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December 15, 2016

Public Employees' Retirement Board
100 North Park, Suite 200
Helena, MT 59620-0139

Members of the Board:

Presented in this report is information to assist the Sheriffs' Retirement System of the State of Montana (SRS) in meeting the requirements of the Governmental Accounting Standards Board (GASB) Statement No. 67. The information is presented for the period ending June 30, 2016.

The annual actuarial valuation was used as a basis for much of the information presented in this report was performed as of June 30, 2015. The valuation was prepared by a prior actuary which was based upon data, furnished by the PERS staff, concerning active, inactive and retired members along with pertinent financial information.

To the best of our knowledge, this report is complete and accurate. The necessary calculations were performed by, and under the supervision of, independent actuaries who are members of the American Academy of Actuaries with experience in performing valuations for public retirement systems.

The calculations were prepared in accordance with the principles of practice prescribed by the Actuarial Standards Board, and, in our opinion, meet the requirements of GASB 67.

The actuarial calculations were performed by qualified actuaries according to generally accepted actuarial procedures and methods. The calculations are based on the current provisions of the System, and on actuarial assumptions that are, individually and in the aggregate, internally consistent and reasonably based on the actual experience of the System. In addition, the calculations were completed in compliance with the laws governing the System. The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.



Board of Trustees
December 15, 2016
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Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Edward Macdonald', written in a cursive style.

Edward A. Macdonald, ASA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Todd B. Green', written in a cursive style.

Todd B. Green, ASA, FCA, MAAA
Principal and Consulting Actuary

EAM/TBG:jan



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REPORT OF THE ANNUAL GASB STATEMENT NO. 67

REQUIRED INFORMATION FOR SHERIFFS' RETIREMENT SYSTEM OF THE STATE OF MONTANA

PREPARED AS OF JUNE 30, 2016

BOARD SUMMARY

This report provides information required by the Sheriffs' Retirement System (SRS) in connection with the Governmental Accounting Standards Board (GASB) Statement No. 67 "Financial Reporting for Pension Plans." The information provided herein was prepared for the purpose of assisting SRS to comply with the financial reporting and disclosure requirements of GASB No. 67 and is not applicable for purposes of funding the System. A calculation of the System's liability for purposes other than GASB No. 67 may produce significantly different results.

The Total Pension Liability (TPL), Fiduciary Net Position (FNP), Net Pension Liability (NPL) and certain sensitivity information shown in this report are based on an actuarial valuation performed as of June 30, 2015, by the System's prior actuary. The total pension liability as of the end of the plan year, June 30, 2016, was determined using standard roll forward procedures, which are detailed in Section II of this report.

The System's FNP has a projected depletion in 2056. As a result, the discount rate used to measure the TPL is the long-term expected rate of return on pension plan investments of 7.75% for benefits payable through 2056. The benefits projected to be paid in 2057 and beyond are discounted using the June 2016 Municipal Bond Index Rate of 3.01%. This produces a blended single discount rate of 5.93%.

As of June 30, 2016, the TPL is \$474,829,830 and the FNP is \$299,152,006. The NPL, which is determined by subtracting the FNP from the TPL, is equal to \$175,677,824. Also included in this report is a sensitivity analysis of the NPL, which shows results using both a 1% increase in the discount rate and 1% decrease in the discount rate. A higher discount rate reduces the NPL while a lower discount increases the NPL.

Schedule A shows three tables of required supplementary information. The first table details the changes in the NPL for the year ending June 30, 2016, with a comparison to the prior two years. The second table shows the ratio of the FNP to the TPL and a ratio of the NPL to the covered-employee payroll for the same three-year period. The final Schedule A table shows a history of the schedule of employer contributions.

The table on the following page highlights some of the information required by GASB No. 67 as of June 30, 2016.



