

INTRODUCTION

The Greater Miami Area has been called "The fastest growing Metropolitan area, in the fastest growing section of the fastest growing state in the nation". Long known as a tourist resort, the area has established itself to such an extent that the permanent population is of a cosmopolitan nature. In the last 25 years, the City of Miami has become one of the nation's major cities. Economics of the 1920's and 1930's have caused fluctuations in the rate of growth for the Metropolitan area but the tendency for the rate to increase has always been evident.

The climate and soil conditions are such that agriculture was the major source of income during the early days of incorporation of Miami in 1896. The tourist trade found the area in general to be an attraction and gradually became the basis of economy. This trade still has a marked effect on the area. In recent years, industry has become attracted to being located in Metropolitan Miami.

The topography of the area is extremely flat with water being a natural barrier to expansion. Biscayne Bay and the Atlantic Ocean lie to the East whereas the western extremities are within the Everglades region. Engineering science has overcome the barriers through a program of land recovery and flood control. At the present time a system of canals and dikes together with dredging operations have allowed urban expansion in the area. Studies are being made for further flood control and consequent reclamation.

As with any Metropolitan area, one city is the focus of the outlying communities. In Dade County, Miami has been the source of progress and expansion and the area beyond is dependent upon the City of Miami to set the pace. The Department of Water and Sewers has become the chief supplier of water in the area. It has been a major factor in the expansion of Dade County and upon its provision for meeting increased future needs rests much of the future growth of Metropolitan Miami. In turn, estimating the necessary future of water supply facilities of the Department is dependent upon the future growth of the area served.

Management and design of water supply require a knowledge of the quantities of water needed in relation to the population supplied. For this purpose, a careful study of the past growth and present trends of the area served by the Department has been made as well as an estimate of the future population through 1980. While it is impossible to exactly forecast growth and population, the methods used in this study together with sound judgment result in a population estimate believed to be as accurate as any prediction can be.

POPULATION

In a study of this nature, which is to provide for the future growth in a Metropolitan area, population and probable future growth must be considered. As previously stated, it is impossible to determine exactly how the greater Miami area will grow, either in number or in character of occupation. In making this estimate of population, careful consideration has been given to the study of population distribution and density, birth and death rates and various supporting data such as the increase in number of electric customers, building permits, new dwellings and marriages.

At the present time, the Department supplies the entire City of Miami, the Cities of Coral Gables, Miami Beach, Hialeah, South Miami, the Towns of Miami Springs and West Miami, several villages including those adjacent to Miami Beach, as well as portions of unincorporated areas in Dade County. The population served has been increasing at an average rate of 8% each year for the past 10 years, whereas the population of Dade County has been increasing at an average annual rate in excess of 12%. There being little vacant land available within the City of Miami limits, any large increase in population would be possible only through a change in zoning restrictions which might provide for multiple dwelling units occupying sites which are presently single or double dwelling units. Annexation of fringe areas would also increase the population but

at present this is not imminent.

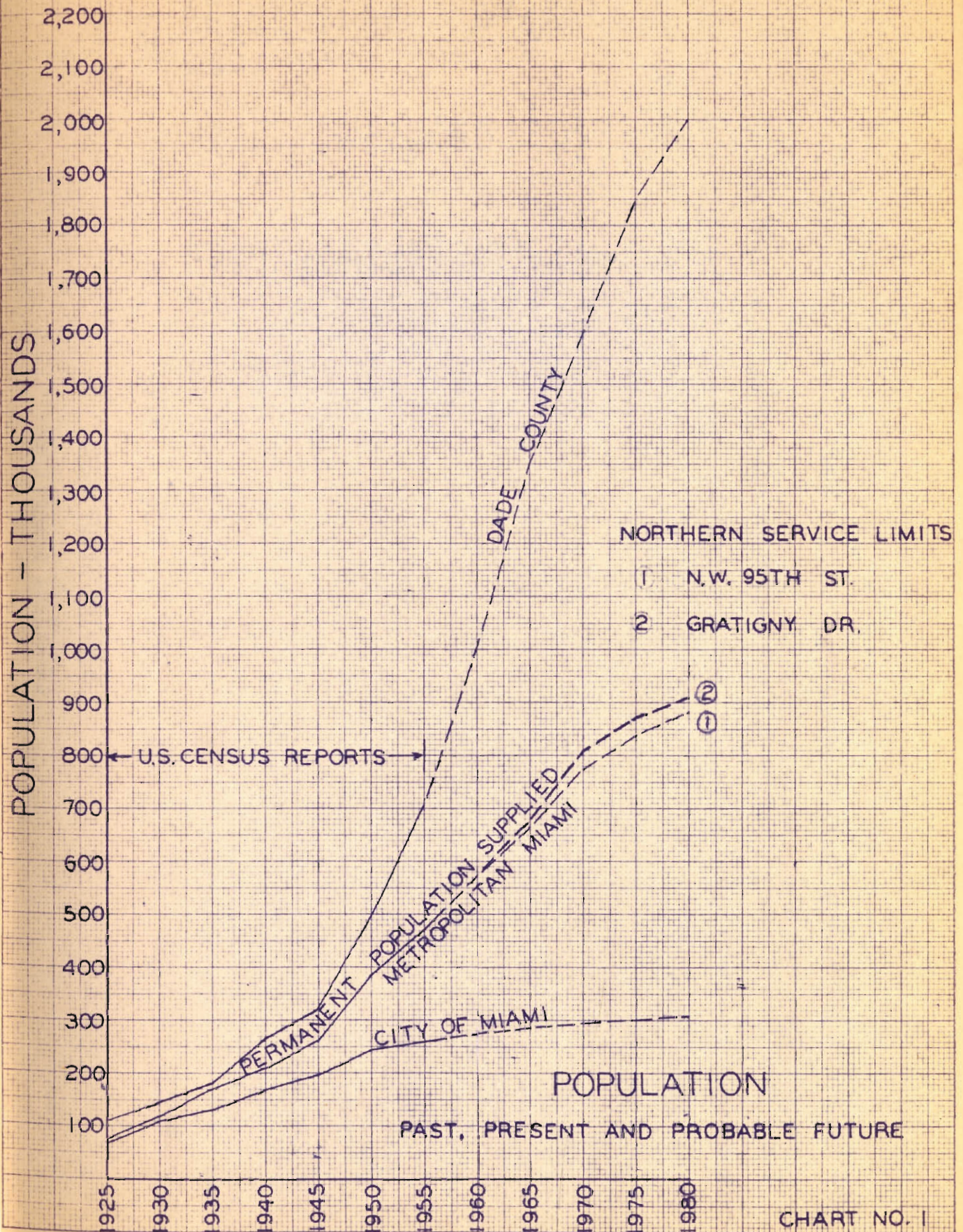
TOTAL POPULATION

Chart No. 1 shows graphically the rapid increase in population of Dade County, a similar rise in the population supplied and gradually decreasing rate of growth in the population of the City of Miami.

