

MISCELLANEOUS POPULATION PROJECTIONS
FOR GUAM

UNITED STATES CENSUS OF HOUSING
1960 HOUSING UNIT TOTAL

Agana	331
Agana Heights	689
Agat	587
Asan	602
Barrigada	1110
Chalan Pago	304
Dededo	1176
Inarajan	269
Mangilao	335
Merizo	234
Mongmong/Toto/Maite	667
Piti	275
Santa Rita	1356
Sinajana	696
Talofofo	208
Tamuning	1260
Umatac	110
Yigo	1539
Yona	<u>475</u>
1960 Housing Unit Total	12,243

* Includes Military and civilian housing units.

A REPORT COVERING THE COMMISSION
 Agricultural Pollution Water Supplies
 of the Island of Guam Which Indicates
 the Need for Conservation Areas.

Austin, Smith and
 Associates

August 31, 1970

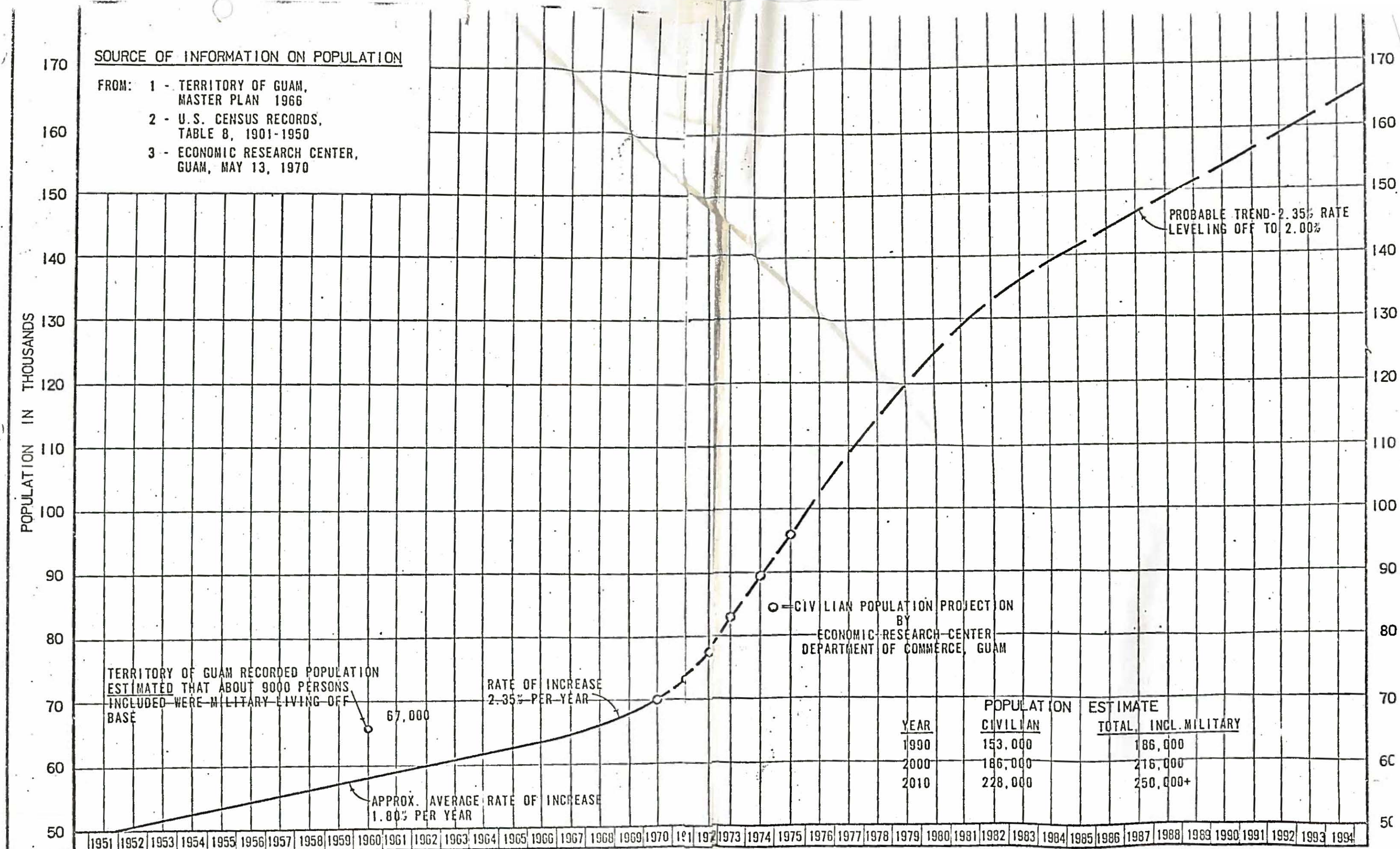
TABLE I

POPULATION PROJECTION FOR GUAM
 1970-1975

CIVILIANS*	1970	1971	1972	1973	1974	1975
Northern Municipalities						
Barrigada	5,600	5,600	5,600	5,700	5,800	6,000
Chalan Pago	2,500	2,500	2,600	2,700	2,800	3,000
Dededo	9,000	10,400	12,000	14,500	17,000	19,000
Mangilao	4,000	4,300	4,800	5,500	6,200	7,000
Mongmong	2,800	3,000	3,400	3,800	4,200	4,500
Tamuning	10,000	10,700	11,500	13,000	14,000	15,000
Yigo	2,500	2,600	2,800	3,200	3,600	4,000
Northern Civilians	36,400	39,100	42,700	48,400	53,600	58,500
Percentage of Civilians	52%	53.6%	55.4%	57.8%	59.8%	61%
Southern Municipalities						
Agana	2,000	1,900	1,700	1,500	1,200	1,000
Agana Heights	3,900	4,000	4,100	4,200	4,300	4,500
Agat	5,200	5,300	5,400	5,600	5,800	6,000
Asan	2,800	2,800	2,900	2,900	3,000	3,000
Inarajan	2,300	2,300	2,300	2,400	2,400	2,500
Merizo	2,000	2,000	2,100	2,200	2,300	2,500
Piti	1,500	1,500	1,600	1,700	1,800	2,000
Santa Rita	2,700	2,800	2,900	3,100	3,300	3,500
Sinajana	5,200	5,200	5,100	5,000	5,000	5,000
Talofofo	1,900	1,900	2,000	2,100	2,300	2,500
Umatac	1,000	1,000	1,000	1,000	1,000	1,000
Yona	3,100	3,100	3,300	3,500	3,700	4,000
Southern Civilians	33,600	33,800	34,400	35,200	36,100	37,500
Percentage of Civilians	48%	46.4%	44.6%	42.2%	40.2%	39%
Total Civilians	70,000	72,900	77,100	83,600	89,700	96,000
MILITARY	33,000	33,000	33,000	33,000	33,000	33,000
GRAND TOTAL	103,000	105,900	110,000	116,600	122,700	129,000

*These figures do not include transients (tourists, visiting businessmen, hotel occupants, etc.)