REPORT OF THE ANNUAL GASB STATEMENT NO. 67

**REQUIRED INFORMATION FOR
SHERIFFS' RETIREMENT SYSTEM
OF THE STATE OF MONTANA**

PREPARED AS OF JUNE 30, 2016

BOARD SUMMARY

	2016
Valuation Date (VD):	June 30, 2015
Prior Measurement Date:	June 30, 2015
Measurement Date (MD):	June 30, 2016
Membership Data:	
Retirees and Beneficiaries	577
Inactive Members	423
Active Employees	<u>1,336</u>
Total	2,336
Discount Rate :	
Long-Term Expected Rate of Return	7.75%
Municipal Bond Index Rate at Prior Measurement Date	3.82%
Municipal Bond Index Rate at Measurement Date	3.01%
Fiscal Year in which Fiduciary Net Position is Projected to be Depleted	2056
Discount Rate at Prior Measurement Date	6.86%
Discount Rate at Measurement Date	5.93%
Net Pension Liability:	
Total Pension Liability (TPL)	\$474,829,830
Fiduciary Net Position (FNP)	<u>299,152,006</u>
Net Pension Liability (NPL = TPL – FNP)	\$175,677,824
FNP as a percentage of TPL	63.00%



Section I - Introduction

**REPORT OF THE ANNUAL GASB STATEMENT NO. 67
REQUIRED INFORMATION FOR THE
SHERIFFS' RETIREMENT SYSTEM
OF THE STATE OF MONTANA
PREPARED AS OF JUNE 30, 2016**

The Governmental Accounting Standards Board issued Statement No. 67 (GASB 67), “*Financial Reporting For Pension Plans*”, in June 2012. GASB 67’s effective date is for plan years beginning after June 15, 2013. This report, prepared as of June 30, 2016. Much of the material provided in this report is based on the data, assumptions and results of the annual actuarial valuation of the Sheriffs’ Retirement System of the State of Montana as of June 30, 2015. The results of that valuation were detailed in a report dated September 29, 2015.

GASB 67 basically divorces accounting and funding, creating disclosure and reporting requirements that may or may not be consistent with the basis used for funding the System.

A major change in GASB 67 is the requirement to determine the Total Pension Liability (TPL) utilizing the Entry Age Normal actuarial funding method. If, as is the case here, the valuation date at which the TPL is determined is before the Measurement Date, the TPL must be rolled forward to the Measurement Date. The Net Pension Liability (NPL) is then set equal to the TPL minus the System’s Fiduciary Net Position (FNP) (the market values of assets) as of the Measurement Date. The benefit provisions recognized in the calculation of the TPL are summarized in Schedule C.

Among the assumptions needed for the liability calculation is a Discount Rate. To determine the Discount Rate, the FNP must be projected into the future for as long as there are anticipated benefits payable under the plan’s provision applicable to the membership and beneficiaries of the System on the Measurement Date. If the FNP is projected to not be depleted at any point in the future, the long term expected rate of return on plan investments expected to be used to finance the benefit payments may be used as the Discount Rate.



Section I - Introduction

However, the FNP is projected to be depleted in the year 2056, therefore, the Discount Rate is determined as the single rate that will generate a present value of benefit payments equal to the sum of the present value determined by discounting all projected benefit payments through the date of depletion by the long term expected rate of return, and the present value determined by discounting those benefits after the date of depletion by a 20-year tax-exempt municipal bond (rating AA/Aa or higher) rate. The rate used for this purpose 3.01%. The basis for this is the June 30, 2016 Bond Buyer General Obligation 20-year Municipal Bond Index published monthly by the Board of Governors of the Federal Reserve System.

The sections that follow provide the results of all the necessary calculations, presented in the order laid out in GASB 67 for note disclosure and Required Supplementary Information (RSI).



Section II – Financial Statement Notes

The material presented herein will follow the order presented in GASB 67. Paragraph numbers are provided for ease of reference.

Paragraphs 30(a) (1)-(3): The information required is to be supplied by the Plan.

Paragraph 30(a) (4): The data required regarding the membership of the Sheriffs’ Retirement System of the State of Montana were furnished by the System’s staff. The following table summarizes the membership of the system as of June 30, 2015, the Valuation Date.

Membership

	Number
Inactive Members Or Their Beneficiaries Currently Receiving Benefits	577
Inactive Members Entitled To But Not Yet Receiving Benefits	423
Active Members	1,336
Total	2,336

Paragraphs 30(a)(5)-(6) and Paragraphs 30(b)-(f): The information required is to be supplied by the Plan.



Section II – Financial Statement Notes

Paragraphs 31(a) (1)-(4): The information is provided in the following table. As stated above, the NPL is equal to the TPL minus the FNP. That result as of June 30, 2016 is presented in the table below.

