

## *Louisville Firefighters Pension Fund*

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March 1, 2018

Librarian  
Legislative Research Commission  
700 Capital Avenue  
Frankfort, KY 40601

To Whom It May Concern:

Pursuant to KRS 65.156, enclosed you will find a copy of the January 1, 2018 Actuarial Report of the Louisville Firefighters Pension Fund.

Should you have any questions, you may reach me at (502) 938-7764.

Sincerely,

A handwritten signature in cursive script, appearing to read "Angela L. Baker".

Angela L. Baker  
Administrator

/alb  
Enclosure



## Louisville Firefighter's Pension Fund

*Actuarial Valuation and Report*

*January 1, 2018*

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## Introduction

An actuarial valuation of the disability, death and retirement benefits provided under the Louisville Firefighter's Pension Fund, as contained in Chapter 32 of the Codified General Ordinances of the Louisville Metro Government, was performed as of January 1, 2018. The purpose of the valuation was to determine the funding requirements of the Fund, with the intention that funding requirements indicated by the valuation be used as the basis for contributions to the Fund for the fiscal year commencing July 1, 2018, in accordance with the Ordinance.

The following report contains the results of an actuarial valuation performed by the firm of Bryan, Pendleton, Swats & McAllister, LLC. These results were based on participant data, information provided by the administrative office of the Fund, and upon Trust Fund asset information provided by the Fund custodian for the following accounts: Pension Fund A – NAM (#1533200), Retirement Account (#3034542), Sweep Account (#9002758), and Operating Account (#3034550).

Per our discussions with Louisville Metro Office of Management and Budget last year, we have included the Operating Account (#3034550) and Sweep Account (#9002758) in our valuation assets. Please note that we have not reconciled the activity in these newly included accounts, and therefore have not determined if there should be any adjustments for payables or receivables as of December 31, 2017. The activity in the other accounts (NAM Account and Retirement Account) has been reconciled. Also, we have not included any of the assumed future administrative expenses in the liabilities for the plan (i.e., only pension benefits are included as liabilities).

The actuarial method employed in this valuation is set forth in Section 32.168 of the Ordinances, and the actuarial assumptions used in this report are the same as those used in the previous year's report. The interest rate assumption is set by the Louisville Metro Finance Department. A detailed explanation of all assumptions is contained in the Summary of Actuarial Assumptions section of this report. In addition, liabilities and costs under alternative assumptions have been analyzed.



## Summary of Report

### Contribution Components Under the Fund

Plan benefits are funded by two contribution components:

- (a) employee contributions representing 7% of total pay (not including state salary supplement), and
- (b) an actuarially determined contribution payable by the City to fund liabilities over and above those expected to be satisfied by other contributions to the Trust Fund.

The first component is no longer applicable as of October 21, 1995, due to the retirement of the last active participant of the Fund. The second component is commonly called the employer contribution.

### Summary of Current Contribution Requirements

Based on the January 1, 2018 actuarial valuation of the Fund, an employer contribution to be applied to the fiscal year beginning July 1, 2018, has been determined. This cost is as follows:

|                       |              |
|-----------------------|--------------|
| Employer Contribution | \$ 1,245,440 |
|-----------------------|--------------|

Each year's valuation recognizes actuarial gains and losses which occur because of deviations of actual plan experience from anticipated plan experience. Such gains and losses for a year are aggregated into a net gain or loss which is reflected in either higher employer contribution levels in future years (net actuarial loss) or lower contributions in future years (net actuarial gain). The Fund experienced a net actuarial gain for the year of \$597,637. This amount is comprised of an approximate gain of \$506,000 attributable to investment return (based on asset valuation method), a loss of approximately \$226,000 due to the cost-of-living increases granted, a gain of approximately \$150,000 due to the decision to consider the Sweep and Operating accounts as an asset for this plan, with the remaining net gain of approximately \$168,000 being attributable to plan experience. These gains and losses are amortized over 15 years.

We have amortized accrued liabilities over the time period set forth in Ordinance section 32.168. However, with an average age of approximately 80 for the members and beneficiaries, we feel that the amortization of future bases should be completed by some earlier date. We prepared a separate memorandum report in 2012 which analyzed the impact in the valuation results if the actuarial assumptions and valuation methods were modified to reflect assumptions and methods which we would recommend. Please advise us if the Board or the Metro Finance Department wishes to see a similar analysis performed for this year's valuation.

GASB 68 calculations for reporting pension liabilities and expense on government financial statements are provided in a separate report.

