

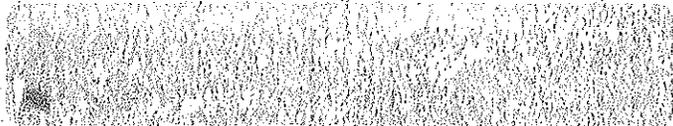
Final Report

***Actuarial Study of Liabilities for the
Current Beneficiaries of the Retirement
System of the Government of Puerto Rico
and Its Instrumentalities and of the
Retirement System of the Judiciary
as of June 30, 1974***

Prepared by

**D. A. JONES, M.A.A.A., A.S.A.
C. J. NESBITT, M.A.A.A., F.S.A.**

January 1975



Final Report

ACTUARIAL STUDY OF LIABILITIES FOR THE CURRENT BENEFICIARIES
OF THE RETIREMENT SYSTEM OF THE GOVERNMENT OF PUERTO RICO
AND ITS INSTRUMENTALITIES AND OF THE RETIREMENT SYSTEM OF
THE JUDICIARY AS OF JUNE 30, 1974

Prepared by

Ann Arbor Actuaries, Inc.
425 Hilldale
Ann Arbor, Michigan 48105

January 1975

1. INTRODUCTION

A preliminary sketch of the work covered by this report was given in steps I through VI of a July 25, 1973 Proposal for the Cooperative Development of Actuarial Supervision of the Employees Retirement System of Puerto Rico. These work steps were incorporated into a contract which became effective as of June 15, 1974. Two interim reports, summarizing the work in progress as of August 15, 1974 and October 15, 1974 were submitted to the Retirement System. Also, Arturo Estrella was selected as an actuarial trainee, and assisted in the collection of information and data. Since September, 1974 he has been enrolled as a graduate student in the actuarial program at The University of Michigan where he is preparing himself for actuarial responsibilities.

In the August 15, 1974 interim report there is a review of the initial steps taken to collect the laws and regulations of the System, reports of previous actuarial studies, and the data required for the beneficiary studies we had undertaken.

In the October 15, 1974 interim report a number of interrelated studies in progress were outlined. The main study is directed to the estimation of the actuarial liabilities for beneficiaries of the System as of June 30, 1974 and comparisons with the funds on hand. This is a basic step in establishing actuarial supervision of the System. A secondary study covers the new beneficiaries with effective separation in the period from July 1, 1973 to June 30, 1974. The objective here is to estimate the liabilities incurred in a fiscal year for new beneficiaries and to relate these liabilities to annual contributions and accumulated contributions. The remaining studies concern the mortality and interest rate assumptions to be used for calculating annuity liabilities. *

This final report indicates how the various studies were carried through and summarizes their conclusions. Section 2 of the report follows up the interim reports by outlining the various procedures used in the studies directed toward determination of the actuarial liabilities for beneficiaries of the System as of June 30, 1974. A number of these procedures were quite detailed, and fuller information about them is given in Appendix D. In Section 3, the actuarial liabilities for beneficiaries of the Retirement System as of June 30, 1974 are summarized. This is followed by a discussion of funding methods and levels of funding, and Section 3 concludes with a recommendation that the Board of Trustees establish both short- and long-term goals for the level of funding. Section 4 compares the growth of liabilities for beneficiaries over the four years 1970 to 1974, and includes three additional recommendations concerning further studies and the data processing required for them.

Section 5 summarizes and interprets a sample study of actuarial liabilities incurred for new beneficiaries in the fiscal year 1974. There is a recommendation that such a study be made annually for the information of the

Board. Section 6 discusses the valuation of actuarial liabilities for beneficiaries of the Judiciary's System as of June 30, 1974.

The Appendices present more detailed information on matters touched on in the main body of the report. A summary of the provisions of the Employees' Retirement System is given in Appendix A. In Appendix B, problems and solutions regarding data assembly are discussed. Appendix C gives information concerning the mortality study of beneficiaries over the period July 1, 1973 to June 30, 1974. Appendix D presents additional notes on actuarial assumptions and the actuarial methodology followed to determine the liabilities. In Appendix E appear tables of beneficiary statistics subdivided by agency, sex, type of preparation, and by age-group.

The report ends with a list of references.

2. DETERMINATION OF THE ACTUARIAL LIABILITIES FOR BENEFICIARIES OF THE EMPLOYEES' RETIREMENT SYSTEM

To provide adequate knowledge of the System, the main laws and a recent summary (see references [1-6]) were reviewed, and questions were discussed with the System's staff. The outcome was the Summary of Provisions appearing in Appendix A.

A next step was the collection of data on those receiving benefits. A tape of actuarial data on 13,572 beneficiaries who were listed on both the June 30, 1974 Master Tape of Pensioners and on the August 31, 1974 Payroll Tape covered the bulk of the data. The pension amounts are as on the August 31 Payroll Tape and include the \$50 increase in monthly benefits effective July 1, 1974. There were 1,081 additional pensioners for which further review had to be made to see if and how they should be included. A considerable number of problems were encountered in regard to the data and these are discussed in further length in Appendix B.

The mortality table and the interest rate to be used for valuing annuities are the basic actuarial assumptions for this report. Preliminary consideration of the mortality table assumption consisted of a comparison of mortality rates, for males and females separately, utilized in previous actuarial reports on Puerto Rican retirement systems (references [7-11]) with mortality rates appearing in a number of demographic and actuarial publications. These included the Annual Vital Statistics Report, 1973, División de Registro Demográfico y Estadísticas Vitales del Departamento de Salud, Puerto Rico [12]; Abridged Life Tables, Puerto Rico, 1969-71 [13]; 1964 Tables for Puerto Rico, from Causes of Death Life Tables for National Populations by Preston, Keyfitz and Schoen (1972) [14]; An Analysis of Government Retirement Systems for the Commonwealth of Puerto Rico by Dr. Juan B. Aponte [15, pp.426-432]; 1969 U.S. mortality rates [16]; the 1971 Individual Annuity Mortality Table [17]; and Social Security mortality tables from Francisco Bayo's paper "Mortality of the Aged" [18]. These comparisons led to a tentative selection of the 1971 Individual Annuity Mortality Table for mortality basis.

To confirm this selection, data was collected on 282 beneficiaries reported as deaths in the period July 1, 1973 to June 30, 1974. This data, together with that on the June 30, 1974 beneficiaries was used as indicated in Appendix C to study the mortality experience among the System's beneficiaries in the 1973-74 fiscal year. Expected deaths were calculated on the basis of the 1971 Individual Annuity Mortality Table and compared with the actual deaths. The overall mortality ratios (Actual Deaths/Expected Deaths) x 100 came out as 100 percent for males and 96 percent for females, but when the data was subdivided by type of separation (age-service or disability) it was found that the mortality rates for the disabled, particularly for the females and at the younger ages, were considerably in excess of 100 percent. To recognize this situation, the rates of mortality for disability annuitants

were increased below age 70 by graded percentages (see Appendix D). At age 30, the adjusted mortality rate for disabled males is 200 percent of the 1971 Individual Annuity Mortality Table rate and for females is 300 percent of the 1971 Individual Annuity Mortality Table rate. With interest at the annual rate of 5 percent, the mortality adjustments produce rather small changes in the annuity values. We considered the possibility of making further adjustment in the mortality rates for disabled annuitants but realized we would then have to compensate by adjusting the mortality for the age-service pensioners to below 100 percent of the 1971 Individual Annuity Mortality Table rates. At the present stage of our knowledge of the mortality of the System's pensioners, we decided this would be over-refinement of the actuarial basis.