For purposes of this study, the area supplied by the Department and adjoining areas are considered to be Metropolitan Miami. The limits of the area are shown on the map, Chart No. 3, accompanying this report. For more detailed study, this area was divided into the prevailing political communities as far as possible with the exception of Miami Beach which was considered to include those villages to which the Water Department of Miami Beach furnishes water. South County, North County and West County are unincorporated areas of Dade County some of which are presently supplied. The population statistics are shown in Tables No. 4A & 4B.

It is anticipated that if the northern service limits were extended to Gratigny Drive (N.W. 119th Street), the total permanent population served by 1980 will be 910,000 persons, whereas during the winter months in 1980 it will be 1,030,000. Any radical departure from this estimate will merely have an effect of expediting or delaying a future construction program.

Population studies were made in each of thirteen political communities and coordinated with water demands. The present population of the communities was estimated from the 1950 United States



PERMANENT POPULATION

GREATERT MIAMI AREA

<u>MUNICIPALITY</u>	<u>1910</u>	<u>1915</u>	<u>1920</u>	<u>1925</u>	<u>1930</u>	<u>1935</u>	<u>1940</u>	<u>1945</u>	<u>1950</u>	<u>1955</u>
*Miami Beach	5,471	15,592	29,571	68,754	110,637	127,600	172,172	192,122	249,276	259,035
*Miami Gables	644	2,342	6,494	13,330	28,012	32,256	46,282	50,981
*Coral Gables	901	5,699	6,747	8,294	9,250	19,837	29,210
*Hialeah	2,600	3,168	3,958	4,803	19,676	43,135
*Miami Springs	402	443	898	1,863	5,108	10,138
Opa Locka	497	1,855	5,271	9,392
*South Miami	1,160	1,690	2,408	2,739	4,809	7,600
*El Portal	365	582	1,371	1,994
Biscayne Park	450	500	914	2,009	2,833
*Miami Shores Village	693	1,956	2,795	5,086	7,839
*Surfside	295	991	1,852	2,592
North Miami	1,354	1,973	2,776	10,734	23,463
North Miami Beach	522	871	1,082	2,129	12,161
Golden Beach	83	125	156	249
*Indian Creek Village	35	44	56
*West Miami	4,043	5,158
*Bal Harbour	325	334
*Bay Harbor Island	520	1,716
*North Bay Village	198	1,247
*Virginia Gardens	235	1,554
UNINCORPORATED AREA	109,859	222,448
+DADE COUNTY	11,933	24,539	42,753	111,352	142,955	180,998	267,739	315,138	495,084	703,777

+ The Dade County Total Includes all Population in the County, including all incorporated and unincorporated areas.

* Served by Department of Water and Sewers

TABLE NO. 2

PAST PERMANENT POPULATION SERVED

(Based on U.S. Census Figures)

<u>Year</u>	<u>Population</u>	<u>Increase</u>
1920	29,000	
1930	122,000	93,000
1940	216,000	94,000
1945	266,200	50,200
1950	388,316	122,116
1955	473,434	85,118

TABLE NO. 3

ESTIMATED FUTURE PERMANENT POPULATION SERVED

(Northern Limits at N.W. 95th Street)

<u>Year</u>	<u>Population</u>	<u>Increase</u>
1955	473,434	
1960	572,000	98,566
1965	665,000	93,000
1970	773,000	108,000
1975	834,000	61,000
1980	882,000	48,000

ESTIMATED FUTURE PERMANENT POPULATION SERVED

(Northern Limits at Gratigny Drive)

<u>Year</u>	<u>Population</u>	<u>Increase</u>
1955	473,434	
1960	572,000	98,566
1965	675,000	103,000
1970	804,000	129,000
1975	869,000	65,000
1980	910,000	41,000

Census Tract Statistics, the 1955 Special Census, and from the number of water services supplying the consumers. These data are shown in Tables No. 1 & 2. Future population to be supplied was obtained as a result of past population trends in each community and density saturation studies were made to determine the possibility of future development, with the resulting data shown in Tables No. 3 & 4. In the following discussion the characteristics of each community are set forth together with an estimate of population for 1980.

POPULATION BY MUNICIPALITIES

1. HIALEAH

This city is now the second largest in Dade County and the sixth largest in Florida. It extends from the Miami River Canal to the Opa Locka Air Base and from N.W. 37th Avenue to Ludlum Road. It contains one third of the industries in Dade County. The City of Hialeah is a wholesale customer of the Department and maintains its own distribution system. It is estimated that the City of Hialeah will have a population of 102,000 by 1980, assuming moderate enlargement by annexation in a northwesterly direction.

2. MIAMI SPRINGS and VIRGINIA GARDENS

This area, lying south and west of the Miami River Canal, north of Miami International Airport and east of Ludlum Road, is a residential area of almost 12,000 persons. Water supply is purchased wholesale from the Department and distributed through town-owned mains. Virginia Gardens is considered to be a "suburb" of Miami Springs and is served by the same water distribution system.

By 1980, the population of these communities is expected to be 18,000, assuming no enlargement by annexation.

3. CONSUMERS WATER COMPANY

a. CORAL GABLES

This modern suburban city of approximately 35,000 persons, including a part of the student body of the University of Miami, lies just west of the Miami city limits. It is bounded on the west by Red Road, on the north by S.W. 8th Street, and on the south by Sunset Road. South of Sunset Road and running along the shore of Biscayne Bay is a presently unoccupied but subdivided area of 3.5 square miles which is part of Coral Gables. Primarily a residential area, there are approximately 50 light-type industries and several large retail and service establishments located in Coral Gables. It is the home of the University of Miami.