## **Description of Actuarial Funding Method**

The actuarial method by which the employer contribution is to be determined is set forth in Section 32.168 of the Ordinance. This section of the Ordinance was last changed effective with the January 1, 1985 actuarial valuation of the Fund.

The employer contribution is determined under an aggregate variation of the Entry Age Normal Funding Method, and is calculated in two pieces. The first piece is the "normal cost" and is evaluated in terms of the normal cost accrual rate. This is the percentage of payroll for active participants which would be exactly sufficient to provide all needed funds if the plan had been in effect without amendment since the first covered employee came to work and would continue without amendment until the last covered employee retired, and all actuarial assumptions were exactly realized. This portion of the annual funding requirement has disappeared due to the fact that no active participants remain in the plan.

The second piece of the total employer contribution is an amount which is intended to amortize the "unfunded supplemental liability". The unfunded supplemental liability is sometimes referred to as the "unfunded past service liability", but that language is misleading. The unfunded supplemental liability is simply the amount by which current assets fall short of the assets that would be on hand if prior normal costs had been accumulated, at the current level, since the first employee came to work. The unfunded supplemental liability is itself composed of a number of components which are separately amortized. However, all such components as of January 1, 1989 were considered completely amortized due to the transfer to CERS.

Each actuarial gain or loss is amortized over 15 years from the date it is established. Each additional supplemental liability component arising from an ordinance change or change in actuarial assumptions is amortized over 30 years from the date of establishment, except for the 2005 benefit increases, which are amortized over 15 years. The handling of the unfunded supplemental liability and its various components is described in Section 32.168(B) of the Metro Government Code of Ordinances.

In the long run, the cost of a pension plan will depend on the benefits actually paid. Actuarial assumptions and/or funding methods may affect the incidence of the cost (and, thereby, the interest available to pay part of future benefits), but do not in and of themselves affect the actual value of the benefits. Nevertheless, it is appropriate and desirable to have a long-term approach to the funding of a pension plan which insures that funds will be available when needed, and that the cost of the plan will be spread equitably among generations of taxpayers and plan participants.

## **Advance Funding of Cost of Living Benefits**

The 2005 amendment to the Ordinance added Section 32.170(D) which provides for annual cost-of-living increases effective each July 1 (beginning July 1, 2006) based on the increase in the Consumer Price Index for the previous calendar year. We believe that future cost-of-living increases should be recognized in the actuarial valuation; however, the Ordinance specifically precludes future increases from being recognized in the actuarial valuation. Therefore, annual cost-of-living increases will be treated as an actuarial loss each year.

## Funding Under Alternative Assumptions

The actuarial assumptions used in this valuation include mortality under the RP-2000 Mortality Table and an interest rate of 7.00%. In addition, we have noted that, by Ordinance, we cannot recognize future cost-of-living increases in the valuation used to determine the employer contribution; however, we believe the Metro Government should be aware of the liabilities and cost associated with these increases. Therefore, we have set forth below a listing of Present Value of Future Benefits and the Employer Contribution under an array of different cost-of-living increase assumptions. However, previous comments concerning the amortization periods of liability bases as required by the Ordinance should also be considered (for example, the liability increases attributable to the change in these assumptions is being amortized over 30 years).

| -- Cost of Living Assumption --         |              |              |              |              |
|---|--------------|--------------|--------------|--------------|
| Interest Rate                           | 0%           | 1%           | 2%           | 3%           |
| <b><u>Present Value of Benefits</u></b> |              |              |              |              |
| 7.0%                                    | \$17,625,061 | \$18,655,746 | \$19,794,309 | \$21,056,373 |
| <b><u>Employer Contribution</u></b>     |              |              |              |              |
| 7.0%                                    | \$1,245,440  | \$1,328,499  | \$1,420,253  | \$1,521,957  |

## Summary of Participant Data

A summary of the participant data used in the January 1, 2017 and January 1, 2018 actuarial valuation is provided below.

|   | <u>2017</u> | <u>2018</u> | <u>Percentage Change</u> |
|---|-------------|-------------|--------------------------|
| Active Participants:                          |             |             |                          |
| Number of participants on valuation date      | 0           | 0           | 0.00%                    |
| Inactive Participants:                        |             |             |                          |
| Number of Retired, Disabled and Beneficiaries | 151         | 142         | (5.96%)                  |
| Total monthly pensions in payment status      | \$ 213,078  | \$ 203,502  | (4.49%)                  |
| Average monthly benefits                      | \$ 1,411    | \$ 1,433    | 1.56%                    |
| Total monthly deferred pensions               | \$ 0        | \$ 0        | 0.00%                    |
| Average age:                                  | 78.92       | 79.72       | 1.01%                    |
| Median age:                                   | 78.96       | 79.97       | 1.28%                    |



## Summary of Plan Provisions

*This summary is not a Summary Plan Description or a plan document. You should not rely solely on this summary in making a determination of eligibility for the plan or its benefits.*

### **Eligibility**

Effective January 1, 1989, no new members are allowed to enter the plan.

