



Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

October 21, 2016

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

Members of the Board:

We are submitting the results of the annual valuation of the assets and liabilities of the Firefighters' Unified Retirement System of the State of Montana (FURS), prepared as of June 30, 2016. The purpose of this letter is to disclose differences between the valuation report issued on October 3, 2016, which was presented at the October 6, 2016 Board meeting, and the valuation report issued October 21, 2016. These differences reflect changes made by Cavanaugh MacDonald LLC and such changes are made through no fault of the Montana Public Employee Retirement Administration (MPERA).

The first step in any actuarial valuation is to perform a data reconciliation to catch any data discrepancies that exist in the current year's valuation data provided by MPERA staff from what would have been expected from the prior year's valuation data. As a result, it is not uncommon for final valuation data to have participant counts that do not exactly match the participant counts in the data provided by the MPERA staff. This is especially true in a year when transitioning from one actuarial firm to another. As a result, the participant demographic information disclosed in the Summary of Results, Appendix D and Appendix E has been updated to reflect the participant counts provided by MPERA, without adjustment for data processing, and to correct any inconsistencies in the demographic information between tables.

The changes mentioned above have no material impact. The funded ratio and the remaining amortization period of the unfunded actuarial accrued liability were unchanged.

Respectfully submitted,

Edward A. Macdonald, ASA, FCA, MAAA
President

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

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Cavanaugh Macdonald
CONSULTING, LLC

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**Firefighters' Unified Retirement System
of the State of Montana**

**Actuarial Valuation
As of June 30, 2016**

Issued as of October 21, 2016





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October 21, 2016

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

Members of the Board:

In this report are submitted the results of the annual valuation of the assets and liabilities of the Firefighters' Unified Retirement System of the State of Montana (FURS), prepared as of June 30, 2016.

The purpose of this report is to provide a summary of the funded status of the System as of June 30, 2016. While not verifying the data at source, the actuary performed tests for consistency and reasonability. The valuation indicates that the statutory contribution rate reflecting all anticipated contribution increases are sufficient to amortize the unfunded accrued liability within a 9-year period.

The promised benefits of the System are included in the actuarially calculated contribution rates, which are developed using the Entry Age Normal Cost Method. Four-year market related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded accrued liability that is being amortized by regular annual contributions as a level percentage of payroll, on the assumption that payroll will increase by 4.00% annually. The assumptions recommended by the actuary and adopted by the Board are, in the aggregate, reasonably related to the experience under the Fund and to reasonable expectations of anticipated experience under the Fund.

This is to certify that Edward Macdonald and Todd Green, Principal and Consulting Actuaries for Cavanaugh Macdonald Consulting, are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. This also certifies that the undersigned have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

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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.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Edward Macdonald'.

Edward A. Macdonald, ASA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Todd B. Green'.

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

A handwritten signature in blue ink, appearing to read 'Joseph A. Nichols'.

Joseph A. Nichols, ASA, EA, FCA, MAAA, MSPA
Senior Actuary

A handwritten signature in blue ink, appearing to read 'Matthew Yonz'.

Matthew Yonz, ASA
Senior Actuarial Analyst



**Firefighters' Unified Retirement System
State of Montana**

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Section I: Summary of Results

For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below:

VALUATION DATE	June 30, 2016	June 30, 2015
Participant Counts		
Active Members	644	627
Retirees and Beneficiaries	614	600
Disabled Members*	7	9
Terminated Vested Members	27	21
Terminated Non-Vested Members	77	71
Total**	1,369	1,328
Annual Covered Payroll of Active Members	\$ 43,118,925	\$ 41,041,360
Average Salaries from Covered Payroll	\$ 66,955	\$ 65,457
Annual Retirement Allowances for Retired Members and Beneficiaries	\$ 21,567,671	\$ 20,322,164
Assets		
Actuarial value	\$ 365,258,501	\$ 333,629,221
Market value	351,628,654	340,636,031
Actuarial Accrued Liability (AAL)	\$ 466,671,399	\$ 441,834,268
Unfunded Actuarial Accrued Liability (UAAL)	\$ 101,412,898	\$ 108,205,047
Funded Ratio	78.27%	75.51%
Market Value Rate of Return	2.15%	4.52%
Annual Cost		
Statutory Funding Rate***	57.67%	57.67%
Total Normal Rate	26.48%	26.51%
Employee Contribution Rate****	<u>10.69%</u>	<u>10.69%</u>
Employer Normal Rate	15.79%	15.82%
Employer Contribution Rate		
Normal Rate	15.79%	15.82%
Administrative Expense Load	0.19%	0.19%
UAAL Rate	<u>30.99%</u>	<u>30.96%</u>
Total Rate	46.97%	46.97%
Amortization Period	9 years	10 years
Employer Contribution Rate Necessary to Amortize UAAL over 30 Years		
Normal Rate	15.79%	15.82%
Administrative Expense Load	0.19%	0.19%
UAAL Rate (30-Year Rate)	<u>12.34%</u>	<u>13.78%</u>
Total Rate	28.32%	29.79%
Shortfall/(Surplus)	(18.65%)	(17.18%)

* Based on PERB categorization for the annual report. For actuarial purposes, 63 members in 2015 and 64 members in 2016 were valued as disabled members with offsetting reductions to the number of retired members.

** A reconciliation between participant counts used for the annual report and counts for the valuation appears at the beginning of Appendix D.

*** The statutory funding rate consists of the member contribution rate of 10.70% of compensation plus the employer contribution rate of 46.97% of compensation.

**** Members who have elected GABA contribute 10.70% of compensation. Members who have not elected GABA contribute 9.50% of compensation. The employee contribution rate reflects the average contribution rate of all employees.



Section I: Summary of Results

As a result of this actuarial valuation of the benefits in effect under the Firefighters' Unified Retirement System as of June 30, 2016, the statutory employer contributions are sufficient to amortize the Unfunded Actuarial Accrued Liability (UAAL) of the Retirement System within 9 years. The Funded Ratio is 78.27%.

Calculations based on the Market Value of Assets

MCA 19-2-407 requires this report to show how market performance is affecting the actuarial funding of the Retirement System. The June 30, 2016, market value of assets is \$13,629,847 less than the actuarial value of assets. This is due to the smoothing of investment gains and losses over a four-year period. If the market value of assets was used, the amortization period would be 10 years, and the Funded Ratio would be 75.35%.

Additional Details

MCA 19-13 sets the employer contribution at 14.36% of salary, the state contribution at 32.61% and the employee contribution at 9.50% for non-GABA actives and 10.7% for GABA actives.

The actuarial costs are calculated using the entry age actuarial cost method. This is the method used by most public plans. It is designed to provide a stable contribution rate as a percent of member pay. This actuarial valuation measures the adequacy of the contribution rates set in Montana State Law.

Investment Experience

The market assets earned 2.15% net of investment and operating expenses. As a result of prior years' unrecognized gains, the actuarial assets earned 8.33%, which is 0.58% greater than the actuarial assumption of 7.75%. The return on the actuarial assets differs from the return on market assets because the actuarial value of assets spreads gains and losses over four years. The chart below shows the annual returns for the past ten years.

Year	Market Return	Actuarial Return	Assumed Investment Return	Market Return over Assumption	Actuarial Return over Assumption
7/1/2006 to 6/30/2007	17.36%	11.44%	8.00%	9.36%	3.44%
7/1/2007 to 6/30/2008	(4.80)	7.31	8.00	(12.80)	(0.69)
7/1/2008 to 6/30/2009	(20.08)	(0.17)	8.00	(28.08)	(8.17)
7/1/2009 to 6/30/2010	11.99	(0.83)	7.75	4.24	(8.58)
7/1/2010 to 6/30/2011	20.71	0.84	7.75	12.96	(6.91)
7/1/2011 to 6/30/2012	2.42	3.87	7.75	(5.33)	(3.88)
7/1/2012 to 6/30/2013	12.43	11.05	7.75	4.68	3.30
7/1/2013 to 6/30/2014	16.53	12.44	7.75	8.78	4.69
7/1/2014 to 6/30/2015	4.52	9.32	7.75	(3.23)	1.57
7/1/2015 to 6/30/2016	2.15	8.33	7.75	(5.60)	0.58

Asset gains or losses result when the return on the actuarial value of assets differs from the assumed investment return assumption.

