

FIREMEN'S RETIREMENT SYSTEM OF ST. LOUIS
ANNUAL ACTUARIAL VALUATION
OCTOBER 1, 2016

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January 11, 2017

The Pension Board
Firemen's Retirement System of St. Louis
1601 South Broadway
St. Louis, MO 63104

Dear Board Members:

We are pleased to present the report of the actuarial valuation of the Firemen's Retirement System of St. Louis ("FRS" or "System") as of October 1, 2016. This actuarial valuation was prepared at your request and is intended for use by the FRS and those designated or approved by the System. This actuarial valuation may be provided to parties other than the System only in its entirety and only with the permission of the System. GRS is not responsible for unauthorized use of this report.

An actuarial valuation of the system is performed annually as required by the Missouri State statutes. The actuarial valuation was performed to measure the funding status of the System and determine the contribution for the following year.

Effective with fiscal year ending September 30, 2014, GASB Statement No. 67 replaced GASB Statement No. 25 for pension plan financial reporting requirements and effective with fiscal year ending September 30, 2015, GASB Statement No. 68 replaced GASB Statement No. 27 for employer financial reporting requirements. Information required by GASB Statement Nos. 67 and 68 is provided in a separate report.

This actuarial valuation is based upon:

- a) **Data Relative to the Members of the System** — Data as of October 1, 2016, for active members and persons receiving benefits, including frozen accrued benefits as of February 1, 2013, was provided by the System's staff. We have tested this data for reasonableness.
- b) **Asset Values** — The System's asset values as of October 1, 2016, were provided by the System's auditor. An actuarial value of assets was used to develop the sponsor's funding requirements.
- c) **Actuarial Method** — The actuarial cost method utilized by the System as required by Missouri State statutes is the Frozen Entry Age Actuarial Cost Method. The objective of this method is to recognize the cost of the System on an aggregate basis as a level percentage of compensation. Any frozen unfunded actuarial accrued liability resulting from changes in plan provisions, assumptions or methods is separately amortized. All actuarial gains and losses under this method are reflected in future normal costs.
- d) **Actuarial Assumptions** — The actuarial assumptions are unchanged from the previous actuarial valuation and are based on the experience review for the period October 1, 2010, through September 30, 2014, first effective with the actuarial valuation as of October 1, 2015.
- e) **Plan Provisions** — The actuarial valuation is based on plan provisions in effect as of October 1, 2016, including the provisions of Ordinance 69245, Ordinance 69353 and Judge Dierker's subsequent ruling (Board Bill 109 or BB109).

The funding objective is to provide employer and employee contributions sufficient to provide the benefits of the System when due. The employer contributes the normal contribution rate (normal cost under Frozen Entry Age Actuarial Cost Method) plus the accrued liability rate (amortization of the frozen unfunded actuarial liability).

The actuarial valuation results set forth in this report are based on the data and actuarial techniques described above, and upon the provisions of the System as of the actuarial valuation date. Based on these items, we certify these results to be true and correct.

To the best of our knowledge, this actuarial statement is complete and accurate, fairly presents the actuarial position of the Firemen's Retirement System of St. Louis as of October 1, 2016, and has been prepared in accordance with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

Future actuarial measurements may differ significantly from the current measurements 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, contribution amounts or applicable law. Due to the limited scope of the actuary's assignment, the actuary did not perform an analysis of the potential range of such future measurements in this report.

The signing actuaries are independent of the plan sponsor.

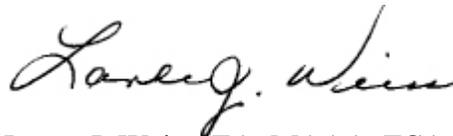
This report should not be relied on for any purpose other than the purpose stated.

Alex Rivera and Lance J. Weiss are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

Respectfully yours,



Alex Rivera, FSA, EA, MAAA, FCA
Senior Consultant



Lance J. Weiss, EA, MAAA, FCA
Senior Consultant

INTRODUCTION

Purposes of the Actuarial Valuation

At your request, we have performed the actuarial valuation of the Firemen's Retirement System of St. Louis ("FRS") as of October 1, 2016.

The purposes of the actuarial valuation are as follows:

- To determine the funding status of the System as of the actuarial valuation date;
- To determine the current contribution level of the System required to fund the current benefit provisions; and
- To provide other data required by the System.

Plan Provisions and Board Bill 109

The actuarial valuation is based on plan provisions in effect as of October 1, 2016, including the provisions of Board Bill 109.

First effective with the actuarial valuation as of October 1, 2013, the actuarial valuation reflects the changes attributable to Ordinance 69245, Ordinance 69353 and Judge Dierker's subsequent ruling (Board Bill 109 or BB109). Our understanding of the key changes to the FRS is as follows:

- FRS is frozen as of February 1, 2013. That is, benefits paid from FRS will be based on the member's service and salary earned as of February 1, 2013. Participants with benefit service in FRS are classified as "grandfathered" members.
- Firefighters hired after February 1, 2013, are not members of FRS.
- Vesting and eligibility service earned after February 1, 2013, in the newly established Firemen's Retirement Plan of St. Louis ("FRP") will count towards vesting and eligibility service in FRS.
- Ancillary benefits, for disability or death occurring after February 1, 2013, are assumed to be paid from the newly established FRP. FRS members who become disabled or die before retirement are eligible for a refund of contributions made to FRS.
- Employer contributions to the frozen FRS will continue to be calculated under the Frozen Initial Liability cost method.
- Member contributions after February 1, 2013, from "grandfathered" participants in FRS will be paid to the FRP.
- Grandfathered members with 20 or more years of service as of February 1, 2013, are eligible to retire with unreduced FRP benefits if retirement commences before age 55.
- Grandfathered members with less than 20 years of service as of February 1, 2013, are eligible to retire with actuarially reduced FRP benefits if retirement commences before age 55.

As a result of BB109, the following assumptions were made:

- Since benefits paid under FRS will no longer depend on future salary increases, we have eliminated the future salary increase assumption in the projection of pay and valuation of benefits. Costs will continue to be spread over the present value of future salary which includes future salary increases.

