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STANDARDS FOR ACTUARIAL WORK

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LEGISLATIVE COMMISSION ON PENSIONS AND RETIREMENT

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STANDARDS FOR ACTUARIAL WORK
ESTABLISHED BY THE STATE OF
MINNESOTA LEGISLATIVE COMMISSION
ON PENSIONS & RETIREMENT

Adopted June 11, 1985

PREFACE

These standards have been adopted by the Legislative Commission on Pension and Retirement as of June 30, 1985. All actuarial work for retirement plans subject to Section 356.215, Minnesota Statutes as of dates after June 30, 1985 shall be prepared in accordance with these standards.

The standards set out herein contain a number of technical pension actuarial terms. Definitions of these terms are found in Section VIII, starting on page 33. Actuarial terminology used herein is in accordance with the terminology adopted by the American Academy of Actuaries. Where such terminology conflicts with the terminology of the Minnesota Statutes, the statutory term is noted in the definition.

These standards may be amended at any time by the Legislative Commission on Pensions and Retirement. Any such amendment shall be effective for the actuarial valuation performed as of the first valuation date following the date of adoption of the amendment.

For each retirement plan subject to Section 356.215, Minnesota Statutes, the valuation date for each valuation performed under these standards shall be July 1.

These standards are adopted for actuarial purposes only. They do not constitute or reflect terms of a contract between the state, or a fund, and the members of a fund; not do they constitute or reflect a promise by the state, or a fund, to maintain a current benefit or practice, or to implement a projected or authorized benefit or practice. A member of a fund should not rely upon the implementation or maintenance of a benefit or practice because of an assumption reflected in these standards.

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I. Introduction

A. These standards have been promulgated by the Legislative Commission on Pension and Retirement in order to implement Section 356.215 of the Minnesota Statutes.

B. The purposes of these standards are:

- (1) To ensure that sound actuarial procedures are utilized in developing actuarial assumptions, actuarial valuations, and cost estimates for proposed legislation for each retirement plan.
- (2) To establish sufficient uniformity of actuarial procedure that financial comparability of the retirement plans of the State of Minnesota is maximized.
- (3) To facilitate the development of sound public policy decision making in the pension area by the Legislature and the Legislative Commission on Pensions and Retirement.

C. Scope of the Standards

(1) These rules apply to the following retirement plans. When "plan" or "retirement plan" is used, such terms shall refer to the following:

(a) Minnesota State Retirement System ("MSRS"), including:

- (i) General State Employees and Correctional Employees
- Chapter 352
- (ii) Legislators - Chapter 3A
- (iii) Judges - Chapter 490
- (iv) State Patrol - Chapter 352B.
- (v) Elective State Officers - Chapter 352C
- (vi) Other Plans in Chapter 352.

- (b) Public Employee Retirement Association (PERA) -Chapter 353
 - (i) General Employees
 - (ii) Police and Fire
 - (c) Teachers Retirement Association (TRA) - Chapter 354
 - (d) Minneapolis Employees Retirement Fund (MERF) - Chapter 422A
 - (e) Minneapolis Teachers Retirement Fund Association - Chapter 354A
 - (f) St. Paul Teachers Retirement Fund Association - Chapter 354A
 - (g) Duluth Teachers Retirement Fund Association - Chapter 354A.
- (2) All actuarial valuations performed for any retirement plan as of a date on or after July 1, 1985 shall be developed in accordance with the standards set out herein.
 - (3) All experience studies performed for any retirement plan as of a date on or after July 1, 1985 shall be developed in accordance with the standards set out herein.
 - (4) All cost estimates relative to proposed legislative changes in the eligibility or benefit provisions of any retirement plan on or after July 1, 1985 shall be developed in accordance with the standards set out herein.

II. Actuarial Assumptions

A. General

- (1) Any actuarial valuation is based upon a projection of expected benefits to be paid in future years by a retirement plan. Any projection of future events requires the use of assumptions relative to the forces which affect those future events.
- (2) There are two general types of actuarial assumptions used in actuarial valuations of a retirement plan:
 - (a) Economic Assumptions
 - (b) Demographic Assumptions
- (3) Any event which triggers or terminates a benefit should be reflected in the set of actuarial assumptions. However, such an event need not be reflected in the assumptions if the impact of that omission on the results of the actuarial valuation is deemed by the Actuary for the Commission not to be material.

B. Economic Assumptions.

- (1) Purpose: to project the effect of economic forces on the retirement plan.
- (2) Primary economic assumptions are:
 - (a) Rates of annual investment return
 - (b) Rates of annual individual compensation increase
 - (c) Rates of annual payroll growth (if applicable)
- (3) The statutes have established the following economic assumptions:

	<u>First Class City Teachers Retirement Fund Associations</u>	<u>MERF</u>	<u>All Others</u>
Investment Return Rates			
Pre-retirement	8.00%	5.00%	8.00%
Post-retirement	8.00%	5.00%	5.00%
Individual Compensation Increase Rates	6.50%	3.50%	6.50%
Payroll Growth Rates	6.50%	N/A	6.50%

The First Class City Teacher Retirement Fund Associations are those of the cities of Minneapolis, St. Paul and Duluth.

C. Demographic Assumptions

(1) Purpose: to project the flow of members through and out of the retirement plan.

(2) There are a number of demographic assumptions:

(a) Primary Demographic Assumptions

- (i) Rates of Turnover - reflect patterns of member terminations from the retirement plan for reasons other than retirement, death and disability. These patterns may vary by sex, age and years of service.
- (ii) Rates of Retirement - reflect patterns by which members retire under the service retirement provisions of the plan. These patterns may vary by sex, age and years of service.
- (iii) Rates of Mortality (Post-Retirement) - reflect mortality patterns of retired members. This determines the expected period over which benefits are to be paid. These patterns may vary by sex and age.

(b) Other Demographic Assumptions

- (i) Rates of Disablement - reflect patterns by which members become disabled under the plan. These patterns may vary by sex, age and type of disability (i.e., occupational, non-occupational).
 - (ii) Rates of Mortality (Pre-Retirement) - reflect mortality patterns of active members prior to retirement. These patterns may vary by sex and age.
 - (iii) Rates of Survivor Mortality - reflect mortality patterns of survivors of deceased members. These patterns may vary by sex and age.
 - (iv) Rates of Termination of Disability - reflect mortality and recovery patterns of disabled members. These patterns may vary by age and sex.
- (3) Unless approved in advance by the Commission, after June 30, 1985 no change in a demographic assumption may be made unless that change has been established by a formal study of experience of the plan.
- (i) Primary demographic assumptions must be set in close accordance with actual experience. The other assumptions should follow the patterns of actual experience but may deviate more from that experience than may the primary assumptions.
 - (ii) Demographic assumptions may be established by reference to a standard table so long as the

Actuary can establish that such table, with appropriate age adjustments, relates reasonably to actual experience.

(iii) Certain decrements are as much a function of years of service as of age. After the first experience study completed after June 30, 1985 these assumptions should be established on a basis which takes into account years of service under the plan as well as years of age. It is anticipated that, at that time the termination and retirement assumptions shall be established on this basis.

(iv) Rates of Retirement - While some retirement systems have for many years been valued using the assumption that all retirements occur on a specific age, it is anticipated that all actuarial valuations of retirement plans after the first experience study completed after June 30, 1985 shall be completed using rates of retirement for various ages and periods of service.

D. Miscellaneous Assumptions

(1) Social Security - Any Social Security benefit estimates required to estimate future benefits of a plan shall be calculated in accordance with the assumption that the Social Security benefit will be a constant percentage of final pay regardless of the year of benefit commencement. The percentages used shall be based upon Social Security retirement benefits calculated by using the Social Security benefit formula in effect on the valuation date.

- (2) Future Expense - The future operating expenses of each retirement system shall be estimated based on the assumption that such expenses will be a percentage of system payroll. That percentage shall be equal to the ratio of such expenses to total covered payroll under the plan in the fiscal year preceding the valuation date.
- (3) Family Characteristics, Remarriage, Etc. - These assumptions shall be based on the best information available from the retirement plan.
- (4) Members Remaining Active Beyond the Age at Which the Retirement Rate becomes 100% - Each such member shall be assumed to retire during the year following the valuation date. Such members shall be included in the valuation for all purposes. The normal costs of such members shall be equal to the positive difference between the present value of the accrued benefit assuming retirement on the valuation date and the present value of the retirement benefit assuming retirement one year hence including one year of additional benefit accrual.
- (5) Discretionary Post Retirement Adjustments - Unless there is a clear historical pattern which renders such an assumption inappropriate, any discretionary post retirement adjustment authorized by law shall be assumed to be paid each year in the future. Such an assumption does not, however, constitute or reflect a contractual obligation or promise to pay a discretionary post retirement adjustment in any future year. Such adjustment shall be assumed to be paid at a level consistent with the economic assumptions used in the valuation.

