

Firemen's Retirement System of St. Louis

Annual Actuarial Valuation as of October 1, 2019



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January 16, 2020

The Pension Board
Firemen's Retirement System of St. Louis
1601 South Broadway
St. Louis, Missouri 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, 2019. 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, 2019, 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, 2019, 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, actuarial 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 were updated based on the experience review for the period October 1, 2014, through September 30, 2018, and are first effective with this actuarial valuation as of October 1, 2019.

e) Plan Provisions — The actuarial valuation is based on plan provisions in effect as of October 1, 2019, 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.

This report is based upon information, furnished to us by the System, concerning retirement and ancillary benefits, active members, deferred vested members, retirees and beneficiaries, and financial data. If your understanding of this information is different, please let us know. This information was checked for internal consistency, but it was not audited.

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, 2019, 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.

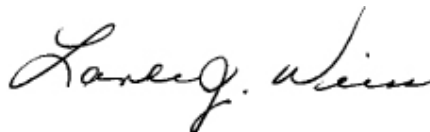
This report should not be relied on for any purpose other than the purpose stated.

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 and Team Leader



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, 2019.

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, 2019, 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.
- 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.



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- 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. Subsequently, the portion of ordinary and accidental disabilities was changed as part of the experience review for the period October 1, 2014, through September 30, 2018.

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

An experience study of the Firemen's Retirement System of St. Louis for the period October 1, 2014, to September 30, 2018, was performed. The primary purpose of the study was to compare the actual demographic and economic experience with the actuarial assumptions used in the actuarial valuations. The study was based on the information used to perform the annual actuarial valuations for the period October 1, 2014, to September 30, 2018.

Following is a summary of the key finding and recommendations:

- Decrease the assumed investment return assumption from 7.00 percent to 6.75 percent.
- Reduce the price inflation assumption from 2.75 percent to 2.50 percent.
- Reduce the general payroll growth assumption from 3.00 percent to 2.75 percent.
- Update the mortality tables to the Pub 2010 Public Safety Healthy Retiree and Employee Mortality Tables, with adjustments for future mortality improvements using Scale MP-2019.
- Adjust the normal retirement rates to better reflect observed experience. In general, overall decreases are recommended for normal retirement rates.
- Assume eligible members enter the DROP after earning at least 26 years of service.
- Adjust the timing of DROP distributions to better reflect observed experience.
- Decrease termination rates to better reflect observed experience.
- Assume members use Sick Leave Balances earned as of February 1, 2013, at rate of 3.0 percent per year.

All actuarial assumptions and methods are disclosed in Section C of this report.



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Asset Information

The market value of the assets of the fund, which are available for benefits, decreased from \$477.2 million at the end of FY 2018 to \$449.8 million at the end of FY 2019. The market value of assets reflects 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 \$473.8 million at the end of fiscal year 2018 to \$469.5 million at the end of fiscal year 2019.

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 following table compares the key actuarial results from the October 1, 2019, 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, due to assumption changes, from zero for plan year ending September 30, 2019, to \$1.30 million for plan year ending September 30, 2020.

| Summary of Results | October 1, 2018 | October 1, 2019 | |
|-------------------------------------|-----------------|-----------------|-----------------|
| | | Old Assumptions | New Assumptions |
| Total Contribution | \$ - | \$ - | \$ 1,297,238 |
| Present Value of Benefits | 471,058,619 | 466,872,577 | 485,990,431 |
| Actuarial Value of Assets | 473,844,718 | 469,480,277 | 469,480,277 |
| Market Value of Assets ^a | 477,152,696 | 449,763,777 | 449,763,777 |

^a Excluding Future Benefit Fund

The present value of benefits increased by \$14.9 million from \$471.1 million as of October 1, 2018, to \$486.0 million as of October 1, 2019. The key reasons for the increase include:

- \$3.1 million reduction in expected liability, for the closed and frozen FRS plan, due to the payment of benefits and adjustments for interest.
- \$0.2 million gain due to terminations, deaths or disabilities during the year. Under current provisions, FRP pays death and disability benefits to FRS members who accrue or have accrued benefits under FRP, resulting in an actuarial gain to FRS.
- \$0.9 million gain due to other demographic experience and data adjustments.
- \$19.1 million increase in the present value of benefits due to changes in actuarial assumptions.

During the plan year, the market value of assets earned 1.6 percent, and decreased from \$477.2 million at October 1, 2018, to \$449.8 million at October 1, 2019. The actuarial value of assets earned 6.6 percent during the year and decreased from \$473.8 million at October 1, 2018, to \$469.5 million at October 1, 2019. The actuarial value of assets is based on a three-year smoothing of investment gains and losses. The investment losses in 2018 and 2019 were partially offset by the investment gain in 2017.

A normal cost contribution is generated if the present value of benefits less the actuarial value of assets



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less the remaining balance of the initial actuarial liability is greater than zero. The City's expected normal cost contribution for 2020, before recognizing any plan year 2019 experience, was zero. After recognizing the experience factors discussed in the preceding two paragraphs, the City's normal cost contribution was also zero. Based on the frozen entry age cost method, the existing initial actuarial liability bases are set to zero if the present value of benefits is less than the actuarial value of assets. The change in assumptions established a new base for the initial actuarial liability under the actuarial cost method and generated a fixed amortization payment of \$1.3 million per year.

