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KNIK ARM CROSSING: THE ECONOMIC IMPACT ON ANCHORAGE

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November 15, 1983

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KNIK ARM CROSSING: THE ECONOMIC IMPACTS ON ANCHORAGE

Summary

This study analyzes two major categories of economic impact on Anchorage of construction of a Knik Arm crossing. The first is the effect associated with construction and is measured by temporary increases in employment, population, and personal income. A downtown high bridge, constructed between 1985 and 1989, would generate an annual average of about 555 direct jobs in construction and an additional 416 support-sector jobs based upon the multiplier effect. Personal income would increase by $241 million. An Elmendorf low bridge would have a smaller construction impact of about 402 construction and 298 support-sector jobs on an average annual basis over five years. Personal income would grow by $177 million.

After construction, the primary economic effect of a Knik Arm crossing on Anchorage would be the movement of people and jobs from the Municipality into the Point McKenzie area. The rate at which that would occur is very sensitive to several factors, including the rate of growth of housing demand, the attractiveness of Point McKenzie relative to other residential locations, land availability and allowable density of development, and the rate of upgrade of the Anchorage housing stock.

Because there is a substantial degree of uncertainty in projecting each of these factors over a long period of time, the potential range of outcomes for settlement patterns is substantial. If housing demand growth continues to be strong after 1990 because of strong economic growth, continued decline in the average household size, and attractive housing prices and a large amount of land becomes available for development at Point McKenzie, as many as

29 thousand people and 12 thousand housing units may relocate across Knik Arm by 2000. On the other hand, slow demand growth and limited land availability could reduce the population and housing unit relocation totals by 2000 to 5 thousand and 2 thousand, respectively. Different assumptions concerning housing demand and availability produce estimates in the range of 16-to-24 thousand for population and 6-to-9 thousand for housing units.

This analysis is not exhaustive either in its examination of assumptions underlying the distribution of population and housing units after construction of a crossing or in its cataloguing of economic effects. The most important economic effect for Anchorage is resettlement, and this study has clearly shown that there is a considerable range of possible magnitudes for that effect.

I. ANCHORAGE POPULATION, EMPLOYMENT, AND HOUSING STOCK PATTERNS

Anchorage's employment, population, and housing stock all grew rapidly from 1975 to 1983, the period over which complete data is available. Table I.1 shows selected historical data for the Municipality of Anchorage as well as the Matanuska-Susitna Borough. Over the eight-year period, Anchorage wage and salary employment grew at an average rate of 5.1 percent while population grew at 3.2 percent and the housing stock at 6.2 percent.

The faster growth in employment than in population is partially attributable to an increasing labor force participation rate while the more rapid increase in housing stock than in population reflects the falling average household size. The growth of the housing stock favored multifamily units (more than two units) including condominiums. Whereas in 1975, 39 percent of units were multifamily, 47 percent of units built since then have been multifamily.

Matanuska-Susitna wage and salary employment grew at an annual rate of 12 percent while population grew at 13.5 percent. The faster growth in population than in employment can be attributed to the increasing number of households living in Matanuska-Susitna whose primary worker is employed in Anchorage or other locations outside the borough.

TABLE I.1. HISTORICAL POPULATION, EMPLOYMENT, AND HOUSING STOCK
(thousands)

	Anchorage					Matanuska-Susitna			
	Wage and Salary Employment	Population[2]	Average Household Size[3]	Housing Stock SF[4]	Housing Stock Other	Wage and Salary Employment	Population[2]	Average Household Size	Occupied Housing Stock
1960	–	–	3.41	–	–	–	–	3.38	–
1961	19.8	–		–	–	–	–		–
1962	21.5	–		–	–	–	–		–
1963	22.1	–		–	–	–	–		–
1964	28.1			–	–	–	–		–
1965	30.7	–		–	–	1.0	–		–
1966	31.5	–		–	–	1.0	–		–
1967	32.9	–		–	–	1.0	–		–
1968	34.0	–		–	–	.9	–		–
1969	37.8	–		–	–	.9	–		–
1970	42.0	130.2	3.39	–	–	1.0	6.6	3.40	–
1971	45.5	136.5		–	–	1.3	7.2		–
1972	48.3	144.0		–	–	1.3	7.8		–
1973	50.6	146.1		–	–	1.5	8.5		–
1974	58.7	151.0		–	–	1.6	9.4		–
1975	69.3	173.6		29.0	18.8	1.9	11.1		–
1976	73.0	187.4		30.7	21.8	2.1	13.5		–
1977	77.9	189.7		32.5	24.2	2.4	15.5		–
1978	77.0	183.6		34.3	26.1	2.7	16.7		–
1979	77.6	180.2		35.7	26.7	2.9	18.4		–
1980	78.8	179.0	2.74	37.0	28.0	3.6	20.2	3.06	–
1981	87.8	184.7		37.9	27.9	3.4	23.3		6.7
1982	95.4	200.5		40.6	29.5	4.2	25.2		–
1983[1] (est.)	103.0	224.0		44.6	32.6	4.7	30.6		9.6

[1]Author's estimate; 1983 Matanuska-Susitna Population from Matanuska-Susitna Planning Department.

[2]1970-1982 Alaska Department of Labor, July 1 estimates.

[3]1980 excludes military on-base population.

[4]Single family (includes duplexes).

Over the same period, the distribution of additions to the housing stock has depended upon the location of available land for development and its characteristics. The subregions shown in Figure I.1 are aggregates of Traffic Analysis Zones used by the Municipality of Anchorage. Figure I.2 shows total housing-unit holding capacity and the evolution of settlement patterns in the ten subregions comprising the Municipality of Anchorage. While the forces which determine the inter-urban location of households are complex, Figure I.2 suggests that those areas with relatively more holding capacity, defined as the sum of current housing units and potential number of units which could be added based upon current zoning regulations (available holding capacity), receive the largest share of new housing.[1] This relationship, however, can be misleading. An area with a great deal of total holding capacity would <u>not</u> be expected to attract a large share of new housing if most of the capacity in that area were already used. The relative amount of <u>unused</u> holding capacity is a more appealing predictor of the allocation of new housing units. Table I.2 shows subregion growth and growth rates as well as a comparison of each subregion's share of the total growth to its share of <u>available</u> holding capacity.

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[1]Available holding capacity was calculated from the Municipality of Anchorage Community Planning Department's inventory of undeveloped residential acreage. This inventory includes estimates of potential future dwelling units by type (single family, duplex, and multifamily) based on current zoning and proposed densities. Available holding capacity is defined simply as the Municipality's estimate of potential future dwelling units.

Figure I.1. Greater Anchorage Subregions

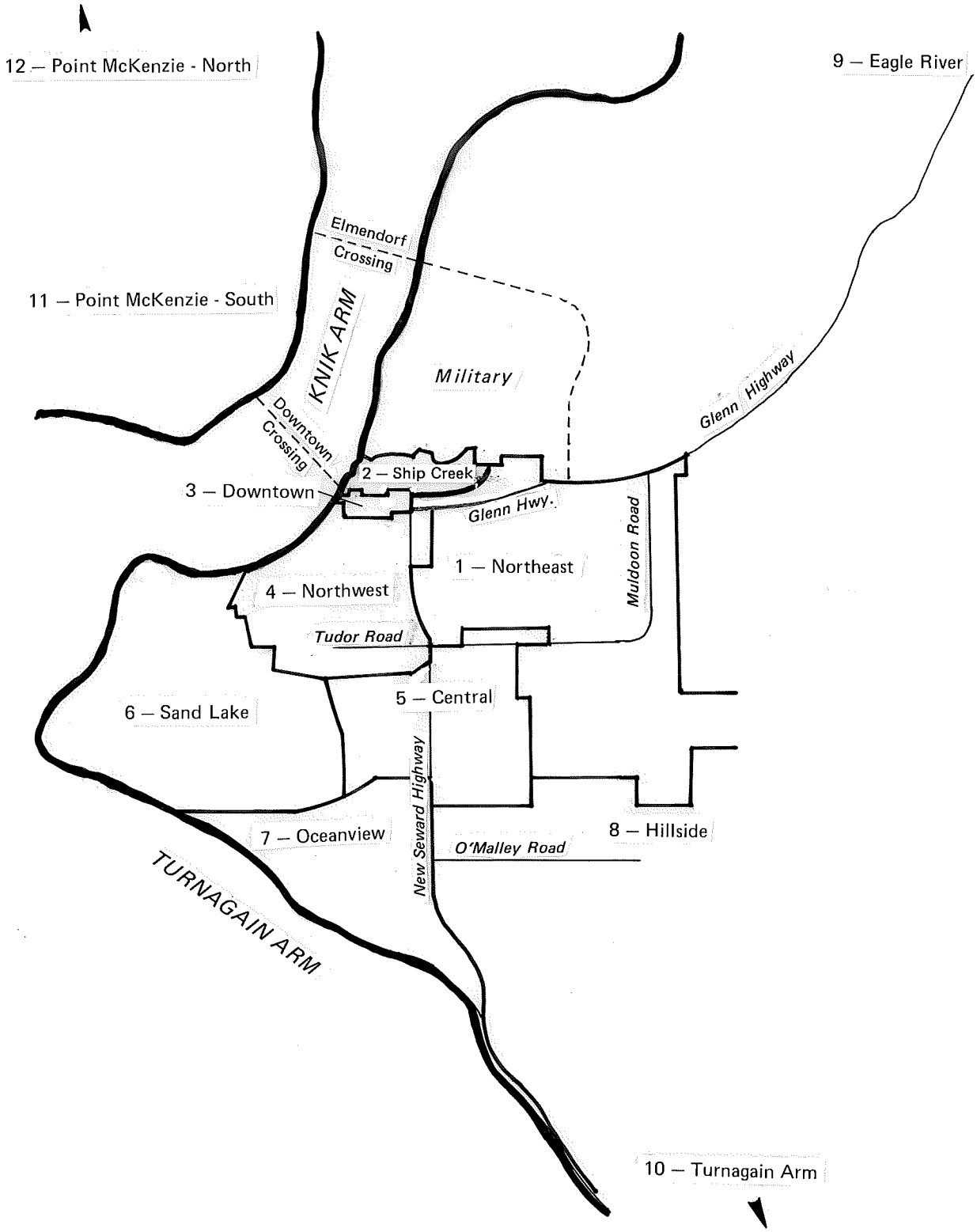
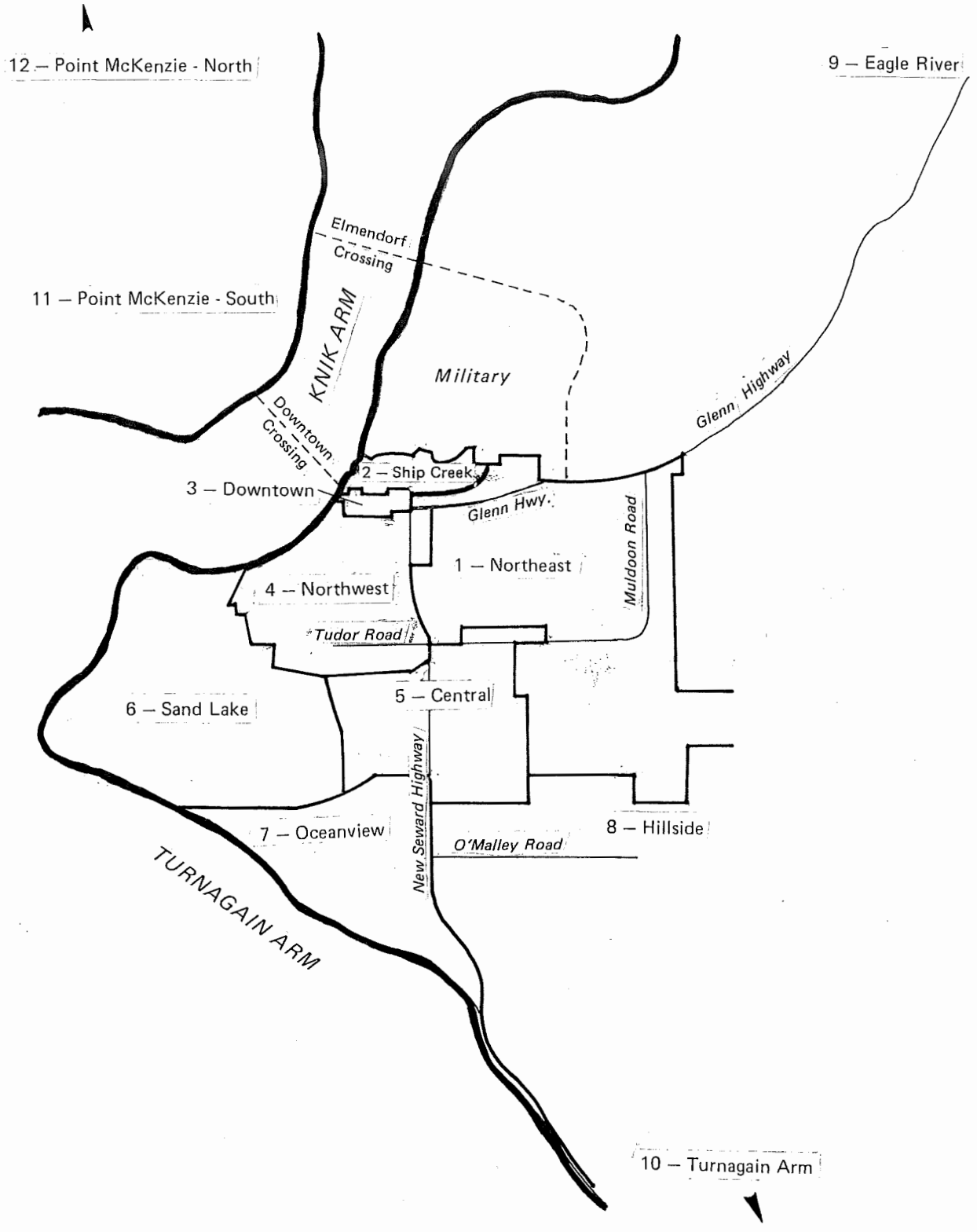


