Dallas Police and Fire Pension System

Actuarial Valuation and Review as of January 1, 2023

Segal

Segal

2727 Paces Ferry Road SE, Building One Suite 1400
Atlanta, GA 30339-4053
segalco.com
T 678.306.3100

December 8, 2023

Board of Trustees
Dallas Police and Fire Pension System
4100 Harry Hines Blvd., Suite 100
Dallas, TX 75219-3207

Dear Board of Trustees Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2023. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for fiscal 2023; actual funding is determined by State law.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board of Trustees to assist in administering the Pension System. The census information on which our calculations were based was provided by the System's IT Department, under the supervision of John Holt, and financial information on which our calculations were based was prepared by the System's Finance Department. That assistance is gratefully acknowledged.

Segal does not audit the data provided. The accuracy and comprehensiveness of the data is the responsibility of those supplying the data. To the extent we can, however, Segal does review the data for reasonableness and consistency. Based on our review of the data, we have no reason to doubt the substantial accuracy of the information on which we have based this report and we have no reason to believe there are facts or circumstances that would affect the validity of these results.

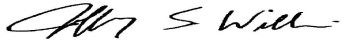
The measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law.

The actuarial calculations were directed under the supervision of Jeffrey Williams. I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of my knowledge, the information supplied in this actuarial valuation is complete and accurate. The assumptions used in this

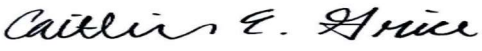
actuarial valuation were selected by the Board based upon my analysis and recommendations. In my opinion, the assumptions are reasonable and take into account the experience of the Plan and reasonable expectations.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,
Segal



Jeffrey S. Williams, FCA, ASA, MAAA, EA
Vice President and Consulting Actuary



Caitlin E. Grice, FCA, ASA, MAAA, EA
Consulting Actuary

Segal

Table of Contents

Table of Contents

Section 1: Actuarial Valuation Summary

Purpose and basis

This report has been prepared by Segal to present a valuation of the Dallas Police and Fire Pension System as of January 1, 2023. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits and to provide information for required disclosures under Governmental Accounting Standards Board (GASB) Statement No. 67.

The contribution requirements presented in this report are based on:

- The benefit provisions of the Pension Plan, as administered by the Board;
- The characteristics of covered active members, inactive members, and retired members and beneficiaries as of December 31, 2022, provided by the System's IT Department;
- The assets of the Plan as of December 31, 2022, provided by the System's Finance Department;
- Economic assumptions regarding future salary increases and investment earnings;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc.;
- Article 6243a-1, as amended by House Bill 3158 (HB 3158), signed into law by the Governor of Texas on May 31, 2017; and
- The funding policy adopted by the Board of Trustees of the Pension System on December 12, 2019 as amended through July 9, 2020.

The majority of assumptions and methods used to value the Plan were set by the Board based on recommendations made by Segal following a five-year experience study for the period ended December 31, 2019.

Certain disclosure information required by GASB Statement No. 68 as of September 30, 2023 for the City is provided in a separate report.

Valuation highlights

1. Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability (UAL), and the principal balance.
   a. The Board's funding policy was adopted in December 2019 and amended in July 2020. In the Board's amended policy, the UAL as of January 1, 2020 was amortized over a closed, 25-year period, with future gains or losses each year thereafter amortized over separate, closed, 20-year periods. Amortization remains on a level percentage of pay basis. If the City's actual contributions differ from the actuarially determined contribution (ADC) by more than 2%, the Board can recommend a change in the City's contribution rate. The Board's funding policy meets the standard of targeting 100% funding of the actuarial accrued liability if the ADC is contributed.
   b. Through 2024, there is a floor on the City's contributions levels. This floor is expected to override the long-term contribution rate of 34.50% of computation pay. Beginning in 2025, the City is expected to contribute based solely on computation pay. If future payroll matches the City's Hiring Plan payroll projection, the System is projected to be 100% funded in 2105.
   c. The effective amortization period of 82 years based on current funding methodology is not a reasonable period for paying off the UAL.
2. Actual contributions made by the City during the year ending December 31, 2022 were $169.9 million, 74.3% of the 2022 ADC. In 2021, actual contributions were $165.5 million, 74.8% of the 2021 ADC. The total contributions made during the plan year were insufficient to reduce the UAL. The Board was advised previously that because the funding policy contributions, as outlined in HB 3158, result in a long effective amortization period; the UAL will continue to increase even after the funded percentage begins to increase. It is currently projected that the UAL will continue to increase as a dollar amount for more than 50 years before it starts to decline.
3. The System's normal cost (for benefits accruing each year) plus expenses is 19.55% of computation pay. Members contribute 13.50% of computation pay, and the City covers the balance. All remaining City contributions pay down the UAL. Although it is important for the System to meet its 6.50% annual rate of return assumption, the assets currently cover a relatively low percentage of the liabilities and investment returns alone cannot close the funding gap. It is therefore vital that the City's payroll projections are accurate, or that the long-term level of contributions is at least 34.50% of those payroll projections, for the System to have a chance to ever achieve full funding.
4. The rate of return on the market value of assets, as calculated by the actuary, was -11.46% for the 2022 plan year. The return on the actuarial value of assets was 2.22% for the 2022 plan year. This resulted in an actuarial loss when measured against the assumed rate of return of 6.50%. This actuarial investment loss increased the ADC by $6.4 million.

5. There was a net experience loss for the year of $104.8 million, or 2.0% of the actuarial accrued liability. This loss was primarily due to the investment loss and the loss due to actual contributions less than the ADC, partially offset by a demographic experience gain. The investment loss was equivalent to 1.7% of the actuarial accrued liability and the loss due to contributions less than the ADC was equivalent to 1.2% of the actuarial accrued liability. This net experience loss is amortized over 20 years.
6. The following actuarial assumptions were changed with this valuation:
   - The assumed retirement rate for DROP actives was lowered from 100% to 75% after ten years in DROP.
   - The salary scale assumption was update based on the 2023 Meet and Confer agreement.

   As a result of these assumption changes, the total normal cost increased by $8.5 million and the actuarial accrued liability increased by $64.3 million. This change in the actuarial accrued liability was amortized over 20 years. The total impact was an increase in the ADC of $10.8 million, or 2.34% of computation pay.

Changes from prior valuation

7. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 39.12%, compared to the prior year funded ratio of 41.06%. This ratio is one measure of funding status, and its history is a measure of funding progress. Using the market value of assets, the funded ratio is 34.42%, compared to 41.83% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of the plan assets to cover the estimated cost of settling the System's benefit obligation or the need for or the amount of future contributions. As shown in prior projections, the System should expect the funded ratio to continue to decline for the foreseeable future; current projections estimate the funded ratio will continue to decline through 2039.
8. The City's ADC for the 2023 plan year is $251.6 million, an increase of $23.1 million from last year. The ADC as a percentage of computation pay increased from 52.30% to 54.36%. Page 30 contains a reconciliation of the ADC from the prior valuation to this year.
9. The actuarial value of assets as of the valuation date is 113.7% of the market value of assets. The investment experience in recent years has only been partially recognized in the actuarial value of assets. As the deferred net loss of $246.8 million is recognized in future years, the System's ADC is likely to increase unless the net loss is offset by future experience. If the net deferred losses were recognized immediately in the actuarial value of assets, the ADC would increase from 54.36% to 58.23% of computation pay.

