

**Houston Firefighters’  
Relief and Retirement Fund**  
*Investing for Firefighters and Their Families*



Board of Trustees

March 24, 2023

**Brett R. Besselman**  
*Chair*

Amy Cardona  
Texas Pension Review Board  
300 West 15<sup>th</sup> Street, Suite 406  
Austin, TX 78717

**Stephen R. Whitehead**  
*Vice Chair*

**Lisa R. Slagle**  
*Secretary*  
*Citizen Member*

Re: HFRRF RSVS

**Pete Ng**  
*Trustee*

Dear Ms. Cardona

**David Riegor**  
*Trustee*

Please find attached the Houston Firefighters’ Relief and Retirement Fund’s (“HFRRF”) final Risk Sharing Valuation Study (“RSVS”) as of July 1, 2022, which develops the estimated municipal contribution rate for FY 2024. HFRRF’s and the City’s estimated municipal contribution rate were within two percentage points; therefore, HFRRF’s RSVS is considered to be the final RSVS for FY 2024.

**Gerard L. Daniels**  
*Trustee*

**David O. Lantrip**  
*Trustee*

**Albertino “Al” Mays**  
*Citizen Member*

However, since the estimated municipal contribution rate for FY 2024 was less than the initial RSVS’ minimum contribution rate of 26.89% and HFRRF’s statutory funded ratio exceeded 90% (but was less than 100%), required adjustments under §13E(c) of HFRRF’s governing statute have been implemented. Please note that (i) adjusting the actuarial value of assets equal to the current market value of assets under §13E(c)(1) would not have caused the municipal contribution rate to increase, and (ii) an agreement was not reached with the City under section §13E(c)(2) or (3) by April 30<sup>th</sup>. Consequently, HFRRF has accelerated the payoff year of the legacy liability to the extent required to increase the estimated municipal contribution rate to equal the minimum contribution rate in accordance with §13E(c)(4). Accordingly, the final RSVS attached includes an addendum to the RSVS to demonstrate the accelerated payoff.

**Arif Rasheed**  
*City Treasurer designee*

**Earnest W. Wotring**  
*Mayor’s Representative*

**Tim Schauer**  
*Executive Director*

Sincerely,

Tim Schauer  
Executive Director



200 Plaza Drive, 1<sup>st</sup> Floor  
Secaucus, NJ 07094

March 24, 2023

Mr. Brett Besselman, Chairman of Board of Trustees  
Mr. Tim Schauer, Executive Director  
Houston Firefighters' Relief and Retirement Fund  
4225 Interwood North Parkway  
Houston, Texas 77032

**Re: Addendum to the July 1, 2022 Proposed Risk Sharing Valuation Study**

This addendum is incorporated and made part of the attached July 1, 2022 Proposed Risk Sharing Valuation Study (Proposed RSVS) for the Houston Firefighters' Relief and Retirement Fund (Fund). Unless otherwise stated, the results presented in this addendum were prepared using the same data, methods and actuarial assumptions that have been used for the Proposed RSVS. Please refer to the Proposed RSVS report for all the other assumptions, methods and caveats related to this addendum.

Buck published its Proposed RSVS on November 18, 2022 pursuant to our engagement to provide actuarial services to the Fund. The Proposed RSVS developed the estimated municipal contribution rate for fiscal year ending June 30, 2024 (FY 2024). The Proposed RSVS was prepared, as required under Senate Bill 2190<sup>1</sup>, for the Fund as of July 1, 2022. The Proposed RSVS reflects the benefit provisions of the Fund as amended by and funding policies mandated by Senate Bill 2190, but without regard to Section 13E.

Since the Fund's and the City's estimated municipal contribution rate were within two percentage points, the Fund's RSVS (the Proposed RSVS) is considered to be the final July 1, 2022 RSVS. However, since the estimated FY 2024 municipal contribution rate of 23.15% was less than the initial RSVS' FY 2024 minimum contribution rate of 26.89% and the Fund's statutory funded level of 95.4% exceeded 90.0% (but was less than 100%), this addendum presents the implementation of the required adjustments under §13E(c) of HFRRF's governing statute, as follows:

- i. Adjusting the actuarial value of assets equal to the current market value of assets under §13E(c)(1) does not cause the municipal contribution rate to increase;
- ii. An agreement was not reached between the Fund and the City under §13E(c)(2) and §13E(c)(3) by April 30<sup>th</sup>;
- iii. Consequently, the Fund has accelerated the payoff year of the legacy liability to the extent required to increase the estimated municipal contribution rate to equal the minimum contribution rate in accordance with §13E(c)(4).

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<sup>1</sup> This Risk Sharing Valuation Study has been provided without waiving the Fund's right to litigate the constitutionality of SB2190.

The following sections of the Proposed RSVS have been revised, in accordance with §13E(c) of HFRRF's governing statute.

**Revised Amortization Schedule as of July 1, 2022 (\$000) (Original on page 3 of Proposed RSVS)**

Plan Year Ending	Initial Liability Layer	Liability Layer as of July 1, 2022	Remaining Amortization Payments as of July 1, 2022	Payment for Fiscal Year 2024	As a % of Fiscal Year 2024 Payroll <sup>1</sup>
June 30, 2016	\$ 900,223	\$ 1,006,958	7.68	\$ 148,518	54.75%
June 30, 2017	(19,325)	(21,375)	7.68 <sup>2</sup>	(3,153)	(1.16)%
June 30, 2018	(32,368)	(35,441)	7.68 <sup>2</sup>	(5,227)	(1.93)%
June 30, 2019	(61,676)	(66,928)	7.68 <sup>2</sup>	(9,871)	(3.64)%
June 30, 2020	(190,421)	(205,049)	7.68 <sup>2</sup>	(30,243)	(11.15)%
June 30, 2021	(342,733)	(366,724)	7.68 <sup>2</sup>	(54,089)	(19.94)%
June 30, 2022	(79,662)	<u>(79,662)</u>	7.68 <sup>2</sup>	<u>(12,993)</u>	<u>(4.79)%</u>
Total		\$ 231,779		\$ 32,942	12.14%

**Revised Risk Sharing Valuation Results<sup>3</sup> (Original on page 1 of Proposed RSVS)**

(\$000)	2022 Risk Sharing Valuation Results		
	2021 Risk Sharing Valuation Results	Proposed RSVS (Published November 18, 2022)	Adjustments in accordance with §13E(c)(4)
Present Value of Future Benefits	\$ 5,562,116	\$ 5,774,144	\$ 5,774,144
Actuarial Accrued Liability	\$ 4,881,608	\$ 5,075,516	\$ 5,075,516
Actuarial Value of Assets	\$ 4,550,468	\$ 4,843,737	\$ 4,843,737
Unfunded Accrued Liability	\$ 331,140	\$ 231,779	\$ 231,779
Funded Ratio	93.2%	95.4%	95.4%
City Normal Cost Rate <sup>4</sup>	14.98%	14.75%	14.75%
City Accrued Liability Rate	11.91%	8.40%	12.14%
Total City Contribution Rate <sup>5</sup>	26.89%	23.15%	26.89%
Estimated City Contribution for following Fiscal Year	\$ 69,617	\$ 62,800	\$ 72,946
Employee Contribution Rate	10.50%	10.50%	10.50%

<sup>1</sup> Based on projected pensionable compensation of \$271,274,000

<sup>2</sup> Per SB 2190, the amortization period for a new liability gain layer is equal to the remaining amortization period on the largest remaining liability loss layer.

<sup>3</sup> This Risk Sharing Valuation Study has been provided without waiving the Fund's right to litigate the constitutionality of SB2190.

<sup>4</sup> Contains an allowance for administrative expenses equal to 1.25% of payroll

<sup>5</sup> As a percentage of pensionable compensation.

## Actuarial Certification

We certify that the information contained in this addendum to the July 1, 2022 Proposed RSVS has been prepared in accordance with the appropriate Actuarial Standards of Practice. Unless otherwise stated, the results presented herein were prepared using the same data, methods and actuarial assumptions that have been used for the Proposed RSVS. A summary of the actuarial assumptions and methods, major Fund provisions, and Fund participant data used to calculate the results of this study can be found in the appendices of the attached July 1, 2022 Proposed RSVS report. Please refer to the same Proposed RSVS for the applicable disclosures under Actuarial Standards of Practice (“ASOPs”) 27, 35, 51 and 56.

