responsibility for funding supplemental income programs and other programs designed to meet the needs of special groups (the elderly, abused persons, the handicapped and the unemployed) is shared by federal and State governments, both of which are showing a reluctance to improve or even maintain established service levels. According to the baseline description, the future provision of social services is expected to face serious institutional and fiscal constraints.

The changeability of government policies affecting the needy makes the status of social services difficult to forecast. Nonetheless, the population growth anticipated, together with the expectation of an economic slowdown, clearly indicates that a substantial share of the

population will continue to need financial support in the form of transfer payments, training programs and income assistance programs indefinitely. The current political climate underscores the high visibility and vulnerability of these programs in the budgetary process as policymakers seek ways to reduce expenditures for social programs. Future public attitudes and the fiscal capacity of federal and State governments appear to be the primary determinants of the community's ability to address future demand for social service. State revenues are declining and federal policy is shifting away from financial support for these services. Thus, it is anticipated that the needs of low income groups and other groups in need of social services will not be fully met during the study period.

Table 33 indicates that the growth impact on social services will be high from 1980 through 1985 and moderate thereafter.

Utilities

Water. The most significant constraint to supplying the future water demands of the Anchorage population is financing for development of the proposed new Eklutna River water supply. The 1983 legislature appropriated $22 million and the 1982 legislature appropriated $13.7 million to begin design and construction of the $150 million project. If the funds required to complete the project become available either from the State government and/or municipal revenue bonds, the future demand for water supply can be met through the study period.

Short-term demand is expected to be accommodated by increasing the capacity of the Ship Creek water treatment facility. This project was also funded with a capital grant from the 1983 legislature and construction is planned to be completed by 1985.

The highest growth impacts on water supply are occuring right now, with periodic water shortages anticipated during the summers of 1983 and 1984. The later portion of the study period generates lower impacts due to the falling growth rate. Nonetheless, it should be stressed that the region's long-term capacity to meet the demand for water depends on securing the remaining $114 million to develop the Eklutna water supply. Clearly, future capital requests to the State from Anchorage will place the Eklutna project at high priority since the municipality will be unable to support any future growth without it.

Sewer. Within the Anchorage bowl, expansion of the current wastewater treatment plant is needed to accommodate future population growth. The first portion of that expansion was funded by the 1983 legislature and it is anticipated that the remainder of that project will be funded either by additional State grants or by revenue bonds paid for by higher user charges. The future impact of growth on the provision of wastewater removal is low throughout the study period due to expected reserve capacities in the Anchorage bowl, Eagle River and Girdwood areas.

The Hillside Wastewater Plan has established the physical barriers to expansion of the system and is being adhered to in zoning regulations which determine the allowable density of development. Thus, there are no significant constraints or negative impacts of growth for the future provision of wastewater treatment within the study period.

Power. The most efficient means to supply the region's future demand for power is a matter of some controversy. The Cook Inlet supplies of natural gas which are now used to generate the bulk of the Anchorage region's electric power are anticipated to become inadequate to meet future power demands in fifteen to twenty years. Thus, alternative energy sources are currently being examined. The potential for large-scale hydropower generation within the next 20 years is still under debate as the Federal Energy Regulatory Commission reviews the Alaska Power Authority's proposal to construct the Susitna Dam complex. Of critical importance to FERC's decision is the economic feasibility of the project and the federal requirement for end use contracts committing Anchorage Municipal Light and Power Company and Chugach Electric Association to purchase Susitna power.

State grants have supported the initial feasibility work on the multi-billion dollar Susitna project and may need to be a primary source of construction dollars, if the project is to be deemed feasible. Without State funds, the power consumers will bear the cost of developing future fuel sources and expanding generation capacity.

Between the two utilities, the distribution network is in place. Both organizations have demonstrated the capability to expand their distribution networks to meet population distribution and are expected to meet this demand in the future. The primary constraint will be cost.

Overall, the impact of future growth is anticipated to range from medium in the immediate future to low throughout the rest of the study period. The reduction in growth rate over the last 35 years will allow the utility companies necessary lead time to prepare for the growing demand for power.

Communications. There are no major constraints to accommodating the future communications demands of Anchorage residents during the study period. Both the local and long distance service providers are in strong financial health and have demonstrated their capacity to accommodate rapid increase in demand during the 1980 to 1983 period.