Figure I.1. Greater Anchorage Subregions



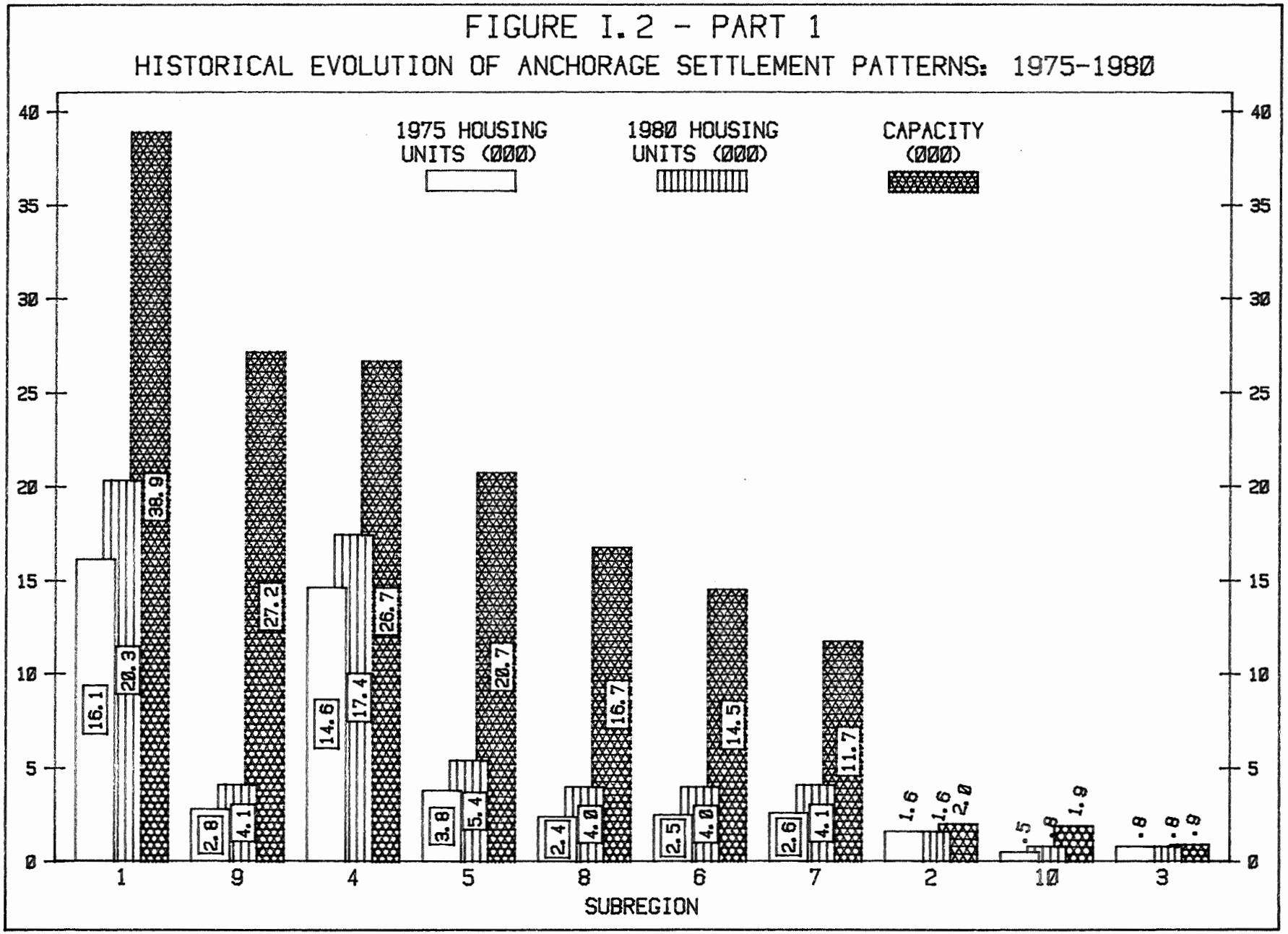


FIGURE I.2 - PART 1
HISTORICAL EVOLUTION OF ANCHORAGE SETTLEMENT PATTERNS: 1975-1980
1975 HOUSING UNITS (000)
1980 HOUSING UNITS (000)
CAPACITY (000)
40
35
30
25
20
15
10
5
0
16.1
20.3
38.9
2.8
4.1
27.2
14.6
17.4
26.7
3.8
5.4
20.7
2.4
4.0
16.7
2.5
4.0
14.5
2.6
4.1
11.7
1.6
1.6
2.0
.5
.8
1.9
.8
.8
.9
1
9
4
5
8
6
7
2
10
3
SUBREGION

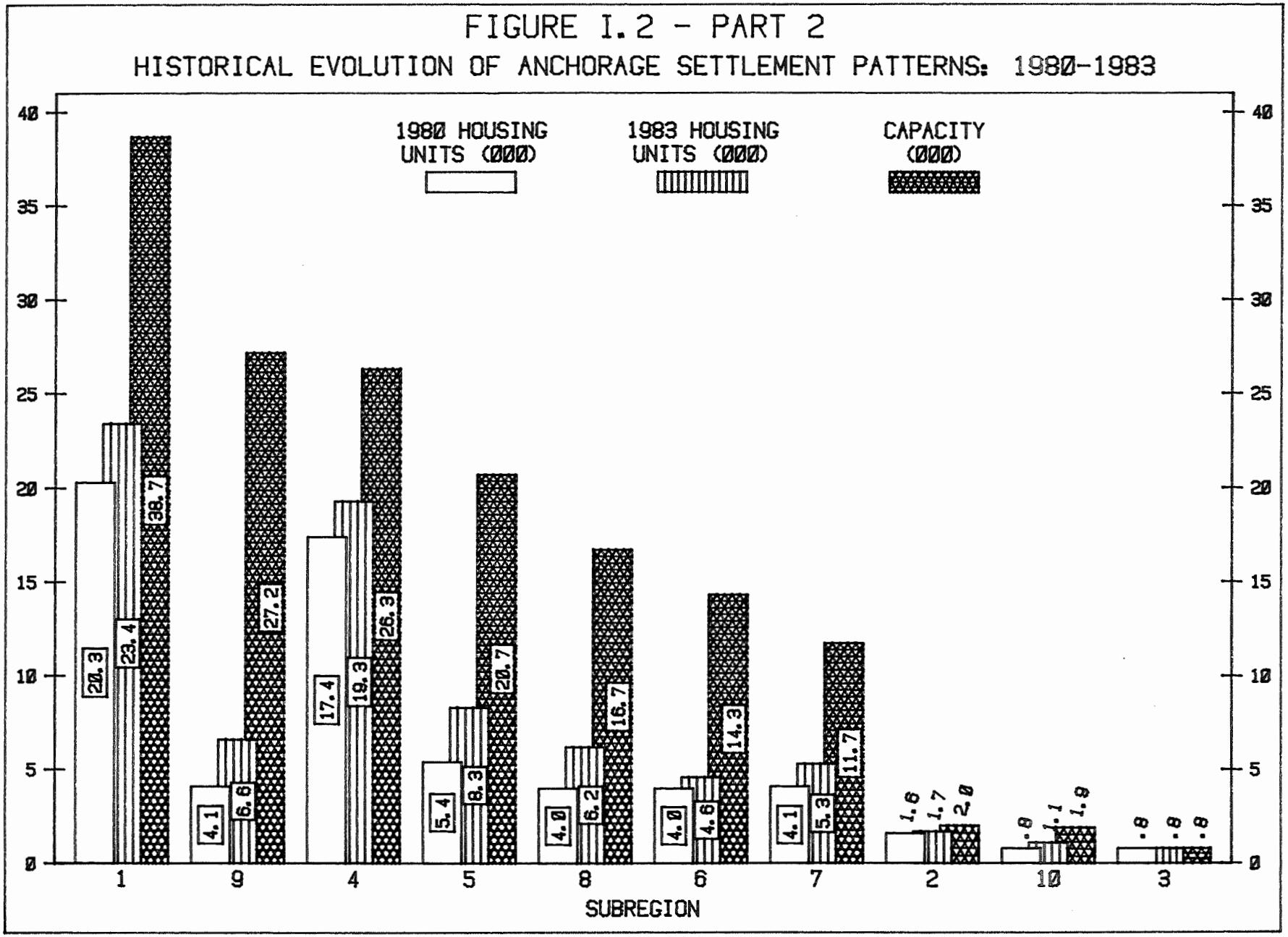


FIGURE I.2 - PART 2
HISTORICAL EVOLUTION OF ANCHORAGE SETTLEMENT PATTERNS: 1980-1983
1980 HOUSING UNITS (000)
1983 HOUSING UNITS (000)
CAPACITY (000)
40
35
30
25
20
15
10
5
0
20.3
23.4
38.7
4.1
6.6
27.2
17.4
19.3
26.3
5.4
8.3
20.7
4.0
6.2
16.7
4.0
4.6
14.3
4.1
5.3
11.7
1.6
1.7
2.0
.8
1.1
1.9
.8
.8
.8
1
9
4
5
8
6
7
2
10
3
SUBREGION

TABLE I.2. ANCHORAGE HISTORICAL HOUSING STOCK GROWTH

Subregion	1975-1983 Change in Housing Stock	1975-1983 Average Annual Growth Rate (%)	Share of Total 1975-1983 Change in Housing Stock	Share of 1975 Available Holding Capacity
Northeast (1)	7,256	4.75	.247	.201
Eagle River (9)	3,813	11.36	.130	.216
Northwest (4)	4,702	3.56	.160	.107
Central (5)	4,494	10.24	.153	.148
Hillside (8)	3,780	12.56	.128	.126
Sand Lake (6)	2,113	7.88	.072	.105
Oceanview (7)	2,727	9.33	.093	.080
Ship Creek (2)	49	.37	.002	.003
Turnagain Arm (10)	550	9.15	.019	.012
Downtown (3)	-68	-1.04	-.002	.001
Total	29,416	6.17	1.0	1.0

Two important relationships can be observed in Table I.2. First, with only a few exceptions, those areas with the most available holding capacity had the highest housing stock growth rates. And second, the share of total housing stock change going to a particular subregion is closely related to that subregion's share of the total unused holding capacity. This suggests that unused holding capacity may be a good predictor of the long-run allocation of housing stock growth. In fact, the Northeast and Northwest subregions "filled up" faster than their share of available capacity would suggest; while for Sand Lake and Eagle River, the rate was

slower. This suggests that other factors such as neighborhood characteristics, the level of public services, land prices and ownership patterns, and soil conditions will also affect the attractiveness of a given location for residential development; but the historical data suggest that land availability (unused holding capacity) is an important factor in determining the long-run allocation of the housing stock.

This is particularly true in a fast-growth economy such as Anchorage's since replacement of existing units is relatively unimportant. The rapid growth in the Anchorage housing stock over the last decade means the majority of Anchorage's housing stock is fairly new, and we would expect demolitions of older housing to decrease as a percentage of the total stock.

While data on actual demolitions is not available and the aggregation of the housing stock change data into large areas masks demolition activity, we can make some general observations. In areas that will remain predominantly residential, demolished units are usually replaced by new units, either on the same site or somewhere else in the same area, and very often in the same year the demolition of the units takes place. When the housing stock is growing rapidly, as it is in Anchorage, more new units will be built than older units are demolished, so the net change will be positive and the demolition of older units will be "masked" in the data.

This is particularly true when the data is aggregated into fairly large areas.

In areas in which land-use patterns are changing, demolition of units may become more apparent. In downtown Anchorage, for example, older single-family units are giving way to commercial buildings and higher-density residential development, and we actually see a net decline in housing units.

