PUBLIC EMPLOYEES RETIREMENT ASSOCIATION

Report of Actuarial Survey
June 29, 1956

John B. St. John, FSA
Penllyn, Penna.

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The foregoing preface has been prepared by the Minnesota Retirement Study Association. We have also inserted the handwritten comments in the body of the report, and have written the appendix. We hope that these additions will be of assistance to PERA members in understanding better some of the complicated ideas used by Mr. St. John in his study.

The following report by Mr. St. John is published (without alteration or omission) as a service to PERA members, the entire cost of publication has been met by voluntary contributions from PERA members who make up the Minnesota Retirement Study Association.

P R E F A C E

Comments by the Minnesota Retirement Study Association
(PERA Membership Organization)

The PERA report of John St. John, independent consulting actuary hired by the PERA board at a cost of more than ten thousand dollars, is now in and part of the public record.

What it revels is a tottering structure on a shaky foundation.

Mr. St. John is a national figure in the actuarial field and has appeared before Congress as an expert witness a number of times. He submitted his report on June 29, 1956.

Under present law, the report discloses, PERA should now have a reserve fund of more than $231,000,000. It actually has $16,000,000. Thus, the fund is $215,000,000 short of actuarial soundness or, in other words, for each active and retired member there is an actuarial deficit of more than $6,000.00 towards paying present and future benefits.

The contribution rate of our retirement system has never been high enough to support the system's benefit level. "Normal Cost" is the contribution rate which (with interest return) would pay all benefits for members provided they paid that rate from the system's beginning. Mr. St. John estimated that a 14% contribution would be normal cost for PERA.

What would a 14% contribution in 1957 mean to the fund? The actuarial deficit would be reduced to $128,000,000 from $215,000,000, but since we would have to make up lost interest on the deficit, our contribution would actually have to be 4% over the regular 14% or a total of 18%. This 18% contribution would be necessary to prevent the deficit from growing larger.

Or, suppose we wish to erase the 128 million dollar deficit by amortizing it over 40 years and then return to the normal cost of PERA. We would have to devote 6% of payroll for 40 years to reducing the deficit as well as continue the normal 14% cost. This would mean a 20% contribution rate for the next 40 years and 14% thereafter.

Though it would have been impractical to begin PERA on a fully funded basis 25 years ago, had the Board adopted funding on a gradual basis (when experts urged them to in 1944 and 1948) we would not be in the present impossible predicament.

What are we faced with?

The high cost of the current deficit and the knowledge that it will increase unless we adopt an 18% contribution rate in 1957 makes it wise to liquidate most of the deficit at once through reducing benefits by one-half and making up the loss by adopting OASI on a summplemental basis, with matching contributions into PERA from the political subdivisions. PERA members could then secure better retirement benefits than they expect at present by contributing a minimum of 6% of their payroll indefinite beginning in 1957, matched by an equal contribution from the employer. The alternative without OASI and with matching employer contributions, would mean a 10% contribution by members of their salary for 40 years, after which he could reduce his contribution to 7% of salary matched by the employer. This is what St. John's report seems to mean for us.

PUBLIC EMPLOYEES RETIREMENT ASSOCIATION

Report of Actuarial Survey
June 29, 1956

The Board
Public Employees Retirement Association
Court House
St. Paul, Minnesota

Gentlemen:

On February 16, 1956 your Chairman notified me of your action retaining me to make an actuarial study of the Public Employees Retirement Association, pursuant to an outline of survey presented to me by your Budget and Purchasing Committee. This will constitute my formal report to you in accordance with the outline of the survey. This report will be supplemented, however, with appendices and tables which may be useful for reference and further study.

The outline of survey requested certain items in general terms and certain other items specifically. I have interpreted the outline as requesting the following:

A. A survey and report of the Association's operations. This is interpreted to mean a customary actuarial survey in accordance with usual practice including an actuarial valuation and balance sheet and calculation of normal annual costs.

B. A projection of the financial status, income, disbursements, fund balance, reserves and surplus based on your present policy of operation.

C. Answers to the following specific questions.

1. The status of your system if contributions of members had in the past been matched by equal employer contributions.

2. The amount of employer contributions that would have been required in the past to make the plan actuarially sound.

3. The amount of employer contributions required in the future to make up for the absence of past matching of members' contributions.

Comment: In an actuarial sense the system is bankrupt. In a strictly legal sense it is not since the law does not guarantee any pension rights. Legally all the system is obligated to is the refund of contributions. As long as there is sufficient money on hand to do this it is "legally" solvent. But bankrupt as far as having the ability to pay all its pension obligations scheduled for all members.

4. The value of certain present savings provisions, specifically,

The ½% of members' contribution not refundable.
The payment by the employer of 50% of the annuity with respect to compulsory retirements.
The 5% bonus benefit for continued contributions after eligibility for retirement on full annuity.

5. The costs of the following additional benefits

a). Maximum annuity of $250.00 per month
b). Monthly benefits for dependent children
c). Disability income benefits.

6. A valuation and projection of operations on the assumption of retirements as indicated by past and current experience. This is interpreted as adding specific suggestions as to the assumptions to be used in the projection referred to in B above.

General Comment

The Public Employees Retirement Association is now completing its 25th year of operation. The system was established without specific provision for employer, or state, contributions. The only general contribution by employing Governmental Units was for the year 1949-1950 and amounted to $682,000. The Association has, in the first 24 years of operation, collected over $23 million from its members, and accumulated assets of over $16 million. Meanwhile it has paid retirement annuities of $5.6 million and refunds to members of $5 million.

A number of factors have contributed to the Association's ability to provide retirement benefits with so little employer contribution. These include the expansion of membership, in successive stages, and devices by which the members' contributions are, in effect, borrowed to meet obligations which are usually met by employer contributions.

These devices, which have enabled the Association to operate in the past will probably not be sufficient in future years. Consideration should be given to initiating a system of regular advance funding with the gradual establishment of substantial employer contributions. Alternatively, the pay-as-you-go funding policy which has been used in the past should be reviewed in the light of probable needs over a longer future period.

The advance funding possibilities and pay-as-you-go needs are covered in this report. Both the customary actuarial survey and the projections of future operations indicate a large financing problem ahead for the Association. The magnitude of this problem as shown by this report should not be taken as a cause for alarm. The existence of a major long-range financing problem does not indicate that the Association's performance in the past has been unsatisfactory, nor does it indicate that the system is in any sense bankrupt or insolvent.

A. Customary Actuarial Survey

The customary actuarial survey or review of a retirement system will cover the following minimum items.

The preparation of an actuarial balance sheet showing the assets of the system and the values, at the date of the balance sheet, of all probable future benefit payments, not provided for by specific future contributions.

The calculation of a current annual cost of the system.

The determination of the values of all probable future benefit payments is the process of valuation of the benefits of the plan. It involves certain assumptions as to interest earnings of the fund and the mortality or probable deaths among members. For the purpose of this valuation, the following assumptions, which are believed to be reasonably accurate and justifiable, are used.

The interest assumption is 3% compounded annually, and

The mortality assumption is the 1937 Standard Annuity Table.

The investment earnings rates of the Association's fund have been less than 3% during the past 15 years, but show a tendency in more recent years of approaching 3%. Current new investments of the fund are being purchased at a yield of 3% or more.