Consumers Water Company buys water wholesale from the Department and owns the distribution system in City of Coral Gables. The population of Coral Gables is estimated to reach 63,000 persons by 1980, assuming no enlargement by annexation.

(1). THE UNIVERSITY OF MIAMI

The Main Campus of this privately endowed institution is located in the southwest section of Coral Gables. The North Campus is located in the central part of Coral Gables. The present enrollment is 13,364 students, 9,111 of which are full time students. It is estimated that two thirds of the full time student body live in the Coral Gables area, either in Uni-

versity facilities or private dwellings. As a result, the University enrollment increases the official population figures during school terms and similarly reflects the population served. The net effect on a yearly average would be to increase the official population of Coral Gables by two thirds of the total number of students residing in the Coral Gables area. The population figures for Coral Gables have been adjusted to include effective student enrollment.

b. SOUTH COUNTY

This area west and south of Coral Gables includes those unincorporated areas of Dade County served either directly by the Department or indirectly by the Department through facilities of Consumers Water Company. It includes those portions of presently sparsely occupied land and can be expected to become more densely populated in the future. Much of the growth in this area is dependent upon flood control measures in the Everglades region. The present population served is estimated to be 25,000 and by 1980 is estimated to be 104,000

c. SOUTH MIAMI

This city is situated southwest of Coral Gables and is included in the franchise territory of the Consumers Water Company and served directly by it. The type of community is not conducive to dense population. The homes and lots are larger than average while the present area of the city is only two square miles. The present population is about 8,500 and the 1980 population (assuming no annexation) is estimated to be 15,000 persons.

4. MIAMI RETAIL SERVICE AREA

a. MIAMI

The City of Miami is supplied directly through the facilities of the Department. The entire population or approximately 265,000 persons are estimated to be served in the City. From the time of its incorporation, the City of Miami developed at a rapid pace until 1950 when much of the available land area had become occupied. Since that time, the rate of increase in population has declined and has become quite stable. With the exception of the central Northwest Section of Metropolitan Miami, expansion of the City of Miami boundaries are limited by Biscayne Bay, the Tamiami Canal, or other already incorporated communities. With the above exception, it is unlikely that any land annexation will take place in the years to come. The population estimate for the future includes some moderate internal increases for urban renewal and other multiple dwelling unit construction programs and in 1980 (assuming no annexation) will approach 305,000 people.

b. MIAMI SHORES

This incorporated village of some 8,500 persons includes 4.25 square miles of land north of the City of Miami. It is served directly by the Department which owns and maintains the distribution facilities. For this reason, water demand estimates are included with the City of Miami demand figures. The future population of Miami Shores (assuming no annexation) is estimated to be 11,000 in 1980.

c. EL PORTAL

This incorporated village of 2,000 persons is located between the northern limits of the City of Miami and the southern limits of Miami Shores. The water supply is part of the Department's system. It is possible for the village to annex a small portion of the unincorporated area lying west of its western boundary on North Miami Avenue. The population by 1980 (assuming no annexation) is estimated to be 2,300 persons. Water demand figures are included with those of Miami City and Miami Shores.

d. NORTH COUNTY

This area has been considered as the unincorporated portions of Dade County, north of the City of Miami to Gratigny Drive and between the incorporated areas of Hialeah, Miami Shores and El Portal. The population of this area has been steadily increasing at a faster rate than the South County area, supported by several large Colored Housing developments. Although smaller in area than the South County area, the future population will be greater due to density of population. The area north of N.W. 95th Street and south of Gratigny Drive is considered an alternate economical limit of the Department's water system for future inclusion. The population of that part of the North County area which can be considered to be eventually supplied south of N.W. 95th Street is estimated to be 135,000 by 1980, and 163,000 if the limits were extended to Gratigny Drive.

e. WEST COUNTY

The designation "West County" has been given to the county area west of the westerly town limits of Miami Springs and Virginia Gardens as well as the property limits of the Miami International Airport and north of S. W. 8th Street (Tamiami Trail). As shown on Chart No. 3, it includes the Town of Sweetwater.

The area west of the airport has been zoned industrial as far west as the proposed location of the Palmetto Road (N.W. 77th Avenue) Expressway. A westerly extension to the Airport runways is not expected to be needed for some years. The area north of N. W. 36th Street and west of Miami Springs extending to the Miami Canal is presently zoned as agricultural.

The present population in this "West County" area is approximately 2,000 persons. At present the residents have water supply from individual wells but it is felt that in the future the Department will supply the demands of the area as part of the Miami Retail Service Area. For this reason it has been included in this report.

According to the Bureau of Economic Research of the University of Miami, a population of 12,000 is expected in this area by 1962. By projecting this rate of increase to 1980, the population of the West County area will reach 40,000 persons.

5. WEST MIAMI

The Town of West Miami is located west of Coral Gables and south of S. W. 8th Street. Less than one square mile in area, it is bounded on the west by Ludlum Road and extends irregularly southward to its extremity at Coral Way. The present population is 5,500 people whereas the population in 1980 (assuming no annexation) is estimated to be 5,900. The water supply for the town is obtained from the Department as a wholesale customer; the town owns and operates its own distribution system.

6. MIAMI BEACH SERVICE AREA

The area served by the Miami Beach Water Department includes the City of Miami Beach and the incorporated villages of Bal Harbour, Bay Harbor, Indian Creek, Surfside, and North Bay. The City of Miami Beach, as a wholesale customer, is supplied by the Department and distributes to the neighboring villages.

The Beach area has developed into one of the world's most famous year round resorts. The City of Miami Beach was incorporated as a town in 1915 and adopted a city charter in 1917. It can accommodate three times its permanent population. The chief business activities are tourism, accommodations, retail and service trades, and professions. At present, it has one quarter of all the hotel rooms in the state of Florida.

At present, the City of Miami Beach has reached a level-

ling off point in the growth of its permanent population. Any vacant land that remains can be assumed to be eventually occupied by tourist accommodations. In addition, land re-use has begun a new trend; newer and larger hotels are replacing the old landmarks and continually increasing the number of accommodations available.

Since 1950, the permanent population of Miami Beach has been increasing at an annual rate of $1\frac{1}{2}\%$ while the tourist population has increased at 7% per year. The tourist growth is similar to the population growth of Dade County whereas the permanent population growth reflects the full occupancy of land for permanent residents.