E. Asset Valuation

- (1) Actuarial Value of Assets for use in each actuarial valuation shall be equal to the Cost Value of those assets as of the Valuation Date plus one third of any net unrealized capital gains (or losses) in those assets. However, assets allocated to the Minnesota Post-Retirement Investment Fund or to any other post-retirement investment fund should be reported and applied on an identical basis to what was reported and applied for the actuarial valuation as of the latest date prior to June 30, 1984.
- (2) This value may be determined as follows:
 - (a) The Cost Value of the assets of the fund are determined net of amounts due and unpaid as of the valuation date.
 - (b) The Market Value of the assets of the fund shall be the published price at the close of the trading day preceding the valuation date net of amounts due and unpaid as of the valuation date. The Market Value of any investment for which trade prices are not generally available shall be established by appraisal or by any other technique which is recognized by persons expert in such assets as producing reasonable results.
 - (c) Net unrealized capital gains (or losses) as of a valuation date shall be those gains and losses which have accumulated over the life of the plan. Thus, the amount of such gains and losses shall be equal to the Market Value less the Cost Value as of the valuation date.

III. Actuarial Cost Methods

A. The Entry Age Actuarial Cost Method shall be utilized for all actuarial valuations of each retirement plan.

(1) For each active member and for each separate benefit type provided under the plan a Normal Cost is calculated as follows:

(a) The Actuarial Present Value ("APV") of the Projected Benefit (see Section VIII) for that member is calculated as of the Entry Age of that member.

(b) The Actuarial Present Value ("APV") of Future Compensation (see Section VIII) is calculated as of the Entry Age of that member. This calculation shall be based on compensation for the year preceding the Valuation Date or the rate of annual compensation as of the Valuation Date. That compensation shall be adjusted back to Entry Age assuming annual pay increases at the rate of 6-1/2% per year (3-1/2% for MERF).

(c) The Normal Cost Rate for the member for that benefit shall be the ratio of (a) to (b).

(d) The dollar Normal Cost for the member for that benefit is the Normal Cost Rate multiplied by the estimated compensation for the year commencing on the valuation date. Estimated compensation shall be the Actuary's best estimate of such compensation. Considerations in making this estimate are as follows:

(i) If the actual compensation in the year preceding the valuation date is used as the base, the estimated compensation is equal to that base multiplied by 1.065 (1.035 for MERF).

- (ii) If a compensation rate at the Valuation Date is used as the base, the estimated compensation is calculated by adjusting such compensation rates appropriately using the assumed rate of annual salary increase.
- (iii) Information available on actual pay increases granted or to be granted during that year to members of that plan shall be taken into account.
- (e) The total Normal Cost for each benefit type over the entire plan is the sum of Normal Costs for each member for that benefit type.
- (f) The total Normal Cost Rate for each benefit type is the Normal Cost for that benefit divided by the total estimated compensation for the year following the valuation date.
- (g) The total Normal Cost Rate for the plan is the total of Normal Cost Rates for each benefit type.
- (2) The Actuarial Accrued Liability ("AAL") for the plan shall be calculated as of each valuation date as follows:
 - (a) The APV of all Projected Benefits is calculated for the entire plan (see Section VIII).
 - (b) The APV of Future Compensation of current members of the plan is calculated (see Section VIII).
 - (c) The APV of Future Normal Costs is determined by multiplying the total Normal Cost Rate for the plan by the APV of Future Compensation.

(d) The AAL is the (a), above, less (c), above.

(e) The Unfunded Actuarial Accrued Liability ("UAAL") is the AAL less the Actuarial Value of Assets.

B. Benefits to be recognized.

- (1) The Actuarial Present Value of the Projected Benefit shall be recognized in the actuarial valuation for each type of benefit which is provided under the plan at the level provided under the plan.
- (2) A particular benefit type or benefit level shall be deemed to be provided under a plan if it is authorized by law in effect on the valuation date. The recognition of a particular benefit type or level for actuarial purposes does not, however, constitute or reflect a contractual obligation or promise to maintain the benefit type or level in the future.
- (3) Any discretionary post retirement adjustment authorized by law shall be assumed to be paid in all future years unless there is a clear historical pattern which would render such an assumption inappropriate. Such an assumption does not, however, constitute or reflect a contractual obligation or promise to pay a discretionary post retirement adjustment in any future year.
- (4) Any benefit type or benefit level which is authorized by law which is in effect on the valuation date, to be provided as of a future date shall be recognized in the valuation. The recognition of such a future benefit type or level for actuarial purposes does not, however, constitute or reflect a contractual obligation or promise to pay such a benefit at the time authorized. Of course, the deferred effect of that

benefit type or benefit level will be recognized. For example, suppose a retirement plan has a retirement benefit level of 1% of final average salary per year of service. Legislation is enacted which is effective July 1, 1989, providing that for retirement on and after July 1, 1991 the benefit level is to be 1-1/2% of final average salary per year of service. In the valuation as of July 1, 1989 retirement benefits projected to commence prior to July 1, 1991 are calculated based on the 1% formula and benefits projected to commence on or after July 1, 1991 are calculated based on the 1-1/2% formula.

C. Special determinations

- (1) Entry Age - for the purposes of the actuarial valuation, entry age for each member shall be determined as the actual age at the valuation date less years of service recognized for the purpose of calculating benefits under the plan with the result rounded to the nearest whole year.
- (2) Amortizing the Unfunded Actuarial Accrued Liability - The Unfunded Actuarial Accrued Liability (UAAL) is to be amortized over the Amortization Period. The additional annual contribution rate required to retire the UAAL for each retirement plan except MERF shall be determined as follows:
 - (a) The total dollars paid in compensation to active members of the plan is determined for the year preceding the valuation date.
 - (b) The total payroll for the year following the valuation date is estimated. Information available on actual increases in compensation granted or to be granted during

that year shall be taken into account. In the absence of such information, the payroll growth assumption is to be used. (See II.B.(3), p.4)

- (c) Assuming that compensation is paid at the end of each month, the present value at the valuation date of the payroll for the year following the valuation date is equal to the estimated payroll in (b) multiplied by .9594, based upon the assumed investment return rate of 8%.
- (d) The Present Value of Future Payrolls is calculated by multiplying the present value of payroll for the year following the valuation date (c, above) by a factor representing the present value of an annuity payable at the beginning of each year during the amortization period at the effective interest rate of 1.41%. This rate reflects the assumed rate of investment return of 8% and the assumed rate of annual payroll increase of 6.5%. For example, if the Amortization Period is 30 years the factor is 24.67.
- (e) The additional annual contribution rate shall be calculated by dividing the UAAL as of the valuation date by the Present Value of Future Payrolls determined in (a) through (d), above.

For MERF the additional annual contribution rate is calculated as follows:

- (a) The total dollars paid in compensation to active members of the system is determined for the year ending on the valuation date.

- (b) The total payroll for the year following the valuation date is estimated. Information available on actual increases in compensation granted or to be granted in that year shall be taken into account. In the absence of such information the total compensation is estimated using the individual salary increase assumption for the year.
 - (c) Assuming that compensation is paid at the end of each month, the present value at the valuation date of the payroll for the year following the valuation date is equal to the estimated payroll in (b) multiplied by .9740, based upon the assumed investment return rate of 5%.
 - (d) The present value of Future Payrolls is calculated by multiplying the present value of payroll for the year following the valuation date (C, above) by a factor representing the present value of an annuity payable at the beginning of each year during the amortization period at the effective annual interest rate of 5.00%. For example, if the amortization period is 30 years the factor is 16.14.
 - (e) The additional annual contribution rate shall be calculated by dividing the UAAL as of the valuation date by the Present Value of Future Payrolls determined in (a) through (d), above.
- (3) Amortization Period - The amortization period at any valuation date is the period from the valuation date to the Amortization Date.

- (4) Amortization Date - The valuation date in the calendar year determined under Section 356.215, Subdivision 4g. For example, suppose a plan has a July 1 valuation date. Suppose further that for the valuation as of July 1, 1989 it is determined under Subdivision 4g that amortization shall be complete in 2015. The Amortization Date shall be July 1, 2015.