### **Service Credits**

For purposes of both eligibility and benefits, service is granted cumulatively for periods of service in the Department, except as noted for special circumstances.

For purposes of determining amounts of benefits only, a member shall have his service credit increased for unused sick leave. In calculating such additional credit, one month's service will be credited for each ten days of accumulated unused sick leave.

### **Normal Retirement**

#### *Condition*

At his own election, any member who has completed 20 years of service (25 years of service if hired on or after July 1, 1984) with the Department may make written application for retirement. Any member who has both completed 20 years of service (25 years of service if hired on or after July 1, 1984) and reached age 62 shall be expected to file an application for retirement except under special circumstances.

#### *Benefit*

The monthly benefit, payable on the last day of each month, is based on a percentage of Average Salary. If a member was hired prior to July 1, 1984, his percentage is determined in accordance with Schedule A below. If a member is hired on or after July 1, 1984, his percentage is determined in accordance with Schedule B.

| <u>SCHEDULE A</u>                   |                               | <u>SCHEDULE B</u>         |                               |
|-------------------------------------|-------------------------------|---------------------------|-------------------------------|
| Full Years of Service               | Percentage of Average Salary* | Full Years of Service     | Percentage of Average Salary* |
| Less than 20 years                  | 2% for each year              | Less than 25 years        | 2% for each year              |
| 20 but less than 21 years           | 50%                           | 25 but less than 26 years | 56%                           |
| 21 but less than 22 years           | 53                            | 26 but less than 27 years | 59                            |
| 22 but less than 23 years           | 56                            | 27 but less than 28 years | 62                            |
| 23 but less than 24 years           | 59                            | 28 but less than 29 years | 65                            |
| 24 but less than 25 years           | 62                            | 29 but less than 30 years | 68                            |
| 25 but less than 26 years           | 65                            | 30 but less than 31 years | 71                            |
| 26 but less than 27 years           | 68                            | 31 but less than 32 years | 74                            |
| 27 but less than 28 years           | 71                            | 32 years or more          | 75                            |
| 28 but less than 28 years, 4 months | 74                            |                           |                               |
| 28, years 4 months or more          | 75                            |                           |                               |

- \* If such retiring member's service is greater than 28 years and 4 months (32 years if hired on or after July 1, 1984) and such member is entitled to credit for accumulated unused sick leave then each month of such credit in excess of 28 years and 4 months (32 years if hired on or after July 1, 1984) shall result in a 1/12 of 1% increase in the percentage to be applied to Average Salary.

"Average Salary" means the sum of the three highest fiscal years of annual base salary, plus scheduled overtime pay, plus salary supplement, as established in the City Employee's Classification and Compensation Ordinance, divided by 36 months.

Effective July 1, 2005 members and beneficiaries received benefit increases as follows:

| <u>Annual Pension Prior to Increase</u> | <u>Increased Annual Benefit</u>  |
|---|----------------------------------|
| Less than \$9,600                       | Greater of \$9,600 or add \$800  |
| \$9,600 - \$20,000                      | Add \$800                        |
| \$20,000 - \$30,000                     | Greater of \$20,800 or add \$600 |
| \$30,000 or more                        | Greater of \$30,600 or add \$400 |

## Resignation or Dismissal

A member who terminates his service either by resignation or dismissal after completion of 10 years of service, but before he is eligible for normal retirement under item (3) above, shall receive a refund of his contributions to the Fund without interest.

Any member who terminates service, elects to receive a refund of his contributions, and is re-employed on or after July 1, 1973, may repay, within one year of re-employment, such contributions with interest at 6% per year from the date of payment. He shall then receive credit for past service prior to his date of termination. If such contributions, with interest, are not repaid upon re-employment, credit for past service shall not be restored.

## Disability Retirement

### Condition

There are three types of disability retirement allowed:

- (1) total and permanent occupational disability caused by in line-of-duty injuries (requires no service with respect to eligibility for benefits);
- (2) total and permanent disability resulting from line-of-duty causes (requires no service eligibility requirements, except that in the instance of heart or lung disease, five years of service is required for eligibility of benefits), and
- (3) total and permanent disability arising in any manner other than that listed in (1) or (2) above (requires the completion of five years of service with respect to eligibility for benefits).