Copies of the comparative financial statements for the fiscal years 1972, 1973, and 1974 were supplied by Subadministrator Gregorio del Valle. From these statements, we estimated that the System's reserve fund had earned effective annual rates of investment income of 5.43 percent, 4.81 percent, and 4.92 percent, respectively, in the three fiscal years 1972, 1973, and 1974. While it would be possible to invest new monies at higher rates than 5 percent, it will be a considerable time before changes, if any, in investment policy would have an effect on the overall rate of investment income. On the basis of the recent earnings pattern, and the considerations mentioned, we decided that an assumption of 5 percent interest was appropriate for estimating the actuarial liabilities for pensions now in course of being paid.

Our studies of the mortality and investment experience were necessarily limited, and our conclusions should be tested by further examination of the experience. This leads to our first recommendation:

I. It is recommended that studies of the mortality experience of beneficiaries of the System and the aggregate rate of return on investments be made on a continuous bases so that a good foundation will be developed for the calculation of actuarial liabilities.

For the actual calculation of the actuarial liabilities for the beneficiaries as of June 30, 1974 two sets of valuation factors were computed. The first set consists of the present value, on the basis of the mortality rates and interest rate assumed, of a life annuity of \$1 per month, such values being calculated at each age for the four subgroups: (1) male age-service pensioners; (2) male disability pensioners; (3) female age-service pensioners; and (4) female disability pensioners. The second set consists of the present value, on the basis of the mortality rates and interest rate assumed, of a benefit of \$100 payable on the death of the pensioner, with such values being calculated at each age for the above-mentioned four subgroups. For surviving spouses, the age-service annuity factors were used.

Conceptually, it was comparatively simple to visualize the calculation of

the actuarial liabilities for the June 30, 1974 beneficiaries to consist of sorting the data by agency (general, police, firemen, unspecified), by sex and by age, and then apply the appropriate valuation factors to the amount of monthly pension or number of pensioners in each agency, sex, age data cell. It was, however, a major undertaking to obtain the pensioner data, to edit it, and to subdivide it.

The data did not provide a good basis for estimating the possible reduction of pensions after 65 for Coordinated Plan pensioners now below age 65. We understand that the provisions for minimum pensions often override the coordination reduction. We valued pensions on the basis of their current income, and for some pensioners below age 65 in the Coordinated Plan there may be an overstatement of the liability. Any such overstatement may well be balanced by non-conservatism of our mortality assumption for age-service beneficiaries.

In the following sections, appears a summary of the actuarial liabilities we calculated for the June 30, 1974 beneficiaries.

3. ACTUARIAL LIABILITIES FOR BENEFICIARIES OF THE EMPLOYEES'
RETIREMENT SYSTEM AS OF JUNE 30, 1974

Data was obtained and processed on 14,641 beneficiaries as of June 30, 1974. Including the \$50 increase in monthly benefits which became effective in July, 1974, the total annual amount of pensions payable from June 30, 1974 was \$45,236,000, the average annual pension was \$3,090, and the total actuarial liabilities for pensions were \$527,445,000, for an average of \$36,000 per pensioner. A summary of beneficiary statistics and liabilities by agency (general, police, etc.) is given in Table 1. More detailed statistics regarding the June 30, 1974 beneficiaries and their liabilities are given in the tables of Appendix E.

TABLE 1

SUMMARY OF BENEFICIARY STATISTICS
AND ACTUARIAL LIABILITIES AS OF JUNE 30, 1974

Agency or Other Subdivision	Number of Beneficiaries	Total Monthly Pensions	Actuarial Liabilities
General	9,333	\$2,326,237	\$308,831,372
Police	1,404	408,181	60,822,505
Firemen	94	20,893	2,877,080
Agency unspecified	3,229	918,929	139,555,878
Surviving spouses and miscellaneous	<u>581</u>	<u>95,405</u>	<u>15,358,271</u>
Totals	14,641	\$3,769,645	\$527,445,106

The June 30, 1974 financial statement shows a total reserve fund of \$326,301,634 which represents only 62 percent of the actuarial liabilities of \$527,445,000 for the current beneficiaries. The actuarial liabilities recognized here are the accrued liabilities according to the terminal funding method whereby (for retirement benefits) at the time of retirement of a participant there is allocated to a reserve fund an amount which, on the average, will suffice with interest earnings to provide the pension over the retiree's future lifetime, and any auxiliary benefits. In other words, there is allocated to the reserve fund an amount equal to the actuarial liability incurred for the pension and other benefits for the new retiree.

In the spectrum of funding methods (of which there is an infinite number), terminal funding develops a relatively low reserve fund and a relatively high annual normal cost consisting of the total actuarial liabilities incurred for new beneficiaries of the year. Over a long period, a benefit system should

tend to a stable state in which the annual normal cost plus the investment income on the reserve fund should equal the annual outgo for benefits and expenses plus a term reflecting fund growth. The higher the reserve fund, the higher is the investment income, and in usual circumstances this implies a lower normal cost required to balance with the annual outgo and fund growth.

In rough figures, the annual rate of outgo as of June 30, 1974 for benefits and expenses is \$50 million and the reserve fund is \$326 million, or 6.5 times the annual rate of outgo. The System's funding is then well ahead of current cost or pay-as-you-go funding but is not as strong as terminal funding.

In these considerations, the reserve fund has been allocated to cover liabilities for current beneficiaries. It could be considered the reserve fund of \$326 million has other obligations to meet besides those for the present beneficiaries. There are accrued liabilities for the active participants. Also, the reserve fund includes \$150,686,597 of accumulated employee contributions.

This discussion of the funding of the System leads to our second recommendation:

II. It is recommended that on the basis of this Report, the Board of Trustees review with the actuaries the current financial status of the System, determine the level of funding to be achieved over the short term and take steps for reaching that level. As further cost estimates, on a more complete and refined basis, emerge from studies of the System, it is recommended that a long-term funding goal be established and realized over a period of years.

4. GROWTH OF BENEFITS AND LIABILITIES 1970-74

The growth of the benefit roll and liabilities over the period 1970 to 1974 is indicated in Table 2.

TABLE 2
COMPARISON OF THE BENEFIT ROLL AND LIABILITIES AT THE ENDS
OF THE FISCAL YEARS 1970 AND 1974

	June 30, 1970	June 30, 1974
Number of beneficiaries	9,378	14,641
Annual amount of pensions	\$ 14,000,000*	\$ 45,236,000
Average annual pension	\$ 1,500*	\$ 3,090
Actuarial liabilities for beneficiaries	\$114,280,000	\$527,445,000
Average liability per beneficiary	\$ 12,187	\$ 36,025
Average liability per \$1 of annual pension	\$ 8.16*	\$ 11.66
Reserve fund	\$183,000,000*	\$326,301,634
Ratio of reserve fund to actuarial liabilities for beneficiaries	160 percent	62 percent

*Estimated.