For these reasons, conventional considerations of population predictions could not be applied to the Miami Beach Area. An intensive study of the tourist population was made for estimating purposes. The peak tourist season was found to increase the permanent population figures by 150%. It is estimated that approximately 58% of the tourist accommodations are occupied at any "off-season" period of the year. The present permanent population is estimated to be 61,000 and the annual average tourist population increases the total population served to 113,000. The present peak population served is estimated to be 153,000 during the winter season. By 1980, the permanent population is estimated to be 72,000 while the population during the winter season is estimated to be 192,000.

7. KEY BISCAWAYNE

This island off the southeast shore of Miami has only recently been partially developed. Prior to the construction of a causeway from the mainland, the island held little appeal for inhabitation. Key Biscayne is supplied with water from the Department through a County owned main on Rickenbacker Causeway, and is a wholesale customer. The present population is approximately 3,500 and in 1980 is estimated to be 9,000 persons, based upon an expansion of the type of residential development already begun.

COMPARISON OF POPULATION ESTIMATES

During the course of the population study, officials of the various municipalities served were interviewed for the purpose of obtaining other estimates of population. Such estimates as were available have been presented in Table No. 5. With the exception of Hialeah, the municipal estimates were based more on the rational application of knowledge by the source than on mathematical or graphical methods. The City of Hialeah had based its estimates on a population study included in a report on a proposed sewer system for Hialeah by Jack F. Cooper Associates, Consulting Engineers. A comparison of estimates is shown in Table No. 5.

PAST, PRESENT AND PROBABLE FUTURE POPULATION SERVED BY MUNICIPALITIES

(Northern Limits - N.W. 95th St.)

MUNICIPALITY	1950	1955	1960	1965	1970	1975	1980
Hialeah	19,676	43,135	70,000	85,000	98,000	100,000	102,000
Miami Springs & Virginia Gardens	5,343	11,692	14,000	15,000	16,000	17,000	18,000
Coral Gables & Univ. of Miami	21,837	32,210	44,000	51,000	59,000	61,000	63,000
South Miami	4,809	7,600	10,500	12,000	13,000	14,000	15,000
South County	13,552	19,500	29,000	46,000	78,000	90,000	104,000
Miami	249,276	259,035	276,000	285,000	293,000	300,000	305,000
Miami Shores	5,086	7,839	9,600	10,200	10,800	10,900	11,000
El Portal	1,371	1,994	2,100	2,150	2,200	2,250	2,300
West County	-	-	9,000	17,000	24,000	32,000	40,000
North County	14,398	25,600	37,000	67,000	100,000	122,000	135,000
West Miami	4,043	5,158	5,500	5,600	5,700	5,800	5,900
Miami Beach Service Area Permanent Peak Tourist	48,896 61,598	56,926 90,119	61,000 99,000	64,000 107,000	67,000 113,000	71,000 117,000	72,000 120,000
Key Biscayne	29	2,745	4,000	5,000	6,500	8,000	9,000
TOTAL PERMANENT POPULATION	388,316	473,434	571,700	664,950	773,200	833,950	882,000
TOTAL PEAK POPULATION	499,914	563,553	670,700	771,950	886,200	950,950	1,002,200
TOTAL AVERAGE POPULATION	425,275	525,525	630,700	728,950	841,200	903,950	954,200

PAST, PRESENT AND PROBABLE FUTURE POPULATION SERVED BY MUNICIPALITIES

(Northern Limits - Gratigny Dr.)

MUNICIPALITY	1950	1955	1960	1965	1970	1975	1980
Hialeah	19,676	43,135	70,000	85,000	98,000	100,000	102,000
Miami Springs & Virginia Gardens	5,343	11,692	14,000	15,000	16,000	17,000	18,000
Coral Gables & Univ. of Miami	21,837	32,210	44,000	51,000	59,000	61,000	63,000
South Miami	4,809	7,600	10,500	12,000	13,000	14,000	15,000
South County	13,552	19,500	29,000	46,000	78,000	90,000	104,000
Miami	249,276	259,035	276,000	285,000	293,000	300,000	305,000
Miami Shores	5,086	7,839	9,600	10,200	10,800	10,900	11,000
El Portal	1,371	1,994	2,100	2,150	2,200	2,250	2,300
West County	-	-	9,000	17,000	24,000	32,000	40,000
North County	14,398	25,600	37,000	77,000	131,000	157,000	163,000
West Miami	4,043	5,158	5,500	5,600	5,700	5,800	5,900
Miami Beach Service Area Permanent Peak Tourist	48,896 61,598	56,926 90,119	61,000 99,000	64,000 107,000	67,000 113,000	71,000 117,000	72,000 120,000
Key Biscayne	29	2,745	4,000	5,000	6,500	8,000	9,000
TOTAL PERMANENT POPU- LATION	388,316	473,434	571,700	674,950	804,200	868,950	910,200
TOTAL PEAK POPULATION	499,914	563,553	670,700	781,950	917,200	985,950	1,030,200
TOTAL AVERAGE POPULA- TION	425,275	525,525	630,700	738,950	872,200	938,950	982,200

COMPARISON OF ESTIMATES OF FUTURE POPULATION

<u>MUNICIPALITY</u>	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>SOURCE OF MUNICIPAL ESTIMATE</u>
<u>Hialeah</u>						
Dept. Est.	70,000	85,000	98,000	100,000	102,000	Jack Cooper, Assoc. (Consulting Engrs.)
Municipal Est.	76,000	87,000	94,000	99,000	103,000	
<u>Miami Springs & Virginia Gardens</u>						
Dept. Est.	14,000	15,000	16,000	17,000	18,000	Building Inspector
Municipal Est.	14,000	14,000	14,000			
<u>Coral Gables</u>						
Dept. Est.	44,000	51,000	59,000	61,000	63,000	Ass't. City Mgr.
Municipal Est.					63,000	
<u>South Miami</u>						
Dept. Est.	10,500	12,000	13,000	14,000	15,000	Building Inspector
Municipal Est.	10,300	10,300	10,300			
<u>Miami</u>						
Dept. Est.	276,000	285,000	293,000	300,000	305,000	City Planning Div.
Municipal Est.				300,000	300,000	
<u>Miami Shores</u>						
Dept. Est.	9,600	10,200	10,800	10,900	11,000	City Clerk
Municipal Est.	10,000	11,000	11,000			
<u>El Portal</u>						
Dept. Est.	2,100	2,150	2,200	2,250	2,300	Village Clerk
Municipal Est.	2,100	2,100	2,100			
<u>West Miami</u>						
Dept. Est.	5,500	5,600	5,700	5,800	5,900	Town Clerk
Municipal Est.	6,000	6,000	6,000			
<u>Miami Beach Service Area</u>						
Dept. Est.	61,000	64,000	67,000	71,000	72,000	Chamber of Commerce & Village Clerks
Municipal Est.	60,000	60,000	60,000			