Amortization of the UAAL

The June 30, 2015, actuarial valuation calculated a 10-year amortization period for the UAAL. The resulting amortization period at June 30, 2016, is 9 years.



Section I: Summary of Results

Funding and Benefits Policy

The Public Employees' Retirement Board has adopted a Funding and Benefits Policy to provide general guidelines to help ensure decisions are made based on sound, consistent, and thoroughly examined criteria. The Funding and Benefits Policy includes guidance on the following topics:

1) Funding Requirement

a) The Funding and Benefits Policy states:

1. The Entry Age Normal Cost Method shall be applied to the projected benefits in determining the Normal Cost and Actuarial Accrued Liability.
2. Asset smoothing can be used in the valuation process to spread the recognition of investment gains and losses over a four-year period.
3. The unfunded actuarial accrued liability should be amortized over a reasonable period of time and should not exceed 30 years on a rolling basis. Generally, the funding period should be constant or decreasing.

b) Analysis: The liabilities of the System are determined using the Entry Age Normal Cost Method and are compared to the actuarial value of assets, which are developed using asset smoothing that recognizes gains and losses over a four-year period. Finally, the amortization period as of June 30, 2016, is 9 years based on actuarial value of assets. The current employer and employee statutory rates keep the System's funding within Board policy guidelines.

2) Funding Objectives

a) The Funding and Benefits Policy states: "The primary objectives are to: 1) ensure that the systems are financially sound and pay all benefits promised using assets accumulated from required employer and member contributions and investment income; and 2) achieve a well-funded status with a range of safety to absorb market volatility without creating a UAL."

b) Analysis: The employer and employee contributions provided for in statute are sufficient to amortize the unfunded actuarial accrued liability within a 9-year period. This ensures that the System is financially sound and will be able to pay all promised benefits and achieve a well-funded status with a range of safety to absorb market volatility without creating and UAL.

3) Benefit Enhancements

a) The Funding and Benefits Policy states: "Proposals must provide funding from sources sufficient to cover future costs. Unfunded liabilities created by the proposal must be amortized over a period of time appropriate to the retirement system, but not more than 30 years."

b) Analysis: Without supplemental funding, a benefit enhancement would increase the amortization period of the unfunded actuarial accrued liability and further delay the goal of achieving a well-funded status with a range of safety to absorb market volatility without creating a UAL.



Section I: Summary of Results

Sensitivity to Future Experience

The valuation results are projections based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing the ultimate cost. The following illustrations provide simple analyses on how the costs are sensitive to changes in the assumed rate of return.

Investment Return – The investment return generally has the largest impact on the funding of the System.

Impact of Assuming 1.00% Lower Investment Return	
	<u>Funded Ratio</u>
Current Assumption 7.75%	78.27%
Lower Assumption 6.75%	<u>68.57%</u>
Decrease	(9.70)%
	<u>Amortization Period</u> <u>Increase / (Decrease)</u>
Current Assumption 7.75%	9 Years
Lower Assumption 6.75%	<u>24 Years</u>
Increase	15 Years
Impact of Assuming 1.00% Higher Investment Return	
	<u>Funded Ratio</u>
Current Assumption 7.75%	78.27%
Higher Assumption 8.75%	<u>88.58%</u>
Increase	10.31%
	<u>Amortization Period</u> <u>Increase / (Decrease)</u>
Current Assumption 7.75%	9 Years
Higher Assumption 8.75%	<u>4 Years</u>
Decrease	(5) Years



Section I: Summary of Results

The future funding status of the System will be determined by the System's experience. The System's actual asset returns and retirement rates, as well as member longevity, salary increases, withdrawal rates, disability rates and future legislation will all impact the funding status of the System. The entry age normal cost method and four year smoothing of asset gains and losses will help to provide a more orderly funding of the System's liabilities, but will not change the actual experience. The amortization period of the UAAL is not likely to decrease by the expected 1.0 year with each passing actuarial valuation. Instead, the amortization period is expected to decrease more or less than 1.0 year each year, reflecting gains and losses due to experience different than the actuarial assumptions.

Initial Valuation

This is the first actuarial valuation report prepared by Cavanaugh Macdonald Consulting (CMC) for FURS. As part of our transition work, we replicated the June 30, 2015, actuarial valuation. Results were well within acceptable limits. Based on our experience, these differences are neither unusual nor significant.

Assumption Changes

There have been no assumption changes since the previous valuation.

Benefit Changes

There have been no benefit changes since the previous valuation.

Contribution Changes

There have been no contribution changes since the previous valuation.

Method Changes

There have been no method changes since the previous valuation.



Section I: Summary of Results

Impact of Changes

The following table summarizes how experience has changed the UAAL since the June 30, 2015, Actuarial Valuation. Further detail can be found in Table 10.

Changes in the Unfunded Actuarial Accrued Liability (UAAL)

June 30, 2015 Valuation UAAL	\$108,205,047
Normal Cost	10,690,919
Contributions	(24,884,989)
Interest	8,250,144
Expected June 30, 2016 UAAL	\$102,261,121
Experience Loss on Actuarial Liabilities	\$1,098,971
Experience Gain on Actuarial Assets	(1,947,194)
Assumption & Method Changes	0
Plan Changes	0
Total (Gain) / Loss	\$(848,223)
June 30, 2016 Valuation UAAL	\$101,412,898



Section I: Summary of Results

Summary

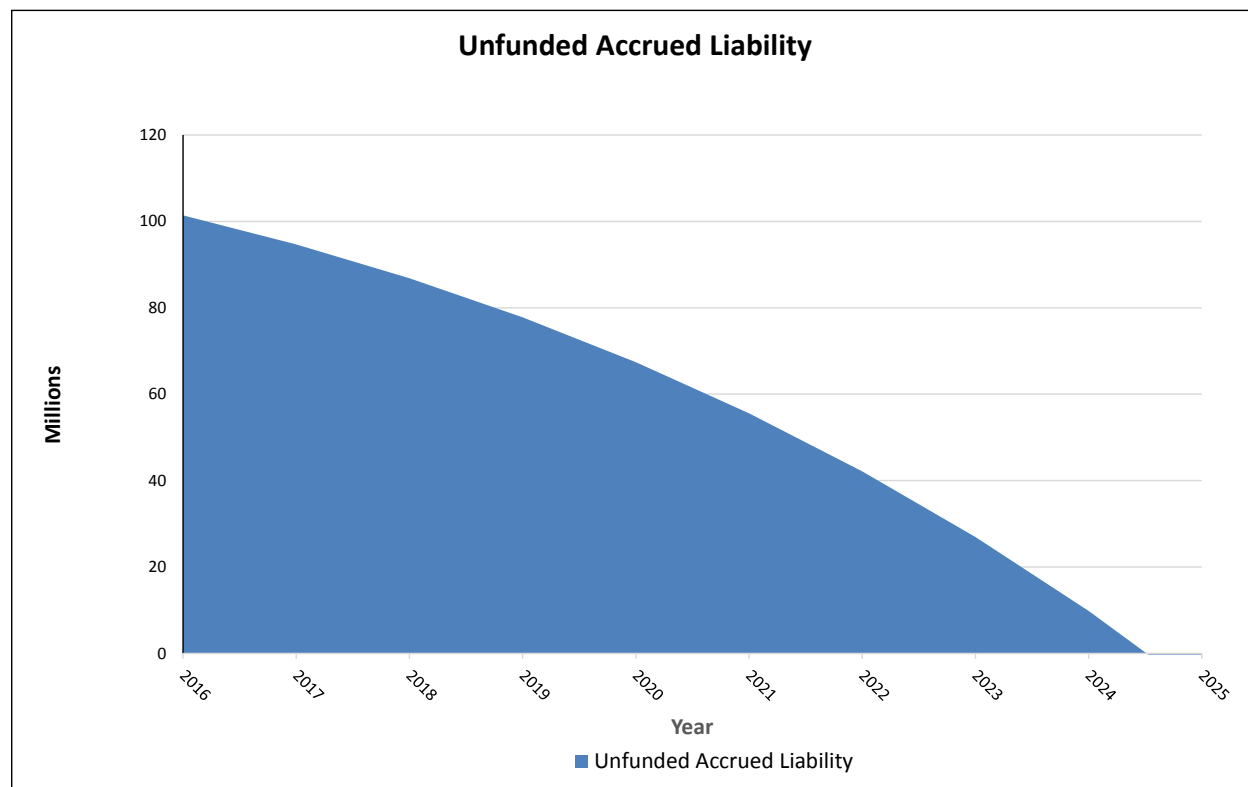
- * The System's actuarial value investment return of 8.33% for the year ended June 30, 2016, is 0.58% more than the actuarial assumption of 7.75%. This represents an asset gain of \$1,947,194 due to investment return being more than anticipated. As of June 30, 2016, the market value of assets was \$351,628,654. As of June 30, 2016, the actuarial value of assets was \$365,258,501. The June 30, 2016, market value of assets will be recognized in future actuarial valuations unless it is offset by returns greater than the 7.75% assumption.
- * As of June 30, 2016, the amortization period of the UAAL is 9 years. Prior to this valuation, the funding period was 10 years. Asset gains primarily account for the decrease in the amortization period. The System's actuarial value of assets currently has unrecognized investment losses that will be recognized over the next 3 years. Absent of investment returns that exceed the assumed rate of return of 7.75% or other actuarial gains, the Systems unfunded actuarial accrued liability is anticipated to increase.
- * The funding of the retirement system will be impacted by future experience, which will sometimes be more favorable than the actuarial assumptions and sometimes less favorable. In particular, investment returns larger and smaller than the 7.75% assumption are expected to have significant impacts on the System's funding progress. In the long term, the favorable experience is needed to offset the less favorable experience. This is the reason for using an actuarial value of assets that allows gains and losses to be smoothed over four years.