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

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 | October 1, 2018 | October 1, 2019 |
|--------------------------------------|------------------------|------------------------|
| Retired Members | 342 | 350 |
| Disabled Members | 271 | 262 |
| Widows and Children | 281 | 278 |
| Total Inactive Members | 894 | 890 |
| Actives - Non-DROP | 455 | 415 |
| Actives - DROP ^a | 65 | 76 |
| Total Active and DROP Members | 520 | 491 |

^a As of October 1, 2019, there are 238 members with DROP account balances, of which 76 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.



Risk Associated with Measuring the Accrued Liability and Contributions

The determination of the accrued liability and the statutory contribution requires the use of actuarial assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the actuarial assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the total required employer contribution that result from the differences between actual experience and the actuarial assumptions.

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 due to changing conditions; 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 fund's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the fund's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the fund's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The statutory contribution for fiscal year 2020 shown on page A-1 should be considered as the minimum contribution that complies with the funding policy governed by statute. Users of this report should be

Risk Associated with Measuring the Accrued Liability and Contributions

aware that contributions made at the statutorily determined amount do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

| | 2018 | 2019 |
|---|--------|--------|
| Ratio of the Market Value of Assets to Covered Payroll | 13.83 | 12.94 |
| Ratio of Actuarial Accrued Liability to Covered Payroll | 13.65 | 13.98 |
| Ratio of Actives to Retirees and Beneficiaries | 0.58 | 0.55 |
| Ratio of Net Cash Flow to Market Value of Assets | -6.27% | -7.71% |

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 14.0 times the payroll, a return on assets 5 percent different than assumed would equal 70 percent of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100 percent is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 14 times the payroll, a change in liability 2 percent other than assumed would equal 28 percent of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Risk Associated with Measuring the Accrued Liability and Contributions

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. At the board's request, we conducted additional risk assessment of investment and contribution risk through stress testing the investment return assumption.

SECTION A

ACTUARIAL VALUATION RESULTS AND ASSET INFORMATION

Summary of Actuarial Valuation Results

Determination of City Contributions - Frozen Initial Liability

| | October 1, 2018 | Old Assumptions October 1, 2019 | New Assumptions October 1, 2019 |
|---|-----------------------|---------------------------------------|---------------------------------------|
| Present Value of All Future Benefits | | | |
| Retirees and Beneficiaries | \$ 316,139,758 | \$ 317,208,017 | \$ 332,183,241 |
| Active Firemen | 101,013,287 | 90,425,792 | 93,319,681 |
| DROP Firemen | 53,809,520 | 59,133,627 | 60,382,368 |
| System Employees Benefit Fund | 96,054 | 105,141 | 105,141 |
| Total | \$ 471,058,619 | \$ 466,872,577 | \$ 485,990,431 |
| Assets | | | |
| Actuarial Asset Value (3-year smoothing) | \$473,844,718 | \$469,480,277 | \$ 469,480,277 |
| Present Value of Future Employee Contributions | - | - | - |
| Total | \$ 473,844,718 | \$ 469,480,277 | \$ 469,480,277 |
| Unfunded Accrued Liability ^a | \$ - | \$ - | \$ 16,510,154 |
| Present Value of Future Normal Costs | \$ (2,786,099) | \$ (2,607,700) | \$ - |
| Present Value of Future Salary ^b | \$ 264,133,985 | \$ 257,691,402 | \$ 270,439,560 |
| Normal Contribution Percent | 0.000% | 0.000% | 0.000% |
| Total Salary ^b | \$ 34,509,069 | \$ 34,769,108 | \$ 34,769,108 |
| Annual City Contributions for Plan Year Ending 9/30/2020 | | | |
| Normal Contribution | \$ - | \$ - | \$ - |
| Accrued Liability Amortization Payment ^c | - | - | 1,297,238 |
| Grand Total | \$ - | \$ - | \$ 1,297,238 |
| Normal Contribution as a % of Total Salary | 0.000% | 0.000% | 0.000% |
| Total Contribution as a % of Total Salary | 0.000% | 0.000% | 3.731% |

^a Change in unfunded accrued liability due to change in assumptions is amortized over a 30-year period on a level-dollar basis

^b Includes salary of all active members.

^c Before assumption changes, the present value of future benefits was less than the actuarial value of assets; therefore, the contribution is equal to zero.