In addition to the ASOP 51 “Contribution risk” discussion, the implementation of Section 13E accelerates the amortization of the Fund’s liability layers and establishes a contribution rate that is greater than determined by the Proposed RSVS. If future contributions are established in this manner at levels greater than those presented in the Proposed RSVS, the Fund may achieve a fully funded position earlier than the 30-year time horizon contemplated in the statute based on the data, assumptions and methods set forth in the Proposed RSVS. On the other hand, the shorter amortization period may significantly increase future actuarially determined contributions, increasing the risk that such amounts are not contributed.

I am a Fellow of the Society of Actuaries and Member of the American Academy of Actuaries. I meet the Academy’s Qualification Standards to issue this Statement of Actuarial Opinion. This report has been prepared in accordance with all applicable Actuarial Standards of Practice, and I am available to answer questions about it.

If you have any questions concerning this information, please let me know.

Respectfully submitted,

Buck Global. LLC



Michael A. Ribble, FSA, EA, MAAA, FCA  
Principal, Consulting Actuary

Attached: July 1, 2022 Proposed Risk Sharing Valuation Study dated November 18, 2022



200 Plaza Drive, 1<sup>st</sup> Floor  
Secaucus, NJ 07094

November 18, 2022

Mr. Brett Besselman, Chairman of Board of Trustees  
Mr. Tim Schauer, Executive Director  
Houston Firefighters' Relief and Retirement Fund  
4225 Interwood North Parkway  
Houston, Texas 77032

**Re: Proposed Risk Sharing Valuation Study**

Dear Brett and Tim:

Pursuant to our engagement to provide actuarial services to the Houston Firefighters' Relief and Retirement Fund (Fund), we have prepared this Risk Sharing Valuation Study, as required under Senate Bill 2190<sup>1</sup>, for the Fund as of July 1, 2022. This reflects the benefit provisions of the Fund as amended by, as well as funding policies mandated by, Senate Bill 2190 without regard to Section 13E. For comparison purposes the 2021 Risk Sharing Valuation Results shown below are based on adjustments in accordance with §13E(c)(4) per our Addendum dated June 8, 2022.

**Risk Sharing Valuation Results<sup>1</sup>**

(\$000)	2022 Risk Sharing Valuation Results	2021 Risk Sharing Valuation Results <sup>2</sup>
Present Value of Future Benefits	\$ 5,774,144	\$ 5,562,116
Actuarial Accrued Liability	\$ 5,075,516	\$ 4,881,608
Actuarial Value of Assets	\$ 4,843,737	\$ 4,550,468
Unfunded Accrued Liability	\$ 231,779	\$ 331,140
Funded Ratio	95.4%	93.2%
City Normal Cost Rate <sup>3</sup>	14.75%	14.98%
City Accrued Liability Rate	8.40%	11.91%
Total City Contribution Rate <sup>4</sup>	23.15%	26.89%
Estimated City Contribution for following Fiscal Year	\$ 62,800	\$ 69,617
Employee Contribution Rate	10.50%	10.50%

<sup>1</sup> This Risk Sharing Valuation Study has been provided without waiving the Fund's right to litigate the constitutionality of SB2190.

<sup>2</sup> As adjusted in accordance with §13E(c)(4).

<sup>3</sup> Contains an allowance for administrative expenses equal to 1.25% of payroll.

<sup>4</sup> As a percentage of pensionable compensation

As shown in the table above, the proposed Risk Sharing Valuation Study results in a funded ratio that exceeds 90% and a City contribution rate of 23.15%, which is less than the Initial Risk Valuation Study Corridor Minimum of 26.89%. In accordance with Section 13E of Senate Bill 2190, potential changes in the actuarial value of assets, assumed rate of return, benefit levels, or the acceleration of the amortization period to payoff liability loss layers may be required.

## Development of the Actuarial Value of Assets (\$000)

### Actuarial Investment Gain (Loss)

	Fiscal Year End June 30, 2022
Market Value of Assets at beginning of year	\$ 5,256,763
Net Cash Flow	
Contributions	\$ 112,293
Disbursements	<u>275,842</u>
Net Cash Flow	\$ (163,549)
Expected Investment Return	\$ 362,346
Expected Market Value of Assets at end of year	\$ 5,455,560
Market Value of Assets at end of year	\$ 5,093,736
Investment Gain / (Loss)	\$ (361,824)

### Schedule of Actuarial Investment Gains (Losses)

Plan Year Ending	Initial Actuarial Gain (Loss)	Current Year Recognized Gain (Loss)	Unrecognized Gain (Loss) As of July 1, 2022
June 30, 2018	46,641	\$ 9,328	\$ 0
June 30, 2019	(64,836)	(12,967)	(12,967)
June 30, 2020	(204,992)	(40,998)	(81,997)
June 30, 2021	1,057,370	211,474	634,422
June 30, 2022	(361,824)	(72,365)	<u>(289,459)</u>
			\$ 249,999

### Actuarial Value of Assets

Market Value as of July 1, 2022	\$ 5,093,736
(Gain) / Loss to be Recognized in Future Years	<u>(249,999)</u>
Actuarial Value as of July 1, 2022	\$ 4,843,737

**Change in Key Results since the Prior Risk Sharing Valuation (\$000)**

<b>Analysis of Change in Unfunded Liability</b>		<b>2021/2022</b>
Unfunded at Beginning of Period		\$ 331,140
Estimated Change Due to Normal Operation		
Normal Cost		\$ 60,907
Contributions		(112,293)
Administrative Expenses		5,243
Interest		<u>21,591</u>
Net Change		\$ (24,552)
Estimated Change due to Actuarial Experience		
Actuarial (gain) loss from asset sources		\$ (143,913)
Actuarial (gain) loss from liability sources		<u>69,104</u>
Net change		\$ (74,809)
Unfunded Actuarial Accrued Liability at End of Period		\$ 231,779

**Development of Liability Layer for Plan Year Ending June 30, 2022**

<b>Source</b>	<b>Amount (\$000)</b>
Actuarial Value of Assets (Gain)/Loss	\$ (143,913)
Actuarial Accrued Liability (Gain)/Loss	69,104
Impact of Assumption Changes	0
Contributions Different than Expected	<u>(4,853)</u>
Total	\$ (79,662)

**Amortization Schedule as of July 1, 2022 (\$000)**

<b>Plan Year Ending</b>	<b>Initial Liability Layer</b>	<b>Liability Layer as of July 1, 2022</b>	<b>Remaining Amortization Payments as of July 1, 2022</b>	<b>Payment for Fiscal Year 2024</b>	<b>As a % of Fiscal Year 2024 Payroll<sup>2</sup></b>
June 30, 2016	\$ 900,223	\$ 1,006,958	12	\$ 102,677	37.85%
June 30, 2017	(19,325)	(21,375)	12 <sup>1</sup>	(2,180)	(0.80)%
June 30, 2018	(32,368)	(35,441)	12 <sup>1</sup>	(3,614)	(1.33)%
June 30, 2019	(61,676)	(66,928)	12 <sup>1</sup>	(6,824)	(2.52)%
June 30, 2020	(190,421)	(205,049)	12 <sup>1</sup>	(20,908)	(7.71)%
June 30, 2021	(342,733)	(366,724)	12 <sup>1</sup>	(37,394)	(13.78)%
June 30, 2022	(79,662)	<u>(79,662)</u>	12 <sup>1</sup>	<u>(8,983)</u>	<u>(3.31)%</u>
Total		\$ 231,779		\$ 22,774	8.40%

<sup>1</sup> Per SB 2190, the amortization period for a new liability gain layer is equal to the remaining amortization period on the largest remaining liability loss layer.

<sup>2</sup> Based on projected pensionable compensation of \$271,274,000.

## **Actuarial Certification**

We certify that the information contained in this Risk Sharing Valuation Study has been prepared in accordance with the appropriate Actuarial Standards of Practice. To the best of our knowledge, the information fairly presents the actuarial position of the Houston Firefighters' Relief & Retirement Fund as of July 1, 2022 on the basis of the actuarial assumptions, methods and Fund provisions set forth herein.

The Board of Trustees of the Fund may use this report for discussing and reaching consensus with the City of Houston on the City Contribution Rate. Use of this report for any other purpose or by anyone other than the Board or the City of Houston may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of the report for that purpose. Because of the risk of misinterpretation of actuarial results, Buck recommends requesting an advance review of any statement, document, or filing to be based on information contained in this report. Buck will accept no liability for any such statement, document or filing made without prior review by Buck.