Section I: Summary of Results

Projected Progress toward 100% Funding

The table below shows the projected progress toward reaching 100%. When the System is 100% funded, the Unfunded Actuarial Accrued Liability will be fully amortized. This is scheduled to occur within 9 years. The ultimate goal of the FURS System is to become at least 100% funded and to establish a reserve equal to 10% of the Systems Actuarial Accrued Liability.





Section II: Assets

Assets

In many respects, an actuarial valuation can be regarded as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is June 30, 2016. On that date, the assets available for the payment of benefits are appraised. These assets are compared with the actuarial liabilities. The actuarial process thus leads to a method of determining what contributions by members and their employers are needed to strike a balance.

The asset valuation method being used is a four-year smoothing method. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

Table 1 lists the assets held and their market value for the past two years. Table 2 summarizes the fund's activity during the past two years. Table 3 summarizes the determination of the actuarial value of assets. Table 4 summarizes historical asset returns for the last 10 years including the amount recognized by the actuarial asset valuation method which was greater or lesser than the actuarial investment return assumption. Table 5 summarizes the historical asset values on a market value and actuarial value basis, to the extent it was available. Additional data can be included in this table for future reports, if provided by the System.

**Section II: Assets**

**Table 1:
Statement of Fiduciary Net Assets
Fiscal Year Ended June 30,**

	<u>2016</u>	<u>2015</u>
ASSETS		
Cash and Short Term Investments	\$ 9,653,872	\$ 6,101,573
Securities Lending Collateral	\$ 9,381,088	\$ 12,467,940
Receivables:		
Interest Receivable	\$ 458,698	\$ 443,025
Accounts Receivable	76,059	69,938
Due from Other Funds	-	-
Due from Primary Government	13,969,719	13,572,990
Notes Receivable	-	-
Total Receivables	<u>\$ 14,504,476</u>	<u>\$ 14,085,953</u>
Investments, at fair value:		
Investment Pools	327,307,667	320,400,352
Other Investments	-	-
Total Investments	<u>\$ 327,307,667</u>	<u>\$ 320,400,352</u>
Capital Assets		
Property and Equipment, at cost, net of Accumulated Depreciation	\$ 469	\$ 1,052
Equipment	309,936	249,913
Total Capital Assets	<u>\$ 310,405</u>	<u>\$ 250,965</u>
TOTAL ASSETS	<u>\$ 361,157,508</u>	<u>\$ 353,306,783</u>
LIABILITIES		
Securities Lending Liability	\$ 9,381,088	\$ 12,467,940
Accounts Payable	12,354	93,348
Unearned Revenue	12,190	5,443
Due to Other Funds	95,337	86,939
Compensated Absences	19,754	10,773
OPEB Implicit Rate Subsidy LT	8,131	6,309
TOTAL LIABILITIES	<u>\$ 9,528,854</u>	<u>\$ 12,670,752</u>
NET ASSETS HELD IN TRUST FOR PENSION BENEFITS	<u>\$ 351,628,654</u>	<u>\$ 340,636,031</u>

**Section II: Assets**

**Table 2:
Statement of Changes in Fiduciary Net Assets
Fiscal Year Ended June 30,**

	<u>2016</u>	<u>2015</u>
ADDITIONS		
Contributions:		
Employer	\$ 6,163,464	\$ 6,100,252
Plan Member	4,751,806	4,710,082
Other	13,969,719	13,572,990
Total Contributions	<u>\$ 24,884,989</u>	<u>\$ 24,383,324</u>
Misc Income	\$ -	\$ -
Investment Income:		
Net Appreciation/(Depreciation) in Fair Value of Investments	\$ (4,394,578)	\$ 5,861,836
Investment Earnings	13,658,784	10,500,175
Security Lending Income	96,890	79,244
Investment Income/(Loss)	<u>\$ 9,361,096</u>	<u>\$ 16,441,255</u>
Investment Expense	(2,018,478)	(1,786,760)
Security Lending Expense	(30,672)	(14,339)
Net Investment Income/(Loss)	<u>\$ 7,311,946</u>	<u>\$ 14,640,156</u>
Total Additions	<u>\$ 32,196,935</u>	<u>\$ 39,023,480</u>
DEDUCTIONS		
Benefit Payments	\$ 20,896,200	\$ 19,745,267
Refunds/Distributions	46,128	1,741
Refunds to Other Plans	-	-
Transfers to DCRP	-	-
Transfers to MUS-RP	-	-
OPEB Expense	2,424	(5,168)
Administrative Expense	259,560	197,460
Total Deductions	<u>\$ 21,204,312</u>	<u>\$ 19,939,300</u>
NET INCREASE (DECREASE) IN PLAN NET ASSETS	<u>\$ 10,992,623</u>	<u>\$ 19,084,180</u>
NET ASSETS HELD IN TRUST FOR PENSION BENEFITS BEGINNING OF YEAR	\$ 340,636,031	\$ 321,558,562
ADJUSTMENT	-	\$ (6,711)
END OF YEAR	<u>\$ 351,628,654</u>	<u>\$ 340,636,031</u>



Section II: Assets

**Table 3:
Determination of Actuarial Value of Assets**

Valuation Date June 30:	2015	2016	2017	2018	2019
A. Actuarial Value Beginning of Year	\$ 300,949,326	\$ 333,629,221			
B. Market Value End of Year	340,636,031	351,628,654			
C. Market Value of Beginning of Year	321,556,669	340,636,031			
D. Cash Flow					
D1. Contributions	24,383,324	24,884,989			
D2. Benefit Payments	(19,747,008)	(20,942,328)			
D3. Administrative Expenses	(197,110)	(259,560)			
D4. Investment Expenses	-	(2,049,150)			
D5. Net	\$ 4,439,206	\$ 1,633,951			
E. Investment Income					
E1. Market Total: B. - C. - D5.	\$ 14,640,156	\$ 9,358,672			
E2. Assumed Rate	7.75%	7.75%			
E3. Amount for Immediate Recognition C*E2. + ((D1. +D2. + D3.) * E2. * 0.5) - D4.	25,089,451	28,591,163			
E4. Amount for Phased-in Recognition E1. - E3.	(10,449,295)	(19,232,491)			
F. Phased-In Recognition of Investment Income					
F1. Current Year: 0.25 * E4.	\$ (2,612,324)	\$ (4,808,123)	\$ -	\$ -	\$ -
F2. First Prior Year	6,019,168	(2,612,324)	(4,808,123)	-	-
F3. Second Prior Year	2,805,445	6,019,168	(2,612,324)	(4,808,123)	-
F4. Third Prior Year	(3,061,051)	2,805,445	6,019,168	(2,612,324)	(4,808,123)
F5. Total Recognized Investment Gain	\$ 3,151,238	\$ 1,404,166	\$ (1,401,279)	\$ (7,420,447)	\$ (4,808,123)
G. Actuarial Value End of Year A. + D5. + E3. + F5.	\$ 333,629,221	\$ 365,258,501			