	Fiscal Year Ending
	June 30, 2016
Total Pension Liability	\$474,829,830
Fiduciary Net Position	<u>299,152,006</u>
Net Pension Liability	\$175,677,824
Ratio of Fiduciary Net Position to Total Pension Liability	63.00%

Paragraph 31(b): This paragraph requires information regarding the actuarial assumptions used to measure the TPL. The actuarial assumptions utilized in developing the TPL are outlined in Schedule C. The total pension liability was determined by an actuarial valuation as of June 30, 2015, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	3.00 percent
Salary increases	4.00 to 11.30 percent, including inflation
Investment rate of return	5.93 percent, net of pension plan investment expense, including inflation
Mortality	Healthy Mortality: RP-2000 Combined Employee and Annuitant Mortality Table projected to 2015 using Scale AA Disabled Mortality: RP-2000 Combined Employee and Annuitant Mortality Table



Section II – Financial Statement Notes

Paragraph 31.b.(1)

- (a) **Discount rate:** The discount rate used to measure the total pension liability was 5.93% percent. The pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members until the plan year ending June 30, 2056. Therefore, the long-term expected rate of return on pension plan investments of 7.75% was applied to all periods of projected benefit payments through June 30, 2056 and the applicable municipal bond index rate of 3.01%, based on the Bond Buyer General Obligation 20-year Municipal Bond Index published monthly by the Board of Governors of the Federal Reserve System as of June 30, 2016, was applied to all periods of projected benefit payments after June 30, 2056. 5.93% discounts the entire projected benefit stream to the same amount as the sum of the present values of the two separate benefit payments streams was used to determine the total pension liability as of June 30, 2016.
- (b) **Projected cash flows:** The projection of cash flows used to determine the Discount Rate assumed the System would receive the contributions provided for in statute.
- (c) **Long term rate of return:** The long-term expected rate of return on pension plan investments is 7.75% and was determined using a combination of analysis which includes log-normal distribution analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. In addition, a Peer System Comparison analysis is also conducted of similar retirement systems which compares the assumed rate of return to the median assumed rate of return of other retirement systems which are similar in terms of asset size.
- (d) **Municipal bond rate:** the municipal bond rate used is 3.01%
- (e) **Periods of projected benefit payments:** projected future benefit payments for all current plan members were projected through 2117.



Section II – Financial Statement Notes

(f) **Assumed Asset Allocation:** The target asset allocation and best estimates of arithmetic real rates of return for each major asset class are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return
Broad US Equity	36.0%	4.55%
Broad Intl Equity	18.0%	6.35%
Private Equity	12.0%	7.75%
Intermediate Bonds	23.4%	1.00%
High Yield Bonds	2.6%	4.00%
Core Real Estate	4.0%	4.00%
Non-Core Real Estate	4.0%	4.00%

(g) **Sensitivity analysis:** this paragraph requires disclosure of the sensitivity of the net pension liability to changes in the Discount Rate. The following presents the net pension liability of the System, calculated using the Discount Rate of 5.93 percent, as well as what the System’s net pension liability would be if it were calculated using a Discount Rate that is 1-percentage-point lower or 1-percentage-point higher than the current rate:

	1% Decrease 4.93%	Current Discount Rate 5.93%	1% Increase 6.93%
System’s net pension liability	\$250,204,529	\$175,677,824	\$115,027,964



Section II – Financial Statement Notes

Paragraph 31(c): June 30, 2015 is the actuarial valuation date upon which the TPL is based. An expected TPL is determined as of June 30, 2016 using standard roll forward techniques. The roll forward calculation adds the annual normal cost (also called the service cost), subtracts the actual benefit payments and refunds for the plan year and then applies the expected investment rate of return for the year. The table below summarizes the calculation.

TPL Roll Forward	(1) TPL Reported for Fiscal Year End 2015	(2) Development of TPL for Fiscal Year End 2016	(2) Development of TPL for Fiscal Year End 2016
(a) Interest Rate	6.86%	6.86%	5.93%
(b) Valuation Date for Measurement	June 30, 2014	June 30, 2015	June 30, 2015
(c) TPL as of June 30, 2015	\$ 392,094,093	\$ 392,795,210	\$ 446,541,715
(d) Entry Age Normal Cost for the period July 1, 2015 - June 30, 2016	14,384,997	14,384,997	17,750,308
(e) Actual Benefit Payments and Refunds for the period July 1, 2015 - June 30, 2016	16,505,327	16,505,327	16,505,327
(f) TPL as of June 30, 2016 = [(c + d) * (1 + (a))] - [e * (1 + (a))/2]	\$ 417,292,096	\$ 418,041,309	\$ 474,829,830
(g) Experience Actuarial (Gain) / Loss: = (2f) - (1f)		\$ 749,213	
(h) Assumption Change =(3f) - (2f)			\$ 56,788,521



Section III – Required Supplementary Information

There are several tables of Required Supplementary Information (RSI) that need to be included in the System’s financial statements:

Paragraphs 32(a)-(c): The required tables are provided in Schedule A.