Source: Economic Research Center, Department of Commerce, Guam
 May 13, 1970



CIVILIAN POPULATION TREND ON ISLAND OF GUAM
 BASED ON YEARS 1950 TO 1967 AND CONMIC RESEARCH CENTER PROJECTION OF 1970

6. The groundwater recharge of the northern portion of the Island of Guam as presented by John F. Mink, Hydrogeologist of the Earth Sciences Group, Inc., is included herein as Appendix A.
7. The major portion of Chapter 20 of "The Nation's Water Resources" by the United States Water Resources Council, Washington, D. C. 1968 is included herein as Appendix B. Although this report deals with the Island of Puerto Rico, the similarity in water resource problems, population growth and urbanization, as well as impending institutional and management problems, makes this report pertinent to the Guam water resources situation and lends credence to the recommendations presented herein.
8. Based on the foregoing studies and reviews, the conclusions have been presented in the appropriate sequence, and based on these conclusions:
9. Recommendations on the necessary steps towards conserving the water resources of Guam are set forth so that adequate water resources of good quality can be maintained for the Island of Guam through the remaining period of the twentieth century.

C. POPULATION

Based on population statistics which have shown a steadily increasing populace over the past six decades, a projection curve, with an average annual increase of 2.35% was drawn up in the Austin, Smith & Associates, Inc. report of 1968. This percentage increase was established

from a 1960-1967 civilian population increase of 11,000 persons over that specific period.

In the year 1960, the Territory of Guam civilian population was listed as 67,000; however, hindsight now seems to indicate that approximately 9,000 of these persons were military or military dependents living off base at that time. This is partially confirmed on page 7 of "Guam 1969, A Developing Pacific Economy" where some 42,000 persons are listed as military or military dependents. During the present census, when there has been a relatively light reduction in military dependents on Guam, the current count lists a military community of only 33,000 persons.