On a municipality-wide basis, the rapid growth in the housing stock results in a fall in the average age of the stock. While a significant number of older units may have been demolished over the recent period of rapid growth, the overall decline in the age of the stock that results from rapid growth means the demolition rate in the near future should decline. The demolition rate may, however, remain high in those subregions where the housing stock is older. We would then expect higher density replacement to be a factor in these subregions.

In summary, Anchorage's housing stock grew rapidly between 1975 and 1983, faster than both population and employment. Housing stock growth rates varied widely by location, and unused holding capacity appears to be a significant factor explaining the allocation of new units. Because the rapid growth results in a decline in the average age of the housing stock, demolitions as a percentage of the total stock should decline in the near future.

II. ANCHORAGE--1983 TO 2000

Table II.1 presents aggregate projections of employment, population, households, and housing stock for Anchorage in the absence of a Knik Arm crossing.[2] Municipality of Anchorage employment and population grow at essentially the same rate while households grow much faster, indicating a continuing reduction in average household size. Both employment and population are projected to grow at a slightly higher rate between 1990 and 2000 than between 1983 and 1990 while growth in off-base households, because of the projected changes in household size, increases at essentially the same rate in both periods. The timing of growth will influence the impact of a Knik Arm crossing on settlement patterns. The faster is growth after construction of a crossing, the more households we would expect to settle at Point McKenzie across Knik Arm.

The projected growth of households shown in Table II.1 implies a growth in the housing stock from 77,200 in 1983 to 132,400 in 2000, or a net change of 59,200. Because of 9,800 demolitions, actual additions to the housing stock are forecast to be 65,000--30,900 single family (including duplexes) and 34,100 multifamily. The 1983 available capacity in Anchorage of 88,450 units falls to

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[2]This projection is based upon assumptions of growth in basic sector activity obtained from the Municipality of Anchorage Planning Department staff.

TABLE II.1. ANCHORAGE EMPLOYMENT AND POPULATION:
NO KNIK ARM CROSSING

(thousands)

	Employment	Permanent Population	Households (Off-Base)	Housing Stock	Matanuska-Susitna Employment
1983	122.0	224.0	74.8	77.2	4.2
1984	124.0	227.0	76.5	79.0	4.2
1985	125.0	231.0	78.4	80.9	4.3
1986	126.0	234.0	81.7	83.3	4.5
1987	127.0	237.0	83.4	86.1	4.6
1988	129.4	240.8	85.7	89.0	4.7
1989	132.6	247.0	88.8	92.3	4.8
1990	136.7	255.0	92.6	96.3	5.0
1991	138.6	259.0	94.9	100.1	5.0
1992	144.2	269.7	100.0	104.1	5.3
1993	146.7	274.7	102.8	107.9	5.3
1994	149.6	280.4	106.0	111.1	5.4
1995	152.4	286.0	109.2	114.0	5.5
1996	155.9	292.7	113.0	117.6	5.6
1997	158.8	298.5	116.4	121.6	5.7
1998	161.4	303.6	119.4	125.4	5.8
1999	164.1	309.0	123.1	128.9	5.9
2000	166.7	314.0	126.4	132.4	5.9
Annual Growth	1.9	2.0		3.2	2.0

SOURCE: BIG.TR4 variables A.MP.99, B.MP.99, A.POP; LOCNEWB variables A.HHOFF HS; author's estimates.

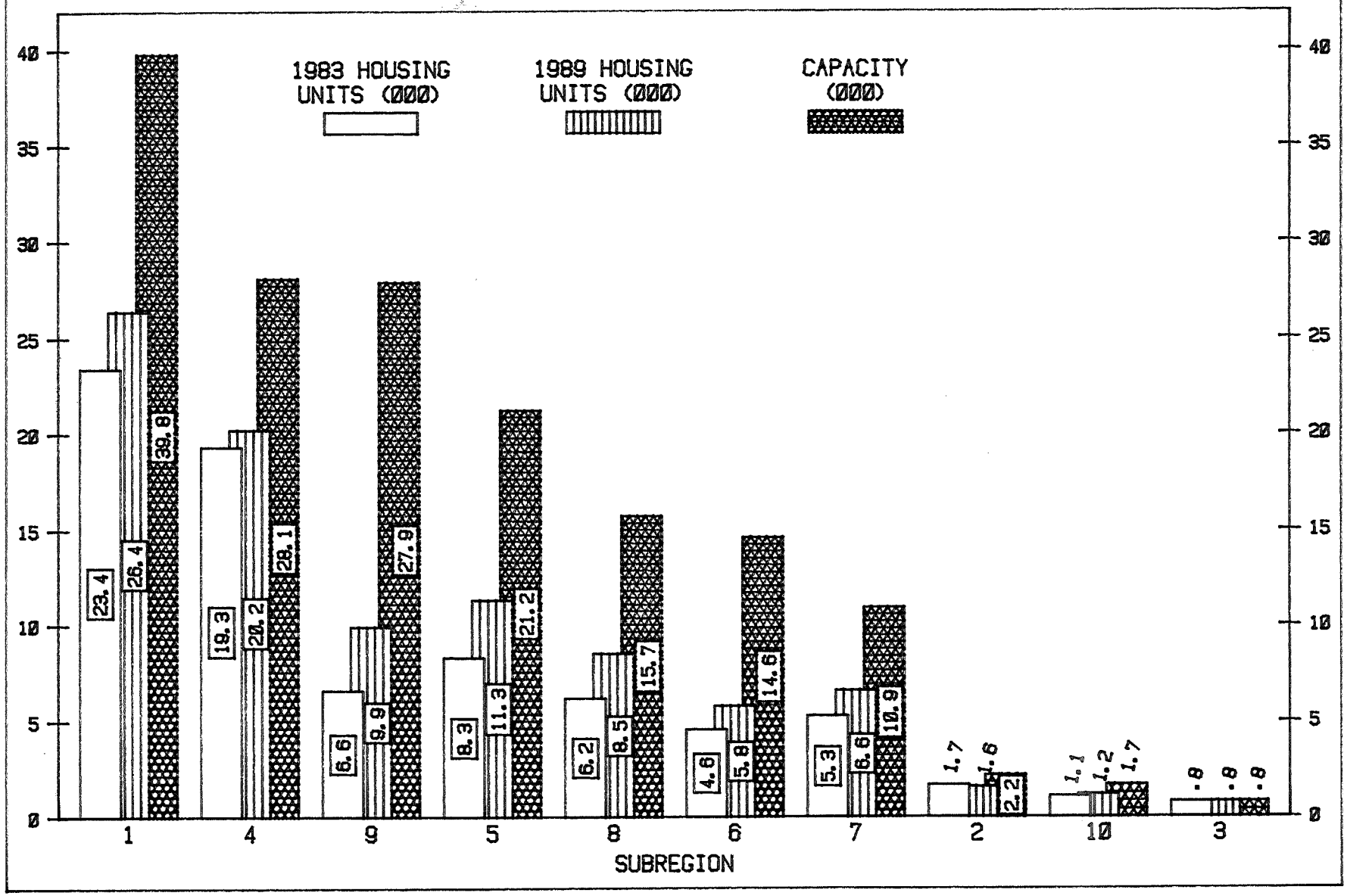
32,575 in 2000. Of the available capacity in 2000, 18,760 are single-family and 13,815 are multifamily units.

Employment in the Matanuska-Susitna Borough is projected to grow slightly faster than that in Anchorage. Matanuska-Susitna employment is very important when considering the impact of a Knik Arm crossing. If Matanuska-Susitna employment were to grow rapidly at the expense of employment in Anchorage, we should see a shift of population out of Anchorage to Matanuska-Susitna and a lower demand for housing at Point McKenzie and for trips over a crossing. Population growth in the Matanuska-Susitna Borough is partially a function of Anchorage employment. The population figure projected for Anchorage assumes that a portion of in-migrants who fill jobs in the Anchorage labor market choose to live in the Matanuska-Susitna Borough. Thus, the distribution of the housing stock is based upon the resident population of the Municipality only.

Figure II.1 shows the projected distribution of housing stock in 1989 and 2000 in the absence of a Knik Arm crossing. The projection continues the historical trend of most new housing being located in the subregions with the largest amount of available holding capacity. Differences between subregions in the amount of new housing each receives as a share of its unused holding capacity are attributable to differences in other factors which influence housing location decisions. These other factors include proximity to employment centers, the level of public services, neighborhood

FIGURE II.1 - PART 1

PROJECTED 1989 ANCHORAGE SETTLEMENT PATTERNS: NO KAC



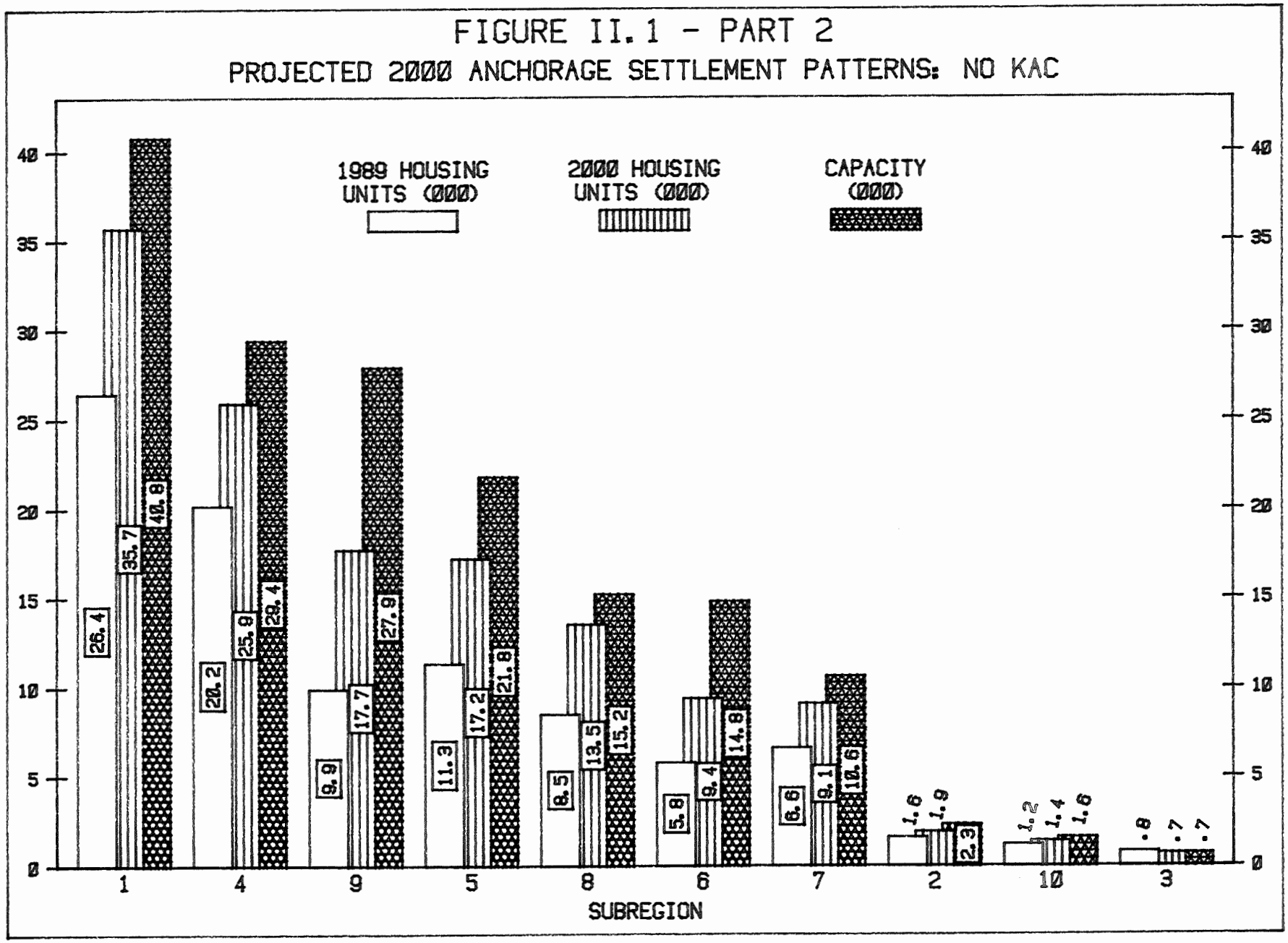


FIGURE II.1 - PART 2
PROJECTED 2000 ANCHORAGE SETTLEMENT PATTERNS: NO KAC
1989 HOUSING UNITS (000)
2000 HOUSING UNITS (000)
CAPACITY (000)
40
35
30
25
20
15
10
5
0
26.4
35.7
40.8
20.2
25.9
29.4
9.9
17.7
27.9
11.3
17.2
21.8
8.5
13.5
15.2
5.8
9.4
14.8
6.6
9.1
12.6
1.6
1.9
2.3
1.2
1.4
1.6
.8
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.7
1
4
9
5
8
6
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2
10
3
SUBREGION

characteristics, soil conditions, land prices, and the tastes of households.