Paragraph 32(d): The money-weighted rates of return required are to be supplied by the Plan.

Paragraph 34: In addition the following should be noted regarding the RSI:

Changes of benefit terms: The following changes were made to the plan provisions as noted:

2015

IF a PERS member transfers employment to a SRS covered position and fails to elect SRS membership within 90 days, the default is PERS membership.

Changes of assumption: None.

Method and assumptions used in calculations of actuarially determined contributions. The actuarially determined contribution rates are determined on an annual basis. The following actuarial methods and assumptions were used to determine contribution rates reported in that schedule:

Valuation date	June 30, 2015
Timing	Actuarially determined contributions are determined on the valuation date payable in the fiscal year beginning immediately following the valuation date
Actuarial cost method	Entry age Normal
Amortization method	Level percentage of payroll, open
Remaining amortization period	30 years
Asset valuation method	4-year smoothed market
Wage Inflation	4.00 percent
Salary increase	4.00 to 11.30 percent, including inflation
Inflation	3.00%
Investment rate of return	7.75 percent, net of pension plan investment expense, including inflation



Section III – Required Supplementary Information

Mortality

Healthy Mortality:
RP-2000 Combined Employee and Annuitant
Mortality Table projected to 2015 using Scale AA
Disabled Mortality:
RP-2000 Combined Employee and Annuitant
Mortality Table



Schedule A – Required Supplementary Tables

SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY GASB 67 Paragraph 32(a)

	2016	2015	2014
Total pension liability			
Service Cost	18,802,901	12,574,185	15,117,708
Interest	22,900,429	25,664,435	23,976,049
Benefit changes	0	0	0
Difference between expected and actual experience	749,213	(194,994)	0
Changes of assumptions	56,788,521	43,058,238	(49,542,278)
Benefit payments	(15,476,437)	(15,280,070)	(13,943,335)
Refunds of contributions	(1,028,890)	0	0
Net change in total pension liability	82,735,737	65,821,794	(24,391,856)
Total pension liability - beginning	392,094,093	326,272,299	350,664,155
Total pension liability - ending (a)	474,829,830	392,094,093	326,272,299
Plan net position			
Contributions - employer	7,316,674	6,902,448	6,689,311
Contributions - member	6,982,217	6,623,175	6,447,179
Net investment income	6,063,591	13,041,786	41,789,437
Benefit payments	(15,476,437)	(15,280,070)	(13,943,335)
Administrative expense	(322,584)	(247,405)	(203,493)
Refunds of contributions	(1,028,890)	0	0
Other	(77,778)	0	0
Net change in plan net position	3,456,793	11,039,934	40,779,099
Plan net position - beginning	295,695,213	284,655,279	243,876,180
Plan net position - ending (b)	299,152,006	295,695,213	284,655,279
Net pension liability - ending (a) - (b)	175,677,824	96,398,880	41,617,020



Schedule A – Required Supplementary Tables

**SCHEDULE OF THE NET PENSION LIABILITY
GASB 67 Paragraph 32(b)**

	2016	2015	2014
Total pension liability	474,829,830	392,094,093	326,272,299
Plan net position	<u>299,152,006</u>	<u>295,695,213</u>	<u>284,655,279</u>
Net pension liability	175,677,824	96,398,880	41,617,020
Ratio of plan net position to total pension liability	63.00%	75.41%	87.24%
Covered-employee payroll	70,593,304	68,045,517	64,672,635
Net pension liability as a percentage of covered- employee payroll	248.86%	141.67%	64.35%



Schedule A – Required Supplementary Tables

**SCHEDULE OF EMPLOYER CONTRIBUTIONS
GASB 67 Paragraph 32(c)**

	2016	2015	2014
Actuarially determined employer contribution	8,639,648	9,737,000	9,779,000
Actual employer contributions	7,316,674	6,902,448	6,689,311
Non-Employer Contributions	0	0	0
Annual contribution deficiency (excess)	1,322,974	2,834,552	3,089,689
Covered-employee payroll	70,593,304	68,045,517	64,672,635
Actual contributions as a percentage of covered-employee payroll	10.36%	10.14%	10.34%