Future actuarial measurements may differ significantly from current measurements due to Fund experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in Fund provisions or applicable law. An analysis of the potential range of such future differences is beyond the scope of this Risk Sharing Valuation Study.

Where presented, references to "funded ratio" and "unfunded accrued liability" typically are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets could result in different funded ratios and unfunded accrued liabilities. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions but makes no assessment regarding the funded status of the Fund if the Fund were to settle a portion or all of its liabilities.

In preparing the actuarial results, we have relied upon information provided by the Board of Trustees as of July 1, 2022 regarding Fund provisions, Fund participants, Fund assets, contribution rates and other matters used in the Risk Sharing Valuation Study. Specifically, a market value of assets equal to \$5,093,736,459 has been provided by the Fund representatives. Although we did not audit the data, we reviewed the data for reasonableness and consistency with the prior year's information. The accuracy of the results of this Risk Sharing Valuation Study is dependent on the accuracy of the data.

As required under Senate Bill 2190, experience studies are performed once in every four-year period. This Risk Sharing Valuation Study was prepared on the basis of the demographic and economic assumptions that were selected on the basis of the Fiscal Year Ending June 30, 2015 through Fiscal Year Ending June 30, 2019 Experience Review and adopted by the Board of Trustees at their October 20, 2020 meeting. This experience study is conducted to determine the assumptions that will serve as the basis for the Risk Sharing Valuation Studies from July 1, 2020 – July 1, 2023.

Except as prescribed in Senate Bill 2190 (as noted in Appendix A), the Board of Trustees has sole authority to determine the actuarial assumptions and has selected the actuarial methods and assumptions used in this Risk Sharing Valuation Study. In our opinion, those actuarial assumptions selected by the Board are reasonably related to the experience of the Fund and to reasonable long-term expectations. The actuarial assumptions prescribed by Senate Bill 2190 have been reflected in this Risk Sharing Valuation Study.



A summary of the actuarial assumptions, major Fund provisions, and Fund participant data used to calculate the results of this study can be found in the appendices.

Based on the statutory requirements of Senate Bill 2190 it is our understanding that the actual City contribution rate may be established as an average of the contribution rates shown in this report and those shown in the Risk Sharing Valuation Study prepared by the City's actuary. If future contributions are established in this manner at levels below those presented in this report, the Fund may not be expected to achieve a fully funded position over the 30-year time horizon as contemplated in the statute based on the data, assumptions and methods set forth on the attached pages.

However, this proposed Risk Sharing Valuation Study results in a funded ratio that exceeds 90% and a City contribution rate of 23.15%, which is less than the Initial Risk Valuation Study Corridor Minimum of 26.89%. In accordance with Section 13E of Senate Bill 2190, potential changes in the actuarial value of assets, assumed rate of return, benefit levels, or the acceleration of the amortization period to payoff liability loss layers may be required.

I am a Fellow of the Society of Actuaries and Member of the American Academy of Actuaries. I meet the Academy's Qualification Standards to issue this Statement of Actuarial Opinion. This report has been prepared in accordance with all applicable Actuarial Standards of Practice, and I am available to answer questions about it.

If you have any questions concerning this information, please let me know.

Respectfully submitted,

Buck Global, LLC



Michael A. Ribble, FSA, EA, MAAA, FCA  
Principal, Consulting Actuary

# Appendix A: Summary of Actuarial Methods and Assumptions

## Basis for Assumptions

The economic and demographic assumptions used in the study (except for the investment return assumption) were adopted by the Board in consultation with Buck. Senate Bill 2190 requires that an actuarial experience study be performed in order to review the experience of the Fund at least once every four years to determine if any changes to the Risk Sharing Valuation Study assumptions are warranted. In general, the assumptions used in the Risk Sharing Valuation Study are based on recommendations made and approved by the Board as part of an Experience Study covering Fiscal Year Ending June 30, 2015 through Fiscal Year Ending June 30, 2019. Senate Bill 2190 requires the use of an investment return assumption of not more than 7.00%.

Actuarial Standards of Practice 27 and 35 require the actuary to identify the economic and demographic assumptions that have a significant effect on the measurement and, for those that the actuary has not selected, to provide the information and analysis the actuary performed to determine that the assumption does not significantly differ from what the actuary deems reasonable for the purpose of the measurement.

The material demographic assumptions are disclosed in this Appendix A. All demographic assumptions were based on an Experience Review covering the period July 1, 2014 to June 30, 2019. The Board of Trustees, at their October 20, 2020 meeting, approved the use of the Experience Review's recommended demographic assumptions. We reviewed the assumptions along with recent experience and the assumptions are still reasonable for the current measurement.

The material economic assumptions include the salary scale and expected return on assets ("EROA"). The Board of Trustees, at their October 20, 2020 meeting, approved the use of the Experience Review's recommended salary scale assumption. We reviewed the salary scale assumption along with recent experience and the assumptions are still reasonable for the current measurement.

In the case of the EROA, Senate Bill 2190 requires the use of an investment return assumption of not more than 7.00%. We used economic information and tools provided by Buck's Financial Risk Management ("FRM") practice. A spreadsheet tool created by the FRM team converts averages, standard deviations, and correlations from Buck's Capital Markets Assumptions ("CMA") that are used for stochastic forecasting into approximate percentile ranges for the arithmetic and geometric average returns. It is intended to suggest possible reasonable ranges for EROA without attempting to predict or select a specific best estimate rate of return. It takes into account the duration (horizon) of investment and the target allocation of assets in the portfolio to various asset classes. Based on our analysis, including consistency with other assumptions used in the valuation and the percentiles generated by the spreadsheet described above, we believe the EROA, in our professional judgment, is reasonable for the purpose of the measurement.

## Use of Models

Actuarial Standard of Practice No. 56 ("ASOP 56") provides guidance to actuaries when performing actuarial services with respect to designing, developing, selecting, modifying, using, reviewing, or evaluating models. In addition to the EROA spreadsheet model disclosed above, Buck uses third-party software in the performance of annual actuarial valuations and projections. The model is intended to calculate the liabilities associated with the Fund provisions using data and assumptions as of the measurement date under the accounting standards specified in this report. The output from the third-party vendor software is used as input to an internally developed model that applies those accounting standards to the liabilities derived and other inputs to generate many of the exhibits found in this report. Buck has an extensive review process whereby the results of the liability calculations are checked using detailed sample output, changes from year to year are summarized by source, and significant deviations from expectations are investigated. Other accounting outputs and internal model are similarly reviewed in detail and at a high level for accuracy, reasonability and consistency with prior results. Buck also reviews the third-party model when significant changes are made to the software. The review is performed by experts within the company who are familiar with applicable accounting rules as well as the manner in which the model generates its output. If significant changes are made to the internal model, extra checking and review are completed. Significant changes to the internal model that are applicable to multiple clients are generally developed, checked and reviewed by multiple experts within the company who are familiar with the details of the required changes.

# **Appendix A: Summary of Actuarial Methods and Assumptions**

## **(continued)**

### **Actuarial Methods**

#### **Actuarial Value of Assets**

Senate Bill 2190 requires the use of an asset valuation method that recognizes gains and losses on the market value of assets (based on the difference between the actual rate of return and the assumed rate of return) over five years. Past gains and losses were fully recognized in the Actuarial Value of Assets at July 1, 2016. New gains and losses will be recognized over five years beginning July 1, 2017.

#### **Actuarial Cost Method**

Senate Bill 2190 requires the use of the Ultimate Entry Age Method with liabilities allocated from date of entry to expected payment of benefit. Under the Ultimate Entry Age Method, future normal cost for active employees is calculated based on the Fund provisions in effect for the most recently hired employees.

Senate Bill 2190 also requires the use of a 30-year, closed, level percent of payroll amortization period, in which new gain/loss amortization bases are established each year. The Unfunded Actuarial Accrued Liability at July 1, 2016 was amortized as a level percentage of payroll over a closed amortization period of 30 years with payments effective for fiscal year beginning July 1, 2017. Additional actuarial experience losses will be amortized over a closed amortization period of 30 years in future Risk Sharing Valuation Studies. If, in any given year, the Fund experiences an actuarial gain, any such gain will be used to offset the largest outstanding loss amortization base, if applicable.