The allocation of new housing stock to Anchorage's subregions is predicated on the projected growth in total employment, population, households, income, and the price of housing.[3] We would expect the allocations to be sensitive to variations in the growth of those variables, but the nature and degree of the sensitivity is uncertain. For example, variations in the growth of those variables can affect the distribution in demand for single-family and multifamily housing. Because the amount of single-family and multifamily holding capacity varies a great deal between Anchorage subregions, the aggregate distribution between the two housing types will affect the total housing unit allocation. The results of some sensitivity tests assuming lower employment, population, and household growth than in the current base case can be found in Appendix A.

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[3]We assume that the price of housing remains attractive through a continuation of state subsidies.

III. KNIK ARM CROSSING IMPACTS--CONSTRUCTION

In projecting the overall economic and population impacts, we consider two crossing configurations (see Figure I.1). The first stretches from Elmendorf AFB to Point McKenzie with access to the crossing running from the intersection of Boniface Parkway and the Glenn Highway through Elmendorf. The second stretches from downtown Anchorage to Point McKenzie.

The Elmendorf crossing, because it is above the Port of Anchorage, would be a low bridge comprised of a series of steel spans. It is likely that the spans would be built in Korea and floated into place. The downtown crossing, because it is below the Port of Anchorage and must allow for the passage of ships, would be a high bridge which would be built completely on site, requiring more local employment.[4] Because of the differences in the two crossings, the direct construction employment impacts would be different and, therefore, would have different effects on the overall Anchorage and Matanuska-Susitna economies. Table III.1 shows both the direct and overall employment impacts of the two proposed crossings assuming construction occurring during the interval 1985 to 1989.[5] The induced employment impacts will be

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[4]Knik Arm Crossing Draft Corridor Alternatives Analysis, August 1983.

[5]Employment is measured as annual average; seasonal peaks would exceed these figures.

TABLE III.1. IMPACT OF KNIK ARM CROSSING CONSTRUCTION

Elmendorf Low Bridge

	Employment (000)		Population	Personal Income
	Direct	Total	(000)	(million $)
1985	.300	0.491	0.470	24.312
1986	.700	1.176	1.307	59.566
1987	.400	0.728	1.190	35.414
1988	.362	0.643	1.111	33.430
1989	.250	0.460	0.982	24.223
Average	.402	.700	1.012	35.389

Downtown High Bridge

	Employment (000)		Population	Personal Income
	Direct	Total	(000)	(million $)
1985	.838	1.375	1.314	68.246
1986	.612	1.085	1.551	51.691
1987	.635	1.113	1.658	56.461
1988	.442	0.803	1.509	40.824
1989	.250	0.477	1.199	24.121
Average	.555	.971	1.446	48.269

SOURCE: BIG.EL and BIG.DT variables S.MP.99, POP, S.Y.YR.

lower in Matanuska-Susitna than in Anchorage because Matanuska-Susitna depends on Anchorage for much of its support sector activities.

Population and personal income also increase due to construction of a crossing. Population increases to provide the labor force to fill the jobs. Personal income increases are primarily related to the direct and indirect wages and salaries paid.

IV. KNIK ARM CROSSING IMPACTS--SETTLEMENT PATTERNS

The effect on settlement patterns of building a Knik Arm crossing depends upon a number of factors. Most important among these are the five listed in Table IV.1. They are the condition of the local economy in the years after the crossing is completed, the actual and perceived accessibility (attractiveness) of Point McKenzie as a residential area, the availability of land at Point McKenzie for development, the density at which development would be allowed to occur, and the rate of upgrade in the existing Anchorage housing stock.

TABLE IV.1. FACTORS DETERMINING SETTLEMENT PATTERNS

Factor	Examples
1. Growth in Housing Demand	Population, employment, income growth, fall in average household size, continued subsidization of housing mortgage rates.
2. Relative Accessibility of Different Areas	Location of bridge, Glenn Highway upgrade
3. Residential Land Availability at Point McKenzie	
4. Density of Land Development at Point McKenzie	
5. Rate of Upgrade of Existing Substandard Housing Stock	Higher density zoning in Spenard

The effect of a crossing on settlement patterns depends on the timing of crossing construction, particularly on the condition of the local economy after the crossing is completed. If the economy is growing, bringing with it population growth and the demand for new housing, more units would be built on Point McKenzie than if the economy is stagnant or declining and the demand for new housing is low.

Two crossing alternatives were recommended in the Knik Arm Crossing Corridor Alternatives Analysis: a low bridge spanning the Arm from Elmendorf AFB to Point McKenzie and a high bridge (to allow ship access to the Port of Anchorage) spanning the Arm from downtown Anchorage to Pt. McKenzie. The two alternatives will differ in their effect on settlement patterns in that they offer different levels of access from Point McKenzie to the employment centers in Anchorage. The downtown crossing offers more direct and quicker access (measured in travel times) than does the Elmendorf crossing with its approach road running through the base to the intersection of Boniface Parkway and the Glenn Highway. Travel time to downtown Anchorage is estimated to be ten minutes longer for the Elmendorf crossing than for the downtown crossing.[6] Although there is uncertainty about how sensitive settlement patterns are to this difference in access, we would expect the downtown crossing, with its shorter travel time, to result in more activity (for example,

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[6]Knik Arm Crossing Corridor Alternatives Analysis, August 1983.

residential development) at Point McKenzie than would the Elmendorf crossing.

Because Point McKenzie represents a new opportunity for settlement once a crossing is built, there is uncertainty about how attractive it will be as a residential area. The perceptions of households about the desirability of the area and the extent to which Point McKenzie represents a good substitute for areas in Anchorage and Matanuska-Susitna will determine the demand for housing on the Point McKenzie side of the crossing. Because the new area represents a locational choice which currently does not exist, it is difficult to assess what household perceptions and demand will actually be. Comparisons to existing residential areas such as Eagle River, the Hillside, or Palmer/Wasilla can, however, provide a basis for assumptions about Point McKenzie's attractiveness. Of those three areas, Eagle River appears to be the most comparable to the Point McKenzie area closest to Anchorage. The Hillside area is much further along in the development process and has increasingly become a high-income area with premiums paid for scenic views and isolation. Palmer and Wasilla are much further away and only represent a residential location for Anchorage workers to a limited extent. The northern Point McKenzie zone, north of the Goose Bay Game Refuge, more closely resembles Wasilla in its travel time to Anchorage and the characteristics of the land. In our analysis, therefore, we assume that the southern Point McKenzie area resembles

Eagle River in its attractiveness to Anchorage residents and that northern Point McKenzie resembles Wasilla.

Just as there is a great deal of uncertainty about the attractiveness of the Point McKenzie area, there is also uncertainty about the availability of land for residential development there. In the southern area, approximately 31 percent, or 15,600 acres, is private or Native land, with the remaining 34,900 acres owned by the Matanuska-Susitna Borough or the state. In the northern zone, approximately 37 percent, or 16,300 acres, is private or Native land; the remainder is owned by the Matanuska-Susitna Borough or the state. Matanuska-Susitna Borough planning officials have stated the Borough is reluctant to open Borough-owned land to residential development for fiscal reasons. The Matanuska-Susitna Borough Draft Comprehensive Plan designates all Borough land in the southern area, and almost all in the northern zone, for industrial use and the state-owned land for either public or agricultural use. At densities proposed by the Matanuska-Susitna Borough, which range from one unit per acre to one unit per five acres or more, the holding capacity of the southern area is 4,903 units, and that of the northern area is 9,122 units. These are one set of land availability and density of development assumptions we use in our simulations.

Alternative assumptions about availability of public land for residential development and allowable densities can give

substantially different holding capacity numbers. In alternative simulations, for example, we assume half of the Matanuska-Susitna Borough-owned land becomes available for residential use, and all land has a maximum density of two units per acre. This yields holding capacity assumptions of 41,488 units for the southern area and 50,222 units for the northern area. Both the availability of Borough land and allowable densities are political considerations about which there is uncertainty.

The rate at which the existing housing stock in Anchorage is upgraded can also affect settlement patterns. If older and substandard housing is demolished at a fairly rapid rate, making way for higher density development, more of the future increase in the housing stock may be located in Anchorage rather than at Point McKenzie because of the increased holding capacity that the higher density redevelopment allows.

Because of the uncertainty surrounding the factors listed in Table IV.1, we report the results of simulations using several combinations of assumptions here and in Appendix A in an attempt to establish a reasonable range of possible outcomes. None of these cases should be considered "most likely" to occur, but each should be viewed in light of its assumptions.

The population and housing stock levels which would be shifted from Anchorage to the Point McKenzie area under four sets of assumptions are shown in Table IV.2. It is clear that by 2000, eleven years after the assumed completion of the crossing, the impact on Anchorage, for a given level of aggregate economic activity, is sensitive to the assumptions concerning land availability at Point McKenzie but not particularly sensitive to bridge location. Under the assumptions most favorable to Point McKenzie allocation--a downtown crossing with high land availability and development, including multifamily units--the Point McKenzie housing stock allocated from Anchorage would be 12.1 thousand units; population transferred would be 29.3 thousand. If multifamily units were not allowed, housing units allocated would be 9.2 thousand and population, 24.2 thousand. The same land availability assumptions with a crossing at Elmendorf would reduce the allocation only marginally to 8.6 thousand housing units and 22.7 thousand population.

Low land availability and development density would significantly restrict the allocation across Knik Arm. By 2000 with an Elmendorf crossing, the housing stock would be 2.6 thousand and population, 7.0 thousand.[7]

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[7]All these figures represent the redistribution from Anchorage to Point McKenzie. Any redistribution from other areas such as Palmer-Wasilla are not included (see Chapter V).

TABLE IV.2. POINT McKENZIE
POPULATION AND HOUSING STOCK:
KNIK ARM CROSSING CASE

(thousands)

	ELMENDORF				DOWNTOWN			
	Low Density		High Density		High Density		High Density with Multifamily units	
Year	Population	Housing Stock	Population	Housing Stock	Population	Housing Stock	Population	Housing Stock
1990	0.7	0.2	2.1	0.8	2.2	0.8	2.9	1.1
1991	1.3	0.5	3.9	1.4	4.2	1.5	5.4	2.2
1992	2.1	0.8	6.5	2.4	7.0	2.5	8.8	3.5
1993	2.9	1.1	8.9	3.3	9.5	3.5	11.9	4.7
1994	3.6	1.3	10.8	4.0	11.6	4.3	14.4	5.7
1995	4.1	1.5	12.7	4.7	13.6	5.0	16.7	6.7
1996	4.8	1.8	14.9	5.5	15.9	5.9	19.5	7.8
1997	5.5	2.0	17.1	6.4	18.3	6.8	22.2	9.0
1998	6.0	2.3	19.0	7.2	20.3	7.7	24.7	10.1
1999	6.5	2.5	20.9	7.9	22.3	8.4	27.0	11.1
2000	7.0	2.6	22.7	8.6	24.2	9.2	29.3	12.1

SOURCE: Variables POPD.11, POPD.12, HS.11, HS.12 from simulations ELMEN.L, ELMEN.H, DOWNT.H, and DOWNT.HD.

The growth in housing units by subregion for each of the four simulations is shown in Figures IV.1 through IV.4. The availability of land at Point McKenzie does not stop the "filling in" of the Anchorage area, but it does slow the process. In all cases except the low-density Elmendorf crossing, the largest number of housing units is added at Point McKenzie-South (subregion 11), followed by Northeast Anchorage (subregion 1). The majority of the remaining new units are divided among Northwest (4), Eagle River (9), Central (5), and Hillside (8).

Table IV.3 shows the number of housing units each subregion would lose to Point McKenzie under different crossing assumptions. Generally, the losses are proportional to the number of additions which would have been built in the absence of a crossing. The Northeast (1) and Eagle River (9) are the closest substitutes for Point McKenzie and lose the most units to the other side of Knik Arm.[8]

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[8]The total number of housing unit additions between 1989 and 2000 is marginally lower, assuming a crossing is constructed. This results from the slight increase in housing unit additions which occurs during the construction phase of the crossing. Since population is essentially unchanged from the base case after construction, there is a slight excess in the vacancy rate after construction, compared to the base case.