* The annual amount of pensions has more than tripled over the four year period. This is a major factor in the increase of the actuarial liabilities for beneficiaries from \$114 million to \$527 million. Another major factor has been the use of a mortality table which is considerably more conservative for valuing annuities than the table used in 1970. All the evidence we have concerning Puerto Rican mortality points to the necessity of using the conservative table. A third factor appears to be a greater weight of annuities of the younger ages. A fourth factor is that the data available did not permit accurate separation of Coordinated Plan and Full Supplementation Plan pensions, and no allowance was made for possible future reduction of Coordinated Plan pensions for retirees now below age 65. These last three factors undoubtedly contributed to the increase in average liability per \$1 of annual pension from \$8.16 in 1970 to \$11.66 in 1974.

Our experience in valuing the liabilities for beneficiaries as of June 30, 1974 has brought us to make the additional recommendations:

III. It is recommended that a study be performed annually of the actuarial liabilities for the totality of beneficiaries of the System. It should become possible to perform such a study relatively easily on a routine basis and thereby more fully inform the Board of Trustees concerning the financial status of the System.

IV. As accurate data, easy to access and to assemble, will be a prime essential for long-term cost estimates, it is recommended that revisions of administrative and data processing be incorporated as soon as feasible. We understand that the University of Pennsylvania group's report on this matter has been received and is being reviewed for implementation.

V. It is recommended that the provisions for coordination with Social Security be reviewed thoroughly and revised. The present coordination is only partial and is out-of-date.

5. STUDY OF THE ACTUARIAL LIABILITIES FOR NEW BENEFICIARIES
OF FISCAL YEAR 1974

To gain further insight into the benefit liabilities of the System, a study was made of the actuarial liabilities for new beneficiaries with effective date of separation in the period from July 1, 1973 to June 30, 1974. Data was obtained on 1,559 such beneficiaries. Various considerations including the form and incompleteness of the data led us to study this data manually on a 20 percent sample basis. A summary of the results is given in Table 3.

TABLE 3

20 PERCENT SAMPLE STUDY OF NEW BENEFICIARIES OF FISCAL YEAR 1974

	Before the \$50 Monthly Increase Effective July, 1974	After the \$50 Monthly Increase Effective July, 1974
Number of new beneficiaries	312	312
Annual amount of new pensions	\$ 1,381,572	\$ 1,568,772
Average annual pension	\$ 4,428	\$ 5,028
Actuarial liabilities for new pensions	\$17,792,000	\$20,218,000
Average liability per new beneficiary	\$ 57,000	\$ 65,000
Average liability per \$1 of annual pension	\$ 12.88	\$ 12.89
Accumulated contributions of new pensioners	\$ 1,506,996	\$ 1,506,996

Because the foregoing figures are for a 20 percent sample, they should be multiplied by a factor of at least 5. It is possible that the factor should be as high as 6 in order to represent accurately all the new beneficiaries with effective separation date in the July 1, 1973 to June 30, 1974 year. On the other hand, the number of new pensioners may be atypically large because of the \$50 monthly increase that became effective in July, 1974. To balance these considerations, we have used the minimal factor of 5. On this basis, we find the results presented in Table 4.

TABLE 4

ESTIMATED PENSIONS AND LIABILITIES FOR NEW BENEFICIARIES
OF FISCAL YEAR 1974

Total estimated annual amount of new pensions (including the \$50 monthly increase)	\$ 7,844,000
Estimated actuarial liabilities for new pensions of fiscal year 1974	\$101,090,000
Estimated accumulated contributions of the new pensioners	\$ 7,535,000
Total employee contributions for fiscal year 1974	\$ 27,888,602
Total employer contributions for fiscal year 1974	\$ 33,993,277
Total employee-employer contributions for fiscal year 1974	\$ 61,881,879

COMMENTS:

(a) The \$101 million of actuarial liabilities for new pensioners exceed the \$62 million of total employee-employer, contributions for fiscal year 1974 by \$39 million. In other words, the total new monies coming into the System, were insufficient to allocate to the reserve fund the amount which with interest earnings would be sufficient to cover the pensions payments to the new retirees over their future lifetimes. In fact the \$62 million of total contributions covers 61 percent of the actuarial liabilities for new pensioners which coincides closely with the overall 62 percent funding level achieved for all beneficiaries as of June 30, 1974.

(b) One can consider that the \$28 million of employee contributions for the fiscal year 1974 should be retained for the benefit of those employees, and at most the employer contributions plus the accumulated past contributors of the new pensioners should be allocated to providing their pensions. On this basis, \$34 million of employer contributions in fiscal year 1974 and \$7.5 million of accumulated contributions of the new pensioners, or a total of only \$41.5 would be available to cover the \$101 million of actuarial liabilities for new pensions, and there is a shortage of \$60 million.

By either of these two tests (a) and (b) (of which the second is the stronger test), the System's contribution income was not sufficient to cover the full actuarial liabilities incurred for new pensioners in fiscal year

1974. As indicated in Section 3, actuarial liabilities are here being recognized according to the terminal funding method and there is a whole spectrum of funding methods which recognize a greater or lesser amount of liability, and require correspondingly greater or lesser reserve funds.

Our recommendation from this study is:

VI. It is recommended that a study be performed annually of the actuarial liabilities incurred for new beneficiaries of the past fiscal year and comparisons be drawn with the employee-employer contribution income for that year. This would provide further information to the Board of Trustees concerning the current workings of the System.

6. THE JUDICIARY'S SYSTEM

An additional study concerned the actuarial liabilities for the beneficiaries of the Judiciary's System as of June 30, 1974. For this purpose, the 1971 Individual Annuity Mortality Table and 5 percent annual interest rate were assumed again. Also the terminal funding method was followed in calculating liabilities. The results are summarized as

TABLE 5

SUMMARY OF BENEFICIARY STATISTICS AND ACTUARIAL LIABILITIES
FOR THE JUDICIARY'S SYSTEM AS OF JUNE 30, 1974

Number of beneficiaries	75
Annual amount of pensions	\$ 806,016
Actuarial liabilities for beneficiaries	\$8,535,789
Average liability per \$1 of annual pension	\$ 10.59
Reserve fund (from June 30, 1974 statement)	\$8,403,761
Ratio of reserve fund to actuarial liabilities for beneficiaries	98 percent

Here the reserve fund is almost equal to the actuarial liabilities (under the terminal funding method) for the Judiciary pensioners. It should be cautioned again, however, that the reserve fund has other obligations besides those for the current beneficiaries. Also, it should be noted that, unlike the situation for the General System, the August 1974 Pensioner Payroll did not have the \$50 monthly increase incorporated into the monthly pensions for the retired judges. Recognition of this increase would add approximately \$400,000 to the actuarial liabilities.