Risk

10. The City's Hiring Plan reflects significant growth in payroll over 20 years, from $372 million in 2017 to $684 million in 2037. The average annual growth in the City's Hiring Plan payroll projections is 3.09%, compared to the valuation assumption of 2.50%. If payroll growth is more modest, or if there is adverse actuarial experience, it will significantly impact the progress towards improved funding.
    a. With 100% funding projected in 2105, the effective amortization period for the UAL is 82 years. This period can vary on an annual basis due to actuarial experience, changes in assumptions, contributions higher or lower than expected, and assumed short-term market value asset returns provided by System staff. In the 2022 actuarial valuation, the projected full funding year was 2090 and the effective period was 68 years.
    b. If the City's Hiring Plan projections are not met and instead the current valuation payroll of $462.8 million increases by the assumed payroll growth of 2.50% each year, and City and member contributions are based on this level of payroll beginning in 2025, the System is projected to be only 80% funded in 2105, rather than 100%.
    c. The City's Hiring Plan payroll projections are shown in *Section 4, Exhibit I*. From 2017 through 2023, valuation payroll based on participant data was cumulatively $7.8 million greater than the City's projections, or 0.28% higher. This is the first year the accumulated valuation payroll has exceeded the City's cumulative Hiring Plan payroll since the Hiring Plan was put in place in 2017.
11. It is important to note that this actuarial valuation is based on plan assets as of December 31, 2022. The Plan's funded status does not reflect short-term fluctuations of the market, but rather is based on the market values on the last day of the plan year. Segal is available to prepare projections of potential outcomes of market conditions and other demographic experience upon request.
12. Since the actuarial valuation results are dependent on a given set of assumptions, there is a risk that emerging results may differ significantly as actual experience proves to be different from the assumptions. We have not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the Plan's future financial condition but have included a brief discussion of some risks that may affect the Plan in *Section 2*. A more detailed assessment would provide the Board with a better understanding of the inherent risks and could be important for the Plan because:
    - The Plan's assets allocation has potential for a significant amount of investment return volatility.
    - Retired participants account for most of the System's liabilities, leaving limited option for reducing costs in the event of adverse experience.
    - The current political and social environment could impact the turnover and retirement patterns of public safety employees, as well as the availability of new hires.

GASB

13. This report constitutes an actuarial valuation for the purpose of determining the actuarially determined contribution under the Plan's funding policy and measuring the progress of that funding policy. The information contained in *Section 5* provides the accounting information for Governmental Accounting Standards Board (GASB) Statement No. 67, for inclusion in the Plan's and employer's financial statements as of December 31, 2022.
14. The Net Pension Liability (NPL) and Pension Expense under GASB statement No. 68 for inclusion in the plan and employer's financial statements as of September 30, 2023 will be provided separately.
15. The NPL is equal to the difference between the Total Pension Liability (TPL) and the Plan's fiduciary net position (equal to the market value of assets). The NPL as of December 30, 2022 is $3.4 billion, an increase from $3.0 billion as of December 31, 2021.

Summary of key valuation results

		2023	2022
Contributions for plan year beginning January 1	• City's actuarially determined contributions (ADC)	$251,606,424	$228,530,758
	• City's ADC as a percent of computation pay	54.36%	52.30%
	• Actual City contributions	--	$169,911,420
Actuarial accrued liability for plan year beginning January 1	• Retired members and beneficiaries	$3,566,237,397	$3,554,266,474
	• Inactive vested members	29,125,817	24,985,278
	• Inactive members due a refund of employee contributions	2,258,087	1,986,450
	• Active members	1,651,393,512	1,577,544,138
	• Total actuarial accrued liability	5,249,014,813	5,158,782,340
	• Total normal cost including administrative expenses	90,442,683	81,440,023
Assets for plan year beginning January 1	• Market value of assets (MVA)	$1,806,567,341	$2,157,840,430
	• Actuarial value of assets (AVA)	2,053,388,085	2,117,978,431
	• Actuarial value of assets as a percentage of market value of assets	113.66%	98.15%
Funded status for plan year beginning January 1	• Unfunded actuarial accrued liability on market value of assets	$3,442,447,472	$3,000,941,910
	• Funded percentage on MVA basis	34.42%	41.83%
	• Unfunded actuarial accrued liability on actuarial value of assets	$3,195,626,728	$3,040,803,909
	• Funded percentage on AVA basis	39.12%	41.06%
	• Effective amortization period for determination of ADC[1]	22 years	23 years
Key assumptions	• Net investment return	6.50%	6.50%
	• Inflation rate	2.50%	2.50%
GASB information	• Discount rate	6.50%	6.50%
	• Total Pension Liability	$5,254,660,197	$5,163,731,692
	• Plan Fiduciary Net Position	1,806,567,341	2,157,840,430
	• Net Pension Liability	3,448,092,856	3,005,891,262
	• Plan Fiduciary Net Position as a percentage of Total Pension Liability	34.38%	41.79%
Demographic data for plan year beginning January 1	• Number of retired members and beneficiaries	5,142	5,071
	• Number of DROP only beneficiaries	147	125
	• Number of inactive vested members	252	233
	• Number of inactive members due a refund of employee contributions	474	462

[1] The unfunded actuarial accrued liability as of January 1, 2020 was amortized over a closed, 25-year period. Beginning on January 1, 2021, each year's experience due to actuarial gains and losses or plan, assumption, or method changes are amortized over closed, 20-year periods. These amortization periods are based on the ADC being paid in full.

Section 1: Actuarial Valuation Summary

	2023	2022
• Number of active members	5,085	5,088
• Total computation pay[1]	$462,820,226	$436,971,384
• Average compensation	$91,017	$85,883

[1] Total computation pay is the active members' actual payroll for the preceding year, increased by the salary scale applicable for each member to account for their anticipated salary increases in the upcoming year.

Important information about actuarial valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal relies on a number of input items. These include:

Plan provisions	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant information	An actuarial valuation for a plan is based on data provided to the actuary by the System. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Financial information	Part of the cost of a plan will be paid from existing assets — the balance will need to come from future contributions and investment income. The valuation is based on the asset values as of the valuation date, typically reported by the System. A snapshot as of a single date may not be an appropriate value for determining a single year's contribution requirement, especially in volatile markets. Plan sponsors often use an "actuarial value of assets" that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal starts by developing a forecast of the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of participants in each year, as well as forecasts of the plan's benefits for each of those events. In addition, the benefits forecasted for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The forecasted benefits are then discounted to a present value, typically based on an estimate of the rate of return that will be achieved on the plan's assets. All of these factors are uncertain and unknowable. Thus, there will be a range of reasonable assumptions, and the results may vary materially based on which assumptions are selected within that range. That is, there is no right answer (except with hindsight). It is important for any user of an actuarial valuation to understand and accept this constraint. The actuarial model may use approximations and estimates that will have an immaterial impact on our results. In addition, the actuarial assumptions may change over time, and while this can have a significant impact on the reported results, it does not mean that the previous assumptions or results were unreasonable or wrong.

Section 1: Actuarial Valuation Summary

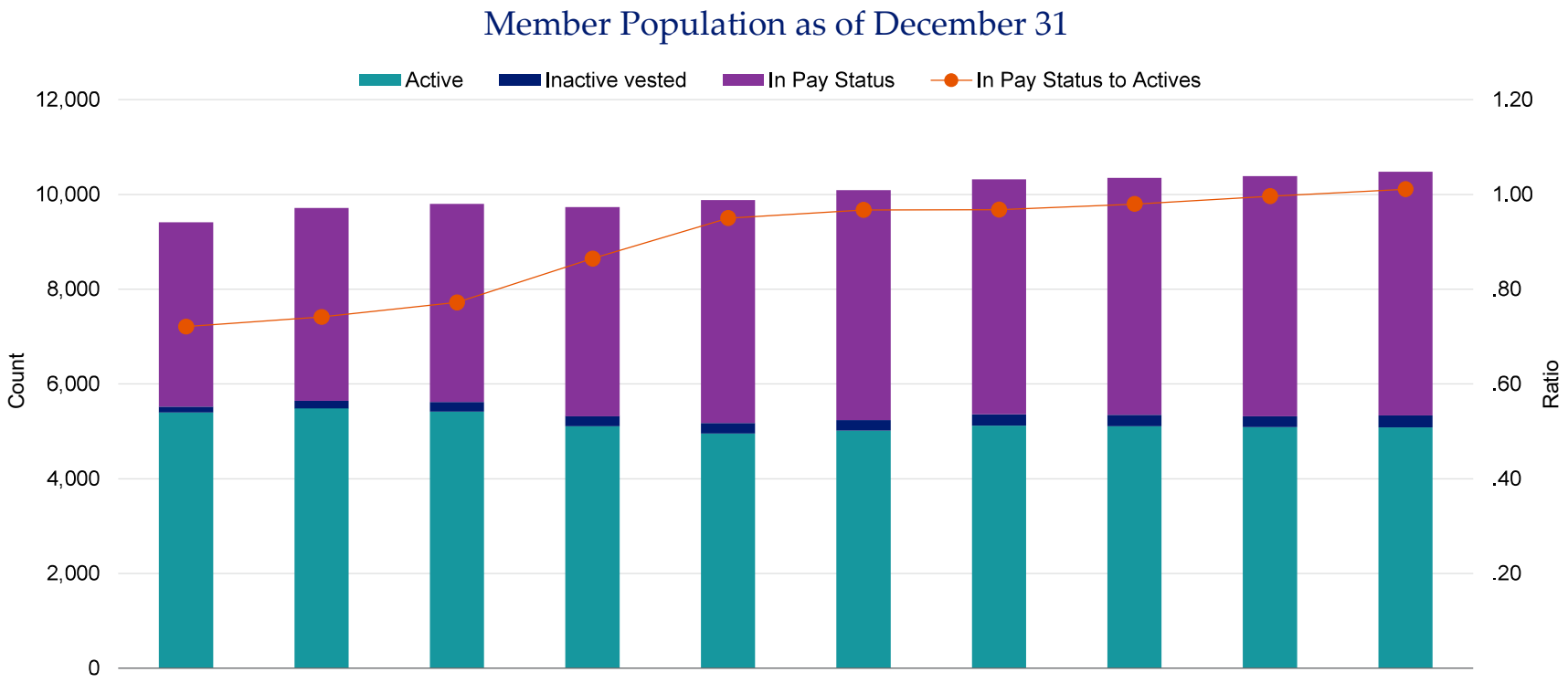
The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