FIGURE IV.1

PROJECTED 2000 ANCHORAGE SETTLEMENT PATTERNS: DOWNTOWN KAC

HIGH DENSITY-MULTIFAMILY UNITS

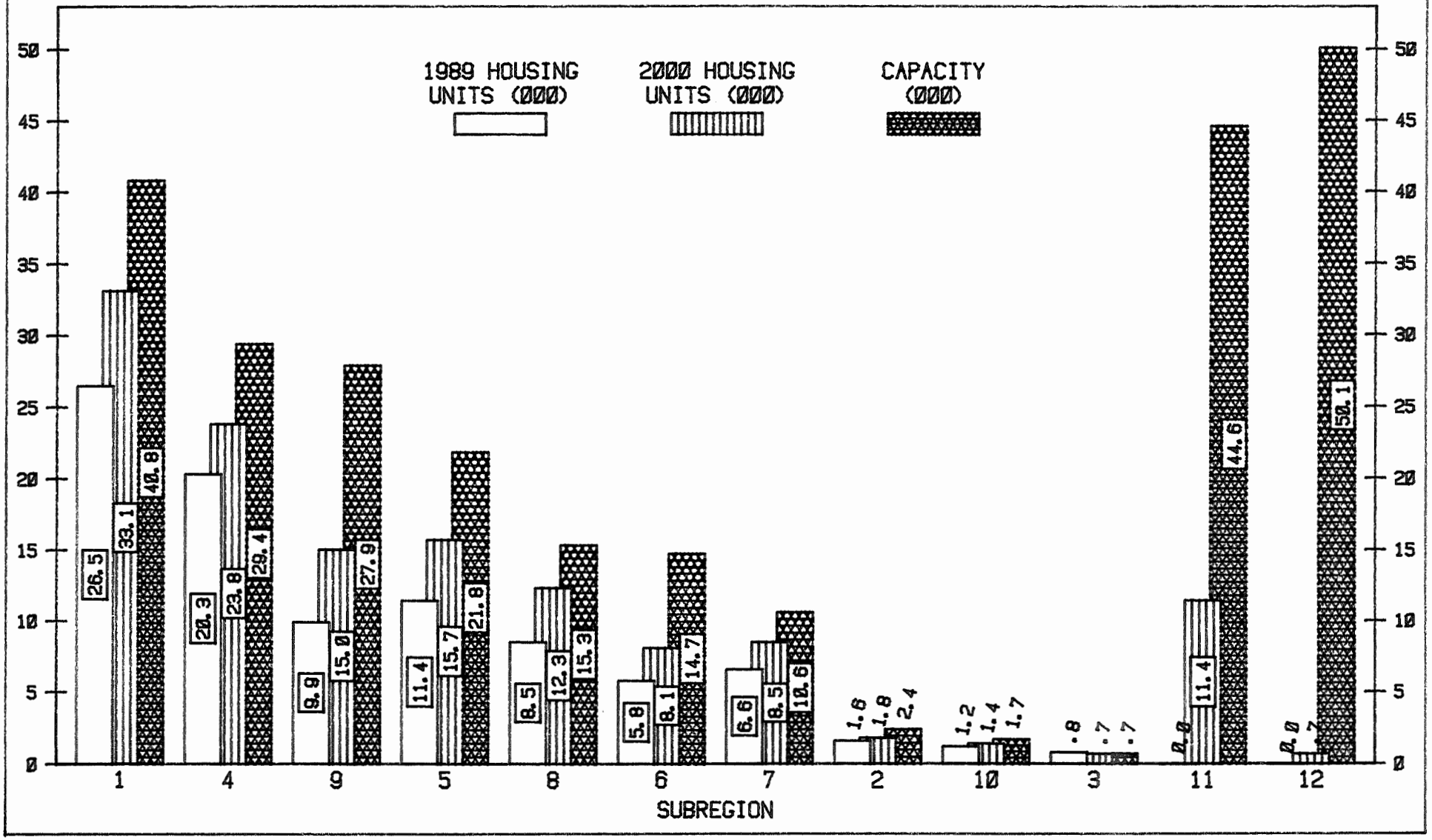
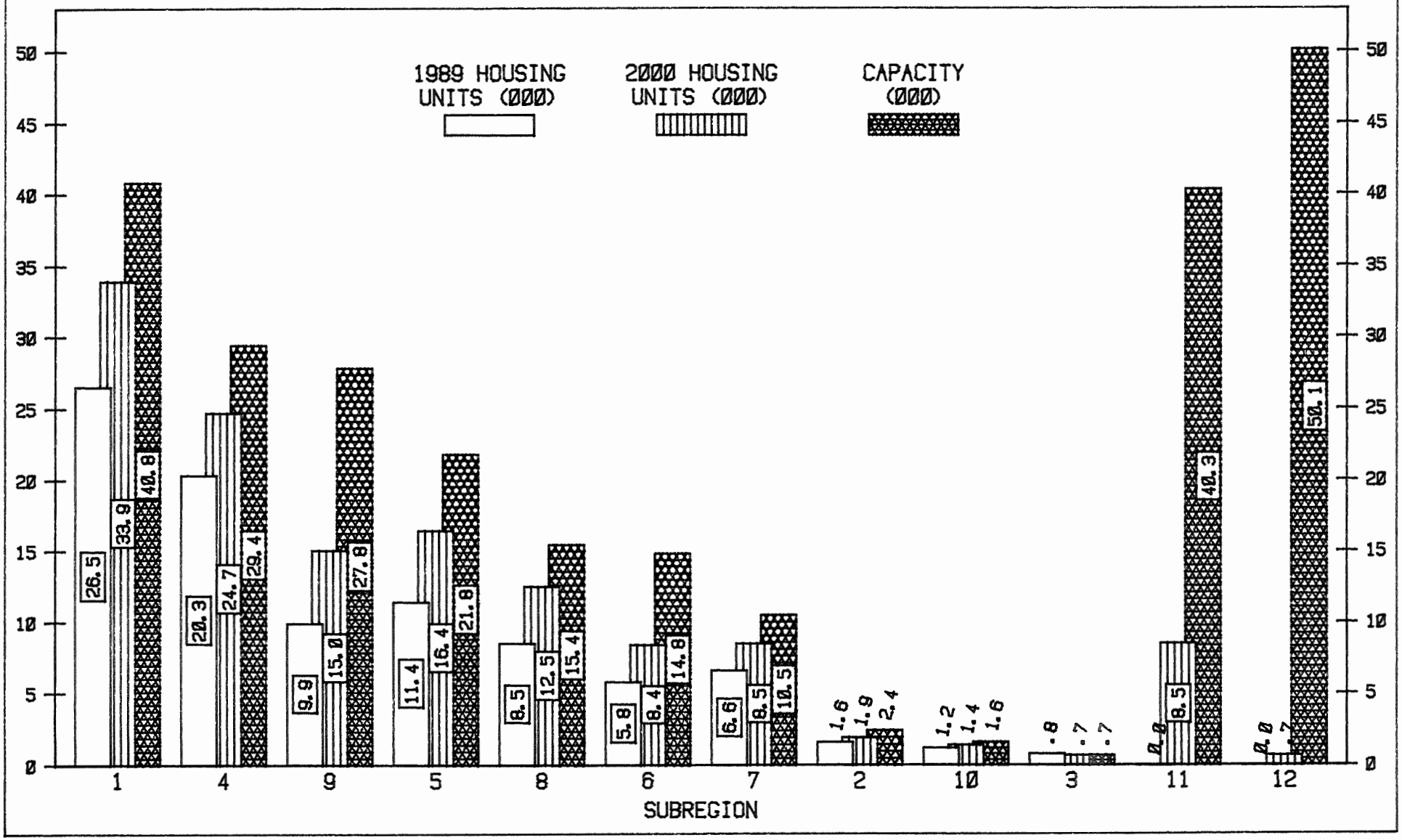


FIGURE IV.2

PROJECTED 2000 ANCHORAGE SETTLEMENT PATTERNS: DOWNTOWN KAC

HIGH DENSITY



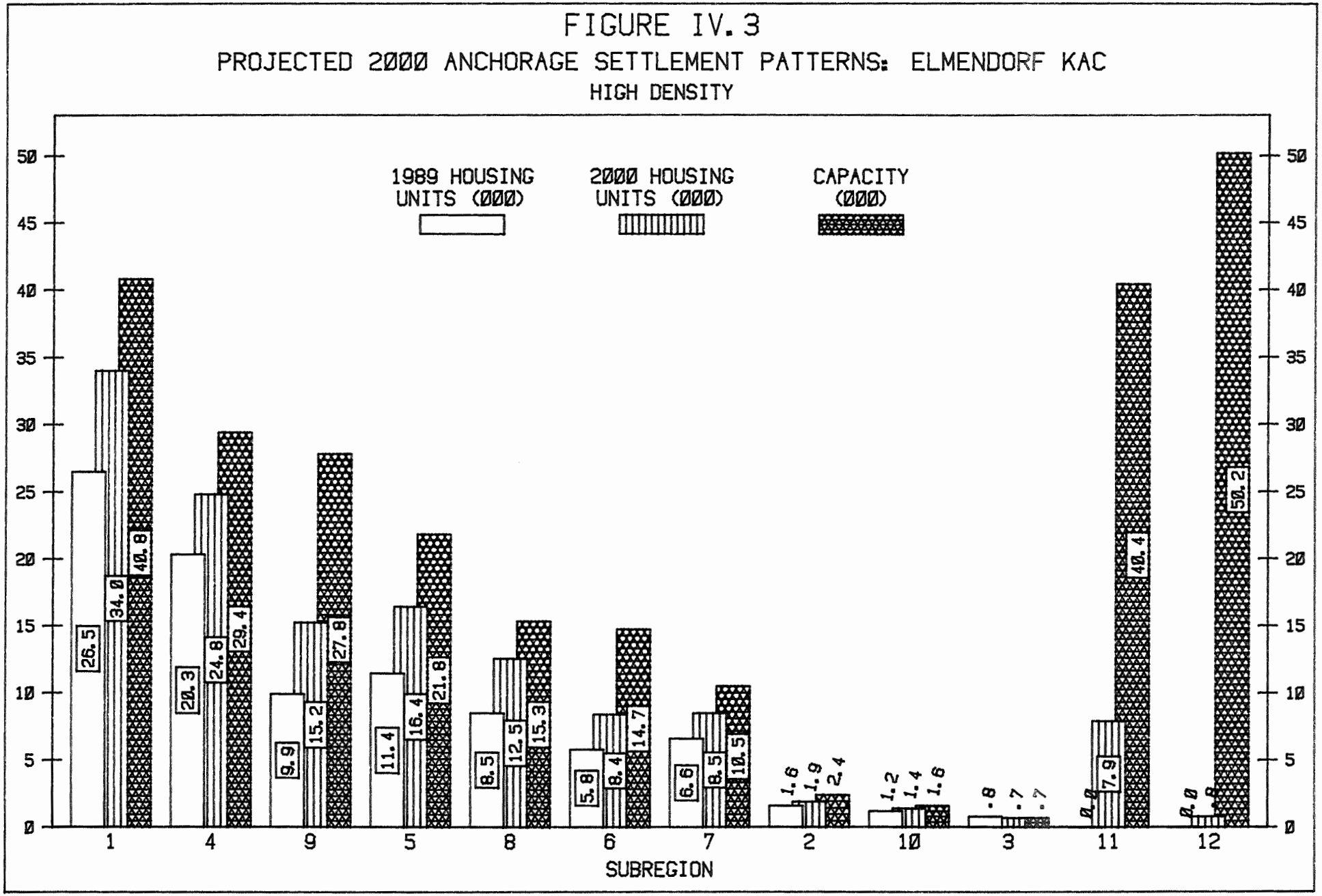


FIGURE IV.3
PROJECTED 2000 ANCHORAGE SETTLEMENT PATTERNS: ELMENDORF KAC
HIGH DENSITY
1989 HOUSING UNITS (000)
2000 HOUSING UNITS (000)
CAPACITY (000)
50
45
40
35
30
25
20
15
10
5
0
26.5
34.0
40.8
20.3
24.8
29.4
9.9
15.2
27.8
11.4
16.4
21.8
8.5
12.5
15.3
5.8
8.4
14.7
6.6
8.5
10.5
1.6
1.9
2.4
1.2
1.4
1.6
.8
.7
.7
.4
7.9
40.4
.0
.8
50.2
1
4
9
5
8
6
7
2
10
3
11
12
SUBREGION