The only significant impact of future growth "is related to the federal policy of deregulation of equipment. That policy will result in an increase in the cost of both installation and service, because the cost of local service is no longer "rolled into" the cost of interstate long distance toll rates. Ultimately, the population group most affected by this change, in Anchorage as well as the rest of the nation, will be low-income families and persons on fixed incomes. For these groups, the cost of owning a phone may well become prohibitive by 1995.

Solid Waste. The principal constraint to accommodating the future demand for solid waste disposal is the acquisition and development of an adequate site to replace the current Merrill Field landfill when it reaches capacity by 1986. The study to identify potential sites is currently underway and it is anticipated that the site will be selected and acquired by 1984. The availability of a suitable site within the Anchorage bowl is doubtful. Thus, it is anticipated that the location will be in an outlying area or outside the municipality.

User charges will finance the development of the new site. The impact of future growth is anticipated to be of medium intensity during the 1980 to 1985 period and low for the remainder of the study period.

Transportation

There are significant constraints to accommodating the transportation needs of future Anchorage residents, The adverse impacts upon transportation services are anticipated to be high from 1980 through 1985 and moderate throughout the rest of the forecast period.

While a significant volume of resources are committed to planning the future transportation system by both local and State officials, the implementation of the plans has not kept pace with local transportation demand. For vehicular traffic, the expansion of the road system requires massive financial investments. In 1983, the municipality adopted the "Accelerated Road Program" which compresses six years of

road construction projects into three years. The program cal 1s for $160 million in construction between 1984 and 1987. While a third of the funding could come from federal sources, the remaining $100 million is anticiapted to come from a combination of State grants and general obligation bonds. Future State oil revenues are anticipated to decline, so the statewide competition for capital funds will intensify. Thus, the likelihood that the State will be able to participate as fully as anticipated in development Anchorage's transportation system is doubtful.

While the transit system is expanding very rapidly, 80 percent of its operating costs are subsidized by local property taxpayers. However, there is growing public concern about rising taxes. The transit system, like social services, is a highly visible and popular target for budget cuts. As future operating support for local government from the State declines, the transit system may experience reductions in its fleet and service levels and, consequently, become less able to divert some of the future burden from the local traffic system.

The overall impact of growth on the provision of vehicular transportation services will be significant congestion and delay for persons and goods in transit within and through the Anchorage region during the study period.

The region's port facilities are anticipated to expand and easily accommodate the future demand for goods to be imported to and through

southcentral Alaska. If the State of Alaska assumes ownership of the Alaska Railroad, the port and railroad may serve as new source of economic expansion through cooperative use of their adjacent land-holdings.

Merrill Field has currently reached its capacity for tie-down facilities and for runway space for small planes. Future expansion is limited to a portion of the adjacent landfill when it is closed in 1986. However, that planned expansion cannot fully accommodate the future demand for small plane service in the bowl. Thus, even combined with the State-owned facilities at Lake Hood, small aircraft services will have to be expanded in the outlying areas of Eagle River-Chugiak. The physical constraints of land availability cannot be overcome within the Anchorage bowl .

PETROLEUM SCENARIO IMPACT' ASSESSMENT

The Sale 87 petroleum development scenario is anticipated to generate an increment of population growth in the Anchorage region beyond the basecase growth. This is consistent with the extra economic stimulus supplied by Sale 87. However, as was noted earlier in this analysis, the petroleum scenario adds only a minor measure of growth that is well within a reasonable range of forecasting error.

Tables 26 through 28 compared the total and incremental population growth and average annual growth rates accruing under the two scenarios.

Over the term of the scenario, the petroleum scenario is anticipated to draw an additional 10,414 residents to the Anchorage region. Total population at the end of the forecast period is projected at 333,033 for the petroleum scenario compared to 322,619 for the basecase scenario. This amounts to an increase of about 3.2% over the total population growth forecast for the basecase. See Table 26.

While the petroleum scenario does not make much difference over the long run, in the short run it does cause some consistent and characteristic, but brief and modest, differences in the timing and pace of growth. The strongest pulse of sale-related population growth occurs in the 1985-1990 interval during the exploration and early development phase. During that period, slighly less than 4,000 new residents are added to the region's population base. Otherwise, the petroleum scenario is not anticipated to add as many as 2,000 new residents in any five-year period. See Table 27.