INTRODUCTION (CONTINUED)

- It is assumed that grandfathered members with less than 20 years of service as of February 1, 2013, will not retire prior to age 55. The retirement rates were adjusted to reflect accelerated retirement when these members first become eligible at age 55.
- The proportion of ordinary and accidental disabilities was changed from 20 percent ordinary and 80 percent accidental to 60 percent ordinary and 40 percent accidental.

Finally, plan liabilities for FRS after BB109 are predominantly for retired members and their beneficiaries. That is, the proportion of retired liabilities to total plan liabilities is projected to be over 80 percent within 10 years. This implies a much shorter duration of liabilities. As a result of this relationship, it is recommended that the discount rate be reviewed annually as the duration decreases and the investment policy is modified.

Under the 2015 Settlement Agreement, accrued sick leave earned through February 1, 2013, and unused as of the member's retirement date can be converted to a pension benefit.

Plan provisions are described in Section C.

Actuarial Assumptions and Methods

The actuarial assumptions are unchanged from the previous actuarial valuation and are based on an experience review of the Firemen's Retirement System of St. Louis for the period October 1, 2010, to September 30, 2014. The actuarial assumptions and methods are disclosed in Section C.

Asset Information

The market value of the assets of the fund, which are available for benefits, increased from \$447.1 million at the end of FY 2015 to \$453.6 million at the end of FY 2016. The market value of assets includes a transfer of \$166,792, from the FRS Future Benefit Fund to the FRS General Reserve Fund, as part of the 2015 Settlement Agreement. The actuarial value of assets decreased from \$476.0 million at the end of fiscal year 2015 to \$465.3 million at the end of fiscal year 2016.

The detailed determinations of asset values utilized in this actuarial valuation and asset changes in the last year are set forth in Section A.

Report Highlights

The table on the following page compares the key actuarial results from the October 1, 2016, actuarial valuation to the prior year's results. The key difference between this year's actuarial valuation results and the prior year's actuarial valuation results is an increase in the City contribution from \$2.72 million for plan year ending September 30, 2016, to \$3.31 million for plan year ending September 30, 2017, due primarily to investment losses on the actuarial value of assets.

**INTRODUCTION
(CONTINUED)**

Summary of Results	2015	2016
Total Contribution	\$ 2,715,140	\$ 3,313,603
Present Value of Benefits	509,679,202	503,718,897
Actuarial Value of Assets	475,986,912	465,333,704
Market Value of Assets ^a	447,058,104	453,640,021

^a Excluding Future Benefit Fund

The expected contribution for plan year ending September 30, 2017, before recognizing plan changes, investment losses, demographic gains or changes in assumptions was estimated to be \$2.72 million. During the year, the market value of assets earned approximately 8.6 percent and the actuarial value of assets earned 4.3 percent, which caused contributions to increase by \$1.46 million. Favorable demographic experience decreased expected contributions by \$0.87 million.

A reconciliation of the increase in City contributions is shown below (in millions).

Expected 2017 City contribution	\$ 2.72
Increase due to investment losses	1.46
Increase due to demographic experience and salary increases	(0.87)
Increase due to changes in assumptions	<u>-</u>
Actual 2017 City contribution	\$ 3.31

The actuarial valuation results are presented in Section A of the report.

**INTRODUCTION
(CONTINUED)**

Membership Characteristics

The following table shows the changes in the population of the fund. Because FRS is closed to new members, the active population has continued to decrease.

Population	2015	2016
Retired Members	375	366
Disabled Members	293	286
Widows and Children	299	292
Total Inactive Members	967	944
Actives - Non-DROP	495	478
Actives - DROP ^a	62	62
Total Active and DROP Members	557	540

^a As of October 1, 2016, there are 196 employees with DROP account balances, of which 62 are active members participating in the DROP.

More detailed breakouts of the membership can be found in Section B.

GASB Disclosure

Effective with fiscal year ending September 30, 2014, GASB Statement No. 67 replaced GASB Statement No. 25 for pension plan financial reporting requirements. Effective with fiscal year ending September 30, 2015, GASB Statement No. 68 replaced GASB Statement No. 27 for employer financial reporting. Information required by GASB Statements Nos. 67 and 68 is provided in a separate report.

SECTION A

ACTUARIAL VALUATION RESULTS AND ASSET INFORMATION

SUMMARY OF ACTUARIAL VALUATION RESULTS

Determination of City Contributions - Frozen Initial Liability

	<u>October 1, 2015</u>	<u>October 1, 2016</u>
Present Value of All Future Benefits		
Retirees and Beneficiaries	\$ 352,961,203	\$ 344,798,628
Active Firemen	109,084,276	112,535,128
DROP Firemen	47,574,401	46,314,159
System Employees Benefit Fund	59,322	70,982
Total	\$ 509,679,202	\$ 503,718,897
 Assets		
Actuarial Asset Value (3-year smoothing)	\$475,986,912	\$ 465,333,704
Present Value of Future Employee Contributions	-	-
Total	\$ 475,986,912	\$ 465,333,704
 Unfunded Accrued Liability	 \$ 33,692,290	 \$ 33,335,610
 Present Value of Future Normal Costs	 \$ -	 \$ 5,049,583
 Present Value of Future Salary ^a	 \$ 303,012,448	 \$ 290,130,906
 Normal Contribution Percent	 0.000%	 1.740%
 Total Salary ^a	 \$ 34,416,545	 \$ 34,394,355
 Annual City Contributions for Plan Year Ending 9/30/2017		
Normal Contribution	\$ -	\$ 598,462
Accrued Liability Amortization Payment	2,715,140	2,715,141
Grand Total	\$ 2,715,140	\$ 3,313,603
 Normal Contribution as a % of Total Salary	 0.000%	 1.740%
 Total Contribution as a % of Total Salary	 7.889%	 9.634%

^a Includes salary of all active members.

