GENERAL ASSEMBLY RETIREMENT SYSTEM
OF ILLINOIS

FIVE YEAR EXPERIENCE ANALYSIS
FOR THE PERIOD 1996-2001

GOLDSTEIN & ASSOCIATES

GOLDSTEIN & ASSOCIATES
Actuaries and Consultants

September 6, 2002

Board of Trustees
General Assembly Retirement System
2101 South Veterans Parkway
P.O. Box 19255
Springfield, Illinois 62794-9255

Re: **Five-Year Experience Analysis**

Dear Board Members:

We are pleased to submit our report on the experience analysis of the system for the five-year period 1996 to 2001.

The purpose of this report is to review the recent experience of the system and to develop recommended actuarial assumptions to be used for the June 30, 2002 actuarial valuation.

The report consists of four sections and one appendix as follows:
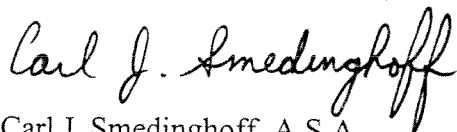
We would be pleased to discuss any aspects of this report with you and other interested persons.

Respectfully submitted,

Sandor Goldstein, F.S.A.
Consulting Actuary

Carl J. Smedinghoff, A.S.A.
Associate Actuary

I. INTRODUCTION

The choice of actuarial assumptions plays an important role in determining the values obtained in an actuarial valuation of the system. To ensure that the actuarial assumptions are appropriate, they must be periodically reviewed and revised if necessary.

Pursuant to Section 5/2-146 of the Illinois Pension Code, the actuary shall

> "make a general investigation at least once every 5 years of the mortality, retirement, disability, separation, interest and employee earnings rates and recommend as a result thereof, the tables to be adopted for all required actuarial calculations."

We have performed an experience analysis of the fund over the five-year period 1996 through 2001. In this report, we summarize the results of the analysis. Based on this analysis, proposed actuarial assumptions for the actuarial valuation of the fund as of June 30, 2002 are presented.

II. GENERAL COMMENTS ON ACTUARIAL ASSUMPTIONS

Actuarial assumptions are "best estimates" of future experience generally derived from an extrapolation of past experience, with possible modification for changes anticipated in the future.

It is not possible to look at one actuarial assumption in isolation and conclude from the choice of that assumption whether or not a realistic picture of the fund is presented. It is the aggregate effect of all actuarial assumptions that is important in determining funding requirements and actuarial

1

GOLDSTEIN & ASSOCIATES

liabilities. In particular, the interest rate and the salary increase assumptions generally have a strong correlation as they are both affected by inflation.

III. ANALYSIS OF EXPERIENCE AND OUTLINE OF ASSUMPTIONS TO BE USED

Mortality Rates

The mortality rates used in a valuation serve two purposes: (1) to estimate the percentage of active members who can be expected to survive to retirement age, and (2) to forecast the life expectancy of members once they have reached retirement.

For the last actuarial valuation, the UP-1994 Mortality Table for Males, rated up 2 years year, was used for active and retired members. The UP-1994 Mortality Table for Females, rated up 1 year, was used for surviving spouses. We have examined the mortality experience of the fund over the last five years and have compared it with the mortality expected under the mortality assumptions used for the last valuation. The results are as follows:

Mortality - Actives

Actual number of deaths	6
Expected number of deaths	6.6
Ratio of actual to expected	90.9%

Mortality - Pensioners

Actual number of deaths	38
Expected number of deaths	52.0
Ratio of actual to expected	73.1%

GOLDSTEIN & ASSOCIATES

Mortality - Survivors

Actual number of deaths	38
Expected number of deaths	33.4
Ratio of actual to expected	113.8%

It can be seen from the above that the number of deaths among active members was 90.9% of the expected number.

The mortality experience of pensioners and survivors has a considerably greater impact on the results of the valuation than the mortality experience of active members. An actual to expected ratio greater than 100% means that mortality has been greater than expected, resulting in fewer benefit payments. A ratio less than 100% means that there have been fewer deaths than expected, resulting in additional costs to the fund.