It is worth noting that most of the continuing growth impact in the later two decades of the forecast do not arise from any change in the level of direct sale-related employment but from the MAP model's assumption that, independent of Sale 87, the region's secondary economy will continue to diversify and thereby amplify the employment and population impacts of a fixed level of Sale 87 direct employment. It is worth noting, too, that, according to the ISER forecasts, the growth effects of Sale 87 do not really become evident until after 1985, when the region's economy is beginning to flag. In contrast with the typical

impact model in which impacts magnify growth management problems, Sale 87's growth impacts serve to shore up a faltering private economy at a time when the pace of economic and population growth is contracting.

In comparison to the average annual growth rates which were established in the assessment methodology to mark growth thresholds the petroleum scenario's growth increment does not intensify growth rates sufficiently to push the region's growth outlook above the basecase thresholds. See Table 28 and Tables 33 and 34. Even in the peak period of 1985-1990, the petroleum scenario adds less than three-tenths of *one* percent to the Anchorage region's average annual growth rate. Again, this is at a time when the basecase growth rate *is* rapidly decelerating and so may help ease the private sector's downward economic adjustment.

Overall, in searching for potential impacts on specific community services and facilities, it appears that the petroleum scenario, at worst, may add a marginal increment of strain upon the only two functions - social services and transportation - which are anticipated to experience moderate growth-related impacts under the basecase scenario.

Finally, the petroleum scenario does not appear to have any gross fiscal impacts upon State government. According to the ISER forecasts of State government revenues and general fund expenditures, the petroleum scenario generally has a slight positive effect, due to associated onshore industrial facilities and prolongation of the economic life of

the trans-Alaska pipeline facilities. See Tables 31 and 32. Nevertheless, State revenues are anticipated to fall precipitously under the petroleum scenario, as under the basecase. Because Anchorage does not have access to the taxable property added by the scenario and is otherwise anticipated to experience fiscal strains, it is plausible that the Sale 87 petroleum scenario will marginally worsen the financial situation of the Anchorage Municipality,

APPENDICES

Municipality of Anchorage
Population Estimation Methodology

The estimate of the July 1, 1981 population for the municipality used the Housing Unit Method. This method relies on four components: a housing unit count, vacancy rates, average household sizes, and group quarters and military populations. Each of these elements is discussed in detail below.

The approach requires that the total housing count be reduced to an occupied housing count (household count) by subtracting out the calculated vacant housing units. This household count is then multiplied by the average household size to determine the household population. This is then added to the group quarters and military populations to determine the total municipal population. This method has the flexibility of permitting disaggregation geographically *or* structurally (data permitting) so as to produce accurate localized population estimates.

Housing Stock

In the spring of 1980, a Residential Land Use Survey was conducted by the Municipal Planning Department. This produced a 1980 benchmark housing unit count which differed only slightly from the 1980 Census Local Review housing counts by small area. In the spring of 1981, all growth areas within the municipality were recanvassed to update the 1980 count. Further updates were made for all areas by identifying new listings in the municipal tax assessor files. In addition, all mobile home parks containing at least 50 units in 1980 were recounted. The 1980 municipal housing atlas was then updated to 1981 by using this data.

Housing unit counts by seven structure types (single family, duplex, 3-4 units, 5-19 units, 20 or more units, mobile homes in parks, mobile homes on lots) were made by census block pieces. A census block piece is the smallest resulting geographic unit when the municipality is divided simultaneously into census blocks, grids (quartersections), traffic analysis zones and service areas. This results in approximately 3,000 census block pieces, of which 2,427 contain population.

Vacancy Rates

In July 1981, a Residential Vacancy Survey was conducted by the Municipal Planning Department. It covered all municipal housing, excluding the military bases and Girdwood/Alyeska. This survey was conducted as a windshield survey. The samples were chosen by a modified random block cluster method. Data was collected by census tract and by five structure types (single family, 2-4 units, 5 *or* more units, mobile homes in parks, mobile homes on lots).

Due to the high percentage of seasonal housing located in Girdwood/Alyeska, vacancy rates from the 1980 Census Local Review data was used for this area.

Average Household Size

The average household sizes used in the estimate were from the 1980 Census Local Review data. This data is broken down as overall rates by census tract only. The final census data is not yet available.

Military

The 1981 military population, which includes both military personnel and their dependents living on base, was obtained from the Department, of the Air Force, Headquarters Alaska Air Command.