The rate of increase per year of 2.35% was established over the past several years by a recorded natural increase in population of (births minus deaths) which has averaged about 2,150 per year. Recorded births have fluctuated from 2,439 in 1969 to 2,511 in 1968, while recorded deaths have averaged only 331 per year over the same period.

Now, in 1970, during a period of low construction growth in the United States, a building boom which is island-wide is occurring on Guam. Guam is one of the few areas within the United States today where a scarcity market of laborers of various categories exists. These labor and service people are needed to meet the increased business and tourist expansion. In 1967 there were 267 hotel rooms available on Guam; in 1968 this number had risen to 520 rooms and an additional 460 rooms were under construction in 1969. Present forecasts call for an additional 2,000 rooms by 1975.

With a young population, where over half of the people of Guam are under the age of 25 years, and with demands for youthful labor in the hotel and tourist industries, not only will the personnel arrive to satisfy the labor market demands, but so will dependents and, in due time, offspring of these people and their dependents.

Table I, put out by the Economic Research Center, Department of Commerce, Guam, on May 13, 1970 shows a short term population projection through the year 1975. This projection shows an annual increase in excess of 8.3% for the year 1972-1973. It also shows an urbanization growth in Dededo and Tamuning in northern Guam, so that by the year 1975, some 61% of the population will be living north and east of Route 4, on an area that comprises less than 44% of the island.

This rapid population increase and urbanization of the Island of Guam is quite similar to the predicted growth in Puerto Rico, as discussed in Appendix B of this report. The results of this rapid growth, coupled with the youthful populace and dependent immigration which can be expected with the expanding labor market, is reflected in Figure 1. The long-range population trend curve indicates a continuing, but gradually decreasing, rate of growth until the rate of increase equals that of the past few years on Guam, with possibly even a lower rate of growth by 1995. Even so, the probable civilian population on Guam can be expected to be around 153,000 persons in 1990; 186,000 persons in 2000, and 228,000 by the year 2010.

The total population, assuming the above quoted civilian growth and

that the military personnel will remain about 33,000, will exceed 250,000 persons on Guam by the end of the first decade of the twenty-first century.

D. DOMESTIC WATER CONSUMPTION

The discussion and arguments set forth in Part I, Section B, Water Consumption, of the Austin, Smith & Associates, Inc. report of 1968 still appear valid as to the per capita water consumption for domestic purposes. Meter readings in 1962 indicated a per capita demand of 80 gallons per day and a daily demand of 102 gallons per person in 1966. The slightly conservative figure of 110 gallons per capita per day for domestic consumption will continue to be used for this report.

Based on the revised civilian population growth curve for Guam shown on Figure 1, plus an approximate 10% allowance for losses between the source and point of consumption, the daily use rate of 110 gallons per capita will bring the supply requirements for the civilian population of Guam to the quantities indicated on Table II.

TABLE II
PROBABLE DAILY
CIVILIAN DOMESTIC WATER DEMANDS
AND DOMESTIC SUPPLY REQUIREMENTS FOR GUAM
SHOWN IN GALLONS PER DAY

<u>Year</u>	<u>Population*</u>	<u>Demand @ 110 gpd</u>	<u>Plus 10+ % Loss</u>	<u>Supply Required</u>
1975	96,000	11,000,000	1,100,000	12,100,000
1980	124,000	14,300,000	1,400,000	15,700,000
1985	141,000	16,300,000	1,600,000	17,900,000
1990	153,000	17,700,000	1,800,000	19,500,000
1995	166,000	19,200,000	1,900,000	21,100,000
2000	186,000	21,500,000	2,100,000	23,600,000
2005	206,000	23,800,000	2,400,000	26,200,000
2010	228,000	26,200,000	2,600,000	28,800,000

*Population does not take into consideration tourists, which we must



DONALD S. AUSTIN
RUSSELL L. SMITH, JR.
CAESAR S. TSUTSUMI
L. O. ANDERS

#1133.16
3 April 1974

Department of Land Management
Government of Guam
Agana, Guam 96910

Attention: Mr. Paul Siebert,
Territorial Planner

Dear Mr. Siebert:

Subject: Population Projections in the Agat-Santa Rita Area

This letter is to confirm the decisions reached at a meeting held at the Department of Land Management on March 29, 1974, with Harry Sickler of the Territorial Planning Commission, Andrew Kinane of your staff, and Loren E. Terzich and myself of Austin, Smith & Associates, Inc. The meeting was held in order to discuss ultimate population projections in the Agat-Santa Rita area; and it was a followup to our letter of March 14, 1974, requesting assistance in the determination of population densities.