IV. Contents of an Actuarial Valuation Report

A. The Actuarial Valuation Report for each system shall contain the actuarial balance sheet described in Chapter 356.215, Subd. 4f. The following is to clarify certain of the concepts included:

- (1) Current Assets is the Actuarial Value of Assets developed under II.E. (page 8) of these Standards.
- (2) Expected Future Assets shall be based upon the statutory contribution rates and shall be developed as follows:
 - (a) Contribution Rates - The Statutory Contribution Rate (expressed as a percentage of compensation) for the plan shall be split as follows:
 - (i) Normal Cost Rate - That Normal Cost Rate developed in the current valuation of the plan.
 - (ii) Supplemental Contribution Rate - The total Statutory Contribution Rate less the Normal Cost Rate.
 - (b) Present Value of Supplemental Contributions - The Supplemental Contribution Rate multiplied by the Present Value of Future Payrolls over the Amortization Period. The Present Value of Future Payrolls is calculated in accordance with III.C.(2)(d), page 13 or 14, as appropriate.
 - (c) Present Value of Future Normal Costs - The Normal Cost Rate multiplied by the APV of Future Compensation.
- (3) Current Benefit Obligations shall be the APV of Credited Projected Benefits.

- (4) Benefit Obligation for Deferred Annuitants Benefits shall include increases due to augmentation projected to the earliest age at which such benefits can commence without reduction for early commencement.

B. Additional Actuarial Disclosure - Each actuarial valuation report shall include:

- (1) The Normal Cost Rates of the plan for each benefit type and the total Normal Cost Rate. If a plan contains more than one set of benefit provisions, separate Normal Cost Rates shall be disclosed for each set of benefit provisions.
- (2) Development of the UAAL for the system as follows:
 - (a) APV of Projected Benefits.
 - (b) APV of their associated Normal Costs.
 - (c) AAL ((a) - (b)).
 - (d) Actuarial Value of Assets.
 - (e) UAAL ((c) - (d)).
 - (f) Present Value of Future Payrolls over the Amortization Period.
 - (g) Additional Annual Contribution Rate to Amortize the UAAL ((e)/(f)).
- (3) A breakdown of APV of Credited Projected Benefits and the APV of Projected Benefits by benefit type.
- (4) Development of several Funding Ratios:
 - (a) Accrued Benefit Funding Ratio - The ratio of Actuarial Value of Assets to APV of Credited Projected Benefit. This ratio is a measure of current funding status, and when viewed over a period of years, presents a view of the

progress of funding of the plan.

(b) Actuarial Liability Funding Ratio - The ratio of the Actuarial Value of Assets to the AAL (see III.A.(2), page 10). This is also a measure of funding status and funding progress. It is based upon the traditional measure of benefit obligations.

(c) Projected Benefit Funding Ratio - The ratio of the following items from the actuarial balance sheet:

- (i) Total Current and Expected Future Assets to
- (ii) Total Current and Expected Future Benefit Obligations.

This is a measure of adequacy or deficiency in the contribution level. A ratio of 100% or more means that contribution levels are adequate to cover the benefits provided in the plan based on current assumptions. A ratio under 100% indicates a deficiency in contribution levels.

(b) If there have been changes in the provisions of the plan or in actuarial assumptions for this valuation, the report shall contain:

(a) The following items based upon the provisions of the plan and the actuarial assumptions in place in the prior actuarial valuation:

- (i) Total Contribution Rate
- (ii) Funding Ratios

Accrued Benefit Funding Ratio

Actuarial Liability Funding Ratio

Projected Benefit Funding Ratio

- (b) The items shown in (a) based upon the new provisions of the plan and the actuarial assumptions used in the prior actuarial valuation. If there have been no changes in the provisions of the plan this step may be omitted.
 - (c) The items shown in (a) based upon the current provisions of the plan and the current set of actuarial assumptions. If there has been no change in the actuarial assumptions, this step may be omitted.
- (6) A breakdown of actuarial gains and losses based upon the provisions of the plan in place and the actuarial assumptions used in the prior actuarial valuation. The gains and losses must be broken down by source. Gains or losses should be shown separately for at least the following:
- (a) Salary increases
 - (b) Investment return
 - (c) Minnesota Post-Retirement Investment Fund - Mortality
 - (d) Mortality of Other Benefit Recipients
 - (e) Active Members' Turnover, Retirement, Mortality and Disability
 - (f) Other items
 - (g) Total

To the extent practical, the gains and losses from active decrements should be broken down by decrement. Particularly it will be important to identify gains or losses from turnover and retirement patterns.

- (7) Cash flow projections - each actuarial valuation report shall contain cash flow projections for each year from the valuation date to the Amortization Date, setting out the following:

- (a) Total statutory contributions.
- (b) Amounts transferred to the Minnesota Post-Retirement Investment Fund for future payments to retiring members.
- (c) Other Disbursements.
- (d) Investment return.
- (e) Current assets.

For purposes of item (c) above, the estimated benefit payments will be based on the actuarial assumptions used to perform actuarial valuations.

For purposes of investment return, item (d) above, the estimated investment return will be based on the interest assumption used in performing actuarial valuations or such other rate as the Commission prescribes.

Projected current assets, in item (e) above, will be the Actuarial Value of Assets. Current assets as of the end of the year is equal to current assets as of the end of the prior year plus items (a) and (d) for the current year less items (b) and (c) for the current year.

The cash flow forecast will include provisions for new members to replace terminated members. The new members will be assumed to have composite characteristics (e.g., age, sex, earnings, etc.) which will be consistent with the characteristics of the present active members of the respective plans or as otherwise prescribed by the Commission.

C. Additional information in each actuarial valuation report.

- (1) Description of the provisions of the plan. Any changes in the provisions of the plan since the last valuation should be highlighted.

- (2) Description of the actuarial basis for the valuation, the actuarial method and assumptions used in the actuarial valuation and the cash flow projections. The date of the experience analysis upon which the latest change in actuarial assumptions is based should be included. Any special techniques used should be disclosed here. Assumptions such as percent married, family composition, etc., should also be disclosed.
- (3) Description of the member data used including:
 - (a) The source of the data.
 - (b) Any material inconsistencies or other problems with the data and any steps taken to correct or compensate for such problems.
 - (c) Reconciliation of data with that used for the prior actuarial valuation.
 - (d) The number of active members and average annual compensation broken down by age and years of service in the plan.
 - (e) The number of persons receiving benefits and average amounts of monthly benefit by age and type of benefit (service retired, disability and survivor)
- (4) Description of the assets of the fund including:
 - (a) Cost Value and Market Value of assets by asset category.
 - (b) Development of Actuarial Assets from Book and Market Value.
 - (c) A reconciliation of the Cost Value of the assets of the plan as of the prior valuation date to the comparable Cost Value as of the current valuation date.

- (5) The valuation report must contain a statement signed by the Actuary responsible for the completion of the report, certifying that to the best of his knowledge and belief, the actuarial valuation was performed in accordance with the requirements of Section 356.215, Minnesota Statutes, and the requirements of these Standards.

V. Experience Study

A. In accordance with Section 356.215 Subd. 2 an experience study shall be performed for each plan. In general, the experience study shall be an analysis of actual experience under the plan compared to the experience expected under the actuarial assumptions then in use. An experience study shall serve as a basis for any changes made in actuarial assumptions. Unless approved by the Commission, no change may be made in an actuarial assumption on or after July 1, 1985 without completion of an experience study.

B. Demographic Experience

(1) Based on data accumulated for at least four years ending on effective date of the experience study, demographic experience shall be analyzed as follows:

(a) Each actual occurrence of each death, disablement, retirement, quit or other pertinent event shall be classified by age nearest birthday on the valuation date preceding that event and if pertinent, years of service at that valuation date.

(b) For each age (X) and, if pertinent, years of service (S) an exposure is calculated by counting the number of persons who during the study period attained age X with service S at the beginning of a year.

(c) Expected occurrences for each decrement at age X and service S are then calculated by multiplying the exposure at age X and service S by the assumed probability of occurrence of the event.

- (d) The ratio of actual to expected events is the basic analytic tool in an experience study. For each decrement and each combination of sex, age and if pertinent, service, the ratio is the actual number of occurrences of the decrement (see (a), above) divided by the expected number of occurrences (see (c), above).
- (e) If all assumptions precisely predict events, these ratios are 100%. If estimated events overstate actual events, these ratios are less than 100%. If they are understated, the ratios are over 100%.
- (f) In lieu of using number of member-years of exposure and numbers of events, the Actuary may develop the experience analysis based upon salaries, actuarial values, or any other measure deemed appropriate by the Actuary for the Commission.

(2) Based on ratios of actual to expected decrements new assumptions may be established.

(3) There may be information available to the Actuary which would indicate that actual past experience should not be the only basis on which to establish actuarial assumptions. If the recommended new assumptions do not follow directly from past experience, the reasons must be clearly explained in the report of the experience study.

C. Economic Experience - While the assumed rates of investment return, individual compensation increase and payroll growth are established in statute, the experience study should include a review of actual experience in these areas.

D. Report

- (1) The report of each experience study should set out the conclusions and recommendations of the Actuary relative to the actuarial assumptions.
- (2) The report should include sufficient statistics (such as ratios of actual to expected experience) so that a pension professional who is not an actuary could assess the viability of the conclusions of the Actuary.
- (3) The analyses of average entry ages and retirement ages required in Section 356.215 Subd. 5 must be performed and presented in the report.