Addendum

While this is the final report under the June 15, 1974-January 15, 1975 contract with Ann Arbor Actuaries, we hope that it will be the initial report in a series prepared by the System to chart carefully the course that should be followed to meet the present obligations and to put future pension benefits on a sound basis. A single report, particularly one prepared under the conditions that existed for this report, can provide only a first approximation to the emerging realities. A series of reports can refine the data, improve the validity of the assumptions, and deepen the understanding of the pension obligations. In reports to follow we shall endeavor to further the findings of this report, and to produce the information needed for sound development of the System.

APPENDIX A

SUMMARY OF PROVISIONS OF EMPLOYEES' RETIREMENT SYSTEM

GENERAL CONDITIONS (AND DEFINITIONS)

Membership

Every person who becomes an employee prior to attaining age 55.

Compulsory Retirement Age

Police, Firemen, and Penal Guards: 62, with continuation up to 65 upon request and approval.

Others: 65, with continuation up to 68 up on request and approval.

Contributions

The member's contribution rate is 7% of total compensation, except that this amount is reduced by 2 1/2% of compensation up to \$6,600 for those members who elect the Coordinated Plan.

The employers' contributions are at percentage rates of compensation to be determined annually by the Administrator to meet actuarial criteria set in the Law.

Average Compensation

Average of the highest 36 months' compensation.

SERVICE RETIREMENT ANNUITY

A participant who has separated from service but has not withdrawn his accumulated contributions is entitled to a service retirement annuity if he completed at least

- (1) ten (10) years service and has attained age fifty-eight (58), or
- (2) twenty-five (25) years service and has attained age fifty-five (55), or
- (3) thirty (30) years service.

If the service requirement has been fulfilled at separation, the annuity may be deferred until the required age in (1) or (2) has been attained.

For those participants who do not elect the Supplementary Plan and who are fully insured under Federal Social Security (OASDI) at age 65, the bases for the calculated annuity amounts are given in Table A.1.

For those participants who do elect the Supplementary Plan, the bases for payments after attaining age 65 are the same as those shown under "Before 65" in Table A.1.

Reversionary Annuity: Optional at Retirement

Any member may elect at retirement, subject to verification of good health by a medical examination, to receive a lesser retirement annuity and to provide actuarially equivalent reversionary annuities to one or more dependents.

Special Provisions for Police and Firemen

In addition to the service requirements in (1), (2), and (3) above, police and firemen may qualify by completing 25 years of service and attaining age 50. Moreover the service retirement annuities of police and firemen are not subject to reduction to the amount actuarially equivalent for commencement prior to age 58.

Special Provision for Mayors

An officer participant with at least 8 years of service as mayor who has attained age 50 is entitled to a service retirement annuity equal to a percentage, of the highest salary he received, to be computed as the sum of (1) 5% for each year of creditable service (up to 10) performed as mayor, (2) 1-1/2% for each year of other creditable service (up to 20) not included in (1), and (3) 2% for each year of such other creditable service in excess of the 20 in (2). The maximum percentage granted is 90%.

DISABILITY RETIREMENT ANNUITY

Occupational Disability

Any member disabled in the course of employment is entitled to an annuity equal to 50% of compensation at disability provided that (a) there is a physician's statement, (b) there is notice filed with the Administrator, and (c) the disability is compensable under Workmen's Accident Compensation Act.

Non-Occupational Disability

Any member with more than ten years of service who becomes disabled from (almost) any non-occupational cause is entitled to an annuity equal to thirty (30)% plus one (1)% per year of service in excess of ten (10) years, up to fifty (50)% of average compensation.

Coordination with Social Security of Disability Annuities

Any participant who is receiving a disability annuity shall, on and after the date on which he attains age 65 and attains the status of fully insured under Federal Social Security Act, receive a recomputed annuity on the basis of the formula for payments after 65 given in Table A.1. In the case of non-occupational disability said recomputed annuity is not to exceed fifty (50)% of average compensation.

DEATH BENEFITS

Occupational Death Annuity

If a member dies from causes of his employment compensable under Workmen's Accident Compensation Act, his widow shall be entitled to an annuity equal to 50% of his compensation until her death or remarriage plus ten (10) dollars per month for each child under eighteen (18) or pursuing studies. If the widow does not survive, each child under eighteen or pursuing studies will be entitled to twenty (20) dollars per month. The maximum available in either case is seventy-five (75)% of the member's compensation.

Non-occupational Death Benefits

For active members the death benefit is equal to the sum of accumulated contributions with interest and one year's compensation.

For annuitants, the death benefit is the excess of accumulated contributions, with interest, over the sum of annuity payments received, or two hundred (200) dollars, which ever is larger.

Upon the death of any participant who is receiving an annuity and who is not covered by Social Security, 60% of the annuity amount is continued in the aggregate to the surviving spouse, until remarriage, and children who are less than 18, disabled and/or students less than 25.

[Basis: Law 169 (1968) for Police, Law 105 (1969) for other ERS members, and Law 32 (1971) for the Judiciary.]

REFUND BENEFIT ON WITHDRAWAL

Any member who separates permanently from service without right to pension shall be paid his contribution with interest. If he should later return to service he may restore his contributions with interest to date to regain his credited service.

Special Benefits for Police, Firemen, Penal Guards, National Guard, and
IRS agents

When disability or death occurs to one of the above as a result of assault in the line of duty the following benefits are payable.

- (a) Disability annuity in an amount equal to the difference between compensation at injury and income of current ability (which could be 0). Upon death due to the injury, the annuity is continued as in (b) below.
- (b) For death, an annuity equal to his compensation at death distributed as follows: 50% to the spouse and the other 50% divided equally among other beneficiaries. Upon death of a beneficiary, his share is distributed to surviving beneficiaries. Upon attaining conditions other than death which terminate a beneficiary's share, his annuity is discontinued.

This provision is to be funded by inclusion in the Government Operating Budget Act.

TABLE A.1

COORDINATED PLAN

Service Retirement Annuity Formula*

Age at Start of Annuity	Years of Credited Service					
	10-25		25-30		More than 30	
	Before 65	After 65	Before 65	After 65	Before 65	After 65
Less than 55	Not eligible		Not eligible		E	ÆF
55-57	Not eligible		C	D	G	H
58-64	A	B	A	B	G	H
65 and over	—	B	—	B	—	H

*Minimum amount on the July 1 following retirement is the larger of 30% of average compensation and \$125.

Maximum amount (except mayors) is 75% of average compensation or 85% under conditions E and G in Table A.1.

Code:

- A. Sum of 1-1/2% of average compensation for each year of service up to 20 and 2% of average compensation for each year of service in excess of 20 years.
- B. Amount in A reduced by 1/2% of the smaller of average compensation and \$6,600 for each year of service.
- C. An amount actuarially equivalent to that in A.
- D. An amount actuarially equivalent to that in B.
- E. A percentage of average compensation equal to 65%, plus 2% for each year of service, in excess of 30 years, that was completed prior to July 1, 1973.
- F. 1-1/2% of the smaller of average compensation and \$6,600 for each year of service plus the percentage as determined in E of the excess of average compensation over \$6,600, if any.
- G. The amount defined in E plus 10% of average compensation.
- H. The amount defined in F, but with "E" replaced by "G"

APPENDIX B

NOTES ON DATA ASSEMBLY

OBJECTIVE

There were three data sets to be formed for this phase of the proposal: (1) a census of members in pensioner status as of June 30, 1974, (2) a record of deaths among pensioners in a recent period to form the basis of a mortality study, and (3) a census of new additions to the pensioner status during the fiscal year 1973-74.