**SUMMARY OF ACTUARIAL VALUATION RESULTS
(CONTINUED)**

	<u>Present Value of Future Benefits</u>	
	<u>October 1, 2015</u>	<u>October 1, 2016</u>
Retirees		
1960 Plan	\$ 138,013,387	\$ 135,246,378
Prospective Widows and Children of Retired Firemen	19,760,022	19,768,835
Ordinary Disability		
1960 Plan	5,329,225	5,714,753
Prospective Widows and Children of Retired Firemen	973,950	1,100,695
Accidental Disability		
1960 Plan	146,013,654	140,168,889
Prospective Widows and Children of Retired Firemen	11,214,102	11,121,238
Widows		
1960 Plan	31,066,305	31,139,244
Old Plan	6,955	6,549
Children		
1960 Plan	583,603	532,047
Total Inactives	\$ 352,961,203	\$ 344,798,628
Active Firemen		
Service Retirement	\$ 105,168,035	\$ 108,962,285
Ordinary Disability Retirement ^a	1,047,384	960,993
Accidental Disability Retirement ^a	698,253	640,663
Withdrawal Benefit	410,518	322,129
Ordinary Death ^a	880,043	824,529
Accidental Death ^a	880,043	824,529
Total Actives	\$ 109,084,276	\$ 112,535,128
DROP Firemen ^b		
Retiree Account Balances	\$ 14,587,927	\$ 16,269,758
Active Firemen ^c	32,986,474	30,044,401
Total DROPS	\$ 47,574,401	\$ 46,314,159
System Employees Benefit Fund	\$ 59,322	\$ 70,982
Total Present Value Future Benefits	\$ 509,679,202	\$ 503,718,897

^a FRS members are eligible for a refund of contributions made to FRS upon pre-retirement death or disability.

^b As of October 1, 2016, there are 196 members with DROP account balances, of which 62 are active members participating in the DROP.

^c Includes active DROP balances, Refund of Member Contributions, and Future Account Additions and Benefits.

**SUMMARY OF ACTUARIAL VALUATION RESULTS
(CONTINUED)**

Actuarial Value of Assets

(1) Expected Return on Market Value of Assets for Prior Year

(a) Market Value of Assets as of 9/30/15 ^a	\$ 447,058,104
(b) Actual Income and Disbursements in Prior Year Weighted for Timing	

Item	Amount	Weight for Timing	Weighted Amount
i) Member Contributions	\$ -	50.0%	\$ -
ii) City Contributions & Misc.	2,715,140	50.0%	1,357,570
iii) Benefit Payments	(32,154,888)	50.0%	(16,077,444)
iv) Refunds	(1,278,330)	50.0%	(639,165)
v) Transfer Due to Sick Leave Settlement	166,792	50.0%	83,396
vi) Total	\$ (30,551,286)		\$ (15,275,643)

(c) Market Value of Assets Adj. for Actual Income and Disbursements [(a) + (b)(vi)]	\$ 431,782,461
(d) Assumed Rate of Return on Plan Assets for the Year	7.000%
(e) Expected Return Over Twelve Month Period	30,224,772
(f) Expected Market Value of Assets 10/1/16	\$ 446,731,590

(2) Actual Return on Market Value of Assets for Prior Year

(a) Market Value of Assets as of 9/30/15 ^a	\$ 447,058,104
(b) Income (less investment income and expenses) for Prior Plan Year	(30,551,286)
(c) Market Value of Assets as of 10/1/15 ^a	453,640,021
(d) Actual Return, Net of Expenses [(c) - (b) - (a)]	\$ 37,133,203

(3) Investment Gain/(Loss) for Prior Period [2(d) - 1(e)]

\$ 6,908,431

(4) Actuarial Value of Assets as of 10/1/16

(a) Market Value of Assets as of 10/1/16 ^a	\$ 453,640,021
(b) Deferred Investment Gains and (Losses) for Last 3 Years	

Plan Year	Gain/(Loss)	Weight for Timing	Deferred Amount
i) 2014	11,009,397	0.00%	\$ -
ii) 2015	(48,897,911)	33.33%	(16,299,304)
iii) 2016	6,908,431	66.67%	4,605,621
iv) Total	\$ (30,980,083)		\$ (11,693,683)

(c) Actuarial Value of Assets [(a) - (b) (iv)]	\$ 465,333,704
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The calculated value is determined by adjusting the market value of assets to reflect the investment gains and losses (the difference between the actual investment return and the expected investment return) during each of the last 3 years at the rate of 33.33% per year.

^a Excluding Future Benefit Fund of \$4,804,701 as of September 30, 2015, and \$5,051,183 as of September 30, 2016

**SUMMARY OF ACTUARIAL VALUATION RESULTS
(CONTINUED)**

Amortization Schedule of Unfunded Accrued Liability

<u>Date Established</u>	<u>Original Period</u>	<u>Outstanding Period 10/1/16</u>	<u>Payment End of Year</u>	<u>Outstanding Balance 10/1/16</u>
10/01/2015	30	29 Years, 0 Months	2,715,141	33,335,610
Total*			\$ 2,715,141	\$ 33,335,610

**The reduction in unfunded accrued liability for FRS due to plan and assumption changes attributable to BB109 on October 1, 2013, was greater than the remaining frozen initial liability. Consequently, the frozen initial liability for FRS was set equal to zero. A new base was established as of October 1, 2015, for the change in actuarial assumptions.*

SUMMARY OF ACTUARIAL VALUATION RESULTS
(CONTINUED)

The actuarial valuation balance sheet shown below demonstrates the sources of income required to fund the current present value of future benefits as of the actuarial valuation date.

Valuation Balance Sheet

Sources of Funds

Actuarial Asset Value		\$ 465,333,704
Present Value of Future Employee Contributions		\$ -
Present Value of City's Future Contributions		
Normal Cost	\$ 5,049,583	
Accrued Liability	33,335,610	
Total	<u>38,385,193</u>	\$ 38,385,193
Grand Total		\$ 503,718,897

**SUMMARY OF ACTUARIAL VALUATION RESULTS
(CONTINUED)**

Change in Market Value of Assets^a

Receipts		
Paid by City		
Allocated to General Reserve Fund	\$	2,715,140
Members' Contribution		
To Members' Savings Fund	\$	-
Income Received on Investments		
Allocated to Member's Savings Fund	\$	6,409,146
Allocated to Benefit Reserve Fund		28,977,545
Allocated to General Reserve Fund		1,746,512
Allocated to Future Benefit Fund		413,274
Allocated to Expense Fund	\$	1,095,335
		<u>38,641,812</u>
Total Receipts	\$	<u>41,356,952</u>
 Disbursements		
Payment to Retired Members and Dependents:		
From Benefit Reserve Fund		
To Retirees, Beneficiaries, and Dependents	\$	(32,154,888)
From Future Benefit Fund		
To Retirees, Beneficiaries, and Dependents	\$	-
From Members Savings Fund		
Withdrawals, Deaths, and Retirements	\$	(1,278,330)
Operating Expenses	\$	(1,095,335)
Total Disbursements	\$	(34,528,553)
Net Operating Income	\$	6,828,399
Fund Balance October 1, 2015^a	\$	451,862,805
Fund Balance October 1, 2016^a		\$458,691,204

^a Includes Future Benefit Fund Assets of \$4,804,701 as of October 1, 2015, and \$5,051,183 as of October 1, 2016.