Summary of Actuarial Valuation Results

Present Value of Future Benefits

| | <u>October 1, 2018</u> | <u>Old Assumptions October 1, 2019</u> | <u>New Assumptions October 1, 2019</u> |
|--|------------------------|--|--|
| Retirees | | | |
| 1960 Plan | \$ 128,228,432 | \$ 132,988,074 | \$ 138,208,213 |
| Prospective Widows and Children of Retired Firemen | 10,638,657 | 10,420,597 | 10,787,134 |
| Ordinary Disability | | | |
| 1960 Plan | 5,390,781 | 5,113,074 | 5,450,736 |
| Prospective Widows and Children of Retired Firemen | 636,434 | 650,482 | 626,483 |
| Accidental Disability | | | |
| 1960 Plan | 132,582,293 | 129,349,484 | 138,069,077 |
| Prospective Widows and Children of Retired Firemen | 8,201,919 | 8,202,379 | 7,944,898 |
| Widows | | | |
| 1960 Plan | 29,995,570 | 29,984,019 | 30,582,389 |
| Children | | | |
| 1960 Plan | 465,672 | 499,908 | 514,311 |
| Total Inactives | <u>\$ 316,139,758</u> | <u>\$ 317,208,017</u> | <u>\$ 332,183,241</u> |
| Active Firemen | | | |
| Service Retirement | \$ 97,889,903 | \$ 87,625,553 | \$ 91,437,431 |
| Ordinary Disability Retirement ^a | 820,258 | 709,574 | 170,311 |
| Accidental Disability Retirement ^a | 546,827 | 473,044 | 681,231 |
| Withdrawal Benefit | 192,791 | 143,084 | 137,147 |
| Ordinary Death ^a | 781,754 | 691,420 | 400,932 |
| Accidental Death ^a | 781,754 | 691,420 | 400,932 |
| Terminated - Pending Refund | - | 91,697 | 91,697 |
| Total Actives | <u>\$ 101,013,287</u> | <u>\$ 90,425,792</u> | <u>\$ 93,319,681</u> |
| DROP Firemen ^b | | | |
| Retiree Account Balances | \$ 17,954,353 | \$ 20,498,486 | \$ 20,498,486 |
| Active Firemen ^c | 35,855,167 | 38,635,141 | 39,883,882 |
| Total DROPS | <u>\$ 53,809,520</u> | <u>\$ 59,133,627</u> | <u>\$ 60,382,368</u> |
| System Employees Benefit Fund | <u>\$ 96,054</u> | <u>\$ 105,141</u> | <u>\$ 105,141</u> |
| Total Present Value Future Benefits | <u>\$ 471,058,619</u> | <u>\$ 466,872,577</u> | <u>\$ 485,990,431</u> |

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

^b As of October 1, 2019, there are 238 members with DROP account balances, of which 76 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

Actuarial Value of Assets

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

(a) Market Value of Assets as of 9/30/18 ^a \$ 477,152,696

(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. | - | 50.0% | - |
| iii) Benefit Payments | (32,808,908) | 50.0% | (16,404,454) |
| iv) Refunds | (2,027,172) | 50.0% | (1,013,586) |
| v) Transfer Due to Sick Leave Settlement | 166,792 | 50.0% | 83,396 |
| vi) Total | \$ (34,669,288) | | \$ (17,334,644) |

(c) Market Value of Assets Adj. for Actual Income and Disbursements [(a) + (b)(vi))] \$ 459,818,052
 (d) Assumed Rate of Return on Plan Assets for the Year 7.000%
 (e) Expected Return Over Twelve Month Period 32,187,264
 (f) Expected Market Value of Assets 10/1/19 \$ 474,670,672

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

(a) Market Value of Assets as of 9/30/18 ^a \$ 477,152,696
 (b) Income (less investment income and expenses) for Prior Plan Year (34,669,288)
 (c) Market Value of Assets as of 10/1/19 ^a 449,763,777
 (d) Actual Return, Net of Expenses [(c) - (b) - (a)] \$ 7,280,369

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

\$ (24,906,895)

(4) Actuarial Value of Assets as of 10/1/19

(a) Market Value of Assets as of 10/1/19 ^a \$ 449,763,777
 (b) Deferred Investment Gains and (Losses) for Last 3 Years

| Plan Year | Gain/(Loss) | Weight for Timing | Deferred Amount |
|-----------|----------------|-------------------|-----------------|
| i) 2017 | 28,595,350 | 0.00% | \$ - |
| ii) 2018 | (9,335,708) | 33.33% | (3,111,903) |
| iii) 2019 | (24,906,895) | 66.67% | (16,604,597) |
| iv) Total | \$ (5,647,253) | | \$ (19,716,500) |

(c) Actuarial Value of Assets [(a) - (b) (iv)] \$ 469,480,277

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 \$4,825,954 as of September 30, 2018, and \$4,546,004 as of September 30, 2019



Summary of Actuarial Valuation Results

Amortization Schedule of Unfunded Accrued Liability

| <u>Date Established</u> | <u>Original Period</u> | <u>Outstanding Period 10/1/19</u> | <u>Payment End of Year</u> | <u>Outstanding Balance 10/1/19</u> |
|-------------------------|------------------------|-----------------------------------|----------------------------|------------------------------------|
| 10/1/2019 ^a | 30 | 30 Years, 0 Months | 1,297,238 | 16,510,154 |
| Total | | | \$ 1,297,238 | \$ 16,510,154 |

^a As of October 1, 2019, the unfunded accrued liability increased by \$16,510,154 due to change in actuarial assumptions. The initial unfunded accrued liability is amortized over a 30-year period on a level-dollar basis using an interest rate of 6.75 percent.



Summary of Actuarial Valuation Results

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.