CENSUS OF MEMBERS IN PENSIONER STATUS

For reasons of efficiency it was preferred to have the census of the nearly 15,000 pensioners in a form suitable for direct input to an electronic data processing unit. Two such files were available. A magnetic tape system containing information on each of the pensioners (Cinta Maestra de Pensionados, Master Tape) is maintained by the Retirement Division by semi-annual updating. On a monthly basis the Treasury Department prepares the pensioners payroll (Payroll) on magnetic tape.

In addition to these electronic files two paper files of pensioners are maintained. There is the system of personnel folders which are collected over the work life time of the pensioners and there is a system of 5 x 8 cards which are prepared as the members file claims for pensions.

By design the Master Tapes contain most of the characteristics on the individual pensioners required for a valuation of liabilities. However, each tape is prepared by updating the preceding tape without any detection and correction of errors, so the current tape contains an accumulation of many errors.

The Payroll Tapes are accurate rolls of the pensioners and pension amounts but they do not contain the auxiliary information required for an actuarial valuation. A combination of the Master Tapes and Payroll Tapes, with some reference to the paper files was required for the census of pensioners on June 30, 1974.

Some studies were done to determine the reliability of the Master Tape, the nature of the errors therein, and the accessibility of the records in the other three sources. The following types of errors were found to be present:

- (a) Pensioners missing from the Master Tape.
- (b) Names of persons on the Master Tape who are not receiving pensions.
- (c) Pensioners double listed on the Master Tape.

- (d) Missing information (Type of Separation, Type of Plan, Agency, etc.) for those listed.
- (e) In those cases where an annuity is being paid to a deceased member's surviving spouse or other dependents the Master Tape information pertains to the deceased member.
- (f) Incorrect information due to miscoding, keypunching errors, etc.

The following procedure was adopted to define the June 30 population of current beneficiaries and to assemble the actuarial characteristics of the population:

(1) The August Pensioner Payroll (hereafter called the Payroll) defined the June 30 annuitant population. The reasons for using this rather than the June Payroll were to obtain annuity amounts which included the increases granted by Law 110-1974 and to compensate for the lag in processing death claims and pension claims (see our October 1974 interim report).

(2) The annuity recipients on the Payroll were partitioned by the following classifications:

- (a) General System vs. Judiciary System
- (b) Employee vs. Survivor recipient
- (c) Included on the June 30, 1974 Master Tape or not.

(3) The liability for each General System retired annuitant, for whom a complete record appeared on the Master Tape, was based on this information. For those with incomplete records various estimates were used to obtain the liability.

(4) For the other annuitants actuarial data were sought or verified in the paper files.

The results of the partitioning in step 2 are given in Table B.1.

The 13,572 General System retired annuitants whose employee numbers appeared on the Master and the Payroll and for whom we assumed the information on the Master to be correct—if consistent—were processed from this point by computer. Of these 13,572 records, seven cases had bad punches which interrupted the computer reading, four cases had Occupational Death as the type of separation though they were not assigned to such an account on the Payroll, twenty-four records were duplicates of twelve individual annuitants, and there were missing and incorrect codes in the eight variables of interest as given in Table B.2.

Nine hundred and ninety records (of a total of 1155 to be reviewed) were checked against the paper file systems to obtain or verify information. Table B.3 gives a summary of the information missing after the check on these records which consisted of 697 records appearing on the Payroll but not on the Master,

the 179 records which appeared under the Payroll account for Law 169, the 49 records in the Payroll account for Law 105, and the 65 records in the account for Law 12 (the Judiciary System).

Of the remaining 165 records 145 were for annuities granted under Laws 447 or 127 to survivors of employees who died from occupational related causes. The information in each of these Master records pertained to the deceased employee and was used to make an estimate of the age of the annuity recipient. The other twenty records appeared in the Payroll account for Law 127 but the records on the Master did not show an occupational death or disability type of separation as required by that law. These records were examined and classified individually on a judgment basis.

Three methods were used to determine the actuarial liabilities for those annuitants whose records did not contain correct information with respect to age and sex. These were (1) to estimate the characteristic on the basis of other information in the record, (2) to give an estimate for the characteristic based on a sample study of the characteristic for an appropriate subpopulation, and (3) to use an average valuation factor for an appropriate subpopulation. Of course missing sex codes were estimated by the first method using given names as the auxiliary information.

A sample study of fifty surviving spouses of deceased male employees showed the average age of the husbands to be 6.2 years greater than that of the wives. Since the difference is commonly between three and five years, we used a five-year difference in the estimation of a surviving widow's age on the basis of the deceased male employee's year of birth. Another sample study showed an average age at hire of 28 years. These averages were used in estimates as follows: One record showed a widow pensioner whose husband had terminated employment in 1932 after 24 years of credited service. The widow's year of birth was estimated to be $1932 - 24 - 28 + 5 = 1885$.

Average annuity valuation factors were calculated using pension amounts for weights, i.e., for a given subpopulation the annuity factor used was the ratio of the total annuity liability to the total monthly benefit. The average factors for death benefits were calculated using number of lives for weights. These factors for the various subpopulations as needed are given in Table B.4.

ASSEMBLY OF DATA ON DEATHS IN FISCAL YEAR 1974.

No single complete death registry is maintained in the Retirement Division. The search for 1974 fiscal year deaths focused on: (I) a registry of notifications of annuitant deaths as transmitted to the Payroll section of the Treasury Department, (II) dead pensioner section of the 5 x 8 card file system mentioned in the previous section of this Appendix, and (III) the death claims reported to the claims Section. The results of the first search in August illustrate

the incomplete status of each of these. Of the 253 deaths found

136 were in I and III
95 were in I but not III
19 were in III but not I
3 were in II but not I or III.

A study of the time lag in reporting 223 of these deaths showed only three deaths reported later than four complete months after the month of death. The average lag was two months. On this basis we waited until October 31 to close the death study.

In all, 282 deaths were reported in these sources for fiscal year 1974. The information on some of these deceased annuitants was incomplete in some respects. The sex, type of separation, and year of birth were determined for 271 but only the sex was determined from the records of the other 11.

DATA FOR NEW PENSIONERS

The information on 1559 pensioners added to the rolls during fiscal year 1974 was provided on a computer printout. The list was prepared by collecting from the June 30, 1974 Master Tape those records showing a date of separation of July 1, 1973 or later. This list should be incomplete by at least those retired employees with pension claims pending at the time of the creation of the Master Tape.

Our study of the liabilities for new pensioners was based on a 20% (every fifth record) sample from this list of 1559 pensioners.