The actuarial valuation is prepared at the request of the System. Segal is not responsible for the use or misuse of its report, particularly by any other party.
An actuarial valuation is a measurement at a specific date — it is not a prediction of a plan's future financial condition. Accordingly, Segal did not perform an analysis of the potential range of financial measurements, except where otherwise noted.
If the System is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan provisions, but they may be subject to alternative interpretations. The System should look to their other advisors for expertise in these areas.
While Segal maintains extensive quality assurance procedures, an actuarial valuation involves complex computer models and numerous inputs. In the event that an inaccuracy is discovered after presentation of Segal's valuation, Segal may revise that valuation or make an appropriate adjustment in the next valuation.
Segal's report shall be deemed to be final and accepted by the System upon delivery and review. Trustees should notify Segal immediately of any questions or concerns about the final content.

As Segal has no discretionary authority with respect to the management or assets of the Pension System, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Pension System.

Section 2: Actuarial Valuation Results

Member information



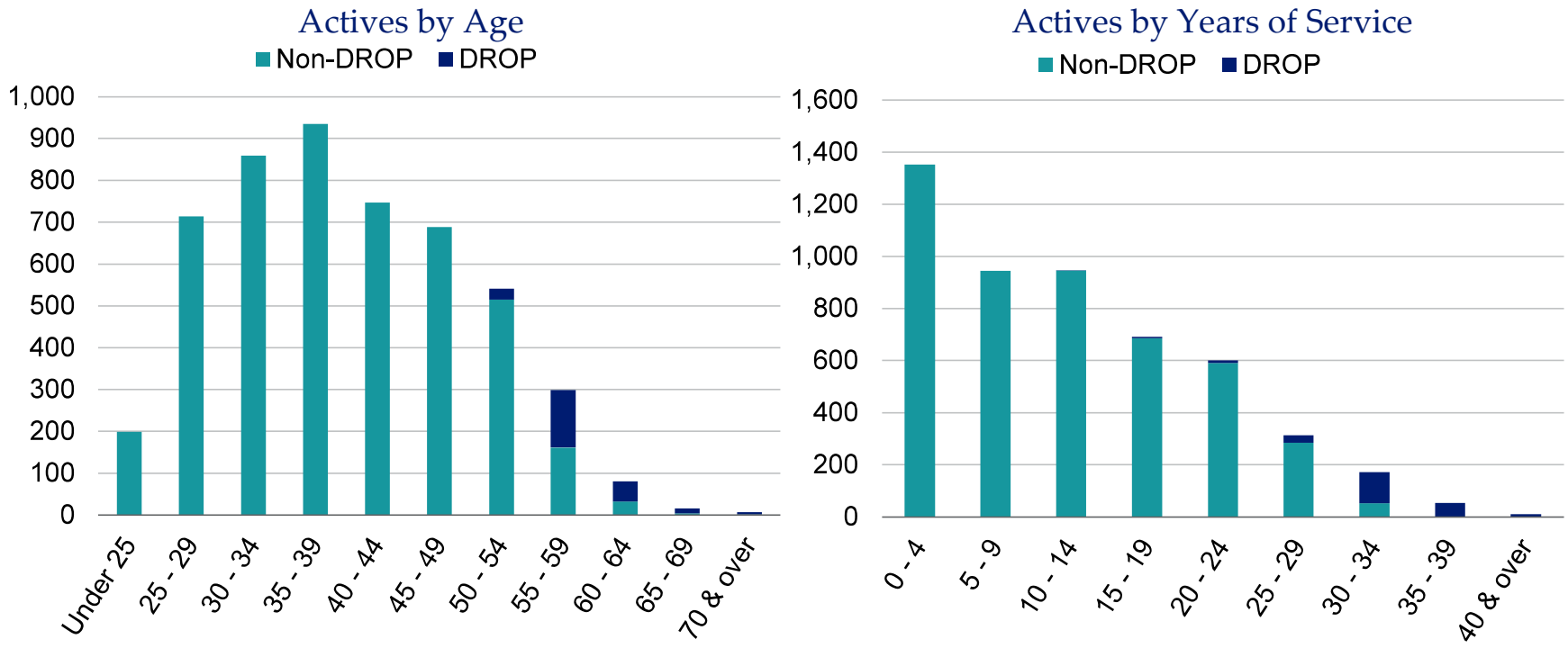
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
In Pay Status[1]	3,890	4,069	4,182	4,414	4,706	4,849	4,956	5,003	5,071	5,142
Inactive Vested[2]	122	157	200	215	226	230	242	241	233	252
Active	5,397	5,487	5,415	5,104	4,952	5,012	5,121	5,106	5,088	5,085
Ratio	0.72	0.74	0.77	0.86	0.95	0.97	0.97	0.98	1.00	1.06

[1] Counts for years ending 2015 through 2020 have been restated to remove beneficiaries who only have a DROP account.
[2] Excluding non-vested terminated participants due a refund of employee contributions

Active members

As of December 31,	2022	2021	Change
Firefighters			
Active participants	2,011	1,996	0.8%
Average age	40.1	40.1	0.0
Average years of service	12.4	12.4	0.0
Average computation pay	$92,065	$86,575	6.3%
Police Officers			
Active participants	3,074	3,092	-0.6%
Average age	40.1	40.1	0.0
Average years of service	12.8	12.8	0.0
Average computation pay	$90,331	$85,436	5.7%
Total			
Active participants	5,085	5,088	-0.1%
Average age	40.1	40.1	0.0
Average years of service	12.6	12.6	0.0
Average computation pay	$91,017	$85,883	6.0%

Distribution of Active Members as of December 31, 2022



The number of active participants in the DROP decreased from 276 at the end of 2021 to 230 at the end of 2022.

Inactive members

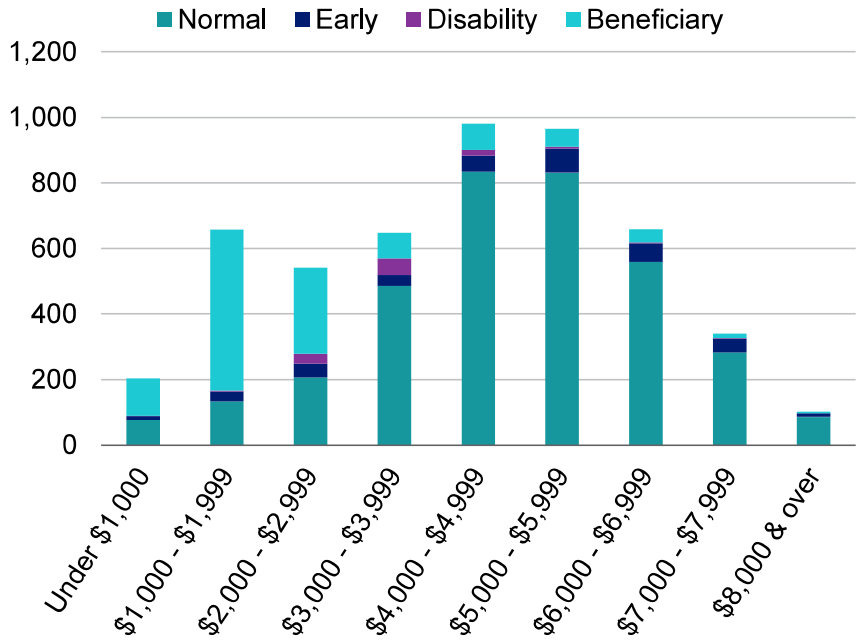
In this year's valuation, there were 252 inactive members with a vested right to a deferred or immediate vested benefit. In addition, there were 474 inactive non-vested members entitled only to a return of their employee contributions.