VI. Cost Estimates of Legislative Proposals

- A. A statement of fiscal impact shall be completed for each legislative proposal which would affect the amounts of or the eligibility for benefits in a retirement plan.
- B. Such statement shall contain the following:
 - (1) A brief statement describing the proposal including a description of current provisions and the changes in those provisions which the proposal would effect.
 - (2) A table showing the current statutory contribution rate and the following items before the change, after the change and the difference resulting from the change:
 - (a) Total Actuarially Determined Contribution Rate
 - (b) That part of the Total Actuarially Determined Contribution Rate not provided by the Employee.
 - (c) Funding Ratios.
 - (i) Accrued Benefit Funding Ratio
 - (ii) Actuarial Liability Funding Ratio
 - (iii) Projected Benefit Funding Ratio
 - (3) Estimated contributions expressed in dollars before the change, after the change and the difference between them for each fiscal year through the amortization period (as it was before the change). For presentation, years after the fifth year may be grouped into five year periods.
 - (4) A statement of the actuarial basis of the estimate.
 - (a) If the estimate is based upon the latest actuarial valuation report reference to the actuarial basis used in that report is sufficient.

(b) If the proposal would affect the experience of the plan (e.g., a change in normal retirement eligibility could affect the assumed rates of retirement) the changes from the assumptions used in the latest valuation should be described.

(c) Any additional assumptions (e.g., the percentage eligible for a new option who would be assumed to elect such option) must be disclosed. In such situations multiple cost estimates setting out a range of costs may be appropriate.

C. The statement of fiscal impact shall contain a statement signed by the Actuary for the Commission certifying that, to the best of his knowledge and belief, the statement was completed in accordance with the requirements of Section 356.215, Minnesota Statutes, and the requirements of these standards.

VII. Data

A. Each retirement plan shall provide the Actuary with all financial and member data required to perform the annual actuarial valuation within eight weeks after the valuation date.

B. Financial Information Required

(1) A balance sheet of the Fund developed on an accrual basis as of June 30 immediately preceding the valuation date showing:

(a) Cash balances

(b) Receivables such as employee contributions receivable, employer contributions receivable, investment return receivable, etc.

(c) Investments by investment category at both market value and cost value.

(d) Current amounts due and unpaid from the Fund

(e) Assets available for benefits ((a) + (b) + (c) - (d))

(2) A statement of revenue and disbursements of the fund on an accrual basis for the year ending immediately prior to the valuation date.

(3) Such other financial information as may be required by the Actuary to comply with Section 356.215 and these standards.

C. Member Data - The following are general lists of data items required. Specific data items and formats of the member data to be required of each specific plan is to be included in the appendix attached hereto.

(1) For each active member the following data shall be provided:

(a) Social Security Number or Member Number

(b) Sex (1-Male, 2-Female)

- (c) Birthdate
 - (d) Hire Date (most recent)
 - (e) Years of Service for determining eligibility
 - (f) Years of Credited Service for calculation of benefits
 - (g) Credited Service for calculation of benefits earned in the 12-month period ending on the valuation date.
 - (h) Actual plan compensation for the 12 month period ending on the valuation date.
 - (i) Rate of annual compensation as of the valuation date.
 - (j) Total employee contributions to the valuation date.
 - (k) Interest on employee contributions to the valuation date.
 - (l) Any additional information required in order that the Actuary comply with Section 356.215 and generally acceptable actuarial practices and procedures.
- (2) In addition, the following data is to be provided for each person who was active as of the prior valuation date and is no longer active:
- (a) All data set out in (1)(a) through (1)(l)
 - (b) Date of status change
 - (c) Status as of valuation date
- (3) For each person receiving benefits, the following data shall be provided:
- (a) Social Security Number or Member Number
 - (b) Sex
 - (c) Birthdate
 - (d) Date benefit commenced - original date of benefit commencement. For example, if a survivor after the death

of the retiree under a joint and survivor form, this should be date of retirement of the retiree.

- (e) Date of latest status change. For example, in the case above, date of death of retiree.
 - (f) Type of Benefit (retirement, disability, survivor, post retirement death, etc.)
 - (g) Form of Benefit (life only, 100% J&S, etc.)
 - (h) Current monthly benefit amount
 - (i) Original monthly benefit amount - if a survivor is receiving benefit of a deceased former retiree, include the original benefit of the retiree
 - (j) Years of Credited Service used in calculating the original monthly benefit.
 - (k) Final average compensation used in calculating the original monthly benefit.
 - (l) Joint Annuitant sex, if applicable.
 - (m) Joint Annuitant birthdate, if applicable.
 - (n) Retired under Rule of 85 (0 = no, 1 = yes)
- (4) In addition, the following data is to be provided for each person who was receiving a monthly benefit as of the prior valuation date and has changed status as of the current valuation date:
- (a) All data set out in (2)(a) through (2)(n).
 - (b) Date of status change.
 - (c) Status as of valuation date.
- (5) For each inactive member who has retained a right to a benefit from the system (including non-vested members who have not yet

received refunds) the following data shall be provided:

- (a) Social Security Number
 - (b) Sex
 - (c) Birthdate
 - (d) Years of Service for determining eligibility at termination.
 - (e) Years of Credited Service at termination for calculation of benefit.
 - (f) Final Average Compensation at termination.
 - (g) Vested monthly benefit under normal form at date of termination.
 - (h) Vested monthly benefit including augmentation (if applicable) to the date specified in (1) below.
 - (i) Employee contributions to date of termination.
 - (j) Interest on employee contributions to valuation date.
 - (k) Date of termination.
 - (l) Earliest date on which benefit could commence without reduction for early commencement.
- (6) If addition, the following data is to be provided with the data on vested terminated members for each person who was vested terminated as of the prior valuation date and has changed status as of the current valuation date:
- (a) All data set out in (5)(a) through (5)(l).
 - (b) Date of status change.
 - (c) Status as of the valuation date.

D. Member Data Reconciliation

(1) Using the member data provided in C(1) through C(6), the actuary shall reconcile the data provided with that utilized in the prior valuation.

(a) Active Members last valuation plus new entrants and transfers to active status less retirements during the period since the last valuation less deaths during the period since the last valuation less disabilities during the period since the last valuation less other terminations since the last valuation should be equal to Active Members this valuation.

(b) Similar analyses should be made of retirees, preferably by types of retirement, and vested terminateds.

(2) If such a reconciliation reveals material imbalances in that data, the retirement plan shall provide the Actuary with any assistance needed to correct that imbalance.

(3) The Actuary may request additional collateral information from the plan to verify the reasonableness of the data.

E. Data Retention - Valuations as of July 1, 1985 and later

(1) The data provided the Actuary for the Commission for development of the actuarial valuations shall be retained by the Actuary for the Commission for a period not less than five years from the valuation date for which it is provided.

(2) The Actuary for the Commission shall use this data for quadrennial experience studies as well as for actuarial valuation purposes. However, the Actuary for the Commission

may request additional information to supplement the data accumulated in accordance with this section for experience study purposes.

F. Data Retention - Valuations as of dates prior to June 30, 1985

- (1) The Actuary for each retirement plan shall retain all data which was provided by the plan for the purpose of developing actuarial valuations of the plan as of dates prior to June 30, 1985.
- (2) Upon request, the Actuary for the Plan shall provide such data to the Actuary for the Commission in order to allow completion of the first experience study after June 30, 1985.
- (3) To the extent that the Actuary for the Plan has not retained the data required, the Actuary for the Commission shall request the required data from the plan. The plan shall provide such data within three months of the date of such request.

VIII. Important Definitions

- A. Actuary - Any person who shall satisfy the requirements of an "approved actuary" under Section 356.215 Subdivision 6.
- B. Actuary for the Commission - The Actuary or firm of Actuaries retained by the Legislative Commission on Pensions and Retirement.
- C. Actuary for the Plan - The Actuary or firm of Actuaries retained by a Retirement Plan.
- D. Actuarial Value of Assets - The asset value determined in accordance with Section II.E. hereof and Section 356.215, Subdivision 4f(b), Minnesota Statutes, as of the valuation date. Such asset value is used for the purposes of determining the Unfunded Actuarial Accrued Liability, Funding Ratios and the initial asset value for cash flow projections.
- E. Projected Benefit - a benefit estimated from a valuation date to a future payment commencement date based upon the provisions of the plan for calculating such benefits, estimated future increases in compensation, estimated increases in service and such other assumptions as may be required.
- F. Credited Projected Benefit - a benefit estimated from a valuation date to a future payment commencement date based upon the provisions of the plan for calculating such benefits, estimated future increases in compensation, service to the valuation date and such other assumptions as may be required.
- G. Actuarial Present Value ("APV") of Projected Benefits - the number of dollars required as of a valuation date such that those dollars plus investment returns on those dollars shall be equal to all expected future benefit payments under the plan to current members.