TABLE B.1

SUMMARY OF PENSIONER DATA

Number on Payroll	14,727
Number on Payroll but not on Master	<u>697</u>
Number on Payroll and on Master	14,030
Number of retired employee recipients	
General System	13,572
Judiciary System	65
Number of survivor recipients	
Law 447 - Occupational Deaths	114
Law 127 - Occupational Deaths	31
Law 105 -	49
Law 169 -	179
Number of recipients under Law 127 with a conflicting Type of Separation	<u>20</u>
	14,030
Number on Master	
Number on Master but not on Payroll	<u>2,460</u>
Number on Master and on Payroll	14,030

TABLE B.2

SUMMARY OF MISSING AND INCORRECT DATA

Variable	Missing	Incorrect
Type of Separation	3,054	10*
Sex	7	-
Agency	3,154	not checked
Monthly Pension	-	-
Year of Birth	10	7
Law	50	13*
Diagnosis (Disability)	9,833**	not checked
Coordinated Plan	12,032**	3*

*In these cases incorrect means an entry that is inadmissible for the particular characteristic.

**For these variables "Missing" includes those cases which are correctly coded as blanks.

TABLE B.3

SUMMARY OF RECORDS REVIEWED

	Payroll Only	Law 169	Law 105	Law 12
General System	694	179	43	0
Judiciary	<u>3</u>	<u>0</u>	<u>6</u>	<u>65</u>
Total	697	179	49	65

Number of records for which information
was not found in the search of system files

Type of Separation	80	*	*	0
Agency	88	0	0	0
Law	78	0	0	0
Diagnosis	117	**	**	0
Year of Birth	173	37	3	1

*Assigned "Occupational Death" although the death occurred
after retirement.

**Not applicable.

TABLE B.4

AVERAGE VALUATION FACTORS

Subpopulation	Number of Lives	Annuity Factor	Insurance Factor
<u>Overall</u>			
Male	7,872	\$133.54	\$ 94.51
Female	6,505	148.24	80.96
<u>Occupational Death</u>			
Male	3	117.12	86.11
Female	381	144.21	90.82
<u>Age-Service</u>			
<u>General</u>			
Male	3,306	118.36	110.45
Female	2,618	129.79	97.95
<u>Police</u>			
Male	351	126.89	100.41
<u>Law 105</u>			
Female	46	131.68	93.85
<u>Law 169</u>			
Female	313	139.12	93.67

APPENDIX C

MORTALITY STUDY OF BENEFICIARIES OVER FISCAL YEAR 1974

This appendix gives a description of the formulas and analysis used in the mortality study that was mentioned in Section 2.

The basic idea of the analysis was to compare the actual number of deaths to the expected number of deaths for the annuitant population on the basis of the 1971 Individual Annuity Mortality Table [17]. This comparison was an examination of the ratios, R_x , of actual deaths, D_x , to expected deaths, $E_x \cdot q_x$, for the various combinations of age, sex, and type of separation (disability or other), i.e.,

$$R_x = \frac{D_x}{E_x} \cdot q_x$$

where E_x is the life-years of exposure and q_x is the tabular mortality rate for a given combination of sex and type of separation.

The number of life-years of exposure generated by the annuitants for the age interval $x - 1$ to x during the fiscal year would be

$$E_x = P_x + D_x - h_x \cdot n_x$$

where P_x is the number of annuitants who were born in 1974-x and were alive on June 30, 1974, D_x is the number of deaths in the fiscal year among those annuitants born in 1974-x, n_x is the number among the $P_x + D_x$ who became annuitants during the fiscal year, and h_x is the average length of the time periods from July 1, 1973 to the points of entry for the n_x new annuitants.

In the above formulas the values for P_x were obtained from the life counts used in the valuation of liabilities described earlier and summarized in the tables in Appendix E. The determination of the numbers of deaths, D_x , was described in Appendix B. As mentioned there, there were 11 deaths, 8 males and 3 females, which were not assignable to an (age-type of service) combination. Hence for any such combination, the D_x and E_x may be understated and, due to the impact of the q factor, the ratio understated.

The values for h_x and n_x should have been derived from the data of the new pensioner study discussed in Section 5 and at the end of Appendix B. These data were not assembled at the time of the mortality study so the term, $h_x n_x$, was ignored in the computation of exposures for the expected deaths. Based upon estimates of 1600 new pensioners, an average entry date of April 1, 1974, and an average death rate of one per hundred, the expected number of deaths

for the entire annuitant population should be decreased by twelve which would increase the overall mortality ratio to 103%.

A summary of the mortality study analysis is given in Table C.1.

TABLE C.1

DEATHS, EXPECTED DEATHS, AND MORTALITY RATIOS

Age Group	Males			Females		
	Actual Deaths	Expected Deaths	Mortality Ratio	Actual Deaths	Expected Deaths	Mortality Ratio
<u>Age-Service Annuitants</u>						
15-59	0	3.98	0.00	1	1.57	0.64
60-64	6	13.89	0.43	2	6.35	0.32
65-69	22	29.45	0.75	6	11.63	0.52
70-74	30	29.79	1.01	12	12.76	0.94
75-79	28	29.55	0.95	12	15.45	0.78
80-84	26	23.24	1.12	9	12.41	0.73
85-89	14	15.48	0.90	4	7.69	0.52
90-	<u>4</u>	<u>7.44</u>	<u>0.54</u>	<u>2</u>	<u>4.60</u>	<u>0.43</u>
Total	130	152.82	0.85	48	72.46	0.66
<u>Disability Annuitants</u>						
15-49	8	2.10	3.81	5	0.82	6.13
50-59	13	8.74	1.49	14	4.62	3.03
60-69	22	16.30	1.35	12	7.47	1.61
70-79	11	8.38	1.31	2	2.37	0.84
80-	<u>5</u>	<u>8.61</u>	<u>0.58</u>	<u>1</u>	<u>0.92</u>	<u>1.09</u>
Total	59	44.13	1.13	34	16.19	2.10
Grand Total	189			82		
	<u>+ 8</u>			<u>+ 3</u>		
	197	196.95	1.00	85	88.65	0.96
Overall	282	285.60	0.99			

*By the 1971 Individual Annuity Mortality Table.

APPENDIX D

NOTES ON ACTUARIAL ASSUMPTIONS AND METHODOLOGY

As indicated in Section 2, the 1971 Individual Annuity Mortality Table [17] with interest at the annual rate of 5 percent were the basic actuarial assumptions. For disability retirees below age 70, the mortality rates were adjusted by the formulas

Adjusted $q_x = 1971 \text{ IAM } q_x(1+.03(70-x))$ for males, and

Adjusted $q_x = 1971 \text{ IAM } q_x(1+.05(70-x))$ for females

where x denotes the age, and q_x the rate of mortality for year of age x to $x + 1$. Thus at age 30, the adjusted mortality rate for males is 220 percent of the 1971 IAM rate, and for females is 300 percent of the 1971 IAM rate. On the basis of the adjusted rates, the mortality ratios for disabled retirees over the fiscal year 1974 were 113 percent for males and 150 percent for females. It was decided not to make further adjustment in the mortality rates for disability annuitants as that would have necessitated a compensatory lowering of the mortality for age-service annuitants below 100 percent of the 1971 Individual Annuity Mortality Table. Overall, the 1971 IAM Table is a realistic measure for the totality of annuitants, and the present stage of our knowledge does not justify over-refinement in distributing costs between age-service and disability groups.