Schedule B – Plan Provisions

- | | |
|---|---|
| Service Credit | <ul style="list-style-type: none">• Service credit is used to determine the amount of a member’s retirement benefit• One month of service credit is earned for each month where the member is paid for 160 hours. This includes certain transferred and purchased service. |
| Membership Service | <ul style="list-style-type: none">• Membership service is used to determine eligibility for vesting, retirement or other benefits.• One month of membership service is earned for any month member contributions are made, regardless of the number hours worked.• All System’s members may purchase service that counts toward membership service.• Additionally, eligible active and inactive Sheriffs’ Retirement System (SRS) members may purchase 1 for 5 (additional) service that will count as membership service. |
| Contributions | <ul style="list-style-type: none">• Member contributions are made through an “employer pick-up” arrangement which result in deferral of taxes on the contributions. |
| Compensation | <ul style="list-style-type: none">• Compensation generally means all remuneration paid, excluding certain allowances, benefits, and lump sum payments. Compensation is specifically defined in law and differs amongst the systems.• Bonuses paid on or after July 1, 2013 to any member will not be treated as compensation for retirement purposes. No member or employer contributions will be paid on bonuses. |
| Withdrawal of employee contributions | <ul style="list-style-type: none">• A member is eligible for a withdrawal of their contributions when they terminate service and are either not eligible for or have not taken a retirement benefit.• The member receives the accumulated member contributions which consists of member contributions and regular interest.• Upon receipt of a refund of accumulated contributions a member’s vested right to a monthly benefit is forfeited. |
| Member contributions interest credited (regular interest) | <ul style="list-style-type: none">• Interest is credited to member accounts at the rates determined by the Board.• The current interest rate credited to member accounts is 0.25%. |
| Vesting eligibility and benefit | <ul style="list-style-type: none">• 5 years of membership service.• Accrued normal retirement benefit, payable when eligible for retirement.• In lieu of a pension, a member may receive a refund of accumulated contributions.• Upon receipt of a refund of contributions, a member’s vested right to a monthly benefit is forfeited. |
| Type of Plan | <ul style="list-style-type: none">• Multiple-employer cost sharing |



Schedule B – Plan Provisions

Membership eligibility	<ul style="list-style-type: none">• Sheriffs• Investigators (effective July 1, 1993)• Detention officers (effective July 1, 2005)
Member contributions	<ul style="list-style-type: none">• 9.245% of member's compensation.
Employer contributions	<ul style="list-style-type: none">• 10.115% of each member's compensation• Rate increased from 9.535% to 9.825% on July 1, 2007 and then to present rate 10.115% on July 1, 2009• These increased contributions as of 2009 of 0.58% will terminate in an actuarial valuation shows that the period required to amortize the system's unfunded liability is less than 25 years, and that the termination of these increases would not cause the amortization to increase beyond 25 years.• Beginning July 1, 2013, employers of retirees who return to work in a position working less than 480 hours contribute 10.115% of the working retiree's compensation.
Compensation period used in benefit calculation	<ul style="list-style-type: none">• HAC = Highest Average Compensation• Hired prior to July 1, 2011: HAC is average of the highest 36 consecutive months (or shorter period of total service) of compensation paid by member.• Hired on or after July 1, 2011: HAC is average of the highest 60 consecutive months (or shorter period of total service) of compensation paid to member.• Hired on or after July 1, 2013: 110% annual cap on compensation considered as part of a member's HAC.
Service retirement Eligibility and benefit formula	<ul style="list-style-type: none">• 20 years of membership service• 2.5% of HAC x years of service credit
Early retirement Eligibility and benefit	<ul style="list-style-type: none">• Age 50 with 5 years of membership service; or• Normal retirement benefit calculated using HAC and service credit at early retirement, and reduced to the actuarial equivalent commencing at the earliest of age 60 or the attainment of 20 years of service credit.
Disability eligibility and benefit formula	<p>Non-duty-related:</p> <ul style="list-style-type: none">• Active or inactive vested member• 5 years membership service• The actuarial equivalent of the accrued normal retirement benefit available at time of disability.