Tests were made among the retired members of the mortality experience over the past five years and it was found that the 1937 Standard table would be reasonably close to the actual experience for retired lives. No test was made of mortality experience prior to retirement but if this table is not conservative for active members the result is to introduce an element of allowance for termination of membership in the plan.

While these assumptions are believed to be reasonably satisfactory there are many other factors which might be taken into account in estimating the value of future benefits such as:

An assumed age at retirement.

The effect of terminations of employment.

The probability of compulsory retirement.

The probability of any member purchasing additional back service credit.

The probability of terminated members continuing as non-employee members.

Some of these factors are either completely unsusceptible of scientific measures or are subject to wide margins of error.

None of these factors can make for accurate results unless all of the essential facts which determine the benefit payable to each member are known with reasonable accuracy. The principal weakness in this respect is the absence of satisfactory records as to creditable governmental service.

For the purpose of this valuation each member's total service was determined from his first date of Public Employment as recorded. This probably produces a materially larger number of years of service on the whole, larger prospective benefits and higher costs and values. No attempt was made to determine service more accurately because time limitations and expense seemed to prevent the necessary procedure of examining the past work history of each member for the purpose of eliminating periods of non-governmental employment.

A further consideration is that even if periods of past governmental employment were determined precisely, whether such periods would be credited for determining any member's annuity, would still depend on the member's own decision as to whether he would or would not purchase such back credit.

The Actuarial Balance Sheet is, therefore, presented with full recognition that

1. Certain essential items of information for calculating member's benefits and their values are not accurately known.

2. Some probabilities which will influence costs are either not specifically recognized in the calculation of the values shown or subject to a substantial margin of error.

Any valuation or estimate of retirement benefits values or costs is necessarily only an estimate. It involves the projecting of probabilities into the future for 50 to 75 years and, hence, cannot have any high degree of precision but must be taken only as a general guide.

The Actuarial Balance Sheet presented on page 5 introduces a very large liability, not previously recognized, under the title of reserves for future benefit payments. These reserves amounting to $237 million represent the fund that should be on hand, earing 3% interest if the only future income of the fund that could be expected were the member's 4% regular contribution. If a systematic employer contribution were introduced a large part of this reserve would be offset by the present value of such employer contributions.

The reserve for future benefits is (a) the value of all benefits promised under the plan to all present members whether active or retired, less (b) the members' accumulated deductions, and (c) the value of members prospective future contributions. The various groups of members with a summary of basic data and benefits and values are shown in the Summary of Valuation on page 6.

Actuarial Balance Sheet
As at June 30, 1955

Assets

Cash in Bank		$ 468,800.88
Interest Accruals		139,553.61
Receivables		399,436.81
Investments at amortized values		15,319,052.65
Office and Equipment		19,138.48
Total Assets		$16,345,982.43

Actuarial Liabilities

Accounts Payable		683.48
Advance Payments and Interest		17,634.85
Members' Accumulated Deductions		15,801,465.43
Reserves for future benefit payments		
Present value of all future benefits	$296,959,037	
Less members accumulated deductions	15,801,465	
Less present value of members future contributions	43,584,239	237,573,333.00
Total Liabilities		$253,393,116.76
Less Unfunded Liabilities		237,047,134.33
Total Funded Liabilities		$ 16,345,982.43

Summary of Valuation as of June 30, 1955

Membership Group	Number of Members	$1,000's Annual Payroll	Annual Contribution	Current or Prospective Annual Annuity	Accumulated Deductions	Value of Future Benefits	Value of Future Contributions	Net Value
Retired members	1,104			$1,164,373	$ 282,205	$ 10,393,648		$ 10,111,443
Less recoveries on compulsory retirements	(54)			(27,581)		-233,870		-233,870
Net Values	1,104			$1,164,373	$ 282,205	$ 10,159,778		$ 9,877,573
Survivors of deceased members	92			57,945		637,186		637,186
Members eligible to retire 7-1-55								
Retired by 1-1-56	266			322,122		3,150,996		3,150,996
Less recoveries	(68)			(43,346)		-392,124		-392,124
Net Values	266			$ 322,122		$ 2,758,872		$ 2,758,872
Active on 1-1-56	1,743	$ 5,560	$ 222,354	$ 2,273,472	$ 1,373,039	21,907,468		20,534,429
Active members not eligible to retire	27,381	80,195	3,207,758	40,850,603	12,802,594	217,785,187	$43,311,730	161,670,863
Survivors benefits for Active Members						40,000,000		40,000,000
Non-employee members								
Currently paying	222		31,223	301,044	336,138	2,241,208	272,509	1,632,561
Deferred paid up	74			67,596	67,860	529,709		461,849
Accounts not used largly paid up								
Cards not punched	5,924				859,526	859,526		0
Paid up punched	1,750				80,103	80,103		0
Totals	38,556	$85,755	$3,461,335	$45,037,155	$15,801,465	$296,959,037	$43,584,239	$237,573,333

Assumptions: 3% interest; 1937 Standard Mortality; Retirement at age 65 or at later attained age with 5 or more years of service; No turnover.

The reserve for future benefits is abnormally high because the plan provides for no systematic employer contribution in future years. The provision for certification and collection of a 2% employer contribution, if applied in all future years, would have a present value of about $22 million and reduce the net reserve requirement from $237 million to $215 million.

The net reserve for future benefits is the amount required to be taken care of by some specific plan of employer contribution or increased members contribution to provide the amounts of money needed to pay the benefits promised.

From data assembled for new members for the years ending June 30th in 1954 and 1955, assuming it is reasonably representative of all new members entering the Association, a weighted average annual cost may be calculated. This cost is 13.23% of earnings for males and 14.87% for females, or a combined cost of about 14% of payroll. Thus, for example, if the members contribution remained at 4% and an employer contribution were introduced to take care of the balance of the normal cost for all members the employer contribution would be 10% of earnings or $2\frac{1}{2}$ times the member's contribution.

The balance sheet would then be revised as follows:

Assets		
Present Assets		$ 16,345,982
Liabilities		
Current Liabilities		18,318
Members accumulated deductions		15,801,465
Reserves for future benefit payments		
Present value of all benefits	$296,959,037	
Less members accumulated deductions	15,801,465	
Less present value of future contributions		
from members	43,584,239	
from employers	108,960,598	$128,612,735
Total Liabilities		$144,432,518
Unfunded Liabilities		$128,086,536
Total Funded Liabilities		$ 16,345,982

The remaining unfunded liabilities would represent the accumulations that would have been on hand if employers had made contributions at the normal cost rate from the date of employment to the present time with respect to all past Public Employment of present members.

This 128 million dollars is the amount the fund is short (as of June 1955) towards meeting its present and future benefits to the members. To keep PERA at its present benefit level you simply must make up this deficit - there is no way you can ignore it. In fairness to all members, especially the younger ones, it must be dealt with now.

[illegible] Fund If Matching Employer Contributions Had Been Made

If the system had provided for a contribution from employers of 4% [illegible]ings, matching employee contributions, the balance sheet would recognize [illegible]ccumulation of past contributions and the value of future contributions. [illegible] past contribution of 4% would have accumulated $27,371,900 as of June 30, 1955 [illegible]ming the same rates of investment earnings from 1933 to 1955 as were actually [illegible]ceived by the present fund.