Retired members and beneficiaries

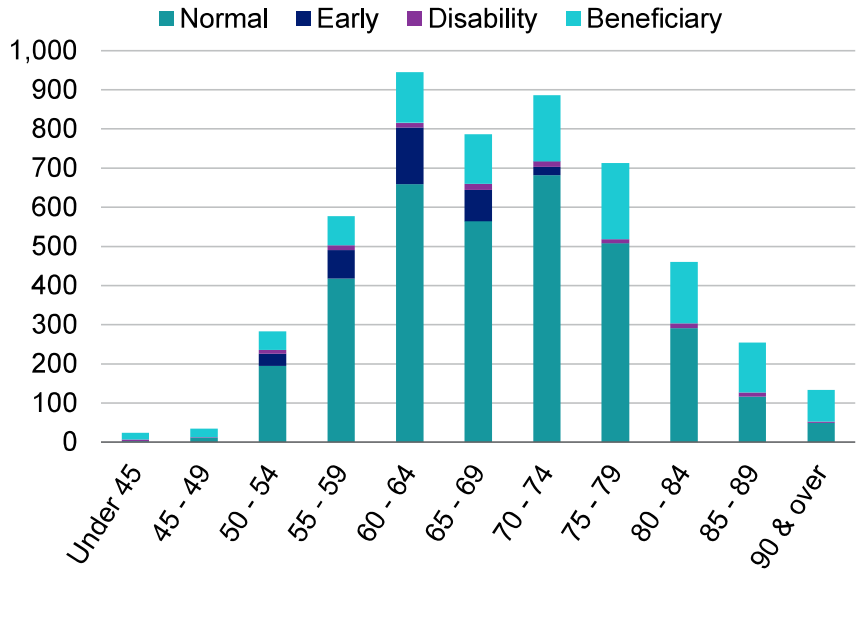
As of December 31,	2022	2021	Change
Retired participants	3,955	3,902	1.4%
Beneficiaries[1]	1,187	1,169	1.5%
Average age	69.2	69.0	-0.2
Average amount	$4,335	$4,311	0.6%
Total monthly amount	22,291,338	21,858,592	2.0%

Distribution of Retired Participants as of December 31, 2022

By Type and Monthly Amount



By Type and Age



[1] Does not include beneficiaries with annuitized DROP accounts only and no lifetime annuity (147 for 2022 and 125 for 2021)

Historical plan population

Member Data Statistics: 2013 – 2022

	Active Members			Retired Members and Beneficiaries[1]		
Year Ended December 31	Count	Average Age	Average Service	Count	Average Age[2]	Average Monthly Amount[3]
2013	5,397	41.3	14.4	3,890	--	$3,543
2014	5,487	41.2	14.2	4,069	68.8	3,699
2015	5,415	41.4	14.3	4,182	69.0	3,826
2016	5,104	41.4	13.0	4,414	68.7	4,102
2017	4,952	40.6	13.4	4,706	67.7	4,171
2018	5,012	40.1	12.8	4,849	68.4	4,217
2019	5,121	39.8	12.3	4,956	68.7	4,250
2020	5,106	40.0	12.6	5,003	68.9	4,273
2021	5,088	40.1	12.6	5,071	69.0	4,311
2022	5,085	40.1	12.6	5,142	69.2	4,335

[1] Does not include DROP only beneficiaries
[2] Information for December 31, 2013 is not available
[3] Average benefits for December 31, 2013 include terminated vested members; average benefits for December 31, 2014 and later include the benefit supplement

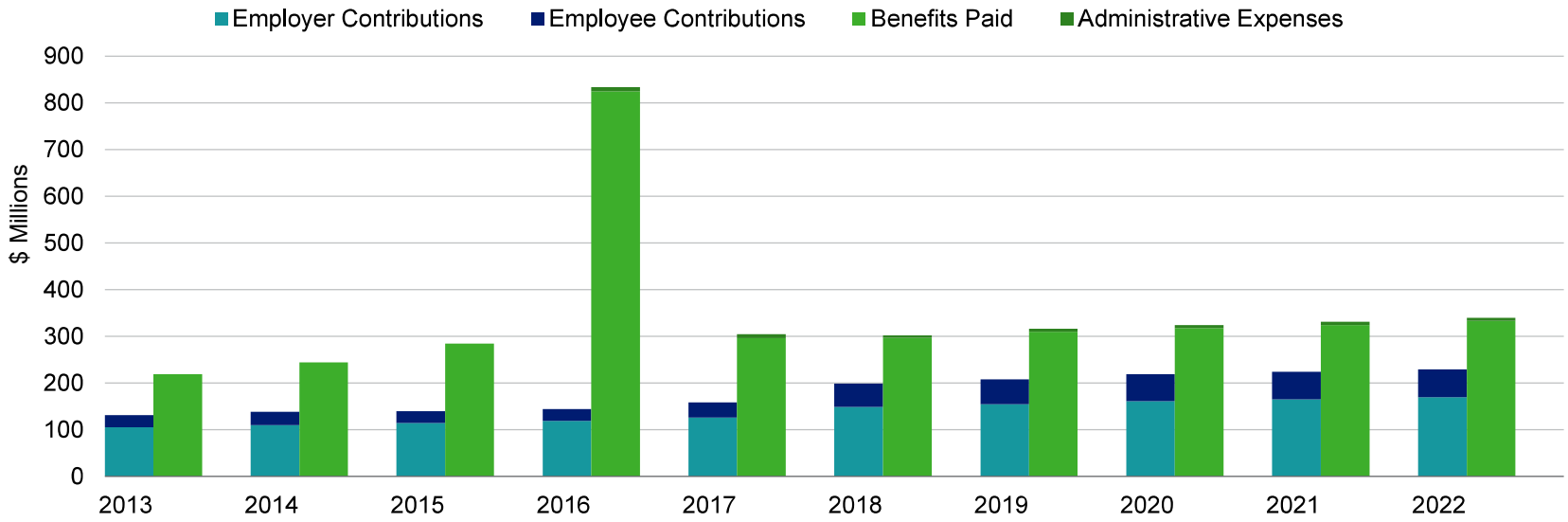
Financial information

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and investment earnings (less investment fees) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Benefit payments in 2016 totaled $825.1 million, of which $606.3 million were DROP lump-sum payments. This was a one-time event, as members reacted to pending changes in the plan provisions. DROP balances have since been annuitized, resulting in more stable projected benefit payment levels in the future.

Additional financial information, including a summary of transactions for the valuation year, is presented in *Section 3, Exhibits D, E and F*.

Comparison of Contributions Made with Benefits and Expenses Paid
for Years Ended December 31



Section 2: Actuarial Valuation Results

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

Determination of Actuarial Value of Assets for Year Ended December 31, 2022

1	Market value of assets, December 31, 2022				$1,806,567,341
2	Calculation of unrecognized return	**Original Amount[1]**	**Percent Deferred[2]**	**Unrecognized Amount[3]**	
	(a) Year ended December 31, 2022	-$377,563,609	80%	-$302,050,887	
	(b) Year ended December 31, 2021	198,197,350	60%	118,918,410	
	(c) Year ended December 31, 2020	-149,294,320	40%	-59,717,728	
	(d) Year ended December 31, 2019	-19,852,697	20%	-3,970,539	
	(e) Total unrecognized return				-$246,820,744
3	Preliminary actuarial value: **(1) - (2e)**				2,053,388,085
4	Adjustment to be within 20% corridor				0
5	Final actuarial value of assets as of December 31, 2022: **(3) + (4)**				$2,053,388,085
6	Actuarial value as a percentage of market value: **(5) ÷ (1)**				113.7%
7	Amount deferred for future recognition: **(1) - (5)**				-$246,820,744