FUND BALANCE SPLIT

Description of Funds

For administrative purposes, the assets of the System are accounted for as four separate funds, as described below. The first three funds were established by Ordinance 49623. The other fund, the Future Benefit Fund, was established by Ordinance 61414. Only the assets of the first three funds are considered when determining the actuarial funding requirements.

Member's Savings Fund: All contributions by members are credited to this Fund. Interest at a rate determined by the Board is credited annually on the minimum balance in each member's account during the preceding year. Withdrawal of refunds of member's accumulated contribution is charged to this Fund. Upon retirement or death of an active member after October 2, 1983, the member's own contributions are refunded to the member while the balance of the member's accumulated contribution fund is transferred to the Benefit Reserve Fund.

Benefit Reserve Fund: Upon retirement or death, this fund is credited with the remaining balance of the member's accumulated contribution fund after the member's own contributions have been refunded from the Member's Savings Fund. It is also credited with an additional amount from the General Reserve Fund which, when added to the Benefit Reserve Fund, will be adequate to provide the present value of all benefits payable to all members and beneficiaries currently receiving benefits. All annuities granted are payable from this Fund.

General Reserve Fund: Contributions made by the City are credited to this Fund, and the reserves for benefits not provided by member's contributions are accumulated in this fund.

Future Benefit Fund: The Future Benefit Fund is excluded from the assets used to determine the contribution requirement for the upcoming year. Through the SHARE program, three-fourths of the return on the fund is used to provide ad hoc increases for members not eligible for other benefit increases. One-half of the return was used for the SHARE program prior to September 1, 2016.

Under the 2015 Settlement Agreement, starting in plan year October 1, 2015, \$166,792 will be transferred each year from the Future Benefit Fund to the General Reserve Fund for the next 15-year period.

**FUND BALANCE SPLIT
(CONTINUED)**

Change in Fund Balances

	<u>Total</u>	<u>Members Savings Fund</u>	<u>Benefit Reserve Fund</u>	<u>General Reserve Fund</u>	<u>Future Benefit Fund</u>
Market Value, September 30, 2015	\$ 451,862,805	\$ 75,149,942	\$ 352,961,203	\$ 18,946,959	\$ 4,804,701
<u>Additions</u>					
City Appropriations	2,715,140	-	-	2,715,140	-
Interest and Dividends Received	37,546,477	6,409,146	28,977,545	1,746,512	413,274
Transfer Due to Surplus/Deficit	-	(3,140,487)	(4,985,232)	8,125,719	-
Total Additions	40,261,617	3,268,659	23,992,313	12,587,371	413,274
<u>Deductions</u>					
Benefit Payments	(32,154,888)	-	(32,154,888)	-	-
Refunds w/o Interest and Withdrawals w/ Interest	(1,278,330)	(1,278,330)	-	-	-
Transfer in accordance with Sick Leave Settlement	-	-	-	166,792	(166,792)
Total Deductions	(33,433,218)	(1,278,330)	(32,154,888)	166,792	(166,792)
Market Value, September 30, 2016	\$ 458,691,204	\$ 77,140,271	\$ 344,798,628	\$ 31,701,122	\$ 5,051,183

SECTION B

DATA REFLECTING PLAN MEMBERSHIP

DATA REFLECTING PLAN MEMBERSHIP

Summary of Membership as of October 1, 2016

Retirees and Dependents

	<u>Number</u>	<u>Monthly Pension</u>
Retirees		
1960 Plan	366	\$ 1,176,958
Ordinary Disability		
1960 Plan	22	41,103
Accidental Disability		
1960 Plan	264	1,038,279
Widows		
1960 Plan	273	316,644
Old Plan	1	200
Children		
1960 Plan	<u>18</u>	<u>9,394</u>
Total	944	\$ 2,582,578

Active and DROP

	<u>Number</u>	<u>Member's Annual Compensation</u>	<u>Contribution</u>
Actives - Non-DROP	478	\$ 30,219,253	\$ 0
Actives - DROP	<u>62</u>	<u>4,175,102</u>	<u>0</u>
Total	540	\$ 34,394,355	\$ 0

**DATA REFLECTING PLAN MEMBERSHIP
(CONTINUED)**

**Active Non-DROP Members as of October 1, 2016
By Attained Age and Years of Service**

Attained Age	<u>Years of Service to Valuation Date</u>							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30-34		35 & Up
20-24									\$ -
25-29		2							2
		\$ 103,863							\$ 103,863
30-34		17	3						20
		\$ 903,768	\$ 172,328						\$ 1,076,096
35-39		27	23	2					52
		\$ 1,532,551	\$ 1,388,762	\$ 117,823					\$ 3,039,136
40-44		15	32	30					77
		\$ 843,833	\$ 1,898,207	\$ 1,891,399					\$ 4,633,439
45-49		7	19	56	24	5			111
		\$ 390,627	\$ 1,113,029	\$ 3,413,624	\$ 1,632,251	\$ 377,092			\$ 6,926,623
50-54		2	16	25	28	63			134
		\$ 119,729	\$ 932,256	\$ 1,488,559	\$ 1,924,847	\$ 4,237,466			\$ 8,702,857
55-59		1	5	7	10	35	7	2	67
		\$ 55,469	\$ 288,592	\$ 415,037	\$ 676,212	\$ 2,511,572	\$ 460,769	\$ 225,928	\$ 4,633,579
60-64			2	2	2		3	5	14
			\$ 115,883	\$ 133,569	\$ 135,091		\$ 200,460	\$ 459,746	\$ 1,044,749
65-69				1					1
				58,911				\$ -	\$ 58,911
Totals: Count	0	71	100	123	64	103	10	7	478
Payroll	\$0	\$ 3,949,840	\$ 5,909,057	\$ 7,518,922	\$ 4,368,401	\$ 7,126,130	\$ 661,229	\$ 685,674	\$ 30,219,253