# Appendix A: Summary of Actuarial Methods and Assumptions (continued)

## Key Economic Assumptions

### Investment Return

Real Rate of Return	4.50%
Price Inflation	<u>2.50%</u>
Total Nominal Rate	7.00%

Expected future investment returns are assumed to be net of investment expenses.

### Wage Inflation

3.00%

### Payroll Growth Rate

3.00%

### Normal Cost Load for Administrative Expenses

1.25% of pensionable payroll<sup>1</sup>

### Individual Pay Increase Rate

Age	(Nominal = Merit + Wage Inflation)	
	Nominal	Merit
20	7.00%	4.00%
25	6.25%	3.25%
30	5.50%	2.50%
35	5.00%	2.00%
40	4.00%	1.00%
45	3.70%	0.70%
50	3.40%	0.40%
55	3.00%	0.00%

<sup>1</sup> required by Senate Bill 2190

## Appendix A: Summary of Actuarial Methods and Assumptions (continued)

### Key Demographic Assumptions

#### Retirement Rates

Number of Years of Service	Probability of Retiring Within One Year
Less than 25	2.0% <sup>1</sup>
25	2.0%
26	5.5%
27	5.5%
28	5.5%
29	5.5%
30	13.0%
31	15.0%
32	20.0%
33	20.0%
34	20.0%
35	30.0%
36	30.0%
37	40.0%
38	40.0%
39	40.0%
40+	100.0%

#### DROP Duration

Duration of DROP at Retirement	Percentage of Participants Electing Retirement at the Specified Duration
0	0%
3	0
5	10
8	20
10	45
13	25

<sup>1</sup> participants eligible to enter the DROP in the future are not assumed to retire with less than 25 years of service before age 55

## Appendix A: Summary of Actuarial Methods and Assumptions (continued)

### Sample Rates

Number of Years of Service at Actual Retirement	Percentage of Participants Retiring with Specific Drop Durations				
	3 yrs.	5 yrs.	8 yrs.	10 yrs.	13 yrs.
20-24	0.0%	0.0%	0.0%	0.0%	0.0%
25-27	0.0%	100.0%	0.0%	0.0%	0.0%
28-29	0.0%	33.3%	66.7%	0.0%	0.0%
30-32	0.0%	13.3%	26.7%	60.0%	0.0%
33-40	0.0%	10.0%	20.0%	45.0%	25.0%

DROP balances for active members are assumed to be paid out over 15 years upon exiting the DROP. DROP balances of members who have left active service are assumed to be paid out over 7.5 years. Future DROP payments are discounted based on the difference between the assumed investment rate of return and the assumed DROP interest crediting rate.

### Mortality Rates

#### Service Retirees and Contingent Annuities

SOA Public Safety (Below-Median, base year 2010) amount weighted tables generationally projected with Mortality Improvement Scale MP-2019. The base table for males is adjusted by 97.2% to reflect credible plan experience.

#### Survivor Beneficiaries

SOA Public Contingent Survivor (Below-Median, base year 2010) amount weighted tables generationally projected with Mortality Improvement Scale MP-2019. The base table for females is adjusted by 106.0% to reflect credible plan experience.

#### Disabled Retirees

SOA Public Safety Disabled Retiree (base year 2010) amount weighted tables generationally projected with Mortality Improvement Scale MP-2019.

#### All others, including active and vested terminated participants

SOA Public Safety (Below-Median, base year 2010) amount weighted tables generationally projected with Mortality Improvement Scale MP-2019.

## Appendix A: Summary of Actuarial Methods and Assumptions (continued)

### Disability Rates

Graduated rates.

Sample Rates per 100 Participants	
Age	Disability
20	0.45
25	0.45
30	0.45
35	1.00
40	1.00
45	1.00
50	1.00
55	1.00
60	1.00

### Percentage of Deaths and Disabilities in the Line of Duty

Age	Death	Disability <sup>1</sup>
25	80%	80%
35	80	80
45	40	80
55	20	80

### Termination Rates

Age	Termination Rate
20	2.40%
25	2.40
30	2.40
35	1.50
40	0.75
45	0.75
50	0.00

For members hired prior to July 1, 2017 who are terminating with at least 10 years but less than 20 years of service:

- 80% will elect a contribution refund
- 20% will elect a deferred monthly pension benefit

<sup>1</sup> Percentage of disabilities in the line of duty is assumed to be a flat 80% for all ages. 50% of firefighters who become disabled in the line of duty are assumed to be incapable of performing any substantial gainful activity.

# **Appendix A: Summary of Actuarial Methods and Assumptions (continued)**

## **Marital Status at Benefit Eligibility**

### Percentage married

82% of male participants are assumed to be married, and 85% of female participants are assumed to be married.

No beneficiaries other than the spouse assumed.

### Age difference

Male participants are assumed to be two years older than wives, and female participants are assumed to be six years younger than their husbands.

## **Development of Risk Sharing Valuation Study Pay**

The Risk Sharing Valuation Study pay is developed by increasing the prior year's pay with the nominal individual pay increase rate. For participants reported with compensation less than \$10,000, their compensation is set equal to their most recent annual compensation amount in excess of \$10,000.

## **Age at which Benefits End for Child Beneficiaries**

Benefits are assumed to end once the child beneficiary reaches age 23.

## **Future DROP Returns**

Future DROP interest crediting rates are assumed to be equal to 65% of the assumed asset return (currently 65% of 7% equals 4.55%).

## **Future Cost-of-Living Adjustments**

COLAs are assumed to be equal to the assumed asset return less 4.75% (currently 7% minus 4.75% equals 2.25%).

## **Census Dates**

All dates in the census used to calculate liabilities are set as July 1<sup>st</sup> in the year of the event.

## **Missing Data Assumptions**

### Pay for New Hires

None were missing.

### Employee Contributions

Based on the prior year's contributions.

### Benefits Not Valued

The proportional retirement program between the Houston municipal, police and fire pension funds which allows for combining service credit from two or more City of Houston pension plans was not valued because its impact is expected not to be material.

## **Summary of Changes from the July 1, 2021 Risk Sharing Valuation Study**

None.



# Appendix B: Summary of Plan Provisions

## Membership

Any firefighter who has not reached the age of 36 at the time he or she first enters employment shall automatically become a participant in the Fund upon completing the training period. Before October 1, 1990, the eligibility age was age 31. Before 1984, participants entered the Fund on January 1 or July 1.

## Average Salary

For members hired prior to July 1, 2017, the average of the highest 36 months of pensionable pay (or 78 pay periods). For members hired on or after July 1, 2017, the average of the final 36 months of pensionable pay (or 78 pay periods).

## Pensionable Pay

Pensionable pay prior to July 1, 2017 includes base pay and overtime, before reduction for pre-tax employee contributions and salary deferrals. Pensionable pay after July 1, 2017 includes base pay, before reduction for pre-tax employee contributions and salary deferrals.

## Standard Service Pension – Members hired prior to July 1, 2017

### Eligibility

20 years of service

### Benefit

For retirement on or after November 1, 1997 and applicable for service accrued prior to July 1, 2017, 50% of average monthly salary; plus 3% of average monthly salary per year of service in excess of 20 years. For service accrued after July 1, 2017, 2.75% of average monthly salary per year of service for the member's first 20 years of service; plus 2.00% of average monthly salary per year of service in excess of 20 years.

For retirement on or after November 1, 1996 and prior to November 1, 1997, 48.334% of average monthly salary, plus 2.834% of average monthly salary per year of service in excess of 20 years.

For retirement on or after November 1, 1995 and prior to November 1, 1996, 46.667% of average monthly salary, plus 2.667% of average monthly salary per year of service in excess of 20 years.

For retirement on or after September 1, 1991 and prior to November 1, 1995, 45% of average monthly salary, plus 2.5% of average monthly salary per year of service in excess of 20 years, up to 30 years, plus 1.0% of average monthly salary in excess of 30 years.

For retirement on or after September 1, 1989 and prior to September 1, 1991, 45% of average monthly salary, plus 2.5% of average monthly salary per year of service in excess of 20 years.

For retirement on or after September 1, 1987 and prior to September 1, 1989, 45% of average monthly salary, plus 2% of average monthly salary per year of service in excess of 20 years.