As a result of the meeting, it was recommended by Mr. Kinane and Mr. Sickler that the existing zoning patterns as shown on the "Official Zoning Map - Covering Municipality of Agat-Santa Rita" dated September 6, 1967 be used. Population would then be based on the following densities:

<u>Zoning</u>	<u>Densities</u>	<u>Public Reservation</u>
R-1	35 persons/acre	14%
R-2	92 " "	31%
C	60 " "	2.4%
M	60 " "	2.4%
A	20 " "	2.4%

BUREAU OF PLANNING
GOVERNMENT OF GUAM
P.O. BOX 2950
AGANA, GUAM 96910

Department of Land Management

3 April 1974

It was further recommended that agricultural zoning areas be used to cover a range of densities from 0 to 20 persons per acre. If you have any questions on this matter, please contact Mr. Terzich at our office.

Very truly yours,

AUSTIN, SMITH & ASSOCIATES, INC.

By *William T. Coleman, Jr.*
WILLIAM T. COLEMAN, JR.
Resident Manager - Engineer

WTC/je

x. c.: Mr. Andrew Kinane
Mr. Harry Sickler
Mr. Charles Brister
ASA/HNL

Table A Summary of Municipality Growth Rates to the Year 2000
 *(See Appendix No. for specific Community areas).

<u>Municipality</u>	<u>Estimated Existing Population</u>	<u>Projected Population Year 2000</u>
Umatac	700	1,600
Agana	1,094	2,550
Asan	1,440	2,700
Piti	1,570	2,645
Merizo	1,635	2,580
Inarajan	1,790	2,765
Agana Heights	2,125	4,000
Talofofo	2,155	2,675
Sinajana	2,545	4,750
Chalan Pago-Ordot	2,762	4,958
Santa Rita	3,200	5,050
Mongmong-Toto-Maite	4,022	5,100
Yona	4,098	8,460
Agat	4,230	9,450
Mangilao	5,694	19,482
Barrigada	5,818	11,474
Yigo	6,097	13,600
Tamuning	11,849	27,500
Dededo	<u>21,877</u>	<u>36,250</u>
TOTALS	84,701	167,589

* Does not include military personnel and dependents.

Table Population Changes and Percentages in Northern, Central and Southern Guam

	<u>Present</u>	<u>Percentage of Present</u>	<u>Projected</u>	<u>Percentage of Projected</u>	<u>Percentage Increases *</u>
North	42,333	49.98	86,684	51.74	104.77
Central	21,990	25.96	43,680	26.07	98.64
South	<u>20,378</u>	<u>24.06</u>	<u>37,225</u>	<u>22.22</u>	<u>82.67</u>
TOTALS	84,701	100.00	167,589	100.00	

* $\frac{\text{Projected-Present}}{\text{Present}} \times 100$

82-70.101
(misc. data)

TABLE IV
POPULATION BY FIVE-YEAR AGE GROUPS X 10

(Roy Chung - 1974)

YEAR	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	Over
1970	12	11.8	10.3	8.0	10.3	6.4	6.2	5.5	4.8	3.5	2.3	1.7	1.1	0.689	0.351	0.440
1975	24	11.5	11.7	10.3	8.0	10.2	6.3	6.1	5.4	4.7	3.4	2.2	1.6	0.901	0.608	0.508
1980	26	23.9	11.5	11.7	10.2	7.9	10.1	6.3	6.1	5.3	4.6	3.3	2.1	1.380	0.795	0.733
1985	29	26.0	23.8	11.8	11.6	10.1	7.8	10.0	6.2	5.9	5.2	4.4	3.1	1.745	1.218	0.998
1990	32	29.1	26.0	23.8	11.4	11.5	10.0	7.8	9.9	6.0	5.8	5.0	4.1	2.608	1.540	1.457
1995	40	31.8	29.0	25.9	23.5	11.3	11.4	9.9	7.7	9.7	6.0	5.5	4.7	3.457	2.301	1.955
2000	49	39.9	31.8	28.9	25.6	23.4	11.2	11.3	9.9	7.5	9.5	5.7	5.2	3.916	3.050	2.794
2005	62	48.9	39.8	39.7	28.7	25.5	23.2	11.1	11.2	9.6	7.4	9.1	5.4	4.381	3.455	3.820
2010	73	61.5	48.8	39.7	31.4	28.5	25.2	23.0	11.0	11.0	9.4	7.1	8.5	4.507	3.865	4.703