Section II: Assets

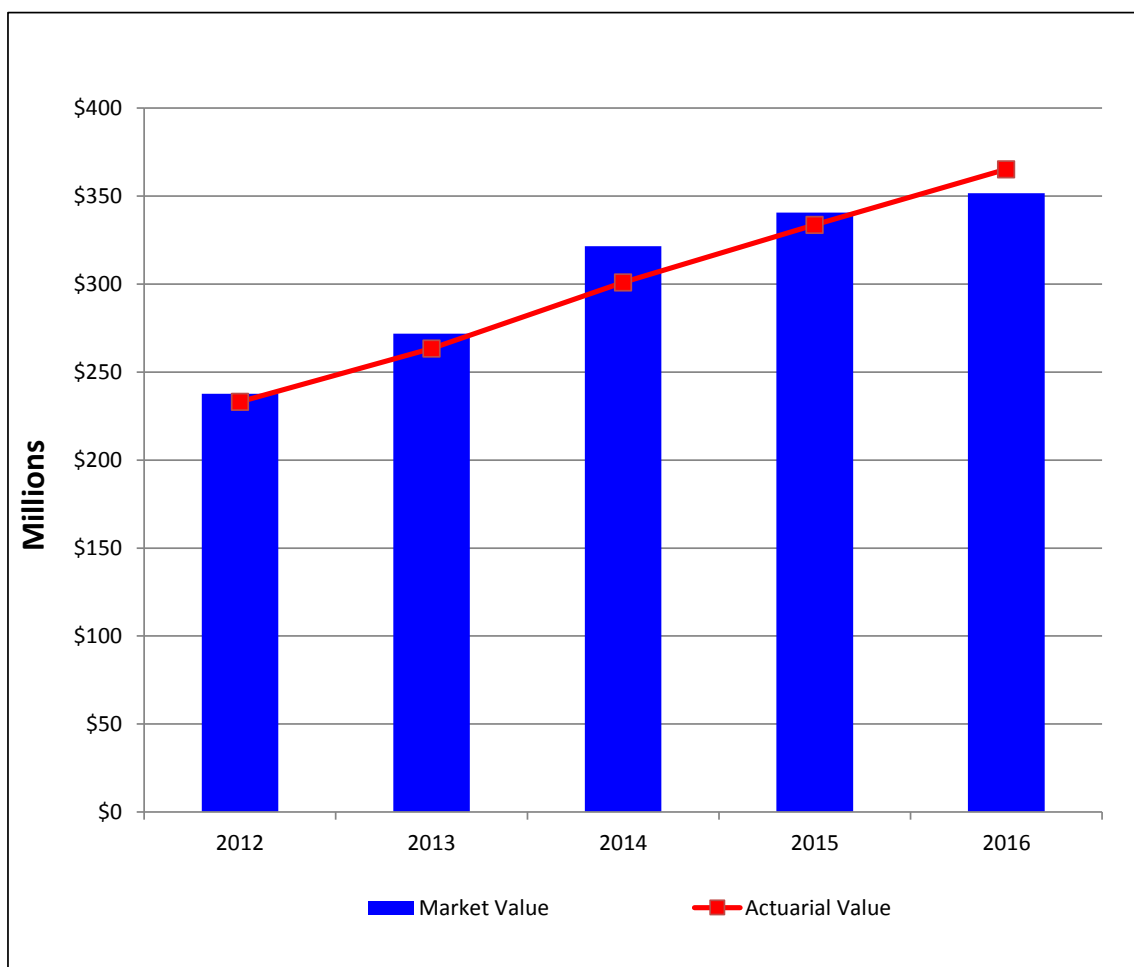
**Table 4:
Historical Investment Returns***

Fiscal Year Ending	Market Returns	Actuarial Returns	Actuarial Assumption	Actuarial Return Over Assumption
June 30, 2007	17.36%	11.44%	8.00%	3.44%
June 30, 2008	(4.80)%	7.31%	8.00%	(0.69)%
June 30, 2009	(20.08)%	(0.17)%	8.00%	(8.17)%
June 30, 2010	11.99%	(0.83)%	7.75%	(8.58)%
June 30, 2011	20.71%	0.84%	7.75%	(6.91)%
June 30, 2012	2.42%	3.87%	7.75%	(3.88)%
June 30, 2013	12.43%	11.05%	7.75%	3.30%
June 30, 2014	16.53%	12.44%	7.75%	4.69%
June 30, 2015	4.52%	9.32%	7.75%	1.57%
June 30, 2016	2.15%	8.33%	7.75%	0.58%
10 Year Average	5.63%	6.25%		(1.58)%

* Returns reflect all investment returns, including investment income and realized and unrealized investment gains and losses, and are net of investment expenses and administrative expenses paid by the System.



**Table 5:
Market Value of Assets vs. Actuarial Value of Assets**





Section III: Actuarial Present Value of Future Benefits

Actuarial Present Value of Future Benefits

In the previous section, an actuarial valuation was related to an inventory process, and an analysis was given of the inventory of assets of the System as of the valuation date. In this section, the discussion will focus on the commitments of the System, which will be referred to as its actuarial liabilities.

Table 6 contains an analysis of the actuarial present value of all future benefits for active members, retirees, and beneficiaries. The analysis is given by type of benefit.

The actuarial liabilities summarized in Table 6 include the actuarial present value of all future benefits expected to be paid with respect to each member covered as of the valuation date. For an active member, this value includes a measure of both benefits already earned and future benefits to be earned. Thus, for all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of their surviving beneficiaries.

The actuarial valuation does not recognize liabilities for employees who become members and participate in the System after the valuation date.



Section III: Actuarial Present Value of Future Benefits

**Table 6:
Actuarial Present Value of Future Benefits for Actives,
Retirees, and Beneficiaries**

	<u>June 30, 2016</u> Total	<u>June 30, 2015</u> Total
A. Active Members Liability Due to Probability of		
Retirement	\$ 251,497,542	\$ 241,698,147
Disability	\$ 16,547,723	\$ 15,810,278
In-Service Death	\$ 7,333,148	\$ 6,240,139
Termination	\$ 12,738,817	\$ 11,682,329
Total	\$ 288,117,230	\$ 275,430,893
B. Inactive Members and Annuitants		
Service Retirement	\$ 235,265,658	\$ 210,659,191
Disability Retirement	\$ 24,834,121	\$ 23,309,073
Beneficiaries*	\$ 32,323,497	\$ 40,536,533
Vested Terminated Members	\$ 3,058,157	\$ 2,079,045
Refund of Member Contributions	\$ 356,588	\$ 295,400
Total	\$ 295,838,021	\$ 276,879,242
C. Grand Total	\$ 583,955,251	\$ 552,310,135



Section IV: Employer Contributions

Employer Contributions

In the previous two sections, attention has been focused on the assets and the present value of all future benefits of the System. A comparison of Tables 3 and 6 indicates that there is a shortfall in current actuarial assets to meet the present value of all future benefits for current members and beneficiaries.

In an active system, there will always be a difference between the assets and the present value of all future benefits. An actuarial valuation sets a schedule of future contributions that will deal with this funding in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. For this valuation, the entry age actuarial cost method has been used. A description of the entry age actuarial cost method is provided in Appendix A. Under this method, or essentially any actuarial cost method, the contributions required to meet the difference between current assets and the present value of all future benefits are allocated each year between three elements:

- A normal cost amount, which ideally is relatively stable as a percentage of salary over the years;
- A load for administrative expenses; and
- An amount which is used to amortize the UAAL.

The two items described above, normal cost and UAAL, are the keys to understanding the actuarial cost method. Let us first discuss the normal cost.

The normal cost is the theoretical contribution rate, which will meet the ongoing costs of a group of average new employees. Suppose that a group of new employees were covered under a separate fund from which all benefits and to which all contributions and associated investment return were to be paid. Under the entry age actuarial cost method, the normal cost contribution rate is that level percentage of pay which would be exactly right to maintain this fund on a stable basis. If experience were to follow the actuarial assumptions exactly, the fund would be completely liquidated with the last payment to the last survivor of the group.