**DATA REFLECTING PLAN MEMBERSHIP
(CONTINUED)**

**Active DROP Members as of October 1, 2016
By Attained Age and Years of Service**

Attained					
Age	20-24	25-29	30 & Up	Totals	
40-44				\$	-
45-49	4	3			7
	\$ 255,573	\$ 197,041	\$ -	\$	452,614
50-54	14	14			28
	\$ 887,004	\$ 971,247	\$ -	\$	1,858,251
55-59	10	3	8		21
	\$ 630,482	\$ 213,173	\$ 642,061	\$	1,485,716
60-64	4		2		6
	\$ 239,821	\$ -	\$ 138,700	\$	378,521
Totals:	Count	32	20	10	62
	Payroll	\$ 2,012,880	1,381,461	780,761	\$ 4,175,102

**DATA REFLECTING PLAN MEMBERSHIP
(CONTINUED)**

Service Retirees - 1960 Plan

<u>Age</u> <u>9/30/2016</u>	<u>Number</u>	<u>Monthly</u> <u>Allowance</u>	<u>Age</u> <u>9/30/2016</u>	<u>Number</u>	<u>Monthly</u> <u>Allowance</u>
45	1	\$ 1,828.56	72	1	\$ 4,069.75
48	3	6,072.31	73	6	25,782.49
49	3	6,458.21	74	11	36,107.82
50	8	19,507.68	75	13	45,284.22
51	6	13,681.70	76	10	38,135.41
52	8	19,918.97	77	22	70,872.19
53	2	5,053.90	78	12	37,856.90
54	10	22,108.06	79	10	27,441.87
55	8	20,713.86	80	7	19,507.62
56	2	9,314.27	81	8	24,994.71
57	9	25,902.33	82	7	16,645.53
58	11	37,972.65	83	7	20,204.26
59	9	41,732.60	84	9	23,530.05
60	10	38,567.40	85	13	28,384.16
61	9	32,590.06	86	5	10,768.67
62	7	25,517.17	87	5	11,964.52
63	10	41,564.97	88	4	8,042.64
64	8	34,165.11	89	4	12,215.23
65	10	40,699.13	90	7	16,089.55
66	13	45,924.39	91	4	12,832.95
67	9	41,077.40	92	2	4,195.31
68	9	23,384.85	93	2	5,789.03
69	12	49,315.31	95	1	3,191.16
70	9	39,870.08	96	2	4,879.11
71	8	25,232.00			
Total				366	\$ 1,176,958.12
Average Monthly Allowance					\$ 3,215.73
Average Age					70.3

**DATA REFLECTING PLAN MEMBERSHIP
(CONTINUED)**

Ordinary Disability Retirees - 1960 Plan

<u>Age 9/30/2016</u>	<u>Number</u>	<u>Monthly Allowance</u>
42	2	\$ 4,622.80
47	1	1,522.99
48	3	4,421.08
49	1	1,644.67
51	1	1,086.59
52	1	3,918.61
55	1	1,677.17
61	1	970.82
62	1	1,287.78
63	1	1,282.22
64	1	1,442.48
65	1	1,342.57
68	2	4,404.17
73	1	2,848.56
74	2	2,858.92
75	1	3,681.68
83	1	2,089.50
Total	22	\$ 41,102.61
Average Monthly Allowance		\$ 1,868.30
Average Age		59.6

**DATA REFLECTING PLAN MEMBERSHIP
(CONTINUED)**

Accidental Disability Retirees - 1960 Plan

<u>Age</u> <u>9/30/2016</u>	<u>Number</u>	<u>Monthly</u> <u>Allowance</u>	<u>Age</u> <u>9/30/2016</u>	<u>Number</u>	<u>Monthly</u> <u>Allowance</u>
34	1	\$ 3,967.37	66	9	\$ 40,239.44
39	1	4,303.38	67	8	31,387.53
40	1	4,303.38	68	6	31,241.10
41	1	3,967.37	69	6	24,784.79
42	1	3,967.37	70	5	20,985.69
44	1	3,791.30	71	3	14,859.62
45	2	9,061.84	72	3	12,651.07
46	3	12,310.22	73	11	43,867.13
47	3	12,040.18	74	4	18,069.60
48	2	7,808.10	75	3	11,065.08
49	5	20,067.53	76	11	39,033.54
50	4	16,508.08	77	4	10,818.70
51	6	24,741.77	78	9	33,830.89
52	10	41,809.53	79	8	23,069.03
53	10	42,092.16	80	4	11,796.88
54	11	44,306.79	81	12	39,126.05
55	11	46,995.68	82	3	7,104.82
56	8	35,446.62	83	2	3,400.60
57	2	10,143.25	84	4	15,092.07
58	11	50,472.35	85	3	9,584.11
59	9	39,600.91	86	4	11,890.04
60	2	7,569.94	87	1	820.63
61	4	15,862.14	88	2	5,461.35
62	11	49,103.99	89	1	2,334.67
63	4	15,994.35	90	4	9,171.79
64	4	16,299.74	91	1	954.69
65	5	23,102.79			
Total				264	\$ 1,038,279.04
Average Monthly Allowance					\$ 3,932.88
Average Age					65.5

**DATA REFLECTING PLAN MEMBERSHIP
(CONTINUED)**

Widows - 1960 Plan

<u>Age</u> <u>9/30/2016</u>	<u>Number</u>	<u>Monthly</u> <u>Allowance</u>	<u>Age</u> <u>9/30/2016</u>	<u>Number</u>	<u>Monthly</u> <u>Allowance</u>
28	1	\$ 1,953.57	74	13	\$ 16,042.05
50	1	1,868.76	75	11	13,695.21
51	2	3,623.35	76	17	20,214.09
52	2	3,473.04	77	11	9,856.36
53	2	4,087.68	78	9	12,137.11
55	2	3,718.74	79	5	6,084.78
56	1	1,590.88	80	8	8,837.92
57	2	2,109.32	81	8	10,067.26
58	2	4,588.72	82	6	6,804.34
59	3	6,551.24	83	6	4,937.92
60	3	5,217.14	84	12	10,749.72
61	2	3,265.16	85	15	14,482.21
62	3	5,085.63	86	11	10,935.96
63	4	7,183.50	87	7	7,514.64
64	4	6,443.30	88	8	6,918.02
65	7	10,401.44	89	12	8,595.87
66	3	4,238.73	90	4	3,292.10
67	6	8,161.69	91	4	4,305.66
68	1	2,221.95	92	5	3,453.01
69	5	6,602.40	93	7	4,828.64
70	6	7,619.36	94	5	2,852.88
71	6	6,642.72	95	4	3,049.64
72	7	10,989.31	96	2	1,014.02
73	7	7,845.21	98	1	491.58
Total				273	\$ 316,643.83
Average Monthly Allowance					\$ 1,159.87
Average Age					77.2