WATER REQUIREMENTS

The expression "water demand" which is used in this report as a basis for establishing requirements is the gross amount of water required to meet the consumption. The usage of water by customers is known as "consumption" and the Department's system is 100% metered. In addition to the consumption, water demand includes unaccounted for water which is unmetered, such as fire use and any unavoidable leakage or waste that might occur.

PAST WATER DEMAND RECORDS

The record of the past water demands is presented in Table No. 6, based upon data obtained from records maintained by the Department. The ratios and per capita water demands were computed from other data in the table. The per capita water demand has been gradually increasing over a period of years. This is a national tendency due to the increasing usage of water consuming equipment such as swimming pools, air-conditioners, clothes and dish washers as well as garbage disposals and lawn sprinkler systems. Although local ground water conditions are such that some of these facilities may be supplied with water from individual wells, the per capita consumption has been steadily rising.

In Table No. 7 are shown the water demands by political communities or sections of the area supplied by the Department in 1955 and 1956. The former year was chosen because it was the year of a Special Federal Census and is a more accurate population count than estimates made since then. 1956 was chosen for comparison because

TABLE NO. 6

PAST WATER DEMAND RECORDS

YEAR	AVERAGE DEMAND M.G.D.	*MAXIMUM DAY DEMAND M.G.D.	RATIO MAX: AVG.	PERMANENT POPULATION SERVED	AVG. DEMAND PER CAPITA G.P.C.D.	MAX. DAY PER CAPITA G.P.C.D.
	24.2	32.5	134%			
	27.4	35.1	128%			
	30.1	40.3	134%			
	33.5	41.4	124%	266,000	126	156
	36.2	48.1	133%			
	38.7	50.1	129%			
	42.6	56.9	134%			
	47.9	65.1	136%			
	49.6	69.1	139%	388,316	128	178
	53.6	77.0	144%			
	61.0	82.8	136%	415,000 E	147	200
	60.5	83.6	138%	459,000 E	132	182
	63.1	90.0	143%			
	71.0	100.0	141%	473,434	150	211
	79.2	110.3	139%	493,300	161	224

E - Estimated

* Maximum day is maximum 24 hour period.

the highest maximum consumption day to date occurred in that year. Demand figures were obtained from records in the Department.

The per capita water demands in Table No. 7 for the Miami Beach area are the result of an analysis of samplings of hotel consumption during the various seasons of the year, together with a detailed study of a five year period of trends in tourists' water demands, compared with those of permanent residents.

FUTURE WATER DEMANDS

Having established the past trends in water demands as shown in Tables No. 6 and 7, it is possible to project future demands. Future populations at anticipated per capita water demands, based on past water demands, have been used for data shown in Tables No. 8 and 9.

A study of zoning maps was made for future industrial growth, and it is believed that any new industries will be similar to the type already prevailing with low water demands. The per capita water demand figures used are believed to be sufficient for any future industrial expansion.

Table No. 8 presents a detailed analysis of the probable future water demands by sections in five year periods. Each section was analyzed individually for population growth and water use.

WATER DEMANDS BY SECTIONS

1955*

SECTION	POPULATION SUPPLIED	AVERAGE DEMAND M.G.D.	MAXIMUM DAY DEMAND M.G.D.	RATIO MAXIMUM TO AVERAGE	AVG. DEMAND PER CAPITA G.P.C.D.	MAX. DAY PER CAPITA G.P.C.D.
1. Hialeah	43,135	4.5	6.9	153%	104	160
2. Miami Springs & Virginia Gardens	11,692	1.6	2.4	150%	137	213
3. Consumers Water Company Service Area Coral Gables South Miami South County	59,310	6.4	8.6	134%	108	145
4. Miami Retail Service Area Miami City Miami Shores El Portal North, South & West County	294,468	39.8	53.9	135%	135	183
5. West Miami	5,158	0.4	0.5	125%	78	97
6. Miami Beach Service Area Miami Beach Bal Harbour Bay Harbor Island Surfside North Bay Indian Creek	56,926				92	140
PERMANENT POPULATION						
AVERAGE TOURIST POPULATION	<u>52,100</u>					
TOTAL AVERAGE POPULATION	109,026	17.8			163	-
PEAK TOURIST POPULATION	90,119				-	242
TOTAL PEAK POPULATION	147,045	27.0		152%	-	184
7. Key Biscayne	2,745	0.5	0.7	140%	182	255
PERMANENT POPULATION - TOTAL	473,434	71.0	100.0	141%	150	211
AVERAGE POPULATION - TOTAL	525,534				135	190

*Calendar Year

24

WATER DEMANDS BY SECTIONS

1956*

SECTION	POPULATION SUPPLIED	AVERAGE DEMAND M.G.D.	MAXIMUM DAY DEMAND M.G.D.	RATIO MAXIMUM TO AVERAGE	AVG. DEMAND PER CAPITA G.P.C.D.	MAX. DAY PER CAPITA G.P.C.D.
1. Hialeah	48,500	5.1	8.5	167%	105	175
2. Miami Springs & Virginia Gardens	12,200	1.8	2.9	161%	148	238
3. Consumers Water Company Service Area Coral Gables South Miami South County	65,300	7.2	10.1	140%	110	155
4. Miami Retail Service Area Miami City Miami Shores El Portal North, South & West County	300,500	43.6	57.7	132%	145	192
5. West Miami	5,300	0.4	0.6	150%	75	113
6. Miami Beach Service Area Miami Beach Bal Harbour Bay Harbor Island Surfside North Bay Indian Creek	58,500				135	196
PERMANENT POPULATION	58,500					
AVERAGE TOURIST POPULATION	<u>52,900</u>					
TOTAL AVERAGE POPULATION	111,400	20.4			183	-
PEAK TOURIST POPULATION	91,500				-	236
TOTAL PEAK POPULATION	150,000	29.5		145%	-	197
7. Key Biscayne	3,000	0.7	1.0	143%	233	333
PERMANENT POPULATION - TOTAL	493,300	79.2	110.3	139%	161	224
AVERAGE POPULATION - TOTAL	546,200				145	202