The assumed investment rate of return is 7.75%, net of investment expenses only. As a result, the actuarially determined contribution must include an amount for administrative expenses expected to occur during the year.

We have determined the normal cost rates separately by type of benefit under the System. These are summarized in Table 7. In Table 7 we also provide a summary of the member and employer statutory contributions.

The term "fully funded" is often applied to a system where contributions for everyone at the normal cost rate will fully pay for the benefits of existing as well as new employees. Often, systems are not fully funded, either because of benefit improvements in the past that have not been completely paid for or actuarial deficiencies that have occurred because experience has not been as anticipated. Under these circumstances, a UAAL exists.



Section IV: Employer Contributions

Table 8 shows how the UAAL was derived for the System. Lines A and B show, respectively, the total present value of future benefits and the portion of the future liability that is expected to be paid from future normal cost contributions, both employer and employee. The future normal cost contributions are the portion of the present value of future benefits that are attributed to future years of service that have not been earned yet by the active membership. Line C shows the actuarial accrued liability. Line D shows the amount of assets available for benefits. Line E shows the UAAL.

The UAAL at any date after establishment of a system is affected by any actuarial gains or losses arising when the actual experience of the system varies from the experience anticipated by the actuarial assumptions used in the valuations. To the extent actual experience as it develops differs from the assumptions used, so also will the actual emerging costs differ from the estimated costs. The impact of these differences in actual experience from the assumptions is included in Section 1, the Summary of Findings.



Section IV: Employer Contributions

**Table 7:
Normal Cost Contribution Rates
As Percentages of Salary**

	<u>June 30, 2016 Total</u>	<u>June 30, 2015 Total</u>
Service retirement	20.35%	20.55%
Disability retirement	2.55%	2.56%
In Service Death	1.10%	0.98%
Vested retirement	<u>2.48%</u>	<u>2.42%</u>
Total Normal Rate	<u>26.48%</u>	<u>26.51%</u>
Employee Normal Rate*	10.69%	10.69%
Employer Normal Rate	15.79%	15.82%
Administrative Expense Load	0.19%	0.19%
Rate Available to Amortize Unfunded Actuarial Liability	<u>30.99%</u>	<u>30.96%</u>
Statutory Funding Rate**	57.67%	57.67%

* Members who have elected GABA contribute 10.70% of compensation. Members who have not elected GABA contribute 9.50% of compensation. The employee contribution rate reflects the average contribution rate of all employees.

** The statutory funding rate consists of the member contribution rate of 10.70% of compensation plus the employer statutory rate of 46.97% of compensation.



Section IV: Employer Contributions

**Table 8:
Unfunded Actuarial Accrued Liability**

	June 30, 2016	June 30, 2015
A. Actuarial present value of all future benefits for present and retirees and their survivors (Table 6)	\$ 583,955,251	\$552,310,135
B. Less actuarial present value of total future normal costs for present members	<u>\$ 117,283,852</u>	<u>\$110,475,867</u>
C. Actuarial accrued liability	\$ 466,671,399	\$441,834,268
D. Less assets available for benefits	<u>\$ 365,258,501</u>	<u>\$ 333,629,221</u>
E. Unfunded actuarial accrued liability	\$ 101,412,898	\$108,205,047



Cash Flows

The fundamental equation for funding a retirement system is that benefits and administrative expenses must be provided for by contributions (past and future) and investment income. When a retirement system matures, benefits and administrative expenses often exceed contributions. In this case we say the system has a “negative cash flow.” Mature systems are characterized by negative cash flows and large pools of assets. This is natural. Actuarial funding is designed to accumulate large pools of assets which will in turn provide investment income and finance negative cash flows when systems mature. If the fund is looked at as a whole, investment income is usually larger than the difference between contributions and benefit payments. The retirement system’s investment strategy should maximize potential returns at a prudent level of risk while providing for needed cash flows.

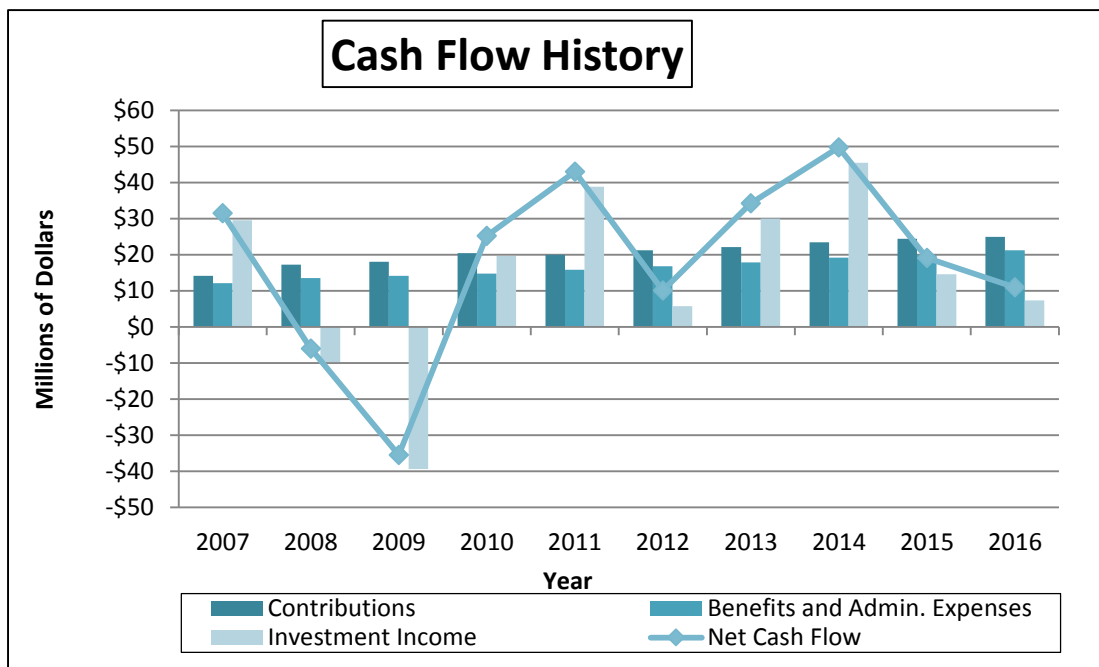
Table 9 shows the System had a positive cash flow for the year ended June 30, 2016. The System’s total cash flow including benefits payments, administrative expenses and investment earnings was \$11.0 million. Of the \$11.0 million, \$7.3 million was due to investment returns.

As long as the System had a positive cash flow, there was no need to plan where the funds would come from to pay benefits since benefits could be paid by incoming contributions. A negative cash flow, as defined above, requires planning what funds will be used to pay the difference between benefits and contributions.



Section V: Cash Flows

**Table 9:
Cash Flow History
(Dollar amounts in millions)**



Year Ended June 30	Historical Cash Flows			
	Contributions	Benefits & Administrative Expenses	Investment Income	Net Cash Flow
2007	\$ 14.1	\$ 12.1	\$ 29.5	\$ 31.5
2008	17.2	13.5	(9.7)	(6.0)
2009	18.0	14.1	(39.4)	(35.5)
2010	20.4	14.8	19.6	25.2
2011	20.0	15.8	38.8	43.0
2012	21.2	16.8	5.7	10.1
2013	22.1	17.9	30.0	34.2
2014	23.4	19.2	45.5	49.7
2015	24.4	19.9	14.6	19.1
2016	24.9	21.2	7.3	11.0



Actuarial Gains or Losses

An analysis of actuarial gains or losses is performed in conjunction with all regularly scheduled valuations.

The results of our analysis of the financial experience of the System in the three most recent regular actuarial valuations are presented in Table 10. Each gain or loss shown represents our estimate of how much the given type of experience caused the Unfunded Actuarial Accrued Liability or Funding Reserve to change in the period since the previous actuarial valuation.

Gains and losses shown due to demographic sources are approximate. Demographic experience is analyzed in greater detail in our periodic assumption studies.

Non-recurring gains and losses result from changes in the actuarial assumptions and benefit improvements.