**DATA REFLECTING PLAN MEMBERSHIP
(CONTINUED)**

Widows - Old Plan

<u>Age</u> <u>9/30/2016</u>	<u>Number</u>	<u>Monthly</u> <u>Allowance</u>
98	<u>1</u>	<u>\$ 200.00</u>
Total	1	\$ 200.00
Average Monthly Allowance		\$ 200.00
Average Age		98.0

**DATA REFLECTING PLAN MEMBERSHIP
(CONTINUED)**

Children - 1960 Plan

<u>Age</u> <u>9/30/2016</u>	<u>Number</u>	<u>Monthly</u> <u>Allowance</u>
14	1	\$ 318.18
15	1	544.96
18	1	388.93
19	2	1,608.11
20	1	352.83
22	2	860.83
23	2	976.42
24	5	2,812.55
36	1	931.01
46	1	286.01
60	1	314.61
Total	18	\$ 9,394.44
Average Monthly Allowance		\$ 521.91
Average Age		25.4

SECTION C

ACTUARIAL VALUATION PROCEDURES

ACTUARIAL COST METHOD

The Actuarial Cost Method. The method used in this actuarial valuation is the Frozen Entry Age Actuarial Cost Method. This method determines a normal cost on an aggregate basis expressed as a level percentage of pay. The normal cost rate equals the ratio of (a) the present value of future benefits less the actuarial value of assets less the frozen unfunded actuarial liability, to (b) the present value of future salaries. Under this method, the actuarial gains (losses), as they occur, reduce (increase) future normal costs.

Amortization of Frozen Unfunded Accrued Liabilities. Unfunded actuarial accrued liabilities attributable to changes in assumptions, plan provisions or methods are amortized on a level basis over 30 years from the creation of the unfunded base. A schedule of the frozen unfunded accrued liability amortization is shown in section A of this report.

The total contribution is equal to the normal cost plus the amortization of the frozen unfunded accrued liabilities.

Actuarial Value of Assets. The calculated value is determined by adjusting the market value of assets, excluding the future benefit fund, to reflect the investment gains and losses (the difference between the actual investment return and the expected investment return) during each of the last three years at a rate of 33 percent per year.

ACTUARIAL ASSUMPTIONS

The assumed rate of investment return used was 7.00 percent, net of investment and administrative expenses, annually.

The post-retirement healthy mortality rates are based on the RP-2014 Healthy Annuitant mortality table, sex distinct. This assumption is used to measure the probabilities of members dying after retirement and the probabilities of each benefit payment being made after retirement. Illustrative rates are shown below. This table provides a margin, of approximately 41 percent based on the most recent experience study, for near-term and long-term mortality improvements.

Post Retirement Mortality		
Rate Per 1,000 Employees		
Age	Male	Female
45	2.7430	2.1130
50	4.0640	2.7680
55	5.7350	3.6220
60	7.7710	5.1910
65	11.0130	8.0480
70	16.7690	12.8680
75	26.8260	20.9380
80	44.7220	34.8440
85	77.4970	60.5040

The pre-retirement mortality rates are based on the RP-2014 Employee mortality tables, sex distinct. Illustrative rates are shown below.

Ordinary Pre Retirement Mortality		
Rate Per 1,000 Employees		
Age	Male	Female
25	0.4840	0.1730
35	0.5230	0.2860
45	0.9730	0.6570
55	2.7880	1.6730
65	8.2770	3.6960

**ACTUARIAL ASSUMPTIONS
(CONTINUED)**

The post-disability mortality rates are assumed to be 20 percent higher than post-retirement mortality rates. Illustrative rates are shown below.

Post - Disability Mortality Rate Per 1,000 Employees		
Age	Male	Female
45	3.2916	2.5356
55	6.8820	4.3464
65	13.2156	9.6576
75	32.1912	25.1256
85	92.9964	72.6048

Rates of separation from active membership are represented by the following table (rates do not apply to members eligible to retire and do not include separation on account of death or disability). This assumption measures the probabilities of members terminating employment.

Employee Withdrawal Rate Per 1,000 Employees	
Years of Service	Rate of Withdrawal
0	75.0
1	100.0
2	50.0
3	50.0
4	22.5
5	22.5
6	22.5
7	22.5
8	22.5
9	22.5
10	22.5
11	12.5
12	12.5
13	12.5
14	12.5
15	12.5
16	5.0
17	5.0
18	5.0
19	5.0
20 or more	0.0

**ACTUARIAL ASSUMPTIONS
(CONTINUED)**

The annual rates of salary increase used for individual members are shown below and include a wage inflation assumption of 3.00 percent. This assumption is used to project a member's current salary for purposes of determining the present value of future salaries. Because FRS benefits have been frozen as of February 1, 2013, this assumption is not used to determine benefits.

Sample Service	Salary Increase Assumptions For an Individual Member
Sample Service	Increase Next Year
0	4.00%
1	4.00%
2	4.00%
3	4.00%
4	4.00%
5	3.50%
6	3.50%
7	3.50%
8	3.50%
9	3.50%
10	3.00%
11	3.00%
12	3.00%
13	3.00%
14	3.00%
15 or more	3.00%

**ACTUARIAL ASSUMPTIONS
(CONTINUED)**

The rates of disability for active members are broken out between ordinary and accidental disability. Ordinary disability accounts for 60 percent of total disabilities and accidental disability accounts for 40 percent of total disabilities.