A 4% employer contribution to be paid in future years would also reduce [illegible] reserves required for future benefit payments by the present value of these [illegible]ture contributions, or $43,584,239. The Balance Sheet, under these circumstances [illegible]ld appear as follows:

[illegible]

[illegible]esent assets		$ 16,345,982
[illegible]ccumulated employer contributions		27,371,900
Total Assets		$ 43,717,882
[illegible]abilities		
[illegible]rrent liabilities		18,318
[illegible]mbers accumulated deductions		15,801,465
[illegible]serves for future benefit payments		
[illegible]esent value of all benefits	$296,959,037	
[illegible]ss members accumulated deductions	15,801,465	
Less present value of future contributions		
from members	43,584,239	
from employers	43,584,239	193,989,094
Total Liabilities		$209,808,877
[illegible]nded Liabilities		166,090,995
[illegible]otal Funded Liabilities		$ 43,717,882

Thus the unfunded liabilities would have been reduced by $71 million [illegible]presenting $27 million of accumulated past contributions and $44 million [illegible]spective future contributions from employers.

[illegible] of Employer Contributions for Actuarial Soundness

important concept

"Actuarial soundness" is an indefinite term meaning fundamentally the [illegible]e of a sound plan for meeting future benefit payments as they fall due.

The Association's past policy of relying on the legislature to provide [illegible]nds as they are due retired members in future years may be considered [illegible]ally sound, provided the legislature understands this obligation, and [illegible]sing of such money as and when needed is practical.
[illegible]ERS is not actuarially sound since the law denies us contractual [illegible]ts to our benefits and the legislature has planned no [illegible]al method to finance the 128 million dollar deficit.

Modern practice, however, shows a strong trend toward payments into a fund in advance of the times when the money will be needed. The possible variations in a sound plan for such payments in advance, or funding, are unlimited.

At the commencement of any retirement plan there is normally an unfunded liability or past service cost. The Association's present condition is better than if a new plan were being set up, by the amount of the members accumulated deductions which are already in the fund and have paid for a part of the benefits of the plan.

The usual procedure in current practice is for the employer to make payments into the fund for all of the amounts required and not covered by the members contributions. Such payments usually consist of

a current or normal annual cost, and

a payment to fund the initial unfunded liability over a long period of years.

*1 On the basis of the balance sheet and costs presented above, for example, the normal cost of 14% might be met by an increased members contribution of 6% and an employer annual contribution of 8%. The unfunded liability as of June 30, 1955 on this basis was $128 million. This amount might be funded over a 40-year period, by annual payments of 4.2% of the $128 million or $5.4 million a year. This funding payment would require an additional 6% of the current payroll.

*2 The transition from the past policy of no employer contribution to a full funding basis as suggested above would probably be considered impractical and some compromise program of funding would be necessary for practical application.

*1 This paragraph is important and cannot be emphasized enough. Normal cost of PERA benefit level — 14%
40 year amortization of 128 mil. dollar deficit 6%
Total cost of supporting PERA at its present benefit level 20%

*2 However, any compromise program short of full funding would postpone liquidation of the 128 million dollar deficit and force an eventual higher rate of contribution for the members who have several years remaining before retirement.

B. Projection of Fund

The principal item in the projection of future fund operations is the estimate of the amount of annuity payments which would be paid to regular retired members and to survivors. The number of retired members and survivors and estimated amounts that would be required to make payment to them have been made by assuming that mortality will occur in the future among this group in accordance with the 1937 Standard Annuity Mortality Table.

In the past the average age at retirement has been approximately 70. This may in a large part be due to the fact that there are so many recent members at the older ages who have not yet completed 5 years of membership in the system and qualified for the minimum annuity. As the number of members with longer periods of contributing membership increases, it seems reasonably certain that the average age at retirement will decrease. For the purpose of projecting the future number of retired members it has been assumed that by the end of 10 years, in 1965, substantially all of those members who are then over age 65 will have retired. By that time most of them will have accumulated sufficient contributory membership so that a reasonable annuity will be available without the purchase of any back service.

On page 11 the projected annuity payments are combined with the prospective income of the fund estimated over a 20 year period. For this projection it is assumed that the members contributions, net after refunds, each year will amount to $2,500,000. In a preliminary test it became obvious that the projection of the fund would not be useful without including as income at least a 2% contribution from employers. Such an item has therefore been included in this projection. The interest income has been assumed to be 3% on the fund balance each year. This is slightly in excess of recent earnings but within reasonable prospects.

The projection of the fund including a 2% contribution from employers every year indicates that the fund would continue to grow at an average of $2,000,000 a year for the next five years. This would in all probability cover the increasing liability for refunds to active members. Thereafter, however, the fund ceases to grow and if no change were made the fund could be completely used up between 1971 and 1975.

A second projection is therefore included, starting with 1961 and continuing for the balance of the 20 year period, assuming that the contribution from employers would be increased to 4% in 1961, 6% in 1966 and 8% in 1971. This projection indicates that these increases in the employer contribution rates would be needed to keep the fund balance in line with the probable increase in refundable contributions of members.

Progress of Fund from July 1, 1955
(In Thousands of Dollars)

June 30 in Year	Income: Net Members Contribution	Income: Levy on Employers	Income: Interest Income at 3%	Income: Total	Disbursements: Annuity Payments	Income Over Disbursements	Fund
1955	$ 2,638	($ 1,778)	$ 391	$ 4,807	$ 1,104	$ 3,703	$16,300
1956	2,500 (2%)	1,700	489	4,689	1,483	3,206	19,506
1957	2,500	1,700	585	4,785	1,854	2,931	22,437
1958	2,500	1,700	673	4,873	2,198	2,675	25,112
1959	2,500	1,700	753	4,953	2,559	2,394	27,506
1960	2,500	1,700	825	5,025	3,000	2,025	29,531
1961	2,500	1,700	886	5,086	3,585	1,501	31,032
1962	2,500	1,700	930	5,130	4,301	829	31,861
1963	2,500	1,700	956	5,156	5,144	12	31,873
1964	2,500	1,700	956	5,156	5,981	-825	31,048
1965	2,500	1,700	931	5,131	6,801	-1,670	29,378
1966-70	12,500	8,500	4,000	25,000	40,000	-15,000	14,378
1971-75	12,500	8,500	---	21,000	45,000	-24,000	-9,622

Assuming Increasing Levy on Employers To 4% in 1961, 6% in 1966 and 8% in 1971

1960	2,500	1,700	825	5,025	3,000	2,025	29,530
1961	2,500 (4%)	3,400	886	6,786	3,585	3,201	32,731
1962	2,500	3,400	982	6,882	4,301	2,581	35,312
1963	2,500	3,400	1,059	6,959	5,144	1,815	37,127
1964	2,500	3,400	1,114	7,014	5,981	1,033	38,160
1965	2,500	3,400	1,145	7,045	6,801	244	38,404
1966-70	12,500 (6%)	25,500	6,000	44,000	40,000	4,000	42,404
1971-75	12,500 (8%)	34,000	8,000	54,500	45,000	9,500	51,904

C.4 Value of Certain Savings Provisions

*/ The ½% Nonrefundable Contributions. The value of this feature is the value of the amount not refunded at the death of members plus the value of the amount not refunded to members who request a refund after 10 years of membership. The value with respect to members who die depends on the age and sex, but is, on the average, approximately 20% of the amount of the refund. Since the amount of the nonrefund is ½% of pay, the savings is approximately 20% of ½% of pay, or 1/10% of pay. The value with respect to terminations and requested refunds after 10 years of membership depends on the number of such terminations and requests. Because there are relatively few terminations after 10 years of membership and because the sacrifice of the paid-up retirement annuity to which the member is entitled is so great, there should be practically none of these cases, and hence, no value to this savings feature with respect to such cases.