Actuarial Valuation Balance Sheet

Sources of Funds

| | | |
|---|-------------------|------------------------------|
| Actuarial Asset Value | | \$ 469,480,277 |
| Present Value of Future Employee Contributions | | \$ - |
| Present Value of City's Future Contributions | | |
| Normal Cost | \$ - | |
| Accrued Liability | <u>16,510,154</u> | |
| Total | | <u>\$ 16,510,154</u> |
| Grand Total | | <u>\$ 485,990,431</u> |



Summary of Actuarial Valuation Results

Change in Market Value of Assets^a

| | | Receipts | |
|---|------------------|----------------------|-------------------------|
| Paid by City | | | |
| Allocated to General Reserve Fund | | \$ | - |
| Members' Contribution | | | |
| To Members' Savings Fund | | \$ | - |
| Income Received on Investments | | | |
| Allocated to Member's Savings Fund | \$ 1,303,978 | | |
| Allocated to Benefit Reserve Fund | 4,746,613 | | |
| Allocated to General Reserve Fund | 1,229,778 | | |
| Allocated to Future Benefit Fund | 74,936 | | |
| Allocated to Expense Fund | <u>1,027,225</u> | \$ | <u>8,382,530</u> |
| Total Receipts | | \$ | <u>8,382,530</u> |
| | | Disbursements | |
| Payment to Retired Members and Dependents: | | | |
| From Benefit Reserve Fund | | | |
| To Retirees, Beneficiaries, and Dependents | | \$ | (32,808,908) |
| From Future Benefit Fund | | | |
| To Retirees, Beneficiaries, and Dependents | | \$ | (188,094) |
| From Members Savings Fund | | | |
| Withdrawals, Deaths, and Retirements | | \$ | (2,027,172) |
| Operating Expenses | | \$ | (1,027,225) |
| Total Disbursements | | \$ | (36,051,399) |
| Net Operating Income | | \$ | (27,668,869) |
| Fund Balance October 1, 2018^a | | \$ | 481,978,650 |
| Fund Balance October 1, 2019^a | | \$ | 454,309,781 |

^a Includes Future Benefit Fund Assets of \$4,825,954 as of October 1, 2018, and \$4,546,004 as of October 1, 2019.



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

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, 2018 | \$ 481,978,650 | \$ 83,356,133 | \$ 316,139,758 | \$ 77,656,805 | \$ 4,825,954 |
| Additions | | | | | |
| City Appropriations | - | - | - | - | - |
| Interest and Dividends Received ¹ | 7,355,305 | 1,303,978 | 4,746,613 | 1,229,778 | 74,936 |
| Transfer Due to Surplus/Deficit | - | (1,485,025) | 44,105,778 | (42,620,753) | - |
| Total Additions | <u>7,355,305</u> | <u>(181,047)</u> | <u>48,852,391</u> | <u>(41,390,975)</u> | <u>74,936</u> |
| Deductions | | | | | |
| Benefit Payments | (32,997,002) | - | (32,808,908) | - | (188,094) |
| Refunds w/o Interest and Withdrawals w/ Interest | (2,027,172) | (2,027,172) | - | - | - |
| Transfer in accordance with Sick Leave Settlement | - | - | - | 166,792 | (166,792) |
| Total Deductions | <u>(35,024,174)</u> | <u>(2,027,172)</u> | <u>(32,808,908)</u> | <u>166,792</u> | <u>(354,886)</u> |
| Market Value, September 30, 2019 | <u>\$ 454,309,781</u> | <u>\$ 81,147,914</u> | <u>\$ 332,183,241</u> | <u>\$ 36,432,622</u> | <u>\$ 4,546,004</u> |

¹ Net of administrative expenses



SECTION B

DATA REFLECTING PLAN MEMBERSHIP

Data Reflecting Plan Membership

Summary of Membership as of October 1, 2019

Retirees and Dependents

| | <u>Number</u> | <u>Monthly Pension</u> |
|------------------------------|---------------|------------------------|
| Retirees | | |
| 1960 Plan | 350 | \$ 1,176,750 |
| Ordinary Disability | | |
| 1960 Plan | 21 | 38,379 |
| Accidental Disability | | |
| 1960 Plan | 241 | 1,011,739 |
| Widows | | |
| 1960 Plan | 265 | 318,353 |
| Children | | |
| 1960 Plan | 13 | 7,530 |
| Total | 890 | \$ 2,552,751 |

Active and DROP

| | <u>Number</u> | <u>Member's Annual Compensation</u> | <u>Contribution</u> |
|---------------------------|---------------|-------------------------------------|---------------------|
| Actives - Non-DROP | 415 | \$ 28,991,522 | \$ 0 |
| Actives - DROP | 76 | 5,777,586 | 0 |
| Total | 491 | \$ 34,769,108 | \$ 0 |



Data Reflecting Plan Membership

Active Non-DROP Members as of October 1, 2019 By Attained Age and Years of Service