For retirement on or after July 1, 1986 and prior to September 1, 1987, 40% of average monthly salary plus 2% of average monthly salary per year of service in excess of 20 years.

For retirement on or after January 1, 1970 and prior to July 1, 1986, 35% of average monthly salary plus 3% of average monthly salary per year of service in excess of salary per year of service in excess of 25 years.

### Maximum

For retirement on or after July 1, 2017, none.

For retirement on or after September 1, 1991, 80% of average monthly salary.

For retirement on or after September 1, 1989 and prior to September 1, 1991, 70% of average monthly salary.

For retirement on or after September 1, 1987 and prior to September 1, 1989, 65% of average monthly salary.

For retirements on or after January 1, 1970 and prior to September 1, 1987, 60% of average monthly salary.

In addition, a member will receive a \$5,000 lump sum payment upon retirement.

## Appendix B: Summary of Plan Provisions (continued)

### Standard Service Pension – Members hired on or after July 1, 2017

#### Eligibility

Age at which the sum of the member's age and service equals 70.

#### Benefit

2.25% of average monthly salary per year of service for the member's first 20 years of service; plus 2.00% of average monthly salary per year of service in excess of 20 years.

#### Maximum

80% of average monthly salary.

In addition, a member will receive a \$5,000 lump sum payment upon retirement.

### Alternate Service Pension

#### Eligibility

Firefighters who became participants prior to September 1, 1987 and who attain age 50 with 20 years of service will receive the greater of the standard or alternate pension.

#### Benefit

50% of average monthly salary plus 1% of average monthly salary per year of service after becoming eligible to retire on an alternate pension.

#### Maximum

65% of average monthly salary.

### Supplemental Bonus Check

Supplemental payments totaling up to \$5 million will be payable on a prorated basis determined by the Board of Trustees to all retirees and survivors.

### Deferred Retirement Option Plan (DROP)

#### Eligibility

20 years of service. Members hired on or after July 1, 2017 are not eligible to enter DROP.

#### Benefit

Effective July 1, 2000, eligible participants may elect to participate in the DROP. The member's standard or alternate service pension (whichever is greater) will be calculated based on service and earnings at the time the DROP is elected.

A notional account will be maintained for each DROP participant. This account will be credited with the following amounts while the member is a participant of the DROP:

- The member's monthly retirement pension, including applicable cost-of-living adjustments (no cost-of living adjustments will be granted while a member is a participant in DROP after July 1, 2017),
- The member's contributions to the Retirement Fund contributed prior to July 1, 2017, and
- Investment earnings/losses at the rate of the Retirement Fund's earnings/losses averaged over a five-year period. Effective July 1, 2017, investment earnings will be contributed to a member's DROP account at the rate of 65% of the Retirement Fund's earnings/losses averaged over a five-year period.

A benefit equal to the DROP account balance would be paid at the time the member leaves active service. The payment would be made as a single lump sum or as the member chooses.

Effective on July 1, 2000, a three-year back DROP is available for all eligible participants. The DROP account would be recalculated based on what the account balance would have been had the participant elected the DROP up to 3 years earlier than he/she actually did. The initial DROP entry date cannot be backdated prior to September 1, 1995, or prior to completion of 20 years of credited service, and must be on the first day of the month selected.

## Appendix B: Summary of Plan Provisions (continued)

The monthly benefit at actual retirement will increase 2% for every year of DROP participation, not to exceed 10 years, for a participant who has at least 20 years of service as of July 1, 2017.

Members can remain in the DROP for 13 years. If a member remains in active service after 13 years in DROP, no further deposits other than unused leave pay will be made to the DROP account, but the DROP account will continue to accrue interest.

If a DROP participant suffers an on-duty disability resulting in the inability to perform any gainful activity or dies in the line of duty, the death or disability annuity benefit would be calculated as though the participant had not entered the DROP. In addition, the DROP account would be payable to the participant or beneficiary.

### Service-Connected Disability Pension

#### Eligibility

No age or service requirements.

#### Benefit

50% of average monthly salary, or service pension if greater and eligible. Firefighters who are not capable of performing any substantial gainful activity will receive 75% of average monthly salary, or service pension, if greater and eligible.

In addition, a member will receive a \$5,000 lump sum.

### Non-Service-Connected Disability Pension

#### Eligibility

No age or service requirements.

#### Benefit

25% of average monthly salary, plus 2.5% of average monthly salary per year of service.

#### Maximum

50% of average monthly salary or service pension, if greater and eligible.

In addition, a member will receive a \$5,000 lump sum.

### Vested Pension

#### Eligibility

For members hired prior to July 1, 2017, at least 10 but less than 20 years of service.

#### Benefit

For members hired prior to July 1, 2017, 1.7% of average monthly salary per year of service payable beginning at age 50. Members receive a refund of contributions without interest in the event of termination before 10 years of service. Members who elect a refund of contributions after attaining 10 years of service receive interest only on contributions made prior to July 1, 2017.

Members hired on or after July 1, 2017 are entitled to a refund of contributions without interest in the event of their termination of employment for any reason other than death.

### Death Benefits

Payable as specified below if survived by a spouse, dependent children, or dependent parents. Effective November 1, 1997 dependent children can continue to receive benefits between the ages of 18 and 22 if they are in college.

#### Non-service-connected

Monthly benefit that would have been payable had the participant retired for non-service-connected disability on the date of his or her death (or service pension if greater).

## Appendix B: Summary of Plan Provisions (continued)

### Postretirement

Monthly benefit payable to the participant prior to his or her death. Effective July 1, 1998, a “graded” postretirement death benefit is payable to a surviving spouse if the retiree was not married at the time of retirement. This “graded” benefit is equal to 20% of the postretirement death benefit for each year of marriage to a maximum 100% after five years of marriage.

### Preretirement

In the case of the death of an active firefighter in the line of duty, eligible survivor will receive a benefit equal to 100% of the decedent’s average monthly salary. Refund of contributions made if no eligible survivors. If death occurs after 10 years of service, interest is credited on the contributions at the flat rate of 5% not compounded. If death occurs before 10 years of service, no interest is credited.

### Lump sum

A one-time \$5,000 lump sum death benefit for any active or retired firefighter. This benefit applies to active members, current retirees, and disabled participants.

### Additional Benefit

Effective on or after July 1, 2001, an extra monthly benefit of \$150 is payable for life to any retired or disabled member or to an eligible survivor of a deceased member. This benefit is not subject to the postretirement adjustment.

### Excess Benefit

Benefit equal to the excess of any members’ standard service pension benefit over the limit imposed by Section 415 of the code.

### Postretirement Adjustment

#### Prior to October 1, 1990

Pensions adjusted each year based on changes in the CPI-U, but not below original amount or above original amount increased 3% each year, not compounded.

Pension adjustments for participants who retire after March 1, 1982 begin at age 55.

Pension adjustments begin immediately for participants whose benefits become payable on or after July 1, 1986 and are based upon 30 or more years of service.

#### On or after October 1, 1990 and prior to November 1, 1997

Pensions adjusted each year based on changes in the CPI-U. The adjustment is based on the amount of benefits payable at the time of adjustment. The maximum annual increase shall be 3% of the benefits payable at the time of adjustment.

Pension adjustments begin immediately for participants whose benefits become payable on or after July 1, 1986 and are based upon 30 or more years of service.

#### On or after November 1, 1997 and prior to October 1, 2017

Pensions adjusted each year at a fixed rate of 3%. The adjustment is based on the amount of benefits payable at the time of adjustment.

Pension adjustments for participants who retire or terminate with a vested benefit after March 1, 1982 begin at age 48. Pension adjustments begin immediately for participants who become disabled and cannot perform any substantial gainful activity (current and future) and qualify for general on-duty disability benefits.

Participants whose benefits become payable on or after July 1, 1986 and are based upon 30 or more years of service are also eligible for pension adjustments to begin immediately.

#### On or after October 1, 2017 and prior to October 1, 2019

Pensions adjusted each year at a rate equal to the Fund’s most recent five fiscal years’ smoothed return minus 5% (but not less than 0% nor greater than 4%). The adjustment is based on the amount of benefits payable at the time of adjustment. Pension adjustments only paid to members who are at least 70 years old.