Employee Disablement Rate Per 1,000 Employees		
Age	Ordinary	Accidental
25	3.00	2.00
30	3.00	2.00
35	3.00	2.00
40	6.00	4.00
45	6.00	4.00
50	6.00	4.00
55	6.00	4.00
60	9.00	6.00

Probabilities of retirement for members eligible to retire during the next year were as follows:

Rates of Retirement	
Years of Service	Rate of Retirement
20	4.00 %
21	2.00
22	2.00
23	2.00
24	2.00
25	3.00
26	4.00
27	4.00
28	4.00
29	4.00
30	10.00
31	10.00
32	10.00
33	20.00
34	20.00
35 or more	100.00

100% retirement assumed at age 70

It was assumed that grandfathered members with less than 20 years of service as of February 1, 2013, will not retire prior to age 55. The retirement rates for the year the member first becomes eligible at age 55 were increased by 5.00% for each year of service over 20 years.

ACTUARIAL ASSUMPTIONS (CONTINUED)

Marital status varies by gender. A male spouse is assumed to be three years older than a female spouse. One hundred percent of members are assumed to be married.

Sick Leave Benefits. In 2010, the City of St. Louis passed ordinances 67845 and 67846 which effectively ended the practice of firefighters accruing sick leave for retirement benefit purposes. Sick leave accrued prior to September 26, 2010, can still be used for retirement benefit purposes. Based on the 2015 Settlement Agreement between FRS and the City, the accrued sick leave balance as of February 1, 2013, can be converted to a pension benefit upon retirement.

It is assumed that the sick leave balance remaining as of the actuarial valuation date will be maintained until the member retires. It is assumed that members will elect to receive 50 percent of the value as a lump sum deposit into the DROP account, and receive 25 percent as service added to the credited service used in the calculation of the retirement benefit and receive 25 percent of the value as additional pay solely for purposes of determining the final average earnings used in the calculation of the retirement benefit.

Furthermore, it is assumed that if a member has not participated in the DROP, the member will participate in the DROP when pension payments commence and the benefit increase and lump sum will be payable four years later at actual retirement. If the member has participated in the DROP and subsequently returned to active service, the benefit increase and lump sum are assumed to be payable immediately upon retirement.

Pursuant to BB109, and subsequent settlement agreements, it is assumed that sick leave benefits do not include salary increases after February 1, 2013.

Shift Differential. No assumption is made for shift differential because it was removed for active members for City fiscal year ending June 30, 2011, and is not expected to be reinstated.

DROP Benefits. It is assumed that members will enter the DROP with 23 years of service. If the member has more than 23 years of service at the actuarial valuation date, it is assumed that the member will enter the DROP the following year. Members with less than 20 years of service as of February 1, 2013, are assumed to enter the DROP at the later of 23 years of service or age 55. It is assumed that members who enter the DROP with less than 30 years of service will return to active status after completing five years in the DROP. DROP balances are assumed to earn 7.00 percent. If a member with a DROP balance dies prior to termination of employment, it is assumed that a lump sum payment equal to the amount in the member's DROP account shall be paid to the beneficiary or the member's estate.

Pursuant to BB109, it is assumed that DROP benefits do not include salary increases after February 1, 2013.

Pay Adjustments. Pay as of October 1, 2016, was assumed to be equal to pay as of October 1, 2015, increased by the actuarial valuation assumed salary scale rate based on service as of the actuarial valuation date.

SUMMARY OF PLAN PROVISIONS

The Retirement System was revised effective January 1, 1960, under Ordinance 49623.

Prior to January 1, 1960, there were two groups of members, one group referred to as “Old Plan” and the other group as “New Plan.” There is no longer a need for this separation in the active members because the revised system makes no distinction between the “Old Plan” members and the “New Plan” members. The retirees are divided into Old Plan, 1944 Plan (New Plan) and 1960 Plan (Ordinance 49623).

Provisions Attributable to Board Bill 109

First effective with the actuarial valuation as of October 1, 2013, the actuarial valuation reflects the changes attributable to Ordinance 69245, Ordinance 69353, and Judge Dierker’s subsequent ruling (Board Bill 109 or BB109). Our understanding of the key changes to the FRS is as follows:

- FRS is frozen as of February 1, 2013. That is, benefits paid from FRS will be based on the member’s service and salary earned as of February 1, 2013. Participants with benefit service in FRS are classified as “grandfathered” members.
- Firefighters hired after February 1, 2013, are not members of FRS.
- Vesting and eligibility service earned after February 1, 2013, in the newly established Firemen’s Retirement Plan of St. Louis (FRP) will count towards vesting and eligibility service in FRS.
- Ancillary benefits, for pre-retirement death or disability occurring after February 1, 2013, are assumed to be paid from the newly established FRP. FRS members who become disabled or die before retirement are eligible for a refund of contributions made to FRS.
- Employer contributions to the frozen FRS will continue to be calculated under the Frozen Initial Liability cost method.
- Member contributions after February 1, 2013, from “grandfathered” participants in FRS will be paid to the FRP.
- Grandfathered members with 20 or more years of service as of February 1, 2013, are eligible to retire with unreduced FRP benefits if retirement commences before age 55.
- Grandfathered members with less than 20 years of service as of February 1, 2013, are eligible to retire with actuarially reduced FRP benefits if retirement commences before age 55.

Service Retirement

Retirements after June 3, 1978: Voluntary retirement after 20 or more years of service. Compulsory retirement at age 60 with 30 years of service. The monthly retirement allowance consists of 40 percent of the final two-year average monthly compensation at 20 years of service, plus 2.0 percent of such final average compensation for each of the next five years of service (50 percent of final average compensation after 25 years of service), plus 4.0 percent of such final average compensation for each additional year of service over 25 years, but with a maximum of 30 years (70 percent of final average compensation after 30 years of service).

Effective October 3, 1982, any retired firefighter may act as a special advisor to the retirement system and thereby be entitled to a minimum pension of \$350.00 per month.

Effective October 1, 1989, any unused accrued sick leave will be added to the years of service used to determine the monthly pension allowance. If the total years of service are limited to 30 years as described above, the unused accrued sick leave will be added to 30.