| Attained Age | Years of Service to Valuation Date | | | | | | | Totals | |
|----------------------|------------------------------------|------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|----------------------|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | | 35 & Up |
| 20-24 | | | | | | | | | \$ - |
| 25-29 | | | | | | | | | \$ - |
| 30-34 | | | 8 | | | | | | 8 |
| | | | \$ 539,611 | | | | | | \$ 539,611 |
| 35-39 | | | 34 | | | | | | 34 |
| | | | \$ 2,279,858 | | | | | | \$ 2,279,858 |
| 40-44 | | | 40 | 13 | 3 | | | | 56 |
| | | | \$ 2,675,792 | \$ 881,185 | \$ 220,671 | | | | \$ 3,777,648 |
| 45-49 | | | 26 | 17 | 39 | 1 | | | 83 |
| | | | \$ 1,737,676 | \$ 1,128,728 | \$ 2,855,280 | \$ 81,760 | | | \$ 5,803,444 |
| 50-54 | | | 17 | 22 | 35 | 40 | 1 | | 115 |
| | | | \$ 1,116,546 | \$ 1,372,370 | \$ 2,326,017 | \$ 3,054,176 | \$ 65,269 | | \$ 7,934,379 |
| 55-59 | | | 9 | 7 | 14 | 49 | 14 | 1 | 94 |
| | | | \$ 586,468 | \$ 500,165 | \$ 943,326 | \$ 3,533,643 | \$ 1,047,210 | \$ 82,625 | \$ 6,693,437 |
| 60-64 | | | 5 | 2 | 3 | 3 | 4 | 5 | 22 |
| | | | \$ 287,926 | \$ 131,042 | \$ 213,396 | \$ 228,739 | \$ 315,755 | \$ 538,023 | \$ 1,714,882 |
| 65-69 | | | | 1 | | | | 2 | 3 |
| | | | | \$ 65,291 | | | | \$ 182,973 | \$ 248,263 |
| Totals: Count | 0 | 0 | 139 | 62 | 94 | 93 | 19 | 8 | 415 |
| Payroll | \$0 | \$0 | \$9,223,879 | \$4,078,781 | \$6,558,690 | \$6,898,318 | \$1,428,234 | \$ 803,620 | \$ 28,991,522 |



Data Reflecting Plan Membership

Active DROP Members as of October 1, 2019 By Attained Age and Years of Service

| Attained Age | Years of Service to Valuation Date | | | Totals |
|----------------|------------------------------------|-------------------|---------------------|---------------------|
| | 20-24 | 25-29 | 30 & Up | |
| 40-44 | 1 | | | 1 |
| | \$ 65,865 | | | \$ 65,865 |
| 45-49 | 2 | | | 2 |
| | \$ 132,757 | \$ - | \$ - | \$ 132,757 |
| 50-54 | 4 | 3 | 5 | 12 |
| | \$ 265,978 | \$ 259,636 | \$ 411,257 | \$ 936,871 |
| 55-59 | 11 | 8 | 27 | 46 |
| | \$ 743,077 | \$ 611,353 | \$ 2,122,190 | \$ 3,476,620 |
| 60-64 | 6 | | 9 | 15 |
| | \$ 412,905 | \$ - | \$ 752,568 | \$ 1,165,473 |
| Totals: | | | | |
| Count | 24 | 11 | 41 | 76 |
| Payroll | \$ 1,620,582 | \$ 870,989 | \$ 3,286,015 | \$ 5,777,586 |

Data Reflecting Plan Membership

Service Retirees - 1960 Plan

| <u>Age</u> <u>9/30/2019</u> | <u>Number</u> | <u>Monthly</u> <u>Allowance</u> | <u>Age</u> <u>9/30/2019</u> | <u>Number</u> | <u>Monthly</u> <u>Allowance</u> |
|----------------------------------|---------------|------------------------------------|--------------------------------|---------------|------------------------------------|
| 46 | 1 | \$ 1,223.01 | 73 | 9 | \$ 41,700.46 |
| 48 | 1 | 1,902.67 | 74 | 8 | 25,350.39 |
| 49 | 1 | 1,278.57 | 75 | 1 | 4,069.75 |
| 51 | 3 | 5,365.77 | 76 | 6 | 26,157.78 |
| 52 | 4 | 8,564.00 | 77 | 11 | 36,348.28 |
| 53 | 8 | 20,324.07 | 78 | 11 | 39,398.10 |
| 54 | 7 | 16,472.16 | 79 | 9 | 34,432.77 |
| 55 | 8 | 21,957.26 | 80 | 19 | 59,381.18 |
| 56 | 3 | 7,526.13 | 81 | 11 | 33,850.66 |
| 57 | 12 | 27,030.84 | 82 | 9 | 24,292.33 |
| 58 | 8 | 22,218.27 | 83 | 6 | 16,312.15 |
| 59 | 5 | 20,041.57 | 84 | 5 | 16,146.21 |
| 60 | 12 | 41,950.68 | 85 | 4 | 9,661.02 |
| 61 | 14 | 49,375.32 | 86 | 6 | 17,389.31 |
| 62 | 12 | 53,323.19 | 87 | 8 | 20,910.57 |
| 63 | 12 | 45,206.26 | 88 | 4 | 8,226.65 |
| 64 | 11 | 42,050.20 | 89 | 3 | 6,846.89 |
| 65 | 9 | 35,711.12 | 90 | 5 | 12,067.54 |
| 66 | 10 | 44,321.32 | 91 | 3 | 6,449.57 |
| 67 | 8 | 36,065.20 | 92 | 1 | 4,250.02 |
| 68 | 10 | 42,793.47 | 93 | 3 | 7,364.78 |
| 69 | 14 | 49,113.52 | 94 | 2 | 6,717.89 |
| 70 | 9 | 43,004.16 | 95 | 1 | 1,726.76 |
| 71 | 9 | 24,278.72 | 99 | 2 | 5,025.48 |
| 72 | 12 | 51,576.41 | | | |
| Total | | | | 350 | \$ 1,176,750.43 |
| Average Monthly Allowance | | | | | \$ 3,362.14 |
| Average Age | | | | | 70.6 |