For each active member, and for each benefit type provided in the plan this value is calculated as follows:

- (1) A Projected Benefit is calculated for each year in the future assuming that benefits would become payable in that year.
- (2) If the benefit is paid as a series of periodic payments (e.g., service retirement), an appropriate annuity factor is calculated for each year's Projected Benefit. The product of the annuity factor and the Projected Benefit for a particular year in the future is the single sum value of the benefit assuming the event which causes that benefit to commence occurs in that year. If the benefit is in the nature of a single sum benefit (e.g., withdrawal of employee contributions with interest), this step is foregone.
- (3) Using all of the demographic assumptions, the probabilities that an active member at the valuation date remains continuously active to each future year for which values from (2) exist are calculated.
- (4) The probability of the occurrence of the event which causes the benefit to commence (i.e., retirement, disability, death, termination, etc.) for each successive year is determined.
- (b) Using the assumed rates of investment return, the present value at the valuation date of \$1 paid at the point in each such year at which events are assumed to occur is calculated. For an assumed rate of investment return of i the present value for the n th year from the valuation date is V^{n+f} where:

$$(a) \quad V = \frac{1}{1+i}$$

- (b) f is a fraction, reflecting the point during the year at which events are deemed to occur. This fraction will often be $1/2$, reflecting occurrence of events at mid-year.
- (6) The product of corresponding values of (2), (3), (4) and (5) is the APV of the Projected Benefit for year n .
- (7) The sum of (6) for all years is the APV of Projected Benefit for a specific benefit type and for a specific member.
- (8) The sum of all such actuarial present values of the specific Projected Benefit for all active members is the APV of Projected Benefit for the specific benefit type for the plan.
- (9) The sum of actuarial present values over all benefit types is the Total APV of Projected Benefits for active members of the plan.

The APV of Projected Benefits for persons receiving benefits at the valuation date is equal to (i) the amount of the monthly benefit currently being paid, multiplied by (ii) an appropriate annuity value taking into account the form of the benefit being paid (e.g., life annuity, 100% Joint and Survivor) the type of benefit being paid (e.g., disability, surviving spouse, child, etc.) and the sex and age of the payee.

The APV of Projected Benefits for vested terminated members is calculated as for persons receiving benefits except that (i) the vested benefit recognized is that benefit, calculated under the law in effect at date of termination, determined under the normal annuity form under the system with augmentation to the earliest age at which the benefit could commence without reduction for early

commencement and (ii) the annuity value is calculated assuming commencement of the benefit at such age.

The APV of Projected Benefits for non-vested inactive members shall be the balance of employee contributions with interest to the valuation date.

H. Actuarial Present Value ("APV") of Credited Projected Benefits -

This calculation is identical to that described in F, above, except that for active members the benefits used at each future year are Credited Projected Benefits rather than Projected Benefits.

I. Actuarial Present Value ("APV") of Future Compensation - This is the estimated number of dollars required today such that those dollars plus investment return on those dollars shall be sufficient to pay estimated compensation for each active member of the system from the valuation date to termination from active status.

The APV of Future Compensation is calculated as follows for each active member:

- (1) Compensation levels are estimated for each year in the future using the individual compensation increase assumption.
- (2) Using all of the demographic assumptions, the probability that the member will remain active in the group to the beginning of each year is determined.
- (3) If events terminating active status are deemed to occur during the year (e.g., at the middle of the year), weighted averages of those probabilities are calculated reflecting such timing. For example, if events are deemed to occur at mid-year the following averages are calculated:

(a) For year n

$1/2 (nP_x + {}^{n+1}P_x)$, where

(b) nPx is the probability, using all decrements, that an active member aged x at the valuation date will remain continuously active to age $x+n$.

(4) Using assumed rates of investment return, the present value at the valuation date of \$1 paid at the mid-point of each future year is calculated. For an assumed rate of investment of i the present value for year n is $Vn^{+.5}$ where $V = \frac{1}{1+i}$

(b) The product of (1), (3) and (4) is the APV of the estimated compensation in year n for an active member.

(6) The sum of such Actuarial Present Values for each future year is the Actuarial Present Value of Future Compensation for that member.

(7) The sum of such Actuarial Present Values of Future Compensation over all active members is the Actuarial Present Value of Future Compensation for the plan.

Calculation of Actuarial Present Values of Compensation from entry-age is calculated as above using estimated compensation at entry-age determined by adjusting current compensation with the current individual compensation increase assumption.

J. Funding Ratios - These ratios are described and defined in IV.B.(4), pages 17 and 18.

- K. Valuation Date - The date as of which all financial and member data is provided for an actuarial valuation. It is also the date as of which all actuarial present values are calculated in that valuation. It is anticipated that all actuarial valuations as of dates in 1985 and later will be based on a valuation date of July 1.
- L. Present Value of Future Payroll - This is a value developed for use in amortizing the UAAL over the Amortization Period. It represents the present value of total payrolls over the amortization period. It is based upon the assumed rates of investment return and payroll growth. The decrements for active lives are not used.

APPENDIX A
INFORMATION TO BE REQUESTED OF EACH PLAN

An actuarial valuation is a study which is based upon information to be provided by the plan. The quality of the valuation can be no better than the quality of the information underlying it.

Each plan will be provided with a specific request for information. However, this Appendix will provide a general overview of the data to be requested.

In general, the following information will be required in order to process the annual actuarial valuation. This information shall be due eight weeks after the valuation date.

1. Copy of Applicable Laws and Bylaws. In addition, changes that have taken effect since the prior valuation must be identified.
2. Balance sheet and statement of revenue and disbursements of the Fund for the Fiscal year ending immediately prior to the valuation date. (See Section VII B)
3. Member data (as described on the following pages) for all active members, members and beneficiaries who are currently receiving benefits or who have a right to a deferred benefit, and inactive members who have not withdrawn their member contributions.
4. Member data (as described on the following pages) for persons who were included in Item 3 on the prior valuation date, but who are not included as of the current valuation date due to a change of status.

15.	Credited Service	7-N	xx.xxxxx For benefit accrual
16.	Credited Service	7-N	xx.xxxxx Prior service period or service for alternate formula
17.	Credited Service	7-N	xx.xxxxx Prior service period or service for alternate formula
18.	Employee Contributions	8-N	\$e
19.	Interest on Employee Contributions	7-N	\$e
20.	Employer Contributions	8-N	\$e
21.	Interest on Employer Contributions	7-N	\$e
22.	Formula Code	2-A	For plans where members can elect benefit Formula
23.	Termination Date	6-N	MMDDYY
24.	Final Average Compensation	8-N	\$e At termination
25.	Annual Accrued Annuity	8-N	\$e At termination
26.	Retirement Date	6-N	MMDDYY
27.	Optional Annuity Code	2-N	See attachment
28.	Beneficiary's Sex	1-A	1 or M for Male, 2 or F for female
29.	Beneficiary's Birthdate	6-N	MMDDYY
30.	Original Pension Amount	8-N	\$e
31.	Annual Pension Amount	8-N	\$e
32.	Secondary Pension Amount	8-N	\$e For level income option, or Joint and Survivor option
33.	Commencement Date for Secondary Pension	6-N	MMDDYY (Blank for J&S)
34.	Date of Death	6-N	MMDDYY
35.	Lump Sum Death Benefit	6-N	\$

Status Codes

Code

00	Active		
10	Retired	-	Normal
11		-	Early
12		-	Rule of 85
13		-	After Disability
20	Terminated	-	Left Contributions in Fund
21		-	Withdrew contributions
30	Disabled	-	Ordinary
31		-	Occupational
40	Deceased	-	Ordinary
		-	Occupational
50	Leave of Absence		
51		-	Medical
52		-	Military

ANNUITY OPTION CODES

Code

01	Lifetime only annuity
02	Guaranteed refund annuity
03	Life only annuity with 3 years guaranteed.
04	Life only annuity with 3 years guaranteed. (1)
05	Life only annuity with 5 years guaranteed.
06	Life only annuity with 5 years guaranteed. (1)
10	Life only annuity with 10 years guaranteed.
11	Life only annuity with 10 years guaranteed. (1)
15	Life only annuity with 15 years guaranteed.
16	Life only annuity with 15 years guaranteed. (1)
50	Joint and 50% Survivor annuity.
51	Joint and 50% Survivor annuity. (1)
52	Joint and 50% Survivor annuity. (2)
53	50% Bounce Back Joint and Survivor annuity.
70	Joint and 75% Survivor annuity.
71	Joint and 75% Survivor annuity. (1)
72	Joint and 75% Survivor annuity. (2)
73	75% Bounce Back Joint and Survivor annuity.
80	Joint and 100% Survivor annuity.
81	Joint and 100% Survivor annuity. (1)
82	Joint and 100% Survivor annuity. (2)
83	100% Bounce Back Joint and Survivor annuity.
90	Joint and Survivor annuity (reversionary benefit is fixed dollar amount).
91	Joint and Survivor annuity (reversionary benefit is fixed dollar amount). (1)
92	Joint and Survivor annuity (reversionary benefit is fixed dollar amount). (2)

- (1) Pensioner deceased, beneficiary receiving payments.
(2) Beneficiary deceased, pensioner receiving payments.