Schedule B – Plan Provisions

Disability retirement eligibility and benefit formula continued

Duty-related disability:

- Vested or non-vested active member
- Any membership service
- Less than 20 years of membership service:
50% of HAC, or
- 20 years or more of membership service:
2.5% of HAC x years of service credit

Survivor's eligibility and benefit formula

Duty-related death:

- Vested or non-vested active member
- Lump-sum payment of the member's accumulated contributions;
or
- a monthly survivor benefit to the designated beneficiary equal to the greater of:
- 50% of HAC; or
- 2.5% of HAC for each year of service credit actuarially reduced from age 60 or from the date when 20 years of membership service would have been completed, whichever provides the greater benefit

Non-duty-related death:

- Active, Inactive, or retired members
- Lump-sum payment of the members accumulated contributions;
or
- a monthly survivor benefit equal to 2.5% of HAC for each year of service credit actuarially reduce from age 60 or from the date when 20 years of membership service would have been completed, whichever provides the greatest benefit.
- A beneficiary may elect to receive the present value of the benefit as a single lump sum.
- For retired members without a contingent annuitant, a payment will be made to the designated beneficiary equal to the accumulated contributions reduce by any retirement benefit already paid.

Retirement benefits - Form of payment

The normal form of payment is a single life annuity with a refund of any remaining accumulated contributions (account balance) to a designated beneficiary. (Option 1)

Optional Benefits:

- Option 2, a life annuity and joint 100% survivor benefit,
- Option 3, a life annuity and joint 50% survivor benefit, and
- Option 4, a life annuity with a period certain.

If a retiring member selects Option 2 or 3 and the contingent annuitant predeceases or is divorced from the member, the retiree may, within 18 months of the death or divorce, choose to revert to the higher Option 1 benefit available at retirement or the retiree may select a different contingent annuitant and/or a different option.



Schedule B – Plan Provisions

Post retirement
benefit increases

For retired members who have been retired at least 12 months, a Guaranteed Annual Benefit Adjustment (GABA) will be made each year equal to:

- 3% for members hired before July 1, 2007, and
- 1.5% for members hired on or after July 1, 2007

Changes since
last valuation

None



Schedule C – Actuarial Assumptions and Methods

Tables C-1 through C-7 give rates of decrement for service retirement, disablement, mortality, and other terminations of employment.

Actuarial Cost Method

The actuarial valuation was prepared using the entry age actuarial cost method. Under this method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated as a level percentage of the individual's projected compensation between entry age and assumed exit. The portion of this actuarial present value allocated to a valuation year is called the normal cost. The normal cost was first calculated for each individual member. The normal cost rate is defined to equal the total of the individual normal costs, divided by the total pay rate.

The portion of this actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets and (b) the actuarial present value of future normal costs is called the UAAL. The UAAL is amortized as a level percentage of the projected salaries of present and future members of the System.

Records and Data

The data used in the valuation consist of financial information; records of age, sex, service, salary, contribution rates, and account balances of contributing members; and records of age, sex, and amount of benefit for retired members and beneficiaries. All of the data were supplied by the System and are accepted for valuation purposes without audit.

Replacement of Terminated Members

The ages at entry and distribution by sex of future members are assumed to average the same as those of the present members they replace. If the number of active members should increase, it is further assumed that the average entry age of the larger group will be the same, from an actuarial standpoint, as that of the present group. Under these assumptions, the normal cost rates for active members will not vary with the termination of present members.

Administrative and Investment Expenses

The investment expenses of the System are assumed to be funded by investment earnings in excess of 7.75% per year.

Administrative expenses are assumed to equal 0.17% of payroll.

Valuation of Assets

Market value of assets

Investment Earnings

The annual rate of investment earnings of the assets of the System is assumed to be 7.75% per year net of investment expenses, compounded annually.



Schedule C – Actuarial Assumptions and Methods

Interest on Member Contributions

Interest on member contributions is assumed to accrue at a rate of 3.50% per annum, compounded annually.

Future Salaries

The rates of annual salary increase assumed for the purpose of the valuation are illustrated in Table C-2. In addition to increases in salary due to merit and longevity, this scale includes an assumed 4.0% annual rate of increase in the general wage level of the membership.

Service Retirement

Table C-3 shows the annual assumed rates of retirement among members eligible for service retirement. Separate rates are used when a member is eligible for reduced benefits, for the first year a member is eligible for full benefits, and for the years following the first year a member is eligible for full benefits.