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Effective November 28, 1995, the monthly retirement allowance consists of 40 percent of the final two-year average monthly compensation at 20 years of service, plus 2.0 percent of such final average compensation for each of the next five years of service (50 percent of final average compensation after 25 years of service), plus 5.0 percent of such final average compensation for each additional year of service over 25 years, but with a maximum of 30 years (75 percent of final average compensation after 30 years of service).

Effective July 1, 2002, a Member has three options for use of unused sick leave and service retirement:

- Receive 100 percent of the value (sick leave multiplied by rate of pay) as a lump sum deposit into the DROP account;
- Receive 100 percent of the sick leave as service added to the credited service used in the calculation of the retirement benefit; or
- Receive 50 percent of the value as a lump sum deposit into the DROP account, and receive 25 percent as service added to the credited service used in the calculation of the retirement benefit and receive 25 percent of the value as additional pay solely for purposes of determining the final average earnings used in the calculation of the retirement benefit.

In 2010, the City of St. Louis passed ordinances 67845 and 67846 which effectively ended the practice of firefighters accruing sick leave for retirement benefit purposes. Sick leave accrued prior to September 26, 2010, can be converted to a pension benefit at retirement.

As part of the 2015 Settlement Agreement, accrued sick leave earned through February 1, 2013, can be converted to a pension benefit at retirement.

Ordinary Disability Retirement

Provides a service retirement allowance if 20 or more years of service. Provides for a monthly retirement allowance after five years of service (but less than 20 years) which is the largest of (a) 90 percent of the monthly service retirement allowance based on the actual service or (b) one-fourth of the final two-year average monthly compensation. In addition, a monthly benefit of 10 percent of the final two-year average monthly compensation, for each unmarried dependent child under age eighteen, but not in excess of three children, is provided.

Benefits are paid by FRS if disability occurred prior to February 1, 2013.

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Accidental Disability Retirement

Provides for retirement if the member is totally and permanently incapacitated for duty as the result of an accident or exposure occurring while in the actual performance of duty. The monthly retirement allowance is 75 percent of the highest monthly salary in effect for the highest step in the range of salary, for his rank held at retirement.

If the accident immediately, totally and permanently incapacitates the member from performing any type of work and confines him to his home, the Board may provide an increased retirement allowance not to exceed 100 percent of the member's actual rate of compensation as of the date his disability allowance began.

Benefits are paid by FRS if disability occurred prior to February 1, 2013.

DROP Benefit

A member eligible for service retirement may defer receipt of the service retirement benefit for up to five years while continuing active employment. Contributions by the member while in the DROP are one percent of annual compensation. The amount the member would have received as a service retirement benefit is deposited into the DROP account. A member terminating the DROP plan may retire or continue active service. Service while in the DROP will not count as creditable service. Upon termination of employment, the member may choose to receive the DROP account with the interest earned by the account.

Ordinary Death Benefit

Provides for the following benefits after death which occurs:

- (1) While in service, a monthly retirement allowance to the widow during widowhood of the greater of (1) 50 percent^a of the final two-year average monthly compensation or (2) \$200. In addition, 10 percent of each unmarried dependent child under age eighteen in her care, but not in excess of three children. **Benefits are paid by FRS if death occurred prior to February 1, 2013.**
- (2) After service retirement, accidental disability retirement or ordinary disability retirement, a monthly allowance to the widow during widowhood of the greater of (1) 50 percent^a of the final two-year average monthly compensation, or (2) \$200. In addition, 10 percent of such compensation for each unmarried dependent child under eighteen in her care but not in excess of three children. **Benefits are paid by FRS if retirement occurred prior to February 1, 2013.**

^a Assumes the widow has applied for and been appointed to the status of special consultant; if not the amount is 25 percent.

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Accidental Death Benefit

Provides, if death is the result of an accident or exposure while in the actual performance of duty, a monthly allowance to the widow during her widowhood of the greater of (1) 50 percent of the final two-year average monthly compensation or (2) \$200. In addition, 10 percent for each unmarried dependent child under 18 in her care but not in excess of three children. **Benefits are paid by FRS if death occurred prior to February 1, 2013.**

\$2,000 Lump Sum Death Benefit

Provides a \$2,000 lump sum amount upon the death of an active or retired member. **Lump sum death benefits are paid by FRS if retirement occurred prior to February 1, 2013, or if pre-retirement death occurred prior to February 1, 2013.**

Cost-of-Living Adjustments

(Ordinance 56444) Retirement allowances to members who retired after March 16, 1973, and prior to December 28, 1983, shall be increased 3.0 percent whenever the Consumer Price Index released by the U.S. Department of Labor shows an increase of at least 3.0 percent for three consecutive months in the preceding twelve-month period. Prior to August 31, 1980, each increase was applied to the base retirement benefit at time of retirement. Commencing August 31, 1980, the cost-of-living adjustment is made to the current retirement benefit.

Ordinance 59018 changed the cost-of-living provision for anyone retiring after December 28, 1983. For those members who retired subsequent to December 28, 1983, the cost-of-living increases for service or ordinary disability retirement are based upon the number of years of service at retirement, and are subject to a maximum of the actual increase in the Consumer Price Index over the most recent 12 months.

For a member with less than 25 years of service at retirement, the cost-of-living is 1.5 percent per year up to age 60 and 5.0 percent per year after age 60 with a 25 percent maximum applied past age 60. For a member with at least 25 years of service but less than 30 years at retirement, the cost-of-living increase is 2.25 percent per year up to age 60 and 5.0 percent per year after age 60 with a 25 percent maximum applied past age 60. For a member with 30 or more years of service at retirement, the cost-of-living increase is 3.0 percent per year up to age 60 and 5.0 percent per year after age 60 with a 25 percent maximum applied past age 60. For a member who retires at age 60 or later, the cost-of-living increase is 5.0 percent per year with a 25 percent maximum applied.

For a member who retires with an accidental disability retirement, the cost-of-living increase is 3.0 percent per year up to age 60 and 5.0 percent per year after age 60 with a 25 percent maximum applied past age 60.

SUMMARY OF PLAN PROVISIONS (CONTINUED)

Return of Contributions

Upon service retirement, ordinary disability, accidental disability or death of an active member, contributions without interest are refunded. Upon withdrawal from service of a member prior to eligibility for a service retirement allowance, the entire amount of the member's contributions with interest accumulated is returned to the member in lieu of any other benefits.