In summary, the value of this feature may be expressed as follows. In a funded system an increase in the member's contribution of 1/10th% (for example, from 4% to 4.1%) should be sufficient to offset this savings feature and permit refunding full contributions without additional cost to the system.

The 50% of Annuity for Compulsory Retirement. The Summary of Valuation on page 6 shows that for retirements during the last six months of 1955 this feature saved the system $392,000 out of a total cost of annuities granted of $3,151,000, or 12.4%. This is indicative, but not an accurate measure of future savings. The actual savings will depend on such unpredictable factors as the extent of compulsory retirements and devices which might be used by employing units to avoid such direct costs. The maximum value is, obviously 50% of the costs of the annuity, if all retirements were compulsory. The minimum value is 0% of the costs, if all employing units were able to find means of persuading members to retire voluntarily. A simple device, for example, might be for the employing unit to offer to pay the member an additional income of 10% of his annumity if he would retire voluntarily. The member would receive 110% of his annuity. The employing unit would apparently save 80% of the 50% compulsory retirement cost. It would have to pay only 10% of the annuity in lieu of 50%.

The 5% Bonus Benefit. The savings in this feature depends on the sex and age of the member and is theoretically as follows, if retirement is delayed and contributions continued for five years from the ages as shown.

Age of First Eligibility	Percent of Annuity Cost Saved	
	Males	Females
60	19.9%	15.0%
65	26.0	19.9
70	33.2	26.0

*/ This 1/2 % nonrefundable feature therefore means virtually nothing to the fund as a savings. It has no legitimate place at all on the financial statement as "income" - as it now appears annually. It simply has had the effect of inflating the so-called "surplus"!

The average savings per year with respect to a member eligible to retire would be roughly 4% to 5%. This savings can be obtained currently only with respect to the very small percentage of members who have completed the necessary years of contributions. The aggregate savings to the system is small because the savings for each person is subject to his willingness to continue in service and the employing unit's attitude toward compulsory retirement.

C5a. Cost of Benefits on Earnings over $400 a Month

The specific cost figure requested was for the additional cost of a maximum annuity of $250 per month as compared with the present maximum of $200 a month. Upon examination of the data with respect to members earning over $400 per month it appears that the number earning in excess of $500 is so small that increasing the applicable salary to $500 would have very little different effect from eliminating the maximum earnings entirely.

Annual costs have been calculated for increasing the benefit without limit to the applicable salary. These costs may be summarized as follows:

The current annual costs to provide each year a proportionate part of the total benefit of 50% of salary is estimated at $417,000. To meet a part of this annual cost the members would contribute 4% with respect to their earnings in excess of $400 monthly. Their annual contribution would be $107,000. A part of this annual contribution would be required to make refunds to those who terminate or die prior to retirement and this amount is estimated at $21,000, leaving a net amount of members contributions of $86,000 per year. This would leave a current annual cost of $331,000 which would not be provided for specifically. Unless other arrangements were made, this annual amount would be added annually to the past service costs to be met by employer contributions sometime in the future.

In addition to this current annual cost there would be an accumulated past service cost, which, funded over a period of 30 years, would amount to $480,000 a year. Of this total $270,000 would be for past membership service of the present members earning over $400. Very little of this would be offset by making back contributions with respect to earnings over $400. The remaining $210,000 annual cost would represent government service peior to membership date. Under the present rule this back service could be purchased by members paying back contributions with interest. Again, however, very little of the cost would be met by such contributions with respect to earnings over $400, because actual earnings during this back service undoubtedly were almost wholly under $400 monthly.

Thus, this extension of benefit would have an annual cost of approximately $897,000 of which approximately $86,000 would be met by members' contributions.

C5b. Annual Cost of Survivors Benefits

A calculation has been made of the annual cost of benefits for surviving children. The calculation is shown in full on page 15.

The costs are based only on those members who have completed 5 or more years of membership in the plan, since some test of eligibility for this benefit seems desirable. The Social Security requirement is not less than 6 quarters of employment out of the last 13 quarters prior to the death of a member.

These calculations show a relatively small cost because they are supplied against a limited portion of the total membership, about 8,000 with 5 or more years of membership. The expected deaths are about 76 per year. It is assumed, however, that only a very small portion of the females would be entitled to benefits with respect to children. These would be widows working with children to support. The major part of the males might be expected to have children till they reach advance ages. These calculations show that about 14 families of deceased members might be expected to claim benefits in any year. The aggregate amount that would be payable on the assumption that the average family benefit is $1,800 a year would be about $25,000 per year. The present value of all future benefits for these families would amount to approximately $160,000. This is about $20 per member covered with 5 or more years of membership. It represents approximately two-tenths of one percent of the aggregate members salaries.

Annual Cost of Survivors Benefits
for Members with 5 or More Years of Membership

Group	Number of Members	Deaths per 1,000	Expected Deaths	% with Children (Assumed)	Expected Number with Children	Annual Annuity at $1,800 per family	Present Value of Annuity	Annuities
				Males				
Under 30	165	1.72	.28	60%	.17	$ 306	12	$ 3,672
30 - 34	480	2.38	1.14	70	.80	1,440	12	17,280
35 - 39	588	3.47	2.04	70	1.43	2,574	10	25,740
40 - 44	762	5.07	3.86	55	2.12	3,816	8	30,528
45 - 49	848	7.40	6.28	40	2.51	4,518	6	27,108
50 - 54	801	10.81	8.66	25	2.17	3,906	5	19,530
55 - 59	883	15.76	13.92	15	2.09	3,762	4	15,048
60 - 64	986	22.96	22.64	7	1.58	2,844	4	11,376
Total	5,513		58.82		12.87	$23,166		$150,282
				Females				
Under 30	175	1.40	.25	10%	.03	$ 54	12	$ 648
30 - 34	195	1.72	.34	"	.03	54	12	648
35 - 39	211	2.38	.50	"	.05	90	10	900
40 - 44	303	3.47	1.05	"	.11	198	8	1,584
45 - 49	412	5.07	2.09	"	.21	378	5	2,268
50 - 54	423	7.40	3.13	"	.31	558	5	2,790
55 - 59	443	10.81	4.79	0	.00	----		---
60 - 64	341	15.76	5.37	0	---	----		---
Total	2,503		17.52		.74	$ 1,332		$ 8,838
Grand Totals	8,016		76.34		13.61	$24,498		$159,120

C5c. Annual Cost of Disability Income Benefit

The costs of a disability income benefit have been very roughly estimated and the calculation is shown in full on page 17.

This cost is based on the assumpation that the benefit would be available only to those members who have completed 10 years of membership service. Because of the recent rapid expansion of membership the number with 10 full years of membership service is perhaps surprisingly small at approximately 3,000 members. As a result the costs shown by this calculation are low and would, of course, increase rapidly as the number of members with 10 or more years of service grows in the future.

The calculation shows that on the basis of disability rates experienced by the Railroad Retirement Systemthis group might be expected to produce an average of 48 disability claims in the course of a year. Most of these claims, approximately 75%, would occur after age 55 and run for a short maximum period. For the purpose of this calculation it has been assumed that the annual rate of disability annunities would be approximately $600. If this annuity were higher the costs would be increased proportionately.