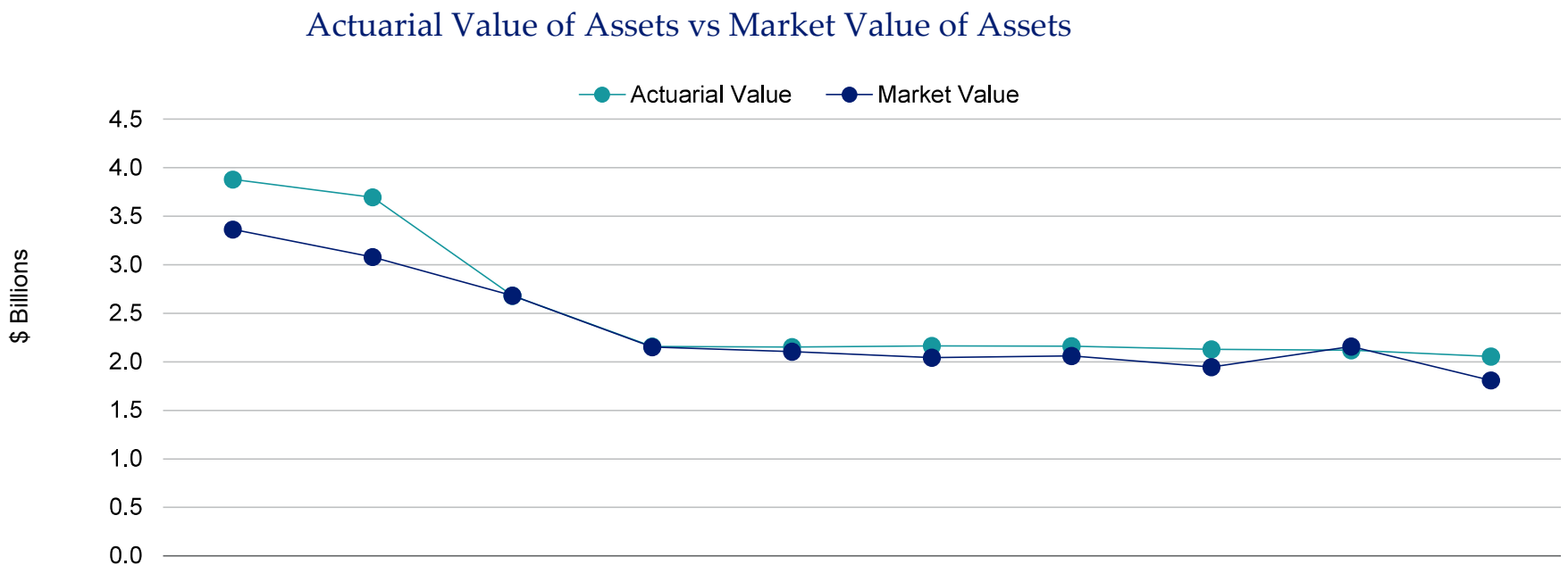
[1] Total return minus expected return on a market value basis
[2] Percent deferred applies to the current valuation year
[3] Recognition at 20% per year over five years

Deferred return as of December 31, 2022 recognized in each of the next four years:

(a) Amount recognized on December 31, 2023	-$69,702,654
(b) Amount recognized on December 31, 2024	-65,732,116
(c) Amount recognized on December 31, 2025	-35,873,252
(d) Amount recognized on December 31, 2026	-75,512,722

Asset history for years ended December 31

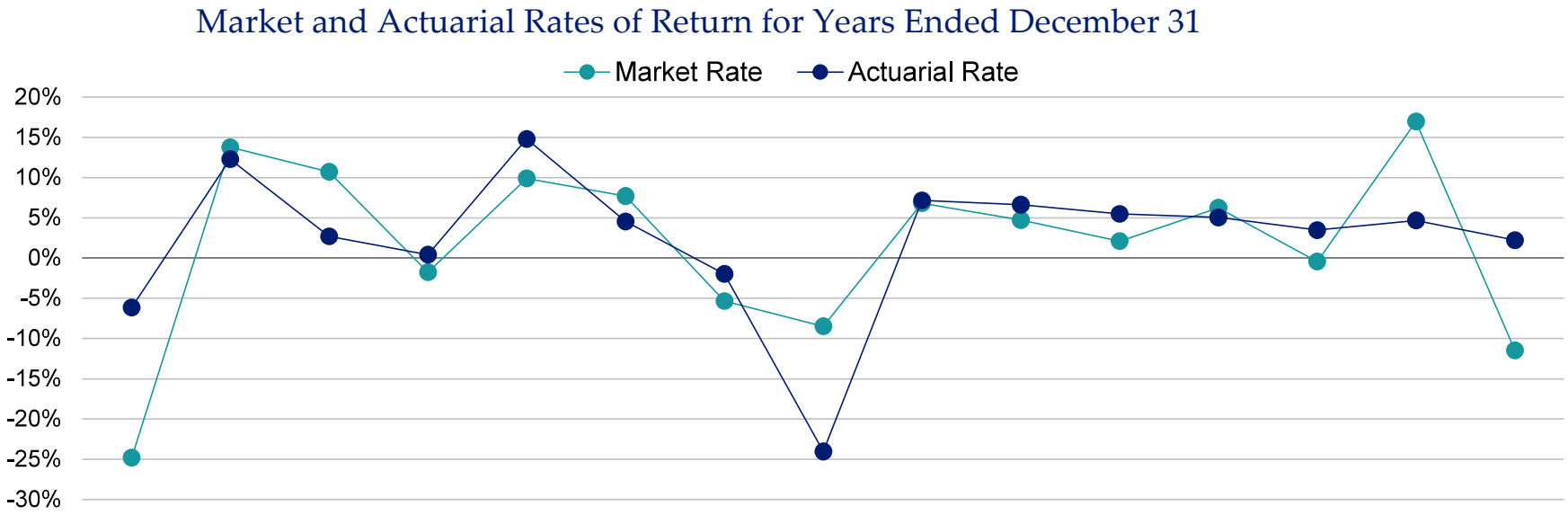
The decline in asset values from 2013 to 2015 was primarily the result of significant write-downs in the System's asset holdings. The decline from 2015 to 2016 reflects the unusually large number of DROP payments made in 2016.



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Actuarial value[1]	$3.88	$3.70	$2.68	$2.16	$2.15	$2.16	$2.16	$2.13	$2.12	$2.05
Market value[1]	3.36	3.08	2.68	2.15	2.10	2.04	2.06	1.94	2.16	1.81
Ratio	1.15	1.20	1.00	1.00	1.02	1.06	1.05	1.09	0.98	1.14

[1] In $ billions

Historical investment returns



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Market rate[1]	-24.80%	13.78%	10.72%	-1.78%	9.92%	7.70%	-5.35%	-8.47%	6.82%	4.74%	2.09%	6.25%	-0.45%	16.99%	-11.46%
Actuarial rate[2]	-6.14%	12.29%	2.69%	0.43%	14.79%	4.52%	-1.98%	-24.03%	7.16%	6.63%	5.48%	5.05%	3.46%	4.68%	2.22%
Assumed rate	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	7.25%	7.25%	7.25%	7.25%	7.25%	7.00%	6.50%	6.50%

Average Rates of Return	Actuarial Value	Market Value
Most recent five-year average return:	4.19%	2.37%
Most recent ten-year average return:	-2.24%	1.29%
15-year average return:	0.50%	0.92%

[1] Returns for 2014 and 2015 include significant write-downs in the System's assets
[2] Includes a change in asset method for plan years 2012 and 2015

Actuarial experience

Assumptions should consider experience and should be based on reasonable expectations for the future.

Each year actual experience is compared to that projected by the assumptions. Differences are reflected in the actuarial valuation.

Assumptions are not changed if experience is believed to be a short-term development that will not continue over the long term. On the other hand, if experience is expected to continue, assumptions are changed.

Actuarial Experience for Year Ended December 31, 2022

1	Loss from investments[1]	-$88,289,836
2	Gain from administrative expenses	658,410
3	Loss from contributions less than actuarial determined contricution	-61,664,659
4	Net gain from other experience	44,515,238
5	Net experience loss: **1 + 2 + 3 + 4**	-$104,780,847

[1] Details on next page

Investment experience

Actuarial planning is long term. The obligations of a pension plan are expected to continue for the lifetime of all its participants.