## **Appendix B: Summary of Plan Provisions (continued)**

On or after October 1, 2019

Pensions adjusted each year at a rate equal to the Fund's most recent five fiscal years' smoothed return minus 4.75% (but not less than 0% nor greater than 4%). The adjustment is based on the amount of benefits payable at the time of adjustment. Pension adjustments only paid to members who are at least 70 years old in October 2019. Pension adjustments only paid to members who are at least 55 years old after October 2019.

### **Contribution Rates**

Members

10.5% of salary effective July 1, 2017.

City

Effective for fiscal year ending 2018, city contribution rates will be made in accordance with the annual Risk Sharing Valuation Study. The city contribution rate in any fiscal year will not be greater than the city contribution rate projected in the initial Risk Sharing Valuation Study for that fiscal year plus 5%. The city contribution rate in any fiscal year will not be less than the city contribution rate projected in the initial Risk Sharing Valuation Study for that fiscal year minus 5%.

# Appendix C: Participant Information

## Summary of Active Participants as of July 1, 2022

Attained Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	Total
<b>Under 25</b>	20	37	1	-	-	-	-	-	-	-	58
Avg. Pay	47,306	48,544	56,471	-	-	-	-	-	-	-	48,253
<b>25 to 29</b>	34	105	79	-	-	-	-	-	-	-	218
Avg. Pay	47,876	51,691	61,359	-	-	-	-	-	-	-	54,599
<b>30 to 34</b>	24	112	304	60	-	-	-	-	-	-	500
Avg. Pay	48,234	53,307	64,662	70,203	-	-	-	-	-	-	61,995
<b>35 to 39</b>	3	49	275	218	80	-	-	-	-	-	625
Avg. Pay	48,681	54,000	62,895	71,512	76,794	-	-	-	-	-	66,914
<b>40 to 44</b>	-	-	90	157	372	64	-	-	-	-	683
Avg. Pay	-	-	63,056	70,939	77,176	82,695	-	-	-	-	74,399
<b>45 to 49</b>	-	-	2	78	333	199	9	-	-	-	621
Avg. Pay	-	-	62,256	69,163	76,397	79,973	93,019	-	-	-	76,830
<b>50 to 54</b>	-	-	-	1	146	128	3	-	-	-	278
Avg. Pay	-	-	-	74,491	75,125	80,100	73,028	-	-	-	77,391
<b>55 to 59</b>	-	-	-	-	7	37	1	-	1	-	46
Avg. Pay	-	-	-	-	74,070	75,825	71,125	-	100,940	-	76,002
<b>60 to 64</b>	-	-	-	-	-	-	-	-	-	-	-
Avg. Pay	-	-	-	-	-	-	-	-	-	-	-
<b>65 to 69</b>	-	-	-	-	-	-	-	-	-	-	-
Avg. Pay	-	-	-	-	-	-	-	-	-	-	-
<b>70 &amp; up</b>	-	-	-	-	-	-	-	-	-	-	-
Avg. Pay	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	81	303	751	514	938	428	13	-	1	-	3,029
Avg. Pay	47,871	52,277	63,458	70,834	76,525	80,059	86,722	-	100,940	-	69,679
Average Age:			39.99			Average Service:			12.52		

## Appendix C: Participant Information (continued)

### Summary of DROP Participants as of July 1, 2022

Attained Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	Total
<b>Under 25</b>	-	-	-	-	-	-	-	-	-	-	-
Avg. Pay	-	-	-	-	-	-	-	-	-	-	-
<b>25 to 29</b>	-	-	-	-	-	-	-	-	-	-	-
Avg. Pay	-	-	-	-	-	-	-	-	-	-	-
<b>30 to 34</b>	-	-	-	-	-	-	-	-	-	-	-
Avg. Pay	-	-	-	-	-	-	-	-	-	-	-
<b>35 to 39</b>	-	-	-	-	-	-	-	-	-	-	-
Avg. Pay	-	-	-	-	-	-	-	-	-	-	-
<b>40 to 44</b>	-	-	-	-	-	4	-	-	-	-	4
Avg. Pay	-	-	-	-	-	80,744	-	-	-	-	80,744
<b>45 to 49</b>	-	-	-	-	-	30	38	-	-	-	68
Avg. Pay	-	-	-	-	-	76,693	86,439	-	-	-	82,139
<b>50 to 54</b>	-	-	-	-	-	63	183	31	-	-	277
Avg. Pay	-	-	-	-	-	80,871	84,500	87,452	-	-	84,005
<b>55 to 59</b>	-	-	-	-	-	28	115	45	14	-	202
Avg. Pay	-	-	-	-	-	77,674	80,213	85,440	85,864	-	81,417
<b>60 to 64</b>	-	-	-	-	-	1	34	14	20	3	72
Avg. Pay	-	-	-	-	-	74,160	81,037	81,959	88,168	97,163	83,773
<b>65 to 69</b>	-	-	-	-	-	-	2	1	1	3	7
Avg. Pay	-	-	-	-	-	-	80,855	112,270	74,160	76,907	82,694
<b>70 &amp; up</b>	-	-	-	-	-	-	-	-	-	1	1
Avg. Pay	-	-	-	-	-	-	-	-	-	81,370	81,370
<b>Total</b>	-	-	-	-	-	126	372	91	35	7	631
Avg. Pay	-	-	-	-	-	79,109	83,037	85,885	86,846	86,226	82,910
Average Age:				54.41	Average Service:				27.59		

## Appendix C: Participant Information (continued)

### Summary of Active and DROP Participants as of July 1, 2022

Attained Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	Total				
<b>Under 25</b>	20	37	1	-	-	-	-	-	-	-	58				
Avg. Pay	47,306	48,544	56,471	-	-	-	-	-	-	-	48,253				
<b>25 to 29</b>	34	105	79	-	-	-	-	-	-	-	218				
Avg. Pay	47,876	51,691	61,359	-	-	-	-	-	-	-	54,599				
<b>30 to 34</b>	24	112	304	60	-	-	-	-	-	-	500				
Avg. Pay	48,234	53,307	64,662	70,203	-	-	-	-	-	-	61,995				
<b>35 to 39</b>	3	49	275	218	80	-	-	-	-	-	625				
Avg. Pay	48,681	54,000	62,895	71,512	76,794	-	-	-	-	-	66,914				
<b>40 to 44</b>	-	-	90	157	372	68	-	-	-	-	687				
Avg. Pay	-	-	63,056	70,939	77,176	82,580	-	-	-	-	74,436				
<b>45 to 49</b>	-	-	2	78	333	229	47	-	-	-	689				
Avg. Pay	-	-	62,256	69,163	76,397	79,543	87,699	-	-	-	77,354				
<b>50 to 54</b>	-	-	-	1	146	191	186	31	-	-	555				
Avg. Pay	-	-	-	74,491	75,125	80,354	84,315	87,452	-	-	80,692				
<b>55 to 59</b>	-	-	-	-	7	65	116	45	15	-	248				
Avg. Pay	-	-	-	-	74,070	76,621	80,135	85,440	86,869	-	80,413				
<b>60 to 64</b>	-	-	-	-	-	1	34	14	20	3	72				
Avg. Pay	-	-	-	-	-	74,160	81,037	81,959	88,168	97,163	83,773				
<b>65 to 69</b>	-	-	-	-	-	-	2	1	1	3	7				
Avg. Pay	-	-	-	-	-	-	80,855	112,270	74,160	76,907	82,694				
<b>70 &amp; up</b>	-	-	-	-	-	-	-	-	-	1	1				
Avg. Pay	-	-	-	-	-	-	-	-	-	81,370	81,370				
<b>Total</b>	81	303	751	514	938	554	385	91	36	7	3,660				
Avg. Pay	47,871	52,277	63,458	70,834	76,525	79,843	83,161	85,885	87,238	86,226	71,960				
Average Age:				42.48				Average Service:				15.12			



## Appendix C: Participant Information (continued)

### Summary of Inactive Participants as of July 1, 2022

	Number	Average Age	Annual Benefits (\$000)	Average Annual Benefits
<b>Benefits in Pay Status</b>				
Retirees	2,521	68.4	\$ 143,517	\$ 56,929
Beneficiaries	671	70.1	32,679	48,702
Disabled Participants	<u>298</u>	65.6	<u>16,677</u>	<u>55,962</u>
Total	3,490		\$ 192,873	\$ 55,265
<b>Deferred Benefits</b>				
Vested Terminated Participants	144	38.2	\$ 409 <sup>1</sup>	\$ 13,208 <sup>2</sup>
Beneficiaries	N/A	N/A	N/A	N/A
Disabled Participants	<u>N/A</u>	N/A	<u>N/A</u>	<u>N/A</u>
Total	144		\$ 409	\$ 13,208

<sup>1</sup> Does not include \$3,336,326 in pending refunds.