On the basis of these calculations the annual cost for the disability benefit with the limitations as specified would be about $160,000 a year. This would be approximately $50 per member who might qualify for such a benfit. It might also be expressed as approximately two-tenths of one percent of the aggregate salaries of members. */

Respectfully submitted,

/s/ John B. St. John

John B. St. John, F.S.A.

*/ But would cost more as the number of members with 10 full years of membership increases substantially in the years ahead. See paragraph 2 above.

Annual Cost of Disability Benefits
for Members with 10 or More Years of Membership

Age Group	Number of Members	Disability Rate (R.R. Ret)	Expected Number of Disabilities	Annual Annuity at $600 per life	Present Value per $1 of Annuity	Cost of One Year's Annuities
			Males	$ 12	$10	$ 120
Under 35	23	.0007	.02	36	10	360
35 - 39	69	.0009	.06	258	10	2,580
40 - 44	217	.0020	.43	732	10	7,320
45 - 49	321	.0038	1.22	2,082	10	20,820
50 - 54	350	.0099	3.47	5,070	8	40,560
55 - 59	452	.0187	8.45	12,420	3	37,260
60 - 64	552	.0375	20.70	$20,610		$109,020
Total	1,984		34.35			
			Females			
Under 35	54	.0007	.04	$ 24	$10	$ 240
35 - 39	83	.0009	.07	42	10	420
40 - 44	143	.0020	.28	168	10	1,680
45 - 49	189	.0038	.72	432	10	4,320
50 - 54	187	.0099	1.85	1,110	10	11,100
55 - 59	211	.0187	3.95	2,370	8	18,960
60 - 64	180	.0375	6.75	4,050	3	12,150
Total	1,047		13.66	$ 8,196		$ 48,870
Grand Totals	3,031		48.01	$28,806		$157,890

PUBLIC EMPLOYEES RETIREMENT ASSOCIATION
Supplementary Actuarial Report
July 19, 1956

The Board
Public Employees Retirement Association
Court House
St. Paul, Minnesota

Gentlemen:

In accordance with your request, this report is a supplement to the Actuarial Survey of June 29, 1956. This report makes various additional projections of the operation of the fund for the next 20 years.

There are, in Tables I to V, five additional projections with the following assumptions as to members' contributions and levies against Employing Units.

Table	Member Contributions	Employer Contributions
I	6% from July 1, 1957	4% from July 1, 1957 6% from July 1, 1959 8% from July 1, 1961
II	4% continued	4% from July 1, 1957
III	5% from July 1, 1957	5% from July 1, 1957
IV	6% from July 1, 1957	6% from July 1, 1957
V	6% from July 1, 1957	2% from July 1, 1957 4% from July 1, 1962 6% from July 1, 1967 8% from July 1, 1972

The following table summarizes the aggregate results of these projections over a 20-year period. It shows the total contributions for the 20-year period from members and from employers. It also shows the interest earnings of the fund over the 20-year period. In each case the annuity payments, while they are not shown on this table, amount to $125,959,000. The table also shows the fund at the end of 20 years on the assumptions as projected.

Summary of Various Projections
(In Thousands of Dollars)

Table	Percentage Contribs.	20 Year Totals Members Contribs.	Employer Contribs.	Interest Earnings	Fund at End of 20 years	Approximate Refundable Deductions
I	6% and 4% - 8%	$72,500	$112,200	$37,687	$113,728	$76,000
II	4% and 4%	50,000	61,200	18,363	20,904	56,000
III	5% and 5%	61,250	76,500	25,780	54,871	66,000
IV	6% and 6%	72,500	91,800	34,596	90,237	76,000
V	6% and 2% - 8%	72,500	71,400	21,717	56,958	76,000

No attempt has been made to make a scientific projection of the accumulation of refundable deductions, but it is roughly estimated that these will increase by $2,000,000 a year for the next 20 years at the 4% contribution rate. A fund of approximately $56,000,000 will be required at the end of 20 years to meet all the refundable deductions at the present rate of contribution of 4%. If the members' contributions are increased to 5% or 6%, there would be additional refundable deductions of approximately $10, or $20 million, required at the end of the 20 year period.

It appears from the summary of projections as shown above that projections II, III, and V would not produce a fund at the end of 20 years sufficient to cover the refundable deductions. Projections I and IV would produce sufficient funds to cover the refundable deductions and would make some progress toward advance funding.

Respectfully submitted,

John B. St. John, F.S.A.

APPENDIX I

Mr. St. John has defined actuarial soundness as the existence of a sound plan for meeting future benefit payments as they fall due. An actuarial deficit is the sum of money that, on the basis of a given planned contribution rate, the system falls short of actuarial soundness. Accordingly, there is nothing imaginary about an actuarial deficit. So long as a system is not actuarially sound, some of the present members will not receive the retirement benefits to which they are entitled. And the actuarial deficit represents the amount of money that present members will not receive in retirement benefits due them. The only cure for a retirement plan that is not actuarially sound is to place it on a sound basis. And the only solution to an actuarial deficit is to cut benefits to the amount of the deficit, or else find some practical way to raise the amount of money represented by the deficit.

The normal cost of a retirement system is the contribution rate that would pay for all benefits for members provided they had paid that rate from the time they entered the system. If PERA had had a normal cost contribution from the beginning, there would now be no actuarial deficit.

A system is called fully funded when it has a contribution rate at normal cost and no actuarial deficit. A system can be actuarially sound whether or not it is fully funded, and full funding is only one of many ways to eliminate an actuarial deficit and make a system actuarilly sound. However, full funding is the least expensive of all the recognized ways of financing the benefits of a retirement system, and the normal cost is the lowest contribution rate that can indefinitely be carried for any retirement system.

Pay-as-you-go or cash disbursement financing, which does not involve building up a fund, requires the highest contribution rate to be carried indefinitely by any retirement system. Various degrees of partial funding are intermediate in cost between full funding and pay-as-you-go financing. Traditionally, the PERA Board has recommended pay-as-you-go financing to the membership and the legislature as a means of financing PERA retirement benefits.

With full funding, the contribution rate into PERA would be the normal 14% of payroll. However, under pay-as-you-go financing, the contribution rate would eventually rise to between 28% and 35% of payroll to finance PERA retirement benefits at their present level. The reason, of course, is that full funding takes maximum advantage of interest on a fund, while pay-as-you-go financing gets very little benefit from interest.

Suppose we wanted to begin contribution in 1957 at the normal rate of 14% of payroll, and only contribute enough additional to continue the resulting $128 million PERA deficit at that same size. We would need to pay interest on the deficit indefinitely in addition to the normal cost for PERA. Since the interest would slightly exceed 4% of payroll and the normal cost of PERA is 14% of payroll, we would have to pay slightly more than 18% of payroll indefinitely to continue the PERA deficit at $128 million.

II

For a more detailed understanding of the figures in Mr. St. John's report, it may be helpful to consider how to calculate the size of an actuarial deficit for a retirement system.

How large should the present reserve fund be for a given retirement system? How can this information be used to calculate the size of an actuarial deficit? Although the details are complicated, the approximate size of the fund needed to make the system actuarially sound can be calculated by the following method.