constant birth rate

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TABLE V
POPULATION BY FIVE-YEAR AGE GROUPS X 1000

YEAR	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	OVER 74
1970	12	11.8	10.3	8.0	10.3	6.4	6.2	5.5	4.8	3.5	2.3	1.7	1.1	0.689	0.351	0.440
1975	22	11.5	11.7	10.3	8.0	10.2	6.3	6.1	5.4	4.7	3.4	2.2	1.6	0.901	0.608	0.508
1980	22	22.1	11.5	11.7	10.2	7.9	10.1	6.3	6.1	5.3	4.6	3.3	2.1	1.380	0.795	0.733
1985	22	22.0	22.1	11.5	11.6	10.1	7.8	10.0	6.2	5.9	5.2	4.4	3.1	1.745	1.218	0.998
1990	22	22.2	22.0	22.0	11.4	11.5	10.0	7.8	9.9	6.1	5.8	5.0	4.1	2.608	1.540	1.457
1995	23	21.9	22.2	21.9	21.8	11.3	11.4	9.9	7.7	9.7	6.0	5.5	4.7	3.457	2.301	1.955
2000	25	23.3	21.8	22.1	21.7	21.7	11.2	11.3	9.9	7.5	9.5	5.7	5.2	3.916	3.050	2.794
2005	26	24.8	23.2	21.8	21.9	21.6	21.5	11.1	11.2	9.6	7.4	9.1	5.4	4.381	3.455	3.820
2010	24	25.6	24.7	23.2	21.6	21.8	21.4	21.3	11.0	11.0	9.4	7.1	8.5	4.507	3.865	4.703

diminishing birth rate

Table IV is a study of the population expansion over the next forty (40) years based on the 1970 census with the assumption that the birth rate will remain constant over this period. These figures are in thousands of people. To get an understanding of the significance of this data, a good estimate of the Department of Education enrollment K-12 is the totals of 5-9 and 10-14 age groups. In 1970, it was 22.1 thousand; by 1980, the estimate will be 35.4 thousand, and by 1990, 55.1 thousand. There is a question as to the validity of this prediction by a constant birth rate, so table ~~IV~~ was prepared using a diminishing birth rate.

As can be seen from this chart, the K-12 areas would

progress from 1970 (22.1 thousand) to 1980 (33.6 thousand) to 1990 (44.2 thousand). Admittedly the better estimate of the birth rate would be neither of these two, but somewhere in between. Of course, neither of these tables assumes any increase due to immigration onto the island or other minor population growth factors. When these are considered, the first chart (IV) shows a better prediction of the overall growth than Table V.

This means that in the next twenty (20) years, the public school system (K-12) will grow by a factor of 2.5 times. The age group from which most university students come will increase by a factor of 3 times.

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2 copy
2-12

CIVILIAN POPULATION PROJECTION*

1970 - 1990

Municipality	1970	1975	1980	1985	1990
San Juan	2,030	1,100	800	800	800
San Juan Heights	3,190	3,500	3,950	4,350	4,750
San Juan	4,340	4,550	4,850	5,100	5,400
San Juan	2,900	3,050	3,350	3,550	3,750
San Juan	6,340	6,400	6,600	6,700	6,900
San Juan	2,840	3,050	3,400	3,700	4,100
San Juan	10,750	18,500	27,000	36,400	47,000
San Juan	1,890	2,250	2,700	3,150	3,600
San Juan	3,110	4,600	6,700	9,000	11,800
San Juan	1,430	1,650	2,100	2,400	2,800
San Juan	2,900	3,250	3,700	4,200	4,650
San Juan	1,190	1,550	2,050	2,500	2,950
San Juan	2,900	2,950	3,200	3,350	3,550
San Juan	3,440	3,550	3,750	3,800	3,850
San Juan	1,880	2,200	2,700	3,150	3,600
San Juan	10,610	13,400	16,300	20,100	23,900
San Juan	810	900	1,000	1,100	1,200
San Juan	2,400	2,500	2,700	2,900	3,050
San Juan	2,550	3,050	3,650	4,250	4,850
TOTAL	67,500	82,000	99,500	120,500	142,500
FOY CHUNG 1974	63,380	85,416	110,200	136,561	176,000
Includes military population					

Source: U.S. Census-Total Population, Department of Commerce.