*Calendar Year

-24a-

The average day demands are based on the per capita demands in Table No. 7 and modified as follows:

<u>NO.</u>	<u>SECTION</u>	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>
1.	Hialeah	110 gpcd	110 gpcd	115 gpcd	120 gpcd	125 gpcd
2.	Miami Springs & Virginia Gardens	150	150	150	155	155
3.	Consumers Water Co. Service Area	120	120	125	130	135
4.	Miami Retail Service Area	150	155	160	165	170
5.	West Miami	100	100	100	100	100
6.	Miami Beach Service Area					
	Permanent	105	110	115	120	135
	Tourist	275	300	325	350	375
7.	Key Biscayne	220	225	230	235	240

A second analysis of probable future water demands has been prepared to check the results of Table No. 8. This analysis, Table No. 9, presents an over-all summary of water demands for the system as a whole based on a gradually rising per capita demand for the total average population supplied in five year intervals as follows:

1960	150 gpcd.
1965	155
1970	160
1975	165
1980	170

FUTURE WATER REQUIREMENTS BY SECTIONS

(Northern Service Limits at N.W. 95th Street)

<u>NO.</u>	<u>SECTION</u>	<u>POPULATION SUPPLIED</u>	<u>AVERAGE DAILY DEMAND M.G.D.</u>	<u>MAXIMUM DAY DEMAND M.G.D.</u>	<u>MAXIMUM HOUR DEMAND M.G.D.</u>
------------	----------------	----------------------------	------------------------------------	----------------------------------	-----------------------------------

1960

1.	Hialeah	70,000	7.7	11.6	17.4
2.	Miami Springs & Virginia Gardens	14,000	2.1	3.2	4.8
3.	Consumers Water Co. Service Area & South County	83,500	10.0	15.0	22.5
4.	Miami Retail Service Area	333,700	50.1	75.2	112.8
5.	West Miami	5,500	0.6	0.9	1.4
6.	Miami Beach Service Area				
	Permanent Population	61,000)			
	Average Tourist Population	59,000)	22.6	33.6	50.4
	Maximum Tourist Population	99,000)			
		4,000)	0.9	1.4	2.1
7.	Key Biscayne				
	AVERAGE POPULATION - TOTAL	630,700	94.0	140.9	211.4

1965

1.	Hialeah	85,000	9.3	14.0	21.0
2.	Miami Springs & Virginia Gardens	15,000	2.3	3.5	5.3
3.	Consumers Water Co. Service Area & South County	109,000	13.1	19.7	29.6
4.	Miami Retail Service Area	381,350	59.1	88.7	133.0
5.	West Miami	5,600	0.6	0.9	1.4
6.	Miami Beach Service Area				
	Permanent Population	64,000)			
	Average Tourist Population	64,000)	26.2	39.1	58.7
	Maximum Tourist Population	107,000)			
		5,000)	1.1	1.7	2.6
7.	Key Biscayne				
	AVERAGE POPULATION - TOTAL	728,950	111.7	167.6	251.6

FUTURE WATER REQUIREMENTS BY SECTIONS

(Northern Service Limits at N.W. 95th Street)

NO.	SECTION	POPULATION SUPPLIED	AVERAGE DAILY DEMAND	MAXIMUM DAY DEMAND	MAXIMUM HOUR DEMAND
			M.G.D.	M.G.D.	M.G.D.
<u>1970</u>					
1.	Hialeah	98,000	11.3	17.0	25.5
2.	Miami Springs & Virginia Gardens	16,000	2.4	3.6	5.4
3.	Consumers Water Co. Service Area & South County	150,000	18.8	28.2	42.3
4.	Miami Retail Service Area	430,000	68.8	103.2	154.8
5.	West Miami	5,700	0.6	0.9	1.4
6.	Miami Beach Service Area Permanent Population	67,000)	29.8	44.4	66.5
	Average Tourist Population	68,000)			
	Maximum Tourist Population	113,000)			
7.	Key Biscayne	6,500	1.5	2.3	3.5
	AVERAGE POPULATION - TOTAL	841,200	133.2	199.6	299.4
<u>1975</u>					
1.	Hialeah	100,000	12.0	18.0	27.0
2.	Miami Springs & Virginia Gardens	17,000	2.6	3.9	5.9
3.	Consumers Water Co. Service Area & South County	165,000	21.4	32.1	48.2
4.	Miami Retail Service Area	467,150	77.1	115.7	173.6
5.	West Miami	5,800	0.6	0.9	1.4
6.	Miami Beach Service Area Permanent Population	71,000)	33.0	49.5	74.3
	Average Tourist Population	70,000)			
	Maximum Tourist Population	117,000)			
7.	Key Biscayne	8,000	1.9	2.9	4.4
	AVERAGE POPULATION - TOTAL	903,950	148.6	223.0	334.8

FUTURE WATER REQUIREMENTS BY SECTIONS

(Northern Service Limits at N.W. 95th Street)

NO.	SECTION	POPULATION SUPPLIED	1980		MAXIMUM DAY DEMAND M.G.D.	MAXIMUM HOUR DEMAND M.G.D.
			AVERAGE DAILY DEMAND M.G.D.	POPULATION SUPPLIED		
1.	Hialeah	102,000	12.8		19.2	28.8
2.	Miami Springs & Virginia Gardens	18,000	2.8		4.2	6.3
3.	Consumers Water Co. Service Area & South County	182,000	24.6		36.9	55.4
4.	Miami Retail Service Area	493,300	83.9		125.9	188.9
5.	West Miami	5,900	0.6		0.9	1.4
6.	Miami Beach Service Area Permanent Population	72,000)				
	Average Tourist Population	72,000)	36.0		54.0	81.0
	Maximum Tourist Population	120,000)				
7.	Key Biscayne	9,000	2.2		3.3	5.0
	AVERAGE POPULATION - TOTAL	954,200	162.9		244.4	366.8