Group Quarters

The number of people living in other types of housing (dormitories, boarding houses, correctional institutions, etc.) was determined by a telephone survey of these establishments. A list of these establishments was produced with the cooperation of the Planning Department's Human Resources Division.

BIBLIOGRAPHY

Alaska, State of, Department of Commerce and Economic Development, Division of Economic Enterprise. 1979. Numbers: basic economic statistics of Alaska census divisions.

_____, Department of Commerce and Economic Development, Division of Economic Enterprise. 1979. The Alaska economic information and report system, Anchorage outlook.

_____, Department of Health and Social Services. 1982. An overview.

_____, Department of Highways. 1976. Five-year highway construction program. Juneau, AK.

_____, Department of Highways. 1973. Anchorage metropolitan area transportation study. Juneau, AK.

_____, Department of Information Management Systems, Instructional Development/Planning and Valuation Divisions. 1982. Ten-year capital improvement program, analysis and recommendations; July 1, 1982-June 30, 1982. Anchorage School District, Anchorage, AK. 266 pp.

_____, Department of Labor. No date. Anchorage annual planning report for 1977-1981.

_____, Department of Labor. Various years. Alaska economic trends.

_____, Department of Labor. Various years. Alaska labor force estimates.

_____, Department of Labor. 1979. Alaska population overview. Juneau, AK.

_____, Department of Labor. 1979. Occupational employment statistics.

_____, Department of Labor, Employment Security Division, Research and Analysis Section. 1964-1980. Statistical quarterly. Juneau, AK.

_____, Department of Labor, Employment Security Division, Research and Analysis Section. 1978. Anchorage annual planning information, FY 1979. Juneau, AK.

_____, Department of Transportation. 1977. AMATS - unified work program, FY 1978. Anchorage, AK.

Alaska Pacific Bank. 1979. Alaska business trends, 1979 economic forecast. Anchorage, AK.

Alaska Power Authority. 1980. Susitna hydroelectric project and other power alternatives.

Alaska Water Study Committee, Electric Power Work Plan Committee. 1979. Southcentral Alaska water resources study, "level B," phase I electric power needs assessment. Anchorage, AK.

Anchorage, Municipality of. 1982. Anchorage Health Systems Plan. Draft. Anchorage, AK.

_____. 1982. Anchorage Park, Greenbelt and Recreation Facilities Plan. Anchorage, AK.

_____. 1977. MATS: transit development program, 1978-1982. Anchorage, AK.

_____. 1977. Anchorage health services plan. Anchorage, AK.

_____. 1977. Anchorage metropolitan area transportation study (AMATS): 1977-1995 long range element. Anchorage, AK.

_____. 1977. Municipal light and power 1978-1983 CIP. Anchorage, AK.

_____, Department of Enterprise Activities, Anchorage Telephone. 1977. Capital improvements plan 1978-1983. Anchorage, AK.

_____, Department of Health and Environmental Protection. 1982. Pipeline impact grant, Behavioral Health Division. Anchorage, AK.

_____, Municipal Health Commission, Department of Community Planning, Human Resources Planning Division. 1982. Anchorage health systems plan 1982-84. Draft. Anchorage, AK.

_____, Planning Department. 1981. Anchorage comprehensive development plan (revision). Draft. Anchorage, AK.

_____, Planning Department. 1980. Quarterly economic indicators. Anchorage, AK.

_____, Planning Department. 1979. Anchorage metropolitan area transportation study, 1979 long range transportation plan update. Anchorage, AK.

_____, Planning Department. 1978. 1978 housing assistance plan. Anchorage, AK.

_____, Planning Department. 1977a. Health services plan. Anchorage, AK.

_____, Planning Department. 1977b. Human resources study. Anchorage, AK.

_____, Planning Department, Air Quality Technical Committee. 1979. Anchorage air quality plan, 1979 SIP revision, *executive* summary, draft report. Anchorage, AK.

_____, Planning Department, Physical Planning Division. 1979. Eagle River-Eklutna comprehensive plan, draft report. Anchorage, AK.

_____, Planning Department, Physical Planning Division. 1977. Anchorage district coastal management program. Anchorage, AK.

Anchorage School District. 1982. Ten-year capital improvement program. Anchorage, AK.