Disability retirement shall not be approved if the disability is not deemed to be permanent or where the disability is incurred in off-duty employment.

### Benefit

Benefit amount depends on the type of disability retirement as follows:

- (1) a member retiring due to occupational in line-of-duty injury shall receive a monthly pension equal to 75% of the sum of his monthly base salary, plus schedule overtime pay, plus the salary supplement determined at the time of such disability.
- (2) a member retiring due to line-of-duty causes shall receive a monthly pension equal to a percentage of the sum of his monthly base salary, plus scheduled overtime pay, plus the salary supplement at the time of disability. If a member was hired prior to July 1, 1984, his percentage is determined in accordance with Schedule A below. If a member is hired on or after July 1, 1984, his percentage is determined in accordance with Schedule B below.

| <u>SCHEDULE A</u>                   |                               | <u>SCHEDULE B</u>         |                               |
|-------------------------------------|-------------------------------|---------------------------|-------------------------------|
| Full Years of Service               | Percentage of Average Salary* | Full Years of Service     | Percentage of Average Salary* |
| 20 but less than 21 years           | 50%                           | 25 but less than 26 years | 56%                           |
| 21 but less than 22 years           | 53                            | 26 but less than 27 years | 59                            |
| 22 but less than 23 years           | 56                            | 27 but less than 28 years | 62                            |
| 23 but less than 24 years           | 59                            | 28 but less than 29 years | 65                            |
| 24 but less than 25 years           | 62                            | 29 but less than 30 years | 68                            |
| 25 but less than 26 years           | 65                            | 30 but less than 31 years | 71                            |
| 26 but less than 27 years           | 68                            | 31 but less than 32 years | 74                            |
| 27 but less than 28 years           | 71                            | 32 years or more          | 75                            |
| 28 but less than 28 years, 4 months | 74                            |                           |                               |
| 28, years 4 months or more          | 75                            |                           |                               |

- (3) a member retiring due to disability arising from other causes not listed in (1) or (2) above shall receive a monthly pension equal to a percentage of his Average Salary at the time of disability. Such percentage is based on full years of service in accordance with either Schedule A or Schedule B above depending on date of hire; however, the percentage is applied to his Average Salary as opposed to monthly salary.

## **Dependent and Estate Benefits**

### *Condition*

There are four types of dependent and estate benefits allowed:

- (1) death in line-of-duty of an active member (requires no service with respect to eligibility for benefits).
- (2) death other than in line-of-duty of an active member (requires the completion of five years of service with respect to eligibility for benefits).
- (3) death of a retired or disabled member.

In the cases of (1), (2), or (3) above, the pension is payable to an eligible surviving spouse until the death or remarriage of such spouse and then to any unmarried, dependent children or to dependent parents.

- (4) death of a member in line-of-duty or after the completion of five years of service who is not survived by an eligible spouse, unmarried dependent children or dependent parents.

### *Benefit*

The benefit amount depends on the type of death, as follows:

- (1) the monthly dependent's benefit payable due to death of an active member in line-of-duty shall equal 75% of monthly salary (which equals the sum of base salary, plus scheduled overtime, plus the salary supplement) at the time of death.
- (2) the monthly dependent's benefit payable due to death of an active member not in line-of-duty shall be a percentage multiplied by the monthly salary, including the sum of base salary, plus scheduled overtime, plus the salary supplement, at time of death, where such percentage equals 50% plus .5% for each six months, or major fraction thereof, of service in excess of 20 years; such percentage shall not exceed 60%. Provided, however, the benefit shall not be less than the benefit the dependent would have received had the member elected to retire immediately prior to death.
- (3) the monthly dependent's benefit payable due to death of a retired or disabled member shall be the same monthly pension that was being paid to the member.
- (4) the lump sum estate benefit payable due to death of a member without surviving spouse, unmarried dependent children or dependent parents based on conditions in (a)(4) above, is the greater of the total contributions made by the member or \$1,000.

## **Worker's Compensation**

Any member who is disabled in the line-of-duty and who files for and receives benefits from Worker's Compensation, shall not have such award deducted (or offset) from any benefits payable under the Pension Fund.