IF SERVICE LIMITS WERE EXTENDED BEYOND N.W. 95th STREET TO INCLUDE THE AREA SOUTH OF GRATIGNY DRIVE, THE DEMANDS THEN WILL BE AS FOLLOWS:

YEAR	POPULATION		AVG. DAY CONS.		MAX. DAY CONS.		MAX. HOUR CONS.	
	SECTION 4*	TOTAL AVERAGE	M.G.D.	TOTAL	M.G.D.	TOTAL	M.G.D.	TOTAL
1960	334,000	631,000	50.1	94.0	75.2	140.9	112.8	211.4
1965	391,000	739,000	60.6	113.2	90.9	169.8	136.4	255.0
1970	461,000	872,000	73.8	138.2	110.7	207.1	166.0	310.6
1975	502,000	938,000	82.8	154.4	124.2	231.5	186.3	347.5
1980	522,000	982,000	88.7	167.7	133.0	251.5	199.5	377.4

*Miami Retail Service Area

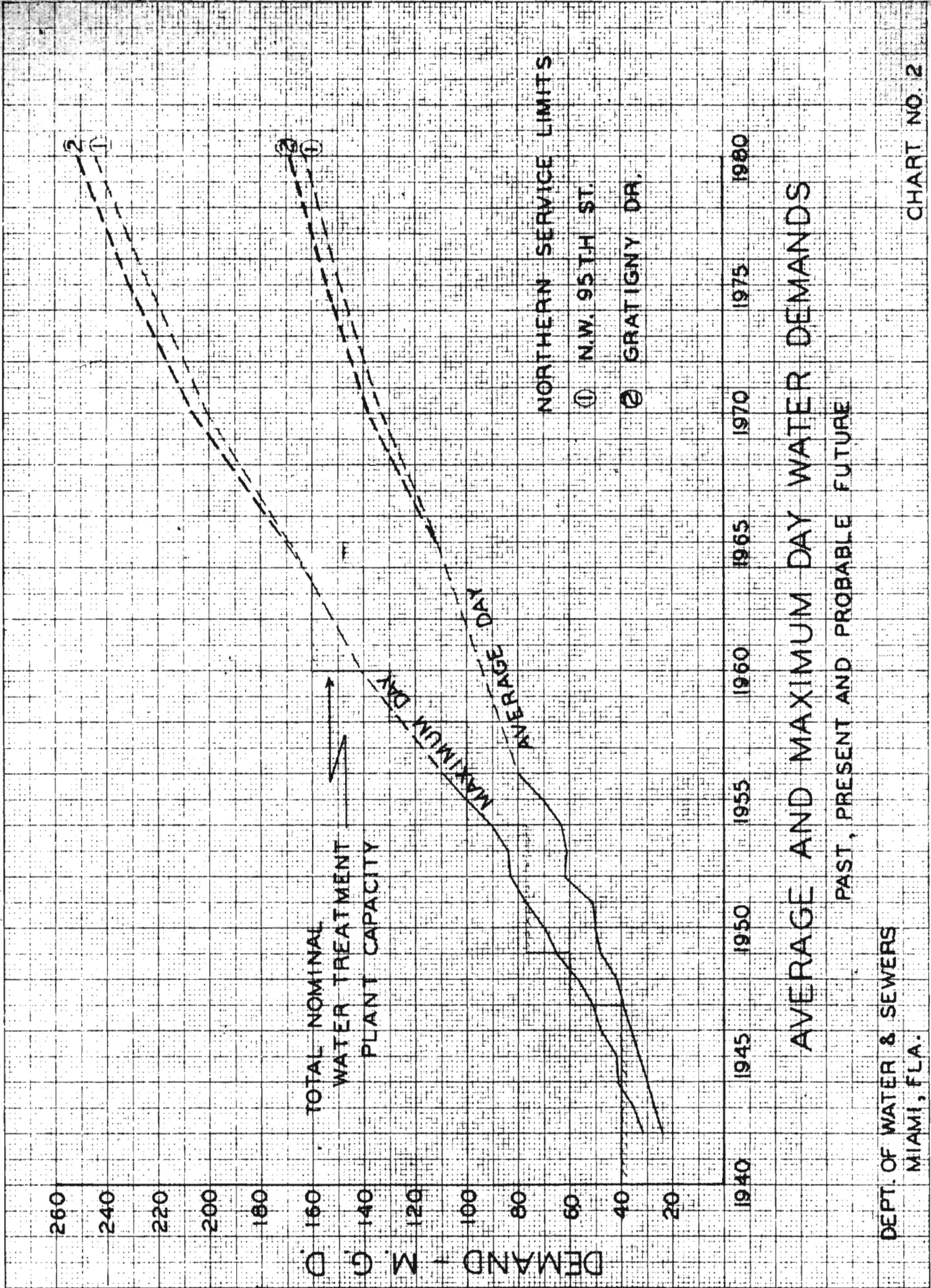
TOTAL FUTURE WATER REQUIREMENTS

YEAR	AVERAGE POPULATION SUPPLIED	AVERAGE DAILY DEMAND M.G.D.	MAXIMUM DAILY DEMAND M.G.D.	MAXIMUM HOUR DEMAND M.G.D.
		<u>(Northern Service Limits - N. W. 95th Street)</u>		
1960	631,000	94.6	141.9	212.8
1965	729,000	113.0	169.5	254.2
1970	841,000	134.6	201.9	302.8
1975	904,000	149.2	223.8	335.7
1980	954,000	162.2	243.3	365.0

YEAR	AVERAGE POPULATION SUPPLIED	AVERAGE DAILY DEMAND M.G.D.	MAXIMUM DAILY DEMAND M.G.D.	MAXIMUM HOUR DEMAND M.G.D.
		<u>(Northern Service Limits - Gratiigny Drive)</u>		
1960	631,000	94.6	141.9	212.8
1965	739,000	114.5	171.8	257.7
1970	872,000	139.6	209.4	314.1
1975	938,000	154.8	232.2	348.3
1980	982,000	166.9	250.4	375.6

The maximum day water demands in Tables No. 8 and No. 9 were estimated to be 150% of the average day water demands while the maximum hourly water demands are estimated to be 150% of the maximum day water demands.