First, estimate the value of all future benefits promised under the plan to all present members, whether active or retired.

Second, subtract the present value of all future contributions to be credited to present members.

Your result will be the amount there should be in the fund at this time in order that, together with future contributions and interest, there will be enough to pay the anticipated retirement benefits.

On the basis of the estimates of Mr. St. John, we can make this calculation for PERA under the provisions of the present law as follows:

A. Present value of all future benefits:	$297,000,000
Less, present value of future contributions:	66,000,000
Actuarially sound reserve fund:	$231,000,000
Less Actual PERA reserve fund:	16,000,000
PERA deficit under present law:	$215,000,000

It is apparent that regardless of any changes in contribution rates from now on, the present value of all future benefits will not be affected. But, since the present value of future contributions will change, the size of the actuarially sound reserve fund and the PERA deficit will vary in inverse proportion with different anticipated rates of contribution. For this reason, you will read of different sizes of deficit in PERA ($237 million, $215 million, $128 million). These different deficit sizes depend on what plans are made for future contribution rates into PERA.

The present law allows a 2% contribution rate from political subdivisions in addition to the 4% from the members when the fund falls below a certain point. However, except for one year in the past, PERA has relied solely on the membership contributions. If we assume PERA to continue on a 4% basis, we can calculate the reserve and deficit as follows:

B. Present value of all future benefits:	$297,000,000
Less, present value of future contributions:	44,000,000
Actuarially sound reserve fund:	$253,000,000
Less, actual PERA reserve fund:	16,000,000
PERA deficit with only 4% contribution:	$237,000,000

The normal cost of PERA benefits is 14% of payroll. If contributions had been at this rate from the beginning, we would not have a deficit. But if we began a 14% contribution in 1957, we would still have a deficit which can be calculated as follows:

C. Present value of all future benefits:	$297,000,000
Less, present value of future contributions:	153,000,000
Actuarially sound reserve fund:	$144,000,000
Less, actual PERA reserve fund:	16,000,000
PERA deficit at 14% contribution beginning in 1957:	$128,000,000

In case we began contribution at 20% of payroll in 1957 and contributed at that rate for 40 years, after which we reduced the contribution rate to 14% of payroll, there would be no deficit. Our calculation would then be as follows:

D. Present value of all future benefits:	$297,000,000
Less, present value of future contributions:	281,000,000
Actuarially sound reserve fund:	16,000,000
Less, actual PERA reserve fund:	16,000,000
PERA deficit (20% f/40 yrs., 14% thereafter):	No deficit

The calculation would look the same if, in 1957, we began contributions at slightly more than 18% of payroll and continued them indefinitely.

-III-

The high cost of the current PERA deficit, and the knowledge that it will increase with anything less than an 18% contribution in 1957, makes it wise to liquidate most of the deficit at once by reducing PERA retirement benefits by half, making up the loss through the adoption of OASI on a supplemental basis, and receiving matching contributions into PERA from the political subdivisions. PERA members could then secure better retirementbenefits than they expect at present by contributing 7% of their payroll indefinitely beginning in 1957. The alternative without OASI, even with matching employer contributions would be a contribution by the PERA member of 10% of salary for forty years, after which he could reduce his contribution to 7% of salary.

For that reason, the Minnesota Retirement Study Association has presented the following Report to the Legislative Interim Committee studying public employee retirement systems in Minnesota. (See Appendix IV)

R E P O R T

May 18, 1956

For: The Public Retirement Study Commission

Prepared by: The Minnesota Retirement Study Association

Concerning: Suggested sound financing of retirement benefits for membership of the Public Employees Retirement Association.

-I-

A sound retirement system increases productivity in both private and public employment, and is advantageous to the employer as well as to the employee. A good retirement system enables employers to retire people who no longer can earn their pay. There is also better employee morale and more opportunity for advancement for younger employees. Without such a retirement plan, an employer usually pays hidden retirement costs for persons kept on the payroll who no longer can do the work. As a result of the employer advantages of a good retirement system, it has become normal for employers to pay at least half of the costs of a retirement plan for their employees.

We recommend that the political subdivisions match employee contribution for retirement benefits for PERA members.

PERA is greatly underfinanced at present. A huge actuarial deficit has accumulated. There is one major practical way to reduce this deficit while ensuring retirement benefits at about the present level for PERA members. The use of Federal Old Age and Survivors Insurance, together with PERA, would allow much of the present deficit to be shifted to OASI and to be borne by the entire United States with little cost to any individual. This would help insure retirement benefits at the present level without placing an impossible financial strain on both the public employees and the political subdivisions.

We recommend use of OASI on a supplemental basis for PERA members.

-II-

A retirement plan along the following lines would be soundly financed with employer matching contributions and use of OASI.

Contributions to Fund:

	Plan I			Plan II		
	OASI	PERA	TOTAL	OASI	PERA	TOTAL
Employer	2%	5%	7%	2%	4%	6%
Employee	2%	5%	7%	2%	4%	6%
Both	4%	10%	14%	4%	8%	12%

Note: Under Plan I, we would reduce contributions into PERA gradually after the fund is built up, so that when OASI total contribution rate rises to 8% in 1975, total PERA contribution will fall to 6%, keeping total contributions at 14%. Under Plan II, total contribution rate to fund will rise to 16% as the anticipated OASI contribution rise reaches 8%, and the total contribution rate would remain at about 16% indefinitely.

We do not recommend either Plan I or Plan II at present, but rather regard them as alternative proposals to be submitted to the PERA membership for their determination which they would prefer.

Benefits (Plans I and II the same):

a) Basically, we recommend keeping the PERA benefit formula, but cutting the benefits from PERA to one-half what they are at present, and adding OASI to make up the balance. For example, at present a member with an income of $400 a month can retire with a $200 a month annuity from PERA (providing he meets the necessary retirement qualifications). We suggest that this member instead receive a $100 a month annuity from PERA, and $100.50 through OASI, resulting in a total retirement annuity of $200.50 per month.

b) A right to withdraw all the money contributed upon leaving public employment, but without receiving any interest return. (At present in PERA we can withdraw only 7/8 of contributions upon leaving public service after ten years of membership.

c) Cost-of-living adjustments in annuities for retired members, to be financed by modification of the PERA investment portfolio.

d) A Savings Clause that no employee will receive less in benefits under the combined system than he would have received under PERA alone with the present benefits.

e) Because OASI provides major benefits for low-income employees, but less adequate returns for higher income employees, we suggest that the top limit for PERA contributions be removed. At present, PERA deductions are not made for more than $400 a month for any employee. If the limit were removed, PERA would help make up for OASI retirement deficiencies for middle income employees.

f) Disability benefits to the extent that careful actuarial study shows that they can be soundly financed by the contribution rate.

g) The following options (the precise benefit figures to be fixed by actuarial study and recommendation):

    1. A straight life annuity, more substantial than the one sketched above, but which doesn't guarantee death benefits or the return of any sum of money upon withdrawal.

    2. Reversionary annuity: a member can accept a lesser annuity, but on condition that the spouse continue receiving that PERA annuity after death of the member.

    3. Split annuity: opportunity for persons retiring before age 65 to receive a greater annuity from PERA before age 65, and a lesser amount afterwards, so that the member can plan his total retirement benefits taking into account that he cannot receive OASI benefits before age 65.