### **Pension Increase after Retirement or Death**

Prior to 2005 pensions being paid to retired members and surviving spouses and dependents are updated and increased for cost of living purposes on an ad-hoc rather than pre-determined basis; the cost associated with these increases are paid separately and are not recognized in the annual actuarial valuations.

Effective July 1, 2006, and each July 1 thereafter, increases shall be provided based on the percentage increase in the Consumer Price Index for all Urban Consumers for the prior calendar year, but not to exceed 5%. The Metro Council reserves the right to suspend or reduce such increases.

### **Pension Fund Sources**

- (a) Each active member contributes 7% of the gross amount of all pay received (excluding any state salary supplement).
- (b) Proceeds of taxes or other revenues appropriated by the Metro Council in order to fund the actuarially determined liabilities in accordance with an annually determined actuarial contribution.
- (c) Miscellaneous gifts, devises and bequests of money or property which are received by the Fund.

### **Investment and Custody of Pension Fund**

The Board of Trustees of the Pension Fund sets investment policy, and employs money managers, and designates a corporate trustee to act as custodian of the fund, under the supervision of the Board. The Director of Finance is custodian of all funds not managed by a corporate trustee or money manager.

### **Administration**

The system is administered by the Board of Trustees of the Pension Fund.

## Summary of Actuarial Assumptions

(Sample Values per 1,000 Lives)

|   | Age  |       |       |        |
|---|------|-------|-------|--------|
|   | 55   | 65    | 75    | 85     |
| <b>Mortality Rates</b>                                  |      |       |       |        |
| RP-2000 Mortality Table for Healthy Annuitants (static) |      |       |       |        |
| Males   | 5.91 | 13.42 | 37.83 | 110.76 |
| Females   | 3.53 | 10.36 | 28.11 | 77.45  |

Assumed future mortality improvement – None (due to average age and collar)

### Withdrawal and Retirement Rates

No longer applicable

### Salary Scale

No longer applicable

### Rate of Investment Return

7.00% per annum

### Future Cost-of-Living Increases

None, as required by Section 32.140(D) of the governing Ordinance

### Valuation Method

Entry Age Normal Funding Method (an aggregate variation), with actuarial gains and losses amortized over 15 years. Supplemental liabilities resulting from ordinance changes and/or changes in actuarial assumptions occurring after June 30, 1985 amortized over 30 years, except for April 2005 Ordinance change which is amortized over 15 years.

### Asset Valuation Method

Book value is adjusted by the weighted average difference between book and market values during the most recent four years, but not outside the range of book and market values. This amount is then adjusted for accrued receivables and payables. This asset valuation method treats unrealized gains and losses differently from realized gains and losses. Thus, asset turnover can cause a significant change in the actuarial value of assets.

### Eligible Spouse

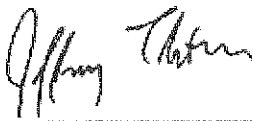
Based on exact information provided by the Administrative Office

### Changes in Assumptions From Prior Actuarial Valuation

None

## Actuarial Certification

The actuarial valuation summarized in this report has been performed utilizing generally accepted actuarial principles and is based on actuarial methods required by Ordinance. It is our opinion that the results of this valuation fully and fairly disclose the actuarial position of the plan on the valuation date, subject to the qualifications indicated in the Introduction and Summary of Report sections of this report. We are consulting actuaries for BPS&M, LLC, and are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.



Jeffrey P. Thornton, FSA, EA, MAAA  
Fellow, Society of Actuaries

February 28, 2018

Date



Kenneth F. Hohman, FSA, FCA, EA, MAAA  
Fellow, Society of Actuaries

February 28, 2018

Date

## Appendix

### Table 1 – Active Participants

There are no active members remaining in the plan.