Allowance was made for death benefits by providing for \$200 minimum death benefits for primary annuitants.

In Table D.1 are presented sample valuation factors computed according to the stated assumptions.

TABLE D.1

VALUATION FACTORS

Age	Males			Females		
	Annual Mortality Rate ¹	Value of \$1 Monthly Annuity ²	Value of \$100 Death Benefit ³	Annual Mortality Rate ¹	Value of \$1 Monthly Annuity ²	Value of \$100 Death Benefit ³
<u>For Age-Service Retirees</u>						
50	.0053	174.30	28.95	.0022	188.93	23.00
60	.0122	145.93	40.49	.0066	161.50	34.16
70	.0260	111.47	54.51	.0140	125.52	48.79
80	.0646	73.97	69.76	.0464	81.98	66.50
90	.1680	39.95	83.59	.1525	45.62	81.28
100	.4314	18.10	92.48	.2805	28.20	88.37
<u>For Disability Retirees</u>						
30	.0018	208.64	14.99	.0014	216.44	11.82
40	.0031	191.24	22.07	.0023	202.87	17.33
50	.0085	168.38	31.36	.0043	183.66	25.15
60	.0159	143.22	41.60	.0099	158.72	35.29
From age 70, the same for the Age-Service Retirees						

1. q_x , where x denotes the age.

2. $12 a_x^{(12)}$

3. $100 \bar{A}_x$

APPENDIX E

BENEFICIARY STATISTICS AS OF JUNE 30, 1974

In the following tables there are presented statistics on number of retirees, amount of monthly pensions, and actuarial liabilities. The statistics are subdivided by agency (general, police, firemen) or surviving spouse, by sex, by type of separation (age-service or disability), and by age group.

TABLE E.1

BENEFICIARY STATISTICS AS OF JUNE 30, 1974 FOR RETIRED GENERAL EMPLOYEES

Males

Age Group	Age-Service Retirees		Disability Retirees		Retirees with Type of Separation Unspecified	
	Number	Monthly Pensions	Number	Monthly Pensions	Number	Monthly Pensions
25-29			2	\$ 517		
30-34			11	2,630		
35-39			25	5,481		
40-44			58	13,380		
45-49	8	\$ 5,675	123	28,501		
50-54	47	33,559	213	46,187		
55-59	190	115,992	230	52,260	2	\$ 505
60-64	503✓	210,644	270	57,675	3	858
65-69	824	241,473	238	53,056	3	1,524
70-74	806	201,533	105	21,986	6	2,112
75-79	534	123,932	41	7,881		
80-84	253	54,277	27	5,079		
85-89	110	22,779	6	1,153		
90-94	28	5,515	3	566		
95-99	2	375				
100-104	1	188				
Unknown	3	1,609				
Totals	3,309	\$1,017,557	1,352	\$296,359	14	\$5,000
Actuarial Liabilities:		\$120,800,995		\$42,600,410		\$597,949
		Grand Totals				
		Number	Monthly Pensions	Actuarial Liabilities		
Males		4,675	\$1,318,916	\$163,999,354		

TABLE E.2

BENEFICIARY STATISTICS AS OF JUNE 30, 1974 FOR RETIRED GENERAL EMPLOYEES

Females

Age Group	Age-Service Retirees		Disability Retirees		Retirees with Type of Separation Unspecified	
	Number	Monthly Pensions	Number	Monthly Pensions	Number	Monthly Pensions
25-29			1	\$ 200		
30-34			19	4,115		
35-39			33	7,435		
40-44			88	18,726		
45-49	7	\$ 2,345	214	43,697	1	\$ 188
50-54	28	10,025	376	74,765		
55-59	147	52,088	432	85,681	1	292
60-64	457	126,343	450	87,794	2	414
65-69	698	156,739	282	55,554	4	849
70-74	637	128,359	100	19,600	3	631
75-79	389	76,306	22	4,127	1	188
80-84	183	34,982	8	1,500		
85-89	58	10,932	1	188		
90-94	11	2,069	1	188		
95-99	3	614				
Unknown	1	375				
Totals	2,619	\$601,182	2,027	\$403,575	12	\$2,564

Actuarial
Liabilities:

\$78,281,395

\$66,192,621

\$358,002

Grand Totals

	Number	Monthly Pensions	Actuarial Liabilities
Males	4,675	\$1,318,916	\$163,999,354 (from Table E.1)
Females	4,658	1,007,321	144,832,018
All	9,333	\$2,326,237	\$308,831,372

TABLE E.3

BENEFICIARY STATISTICS AS OF JUNE 30, 1974 FOR RETIRED POLICE EMPLOYEES*

Males

Age Group	Age-Service Retirees		Disability Retirees		Retirees with Type of Separation Unspecified		
	Number	Monthly Pensions	Number	Monthly Pensions	Number	Monthly Pensions	
20- 24			3	\$ 1,238			
25- 29			11	3,858			
30- 34			43	16,114			
35- 39			73	25,925			
40- 44			84	27,145			
45- 49			89	26,083	1	\$254	
50- 54	12	\$ 4,862	143	36,711			
55- 59	40	17,319	179	45,768			
60- 64	100	38,550	182	46,517			
65- 69	89	28,977	92	23,552	1	344	
70- 74	48	13,450	53	11,741			
75- 79	39	9,925	24	5,603			
80- 84	18	4,247	19	3,981			
85- 84 ⁹	5	1,152	7	1,316			
90- 94			7	1,313			
95-100			2	375			
Unknown	<u>1</u>	<u>375</u>					
Totals	352	\$118,862	1011	\$277,247	2	\$598	
Actuarial Liabilities:		\$15,117,455		\$43,513,574		\$88,415	
			Grand Totals				
			Number	Monthly Pensions	Actuarial Liabilities		
	Males		1,365	\$396,707	\$58,719,444		

*Includes civil employees.

TABLE E.4

BENEFICIARY STATISTICS AS OF JUNE 30, 1974 FOR RETIRED POLICE EMPLOYEES*

Females

Age Group	Age-Service Retirees		Disability Retirees		Retirees with Type of Separation Unspecified	
	Number	Monthly Pensions	Number	Monthly Pensions	Number	Monthly Pensions
30-34			2	\$ 743		
35-39			10	2,945		
40-44			5	1,529		
45-49			4	886		
50-54	2	\$ 762	3	612	None	
55-59	1	371	1	188		
60-64	3	1,230	4	832		
65-69	3	1,158				
70-74	1	212				
Totals	10	\$3,736	29	\$7,738		

Actuarial Liabilities: \$583,941 \$1,519,120

	Grand Totals		
	Number	Monthly Pensions	Actuarial Liabilities
Males	1,365	\$396,707	\$58,719,444 (from Table E.3)
Females	39	11,474	2,103,061
All	1,404	\$408,181	\$60,822,505

*Includes civil employees.