In other words, there will be two separate and distinct plans: PERA and OASI. OASI benefits will remain as adopted by the federal government. PERA benefits will be modified as indicated above. The combination of the two distinct plans will provide for PERA members benefits that are as good or better than they receive now, soundly financed, and without prohibitive cost either to the political subdivisions or to the employees themselves.

TABLE: ILLUSTRATION OF BENEFITS PAYABLE UNDER COMBINED PLAN:

Benefit Payable at Age 65 or Over; service 20 years

Average Compensation Per Month	PERA BENEFIT	OASI BENEFIT	TOTAL BENEFIT	TOTAL BENEFIT With Dependent Wife at 65
$150.00	$ 37.50	$ 68.50	$ 106.00	$140.25
$200.00	50.00	78.50	128.50	167.75
$250.00	62.50	88.50	151.00	195.25
$300.00	75.00	98.50	173.50	222.75
$400.00	100.00	108.50	208.50	262.75
$500.00	125.00	108.50	233.50	287.75
$600.00	150.00	108.50	258.50	312.75

Example: Assume a member with 20 years of service received an average monthly compensation of $300 for calculation of OASI benefits; but an average compensation during the five highest years (for PERA calculation) of $350.00 per month. He would be entitled to 25% of $350 for his PERA annuity of $87.50 a month. He would be entitled to an OASI benefit of $98.50 a month. His total retirement annuity will then amount to $186.00 a month.

Suggestions for Good Administration

1. Annual actuarial evaluation and actuarial cost analysis for every benefit or contribution change recommended at any time for PERA.

2. Contractual guarantee of retirement benefits.

3. Opportunity for all PERA members to vote for elected members of the Board whether or not they assign proxies or come to the annual meetings. Fair and democratic procedures in membership meetings and Board meetings. Practical opportunity for the membership to call special membership meetings by petition. Public access to PERA records and publications. The law should clearly indicate whether or not PERA is a public agency, and whether the laws concerning public agencies also apply to PERA.

4. A more diversified and flexible investment policy for PERA funds.

5. A clear and understandably worded PERA law should establish the changed system.

PLACE PERA ON AN ACTUARIAL RESERVE BASIS:

This plan is calculated to begin putting PERA on an actuarial reserve basis of financing. To begin building a realistic fund, properly invested, that will pay off future benefits.

OASI BUY-BACK FEATURE:

The 1954 ammendments to the Social Security Act provides for employees who are near retirement the opportunity to buy back 8 quarters (two years) of OASI coverage and be fully-covered providing this is done before the year 1957 ends. This is why it is very important that we get legislation passed in the State Legislature during the 1957 session. This solves two important problems:

1. It will salvage PERA. OASI will help us achieve financially sound retirement benefits by combining it on a supplemental basis with a realistic and modified PERA plan. To support PERA at the present benefit level would cost us about an 18% contribution rate, instead of the present 4%. This is obviously prohibitive.* The alternative, therefore, is to cut back the benefit level to cut back the cost. Supplement the then modified PERA plan with OASI. The OASI retirement annuity plus the so-called welfare benefit -- survivorship benefits -- would more than make up for the benefits cut-back in PERA. (See page 3 for computation tables).

2. Members near retirement can be covered fully by OASI. You can get full coverage under OASI with the buy-back feature at a cheap price. See discussion that follows.

COST OF BUY-BACK PROVISION:

For the employee it would cost 2% of his pay up to the maximum of $4,200 per year for each of the two years. This would be matched by an equal amount, 2% from your employer. Thus you are fully-covered under OASI. The law would have to make it mandatory on the employer. In dollars and cents it means you would be paying in about $160 of your own money and be getting out in total retirement benefits about $20,000 assuming you live the normal life span.

OASI SPOUSE BENEFITS:

An added feature of OASI is the provision that the spouse of persons receiving OASI receive an amount equal to half the retirement benefit paid them. For example, a man receiving an OASI benefit of $108.00 per month who has a dependent wife is paid an additional $54.00 per month for her.

WHAT ABOUT PRESENTLY RETIRED MEMBERS OF PERA?

Under our plan provision would be made so that currently retired members of PERA would go right on receiving their present retirement benefit with absolutely no reduction. The money would be paid out of the PERA fund. Under the heading d, on page 2, "savings Clause", you will note that it is stated no person will receive less in benefits than before the combined system. We would expand this to mean that the currently retired member will not suffer a reduction of benefits as well.

*Footnote. The provision in the PERA law providing for a governmental contribution into the fund when the surplus is exhausted, (one-half of the employees contribution, or 2%) would not be sufficient to forestall bankruptcy.

PUBLIC EMPLOYEES RETIREMENT ASSOCIATION

Supplementary Actuarial Report
July 19, 1956

John B. St. John, F.S.A.
Penllyn, Pa.

PUBLIC EMPLOYEES RETIREMENT ASSOCIATION
Supplementary Actuarial Report
July 19, 1956

The Board
Public Employees Retirement Association
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St. Paul, Minnesota

Gentlemen:

In accordance with your request, this report is a supplement to the Actuarial Survey of June 29, 1956. This report makes various additional projections of the operation of the fund for the next 20 years.

There are, in Tables I to V, five additional projections with the following assumptions as to members' contributions and levies against Employing Units.

Table	Member Contributions	Employer Contributions
I	5% from July 1, 1957	4% from July 1, 1957 6% from July 1, 1959 8% from July 1, 1961
II	4% continued	4% from July 1, 1957
III	5% from July 1, 1957	5% from July 1, 1957
IV	6% from July 1, 1957	6% from July 1, 1957
V	6% from July 1, 1957	2% from July 1, 1957 4% from July 1, 1962 6% from July 1, 1967 8% from July 1, 1972

The following table summarizes the aggregate results of these projections over a 20-year period. It shows the total contributions for the 20-year period from members and from employers. It also shows the interest earnings of the fund over the 20-year period. In each case the annuity payments, while they are not shown on this table, amount to $125,959,000. The table also shows the fund at the end of 20 years on the assumptions as projected.

Summary of Various Projections
(In Thousands of Dollars)

Table	Percentage Contribs.	20 Year Totals Members Contribs.	Employer Contribs.	Interest Earnings	Fund at End of 20 Years	Approximate Refundable Deductions
I	6% and 4% - 8%	$72,500	$112,200	$37,687	$113,728	$76,000
II	4% and 4%	50,000	61,200	18,363	20,904	56,000
III	5% and 5%	61,250	76,500	25,780	54,871	66,000
IV	6% and 6%	72,500	91,800	34,596	90,237	76,000
V	6% and 2% - 8%	72,500	71,400	21,717	56,958	76,000

No attempt has been made to make a scientific projection of the accumulation of refundable deductions, but it is roughly estimated that these will increase by $2,000,000 a year for the next 20 years at the 4% contribution rate. A fund of approximately $56,000,000 will be required at the end of 20 years to meet all the refundable deductions at the present rate of contribution of 4%. If the members' contributions are increased to 5% or 6%, there would be additional refundable deductions of approximately $10, or $20 million, required at the end of the 20-year period.

It appears from the summary of projections as shown above that projections II, III and V would not produce a fund at the end of 20 years sufficient to cover the refundable deductions. Projections I and IV would produce sufficient funds to cover the refundable deductions and would make some progress toward advance funding.

Respectfully submitted,

John D. St. John, F.S.A.