Data Reflecting Plan Membership

Ordinary Disability Retirees - 1960 Plan

| <u>Age</u> <u>9/30/2019</u> | <u>Number</u> | | <u>Monthly</u> <u>Allowance</u> |
|----------------------------------|---------------|-----------|------------------------------------|
| 45 | 2 | \$ | 3,975.56 |
| 50 | 1 | | 2,002.45 |
| 51 | 3 | | 4,345.73 |
| 52 | 1 | | 1,291.75 |
| 54 | 1 | | 1,136.22 |
| 55 | 1 | | 3,501.85 |
| 58 | 1 | | 1,321.25 |
| 64 | 1 | | 1,123.85 |
| 65 | 1 | | 1,359.80 |
| 66 | 1 | | 1,376.71 |
| 67 | 1 | | 1,523.14 |
| 68 | 1 | | 1,409.70 |
| 71 | 2 | | 4,590.16 |
| 76 | 1 | | 2,848.56 |
| 77 | 2 | | 2,890.54 |
| 78 | 1 | | 3,681.68 |
| Total | 21 | \$ | 38,378.95 |
| Average Monthly Allowance | | \$ | 1,827.57 |
| Average Age | | | 61.5 |



Data Reflecting Plan Membership

Accidental Disability Retirees - 1960 Plan

| <u>Age</u> <u>9/30/2019</u> | <u>Number</u> | <u>Monthly</u> <u>Allowance</u> | <u>Age</u> <u>9/30/2019</u> | <u>Number</u> | <u>Monthly</u> <u>Allowance</u> |
|----------------------------------|---------------|------------------------------------|--------------------------------|---------------|------------------------------------|
| 37 | 1 | \$ 4,189.23 | 67 | 4 | \$ 17,211.27 |
| 42 | 1 | 4,544.04 | 68 | 5 | 24,394.76 |
| 43 | 1 | 4,544.04 | 69 | 9 | 42,489.75 |
| 44 | 1 | 4,189.23 | 70 | 7 | 28,888.51 |
| 45 | 1 | 4,189.23 | 71 | 6 | 32,988.17 |
| 47 | 1 | 4,003.32 | 72 | 6 | 26,066.88 |
| 48 | 2 | 9,568.60 | 73 | 4 | 18,185.80 |
| 49 | 3 | 12,998.65 | 74 | 2 | 10,220.38 |
| 50 | 2 | 8,565.75 | 75 | 3 | 12,651.07 |
| 51 | 2 | 8,244.74 | 76 | 11 | 43,969.21 |
| 52 | 5 | 21,189.75 | 77 | 4 | 18,069.60 |
| 53 | 4 | 17,431.24 | 78 | 3 | 11,141.36 |
| 54 | 6 | 26,125.41 | 79 | 8 | 30,126.07 |
| 55 | 11 | 48,295.39 | 80 | 4 | 10,818.70 |
| 56 | 9 | 40,408.97 | 81 | 8 | 30,692.27 |
| 57 | 12 | 50,932.29 | 82 | 7 | 19,928.11 |
| 58 | 12 | 53,627.13 | 83 | 4 | 11,967.88 |
| 59 | 8 | 37,428.89 | 84 | 9 | 29,726.24 |
| 60 | 2 | 10,710.49 | 85 | 3 | 7,179.96 |
| 61 | 11 | 53,294.90 | 87 | 3 | 12,572.51 |
| 62 | 9 | 41,815.49 | 88 | 1 | 3,610.14 |
| 63 | 2 | 7,993.28 | 89 | 4 | 11,890.04 |
| 64 | 3 | 12,590.99 | 90 | 1 | 820.63 |
| 65 | 10 | 47,699.68 | 91 | 1 | 2,404.53 |
| 66 | 4 | 16,809.31 | 92 | 1 | 2,334.67 |
| Total | | | | 241 | \$ 1,011,738.55 |
| Average Monthly Allowance | | | | | \$ 4,198.09 |
| Average Age | | | | | 67.0 |



Data Reflecting Plan Membership

Widows - 1960 Plan

| <u>Age</u> <u>9/30/2019</u> | <u>Number</u> | <u>Monthly</u> <u>Allowance</u> | <u>Age</u> <u>9/30/2019</u> | <u>Number</u> | <u>Monthly</u> <u>Allowance</u> |
|----------------------------------|---------------|------------------------------------|--------------------------------|---------------|------------------------------------|
| 31 | 1 | \$ 1,953.57 | 76 | 7 | \$ 7,845.21 |
| 51 | 1 | 2,266.74 | 77 | 17 | 21,761.64 |
| 52 | 1 | 1,429.49 | 78 | 11 | 14,285.22 |
| 53 | 1 | 1,868.76 | 79 | 18 | 21,151.45 |
| 54 | 2 | 3,623.35 | 80 | 14 | 12,983.38 |
| 55 | 2 | 3,473.04 | 81 | 10 | 13,594.13 |
| 56 | 3 | 6,829.21 | 82 | 5 | 6,472.26 |
| 57 | 1 | 1,987.96 | 83 | 11 | 12,166.14 |
| 58 | 2 | 3,718.74 | 84 | 6 | 7,942.36 |
| 59 | 1 | 1,590.88 | 85 | 9 | 9,644.30 |
| 60 | 2 | 2,109.32 | 86 | 7 | 6,541.32 |
| 61 | 3 | 4,869.04 | 87 | 10 | 8,774.64 |
| 62 | 3 | 6,551.24 | 88 | 14 | 13,142.21 |
| 63 | 4 | 6,629.76 | 89 | 7 | 6,397.52 |
| 64 | 2 | 3,265.16 | 90 | 6 | 5,885.90 |
| 65 | 2 | 3,416.60 | 91 | 6 | 6,217.50 |
| 66 | 4 | 7,183.50 | 92 | 10 | 6,305.37 |
| 67 | 2 | 3,407.32 | 93 | 3 | 2,689.54 |
| 68 | 6 | 9,320.96 | 94 | 1 | 1,170.56 |
| 69 | 3 | 4,238.73 | 95 | 4 | 2,723.53 |
| 70 | 5 | 5,379.63 | 96 | 2 | 1,661.16 |
| 71 | 2 | 3,992.84 | 97 | 3 | 1,767.28 |
| 72 | 4 | 6,037.86 | 98 | 1 | 725.52 |
| 73 | 8 | 10,329.10 | 99 | 2 | 1,014.02 |
| 74 | 7 | 8,550.43 | 101 | 1 | 491.58 |
| 75 | 8 | 10,976.41 | | | |
| Total | | | | 265 | \$ 318,353.38 |
| Average Monthly Allowance | | | | | \$ 1,201.33 |
| Average Age | | | | | 78.9 |