<sup>2</sup> Average is over 31 members not due pending refunds

## Appendix C: Participant Information (continued)

### Participant Data Reconciliation

	Active	DROP	Deferred Vested	Retired	Total
Number of members as of July 1, 2021	3,048	623	156	3,441	7,268
Change in status during the plan year:					
Actives who retired	(13)	(72)		85	0
Actives who terminated	(23)		23		0
Actives who entered DROP	(83)	83			0
Inactives who returned to service	1		(1)		0
Inactives who retired			(4)	4	0
Participants who became disabled	(6)	(2)		8	0
No longer members due to:					
Death	(4)	(1)		(86)	(91)
Non-vested terminations					0
Child attained cut-off age				(2)	(2)
Benefits no longer due	(33)		(30)		(63)
New member due to:					
Initial membership	142			3	145
Death of another member				36	36
Correction				1	1
Number of members as of July 1, 2022	3,029	631	144	3,490	7,294

## Appendix C: Participant Information (continued)

### Retiree and Beneficiaries Added to and Removed from Rolls

Period Ended	Added to Rolls		Removed from Rolls		Rolls at the End of the Year			
	Number	Annual Benefits (\$000)	Number	Annual Benefits (\$000)	Number	Annual Benefits (\$000)	Percentage Increase in Annual Benefits	Average Annual Benefit
December 31, 1978	72	719	23	76	794	4,294	15.8%	5,408
December 31, 1979	67	719	21	83	840	5,008	16.6	5,962
December 31, 1980	33	473	23	84	850	5,498	9.8	6,468
December 31, 1981	61	862	38	159	873	6,097	10.9	6,983
December 31, 1982	63	644	26	171	910	6,772	11.1	7,442
December 31, 1983	54	605	39	207	925	7,403	9.3	8,003
June 30, 1984 <sup>1</sup>	41	619	17	98	949	3,952	6.8	8,328
June 30, 1985	75	968	53	290	971	8,432	6.7	8,684
June 30, 1986	54	752	38	243	987	9,550	13.3	9,676
June 30, 1987	76	1,101	33	235	1,030	10,522	10.2	10,215
June 30, 1988	121	2,002	38	311	1,113	12,754	21.2	11,459
June 30, 1989	74	1,306	42	299	1,145	14,032	10.0	12,255
June 30, 1990	111	1,996	37	288	1,219	16,428	17.1	13,477
June 30, 1991	129	1,784	38	401	1,310	17,888	8.9	13,665
June 30, 1992	78	1,588	44	401	1,344	19,866	11.1	14,781
June 30, 1993	82	1,717	48	585	1,378	21,516	8.3	15,614
June 30, 1994	112	2,006	58	660	1,432	23,297	8.3	16,269
June 30, 1995	87	1,728	28	353	1,491	25,142	7.9	16,863
June 30, 1996	67	1,402	56	660	1,502	26,379	4.9	17,563
June 30, 1997	56	1,050	37	487	1,521	27,581	4.6	18,133

<sup>1</sup> Six-month period

## Appendix C: Participant Information (continued)

### Retirees and Beneficiaries Added to and Removed from Rolls (continued)

Period Ended	Added to Rolls		Removed from Rolls		Rolls at the End of the Year		Percentage Increase in Annual Benefits	Average Annual Benefit
	Number	Annual Benefits (\$000)	Number	Annual Benefits (\$000)	Number	Annual Benefits (\$000)		
June 30, 1998	54	1,064	43	477	1,532	28,675	4.0	18,717
June 30, 1999	64	1,840	28	551	1,568	30,233	5.4	19,281
June 30, 2000	95	2,364	71	1,167	1,592	34,583	14.4	21,723
June 30, 2001	127	3,581	47	775	1,672	38,347	10.9	22,935
June 30, 2002	172	5,493	61	998	1,783	44,300	15.5	24,846
June 30, 2004 <sup>1</sup>	377	N/A	109	N/A	2,051	57,676	30.2	28,121
June 30, 2005	135	4,353	53	1,107	2,133	62,882	9.0	29,481
June 30, 2006	195	7,231	60	1,437	2,268	70,420	12.0	31,050
June 30, 2007	106	3,822	59	1,407	2,315	74,948	6.4	32,375
June 30, 2008	166	9,334	21	828	2,460	98,216	31.0	39,925
June 30, 2009	133	3,369	43	2,081	2,550	94,536	-3.7	37,073
June 30, 2010	162	7,159	103	2,886	2,609	96,580	2.2	37,018
June 30, 2011	181	8,905	64	1,489	2,726	106,832	10.6	39,190
June 30, 2012	141	7,042	77	2,398	2,790	114,176	6.8	40,923
June 30, 2013	170	8,286	54	1,837	2,906	124,080	8.7	42,698
June 30, 2014	162	7,772	70	1,401	2,998	132,749	7.0	44,279
June 30, 2015	147	7,273	85	383	3,060	140,629	5.9	45,957
June 30, 2016	138	7,496	60	2,302	3,138	150,005	6.7	47,803
June 30, 2017	207	11,829	95	3,667	3,250	162,671	8.4	50,053
June 30, 2018	150	8,353	88	2,546	3,312	169,601	4.3	51,208
June 30, 2019	114	6,432	81	3,818	3,345	173,433	2.3	51,848
June 30, 2020	148	8,388	83	3,821	3,410	179,050	3.2	52,508
June 30, 2021	127	6,730	96	4,510	3,441	182,964	2.2	53,172
June 30, 2022	137	7,716	88	4,286	3,490	192,873	5.4	55,265

<sup>1</sup> Two-year period

## Appendix D: ASOP 51

### Actuarial Standard of Practice No. 51 Disclosures

Funding future retirement benefits prior to when those benefits become due involves assumptions regarding future economic and demographic experience. These assumptions are applied to calculate actuarial liabilities and the corresponding funded status of the Fund. However, to the extent future experience deviates from the assumptions used, variations will occur in these calculated values. These variations create risk to the Fund. Understanding the risks to the funding of the Fund is important. Therefore, an Actuarial Standard of Practice (ASOP) has been adopted. Actuarial Standard of Practice No. 51 (ASOP 51) requires certain disclosures of potential risks to the Fund and provides useful information for intended users of actuarial reports that determine Fund contributions or evaluate the adequacy of specified contribution levels to support benefit provisions.

Under ASOP 51, risk is defined as the potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience.

It is important to note that not all risk is negative but all risk should be understood and accepted based on knowledge, judgment and educated decisions. Future measurements may deviate in ways that produce positive or negative financial impacts to the Fund.

In the actuary's professional judgment, the following risks may reasonably be anticipated to significantly affect the plan's future financial condition:

- Investment risk – the risk that assets will have a lower return than expected
- Contribution risk – the risk that the actual contribution made will be different than the recommended contribution in the Risk Sharing Valuation Study
- Salary increase risk – the risk that actual salary increases will be higher than expected
- Longevity and other demographic risk – the risk that mortality or other demographic experience will be different from expected

The following information is provided to comply with ASOP 51 and furnish beneficial information on potential risks to the Fund. This list is not all-inclusive; it is an attempt to identify the most significant risks and how those risks might affect the results shown in this report.

Note that ASOP 51 does not require the actuary to evaluate the ability or willingness of the Fund sponsor to make contributions to the Fund. In addition, this Risk Sharing Valuation Study report is not intended to provide investment advice or to provide guidance on the management or reduction of risk. Buck welcomes the opportunity to assist in such matters as part of a separate project or projects utilizing the appropriate staff and resources for those objectives.