The assumed long-term rate of return of 6.50% considers past experience, the asset allocation policy of the Board and future expectations.

Investment Experience

		Year Ended December 31, 2022	
		Market Value	**Actuarial Value**
1	Net investment income	-$240,891,386	$45,791,357
2	Average value of assets	2,102,649,579	2,062,787,580
3	Rate of return: **1 ÷ 2**	-11.46%	2.22%
4	Assumed rate of return	6.50%	6.50%
5	Expected investment income: **2 x 4**	136,672,223	134,081,193
6	Investment loss: **1 - 5**	-$377,563,609	-$88,289,836

Contributions

Contributions for the year ended December 31, 2022 totaled $229,617,994, compared to the recommended contribution amount of $280,438,165. This resulted in a loss of $61,664,659, when adjusted for timing, or 1.2% of the actuarial accrued liability.

Non-investment experience

Administrative expenses

Administrative expenses for the year ended December 31, 2022 totaled $6,361,999, as compared to the assumption of $7,000,000. This resulted in an experience gain of $658,410 for the year, when adjusted for timing.

Other experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- Mortality experience (more or fewer than expected deaths)
- The extent of turnover among members
- Retirement experience (earlier or later than projected)
- The number of disability retirements (more or fewer than projected)
- Salary increases (greater or smaller than projected)

The net gain from this other experience for the year ended December 31, 2022 amounted to $44,515,238, which is 0.9% of the actuarial accrued liability.

Actuarial assumptions

- The assumption changes reflected in this report are:
  - The assumed retirement rate for DROP actives was lowered from 100% to 75% after ten years in DROP.
  - The salary scale assumption as updated based on the 2023 Meet and Confer agreement.
- These changes increased the actuarial accrued liability by 1.2% and increased the total normal cost by 11.4%.

- Details on actuarial assumptions and methods are in *Section 4, Exhibit I.*

Plan provisions

- There were no changes in plan provisions since the prior valuation.

Unfunded actuarial accrued liability

Development of Unfunded Actuarial Accrued Liability for Year Ended December 31, 2022

1	Unfunded actuarial accrued liability at beginning of year		$3,040,803,909
2	Total normal cost at beginning of year, including administrative expense assumption		81,440,023
3	Total contributions		-229,617,994
4	Interest on 1, 2 & 3		195,561,863
5	Expected unfunded actuarial accrued liability		$3,088,187,801
6	Changes due to:		
	(a) Net experience loss	$43,116,189	
	(b) Assumptions	64,322,738	
	Total changes		$107,438,927
7	Unfunded actuarial accrued liability at end of year		$3,195,626,728

Actuarially determined contribution

The actuarially determined contribution is equal to the City normal cost payment and a payment on the unfunded actuarial accrued liability. As of January 1, 2023, the actuarially determined contribution is $251,606,424, or 54.36% of computation pay. The funding policy used to calculate the actuarially determined contribution is based on a closed, 25-year amortization of the UAL as of January 1, 2020 and a closed, 20-year amortization of any changes in the UAL thereafter. Amortization is on a level-percentage-of-pay basis.

Under the provisions of HB 3158, the City contributes mandated biweekly amounts through 2024 (but no less than 34.50% of computation pay), plus $13 million per year. Beginning January 1, 2025, the City will contribute 34.50% of computation pay. The effective amortization period, based on the City's Hiring Plan payroll projections, is 82 years.

The contribution requirement as of January 1, 2023 is based on the data previously described, the actuarial assumptions and plan provisions described in *Section 4*, including all changes affecting future costs adopted at the time of the actuarial valuation, actuarial gains and losses, and changes in the actuarial assumptions.

Actuarially Determined Contribution for Year Beginning January 1

		2023		2022	
		Amount	% of Computation Pay	Amount	% of Computation Pay
1	Total normal cost	$83,659,661	18.08%	$74,657,001	17.09%
2	Administrative expenses	6,783,022	1.47%	6,783,022	1.55%
3	Expected member contributions	-62,480,730	-13.50%	-58,991,137	-13.50%
4	Employer normal cost: (1) + (2) + (3)	$27,961,953	6.04%	$22,448,886	5.14%
5	Actuarial accrued liability	$5,249,014,813		$5,158,782,340	
6	Actuarial value of assets	2,053,388,085		2,117,978,431	
7	Unfunded actuarial accrued liability: (5) - (6)	$3,195,626,728		$3,040,803,909	
8	Payment on unfunded actuarial accrued liability	$215,845,468	46.64%	$198,998,142	45.54%
9	Adjustment for timing[1]	7,799,003	1.69%	7,083,730	1.62%
10	Actuarially determined contribution: (4) + (8) + (9)	$251,606,424	54.36%	$228,530,758	52.30%
11	Total computation pay[2]	$462,820,226		$436,971,384	

[1] Actuarially determined contributions are assumed to be paid at the middle of every month.
[2] Total computation pay, or valuation pay, is the active members' actual payroll for the preceding year, increased by the salary scale applicable for each member to account for their anticipated salary increases in the upcoming year.

Reconciliation of actuarially determined contribution

Reconciliation of Actuarially Determined Contribution
from January 1, 2022 to January 1, 2023

		Amount
1	Actuarially determined contribution as of January 1, 2022	$228,530,758
2	Effect of expected change in amortization payment due to payroll growth	5,134,094
3	Effect of change in actuarial assumptions	10,809,324
4	Effect of contributions less than actuarially determined contribution	4,467,821
5	Effect of investment loss	6,396,908
6	Effect of other gains and losses on accrued liability	-3,272,989
7	Net effect of other changes, including composition and number of members	-459,491
8	Total change	$23,075,666
9	Actuarially determined contribution as of January 1, 2023	$251,606,424

History of employer contributions

History of Employer Contributions: 2016 – 2023

Year Ended December 31	Actuarially Determined Employer Contribution (ADC)		Actual Employer Contribution		Percent Contributed
	Amount	Percentage of Pay	Amount	Percentage of Pay	
2016	$261,859,079	71.70%	$119,423,106	32.70%	45.61%
2017	168,865,484	47.25%	126,318,005	35.34%	74.80%
2018	157,100,128	45.40%	149,356,565	43.16%	95.07%
2019	152,084,297	41.88%	155,721,087	42.88%	102.39%
2020	185,428,764	46.71%	161,950,183	40.80%	87.34%
2021	221,285,746	51.77%	165,541,265	38.73%	74.81%
2022	228,530,758	52.30%	169,911,420	38.88%	74.35%
2023	251,606,424	54.36%	TBD	N/A	N/A

Risk

The actuarial valuation results are dependent on a single set of assumptions; however, there is a risk that emerging results may differ significantly as actual experience proves to be different from the current assumptions.

We have not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the Plan's future financial condition but have included a brief discussion of some risks that may affect the Plan.

- **Economic and Other Related Risks**. Potential implications for the Plan due to the following economic effects (that were not reflected as of the valuation date) include:
  - Volatile financial markets and investment returns lower than assumed
  - High inflationary environment impacting salary increases
  - Lingering direct and indirect effects of the COVID-19 pandemic
- **Investment Risk** (the risk that returns will be different than expected)

  The System has experienced some of the challenges associated with investment risk and has had to write down the value of its assets significantly in recent years. Recognized market returns have been well below the long-term assumption as the System rebalances the investment portfolio and are expected to continue to be below average in the short-term.

  The market value rate of return over the last 15 years has ranged from a low of -24.80% to a high of 16.99%.
- **Longevity Risk** (the risk that mortality experience will be different than expected)

  The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the actuarially determined contribution.
- **Contribution Risk** (the risk that actual contributions will be different from actuarially determined contribution)

  Plan contributions are set by statute. Periodic projections are prepared by the actuary to determine if expected statutory contributions are sufficient to fund the system and to ensure the payment of promised benefits.

  Although State law establishes minimum City contributions through 2024, the contribution is scheduled to be a flat 34.50% of computation pay beginning in 2025. If the payroll growth matches the City's Hiring Plan projections, and if all other assumptions are met, the System is projected to be fully funded in 82 years. The City's plan reflects significant growth in payroll over 20 years, from $372 million in 2017 to $684 million in 2037. The annual average growth in the City's Hiring Plan is 3.09%, compared to the valuation assumption of 2.50%. If payroll growth is more modest, or if there is adverse experience in the System that leads to losses, the period required to achieve 100% funding could be significantly longer.