TABLE E.6

BENEFICIARY STATISTICS AS OF JUNE 30, 1974 FOR RETIRED EMPLOYEES
WITH AGENCY UNSPECIFIED

Males

Age Group	Age-Service Retirees		Disability Retirees		Retirees with Type of Separation Unspecified	
	Number	Monthly Pensions	Number	Monthly Pensions	Number	Monthly Pensions
25-29			19	\$ 6,802		
30-34			25	9,865	1	\$ 206
35-39			58	21,309	1	309
40-44			73	23,048	2	598
45-49	1	\$ 962	114	29,895	2	457
50-54			129	36,019	19	11,416
55-59	7	5,482	123	33,057	88	48,750
60-64	17	5,240	114	30,664	320	125,342
65-69	21	7,176	53	13,095	472	137,291
70-74	19	4,817	2	444	52	17,079
75-79	3	711			1	425
80-84	1	200			2	550
Unknown	—	—	—	—	11	3,391
Totals	69	\$24,590	710	\$204,202	971	\$345,819
Actuarial Liabilities:		\$3,219,308		\$34,033,914		\$46,486,803
			Grand Totals			
			Number	Monthly Pensions	Actuarial Liabilities	
	Males	1,750	\$574,611	\$83,740,025		

TABLE E.7

BENEFICIARY STATISTICS AS OF JUNE 30, 1974 FOR RETIRED EMPLOYEES
WITH AGENCY UNSPECIFIED

Females

Age Group	Age-Service Retirees		Disability Retirees		Retirees with Type of Separation Unspecified	
	Number	Monthly Pensions	Number	Monthly Pensions	Number	Monthly Pensions
25-29			5	\$ 1,221		
30-34			12	3,112		
35-39			29	6,784		
40-44			75	16,574		
45-49	1	\$ 643	101	22,766	1	\$ 188
50-54			171	36,922	15	5,057
55-56	3	1,764	190	38,264	63	22,051
60-64	11	3,966	88	17,782	278	70,059
65-69	11	2,631	25	5,355	319	73,346
70-74	6	1,575	2	375	19	4,502
75-79	1	183			2	60
Unknown	—	—	—	—	51	9,128
Totals	33	\$10,765	698	\$149,159	748	\$184,394
Actuarial Liabilities:		\$1,606,018		\$26,545,421		\$27,664,414

	Grand Totals		
	Number	Monthly Pensions	Actuarial Liabilities
Males	1,750	\$574,611	\$ 83,740,025 (from Table E.6)
Females	1,479	344,318	55,815,853
All	3,229	\$918,929	\$139,555,878

TABLE E.8

BENEFICIARY STATISTICS AS OF JUNE 30, 1974
FOR SURVIVING SPOUSES OR DEPENDENTS*

Age Group	Females			Males	
	Number	Exp Deaths	Monthly Pensions	Number	Monthly Pensions
15- 19	810 v 1	.0002	\$ 60		
20- 24				1	\$ 10
25- 29	826 X 3	.0012	588		
30- 34	831 X 5	.0025	664		
35- 39	etc 10	.0070	2,328		
40- 44	16	.0162	3,213		
45- 49	15	.0228	2,606		
50- 54	24	.0569	3,109		
55- 59	35	.1491	4,299		
60- 64	46	.3326	6,357		
65- 69	46	.4648	6,263	1	78
70- 74	56	.8765	7,346		
75- 79	80	2.2695	6,892		
80- 84	23	1.0078	2,017	1	37
85- 89	13	1.0597	1,012		
90- 94	6	1.0042	564		
95- 99	1	.2821	133		
100-104	1	.2964	110		
Unknown	21		3,977	1	175
Totals	402		\$51,538	4	\$300
		.819			
Actuarial Liabilities:			\$7,420,518		\$35,216
Grand Totals					
	Number		Monthly Pensions		Actuarial Liabilities
	406		\$51,838		\$7,455,734

*In addition there were 175 survivor beneficiaries and miscellaneous beneficiaries in special categories which were valued separately.

TABLE E.9

BENEFICIARY STATISTICS AS OF JUNE 30, 1974 FOR JUDICIARY'S SYSTEM

Age Group	Age-Service (Male)		Surviving Spouse (Female)	
	Number	Monthly Pensions	Number	Monthly Pensions
50-54			1	\$ 682
55-59	11	\$11,705	2	2,491
60-64	14	16,784		
65-69	13	12,001	2	1,675
70-74	12	12,486	2	561
75-79	10	5,560	1	380
80-84	5	2,163		
85-89	<u>2</u>	<u>680</u>	-	-
	67	\$61,379	8	\$5,789
Actuarial Liabilities:		\$7,636,838		\$898,951
	<u>Grand Totals</u>			
	<u>Number</u>	<u>Monthly Pensions</u>	<u>Actuarial Liabilities</u>	
	75	\$67,168	\$8,535,789	

REFERENCES

1. Laws of Puerto Rico, Act No. 447 (1951). ✓
2. Laws of Puerto Rico, Act No. 127 (1958). ✓
3. Laws of Puerto Rico, Act No. 169 (1968). -
4. Laws of Puerto Rico, Act No. 105 (1969). ✓
5. Laws of Puerto Rico, Act No. 32 (1971). -
6. Laws of Puerto Rico, Act No. 123 (1973). - *Page 19 - Sec. 447
3509*
7. Report on an Actuarial Valuation of the Employees' Retirement System of the Commonwealth of Puerto Rico, June 30, 1965, Public Administration Service, Chicago. ✓
8. Study of Public Employee Retirement Systems of the Commonwealth of Puerto Rico, as of June 30, 1970, Woodward and Fondiller, Inc., New York. ✓
9. Actuarial Valuation of Annuity and Pension System for the Teachers of Puerto Rico, as of June 30, 1970, Woodward and Fondiller, New York. ✓
10. Report on the Twenty-seventh Annual Actuarial Valuation of the Employees' Retirement System of Puerto Rico Water Resources Authority, as of June 30, 1972, George B. Buck Consulting Actuaries, Inc., New York.
11. Actuarial Valuation of University of Puerto Rico Retirement System, as of June 30, 1973, Woodward and Fondiller, New York.
12. Annual Vital Statistics Report, 1973, Division de Registro Demografico y Estadisticas Vitales del Departamento de Salud, Puerto Rico.
13. Abridged Life Tables, Puerto Rico, 1969-71, source as for [12].
14. Causes of Death Life Tables for National Populations, by S. H. Preston, N. Keyfitz, and R. Schoen (1972).
15. An Analysis of Government Retirement Systems for the Commonwealth of Puerto Rico by Dr. Juan B. Aponte (1962). *Release 1962.*
16. Statistical Abstract of the United States (1973), Table No. 80, Expectation of Life and Mortality Rates by Age, Race, and Sex, 1969.
17. The 1971 Individual Annuity Mortality Table, by H. Cherry, Trans. Society of Actuaries, Vol. 23 (1971).

18. Mortality of the Aged, by Francisco Bayo, Trans. Society of Actuaries,
Vol. 24 (1972).