2-17

APPENDIX B

POPULATION TRENDS IN VARIOUS VILLAGES

ELECT. DIST.	METCALF & EDDY PROJECTED 1980	PROJECTED *GROWTH RATE	CHIEF COMMISSIONERS SURVEY AS OF DECEMBER 1968	ACTUAL *GROWTH
Agana	3,000	BA	2,419	A
Agana Heights	4,376	A	3,729	A
Agat	5,450	A	4,904	AA
Asan	3,000	BA	2,545	A
Barrigada	7,100	A	5,431	BA
Chalan Pago	3,100	A	2,340	BA
Dededo	5,600	AA	5,749	FAA
Inarajan	2,900	A	2,252	BA
Mangilao	2,500	AA	3,518	FAA
Merizo	2,350	A	1,852	BA
Mongmong/Toto	4,014	A	2,604	FBA
Piti	2,000	BA	1,322	A
Santa Rita	3,250	A	2,525	BA
Sinajana	6,170	A	5,283	BA
Talofofo	2,000	A	1,840	A
Tamuning	12,046	AA	6,749	A
Umatac	1,200	A	982	BA
Yigo	1,800	BA	2,150	AA
**Yona	4,400	AA	3,089	A

+ total 76,256
 *FAA = Far above average
 AA = Above average
 A = Average
 BA = Below average
 FBA = Far below average