FIGURE IV.4

PROJECTED 2000 ANCHORAGE SETTLEMENT PATTERNS: ELMENDORF KAC

LOW DENSITY

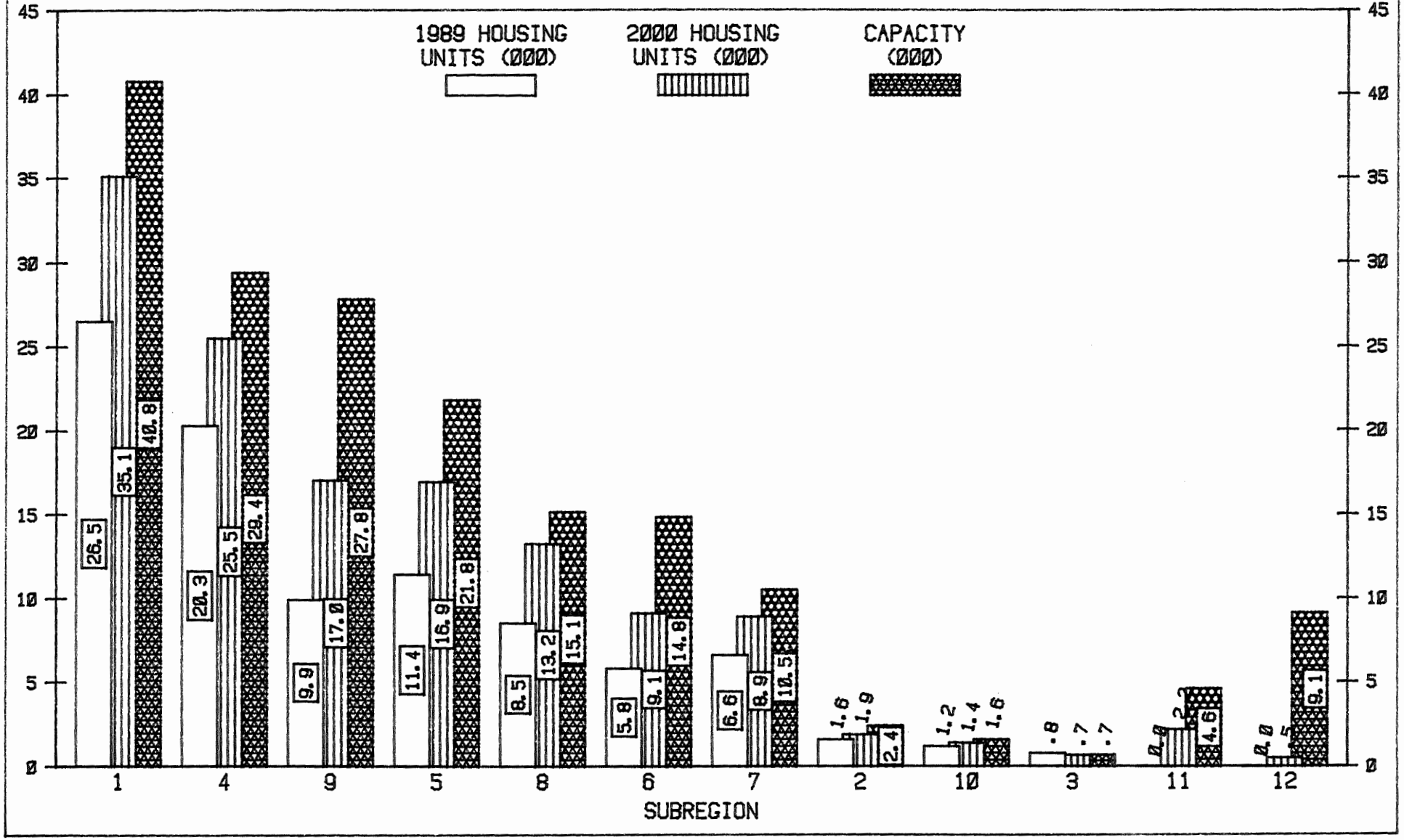


TABLE IV.3. ALLOCATION OF HOUSING STOCK ADDITIONS
(thousands)

Subregions	Base Case Additions 1989–2000	Knik Arm Crossing Change from Base Case Additions 1989–2000			
		Elmendorf Low Density	Elmendorf High Density	Downtown High Density	Downtown High Density with Multi-family Units
Northeast (1)	9.3	-0.7	-1.8	-1.9	-2.7
Eagle River (9)	7.8	-0.7	-2.5	-2.7	-2.7
Northwest (4)	5.6	-0.4	-1.1	-1.2	-2.0
Central (5)	5.9	-0.4	-0.9	-0.9	-1.6
Hillside (8)	5.0	-0.3	-1.0	-1.1	-1.2
Sand Lake (6)	3.6	-0.3	-1.0	-1.1	-1.3
Ocean View (7)	2.5	-0.1	-0.5	-0.6	-0.6
Ship Creek (2)	0.3	0	-0.1	-0.1	-0.1
Turnagain Arm (10)	0.2	0	0	0	-0.1
Downtown (3)	-0.1	0	0	0	0
Point McKenzie-South (11)	0	2.0	7.9	8.5	11.4
Point McKenzie-North (12)	0	0.5	0.8	0.7	0.7
Total	40.1	-.3	-.3	-.2	-.2

SOURCE: Archives LOCNEWB, ELMEN.L, ELMEN.H, DOWNT.H, DOWNT.HD.

The construction of a Knik Arm crossing does more than increase the total supply of residential land and shift a portion of demand across Knik Arm. Since the increased supply is primarily land for single-family units, the price of single-family land falls relative to that of multifamily-unit land. Consequently, there is a change in the mix of units constructed which is a function of the characteristics of the Point McKenzie land made available for development.

Table IV.4 shows the change in the composition of the housing stock additions in each simulation. In each, there is an increase in single-family units at the expense of multifamily units. In all but the low availability of land Elmendorf crossing case, more than three thousand single-family units replace multifamily units.

The composition of units each subregion loses to Point McKenzie also varies with the land availability and development density assumptions. In particular, if multifamily development is allowed at Point McKenzie, then Northeast (1), Northwest (4), and Central (5) Anchorage will lose a combined 5 thousand units to Point McKenzie. Without multifamily development allowed, they will lose only 2.8 thousand units.

TABLE IV.4. DETAILED COMPOSITION OF HOUSING STOCK ADDITIONS
PART ONE
(thousands)

Subregions	Base Case Additions 1989-2000	Knik Arm Crossing Change from Base Case Additions 1989-2000			
		Elmendorf Low Density	Elmendorf High Density	Downtown High Density	Downtown High Density with Multi-family Units
Single Family					
Northeast (1)	2.1	-0.2	-0.8	-0.9	-0.9
Eagle River (9)	6.9	-0.6	-2.3	-2.5	-2.5
Northwest (4)	0.9	-0.1	-0.4	-0.5	-0.5
Central (5)	0.7	0	0	-0.1	-0.1
Hillside (8)	2.7	-0.2	-0.8	-0.9	-0.9
Sand Lake (6)	1.8	-0.2	-0.7	-0.8	-0.8
Ocean View (7)	1.6	-0.1	-0.5	-0.6	-0.6
Ship Creek (2)	0	0	0	0	0
Turnagain Arm (10)	0.1	0	0	0	0
Downtown (3)	-0.1	0	0	0	0
Point McKenzie-South (11)	0	2.2	7.9	8.5	8.4
Point McKenzie-North (12)	0	0.5	0.8	0.7	0.7
Total	16.7	1.2	3.0	3.1	3.1

SOURCE: Archives LOCNEWB, ELMEN.L, ELMEN.H, DOWNT.H, DOWNT.HD.

TABLE IV.4. DETAILED COMPOSITION OF HOUSING STOCK ADDITIONS
PART TWO
(thousands)

Subregions	Base Case Additions 1989–2000	Knik Arm Crossing Change from Base Case Additions 1989–2000			
		Elmendorf Low Density	Elmendorf High Density	Downtown High Density	Downtown High Density with Multi-family Units
Multifamily					
Northeast (1)	7.2	-0.5	-1.0	-1.1	-1.8
Eagle River (9)	0.9	-0.1	-0.1	-0.1	-0.2
Northwest (4)	4.8	-0.4	-0.8	-0.8	-1.7
Central (5)	5.2	-0.4	-0.8	-0.9	-1.5
Hillside (8)	2.3	-0.1	-0.1	-0.2	-0.3
Sand Lake (6)	1.8	-0.1	-0.3	-0.3	-0.5
Ocean View (7)	0.9	0	0	0	0
Ship Creek (2)	0.3	0	0	0	0
Turnagain Arm (10)	0.1	-0.1	-0.1	-0.1	-0.1
Downtown (3)	0	0	0	0	0
Point McKenzie-South (11)	0	0	0	0	3.0
Point McKenzie-North (12)	0	0	0	0	0
Total	23.3	-1.5	-3.2	-3.3	-3.3

SOURCE: Archives LOCNEWB, ELMEN.L, ELMEN.H, DOWNT.H, DOWNT.HD.

V. KNIK ARM CROSSING IMPACTS--ADDITIONAL CONSIDERATIONS

Palmer-Wasilla Growth

With the completion of a Knik Arm Crossing, we may expect to see the residential location of some Anchorage workers shift from the Palmer/Wasilla area to Point McKenzie. This again brings us to the uncertainty about the extent to which the new areas at Point McKenzie are comparable to existing areas. Those Anchorage workers who choose to live in Palmer/Wasilla rather than Eagle River presumably would not choose the southern Point McKenzie area if it were to resemble Eagle River in its characteristics. The northern Point McKenzie zone, however, might be expected to attract some households who would have located in Palmer/Wasilla had no crossing been built. Because these households would have settled in the Matanuska-Susitna Borough in any case, the only effect on Anchorage of those workers who commute to Anchorage is that they would use the crossing rather than the Glenn Highway.

A related consideration is the amount and causes of population growth in the Matanuska-Susitna Borough. Current forecasts by the Borough project a year 2000 population of 84,175, representing an average annual growth rate of 6.7 percent (Table V.1). These projections assume no Knik Arm crossing or industrial development at Point McKenzie, so this population growth is expected to be concentrated in the Palmer/Wasilla area, with very little at Point McKenzie. The possible causes of this high projected growth fall

TABLE V.1. MATANUSKA-SUSITNA BOROUGH POPULATION PROJECTIONS

(Amended)

Year	Population	Average Annual Growth Rate (%)
1982	26,002	-
1985	32,927	8.2
1990	57,254	11.7
1995	71,511	4.5
2000	84,175	3.3
		6.7

SOURCE: Matanuska-Susitna Planning Department.

into three categories: (1) large numbers of households whose primary worker is employed in Anchorage choose to live in the Matanuska-Susitna Borough, with no significant expansion of basic sector employment in the Matanuska-Susitna Borough; (2) significant expansion of basic employment in the Matanuska-Susitna Borough at the expense of basic employment in Anchorage; and (3) significant expansion of basic employment in the Matanuska-Susitna Borough with no effect on basic employment in Anchorage. If the Matanuska-Susitna Borough's population projections are accurate, then the effect of building a Knik Arm crossing on settlement patterns will depend a great deal on which of the three scenarios described above actually comes true. In the first two scenarios, there is a tradeoff between population growth in Anchorage and Matanuska-Susitna. If

Matanuska-Susitna growth is high and Anchorage growth low, we would expect a crossing to attract fewer households to Point McKenzie than if the opposite were true. In the third scenario, since Matanuska-Susitna growth does not substitute for Anchorage growth, we would expect to see construction of a crossing induce more residential development at Point McKenzie than if we did observe a tradeoff between Anchorage and Matanuska-Susitna growth.

Employment

The employment which would be distributed to the Point McKenzie area from Anchorage if a Knik Arm crossing were built would be primarily population-serving employment associated with commercial and retail establishments. If the Eagle River subregion can be used as a guide to the level of population-serving employment which would accompany population moving to Point McKenzie, then we would expect at least five employees for each 100 population in the early part of the 1990s. This ratio could subsequently grow as the population increased.

Industrial Development

The Matanuska-Susitna Borough population projections in Table V.1 assume no industrial development at Point McKenzie during the projection period. This is consistent with our analysis. It is conceivable that construction of a Knik Arm crossing could, by improving access to Anchorage, induce some basic sector development to locate at Point McKenzie that would otherwise locate in

Anchorage. In such a case, population would follow employment to Point McKenzie, and employment at Point McKenzie would be expected to attract more households than would be the case if no basic development occurred. Evidence of location decisions of Alaskans indicates, however, that proximity to work is not the only factor in deciding where to live so that some commuting to the Point McKenzie side from Anchorage would occur were basic industry to locate there.

Recreational Demand

A final consideration is the increased access to recreational activities in the Matanuska-Susitna Borough made possible by the crossing. We do not expect this to cause a significant amount of settlement at Point McKenzie since a crossing increases this access for households living in Anchorage as well. The infrequency of recreation trips relative to work trips suggests that the time savings of living at Point McKenzie rather than in Anchorage would have little, if any, effect on settlement patterns.

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APPENDIX A

LOW-GROWTH SENSITIVITY TESTS

In order to test the sensitivity of projected allocations of new housing units to the rate of growth of aggregate employment, population, and households, we resimulated the economic and population model, assuming lower growth rates for mining employment and exogenous construction employment than were assumed in the Municipality's base case. This "low-growth" base case is compared to the previous (Municipality of Anchorage) higher-growth base case in Table A.1. From this low-growth base case, we simulated the impact of a Knik Arm crossing from downtown Anchorage to Point McKenzie and then analyzed three allocation assumptions, based on varying levels of land availability and density of development. The results of these simulations are shown in Tables A.2 and A.3. As was expected, significantly fewer housing units are built in the two Point McKenzie subregions than in the higher-growth projections. Table A.4 shows a comparison of the year 2000 housing unit allocations for the two aggregate growth assumptions. The slower population and household growth in the low-growth scenario results in fewer total units built, and, consequently, the number of units allocated to the two Point McKenzie subregions is much smaller.