A mortality ratio of 110% to 120% is generally desirable to allow for expected improvement in life expectancies in the future.

It can be seen from the above that over the last five years, the number of deaths among pensioners has been 73.1% of the number expected. That is, there have been fewer deaths among pensioners than the number expected according to the mortality rates that we have used in our valuations. Therefore, a change in the mortality rate assumption for pensioners would appear to be warranted to reflect the lower than expected mortality rates experienced.

GOLDSTEIN & ASSOCIATES

We therefore propose to use the following mortality rate assumptions for the June 30, 2002 actuarial valuation of the system: (1) For active members and pensioners: The UP-1994 Mortality Table for Males; (2) For Survivors: The UP-1994 Mortality Table for Females.

We have estimated that the use of the above mortality assumptions would have resulted in a mortality ratio of 101% over the last five years for pensioners and survivors combined

Termination Rates

Termination rates are used to estimate the probability that an employee will terminate employment at a given age. The following is a sample of the termination rates that have been used for the last five years:

Age	Rate of Termination Per 1,000 Members
20-65	90
66 and over	0

We examined the system's termination experience over the last five years and compared it with the termination expected under the above assumptions. The results are as follows:

Actual number of terminations	50
Expected number of terminations	65.1
Ratio of actual to expected	76.8%

4

GOLDSTEIN & ASSOCIATES

An actual to expected ratio greater than 100% means that more employees have terminated than expected, resulting in fewer employees staying until retirement, producing a savings to the fund. A ratio of less than 100% means that there have been fewer terminations than expected resulting in additional costs to the fund.

It can be seen from the above that over the last five years, the number of terminations of active members has been 76.8% of the number expected according to our assumptions. We therefore propose to revise the termination rates to bring them more in line with the recent experience of the system: The following are the termination rates that we propose to use for the June 30, 2002 valuation:

Age	Rate of Termination Per 1,000 Members
20-65	70
66 and over	0

We have estimated that the use of these proposed termination rates would have produced an actual to expected ratio of approximately 99% over the five-year period.

Retirement Rates

Retirement rates are used to estimate the probability that an employee will retire at each age at which a retirement benefit is available. For previous valuations, rates of retirement for each age from 55 to 80 have been used. The following are samples of the rates of retirement that have been used for the past five years:

5

GOLDSTEIN & ASSOCIATES

Age	Rate of Retirement Per 1,000 Members
55	180
60	160
65	170
70	200
75	200
80	1000

We examined the retirement experience of the fund over the past five years and compared it with the retirements expected according to the above rates. The results are as follows:

Actual number of retirements	16
Expected number of retirements	25.1
Ratio of actual to expected	63.7%
Actual average retirement age	60.1
Expected average retirement age	62.0

It can be seen from the above that over the five-year period, the number of retirements has been fairly close to the number expected according to the assumed rates of retirement. However, the average age at retirement has been lower than that expected according to the assumed retirement rates. We therefore propose to revise the assumed rates of retirement to bring them more in line with the actual retirement experience over the last five years. The following are samples of the rates of retirement that we propose to use:

GOLDSTEIN & ASSOCIATES

Age	Rate of Retirement Per 1,000 Members
55	200
60	100
65	80
70	50
75	50
80	1,000

We have estimated that the use of these proposed retirement rates would have resulted in an actual to expected ratio of 88.9% over the five-year period and the expected average retirement age would have been 59.6 over this period.

Disability Rates

Disability rates are used to evaluate the probability that a participant will become permanently disabled and receive a retirement annuity as a result of disability. The following is a sample of the disability rates that have been used for the past five years:

Age	Disabilities Per 1,000 Members
30	.6
35	.6
40	.8
45	1.1
50	1.7
55 and over	0.0

It appears that there have not been any cases of annuities granted as a result of permanent disability over the past five years. The rates of disability that we are using are very small and result in less

GOLDSTEIN & ASSOCIATES

than one expected disability per year. We therefore propose to continue to use the same rates of disability that we have used for previous valuations.