Progress of Fund from July 1, 1955
(In Thousands of Dollars)

Contributions:
Members: 6% from July 1, 1957
Employers: 4% from July 1, 1957, 6% from July 1, 1959 and 8% from July 1, 1961

June 30 in Year	Income: Net Members Contribution	Income: Levy on Employers	Income: Interest Income at 3%	Income: Total	Disbursements: Annuity Payments	Income Over Disbursements	Fund
1955	$ 2,638		$ 391	$ 4,807	$ 1,104	$ 3,703	$16,300
1956	2,500	---	489	2,989	1,483	1,506	17,806
1957	2,500	---	534	3,034	1,854	1,180	18,986
1958	3,750	$ 3,400	570	7,720	2,212	5,508	24,494
1959	3,750	3,400	735	7,885	2,597	5,288	29,782
1960	3,750	5,100	893	9,743	3,070	6,673	36,455
1961	3,750	5,100	1,094	9,944	3,701	6,243	42,698
1962	3,750	6,800	1,281	11,831	4,457	7,374	50,072
1963	3,750	6,800	1,502	12,052	5,334	6,718	56,790
1964	3,750	6,800	1,704	12,254	6,201	6,053	62,843
1965	3,750	6,800	1,885	12,435	7,050	5,385	68,228
1966-70	18,750	34,000	12,000	64,750	41,000	23,750	91,978
1971-75	18,750	34,000	15,000	67,750	46,000	21,750	113,728
Totals 1956-75	$72,500	$112,200	$37,687	$222,387	$124,959	$97,428	

Table 11

Progress of Fund from July 1, 1955
(In Thousands of Dollars)

Contributions:
Members: 4%
Employers: 4% from July 1, 1957

June 30 in Year	Income				Disbursements	Income Over Disbursements	Fund
	Net Members Contribution	Levy on Employers	Interest Income at 3%	Total	Annuity Payments		
1955	$ 2,638		$ 391	$ 4,807	$ 1,104	$ 3,703	$16,300
1956	2,500		489	2,989	1,483	1,506	17,806
1957	2,500		534	3,034	1,854	1,180	18,986
1958	2,500	$ 3,400	570	6,470	2,212	4,258	23,244
1959	2,500	3,400	697	6,597	2,597	4,000	27,244
1960	2,500	3,400	817	6,717	3,070	3,647	30,891
1961	2,500	3,400	927	6,827	3,701	3,126	34,017
1962	2,500	3,400	1,021	6,921	4,457	2,464	36,481
1963	2,500	3,400	1,094	6,994	5,334	1,660	38,141
1964	2,500	3,400	1,144	7,044	6,201	843	38,984
1965	2,500	3,400	1,170	7,070	7,050	20	39,004
1966-70	12,500	17,000	5,900	35,400	41,000	-5,600	33,404
1971-75	12,500	17,000	4,000	33,500	46,000	-12,500	20,904
Totals 1956-75	$50,000	$61,200	$18,363	$129,563	$124,959	$ 4,604	

Table II

Progress of Fund from July 1, 1955
(In Thousands of Dollars)

Contributions:
Members: 5% from July 1, 1957
Employers: 5% from July 1, 1957

June 30 in Year	Income				Disbursements		
	Net Members Contribution	Levy on Employers	Interest Income at 3%	Total	Annuity Payments	Income Over Disbursements	Fund
1955	$ 2,638		$ 391	$ 4,807	$ 1,104	$ 3,703	$16,300
1956	2,500		489	2,989	1,483	1,506	17,806
1957	2,500		534	3,034	1,854	1,180	18,986
1958	3,125	$ 4,250	570	7,945	2,212	5,733	24,719
1959	3,125	4,250	742	8,117	2,597	5,520	30,239
1960	3,125	4,250	907	8,282	3,070	5,212	35,451
1961	3,125	4,250	1,064	8,439	3,701	4,738	40,189
1962	3,125	4,250	1,206	8,581	4,457	4,124	44,313
1963	3,125	4,250	1,329	8,704	5,334	3,370	47,683
1964	3,125	4,250	1,430	8,805	6,201	2,604	50,287
1965	3,125	4,250	1,509	8,884	7,050	1,834	52,121
1966-70	15,625	21,250	8,000	44,875	41,000	3,875	55,996
1971-75	15,625	21,250	8,000	44,875	46,000	-1,125	54,871
Totals 1956-75	$61,250	$76,500	$25,780	$163,530	$124,959	$38,571	

Table III

Progress of Fund from July 1, 1955
(In Thousands of Dollars)

Contributions:
Members: 6% from July 1, 1957
Employers: 6% from July 1, 1957

June 30 in Year	Income				Disbursements		
	Net Members Contribution	Levy on Employers	Interest Income at 3%	Total	Annuity Payments	Income Over Disbursements	Fund
1955	$ 2,638		$ 391	$ 4,807	$ 1,104	$ 3,703	$16,300
1956	2,500		489	2,989	1,483	1,506	17,806
1957	2,500		534	3,034	1,854	1,180	18,986
1958	3,750	$ 5,100	570	9,420	2,212	7,208	26,194
1959	3,750	5,100	786	9,636	2,597	7,039	33,233
1960	3,750	5,100	997	9,847	3,070	6,777	40,010
1961	3,750	5,100	1,200	10,050	3,701	6,349	46,359
1962	3,750	5,100	1,391	10,241	4,457	5,784	52,143
1963	3,750	5,100	1,564	10,414	5,334	5,080	57,223
1964	3,750	5,100	1,717	10,567	6,201	4,366	61,589
1965	3,750	5,100	1,848	10,698	7,050	3,648	65,237
1966-70	18,750	25,500	11,000	55,250	41,000	14,250	79,487
1971-75	18,750	25,500	12,500	56,750	46,000	10,750	90,237
Totals 1956-75	$72,500	$91,800	$34,596	$198,896	$124,959	$73,937	

Table IV

Progress of Fund from July 1, 1955
(In Thousnads of Dollars)

Contributions:
Members: 6% from July 1, 1957
Employers: 2% from July 1, 1957, 4% from July 1, 1962,
6% from July 1, 1967 and 8% from July 1, 1972

June 30 in Year	Income				Disbursements		
	Net Members Contribution	Levy on Employers	Interest Income at 3%	Total	Annuity Payments	Income Over Disbursements	Fund
1955	$ 2,638		$ 391	$ 4,707	$ 1,104	$ 3,703	$16,300
1956	2,500	---	489	3,989	1,483	1,506	17,806
1957	2,500	---	534	3,034	1,854	1,180	18,986
1958	3,750	$ 1,700	570	6,020	2,212	3,808	22,794
1959	3,750	1,700	684	6,134	2,597	3,537	26,331
1960	3,750	1,700	790	6,240	3,070	3,170	29,501
1961	3,750	1,700	885	6,335	3,701	2,634	32,135
1962	3,750	1,700	964	6,414	4,457	1,957	34,092
1963	3,750	3,400	1,023	8,173	5,334	2,839	36,931
1964	3,750	3,400	1,108	8,258	6,201	2,057	38,988
1965	3,750	3,400	1,170	8,320	7,050	1,270	40,258
1966-70	18,750	22,100	6,500	47,350	41,000	6,350	46,608
1971-75	18,750	30,600	7,000	56,350	46,000	10,350	56,958
Totals 1956-75	$72,500	$71,400	$21,717	$165,617	$124,959	$40,658	

Table V