**Table 2 – Projected Schedule of Benefit Payments**

| CALENDAR<br>YEAR | TOTAL PROJECTED BENEFITS |           |           |           |
|------------------|--------------------------|-----------|-----------|-----------|
|                  | NO COLA                  | 1% COLA   | 2% COLA   | 3% COLA   |
| 2018             | 2,395,780                | 2,395,780 | 2,395,780 | 2,395,780 |
| 2019             | 2,291,698                | 2,314,615 | 2,337,532 | 2,360,449 |
| 2020             | 2,181,280                | 2,225,124 | 2,269,403 | 2,314,120 |
| 2021             | 2,065,840                | 2,128,437 | 2,192,286 | 2,257,400 |
| 2022             | 1,946,642                | 2,025,683 | 2,107,108 | 2,190,963 |
| 2023             | 1,824,868                | 1,917,955 | 2,014,802 | 2,115,522 |
| 2024             | 1,701,670                | 1,806,357 | 1,916,357 | 2,031,883 |
| 2025             | 1,578,149                | 1,691,989 | 1,812,797 | 1,940,924 |
| 2026             | 1,455,366                | 1,575,952 | 1,705,193 | 1,843,614 |
| 2027             | 1,334,364                | 1,459,375 | 1,594,689 | 1,741,043 |
| 2028             | 1,216,105                | 1,343,336 | 1,482,425 | 1,634,343 |
| 2029             | 1,101,480                | 1,228,886 | 1,369,552 | 1,524,706 |
| 2030             | 991,329                  | 1,117,055 | 1,257,245 | 1,413,399 |
| 2031             | 886,426                  | 1,008,836 | 1,146,687 | 1,301,747 |
| 2032             | 787,476                  | 905,184   | 1,039,058 | 1,191,128 |
| 2033             | 695,076                  | 806,962   | 935,481   | 1,082,907 |
| 2034             | 609,667                  | 714,883   | 836,942   | 978,337   |
| 2035             | 531,519                  | 629,480   | 744,254   | 878,519   |
| 2036             | 460,714                  | 551,082   | 658,014   | 784,335   |
| 2037             | 397,158                  | 479,811   | 578,585   | 696,420   |

The above estimates are based on the assumptions set forth in the Summary of Actuarial Assumptions section.

### Table 3 – Determination of Valuation Assets

**a. Determination of Book and Market Value of Assets - December 31, 2017**

| <u>Account</u>                         | <u>Book Value</u> | <u>Market Value</u> | <u>Accrued Income</u> |
|--|-------------------|---------------------|-----------------------|
| Commonwealth Bank & Trust Co.          |                   |                     |                       |
| Louisville Firefighters Pen Fd A - NAM | \$ 9,104,961      | \$ 10,880,062       | \$ 1                  |
| Totals                                 | \$ 9,104,961      | \$ 10,880,062       | \$ 1                  |

**b. Determination January 1, 2018 Valuation Assets**

1. Trust Fund History (Louisville Firefighters Pen Fd A - NAM)

| <u>Year</u> | <u>Book Value</u>   | <u>Market Value</u> | <u>Difference</u> | <u>Weight</u> | <u>Weighted Difference</u> |
|-------------|---|---------------------|-------------------|---------------|----------------------------|
| 2017        | \$ 9,104,961  | \$ 10,880,062       | \$ 1,775,101      | 4             | \$ 7,100,404               |
| 2016        | 7,241,190   | 7,553,241           | 312,051           | 3             | 936,153                    |
| 2015        | 6,420,435   | 6,872,133           | 451,698           | 2             | 903,396                    |
| 2014        | 5,783,538   | 6,353,516           | 569,978           | 1             | 569,978                    |
| 2.          | Total Weighted Difference                                   |                     |                   |               | \$ 9,509,931               |
| 3.          | Adjustment to Assets<br>(2) / Sum of Weights                |                     |                   |               | 950,993                    |
| 4.          | Valuation Assets  |                     |                   |               | 10,055,954                 |
| 5.          | Accrued Income December 31, 2017                            |                     |                   |               | 1                          |
| 6.          | Accrued Contribution  |                     |                   |               | 1,268,830 *                |
| 7.          | Cash Balance in Retirement Account #3034542                 |                     |                   |               | 237,221                    |
| 8.          | Cash Balance in Sweep Account #9002758                      |                     |                   |               | 139,742                    |
| 9.          | Cash Balance in Operating Account #3034550                  |                     |                   |               | 10,000                     |
| 10.         | Total Valuation Assets<br>(4) + (5) + (6) + (7) + (8) + (9) |                     |                   |               | \$ 11,711,748              |

\* Includes six anticipated contributions of \$211,471.63 each from January 1, 2018 to June 30, 2018. Please let us know if the upcoming contributions from Louisville Metro Government differ from these amounts.