## Appendix D: ASOP 51 (continued)

### Assessment of Risks

- Investment return - One type of investment risk is that assets materially underperform expected return.
  - Lower assets mean higher unfunded liability and larger contribution amounts. For example, if returns on assets at market value were 1% less than actual, this would reduce the actuarial value of assets by approximately \$10,400,000, which would increase the estimated City Contribution for Fiscal Year 2024 contribution by \$1,166,000.
  - The five-year smoothing method used for the actuarial value of assets defers a portion of investment gain/loss in each of the previous five years. If the assumed return on assets consistently overestimates the actual return on assets, the actuarial value of assets will be consistently higher than the true market value. Consistent underestimation of the unfunded liability can prevent the Fund from achieving anticipated funding goals even when all minimum required contributions are made timely.
- Asset growth does not keep pace with liability increases over time - Another type of investment risk is that asset returns do not keep pace with liability growth over time. Fund liabilities are based on the discounted present value of anticipated future benefit payments. That present value grows at the discount rate as time passes and the future payouts move closer. If investment returns are lower than the rates used to discount liabilities, Fund liabilities will increase more rapidly than Fund assets. Over extended periods of time, such as those involved in pension obligations, these discrepancies can accumulate to significant shortfalls.
- Market shocks or regime changes - Invested assets are subject to significant disruptions from market shocks, such as the financial crisis of 2008/2009, or as a result of systemic regime changes that persist for years, such as historically low interest rates over the recent decade. These shocks or changes will increase the risk that investments will underperform the expected return. They may also lead to a need to lower the long-term return on assets assumption. Since the long-term return on asset assumption is also used for discounting liabilities a lower assumption will increase liabilities and recommended contributions. Currently the investment return assumption used for funding is set by Senate Bill 2190.
- Salary increases - Fund costs are sensitive to salary increases, with higher rates leading to higher obligations. This is because benefits at retirement are pay related, meaning that higher pay generates higher benefit levels at retirement. Compensation increases greater than assumed lead to actuarial losses since projected benefits are higher than predicted by assumed rates.
- The Fund provides certain eligible members to enter the Deferred Retirement Option Program (DROP). It allows members who elect DROP the option to continue to work beyond their standard or alternative service eligibility date and convert part of their retirement benefit into a lump sum.

## Appendix D: ASOP 51 (continued)

- A DROP presents a risk due to large lump sums paid, particularly during economic downturns. Another investment consideration is the need for liquid assets to pay DROP lump sums as employees and retirees may elect to receive their DROP account at any time creating either the necessity to maintain larger allocations of cash to pay these large lump sum benefits or force the Fund to sell securities or other illiquid investments at inopportune times. These payments are less predictable than monthly retirement benefits and may cause some losses.
- The DROP provided by the Fund also presents risk due to investment return provided to the DROP account. The Fund provides DROP investment return at the rate of 65% of the Fund's earnings/losses averaged over a five-year period. When the average is a loss, the DROP account is only decreased by 65% of the loss rate and the Fund has to absorb the remaining 35%. However, this risk is also mitigated by the 65% factor - when the average is an earning, the Fund gets to keep the extra 35% earnings.
- Longevity and other demographic risks - Potential that mortality or other demographic experience (retirement, turnover, disability) may be different than expected. As the Fund matures and the majority of participants reach (or have reached) retirement eligibility, risks associated when participants retire can become significant. The Fund provides for unreduced early retirement benefits after meeting certain age and service conditions. These benefits are highly subsidized and thus can be significantly more valuable than normal retirement benefits and regular early retirement benefits. The demographic assumptions used to determine the Risk Sharing Valuation Study attempt to account for unreduced early retirement based on historical plan experience. However, due to the unpredictable nature of such benefits, future experience could differ significantly from past experience.

In addition to the risk that participants will not retire as expected, the Fund is subject to longevity risk - the risk that participants will live longer (or shorter) than expected. Cost of living adjustments (COLA) provided by the Fund increase longevity risk because if a participant lives longer than expected more COLA will be provided.

- Declining active workforce - since the City's contributions are based on a percentage of participant's salaries, a declining active workforce will have the impact of the Fund potentially receiving lower contributions. In addition, if the required dollar amount of contributions remain level or increase, a declining active workforce will result in higher contribution rates in order to meet required contribution levels.
- Contribution risk – risk of not contributing an actuarially determined contribution. Based on the statutory requirements of Senate Bill 2190 it is our understanding that the actual City contribution rate may be established as an average of the contribution rates shown in this report and those shown in the Risk Sharing Valuation Study prepared by the City's actuary. If future contributions are established in this manner at levels below those presented in this report, the Fund may not be expected to achieve a fully funded position over the 30-year time horizon as contemplated in the statute based on the data, assumptions and methods set forth in this report.
- Ultimate Entry Age Normal Cost Method (Ultimate EANC) - The Ultimate EANC method is a variation of EANC, where the normal cost is calculated for each active member based on the Fund provisions applicable to new members of the Fund. As the Fund has a lower annual cost for new members hired on or after July 1, 2017, use of the Ultimate EANC method lowers the normal cost and increases the actuarial accrued liability, as compared to EANC.

## Appendix D: ASOP 51 (continued)

### Historical Results

The following table shows selected historical values of key Risk Sharing Valuation Study measures. These items illustrate how actual volatility has impacted the Fund in recent years and gives additional context to the risks described above. Further information can be found in the RSVS reports for each year.

(\$1,000)					Current
RSVS Date	07/01/18	07/01/19	07/01/20	07/01/21	RSVS 07/01/22
<u>Liabilities and Assets at Valuation Date</u>					
• Actuarial Accrued Liability (AAL)	4,948,133	5,057,759	4,932,307	4,881,608	5,075,516
- Normal Cost	69,741	70,345	61,078	60,907	63,222
• Actuarial Value of Assets (AVA)	4,027,079	4,190,934	4,251,851	4,550,468	4,843,737
- Funded Percent (AVA)	81%	83%	86%	93%	95%
• Market Value of Assets (MVA)	4,170,354	4,237,692	4,102,932	5,256,763	5,093,736
- Funded Percent (MVA)	84%	84%	83%	108%	100%
<u>Contributions and Disbursements for Plan Year Ended</u>					
	2018	2019	2020	2021	2022
• Actuarially Determined Contribution (ADC)	96,530	99,676	96,332	88,104	78,571
• Actual Contribution	83,010	89,897	83,837	77,495	81,351
• Disbursements	295,674	278,615	336,153	291,767	275,842
<u>Rates of Return for Plan Year Ended</u>					
	2018	2019	2020	2021	2022
• Assumed	7.00%	7.00%	7.00%	7.00%	7.00%
• AVA	8.40%	8.10%	6.90%	11.60%	10.20%
• MVA	8.20%	5.40%	2.00%	33.40%	0.00%
<u>Maturity Measures at Valuation Date</u>					
• Payroll	260,345	272,498	259,235	243,045	255,100
- Asset Volatility Ratio (AVA / Payroll)	15.5	15.4	16.4	18.7	19.0
- Liability Volatility Ratio (AAL / Payroll)	19.0	18.6	19.0	20.1	19.9
• Retiree and Beneficiary (In-pay) Liability	3,381,597	3,445,240	3,428,579	3,454,553	3,618,126
- Percent of Total Liability	68%	68%	70%	71%	71%
• Contributions minus Disbursements in Prior Year	(212,664)	(188,718)	(252,316)	(214,272)	(194,491)
- Percent Market Value of Assets	-5.1%	-4.5%	-6.1%	-4.1%	-3.8%



## Appendix D: ASOP 51 (continued)

### Commentary on Plan Maturity Measures

#### *The ratio of retired life actuarial accrued liability to total actuarial accrued liability*

A mature plan will often have a ratio above 60 - 65 percent. A higher percentage will generally indicate an increased need for asset / liability matching due to inability to absorb volatility in future returns. Also, an increasing percentage may indicate a need for a less risky asset allocation which may lead to a lower long-term return on assets assumption and increased costs.

#### *The ratio of cashflow to market value of assets*

The cashflow as a percentage of assets means the Fund may need to invest in more liquid assets to cover the benefit payments. More liquid assets may not garner the same returns as less liquid assets and therefore increase the investment risk. However, there may already be enough liquid assets to cover the benefit payments, less investment return is needed to cover the shortfall, or only a small portion of assets will need to be converted to cash. Therefore, the investment risk is likely not amplified at this time. This maturity measure should be monitored for continual upward trend with greater magnitude.

#### *The ratio of actuarial value of assets to participant payroll*

Plans that have higher asset-to-payroll ratios experience *more* volatile employer contributions (as a percentage of payroll) due to investment return. For example, if lower than expected asset return increases the unfunded liability of two plans by the same percent the plan with a higher assets-to-payroll ratio may experience higher contribution volatility than a plan with a lower asset-to-payroll ratio.