Section VI: Actuarial Gains of Losses

**Table 10:
Analysis of Actuarial (Gains) or Losses***
(in thousands)

	UAAL (Gain)/Loss		
	June 30, 2016	June 30, 2015	June 30, 2014
Investment Income			
Investment income was (greater) less than expected based on actuarial value of assets.	\$ (1,947.2)	\$ (4,748.3)	\$ (12,459.0)
Pay Increases			
Pay increases were (less) greater than expected.	\$ (433.8)	\$ (1,456.0)	\$ (208.6)
Age & Service Retirements			
Members retired at (older) younger ages or with (less) greater final average pay than expected	\$ 1,471.9	\$ 302.2	\$ (345.5)
Disability Retirements			
Disability claims were (less) greater than expected	\$ 80.5	\$ (214.3)	\$ 342.2
Death-in-Service Benefits			
Survivor claims were (less) greater than expected	\$ 90.0	\$ (182.7)	\$ (21.9)
Withdrawal From Employment			
(More) less reserves were released by withdrawals than expected	\$ 456.8	\$ 95.9	\$ (190.9)
Death After Retirement			
Retirees (died younger) lived longer than expected	\$ 84.5	\$ 1,544.5	\$ (907.8)
Data Adjustments and Benefit Payment Timing			
Service purchases, data corrections, etc.	\$ (229.4)	\$ -	\$ -
Other			
Miscellaneous (gains) and losses	\$ (421.5)	\$ (1,168.2)	\$ 1,172.6
Total (Gain) or Loss During Period From Financial Experience			
	\$ (848.2)	\$ (5,827.0)	\$ (12,618.9)
Non-Recurring Items.			
Changes in actuarial assumptions and methods	\$ -	\$ -	\$ -
Changes in benefits caused a (gain) loss	\$ -	\$ -	\$ -
Composite (Gain) Loss During Period			
	\$ (848.2)	\$ (5,827.0)	\$ (12,618.9)

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.



Appendix A: Actuarial Procedures and Methods

The actuarial assumptions (other than the administrative expense rate) were adopted by the Board based upon the results of an actuarial experience study covering the period July 1, 2003 through June 30, 2009.

Tables B-3 through B-6 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.

The administrative expense rate is based upon actual recurring administrative expenses during the period July 1, 2008, through June 30, 2013.

Administrative expenses are assumed to equal 0.19% of payroll.



Appendix A: Actuarial Procedures and Methods

Valuation of Assets

The actuarial asset valuation method spreads asset gains and losses over four years. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

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.

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 B-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 B-3 shows the annual assumed rates of retirement for active members meeting the service retirement eligibilities.

Disablement

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

Mortality

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

There is sufficient margin in the current mortality tables for possible future improvement in mortality rates and that margin will be reviewed again when the next experience investigation is conducted.

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 B-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 B-7 shows the assumed probability of retaining membership in the System among members terminating with five or more years of service.



Appendix A: Actuarial Procedures and Methods

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 three years younger than their male spouse.

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.



Table B-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%
F. Administrative expenses as a percentage of payroll	0.19%
II. Demographic assumptions	
A. Individual salary increase due to promotion and longevity	Table B-2
B. Retirement	Table B-3
C. Disablement	Table B-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. For Males and Females: RP 2000 Combined Mortality Table projected to 2015 using Scale AA.	Table B-5
E. Mortality among disabled members For Males and Females: RP 2000 Combined Mortality Table.	Table B-5
F. Other terminations of employment	Table B-6
G. Probability of retaining membership in the System upon vested termination	Table B-7



Table B-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



Table B-3

**Retirement
Annual Rates**

Age	20 or More Years of Service
Less than 50	5.0%
50	10.0%
51	10.0
52	10.0
53	10.0
54	10.0
55	25.0
56	25.0
57	25.0
58	25.0
59	25.0
60	50.0
61	50.0
62	50.0
63 & Over	100.0

Vested terminations are assumed to retire at their earliest unreduced eligibility.



Table B-4
Disablement
Annual Rates

<u>Age</u>	<u>All Members</u>
22	.00%
27	.10
32	.10
37	.10
42	.50
47	.50
52	.50
57	.50
62	.00

All disabilities are assumed to be permanent and without recovery.



Table B-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



Table B-6

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

<u>Years of Service</u>	<u>All Members</u>
0	4.0%
1	4.0
2	2.0
3	2.0
4	2.0
5	2.0
6	2.0
7	2.0
8	2.0
9	2.0
10	2.0
11	2.0
12	2.0
13	2.0
14	2.0
15 & Over	1.0



Table B-7

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

<u>Age</u>	<u>Probability of Retaining Membership</u>
Under 35	50%
35	80
36	80
37	80
38	80
39	80
40	80
41	80
42	80
43	80
44	80
45	80
46	80
47	80
48	80
49	80
50 & Over	0

Family Composition

Female spouses are assumed to be three years younger than males. 100% of non-retired employees are assumed married for both male and female employees. Actual marital characteristics are used for pensioners.

Vested Benefits for Termination Members

Vested benefits for members who terminated during years ending June 30, 2009 and later were estimated based upon compensation and service information in the census data. For members who terminated prior to June 30, 2008, vested benefits valued were the same as had been calculated by the prior actuary for the June 30, 2008 actuarial valuation.



Appendix C: Summary of Benefit 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.• Members may purchase service that counts toward 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%.



Appendix C: Summary of Benefit Provisions

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
Membership eligibility	<ul style="list-style-type: none">• Firefighters of first-and second-class cities• Firefighters of other cities that adopt the plan• Rural fire district departments that adopt the plan• Firefighters hired by the Montana Air National Guard (MANG) on or after October 1, 2001
Member contributions	<ul style="list-style-type: none">• Members not electing GABA (Guaranteed Annual Benefit Adjustment): 9.5% of member's compensation• Members electing GABA: 10.7% of member's compensation
Employer contributions	<ul style="list-style-type: none">• 14.36% of each member's compensation• 14.36% of each working retiree's compensation
State contributions	<ul style="list-style-type: none">• 32.61% each member's compensation• 32.61% of each working retiree's compensation
Compensation period used in benefit calculation	<ul style="list-style-type: none">• HAC = Highest Average Compensation• HAC is average of the highest 36 consecutive months (or shorter period of total service) of compensation paid to member.• Part-time firefighter: 15% of regular compensation of a newly confirmed full-time firefighter.• Hired on or after July 1, 2013: 110% annual cap on compensation considered as part of a member's HAC.



Appendix C: Summary of Benefit Provisions

Service retirement eligibility and benefit formula

- 20 years of membership service
- **Member hired on or after July 1, 1981, or a member who has elected to be covered by GABA:**
 - 2.5% of HAC x years of service credit

Member hired prior to July 1, 1981, and who had not elected to be covered by GABA, the greater of above, or:

- a. If membership service is less than 20 years:
2% of highest monthly compensation (HMC) x years of membership service and
- b. If membership service is greater or equal to 20 years:
50% of HMC + 2% of HMC x years of membership service in excess of 20

Early retirement eligibility and benefit

- Age 50 with 5 years of membership service
- Normal retirement benefit calculated using HAC and service credit at early retirement.

Disability retirement eligibility and benefit formula

- Any active or inactive member
- **The greater of:**
 - a. 50% of HAC, or
 - b. 2.5% of HAC x years of service credit

Survivor's eligibility and benefit formula

- Any active or inactive member
- For deaths of active members with less than 20 years of membership service, a monthly survivor benefit to the surviving spouse (or equally to dependent children if there is no surviving spouse or after a surviving spouse dies, for as long as they remain dependent children) equal to 50% of HAC.
- For active or inactive members with more than 20 years of membership service, a benefit equal to the accrued retirement benefit at the date of death.

Retirement benefits – Form of payment

- The retirement benefit is paid for the retired member's life.
- Upon the death of the retired member, the benefit is paid to the surviving spouse.
- If there is no surviving spouse, or after the death of a surviving spouse, benefits are paid to the dependent children, if any, for as long as they remain dependent children.



Appendix C: Summary of Benefit Provisions

Post retirement benefit increases

- For retired members who became active members on or after July 1, 1997, and those who elected to be covered under GABA, and who have been retired for at least 12 months, a GABA will be paid each year in January equal to 3%.
- For retired members who were hired prior to July 1, 2007, and who did not elect GABA, the minimum benefit adjustment is provided equal to 50% of the current base compensation of a newly confirmed active firefighter of the employer that last employed the member as a firefighter.