**c. Past Investment Returns**

| <u>Year End</u>   | <u>Market Value</u> | <u>Valuation Assets</u> |
|-------------------|---------------------|-------------------------|
| December 31, 2017 | 20.19%              | 11.46%                  |
| December 31, 2016 | 5.09%               | 4.65%                   |
| December 31, 2015 | 1.52%               | 1.38%                   |
| December 31, 2014 | 7.82%               | 13.80%                  |
| December 31, 2013 | 21.62%              | 14.00%                  |
| December 31, 2012 | 11.44%              | 9.63%                   |
| December 31, 2011 | 4.13%               | 5.10%                   |
| December 31, 2010 | 5.50%               | 5.31%                   |
| December 31, 2009 | 21.78%              | 3.67%                   |
| December 31, 2008 | (21.65%)            | (10.61%)                |

The equivalent compound rate of annual return for the latest periods are:

|             |        |        |
|-------------|--------|--------|
| Latest year | 20.19% | 11.46% |
| Two-year    | 12.39% | 8.00%  |
| Three-year  | 8.64%  | 5.75%  |
| Four-year   | 8.44%  | 7.71%  |
| Five-year   | 10.95% | 8.94%  |
| Six-year    | 11.03% | 9.05%  |
| Seven-year  | 10.02% | 8.48%  |
| Eight-year  | 9.44%  | 8.08%  |
| Nine-year   | 10.75% | 7.58%  |
| Ten-year    | 6.98%  | 5.60%  |

Market value returns exclude the Operating and Sweep Accounts.

**Table 4 – Determination of Supplemental Liability Bases**

**a. Determination of January 1, 2018 Supplemental Liability Bases**

|  |    |           |
|--|----|-----------|
| 1. Unfunded Supplemental Liability, January 1, 2017                                | \$ | 8,456,645 |
| 2. Amortization Payment, January 1, 2017   |    |           |
| (a) Employer Contribution, Beginning of Year                                       |    | 1,713,843 |
| (b) Employer Contribution, End of Year   |    | 1,833,812 |
| (c) Actual 2017 Contribution   | \$ | 2,537,660 |
| (d) Amortization Payment, January 1, 2017 (a*(c/b))                                |    | 2,371,645 |
| 3. Interest on Net Liability, [(1) - (2)(d)] x 7.0%                                |    | 425,950   |
| 4. Expected Unfunded Supplemental Liability, January 1, 2018<br>(1) - (2)(d) + (3) | \$ | 6,510,950 |
| 5. Actual Unfunded Supplemental Liability, January 1, 2018                         |    | 5,913,313 |
| 6. Total Supplemental Liability Base Established January 1, 2018, (5) - (4)        |    | (597,637) |
| (a) Base due to Ordinance Change   |    | 0         |
| (b) Base due to Assumption Change  |    | 0         |
| (c) Base due to Actuarial Loss (Gain)  | \$ | (597,637) |

**b. Maintenance of Supplemental Liability Bases**

| Year   |                    | Amort. | Years     | Original  | Amort.      | Outstanding |
|--------|--------------------|--------|-----------|-----------|-------------|-------------|
| Estab. | Reason Established | Period | Remaining | Amount    | Payment     | Balance     |
| 2004   | Actuarial Loss     | 15     | 1.0       | 9,351     | 280         | 280         |
| 2005   | Actuarial Gain     | 15     | 1.2       | (256,056) | (26,888)    | (32,791)    |
| 2006   | Ordinance Change   | 15     | 2.2       | 3,419,478 | 357,246     | 747,677     |
| 2006   | Assumption Change  | 30     | 15.8      | 3,027,044 | 230,502     | 2,316,109   |
| 2006   | Actuarial Loss     | 15     | 2.2       | 514,822   | 53,785      | 112,564     |
| 2007   | Actuarial Loss     | 15     | 3.1       | 422,859   | 44,089      | 128,264     |
| 2008   | Actuarial Loss     | 15     | 4.1       | 644,924   | 67,108      | 246,427     |
| 2009   | Actuarial Loss     | 15     | 5.0       | 2,068,926 | 214,867     | 942,206     |
| 2010   | Actuarial Loss     | 15     | 5.9       | 1,400,532 | 145,179     | 733,362     |
| 2011   | Actuarial Loss     | 15     | 6.9       | 6,935     | 717         | 4,072       |
| 2012   | Actuarial Gain     | 15     | 7.8       | (23,785)  | (2,457)     | (15,367)    |
| 2013   | Actuarial Loss     | 15     | 8.7       | 116,857   | 12,049      | 81,937      |
| 2014   | Actuarial Loss     | 15     | 9.6       | 99,876    | 10,281      | 75,141      |
| 2015   | Actuarial Gain     | 15     | 10.5      | (211,691) | (21,756)    | (169,340)   |
| 2016   | Assumption Change  | 30     | 24.0      | 574,506   | 43,269      | 530,973     |
| 2016   | Actuarial Loss     | 15     | 11.4      | 748,864   | 76,842      | 632,225     |
| 2017   | Actuarial Loss     | 15     | 12.6      | 196,618   | 20,175      | 177,211     |
| 2018   | Actuarial Gain     | 15     | 15.0      | (597,637) | (61,325)    | (597,637)   |
|        |                    |        |           |           | \$1,163,963 | \$5,913,313 |