APPENDIX B
SAMPLE REPORT

RETIREMENT PLAN - SAMPLE REPORT

ACTUARIAL VALUATION REPORT

JULY 1, 1984

RETIREMENT PLAN - SAMPLE REPORT

REPORT HIGHLIGHTS

(DOLLARS IN THOUSANDS)

	7/1/83 VALUATION	7/1/84 VALUATION
A. CONTRIBUTIONS (TABLE 11)		
1. Statutory Contributions - Chapter 353 % of Payroll	9.61%	9.61%
2. Required Contributions - Chapter 356 % of Payroll	9.47%	9.92%
3. Sufficiency (Deficiency) (A1-A2)	0.14%	-0.31%
B. FUNDING RATIOS		
1. Accrued Benefit Funding Ratio		
a. Current Assets (Table 1)	\$1,498,000	\$1,598,000
b. Current Benefit Obligations (Table 8)	\$1,667,000	\$1,861,000
c. Funding Ratio (a/b)	89.86%	85.87%
2. Accrued Liability Funding Ratio		
a. Current Assets (Table 1)	\$1,498,000	\$1,598,000
b. Actuarial Accrued Liability (Table 9)	\$1,978,000	\$2,229,000
c. Funding Ratio (a/b)	75.73%	71.69%
3. Projected Benefit Funding Ratio (Table 8)		
a. Current and Expected Future Assets	\$2,370,000	\$2,402,000
b. Current and Expected Future Benefit Obligations	\$2,353,000	\$2,703,000
c. Funding Ratio (a/b)	100.72%	88.86%
C. PLAN PARTICIPANTS		
1. Active Members (Table 3)		
a. Number	83,378	83,702
b. Total Annual Earnings	\$1,105,000	\$1,225,000
c. Average Annual Earnings (Actual \$)	\$14,051	\$14,651
2. Others		
a. Service Retirements (Table 4)	15,458	16,379
b. Disability Retirements (Table 5)	698	638
c. Survivors (Table 6)	3,093	3,051
d. Deferred Retirements (Table 7)	1,866	1,843
e. Terminated Other Non-vested (Table 7)	5,778	7,161
f. Total	26,893	29,072

COMMENTARY

THIS SECTION WILL CONTAIN AN EXPLANATION OF THE VALUATION RESULTS. THE MOST IMPORTANT FINDINGS WILL BE EXPLAINED BY COMPARING THE RESULTS TO THE CORRESPONDING NUMBERS FOR THE PRIOR YEAR AND COMMENTING ON ANY SIGNIFICANT EVENTS THAT OCCURRED DURING THE YEAR.

THE SAMPLE TABLES THAT FOLLOW DISPLAY THE BASIC INFORMATION TO BE REPORTED FOR EACH PLAN. SOME ALTERATIONS MAY BE REQUIRED TO ACCOMMODATE THE CHARACTERISTICS OF A PARTICULAR FUND. WHEN A PLAN PROVIDES MORE THAN ONE SET OF BENEFITS (I.E. BASIC AND COORDINATED) THE FOLLOWING TABLES CAN BE SUBDIVIDED TO CREATE TWO NEW TABLES, TABLES "A" AND "B", WHICH WILL FOLLOW THE SAME FORMAT AS THE PRIMARY TABLE BUT WILL CONTAIN INFORMATION SPECIFIC TO EACH SET OF BENEFITS.

RETIREMENT PLAN - SAMPLE REPORT

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CHAPTER 356 INFORMATION

TABLE 15 MEMBERSHIP CHANGES

RETIREMENT PLAN - SAMPLE REPORT

TABLE 1

ACCOUNTING BALANCE SHEET FOR GENERAL FUND
(DOLLARS IN THOUSANDS)

JUNE 30, 1984

	MARKET VALUE	COST VALUE
A. ASSETS		
1. Cash and Cash Equivalents	\$35,000	\$35,000
2. Investments		
a. Fixed Income	450,000	450,000
b. Equity	350,000	404,000
c. Real Estate	110,000	110,000
3. Equity in Minnesota Post-Retirement Investment Fund (MPRIF)	635,000	635,000
4. Other	1,000	1,000
B. TOTAL ASSETS	\$1,581,000	\$1,635,000
C. AMOUNTS CURRENTLY PAYABLE	\$19,000	\$19,000
D. ASSETS AVAILABLE FOR BENEFITS		
1. Member Contribution Reserves	\$367,000	\$367,000
2. Employer Contribution Reserves	560,000	614,000
3. Minnesota Post-Retirement Investment Fund	635,000	635,000
4. Total Available Assets	\$1,562,000	\$1,616,000
E. TOTAL AMOUNTS CURRENTLY PAYABLE AND ASSETS AVAILABLE FOR BENEFITS	\$1,581,000	\$1,635,000
F. DETERMINATION OF ACTUARIAL VALUE OF ASSETS		
1. Cost Value of Assets Available for Benefits (D4)		\$1,616,000
2. Market Value (D4)	\$1,562,000	
3. Cost Value (D4)	1,616,000	
4. Market Over Cost (F2-F3)	(\$54,000)	
5. 1/3 of Market Over Cost (F4)/3		(18,000)
5. Actuarial Value of Assets (F1+F5) (Same as "Current Assets" in Table 8)		\$1,598,000

RETIREMENT PLAN - SAMPLE REPORT

TABLE 2

CHANGES IN ASSETS AVAILABLE FOR BENEFITS
(DOLLARS IN THOUSANDS)

YEAR ENDING JUNE 30, 1984

	MARKET VALUE	COST VALUE
	-----	-----
A. ASSETS AVAILABLE AT BEGINNING OF YEAR	\$1,439,000	\$1,473,000
 B. REVENUE		
1. Member Contributions	\$58,000	\$58,000
2. Employer Contributions	79,000	79,000
3. Investment Income	73,000	73,000
4. Transfer from (to) MPRIF	59,000	59,000
5. Net Realized Gain (Loss)	1,000	1,000
6. Other	500	500
6. Net Change in Unrealized Gain (Loss)	(20,000)	
	-----	-----
7. Total Revenue	\$250,500	\$270,500
	-----	-----
 C. DISBURSEMENTS		
1. Service Retirements	\$65,000	\$65,000
2. Disability Benefits	3,000	3,000
3. Survivor Benefits	6,000	6,000
4. Refunds	24,000	24,000
5. Expenses	4,000	4,000
6. Transfer to State General Fund	500	500
7. Other	25,000	25,000
	-----	-----
8. Total Disbursements	\$127,500	\$127,500
	-----	-----
 D. ASSETS AVAILABLE AT END OF YEAR (COST BASIS)	\$1,562,000	\$1,616,000
(A-07-C8)	=====	=====

RETIREMENT PLAN - SAMPLE REPORT

TABLE 3

ACTIVE MEMBERS

YEARS OF SERVICE

AGE	<1	1-4	5-9	10-14	15-19	20-24	25-29	30+	TOTAL
<25	1,759	3,264	274						5,297
25-29	1,587	5,275	3,009	168					10,039
30-34	1,433	4,796	4,345	1,563	66				12,203
35-39	1,204	4,118	3,558	2,087	651	18			11,636
40-44	770	3,208	2,997	1,877	995	237	19		10,103
45-49	477	2,273	2,630	2,054	1,129	487	254	24	9,328
50-54	347	1,678	2,043	2,160	1,401	645	437	158	8,869
55-59	243	1,266	1,813	2,038	1,653	772	532	423	8,740
60-64	83	662	1,129	1,315	1,181	642	351	230	5,593
65+	222	377	407	397	261	113	61	56	1,894
TOTAL	8,125	26,917	22,205	13,659	7,337	2,914	1,654	891	83,702