If the City's Hiring Plan projections are not met and instead the current valuation payroll of $462.8 million increases by the assumed payroll growth of 2.50% each year, and City and member contributions are based on this level of payroll beginning in 2025, the System is projected to be only 80% funded in 82 years, rather than 100%.

- **Demographic Risk** (the risk that participant experience will be different than assumed)

  Examples of this risk include:

  – Actual retirements occurring earlier or later than assumed. The value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply.

  – More or less active participant turnover than assumed.

- There are external factors including legislative or financial reporting changes that could impact the plan's funding and disclosure requirements. While we do not assume any changes in such external factors, it is important to understand that they could have significant consequences for the System.

- **Actual Experience over the last ten years**

  Past experience can help demonstrate the sensitivity of key results to the Plan's actual experience. Over the past ten years:

  – The annual market value investment experience has ranged from a loss of $473 million (including write-downs) to a gain of $198 million. If all investment returns were equal to the assumed rates of return over the last ten years, the market value of assets as of the current date would be approximately $4.0 billion as opposed to the actual value of $1.8 billion.

  – The funded percentage on the actuarial value of assets has ranged from a low of 39.1% to a high of 75.6%.

- **Maturity Measures**

  As pension plans mature, the cash needed to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities.

  Currently the Plan has a non-active to active participant ratio of 1.06. For the prior year, benefits and administrative expenses paid were $110.4 million more than contributions received. As the Plan matures, more cash will be needed from the investment portfolio to meet benefit payments.

- **Detailed Risk Assessment**

  A more detailed assessment of the risks would provide the Board with a better understanding of the risks inherent in the System. This assessment may include scenario testing, sensitivity testing, stress testing, and stochastic modeling.

A detailed risk assessment could be important for the Plan because:

- The Plan's asset allocation has potential for a significant amount of investment return volatility.
- Inactive and retired participants account for most of the Plan's liabilities, leaving limited options for reducing plan costs in the event of adverse experience.
- Potential changes in the covered population may result in participant choices that vary from those assumed.
- The Board has not had a detailed risk assessment in several years.

GFOA funded liability by type

The Actuarial Accrued Liability represents the present value of benefits earned, calculated using the Plan's actuarial cost method. The Actuarial Value of Assets reflects the financial resources available to liquidate the liability. The portion of the liability covered by assets reflects the extent to which accumulated plan assets are sufficient to pay future benefits, and is shown for liabilities associated with employee contributions, pensioner liabilities, and other liabilities. The Government Finance Officers Association (GFOA) recommends that the funding policy aim to achieve a funded ratio of 100 percent.

GFOA Funded Liability by Type as of December 31

	2022	2021
Actuarial accrued liability (AAL)		
Active member contributions	$410,982,253	$382,198,948
Retirees and beneficiaries	3,566,237,397	3,554,266,474
Inactive vested members	29,125,817	24,985,278
Active and inactive non-vested members (employer-financed)	1,242,669,346	1,197,331,640
Total	$5,249,014,813	$5,158,782,340
Actuarial value of assets	2,053,388,085	2,117,978,431
Cumulative portion of AAL covered		
Active member contributions	100.00%	100.00%
Retirees and beneficiaries	46.05%	48.84%
Active and inactive members (employer-financed)	0.00%	0.00%

Actuarial balance sheet

An overview of the Plan's funding is given by an Actuarial Balance Sheet. In this approach, first the amount and timing of all future payments that will be made by the Plan for current members is determined. Then these payments are discounted at the valuation interest rate to the date of the valuation, thereby determining the present value, referred to as the "liability" of the Plan.

Second, this liability is compared to the assets. The "assets" for this purpose include the net amount of assets already accumulated by the Plan, the present value of future member contributions, the present value of future employer normal cost contributions, and the present value of future employer amortization payments for the unfunded actuarial accrued liability.

Actuarial Balance Sheet

	Year Ended	
	December 31, 2022	**December 31, 2021**
Liabilities		
Present value of benefits for retired members and beneficiaries (non-DROP)	$2,720,594,387	$2,690,126,664
Present value of benefits for retired members and beneficiaries (DROP)	845,643,010	864,139,810
Present value of benefits for inactive members	31,383,904	26,971,728
Present value of benefits for active members	2,490,609,201	2,293,640,796
Total liabilities	$6,088,230,502	$5,874,878,998
Assets		
Total valuation value of assets	$2,053,388,085	$2,117,978,431
Present value of future contributions by members	636,975,115	573,986,447
Present value of future employer contributions for:		
Entry age cost	202,240,574	142,110,211
Unfunded actuarial accrued liability	3,195,626,728	3,040,803,909
Total of current and future assets	$6,088,230,502	$5,874,878,998

Section 3: Supplemental Information

Exhibit A: Table of plan demographics

Category	Year Ended December 31 2022	2021	Change From Prior Year
Active members in valuation:			
Number	5,085	5,088	-0.1%
Average age	40.1	40.1	0.0
Average years of service	12.6	12.6	0.0
Total computation pay	$462,820,226	$436,971,384	5.9%
Average computation pay	$91,017	85,883	6.0%
Account balances	$410,982,253	382,198,948	7.5%
Total active vested members	3,732	3,661	1.9%
Active members (excluding DROP):			
Number	4,855	4,812	0.9%
Average age	39.2	39.0	0.2
Average years of service	11.7	11.5	0.2
Total computation pay	$439,656,973	$410,752,408	7.0%
Average computation pay	90,558	85,360	6.1%
Active members (DROP only):			
Number	230	276	-16.7%
Average age	58.9	58.3	0.6
Average years of service	32.7	31.8	0.9
Total computation pay	$23,163,253	$26,218,976	-11.7%
Average computation pay	100,710	94,996	6.0%
DROP account balances	96,505,872	113,584,279	-15.0%
Inactive vested members:			
Number	252	233	8.2%
Average age	42.1	41.7	0.4
Average monthly benefit	$1,316	$1,219	8.0%
Inactive nonvested members due a refund:			
Number	474	462	2.6%
Accumulated contribution balance	$2,258,087	$1,986,450	13.7%

Section 3: Supplemental Information

Retired members:			
Number in pay status	3,845	3,786	1.6%
Average age	68.1	67.9	0.2
Average monthly benefit	$4,935	$4,919	0.3%
Disabled members:			
Number in pay status	110	116	-5.2%
Average age	68.8	69.1	-0.3
Average monthly benefit	$3,575	$3,619	-1.2%
Beneficiaries:			
Number in pay status	1,187	1,169	1.5%
Average age	72.9	72.9	0.0
Average monthly benefit	$2,462	$2,408	2.2%
Beneficiaries with DROP only:			
Number	147	125	17.6%

Exhibit B: Members in active service as of December 31, 2022 by age, years of service, and average pay[1]

Age	Total	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	199	198	1	- -	- -	- -	- -	- -	- -	- -
	$66,624	$66,566	$78,060	- -	- -	- -	- -	- -	- -	- -
25 - 29	714	569	145	- -	- -	- -	- -	- -	- -	- -
	$74,021	$71,825	$82,639	- -	- -	- -	- -	- -	- -	- -
30 - 34	859	394	376	89	- -	- -	- -	- -	- -	- -
	$81,568	$73,342	$86,590	$96,765	- -	- -	- -	- -	- -	- -
35 - 39	935	135	266	431	103	- -	- -	- -	- -	- -
	$92,640	$74,181	$87,453	$99,593	$101,134	- -	- -	- -	- -	- -
40 - 44	747	38	108	244	280	77	- -	- -	- -	- -
	$97,771	$73,669	$88,740	$98,300	$102,073	$105,007	- -	- -	- -	- -
45 - 49	688	15	31	123	180	288	51	- -	- -	- -
	$102,120	$73,035	$87,865	$97,783	$102,405	$105,831	$107,843	- -	- -	- -
50 - 54	541	2	12	41	90	170	185	41	- -	- -
	$103,067	$57,504	$91,113	$97,147	$100,587	$104,655	$105,758	$101,427	- -	- -
55 - 59	299	1	4	14	22	48	70	107	33	- -
	$101,474	$79,736	$98,771	$98,111	$99,383	$103,302	$102,678	$100,361	$103,679	- -
60 - 64	80	- -	1	4	13	17	6	21	17	1
	$103,281	- -	$99,503	$93,215	$98,796	$102,295	$103,280	$104,013	$108,289	$121,909
65 - 69	16	1	- -	1	2	1	1	3	3	4
	$98,058	$69,663	- -	$95,736	$93,998	$100,239	$111,031	$95,300	$95,865	$107,691
70 & over	7	- -	- -	- -	1	- -	- -	- -	- -	6
	$114,515	- -	- -	- -	$110,885	- -	- -	- -	- -	$115,120
Total	5,085	1,353	944	947	691	601	313	172	53	11
	$91,017	$71,780	$86,628	$98,600	$101,668	$105,081	$105,378	$100,973	$104,715	$113,036