Disablement

The rates of disablement used in this valuation are illustrated in Table C-4.

Mortality

The mortality rates used in this valuation are illustrated in Table C-5. A written description of each table used is included in Table C-1.

Other Terminations of Employment

The rates of assumed future withdrawal from active service for reasons other than death, disability or retirement are shown for representative ages in Table C-6.

Benefits for Terminating Members

Members terminating with less than five years of service are assumed to request an immediate withdrawal of their contributions with interest. Table C-7 shows the assumed probability of retaining membership in the System among members terminating with five or more years of service.

We estimated the present value of future benefits for terminated vested members based on the greater of the present value of their deferred benefit at age 60 or their available contribution account.

Probability of Marriage & Dependent Children

If death occurs in active status, all members are assumed to have an eligible surviving spouse with no dependent children. Female spouses are assumed to be three years younger than males.



Schedule C – Actuarial Assumptions and Methods

Records with no Birth Date

New records with no birth date are assumed to be 37 years old. Records that are not new and have no birth date used the same birth date as the prior year's valuation.



Schedule C – Actuarial Assumptions and Methods

Table C-1

Summary of Valuation Assumptions

I. Economic assumptions		
A. General wage increases		4.00%
B. Investment return		7.75%
C. Price Inflation Assumption		3.00%
D. Growth in membership		0.00%
E. Interest on member accounts		3.50%
II. Demographic assumptions		
A. Individual salary increase due to promotion and longevity		Table C-2
B. Retirement		Table C-3
C. Disablement		Table C-4
D. Mortality among contributing members, service retired members, and beneficiaries. The tables include margins for mortality improvement which is expected to occur in the future.		Table C-5
For Males and Females: RP 2000 Combined Mortality Table projected to 2015 using Scale AA.		
E. Mortality among disabled members		Table C-5
For Males and Females: RP 2000 Combined Mortality Table.		
F. Other terminations of employment		Table C-6
G. Probability of retaining membership in the System upon vested termination		Table C-7



Schedule C – Actuarial Assumptions and Methods

Table C-2

Future Salaries

Years of Service	Individual Merit & Longevity	General Wage Increase	Total Salary Increase
1	7.30%	4.00%	11.30%
2	5.60	4.00	9.60
3	4.40	4.00	8.80
4	3.50	4.00	7.50
5	2.80	4.00	6.80
6	2.20	4.00	6.20
7	1.70	4.00	5.70
8	1.30	4.00	5.30
9	1.00	4.00	5.00
10	0.70	4.00	4.70
11	0.40	4.00	4.40
12	0.40	4.00	4.40
13	0.40	4.00	4.40
14	0.40	4.00	4.40
15	0.40	4.00	4.40
16	0.20	4.00	4.20
17	0.20	4.00	4.20
18	0.20	4.00	4.20
19	0.20	4.00	4.20
20	0.20	4.00	4.20
21	0.00	4.00	4.00
22 & Up	0.00	4.00	4.00



Schedule C – Actuarial Assumptions and Methods

Table C-3

**Retirement
Annual Rates**

<u>Age</u>	<u>20 or More Years of Service</u>
Less than 50	10.0%
50	10.0%
51	10.0
52	10.0
53	10.0
54	10.0
55	15.0
56	15.0
57	15.0
58	15.0
59	15.0
60	20.0
61	20.0
62	20.0
63	20.0
64	20.0
60 & Over	100.0

Vested terminations are assumed to retire at their earliest unreduced eligibility



Schedule C – Actuarial Assumptions and Methods

Table C-4
Disablement
Annual Rates

<u>Age</u>	<u>All Members</u>
22	.00%
27	.10
32	.10
37	.10
42	.40
47	.40
52	.40
57	.40
62	.00

75% of disabilities are assumed to be duty-related. All disabilities are assumed to be permanent and without recovery.