**Table 5 – Determination of Employer Contribution – January 1, 2018**

**a. Present Value of Future Benefits**

|  |               |
|--|---------------|
| 1. Retired Lives                         | \$ 17,625,061 |
| 2. Normal Retirement                     | 0             |
| 3. Disability                            | 0             |
| 4. Death                                 | 0             |
| 5. Return of Firefighter's Contributions | 0             |
| 6. Total (1) + (2) + (3) + (4) + (5)     | \$ 17,625,061 |

**b. Determination of Unfunded Supplemental Liability**

|  |               |
|--|---------------|
| 7. Accrued Supplemental Liability            | \$ 17,625,061 |
| 8. Valuation Assets (see Table 3)            | 11,711,748    |
| 9. Unfunded Supplemental Liability (7) - (8) | \$ 5,913,313  |

**c. Determination of Annual Normal Cost**

|   |         |
|---|---------|
| 10. Present Value of Future Normal Cost (6) - (7)       | \$ 0    |
| 11. Present Value of Future Firefighter Contributions   | 0       |
| 12. Net Present Value of Future Normal Cost (10) - (11) | 0       |
| 13. Present Value of Future Salary                      | 0       |
| 14. Normal Cost Accrual Rate (12) / (13)                | 0.0000% |
| 15. Total Base Salary                                   | \$ 0    |
| 16. a) Normal Cost (14) x (15)                          | 0       |
| b) Normal Cost as a % of Base Salary                    | 0.0000% |

**d. Determination of Total Employer Contribution**

|   |              |
|---|--------------|
| 17. Total Payment Amortizing Unfunded Supplemental Liability<br>(see Table 4) | \$ 1,163,963 |
| 18. Total Annual Cost (16) + (17), but not less than \$0                      | \$ 1,163,963 |
| 19. Total Annual Cost at Plan Year-End (18) x 1.07 (assumed interest)         | \$ 1,245,440 |

**Table 6 – Yearly Comparison of Selected Plan Information**

|  | <u>1/1/2015</u> | <u>1/1/2016</u> | <u>1/1/2017</u> | <u>1/1/2018</u> |
|--|-----------------|-----------------|-----------------|-----------------|
| Annual Covered Salary  |                 |                 |                 |                 |
| (a) Total for All Active Firefighters                                    | \$ 0            | \$ 0            | \$ 0            | \$ 0            |
| (b) Average Increase From Prior Year<br>for all Continuing Firefighters  | N/A             | N/A             | N/A             | N/A             |
| Present Value of Future Benefits   |                 |                 |                 |                 |
| (a) Active   | \$ 0            | \$ 0 *          | \$ 0            | \$ 0            |
| (b) Inactive   | 20,685,374      | 20,221,958 *    | 18,923,998      | 17,625,061      |
| (c) Total  | 20,685,374      | 20,221,958 *    | 18,923,998      | 17,625,061      |
| Valuation Assets   |                 |                 |                 |                 |
| (a) Total Valuation Assets   | \$ 9,505,109    | \$ 9,786,122    | \$ 10,467,353   | \$ 11,711,748   |
| (b) Approximate Rate of Return   | 13.80%          | 1.38%           | 4.65%           | 11.46%          |
| Unfunded Supplemental Liability  | \$ 11,180,265   | \$ 10,435,836   | \$ 8,456,645    | \$ 5,913,313    |
| Funded Percentage<br>(Valuation Assets/Present Value of Future Benefits) | 45.95%          | 48.39%          | 55.31%          | 66.45%          |
| Total Amortization Payment   | \$ 2,703,552    | \$ 2,498,437    | \$ 1,713,843    | \$ 1,163,963    |
| Employer Contribution (Actuarially Determined)                           | \$ 2,906,318    | \$ 2,673,328    | \$ 1,833,812    | \$ 1,245,440    |
| Employer Contribution (Actual)   | \$ 2,906,318    | \$ 2,828,318    | \$ 2,537,660    | TBD             |
| Benefit Payments During Prior Year                                       | \$ 2,845,950    | \$ 2,738,583    | \$ 2,623,877    | \$ 2,520,974    |
| Consumer Price Index-Urban<br>(Average over Average)                     | 1.60%           | 0.10%           | 1.30%           | 2.10%           |