CH2M Hill. December 1981. Eagle River water resource study, executive summa ry. Municipality of Anchorage, Water and Sewer Utilities, Anchorage, AK. 24 pp.

Ender, R.L. 1979. 1978 population profile, Municipality of Anchorage. University of Alaska, Anchorage Urban Observatory, Anchorage, AK.

_____. 1979. Alcohol and drug abuse in Anchorage, Anchorage health needs assessment study. University of Alaska, Anchorage Urban Observatory, Anchorage, AK.

Goldsmith, S., and E. Porter. 1981. Alaska economic projections for estimating electricity requirement for the railbelt. University of Alaska, Institute of Social and Economic Research, Anchorage, AK.

McGinnis, Frederick P. 1979. Health and social services needs and strategies in the 80's. Conference on Alaska's Future Frontiers. Juneau, AK. pp. D-75-I)103.

Selkregg, L., and E.H. Buck, editors. 1972. Environmental atlas of the greater Anchorage area borough. University of Alaska, Arctic Environmental Information and Data Center, Anchorage.

South Central Health Planning and Development, Inc. 1982. Health systerns plan 1982-1986. Anchorage, AK.

Tryck, Nyman and Hayes. 1973. Anchorage Water Sources. Anchorage, AK.

Tuck, B.H., and L. Huskey. 1981. St. George basin petroleum development scenario: economic and demographic analysis. OCS Technical Report No. 57. Bureau of Land Management. Anchorage, AK.

URS Company and Bomhoff & Associates. 1979. Greater Anchorage area wastewater study. Municipality of Anchorage, AK.

U.S. Army Corps of Engineers. 1979a. Metropolitan Anchorage urban study, final draft, vol. II, water supply. Anchorage, AK.

_____. 1979b. Metropolitan Anchorage urban study, final draft, vol. V, water supply. Anchorage; AK.

_____. 1979b. Metropolitan Anchorage urban study, final draft, vol . X, background information appendix. Anchorage, AK.

_____. 1977a. Metropolitan Anchorage urban study, state two report, part IV, wastewater treatment facility plan. Unpublished. Anchorage, AK.

_____. 1977b. Metropolitan Anchorage urban study, state two report, part V, water supply. Unpublished. Anchorage, AK.

_____. 1976. Metropolitan Anchorage urban study. Alaska District. Anchorage, AK.

U.S. Department of Commerce, Bureau of the Census. 1981. Alaska final population and housing unit counts. PH C 80-V-3. U.S. Government Printing Office, Washington, D.C.

U.S. Department of Health and Human Services. 1981. Economics and mental health. EN No. 1 (ADM) 81-1114. U.S. Government Printing Office, Washington, D.C.

U.S. Department of Housing and Urban Development. 1981. Housing situation report. Anchorage, AK.

U.S. Department of Labor, Bureau of Labor Statistics. 1980. Autumn 1979 urban family budgets and comparative indexes for selected urban areas.

Withers, B. 1979. Lower Cook Inlet statewide regional population and economic systems impact analysis: baseline conditions and forecast of conditions without the planned lease sale. Bureau of Land Management, Alaska Outer Continental Shelf Office. Anchorage, AK.

LIST OF INTERVIEWEES

Alaska Department of Health and Social Services - Dr. Fred McGinnis

Alaska Native Medical Center - Lloyd Hermansen

Alaska State Parks - Sandy Rabinowitch

Alaska State Troopers - Major Walter Gilmour

Central Alaska Utility - Bob Smith

Community Health Center - Brian Saylor

Chugach Electric Association - Ted Wellman

Humana Hospital - Sharon Anderson

Municipality of Anchorage
- Physical Planning - Mike Carberry, Tom Nelson
- Recreation and Leisure Activities - Bob Robertson, Mary Putnam
- Anchorage Telephone Utility - Al Pistorius, A? Moraunas
- Anchorage Water Utility - Bob Smith, Louis Bonito, Al Sundquist, Joe Nicholson
- Municipal Light and Power - Tom Stahr
- Solid Waste Disposal - Joel Grunwaldt
- Social Services - Sam Cornell, Jewel Jones
- Human Resources - Don DeMaris, Jan Gahler
- Municipal Utilities - John Harshman
- Anchorage Fire Department - James Evans
- Anchorage Police Department - George Novacky
- Anchorage School District - William Schaedal

University of Alaska - Cecilia Kleinkauf