Changes since last valuation

- None



Appendix D: Valuation Data

Valuation Data

This chart is presented for informational purposes only. The counts shown in the valuation line were used for preparation of the liabilities disclosed within this report. The counts disclosed for the Annual Financial Report and the Summary of Results (page 1) match the Financial Statements at the request of the Board. The differences between counts, if any, have no material effect upon the liability calculation.

	<u>Active</u>	<u>Disabled</u>	<u>Retirees and Beneficiaries</u>	<u>Terminated Vested Members</u>	<u>Terminated Non-Vested Members</u>	<u>Total</u>
Participant Counts Used for Valuation	644	64	557	27	77	1,369
Disabled Members having attained normal retirement age		(57)	57			0
Beneficiaries of Disabled Members						
Beneficiaries with less than one year of certain payments remaining						
Other Adjustments						
Participant Counts shown in the Annual Financial Report	644	7	614	27	77	1,369



Appendix D: Valuation Data

This valuation is based upon the membership of the System as of June 30, 2016. Membership data were supplied by the System and accepted for valuation purposes without audit. However, tests were performed to ensure that the data are sufficiently accurate for valuation purposes.

The salaries used in the tables and charts which follow are different than the salaries used for the Summary on Page 1. The valuation projected salaries to be paid for the following fiscal year, whereas the Summary, salaries are applicable in the year ending on the valuation.

<u>Active Members</u>	<u>Number</u>	<u>Valuation Projected Salaries</u>
Full-Time Members	637	\$ 45,197,009
Part-Time Members	<u>7</u>	<u>\$ 154,608</u>
Total Active Members	644	\$ 45,351,617

Table D-1 contains summaries of the data for contributing members. For full-time members, values shown in the tables are the numbers of members and their total and average annual salaries. For part-time members, only the numbers of members are shown.

Table D-2 presents distributions of the following:

- Members receiving service retirement benefits.
- Members receiving disability retirement benefits.
- Survivors of deceased retired members receiving benefits.
- Survivors of deceased active members.
- Terminated vested members.

Table D-3 is a reconciliation of membership data from June 30, 2015 to June 30, 2016.



Appendix D: Valuation Data

The following is a summary of retired members and beneficiaries currently receiving benefits. The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 39 for an explanation of the number of annuitants used for valuation purposes.

<u>Type of Annuitant</u>	<u>Number</u>	<u>Annual Benefits</u>	<u>Average Annual Benefits</u>
Service Retirement	423	\$ 16,341,920	\$ 38,633
Survivors of Deceased Retired Members	115	3,046,078	26,488
Survivors of Deceased Active Members	<u>19</u>	<u>477,615</u>	<u>25,138</u>
Total Retirees and Beneficiaries	557	\$ 19,865,613	\$ 29,339
Disability Retirement	64	1,702,058	26,595
Total Annuitants	621	\$ 21,567,671	\$ 34,731

<u>Terminated Members with Contributions Not Withdrawn</u>	<u>Number</u>
Vested Terminated Members	27
Non-Vested Terminated Members	<u>77</u>
Total Terminated Members	104



**Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2016**

Number of Employees

Age	Completed Years of Service											Totals	
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+
<25	10	2	5	1									18
25 to 29	12	9	11	23	11								66
30 to 34	9	5	10	30	56	17							127
35 to 39	12	5	4	9	48	42	5						125
40 to 44	2	2	1	6	26	36	34	4	1				112
45 to 49	1	1		3	10	21	33	25	2				96
50 to 54	1	1			2	2	10	12	11	2			41
55 to 59		3		1	2	2	3	5	18	5	1		40
60 to 64	1			1	1	1	1		2		1		8
65 to 69					2		1						3
70 and up					1								1
Totals	48	28	31	74	159	121	87	46	34	7	2		637



Appendix D: Valuation Data

**Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2016**

Annual Salaries in Thousands

Age	<u>Completed Years of Service</u>											Totals	
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+
<25	442	104	248	59									852
25 to 29	592	475	617	1,398	632								3,714
30 to 34	427	250	617	1,892	3,719	1,207							8,112
35 to 39	677	279	227	545	3,276	3,174	399						8,577
40 to 44	112	93	68	411	1,737	2,707	2,918	273	72				8,391
45 to 49	48	35		294	694	1,532	2,683	2,170	226				7,682
50 to 54	103	65			191	135	788	1,067	1,004	171			3,525
55 to 59		151		112	117	145	220	422	1,660	434	69		3,328
60 to 64	76			79	66	105	49		172		96		643
65 to 69					194		79						273
70 and up					100								100
Totals	2,477	1,452	1,776	4,791	10,725	9,004	7,136	3,932	3,134	606	165		45,197

The salary shown in the above chart was used for valuation purposes and assumes pay increases for the year.



Appendix D: Valuation Data

**Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2016**

Average Annual Salary

Age	<u>Completed Years of Service</u>												Totals
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	
<25	44,182	51,772	49,510	59,436									47,353
25 to 29	49,343	52,790	56,066	60,784	57,440								56,270
30 to 34	47,461	50,055	61,737	63,069	66,406	70,990							63,877
35 to 39	56,377	55,861	56,644	60,606	68,248	75,569	79,890						68,617
40 to 44	56,073	46,517	67,882	68,528	66,818	75,183	85,816	68,294	71,740				74,918
45 to 49	48,275	35,180		98,053	69,401	72,953	81,299	86,781	112,958				80,020
50 to 54	103,002	65,241			95,377	67,529	78,807	88,951	91,276	85,714			85,976
55 to 59		50,222		111,700	58,338	72,623	73,190	84,333	92,202	86,826	69,087		83,209
60 to 64	76,064			78,575	66,145	104,520	49,078		86,215		95,701		80,314
65 to 69					96,909		79,195						91,004
70 and up					99,679								99,679
Totals	51,606	51,870	57,293	64,738	67,452	74,415	82,023	85,473	92,169	86,508	82,394		70,953

The salary shown in the above chart was used for valuation purposes and assumes pay increases for the year.



Appendix D: Valuation Data

**Table D-1:
Active Members Distribution of
Part-Time Employees
as of June 30, 2016**

Number of Employees

Age	<u>Completed Years of Service</u>										Totals		
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34		35 to 39	40+
<25	1												1
25 to 29													
30 to 34					1								1
35 to 39	2	1											3
40 to 44	1												1
45 to 49													
50 to 54								1					1
55 to 59													
60 to 64													
65 to 69													
70 and up													
Totals	4	1			1			1					7



Appendix D: Valuation Data

**Table D-2:
Distribution of Inactive Lives**

Please refer to the chart on page 39 for an explanation of the number of annuitants used for valuation purposes.

Members Receiving Service Retirement Benefits as of June 30, 2016

<u>Age</u>	<u>Number of Persons</u>	<u>Annual Benefits</u>	<u>Average Annual Benefits</u>
<50	16	\$ 488,354	\$ 30,522
50 to 54	35	1,250,669	35,733
55 to 59	67	2,512,261	37,496
60 to 64	73	3,318,621	45,461
65 to 69	92	4,114,108	44,719
70 to 74	53	2,192,030	41,359
75 to 79	51	1,646,688	32,288
80 to 84	20	454,945	22,747
85 to 89	9	235,227	26,136
90 and up	7	129,018	18,431
Totals	423	\$ 16,341,920	\$ 38,633

Members Receiving Disability Retirement Benefits as of June 30, 2016

<u>Age</u>	<u>Number of Persons</u>	<u>Annual Benefits</u>	<u>Average Annual Benefits</u>
<50	7	\$ 208,106	\$ 29,729
50 to 54	6	199,266	33,211
55 to 59	6	139,064	23,177
60 to 64	6	153,502	25,584
65 to 69	16	446,602	27,913
70 to 74	7	172,933	24,705
75 to 79	5	120,400	24,080
80 to 84	8	194,203	24,275
85 to 89	3	67,982	22,661
90 and up	-	-	-
Totals	64	\$ 1,702,058	\$ 26,595



Table D-2:
Distribution of Inactive Lives

Please refer to the chart on page 39 for an explanation of the number of annuitants used for valuation purposes.