**Added in second edition.

Metcalf & Eddy

2-14

COMMUNITIES

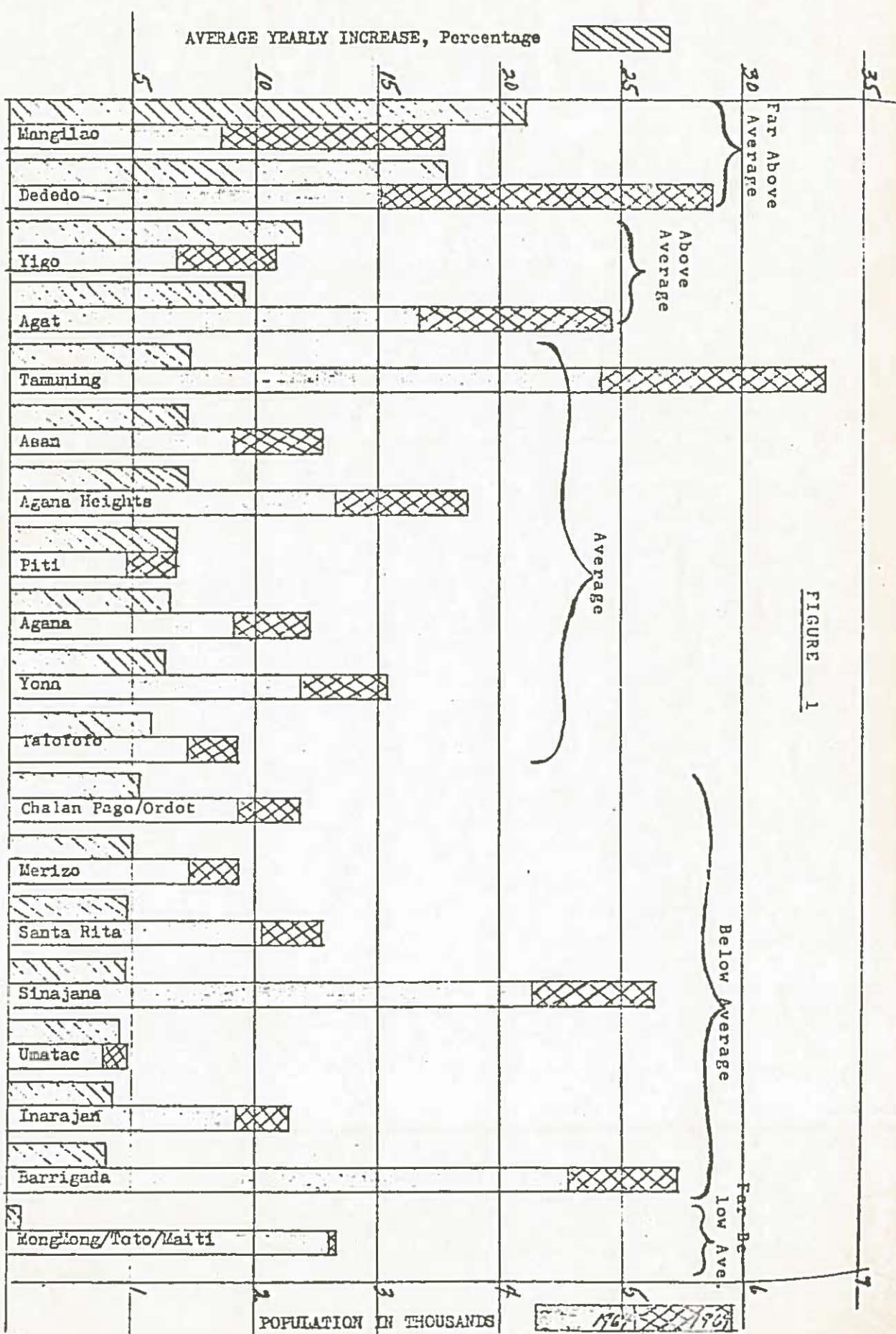


FIGURE 1

SOURCE OF INFORMATION ON POPULATION

- FROM: 1 - TERRITORY OF GUAM,
MASTER PLAN 1966
2 - U.S. CENSUS RECORDS,
TABLE 8, 1901-1950
3 - ECONOMIC RESEARCH CENTER,
GUAM, MAY 13, 1970

POPULATION IN THOUSANDS

170

160

150

140

130

120

110

100

90

80

70

60

50

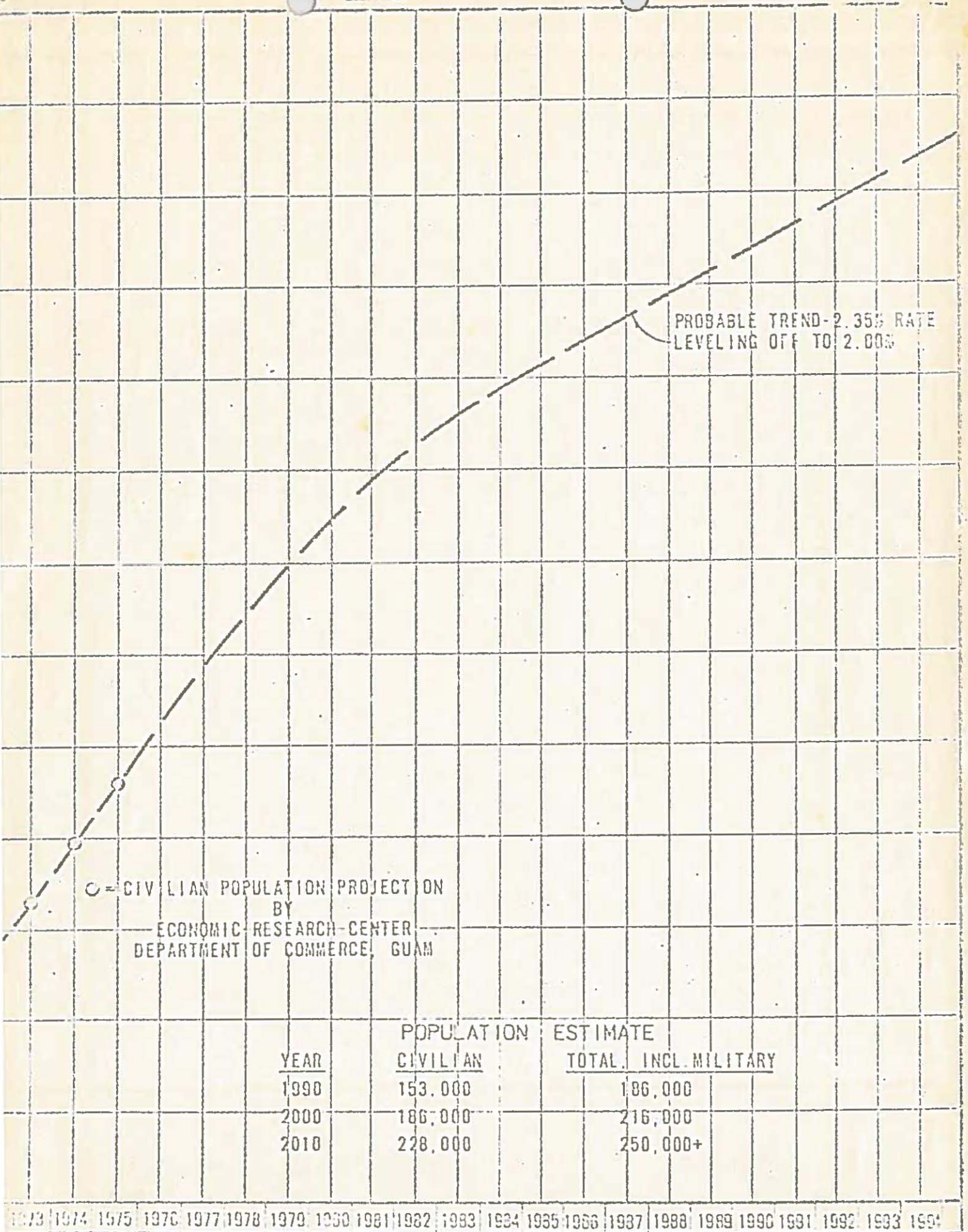
TERRITORY OF GUAM RECORDED POPULATION
ESTIMATED THAT ABOUT 9000 PERSONS
INCLUDED WERE MILITARY LIVING OFF
BASE