Schedule C – Actuarial Assumptions and Methods

Table C-5
Mortality
Annual Rates

Age	Contributing Members, Service Retired Members and Beneficiaries		Disabled Members	
	Men	Women	Men	Women
25	0.0323%	0.0168%	0.0376%	0.0207%
30	0.0412	0.0227	0.0444	0.0264
35	0.0717	0.0402	0.0773	0.0475
40	0.0957	0.0563	0.1079	0.0706
45	0.1239	0.0882	0.1508	0.1124
50	0.1628	0.1296	0.2138	0.1676
55	0.2718	0.2409	0.3624	0.2717
60	0.5297	0.4689	0.6747	0.5055
65	1.0309	0.9003	1.2737	0.9706
70	1.7702	1.5529	2.2206	1.6742
75	3.0622	2.4916	3.7834	2.8106
80	5.5360	4.1291	6.4368	4.5879
85	9.9680	7.0761	11.0757	7.7446
90	17.2706	12.5879	18.3408	13.1682
95	25.9578	18.8755	26.7491	19.4509

10% of all member deaths are assumed to be duty-related.



Schedule C – Actuarial Assumptions and Methods

Table C-6

**Other Terminations of Employment
Among Members Not Eligible to Retire
Annual Rates**

Years of Service	<u>All Members</u>
0	20.0%
1	15.0
2	12.0
3	10.0
4	10.0
5	5.0
6	5.0
7	5.0
8	5.0
9	5.0
10	3.0
11	3.0
12	3.0
13	3.0
14	3.0
15	1.0
16	1.0
17	1.0
18	1.0
19	1.0



Schedule C – Actuarial Assumptions and Methods

Table C-7

**Probability of Retaining Membership in the System
Upon Vested Termination**

<u>Age</u>	<u>Probability of Retaining Membership</u>
Under 35	30%
35	40
36	40
37	40
38	40
39	40
40	50
41	50
42	50
43	50
44	50
45	60
46	60
47	60
48	60
49	60
50 & Over	100



Schedule D – Glossary of Terms

Actuarial Present Value of Projected Benefit Payments

Projected benefit payments discount to reflect the expected effects of the time value (present value) of money and the probabilities of payment.

Actuarial Valuation

The determination, as of a point in time (the actuarial valuation date), of the service cost, total pension liability, and related actuarial present value of projected benefit payments for pensions performed in conformity with Actuarial Standards of Practice unless otherwise specified by the GASB.

Actuarial Valuation Date

The date as of which an actuarial valuation is performed.

Actuarially Determined Contribution

A target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.

Cost-Sharing Multiple Employer Defined Benefit Pension Plan (Cost-Sharing Pension Plan)

A multiple-employer defined benefit pension plan in which the pension obligation to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.

Covered Employee Payroll

The payroll on which contributions to a pension plan are based.



Schedule D – Glossary of Terms

Discount Rate

The single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the total of the following:

1. The actuarial present value of benefit payments projected to be made in future periods in which (a) the amount of the pension plan's fiduciary net position is projected (under the requirements of Statement 67) to be greater than the benefit payments that are projected to be made in the period and (b) pension plan assets up to that point are expected to be invested using a strategy to achieve the long-term expected rate of return, calculated using the long-term expected rate of return on pension plan investments.
2. The actuarial present value of projected benefit payments not included in (1), calculated using the municipal bond rate.

Entry Age Actuarial Cost Method

A method under which the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this actuarial present value allocated to a valuation year is called the normal cost. The portion of the actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is called the actuarial accrued liability.

Money-Weighted Rate of Return

A method of calculating period-by-period returns on pension plan investments that adjust for the changing amounts actually invested. For purpose of Statement 67, money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.

Net Pension Liability

The liability of employers and non-employer contributing entities to plan members for benefits provided through a defined benefit pension plan. It is calculated by subtracting the plan's fiduciary net position from the plan's total pension liability.

Non-Employer Contributing Entity

Entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of Statement 67, plan members are not considered non-employer contributing entities.



Schedule D – Glossary of Terms

Plan Members

Individuals that are covered under the terms of a pension plan. Plan Members generally included (1) employees in active service (active plan members) and (2) terminated employees who have accumulated benefits but are not yet receiving them and retirees or their beneficiaries currently receiving benefits (inactive plan members).

Projected Benefit Payments

All benefits estimated to be payable through the pension plan to current active and inactive plan members as a result of their past service and their expected future service.

Real Rate of Return

The rate of return on an investment after adjustment to eliminate inflation

Service Cost

The portion of the actuarial present value of projected benefit payments that is attributed to a valuation year.

Single-Employer Defined Benefit Pension Plan (Single-Employer Pension Plan)

A defined benefit pension plan that is used to provide pensions to employees of only one employer.

Total Pension Liability

The portion of the actuarial present value of projected benefit payments that is attributed to past periods of member service in conformity with the requirements of Statement 67.