TABLE A.1. LOW AND HIGH ANCHORAGE ECONOMIC GROWTH COMPARISONS
(thousands)

	Low Growth			High Growth		
Year	Employment	Population	Households (Off-Base)	Employment	Population	Households (Off-Base)
1985	125.0	231.0	78.4	125.0	231.0	78.4
1990	130.2	242.8	87.9	136.7	255.0	92.6
1995	135.3	253.9	96.1	152.4	286.0	109.2
2000	142.6	269.0	107.1	166.7	314.0	126.4

SOURCE: Output files BIG.KABL and BIG.TR4, variables A.MP.99, A.POP; and output files LOCNEWB and LOC.KABL, variable A.HHOFF

TABLE A.2. LOW ECONOMIC GROWTH CASE
(thousands)

	Low Base Case			Downtown Knik Arm Crossing Impact					
				Low Density		Medium Density		High Density with Multifamily Units	
	Employment	Population	Housing Stock	Population	Housing Stock	Population	Housing Stock	Population	Housing Stock
1983	122	224	77.2						
1984	124	227	79						
1985	125	231	80.9						
1986	126	234	83.3						
1987	127	236	85.5						
1988	128	238	87						
1989	129	240	88.0						
1990	130.2	242.8	91.5	0.7	0.2	2.1	.8	2.3	0.9
1991	130.2	243.7	94.3	1.1	0.4	3.6	1.4	4.0	1.6
1992	133.3	249.3	96.4	1.7	0.6	5.2	2.1	5.8	2.3
1993	133.8	250.7	97.9	2.1	0.8	6.6	2.6	7.3	2.9
1994	134.3	251.9	98.9	2.5	0.9	7.6	3.0	8.3	3.3
1995	135.3	253.9	99.9	2.8	1.0	8.6	3.4	9.4	3.8
1996	136.7	256.7	101.8	3.2	1.2	9.9	3.9	10.9	4.4
1997	138.0	259.6	104.5	3.8	1.4	11.4	4.6	12.6	5.1
1998	139.5	262.5	107.3	4.3	1.6	13.0	5.3	14.3	5.9
1999	141.0	265.6	109.8	4.7	1.8	14.5	5.9	15.9	6.6
2000	142.6	269.0	112.1	5.2	2.0	16.0	6.6	17.6	7.3

SOURCE: BIG.KABL variables A.MP.99, A.POP; LOC.KABL variable HS; LOC.LDTL, LOC.LDTM, and LOC.LDTH variables POPD.11, POPD.12, HS.11, HS.12.

TABLE A.3. LOW ECONOMIC GROWTH HOUSING STOCK ADDITIONS
(thousands)

Subregions	Housing Stock Additions 1989-2000	Downtown Knik Arm Crossing Change from Base Case Additions 1989-2000		
		Low Density	Medium Density	High Density with Multi-family Units
Northeast (1)	5.3	-0.5	-1.3	-1.5
Eagle river (9)	4.9	-0.7	-1.9	-2.0
Northwest (4)	2.8	-0.2	-1.0	-1.2
Central (5)	3.8	-0.2	-0.6	-0.7
Hillside (8)	3.4	-0.4	-1.0	-1.0
Sand Lake (6)	1.9	-0.2	-0.6	-1.1
Ocean View (7)	1.8	-0.2	-0.6	-0.6
Ship Creek (2)	0.1	0.0	-0.1	-0.1
Turnagain Arm (10)	0.2	0.0	0.0	0.0
Downtown (3)	-0.1	0.0	0.0	0.0
Point McKenzie-(South) (11)	0	1.7	6.2	6.9
Point McKenzie-North (12)	0	0.3	0.4	0.4
Total	24.1	-0.5	-0.5	-0.5

TABLE A.4. HOUSING UNIT DISTRIBUTION IN 2000
HIGH VS. LOW ECONOMIC GROWTH[a]
(thousands)

Subregion	Low Density		High Density with Multifamily Units	
	Economic Growth		Economic Growth	
	High	Low	High	Low
Northeast (1)	35.0	30.4	33.1	29.4
Eagle River (9)	16.9	13.3	15.0	12.1
Northwest (4)	25.4	22.3	23.8	21.4
Central (5)	16.8	14.2	15.7	13.7
Hillside (8)	13.2	11.0	12.3	10.3
Sand Lake (6)	9.0	7.2	8.1	6.8
Ocean View (7)	8.9	7.8	8.5	7.5
Ship Creek (2)	1.9	1.7	1.8	1.6
Turnagain Arm (10)	1.4	1.4	1.4	1.3
Downtown (3)	0.7	0.7	0.7	0.7
Point McKenzie-South (11)	2.7	1.7	11.4	6.9
Point McKenzie-North (12)	0.5	0.3	0.7	0.4
Total	132.4	112.1	132.5	112.1

[a]Downtown Crossing Case: Output files DOWNT.L, LOC.LDTL, DOWNT.HD, LOC.LDTH.

Also interesting is the variation in projected housing stock additions by subregion, resulting from the low-growth assumptions. Table A.5 shows the percentage of total 1983-2000 housing stock additions going to each subregion for comparable low- and high-growth cases. The differences in the share of new housing allocated to each subregion are a result of different distributions between single-family and multifamily units built in the low-growth cases and the higher-growth cases. In the low-growth cases, aggregate demand for housing reduces upward pressure on housing prices relative to the higher-growth cases, making single-family housing more affordable. In the low-growth cases, therefore, a larger share of the new units would be single family than in the higher-growth cases. When these new units are allocated, subregions which are more attractive as locations for single-family housing would get a larger share of the total increase in housing units.

TABLE A.5. PROJECTED CHANGE IN HOUSING STOCK BY SUBREGION
1983-2000
(percent of total)

Subregions	High Growth	Low Growth	Low Density		High Density with Multifamily Units	
			High Growth	Low Growth	High Growth	Low Growth
Northeast (1)	22.5	21.5	21.3	20.7	18.0	18.0
Eagle River (9)	19.3	20.0	18.0	18.2	14.7	14.9
Northwest (4)	12.6	10.6	11.8	10.0	9.1	7.6
Central (5)	16.3	17.3	15.6	17.2	13.7	15.8
Hillside (8)	13.1	14.3	12.6	13.5	11.1	11.8
Sand Lake (6)	8.2	7.5	7.6	7.0	6.1	5.8
Ocean View (7)	6.8	7.7	6.6	7.2	5.8	6.2
Ship Creek (2)	0.5	0.2	0.5	0.1	0.2	0.0
Turnagain Arm (10)	0.9	1.3	0.9	1.3	0.8	1.2
Downtown (3)	-0.2	-0.4	-0.2	-0.4	-0.2	-0.4
Point McKenzie-South (11)	0	0	4.6	4.5	19.5	18.0
Point McKenzie-North (12)	0	0	0.8	0.7	1.3	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: Output files LOCNEWB, LOC.KABL, DOWNT.L, LOC.LDTL, DOWNT.HD, and LOC.LDTH.

APPENDIX B

LAND AVAILABILITY AND HOUSING UNIT HOLDING CAPACITY AT POINT McKENZIE

In forecasting the amount of land that will be available at Point McKenzie and the number of housing units which the land could support if a crossing is built, three factors were considered: (1) land ownership patterns at Point McKenzie, (2) the intentions of the Matanuska-Susitna Borough in the use of Borough-owned land at Point McKenzie, and (3) the densities at which residential development will occur.

Table B.1 summarizes the ownership patterns of the land at Point McKenzie. The South Point McKenzie subregion contains approximately 50,500 acres (excluding the Susitna Flats Game Refuge), and the North Point McKenzie subregion contains approximately 44,000 acres. Figure B.1 shows the subregion boundaries.

The Matanuska-Susitna Borough Draft Comprehensive Plan designates only private and Native land as open for residential development. No borough (with the exception of a few acres in the North Point McKenzie zone), state, or university land is designated for residential use. Proposed densities on private and Native lands recommended by the Matanuska-Susitna Borough range from one dwelling unit per acre to one dwelling unit per five acres or more.

TABLE B.1. LAND OWNERSHIP AT POINT McKENZIE
(percent)

	South Point McKenzie Zone*	North Point McKenzie Zone
Private	20	35
Native	11	2
Borough	22	39
State	44**	23
Federal	0	0
City	0	0
University of Alaska	3	1

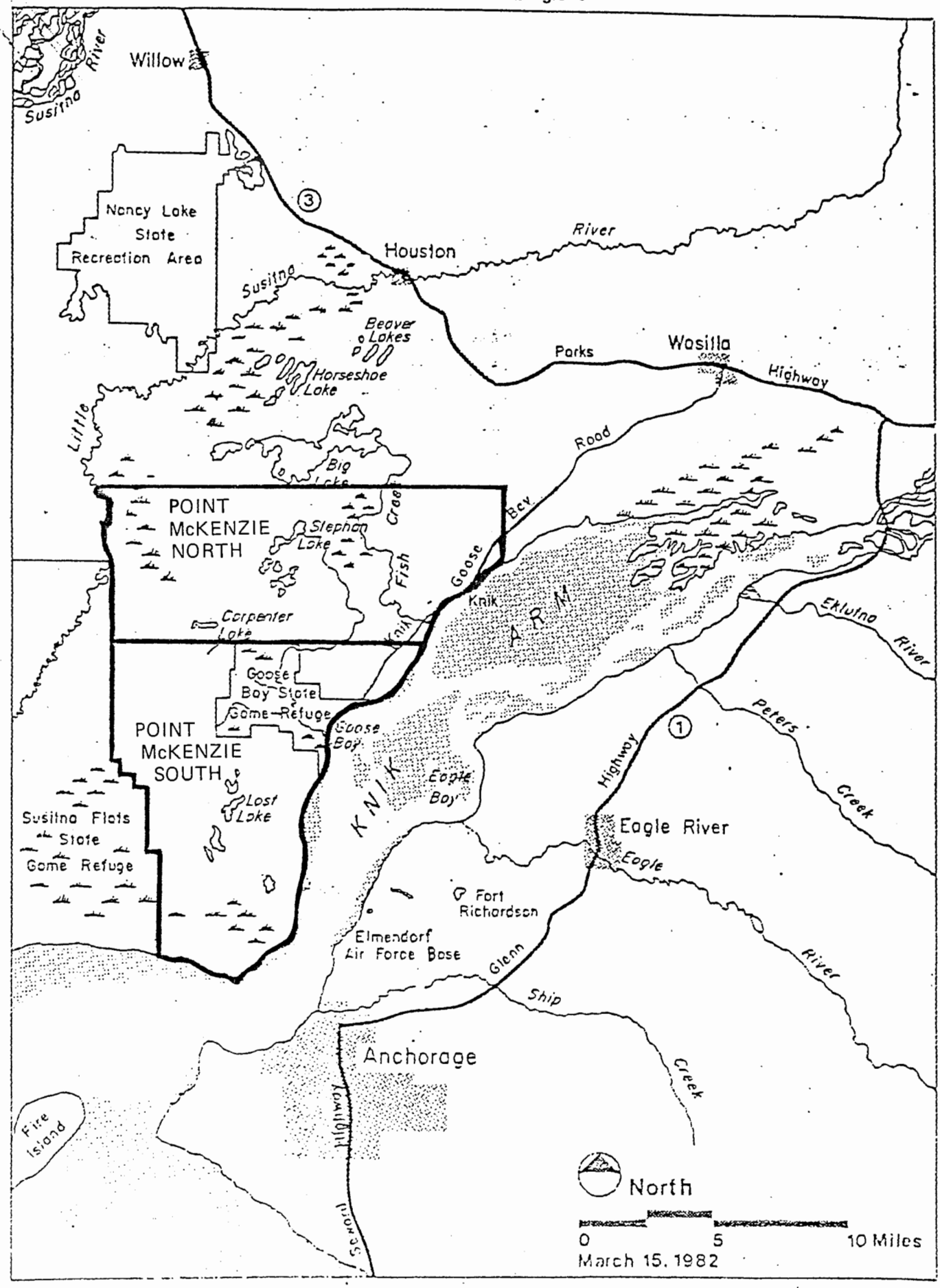
*Excludes Susitna Flats Game Refuge.
**Includes Goose Bay Game Refuge.

SOURCE: Matanuska-Susitna Borough Draft Comprehensive Plan Land Status maps.