Although Tables No. 8 and 9 were compiled from data obtained using different bases, the net results are quite similar and confirm each other. Since Table No. 8 is the more detailed and analytical, it will better serve in future studies of the distribution system, and will therefore be used for subsequent sections of this report.



AVERAGE AND MAXIMUM DAILY WATER DEMANDS

PAST, PRESENT AND PROBABLE FUTURE

DEPT. OF WATER & SEWERS
MIAMI, FLA.

CHART NO. 2

SUMMARY

The data in the preceding tables is intended to be used as a basis for the design of additional treatment facilities, transmission and distribution mains as well as for reinforcements therein, for the next twenty years.

The studies of population and water demands have been made with two alternate northern limits to the Service Area. The first alternate is N. W. 95th Street as the northern economical limit by 1980, with the following requirements for the Service Area:

Probable Average Population	954,000
Probable Peak Population	1,002,000
Probable Maximum Day Demand	244 mgd.
Probable Maximum Hourly Demand	367 mgd.
Probable Average Day Demand	163 mgd.

The second alternate is the Service Area extended as far north as Gratigny Drive (N. W. 119th Street) with the following requirements by 1980:

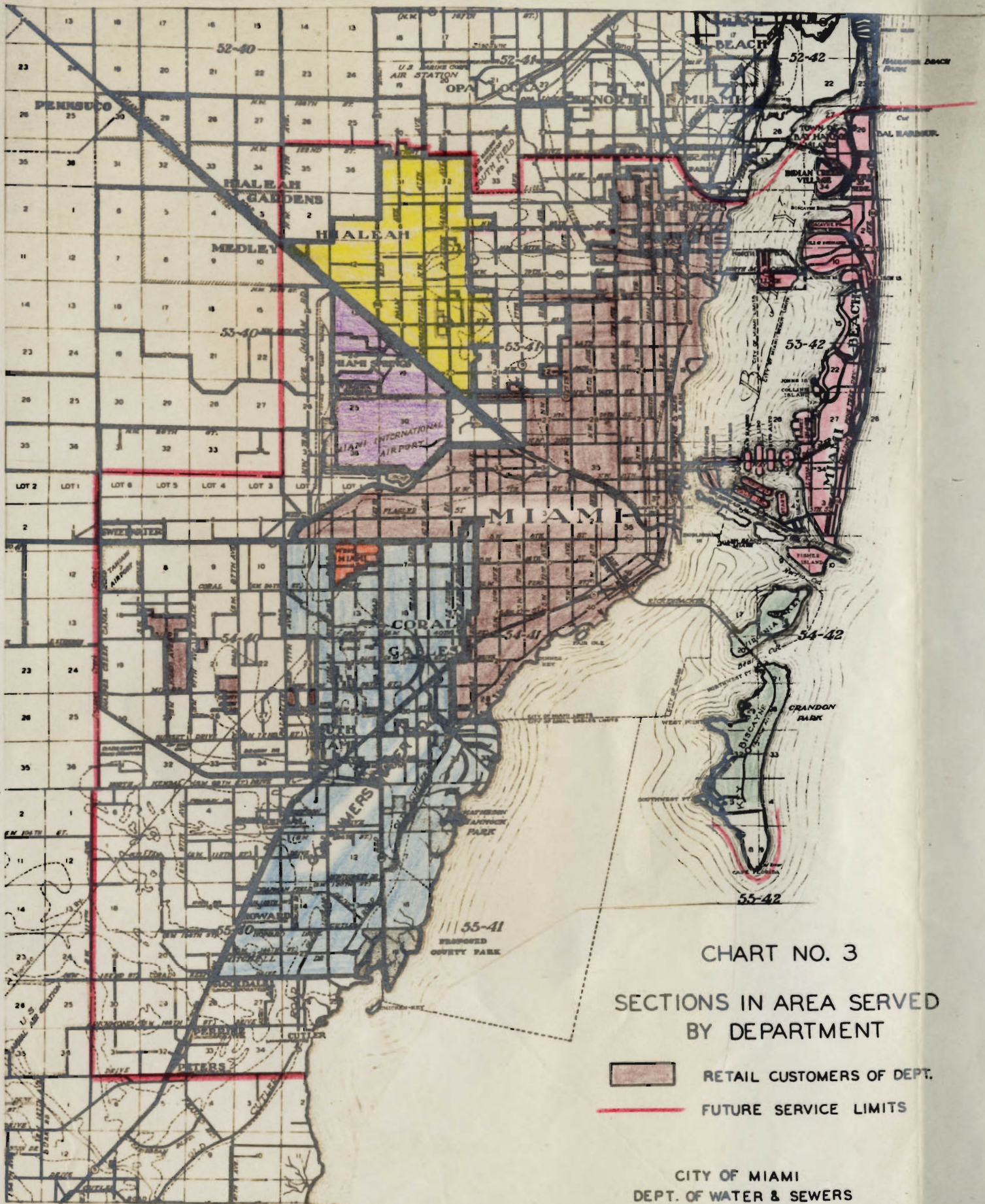
Probable Average Population	982,000
Probable Peak Population	1,030,000
Probable Maximum Day Demand	252 mgd.
Probable Maximum Hourly Demand	377 mgd.
Probable Average Day Demand	168 mgd.

The decision of accepting either N. W. 95th Street or Gratigny Drive as a northern service limit rests upon many factors which will be considered in the study of the distribution system. The southern limit of the system can be extended south to Eureka Drive (S.W. 184th Street) at which point previously established private water utilities prevent extension in that direction. Until such time as land reclamation and flood control permit occupancy of land west of Snapper Creek Road and S. W. 117th Avenue, the southwestern edge of the service area will abut that limit from Eureka Drive (S.W. 184th St.) to N. W. 12th Street. The northwestern limits are considered to be along the proposed Palmetto Expressway (N. W. 77th Avenue) from N. W. 12th Street to the Miami Canal and thence the incorporated western limits and Hialeah.

The population included in the Service Area should continue to rise at the present rate until 1970 when the rate will probably taper off due to lack of suitable land for urban development. The past trend of population moving northward of the City of Miami limits is gradually being replaced by a southward movement. The latter area will not be as densely populated because of its nature, as larger lots and more expensive homes should prevail under present zoning regulations.

Walter E. Dinn
Planning Engineer
December, 1957

WED:mk



The CITY PLANNING BOARD
of **MIAMI, FLORIDA**