Salary Progression

Since retirement benefits are based on a participant's final average salary, it is necessary to project each participant's current salary to future ages in order to determine pension costs and liabilities. Therefore, an assumption needs to be made concerning the rate at which salaries can be expected to increase in the future.

For the past five years, a salary increase assumption of 6.5% per year has been used.

The choice of a salary increase assumption involves a consideration of the following factors which affect salary increases:

(1) Promotional and seniority increases, reflecting normal pay increases as employees accumulate increased experience and responsibility throughout their careers.

(2) General increases, affecting the compensation of all employees, primarily on account of inflation.

The promotional component of the salary increase assumption can be estimated for a group of employees by comparing the progression of salaries with increasing age for a given year. An analysis of this type eliminates the effect of inflationary salary increases on the salary progression.

GOLDSTEIN & ASSOCIATES

Studies of this type indicate that the average rate of promotional increase throughout an employee's career is generally between 1% and 1.5% per year. The rate of promotional increase tends to be higher than this at the younger ages and lower at the older ages. But over an employee's career, the rate of promotional increase generally falls in the range of 1% to 1.5% per year.

Under the General Assembly Retirement System, it is possible for a former member of the General Assembly who entered service prior to 1995 to continue in governmental employment at a salary that is higher than the last salary the member had in the General Assembly. Under the provisions of the Retirement Systems Reciprocal Act, such a member will have his or her retirement annuity from the General Assembly Retirement System based on the highest salary from governmental employment prior to retirement. We therefore propose to use a promotional salary increase factor of 2.0% per year as a way of taking into account, at least to some extent, the additional liability attributable to former members who continue in governmental employment at salaries higher than their General Assembly salary.

We have examined the actual increases in salaries that have occurred over the past five years. The average rate of increases in salaries over the past five years were as follows:

Fiscal Year	Rate of Increase
1997	6.5%
1998	3.1%
1999	8.4%
2000	5.5%
2001	5.4%
Average For 1997 – 2001	5.8%

GOLDSTEIN & ASSOCIATES

Based on the rates of increase in salaries experienced over the past five years and expectations for the future, we propose to continue to use a salary increase assumption of 6.5% per year. This 6.5% per year assumption can be considered to consist of a promotional increase factor of 2.0% per year and a general increase factor of 4.5% per year.

Investment Return Rate

An investment return assumption is needed in order to discount future benefit payments to the present time. The investment return assumption should reflect the expected long-term average future yield of the fund, including capital appreciation. An investment return assumption of 8.0% per year has been used for the past five years.

As a guide in setting the investment return assumption, we reviewed the investment performance of the system over the five-year period July 1, 1996 to June 30, 2001. Based on information prepared by the State Board of Investment, he rate of return earned by the system over the past five years has been as follows:

Fiscal Year	Rate of Return
1997	18.8%
1998	18.1%
1999	12.9%
2000	11.8%
2001	(7.1%)
Average For 1997 – 2001	10.5%

GOLDSTEIN & ASSOCIATES

<u>General Economic Considerations.</u> In setting the investment return assumption, the recent experience of the fund is again of limited value since the investment return assumption applies over a period of 50 to 60 years. In the long run, the rate of return on investments will consist of two components:

(1) an inflationary element, and,

(2) a real rate of return.

Although the investment return rate may not follow the rate of inflation in the short run, a long run correlation does exist. If money declines in purchasing power, in the future, a lender will require a higher rate of interest to offset the effect of the lower purchasing power of the dollars that will be . paid back. Past experience confirms that interest rates do in fact rise with inflation.

<u>Taking Into Account Target Asset Allocation.</u> The current target asset allocation of the Illinois State Board of Investment is as follows:

Equities	61%
Fixed Income	23%
Real Estate	8%
Alternate Invesments	8%

The 2002 Yearbook of Stocks, Bonds, Bills and Inflation, published by Ibbotson Associates, shows average annual rates of return for various asset classes over the 76-year period 1926 through 2001. According to the Ibbotson Associates Report, average real returns (after adjusting for inflation) over the 76-year period have been as follows:

GOLDSTEIN & ASSOCIATES

Large company stock	7.4%
Long-term corporate bonds	2.6%
Inflation	3.1%

We have made the following assumptions in order to estimate the expected long-term return on the investments of the system: (1) the State Board of Investment maintains the current target asset allocation on a long-term basis, (2) the average future rate of return on equities will be equal to the average annual return on large company stocks over the past 76 years, (3) the average future rate of return on fixed income securities will be equal to the average annual return on long-term corporate bonds over the past 76 years, (4) the average future rate of return on real estate will be equal to the average future rate of return on fixed income securities, and (5) the average future rate of return on alternative investments will be equal to the average future rate of return on equities. On this basis, the expected long-term real rate of return for the assets of the system is estimated to be as follows:

$$(7.4\% \text{ X } .61) + (2.6\% \text{ X } .23) + (2.6\% \text{ X } .08) + (7.4\% \text{ X } .08) = 5.9\%$$

Adding a 3% inflation assumption to the above expected real rate of return produces an expected long-term total rate of return for the system of 8.9%.

For the following reasons, the investment return assumptions used for actuarial valuations of the system should be somewhat lower than this long-term expected rate of return: (1) using an investment return assumption that is somewhat lower than the long-term expected rate of return provides a margin to help offset losses from other aspects of the system's experience being less

GOLDSTEIN & ASSOCIATES

favorable than assumed. As the system has a relatively small number of members, the system's experience can fluctuate significantly from one year to another. (2) The system's funding status is relatively poor, with a funded ratio of 40.7% as of June 30, 2001. If future rates of return are higher than the assumed rate of return of 8.0%, this would help improve the system's funding status. Thus, an investment return assumption of 8% per year can be considered to be an appropriate one based on the expected long-term rate of return of the system.

We therefore propose to continue to use an interest rate assumption of 8% per year for the June 30, 2002 actuarial valuation.

IV. ESTIMATE OF NET EFFECT OF PROPOSED CHANGES IN ASSUMPTIONS

We are proposing changing the mortality rate assumption for active and retired members from the UP-1994 Mortality Table for Males, rated up 2 years to the UP-1994 Mortality Table for Males, with no adjustment. We are proposing to change the mortality assumption for survivors from the UP-1994 Mortality Table for Females, rated up 1 year, to the UP-1994 Mortality Table for Females, with no adjustment. These changes in the mortality assumption would result in some increase in liabilities and costs

We are proposing to decrease the rates of termination which would result in fewer expected terminations. This would have the impact of a relatively small increase in costs and liabilities. We are proposing to decrease retirement rates at the later ages, resulting in fewer expected retirements. This would result in some decrease in liabilities and costs.

13

GOLDSTEIN & ASSOCIATES

We have estimated that the proposed changes in actuarial assumptions would have the impact of increasing the total actuarial liabilities of the system by approximately $1,200,000, which represents a .7% increase in the total actuarial liabilities of the system.

GOLDSTEIN & ASSOCIATES

SUMMARY OF PROPOSED ASSUMPTIONS FOR THE JUNE 30, 2002 VALUATION

Mortality Rates. For active members and pensioners: The UP-1994 Mortality Table for Males; (2) For Survivors: The UP-1994 Mortality Table for Females.

Termination Rates. Termination rates based on the recent experience of the system. The following is a sample of the termination rates:

Age	Rate of Termination Per 1,000 Members
20-65	70
66 and over	0

Retirement Rates. Rates of retirement for each age from 55 to 80 based on the recent experience of the system. The following is a sample of the proposed rates of retirement:

Age	Rate of Retirement Per 1,000 Members
55	200
60	100
65	80
70	50
75	50
80	1,000

Disability Rates. The following is a sample of the proposed disability rates:

Age	Disabilities Per 1,000 Members
30	.6
35	.6
40	.8
45	1.1
50	1.7
55 and over	0.0

GOLDSTEIN & ASSOCIATES

Salary Progression. 6.5% per year, compounded annually.

Investment Return Rate. 8.0% per year, compounded annually.

Marital Status. 75% of participants are assumed to be married.

Spouse's Age. The age of the spouse is assumed to be 4 years younger than that of the employee.

GOLDSTEIN & ASSOCIATES