Data Reflecting Plan Membership

Children - 1960 Plan

| <u>Age</u> <u>9/30/2019</u> | <u>Number</u> | <u>Monthly</u> <u>Allowance</u> |
|----------------------------------|---------------|------------------------------------|
| 17 | 1 | \$ 318.18 |
| 18 | 1 | 544.96 |
| 19 | 1 | 433.49 |
| 20 | 1 | 1,486.12 |
| 21 | 2 | 822.42 |
| 22 | 2 | 1,608.11 |
| 23 | 1 | 352.83 |
| 25 | 1 | 432.22 |
| 38 | 1 | 931.01 |
| 49 | 1 | 286.01 |
| 63 | <u>1</u> | <u>314.61</u> |
| Total | 13 | \$ 7,529.96 |
| Average Monthly Allowance | | \$ 579.23 |
| Average Age | | 27.5 |

SECTION C

ACTUARIAL VALUATION PROCEDURES

Actuarial Cost Method

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 dollar 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.

Existing frozen unfunded accrued liabilities are fully funded if the actuarial value of assets is greater than the present value of future benefits.

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 Board adopts the assumptions after consultation with the actuary. All actuarial assumptions are expectations of future experience and are not market measures. The rationale for the actuarial assumptions may be found in the experience study report covering the period October 1, 2014, through September 30, 2018.

Interest

6.75 percent per year, compounded annually, net of investment and administrative expenses, annually.

General Inflation

2.50 percent per year, compounded annually.

This assumption serves as the basis for the determination of annual increases that are equal to the annual increase in the Consumer Price Index-U during the preceding 12-month calendar year.

Mortality

Mortality assumptions for employees and retirees are as follows:

| Applicable Group | Base Mortality Table |
|------------------|---|
| Pre-retirement | Pub-2010 Public Safety Employee, sex distinct |
| Post-retirement | Pub-2010 Public Safety Healthy Retiree, sex distinct |
| Post-disability | Pub-2010 Public Safety Disabled Retiree, sex distinct |

Future mortality improvements are reflected by projecting the base mortality tables forward from the year 2010 using the MP-2019 projection scale.

Illustrative rates are shown below.

| Sample Mortality Rates | | | | | | | | |
|------------------------|--|--------|--------------------|--------|--|--------|--------------------|--------|
| | Future Life Expectancy (years) in 2019 | | | | Future Life Expectancy (years) in 2035 | | | |
| | Post-retirement | | Disabled - Retiree | | Post-retirement | | Disabled - Retiree | |
| Age | Male | Female | Male | Female | Male | Female | Male | Female |
| 35 | 51.16 | 53.34 | 48.94 | 51.21 | 52.66 | 54.82 | 50.61 | 52.87 |
| 40 | 45.89 | 48.02 | 43.96 | 46.16 | 47.36 | 49.49 | 45.57 | 47.78 |
| 45 | 40.66 | 42.73 | 38.99 | 41.13 | 42.11 | 44.19 | 40.55 | 42.72 |
| 50 | 35.50 | 37.50 | 34.03 | 36.13 | 36.93 | 38.94 | 35.56 | 37.68 |
| 55 | 30.43 | 32.38 | 29.16 | 31.26 | 31.83 | 33.80 | 30.65 | 32.78 |
| 60 | 25.55 | 27.50 | 24.50 | 26.69 | 26.89 | 28.85 | 25.91 | 28.10 |
| 65 | 20.96 | 22.86 | 20.18 | 22.38 | 22.20 | 24.11 | 21.46 | 23.66 |
| 70 | 16.67 | 18.46 | 16.14 | 18.25 | 17.79 | 19.61 | 17.28 | 19.41 |
| 75 | 12.74 | 14.37 | 12.41 | 14.33 | 13.74 | 15.43 | 13.42 | 15.40 |



Actuarial Assumptions

Termination

Rates of separation are represented by the following table. This assumption measures the probabilities of members terminating employment.

| Employee Withdrawal Rate Per 1,000 Employees | |
|---|-----------------------|
| Years of Service | Number of Withdrawals |
| 0 | 75.0 |
| 1 | 100.0 |
| 2 | 50.0 |
| 3 | 50.0 |
| 4 | 22.5 |
| 5 | 12.5 |
| 6 | 12.5 |
| 7 | 12.5 |
| 8 | 12.5 |
| 9 | 12.5 |
| 10 | 12.5 |
| 11 | 12.5 |
| 12 | 12.5 |
| 13 | 12.5 |
| 14 | 12.5 |
| 15 | 10.0 |
| 16 | 5.0 |
| 17 | 5.0 |
| 18 | 5.0 |
| 19 | 5.0 |
| 20 or more | 0.0 |

It is assumed that terminated employees will not be rehired. The rates do not apply to members eligible to retire and do not include separation on account of death or disability.