AVERAGE ANNUAL EARNINGS

YEARS OF SERVICE

AGE	<1	1-4	5-9	10-14	15-19	20-24	25-29	30+	TOTAL
<25	10,422	11,083	13,577						9,004
25-29	11,568	14,139	16,149	15,952					13,418
30-34	11,658	14,563	19,011	20,056	18,894				15,831
35-39	11,053	12,835	18,605	22,858	24,555	19,500			16,261
40-44	10,939	11,454	14,835	19,179	23,996	24,447	21,684		14,956
45-49	11,015	11,076	13,410	15,262	20,627	26,257	25,622	25,875	14,764
50-54	9,746	10,937	13,275	14,350	17,974	24,306	27,112	26,146	15,333
55-59	9,074	10,512	13,242	14,446	16,427	20,409	24,897	27,550	15,675
60-64	9,036	9,211	12,510	14,259	15,943	20,257	22,501	26,691	15,333
65+	8,468	6,599	8,287	9,184	12,218	16,150	16,442	23,911	9,228
TOTAL	10,988	12,469	15,738	16,979	18,911	22,373	24,736	22,846	14,651

TOTAL ANNUAL EARNINGS (IN THOUSANDS) BY YEARS OF SERVICE

<1	1-4	5-9	10-14	15-19	20-24	25-29	30+	TOTAL
89,277	335,621	349,464	231,913	138,747	65,195	40,914	20,356	1,271,487

RETIREMENT PLAN - SAMPLE REPORT

TABLE 4

SERVICE RETIREMENTS

YEARS RETIRED

AGE	<1	1-4	5-9	10-14	15-19	20-24	25+	TOTAL
<50	2							2
50-54	15	15						30
55-59	200	500	17					717
60-64	580	2,420	500					3,500
65-69	450	2,950	1,500	1,000				5,900
70-74		1,500	1,500	1,000	500			4,500
75-79			300	500	400	100		1,300
80-84					300	50	50	400
85+							30	30
TOTAL	1,247	7,385	3,817	2,500	1,200	150	80	16,379

AVERAGE ANNUAL ANNUITY

YEARS RETIRED

AGE	<1	1-4	5-9	10-14	15-19	20-24	25+	TOTAL
<50	4,800							4,800
50-54	5,000	3,500						4,200
55-59	5,200	3,900	3,400					4,400
60-64	5,600	4,300	3,600					4,500
65-69	5,400	4,400	3,800	3,600				4,100
70-74		4,100	3,900	3,700	3,300			3,800
75-79			3,600	3,500	3,300	3,200		3,500
80-84					3,300	3,000	2,900	3,200
85+							2,700	2,700
TOTAL	5,400	4,300	3,800	3,600	3,300	3,100	2,800	4,069

TOTAL ANNUAL ANNUITY (IN THOUSANDS) BY YEARS OF RETIREMENT

<1	1-4	5-9	10-14	15-19	20-24	25+	TOTAL
6,734	31,756	14,505	9,000	3,960	465	224	66,643

RETIREMENT PLAN - SAMPLE REPORT

TABLE 5

DISABILITY RETIREMENTS

AGE	YEARS DISABLED							TOTAL
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<50	10							10
50-54	20	50						70
55-59	13	150	50					213
60-64		100	100	40				240
65-69			50	40	10			100
70-74					5			5
75-79								
80-84								
85+								
TOTAL	43	300	200	80	15			638

AVERAGE ANNUAL BENEFIT

AGE	YEARS DISABLED							TOTAL
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<50	5,100							5,100
50-54	5,500	4,500						4,800
55-59	5,200	4,900	4,500					4,800
60-64		4,400	4,300	4,100				4,300
65-69			4,100	4,300	4,200			4,200
70-74					4,000			4,000
75-79								
80-84								
85+								
TOTAL	5,300	4,700	4,300	4,200	4,100			4,550

TOTAL ANNUAL BENEFIT (IN THOUSANDS) BY YEARS OF DISABILITY

<1	1-4	5-9	10-14	15-19	20-24	25+	TOTAL
220	1,410	860	336	62			2,903

RETIREMENT PLAN - SAMPLE REPORT

TABLE 6

SURVIVORS

AGE	YEARS SINCE DEATH							TOTAL
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<50	31	150	100	50	10			341
50-54	35	100	50	50	20	20		275
55-59	60	200	100	80	40	30		510
60-64	50	200	100	80	60	30	20	540
65-69	25	250	150	120	80	40	20	685
70-74			100	80	60	40	20	300
75-79			100	80	40	20	30	270
80-84				60	40	20	10	130
85+								
TOTAL	201	900	700	600	350	200	100	3,051

AVERAGE ANNUAL BENEFIT

AGE	YEARS SINCE DEATH							TOTAL
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<50	2,000	1,900	1,800	1,600	1,400			1,700
50-54	2,500	2,400	2,100	2,000	1,900	1,700		2,200
55-59	2,800	2,500	2,300	2,200	2,100	2,000		2,300
60-64	2,900	2,500	2,400	2,300	2,200	2,100	1,600	2,300
65-69	3,000	2,300	2,300	2,300	2,100	2,000	1,500	2,200
70-74			2,200	2,100	1,900	1,700	1,300	2,000
75-79			2,000	2,100	1,600	1,600	1,200	1,800
80-84				1,900	1,500	1,400	1,200	1,600
85+								
TOTAL	2,900	2,400	2,200	2,100	1,800	1,700	1,400	2,185

TOTAL ANNUAL BENEFIT (IN THOUSANDS) BY YEARS SINCE DEATH

<1	1-4	5-9	10-14	15-19	20-24	25+	TOTAL
596	2,160	1,540	1,260	630	340	140	6,666

RETIREMENT PLAN - SAMPLE REPORT

TABLE 7

RECONCILIATION OF MEMBERS

	ACTIVES	TERMINATED	
		DEFERRED RETIREMENT	OTHER NON-VESTED
A. On July 1, 1983	83,378	1,866	5,778
B. Additions	8,556	177	2,705
C. Deletions:			
1. Service Retirement	(1,117)	(130)	
2. Disabilities	(43)		
3. Death	(129)		
4. Terminated-Deferred	(177)		
5. Terminated-Refund	(3,660)		(891)
6. Terminated-Other Non-vested	(2,705)		
7. Returned as Active			(431)
D. Data Adjustments	(401)	(70)	
E. On July 1, 1984	83,702	1,843	7,161

	RECIPIENTS		
	RETIREMENT ANNUITANTS	DISABLED	SURVIVORS
A. On July 1, 1983	15,458	698	3,093
B. Additions	1,247	43	201
C. Deletions:			
1. Service Retirement			
2. Disabilities			
3. Death	(592)	(88)	(226)
4. Terminated-Deferred			
5. Terminated-Refund			
6. Terminated-Other Non-vested			
7. Returned as Active			
D. Data Adjustments	266	(15)	(17)
E. On July 1, 1984	16,379	638	3,051

RETIREMENT PLAN - SAMPLE REPORT

TABLE 8

ACTUARIAL BALANCE SHEET FOR GENERAL FUND
(DOLLARS IN THOUSANDS)

JULY 1, 1984

A. CURRENT VALUE OF ASSETS (TABLE 1)	\$1,598,000
B. EXPECTED FUTURE ASSETS	
1. Present Value of Expected Future Supplemental Contributions	330,000
2. Present Value of Future Normal Costs	474,000
3. Total Expected Future Assets	<u>\$804,000</u>
C. TOTAL CURRENT ASSETS AND EXPECTED FUTURE ASSETS	<u>\$2,402,000</u>
D. CURRENT BENEFIT OBLIGATIONS	
1. Benefit Recipients	
a. Retirement Annuities	\$635,000
b. Disability Benefits	20,000
c. Survivors' Benefits	67,000
2. Deferred Retirements	12,000
3. Former Members without Vested Rights	9,000
4. Active Members	
a. Retirement Annuities	950,000
b. Disability Benefits	63,000
c. Survivors' Benefits	56,000
d. Deferred Retirements	14,000
e. Refund Liability Due to Death or Withdrawal	35,000
5. Total Current Benefit Obligations	<u>\$1,861,000</u>
E. EXPECTED FUTURE BENEFIT OBLIGATIONS	<u>\$842,000</u>
F. TOTAL CURRENT AND EXPECTED FUTURE BENEFIT OBLIGATIONS	<u>\$2,703,000</u>
G. CURRENT UNFUNDED LIABILITY (D5-A)	\$263,000
H. CURRENT AND FUTURE UNFUNDED LIABILITY (F-C)	\$301,000