Survivors of Deceased Retired Members as of June 30, 2016

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	-	\$ -	\$ -
50 to 54	1	21,091	21,091
55 to 59	1	23,315	23,315
60 to 64	2	56,487	28,243
65 to 69	10	255,158	25,516
70 to 74	9	322,493	35,833
75 to 79	23	698,529	30,371
80 to 84	25	693,388	27,736
85 to 89	25	516,422	20,657
90 and up	19	459,195	24,168
Totals	115	\$ 3,046,078	\$ 26,488

Survivors of Deceased Active Members as of June 30, 2016

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	2	\$ 51,538	\$ 25,769
50 to 54	1	30,300	30,300
55 to 59	1	20,371	20,371
60 to 64	2	46,824	23,412
65 to 69	2	55,826	27,913
70 to 74	3	71,635	23,878
75 to 79	1	37,795	37,795
80 to 84	2	45,101	22,550
85 to 89	2	48,481	24,241
90 and up	3	69,744	23,248
Totals	19	\$ 477,615	\$ 25,138



**Table D-2:
Distribution of Inactive Lives**

Please refer to the chart on page 39 for an explanation of the number of annuitants used for valuation purposes.

**Terminated Vested Members as of June 30, 2016
Number of Persons**

<u>Age</u>	<u>Number</u>
<25	
25 to 29	1
30 to 34	7
35 to 39	10
40 to 44	4
45 to 49	4
50 to 54	
55 to 59	1
60 to 64	
65 to 69	
70 and above	
Total	27



**Table D-3:
Data Reconciliation**

The following table shows a reconciliation of the participants used in the previous valuation to this valuation. This chart reflects the counts used for valuation purposes as a result of data processing.

	<u>Active Contributing Members</u>	<u>Terminated Vested Members</u>	<u>Service Retired Members</u>	<u>Disabled Members</u>	<u>Survivors and Beneficiaries</u>
June 30, 2015 Valuation	627	21	379	63	168
Refunds and Non-Vested Terminations	(11)	-			
Vested Terminations	(7)	7			-
Service Retirements	(18)	-	19	-	-
Disability Retirements	(2)		-	2	-
Deaths	-	-	(7)	(1)	(7)
New Entrants	55	(1)	-		6
Rehires					
Other			32		(33)
June 30, 2016 Valuation	644	27	423	64	134



Appendix E: Comparative Schedules

Comparative Schedules

This section contains tables that summarize the experience of the System shown in present and past valuation reports.

Table E-1 shows a summary of the active members covered as of the various valuation dates.

Table E-2 shows a summary of the retired and inactive members as of the various valuation dates.

Table E-3 summarizes the contribution rates determined by each annual actuarial valuation.



**Table E-1:
Active Membership Data**

<u>Valuation Date (June 30)</u>	<u>Actives</u>	<u>Annual Salaries in Thousands</u>	<u>Average Annual Salary</u>	<u>Average Age</u>	<u>Average Years of Service</u>	<u>Average Hire Age</u>
2016	644	43,119	66,955	40.1	10.8	29.3
2015	627	41,041	65,457	39.1	11.0	28.1
2014	616	39,495	64,155			
2013	610	37,727	61,848			
2012	590	35,849	60,762			



Appendix E: Comparative Schedules

**Table E-2:
Retired and Inactive Membership Data**

Valuation Date (June 30)	Number	All Annuitants					Terminated Members	
		Annual Benefits in Thousands	Average Annual Benefit	Average Current Age	Average Age at Retirement	Average Service at Retirement	Number Vested Terminated	Number Non-Vested Terminated
2016	621	21,568	34,731	69.3	52.6	23.7	77	27
2015	609	20,322	33,369	68.4	50.5	24.1	71	21
2014	595	19,208	32,282				66	19
2013	587	18,234	31,063				63	15
2012	571	17,066	29,889				62	13



Appendix E: Comparative Schedules

**Table E-3:
Contribution Rates**

Valuation Date (June 30)	Contribution Rates			Normal	UAAL
	Employee***	Employer/State	Total	Cost Rate*	Rate**
2016	10.69%	46.97%	57.66%	26.67%	30.99%
2015	10.69	46.97	57.66	26.70	30.96
2014	10.69	46.97	57.66	26.70	30.96
2013	10.69	46.97	57.66	26.59	31.07
2012	10.69	46.97	57.66	26.50	31.16

* Includes administrative expenses starting with the 2014 Valuation Date

** The UAAL rate is the amount available to amortize the UAAL. It is equal to the total contribution rate, minus the normal cost rate.

*** Members who have elected GABA contribute 10.70% of compensation. Members who have not elected GABA contribute 9.50% of compensation. The employee contribution rate reflects the average contribution rate of all employees.



Appendix F: Financial Statement Information

The information presented in the required supplementary schedules was determined as part of the actuarial valuation as of June 30, 2016. Additional information as of the latest actuarial valuation follows.

Valuation date	June 30, 2016
Actuarial cost method	Entry Age Normal
Amortization method	Open
Remaining amortization period	30 Years
Asset valuation method	Four-year smoothed market
Actuarial assumptions:	
Investment rate of return*	7.75%
General wage growth*	4.00%
Merit salary increases	0.0% - 7.3%
*Includes inflation	3.00%



Appendix F: Financial Statement Information

Gain and Loss in Accrued Liability During Years Ended June 30 Resulting from Differences Between Assumed Experience and Actual Experience						
Type of Activity	Gain or (Loss) for Year Ending June 30, (expressed in thousands)					
	2011	2012	2013	2014	2015	2016
Investment Income on Actuarial Value of Assets	\$ (14,918)	\$ (8,621)	\$ 7,762	\$ 12,459	\$ 4,748	\$ 1,947
Combined Liability Experience	(804)	(2,047)	1,384	160	1,079	(1,099)
(Loss)/Gain During Year from Financial Experience	\$ (15,722)	\$ (10,668)	\$ 9,146	\$ 12,619	\$ 5,827	\$ 848
Non-Recurring Items	0	0	0	0	0	0
Composite Gain of (Loss) During Year	\$ (15,722)	\$ (10,668)	\$ 9,146	\$ 12,619	\$ 5,827	\$ 848

Schedule of Funding Progress (expressed in thousands)						
Valuation Date June 30,	Actuarial Value of Assets	Actuarial Liability (AAL)	Funded Ratio	Unfunded AAL (UAAL)	Covered Payroll	UAAL as a Percentage of Covered Payroll
2016	\$ 365,259	\$ 466,671	78%	\$ 101,413	\$ 43,119	235%
2015	333,629	441,834	76%	108,205	41,627	260%
2014	300,949	419,013	72%	118,064	39,892	296%
2013	263,483	396,769	66%	133,286	37,963	351%
2012	233,121	377,211	62%	144,090	36,177	398%
2011	219,959	355,188	62%	135,229	34,852	388%



Appendix F: Financial Statement Information

Solvency Test Aggregate Accrued Liabilities for (expressed in thousands)							
Valuation Date	Active	Retirees & Beneficiaries	Active	Actuarial Value of Reported Assets	Portion of Accrued Liability Covered by Reported Assets		
	Member Contributions		Employer Financed Contributions		(1)	(2)	(3)
June 30,	(1)	(2)	(3)		(1)	(2)	(3)
2016	\$ 43,046	\$ 292,423	\$ 131,203	\$ 365,259	100%	100%	23%
2015	41,278	274,505	126,051	333,629	100%	100%	14%
2014	38,805	260,538	119,670	300,949	100%	100%	1%
2013	36,441	248,723	111,606	263,483	100%	91%	0%
2012	34,790	235,553	106,868	233,121	100%	84%	0%
2011	33,089	219,842	102,257	219,959	100%	85%	0%



Appendix G: Glossary

The following definitions are largely excerpts from a list adopted in 1981 by the major actuarial organizations in the United States. In some cases the definitions have been modified for specific applicability to the Firefighters' Unified Retirement System. Defined terms are capitalized throughout this Appendix.

Accrued Benefit

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

Actuarial Accrued Liability

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement, and retirement; changes in compensation, rates of investment earnings, and asset appreciation or depreciation; procedures used to determine the Actuarial Value of Assets; and other relevant items.

Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

Actuarial Gains and Losses

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

Actuarial Present Value

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Valuation

The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

Amortization Payment

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.



Appendix G: Glossary

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 of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this 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.

Market Value of Assets

The fair value of cash, investments and other property belonging to a pension plan that could be acquired by exchanging them on the open market.

Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

Projected Benefits

Those pension plan benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits.

Unaccrued Benefit

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

Unfunded Actuarial Accrued Liability

The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.