67,000

RATE OF INCREASE
2.35% PER YEAR

APPROX. AVERAGE RATE OF INCREASE
1.80% PER YEAR

1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971



END ON ISLAND OF GUAM

TABLE I
POPULATION PROJECTION FOR GUAM
1970-1975

CIVILIANS*	1970	1971	1972	1973	1974	1975
Northern Municipalities						
Barrigada	5,600	5,600	5,600	5,700	5,800	6,000
Chalan Pago	2,500	2,500	2,600	2,700	2,800	3,000
Dededo	9,000	10,400	12,000	14,500	17,000	19,000
Mangilao	4,000	4,300	4,800	5,500	6,200	7,000
Mongmong	2,800	3,000	3,400	3,800	4,200	4,500
Tamuning	10,000	10,700	11,500	13,000	14,000	15,000
Yigo	2,500	2,600	2,800	3,200	3,600	4,000
Northern Civilians	36,400	39,100	42,700	48,400	53,600	58,500
Percentage of Civilians	52%	53.6%	55.4%	57.8%	59.8%	61%
Southern Municipalities						
Agana	2,000	1,900	1,700	1,500	1,200	1,000
Agana Heights	3,900	4,000	4,100	4,200	4,300	4,500
Agat	5,200	5,300	5,400	5,600	5,800	6,000
Asan	2,800	2,800	2,900	2,900	3,000	3,000
Inarajan	2,300	2,300	2,300	2,400	2,400	2,500
Merizo	2,000	2,000	2,100	2,200	2,300	2,500
Piti	1,500	1,500	1,600	1,700	1,800	2,000
Santa Rita	2,700	2,800	2,900	3,100	3,300	3,500
Sinajana	5,200	5,200	5,100	5,000	5,000	5,000
Talofofo	1,900	1,900	2,000	2,100	2,300	2,500
Umatac	1,000	1,000	1,000	1,000	1,000	1,000
Yona	3,100	3,100	3,300	3,500	3,700	4,000
Southern Civilians	33,600	33,800	34,400	35,200	36,100	37,500
Percentage of Civilians	48%	46.4%	44.6%	42.2%	40.2%	39%
Total Civilians	70,000	72,900	77,100	83,600	89,700	96,000
MILITARY	33,000	33,000	33,000	33,000	33,000	33,000
GRAND TOTAL	103,000	105,900	110,000	116,600	122,700	129,000

*These figures do not include transients (tourists, visiting businessmen, hotel occupants, etc.)

Source: Economic Research Center, Department of Commerce, Guam
May 13, 1970

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TABLE 1
POPULATION CENSUS AND PROJECTION

<u>DISTRICT</u>	<u>1964</u>	<u>*1969</u>	<u>1990</u>
Agana	1,827	2,419	5,000
Agana Heights	2,667	3,729	9,900
Agat	3,362	4,904	13,000
Asan	1,828	2,545	5,500
Barrigada	4,530	5,431	10,000
Chalan Pago/Ordot	1,861	2,340	5,200
Dededo	3,039	5,749	28,000
Inarajan	1,863	2,252	4,200
Mangilao	1,718	3,518	10,000
Merizo	1,378	1,852	4,000
Mongmong/Toto/Maite	2,662	2,604	5,000
Piti	989	1,322	3,400
Santa Rita	2,027	2,525	5,300
Sinajana	4,279	5,283	10,000
Talofofo	1,430	1,840	5,000
Tamuning	4,839	6,749	30,000
Umatac	791	982	2,000
Yigo	1,349	2,150	11,000
Yona	<u>2,353</u>	<u>3,089</u>	<u>7,500</u>
TOTAL	44,892	61,283	174,000

*As of December 31, 1968

Metcalf & Eddy