RETIREMENT PLAN - SAMPLE REPORT

TABLE 9

DETERMINATION OF UNFUNDED ACTUARIAL ACCRUED LIABILITY
AND SUPPLEMENTAL CONTRIBUTION RATE

JULY 1, 1984

	ACTUARIAL PRESENT VALUE OF PROJECTED BENEFITS	ACTUARIAL PRESENT VALUE OF FUTURE NORMAL COSTS	ACTUARIAL ACCRUED LIABILITY
	(1)	(2)	(3) = (1) - (2)
A. DETERMINATION OF ACTUARIAL ACCRUED LIABILITY (AAL)			
1. Active Members			
a. Retirement Annuities	\$1,700,000	\$420,000	\$1,280,000
b. Disability Benefits	100,000	20,000	80,000
c. Survivors Benefits	90,000	18,000	72,000
d. Deferred Retirements	20,000	40,000	(20,000)
e. Refunds Due to Death or Withdrawal	50,000	12,000	38,000
f. Total Active Members	\$1,960,000	\$474,000	\$1,486,000
2. Deferred Retirements	\$12,000		\$12,000
3. Former Members Without Vested Rights	9,000		\$9,000
4. Annuitants in MPRIF	635,000		\$635,000
5. Recipients Not in MPRIF	87,000		\$87,000
6. Total AAL	\$2,703,000	\$474,000	\$2,229,000
B. DETERMINATION OF UNFUNDED ACTUARIAL ACCRUED LIABILITY (UAAL)			
1. AAL			\$2,229,000
2. Actuarial Value of Assets (Table 1)			1,598,000
3. UAAL (B1-B2)			\$631,000
C. DETERMINATION OF SUPPLEMENTAL CONTRIBUTION RATE			
1. Present Value of Future Payrolls Through the Amortization Date of June 30, 2009			\$26,000,000
2. Supplemental Contribution Rate (B3/C1)			2.43%

RETIREMENT PLAN - SAMPLE REPORT

TABLE 10

CHANGES IN UNFUNDED ACTUARIAL ACCRUED LIABILITY (UAAL)
(DOLLARS IN THOUSANDS)

YEAR ENDING JULY 1, 1984

A. UAAL AS OF JULY 1, 1983	\$516,000
B. CHANGE DUE TO INTEREST REQUIREMENTS AND CURRENT RATE OF FUNDING	
1. Normal Cost and Expenses	\$85,000
2. Contribution	(137,000)
3. Interest on B1 and B2	(2,000)

4. Total	(\$54,000)

C. EXPECTED UAAL AS OF JULY 1, 1984 (A+B4)	\$462,000
D. INCREASE (DECREASE) DUE TO ACTUARIAL LOSSES (GAINS) BECAUSE OF EXPERIENCE DEVIATIONS FROM EXPECTED	
1. Salary Increases	\$20,000
2. Investment Return	24,000
3. MPRIF Mortality	(8,000)
4. Mortality of Other Benefit Recipients	2,000
5. Active Members' Turnover, Retirement, and Other Decrements	2,000
6. Expenses and Other Items	2,000

7. Total	\$42,000

E. UAAL AS OF JULY 1, 1984 BEFORE PLAN AMENDMENTS AND CHANGES IN ACTUARIAL ASSUMPTIONS (C+D6)	\$504,000
F. CHANGE IN ACTUARIAL ACCRUED LIABILITY DUE TO PLAN AMENDMENTS	\$43,000
G. CHANGE IN ACTUARIAL ACCRUED LIABILITY DUE TO CHANGES IN ACTUARIAL ASSUMPTIONS	\$84,000

H. UAAL AS OF JULY 1, 1984 (E+F+G)	\$631,000
	=====

RETIREMENT PLAN - SAMPLE REPORT

TABLE 11

DETERMINATION OF CONTRIBUTION SUFFICIENCY (DOLLARS IN THOUSANDS)

	% OF	\$
	PAYROLL	AMOUNT
A. STATUTORY CONTRIBUTIONS - CHAPTER 353		
1. Employee Contributions	4.53%	\$57,598
2. Employer Contributions	5.08%	\$64,592
3. Total	9.61%	\$122,190
B. REQUIRED CONTRIBUTIONS - CHAPTER 356		
1. Normal Cost		
a. Retirement Benefits	5.90%	\$75,018
b. Disability Benefits	0.40%	\$5,086
c. Surviving Spouse	0.35%	\$4,450
d. Deferred Retirement Benefits	0.25%	\$3,179
e. Refunds Due to Death or Withdrawal	0.34%	\$4,323
f. Total	7.24%	\$92,056
2. Supplemental Contribution Amortization by June 30, 2010 of UAAL of \$631,000	2.43%	\$30,897
3. Allowance for Expenses	0.25%	\$3,179
4. Total	9.92%	\$126,132
C. CONTRIBUTION SUFFICIENCY (DEFICIENCY) (A3-B4)	-0.31%	(\$3,942)

Note: Annual Payroll is \$1,271,487

RETIREMENT PLAN - SAMPLE REPORT

TABLE 12

CASH FLOW
(DOLLARS IN MILLIONS)

FISCAL YEAR	STATUTORY CONTRIBUTIONS	TRANSFERS TO MPRIF	OTHER DISBURSEMENTS	INVESTMENT RETURN	CURRENT ASSETS YEAR END
1984					\$1,598.0
1985	\$117.7	\$60.0	\$35.0	\$130.0	1,750.7
1986	124.8	63.6	37.1	137.8	1,912.6
1987	132.2	67.4	39.3	146.1	2,084.1
1988	140.2	71.5	41.7	154.8	2,266.0
1989	148.6	75.7	44.2	164.1	2,458.8
1990	157.5	80.3	46.8	174.0	2,663.1
1991	167.0	85.1	49.6	184.4	2,879.7
1992	177.0	90.2	52.6	195.5	3,109.3
1993	187.6	95.6	55.8	207.2	3,352.7
1994	198.9	101.4	59.1	219.6	3,610.7
1995	210.8	107.5	62.7	232.8	3,884.2
1996	223.4	113.9	66.4	246.8	4,174.0
1997	236.8	120.7	70.4	261.6	4,481.3
1998	251.0	128.0	74.7	277.3	4,807.0
1999	266.1	135.7	79.1	293.9	5,152.2
2000	282.1	143.8	83.9	311.6	5,518.2
2001	299.0	152.4	88.9	330.2	5,906.1
2002	316.9	161.6	94.2	350.1	6,317.3
2003	336.0	171.3	99.9	371.1	6,753.2
2004	356.1	181.5	105.9	393.3	7,215.2
2005	377.5	192.4	112.2	416.9	7,704.9
2006	400.1	204.0	119.0	441.9	8,224.0
2007	424.1	216.2	126.1	468.5	8,774.3
2008	449.6	229.2	133.7	496.6	9,357.5
2009	476.6	242.9	141.7	526.4	9,975.8

RETIREMENT PLAN - SAMPLE REPORT

TABLE 15

MEMBERSHIP CHANGES
(DOLLARS IN THOUSANDS)

	NUMBER	PAYROLL
A. ACTIVE MEMBERS		
1. As of the Last Valuation Date	83,378	1,244,250
2. New Entrants	8,556	124,730
3. Total	91,934	1,368,980
4. Separations from Active Service		
a. Refund of Contributions	3,660	43,920
b. Separation with Deferred Annuity	177	2,478
c. Separation with neither Refund nor Deferred Annuity	3,106	34,166
d. Disability	43	602
e. Death	129	1,806
f. Retirement with Service Annuity	1,117	14,521
5. Total Separations	8,232	97,493
6. As of Current Valuation Date	83,702	1,271,487
	NUMBER	ANNUAL ANNUITY
B. Service Retirement Annuitants		
1. As of the Last Valuation Date	15,458	61,592
2. New Entrants	1,247	6,734
3. Total	16,705	68,326
4. Terminations		
a. Deaths	592	2,960
b. Others	(266)	(1,277)
5. Total Terminations	326	1,683
6. As of Current Valuation Date	16,379	66,643
	NUMBER	ANNUAL ANNUITY
C. Disabled Annuitants		
1. As of the Last Valuation Date	698	3,211
2. New Entrants	43	220
3. Total	741	3,431
4. Terminations		
a. Deaths	88	475
b. Others	15	53
5. Total Terminations	103	528
6. As of Current Valuation Date	638	2,903

RETIREMENT PLAN - SAMPLE REPORT

TABLE 15

	NUMBER	ANNUAL ANNUITY
D. Surviving Spouse Annuitants		
1. As of the Last Valuation Date	3,000	6,569
2. New Entrants	180	566
3. Total	3,180	7,135
4. Terminations		
a. Deaths	226	565
b. Others	17	34
5. Total Terminations	243	599
6. As of Current Valuation Date	2,937	6,536
	NUMBER	ANNUAL ANNUITY
E. Surviving Children Annuitants		
1. As of the Last Valuation Date	93	100
2. New Entrants	21	30
3. Total	114	130
4. Terminations		
a. Deaths		
b. Others		
5. Total Terminations	0	0
6. As of Current Valuation Date	114	130
	NUMBER	ANNUAL ANNUITY
F. Deferred Annuitants		
1. As of the Last Valuation Date	1,866	2,000
2. New Entrants	177	188
3. Total	2,043	2,188
4. Terminations		
a. Deaths		
b. Others	200	220
5. Total Terminations	200	220
6. As of Current Valuation Date	1,843	1,968