For the purposes of model simulations, we combined assumptions about land availability and allowable development densities to arrive at housing-unit holding capacities (densities) for the two zones at Point McKenzie. Four separate combinations were used in the analysis, as shown in Table B.2. The "low-density" case assumes only private and Native lands will be used for residential development at densities proposed in the Matanuska-Susitna Borough Draft Comprehensive Plan. The "medium- density" case assumes the same amount of land as the "low" case (private and Native only) with 240 acres of multifamily units at fifteen units per acre. The remainder of the land is all single-family at two units per acre. The "high-density" case assumes private and Native land plus

Figure B.1

Point McKenzie Subregions



one-half of the Borough land will be used for residential development, all at two dwelling units per acre (all single family). The "high-density-with-multifamily" case assumes the same amount of land as the "high" case but allows 326 acres of multifamily units at fifteen dwelling units per acre. The remainder of the land is all single family at two units per acre. (The "medium" and "high-with-multifamily" cases assume the same proportion of single-family to multifamily holding capacity as Eagle River had in 1981.)

The combination of two land availability and three allowable developmental density levels results in six total combinations of holding capacity assumptions. The two sets labeled "high density with low land availabiity" and "low density with high land availability" were not utilized.

TABLE B.2. HOLDING CAPACITY ASSUMPTIONS

	South Point McKenzie Zone		North Point McKenzie Zone	
	Single-Family	Multifamily	Single-Family	Multifamily
Low Density	4,903	0	9,122	0
Medium Density	30,020	3,600	33,000	0
High Density	41,488	0	50,222	0
High Density with Multifamily	40,836	4,896	50,222	0
High Density with Low Land Availability*	30,500	0	33,000	0
Low Density with High Land Availability*	6,638	0	12,556	0

*These cases were not simulated but appear in this table for descriptive completeness of all possible density/land availability combinations.

APPENDIX C

MODELS, ASSUMPTIONS, AND CASES

I. MODELS

Aggregate population, employment, and household projections were made using the Municipality of Anchorage's combined economic and population model BIGMOD, developed by the Institute of Social and Economic Research (ISER) in 1982. The population and housing unit allocations were made using the Municipality's subregional allocation model LOCMOD, also developed by ISER in 1982. Descriptions of both models can be found in "Municipality of Anchorage Economic Modeling Project," Model Documentation, Volume I, ISER, June 1982.

II. ASSUMPTIONS

Economic and Population Model: Fast Growth Assumptions

The exogenous employment assumptions used in forecasting aggregate employment, population, and households for the fast-growth base case scenario are identical to those used in the Municipality of Anchorage Planning Research Department's current base case (output file BIG.TR4, created in Spring 1983 by ISER). The Municipality's base case is, therefore, the same one used as the base case for these Knik Arm crossing impact projections.

Two economic impact projections were made, based upon this case. The first assumes a crossing is built from Elmendorf AFB to Point McKenzie (economic model output file BIG.EL), and the second assumes a crossing is built from downtown Anchorage to Point McKenzie (economic model output file BIG.DT). The two cases differ in their direct employment impacts (see Table C.1). The Elmendorf crossing is assumed to be a low bridge built with steel spans manufactured in Korea and floated into place. The downtown crossing is assumed to be a high bridge (to allow ship access to the Port of Anchorage) with all construction taking place on-site. The different employment assumptions reflect the different bridge designs.

TABLE C.1. DIRECT CONSTRUCTION EMPLOYMENT IMPACTS
(thousands)

	Elmendorf Low Bridge	Downtown High Bridge
1985	.300	.838
1986	.700	.612
1987	.400	.635
1988	.362	.442
1989	.250	.250

SOURCE: Knik Arm Crossing Consultants, October 1983.

Economic and Population Model: Slow Growth Assumptions

Because settlement patterns are affected by the rate of aggregate growth, a low-growth base case (economic model output file BIG.KABL) was simulated, assuming lower rates of growth in key industries--mining, construction, state government, and local government. From this low-growth base case, a single impact case was run, assuming the construction of a downtown crossing (economic model output file BIG.LDT).

Subregional Allocation Model

In developing impact cases for the location model, two different factors were considered. First, the availability of land at Point McKenzie and, second, the density at which residential development would occur. Two levels of land availability were defined--low and high. The low level assumes only private and Native lands are available for residential development. The high category assumes private, Native, and half of the Matanuska-Susitna Borough's land is available. Because the Borough owns a great deal of land at Point McKenzie, the difference between the low and high cases is substantial (see Appendix B). Three categories of possible residential development densities were defined--low, high, and high with multifamily. (Note that the "medium-density" case described in Appendix B assumes high density with multifamily but low land availability.) The low category uses densities proposed in the Matanuska-Susitna Borough Draft Comprehensive Plan. These densities vary from one unit per acre to one unit per five acres or more. The

high case assumes two dwelling units per acre for all available land, and the high-with-multifamily case assumes a small amount of land is available for multifamily units at fifteen dwelling units per acre, with the remaining land having a density of two dwelling units per acre.

III. CASES

With two economic growth scenarios, two crossing locations, two land-availability levels, and three land development density categories, a possible twenty-four cases can be simulated (see Figure A.1). We selected a subset of these which we thought would be of greatest interest, and they are described below.[a,b]

1. Elmendorf Low Density. This case assumes high aggregate growth, an Elmendorf crossing, low land availability, and low-density development (ELMEN.L).

2. Elmendorf High Density. This case assumes high aggregate growth, an Elmendorf crossing, high land availability, and high-density development (ELMEN.H).

3. Downtown High Density. This case assumes high aggregate growth, a downtown crossing, high land availability, and high-density development (DOWNT.H).

4. Downtown High Density with Multifamily Units. This case assumes high aggregate growth, a downtown crossing, high land availability, and high-density development, including multifamily (DOWNT.HD).

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[a]In addition, variation in the rate of existing housing stock upgrade in Anchorage was considered as a sensitive variable. All the simulations reported here assume relatively slow replacement and upgrade of existing units.

[b]An additional case, DOWNT.L, was generated solely for comparing the low and high economic growth cases (see Appendix A).

5. Low-Growth Downtown Low Density. This case assumes low aggregate growth, a downtown crossing, low land availability, and low-density development (LOC.LDTL).

6. Low-Growth Downtown Medium Density. This case assumes low aggregate growth, a downtown crossing, low land availability, and high-density development, including multifamily (LOC.LDTM).

7. Low-Growth Downtown High Density with Multifamily Units. This case assumes low aggregate growth, a downtown crossing, high land availability, and high-density development, including multifamily (LOC.LDTH).

Although many more cases could be run based on different assumptions about aggregate growth and the availability of land and density of development, we believe these cases represent a good sample of the possible outcomes. A detailed description of the land availability and density assumptions and the resulting holding capacities for the Point McKenzie subregions can be found in Appendix B.

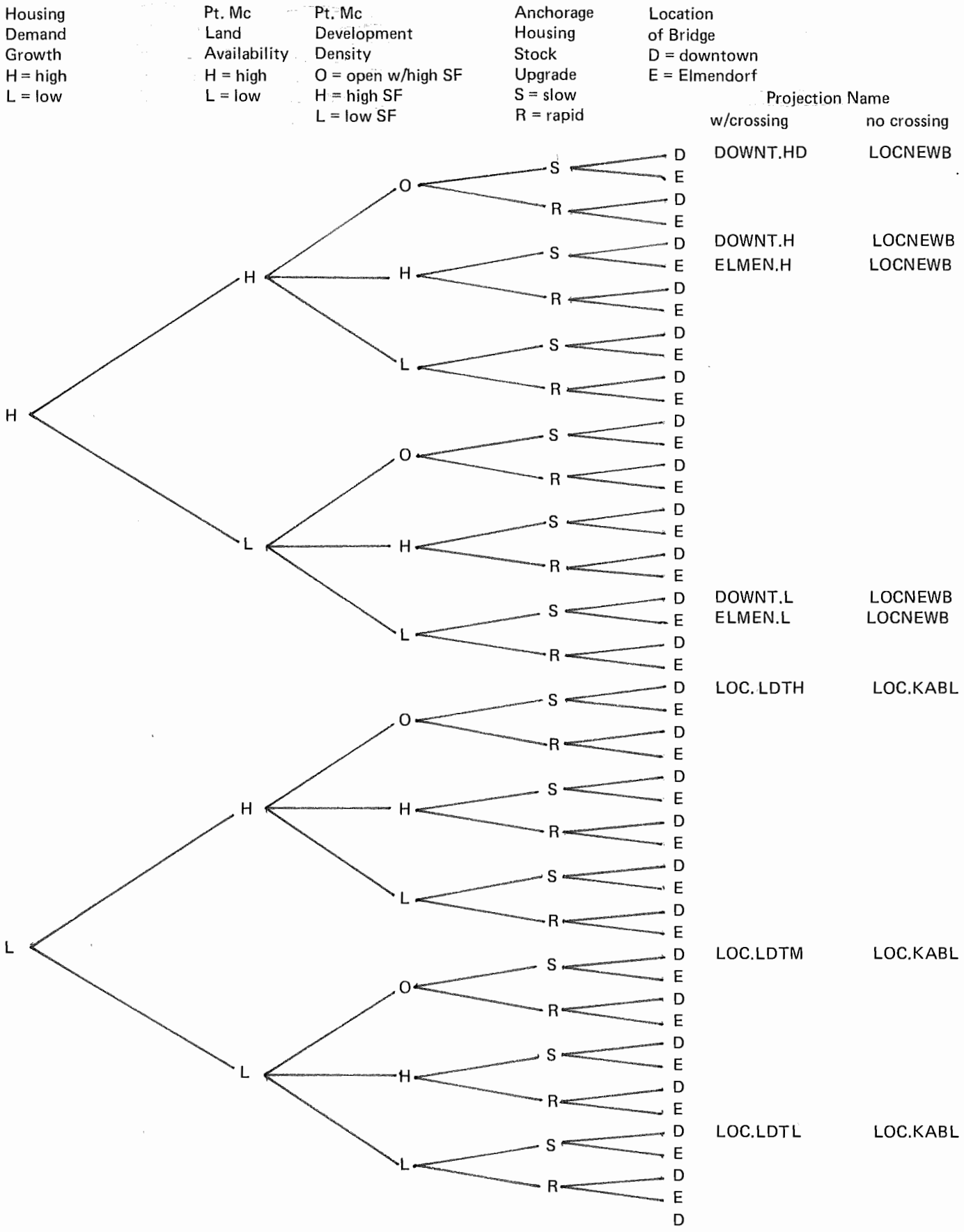

Figure C.1 Projection Guide

APPENDIX D

KNIK ARM CROSSING CONSTRUCTION EMPLOYMENT ASSUMPTIONS

The assumptions for the labor required to build the Knik Arm crossing were supplied by the Knik Arm Crossing consulting group. All figures were converted into annual average equivalents. For the purposes of the model simulations, we assumed that half of the employment would be located in Anchorage and half would be located in the Matanuska-Susitna (Mat-Su) Borough. A summary of the assumptions appears in Table D.1. The differences in labor requirements for the two crossings reflect different bridge designs and construction techniques. The Elmendorf crossing would be a low bridge constructed of steel spans, manufactured in Korea and floated into place. The downtown crossing would be a high bridge constructed completely on-site, thus requiring more local labor.

TABLE D.1. KNIK ARM CROSSING DIRECT CONSTRUCTION EMPLOYMENT REQUIREMENTS
(thousands)

	Elmendorf Low Bridge		Downtown High Bridge	
	Anchorage	Mat-Su	Anchorage	Mat-Su
1985	.150	.150	.419	.419
1986	.350	.350	.306	.306
1987	.200	.200	.318	.318
1988	.181	.181	.221	.221
1989	.125	.125	.125	.125

SOURCE: Knik Arm Crossing Consultants, October 1983.

APPENDIX E

INITIALIZATION OF ECONOMIC MODEL

The early-year population and household projections produced by the economic model are slightly lower than the recent estimates made by the Municipality of Anchorage based on a sample survey. We did not attempt to initialize the economic and population model (BIGMOD) to force short-run consistency with the Municipality estimates. We did not make the adjustment primarily for three reasons: First, recent rapid growth in population and households appears to be a cyclical fluctuation rather than a structural change in the economy. The model was not designed to capture such short-run fluctuations. Second, since the period of interest in this modeling effort is post-1990, capturing short-run fluctuations in the early 1980s was not assigned much importance. And third, a desire to make all the model runs consistent with the existing Municipality base case dictated that we not change the structure of the model or the exogenous assumptions.

In the housing and population allocation model (LOCMOD), housing stock data from the Municipality's housing unit counts for 1982 and 1983 was used to update the model. LOCMOD underestimates the total change in housing stock for 1983 because of the underestimation of population and households by BIGMOD; but because the model allocates a share of the total housing stock change to each zone, 1982 and 1983 data could be used to update the allocation procedure without

introducing any inconsistencies into the relationship between BIGMOD and LOCMOD.

The updating of LOCMOD involved two steps. First, the coefficients for the allocation equations were reestimated, using the updated data which now includes values for 1982 and 1983. And second, the intercepts in the allocation equations were adjusted so that the simulated share of the housing stock change going to each zone in 1983 is equal to the average share of the actual change for the period 1980 to 1983. This averaging process reflects the long-run nature of the model and the fact that the actual distribution in any given year may not be a good indicator of longer-run trends.