Actuarial Assumptions

Salary Increases

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.

Illustrative rates of increase per individual employee per year, compounded annually:

| Salary Increase Assumptions For an Individual Member | |
|---|-----------------------|
| Sample Service | Increase Next Year |
| 0 | 3.75% |
| 1 | 3.75% |
| 2 | 3.75% |
| 3 | 3.75% |
| 4 | 3.75% |
| 5 | 3.25% |
| 6 | 3.25% |
| 7 | 3.25% |
| 8 | 3.25% |
| 9 | 3.25% |
| 10 | 2.75% |
| 11 | 2.75% |
| 12 | 2.75% |
| 13 | 2.75% |
| 14 | 2.75% |
| 15 or more | 2.75% |

The underlying salary increase assumption is based on a wage inflation assumption of 2.75 percent per year, comprised of 2.50 percent for general inflation plus 0.25 percent for productivity increases. The rates shown above include wage inflation plus an age-based component for merit, promotion, and longevity.

Actuarial Assumptions

Disability

The rates of disability for active members are broken out between ordinary and accidental disability. Ordinary disability accounts for 20 percent of total disabilities and accidental disability accounts for 80 percent of total disabilities. Illustrative rates of disability from the plan are as follows for members:

| Employee Disablement Number Per 1,000 Employees | | |
|--|----------|------------|
| Age | Ordinary | Accidental |
| 25 | 0.50 | 2.00 |
| 30 | 1.00 | 4.00 |
| 35 | 1.00 | 4.00 |
| 40 | 1.50 | 6.00 |
| 45 | 1.50 | 6.00 |
| 50 | 1.50 | 6.00 |
| 55 | 1.50 | 6.00 |
| 60 | 1.50 | 6.00 |

Rates of disability are based on the disability rates used by FRP which were updated in an experience study for the period October 1, 2013, through September 30, 2017, performed by the actuary for FRP (Cheiron).

Actuarial Assumptions

Retirement

Employees are assumed to retire in accordance with the rates shown below. The rates apply only to employees who have fulfilled the service requirement necessary for retirement at any given age.

| Rates of Retirement | |
|---------------------|--------------------|
| Years of Service | Rate of Retirement |
| 20 | 5.00 % |
| 21 | 2.00 |
| 22 | 2.00 |
| 23 | 2.00 |
| 24 | 2.00 |
| 25 | 3.00 |
| 26 | 3.00 |
| 27 | 3.00 |
| 28 | 3.00 |
| 29 | 3.00 |
| 30 | 7.50 |
| 31 | 7.50 |
| 32 | 7.50 |
| 33 | 15.00 |
| 34 | 15.00 |
| 35 or more | 100.00 |

100 percent 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 percent for each year of service over 20 years.

Actuarial Assumptions

DROP Benefits

Members are assumed to enter the DROP with 26 years of service. If the member has more than 26 years of service at the actuarial valuation date, the member is assumed to 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 26 years of service or age 55.

Members who enter the DROP with less than 30 years of service are assumed to return to active status after completing five years in the DROP.

DROP balances are assumed to earn 6.75 percent per year.

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 is paid to the beneficiary or the member's estate.

DROP distribution rates for current retired members with DROP balances:

- 4.50 percent distribution per year from retirement age to age 72;
- 5.00 percent distribution at age 73 increasing by 0.50 percent per year to 11.00 percent at age 85; and
- 12.00 percent at age 86 increasing by 1.00 percent per year.

DROP distribution rates for members who retire in the future with DROP balances are based on a uniform 30-year distribution rate upon retirement.

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



Actuarial Assumptions

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 between FRS and the City, the accrued sick leave balance as of February 1, 2013, can be converted to a pension benefit upon retirement.

The frozen sick leave balance as of February 1, 2013, is assumed to be utilized by the member at a rate of 3.0 percent per year.

Members are assumed to convert unused sick leave balances at retirement in to a pension benefit and receive:

- 50 percent of the value as a lump sum deposit into the DROP account;
- 25 percent as service added to the credited service used in the calculation of the retirement benefit; and
- 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.

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

Marriage Assumption

100.0 percent of active participants are assumed to be married. Actual marital status at benefit commencement is used for retirees.

Spouse's Age

For members whose spouse information is not provided, the female spouse is assumed to be three years younger than the male spouse for valuation purposes.

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.

Administrative Expenses

Administrative expenses are assumed to be approximately 25 basis points.

Decrement Timing

All decrements are assumed to occur mid-year.



Actuarial Assumptions

Decrement Relativity

Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

Decrement Operation

Turnover decrements do not operate after a member reaches retirement eligibility.

Eligibility Testing

Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.

415(b) and 401(a)(17) Limits

No explicit assumption is made with respect to these items.



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. 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

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

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

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

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.