[1] Compensation is annualized for those hired during the prior plan year

Police members in active service as of December 31, 2022 by age, years of service, and average pay[1]

Age	Total	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	123	123	- -	- -	- -	- -	- -	- -	- -	- -
	$65,898	$65,898	- -	- -	- -	- -	- -	- -	- -	- -
25 - 29	469	381	88	- -	- -	- -	- -	- -	- -	- -
	$73,774	$71,799	$82,323	- -	- -	- -	- -	- -	- -	- -
30 - 34	496	209	233	54	- -	- -	- -	- -	- -	- -
	$81,929	$72,968	$86,818	$95,520	- -	- -	- -	- -	- -	- -
35 - 39	532	67	139	252	74	- -	- -	- -	- -	- -
	$92,577	$72,433	$87,756	$98,297	$100,389	- -	- -	- -	- -	- -
40 - 44	457	27	52	131	194	53	- -	- -	- -	- -
	$97,446	$73,602	$88,328	$97,398	$101,860	$102,502	- -	- -	- -	- -
45 - 49	404	10	24	67	102	168	33	- -	- -	- -
	$100,410	$74,322	$85,824	$98,373	$100,982	$103,128	$107,455	- -	- -	- -
50 - 54	344	2	9	39	61	89	112	32	- -	- -
	$101,394	$57,504	$91,707	$97,122	$102,180	$101,183	$105,074	$98,280	- -	- -
55 - 59	186	- -	1	14	15	28	38	77	13	- -
	$100,181	- -	$100,885	$98,111	$100,475	$103,483	$102,119	$97,525	$104,975	- -
60 - 64	50	- -	- -	4	6	14	4	14	8	- -
	$101,941	- -	- -	$93,215	$99,715	$100,108	$106,635	$103,425	$106,238	- -
65 - 69	9	- -	- -	1	1	1	1	2	1	2
	$104,715	- -	- -	$95,736	$93,501	$100,239	$111,031	$100,912	$102,385	$118,858
70 & over	4	- -	- -	- -	- -	- -	- -	- -	- -	4
	$108,151	- -	- -	- -	- -	- -	- -	- -	- -	$108,151
Total	3,074	819	546	562	453	353	188	125	22	6
	$90,331	$71,318	$86,539	$97,703	$101,372	$102,444	$104,960	$98,433	$105,316	$111,720

[1] Compensation is annualized for those hired during the prior plan year

Fire members in active service as of December 31, 2022 by age, years of service, and average pay[1]

Age	Total	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	76	75	1	- -	- -	- -	- -	- -	- -	- -
	$67,798	$67,661	$78,060	- -	- -	- -	- -	- -	- -	- -
25 - 29	245	188	57	- -	- -	- -	- -	- -	- -	- -
	$74,494	$71,877	$83,128	- -	- -	- -	- -	- -	- -	- -
30 - 34	363	185	143	35	- -	- -	- -	- -	- -	- -
	$81,074	$73,764	$86,219	$98,687	- -	- -	- -	- -	- -	- -
35 - 39	403	68	127	179	29	- -	- -	- -	- -	- -
	$92,723	$75,903	$87,120	$101,417	$103,035	- -	- -	- -	- -	- -
40 - 44	290	11	56	113	86	24	- -	- -	- -	- -
	$98,282	$73,832	$89,123	$99,345	$102,555	$110,540	- -	- -	- -	- -
45 - 49	284	5	7	56	78	120	18	- -	- -	- -
	$104,553	$70,461	$94,865	$97,077	$104,266	$109,614	$108,555	- -	- -	- -
50 - 54	197	- -	3	2	29	81	73	9	- -	- -
	$105,988	- -	$89,329	$97,625	$97,235	$108,470	$106,808	$112,614	- -	- -
55 - 59	113	1	3	- -	7	20	32	30	20	- -
	$103,602	$79,736	$98,067	- -	$97,043	$103,049	$103,342	$107,640	$102,836	- -
60 - 64	30	- -	1	- -	7	3	2	7	9	1
	$105,514	- -	$99,503	- -	$98,008	$112,497	$96,569	$105,189	$110,112	$121,909
65 - 69	7	1	- -	- -	1	- -	- -	1	2	2
	$89,499	$69,663	- -	- -	$94,494	- -	- -	$84,075	$92,605	$96,524
70 & over	3	- -	- -	- -	1	- -	- -	- -	- -	2
	$123,000	- -	- -	- -	$110,885	- -	- -	- -	- -	$129,058
Total	2,011	534	398	385	238	248	125	47	31	5
	$92,065	$72,489	$86,750	$99,910	$102,231	$108,836	$106,008	$107,726	$104,288	$114,615

[1] Compensation is annualized for those hired during the prior plan year

Exhibit C: Reconciliation of member data

	Active Members	Inactive Vested Members[1]	Disableds	Retired Members	Beneficiaries[2]	Total
Number as of January 1, 2022	**5,088**	**233**	**116**	**3,786**	**1,169**	**10,392**
New members	307	N/A	N/A	N/A	N/A	307
Terminations – with vested rights	-40	40	0	0	0	0
Terminations – without vested rights	-36	N/A	N/A	N/A	N/A	-36
Retirements	-142	-11	N/A	153	N/A	0
New disabilities	-3	0	3	N/A	N/A	0
Died with beneficiary	0	0	0	0	84	84
Died without beneficiary	-4	0	-9	-96	-62	-171
Lump sum cash-outs	-107	-9	0	0	0	-116
Rehire	22	-1	N/A	0	N/A	21
Certain period expired	N/A	N/A	0	0	-4	-4
Data adjustments	0	0	0	2	0	2
Number as of January 1, 2023	**5,085**	**252**	**110**	**3,845**	**1,187**	**10,479**

[1] Excludes non-vested terminated members due a refund of contributions
[2] Excludes beneficiaries with DROP only

Exhibit D: Summary statement of income and expenses on a market value basis

	Year Ended December 31, 2022		Year Ended December 31, 2021	
Net assets at market value at the beginning of the year		$2,157,840,430		$1,943,700,593
Contribution and other income:				
City contributions	$169,911,420		$165,541,265	
Member contributions	59,706,574		58,559,980	
Total contribution income		*$229,617,994*		*$224,101,245*
Investment income:				
Investment income	$23,529,597		$28,758,381	
Recognition of capital appreciation/(depreciation)	-255,777,638		303,367,916	
Less investment fees	-8,643,345		-11,063,408	
Net investment income		*-$240,891,386*		*$321,062,889*
Total income available for benefits		**-$11,273,392**		**$545,164,134**
Less benefit payments and administrative expenses:				
Benefit payments	-$329,187,721		-$321,348,320	
Refunds	-4,449,977		-3,285,148	
Administrative expenses	-6,361,999		-6,390,829	
Net benefit payments and administrative expenses		*-$339,999,697*		*-$331,024,297*
Change in market value of assets		**-$351,273,089**		**$214,139,837**
Net assets at market value at the end of the year		**$1,806,567,341**		**$2,157,840,430**

Exhibit E: Summary statement of plan assets

	December 31, 2022		December 31, 2021	
Cash equivalents and prepaid expenses		$74,996,415		$59,924,644
Capital assets		11,499,772.00		11,745,139
Total accounts receivable		11,897,407		9,925,407
Investments:				
Equity securities	$819,431,503		$960,008,108	
Real assets	344,739,510		405,937,634	
Fixed income securities	318,424,211		416,490,402	
Private equity	217,177,506		287,199,831	
Other	14,753,672		12,828,802	
Total investments at market value		$1,714,526,402		$2,082,464,777
Total assets		1,812,919,996		2,164,059,967
Total accounts payable		-6,352,655		-6,219,537
Net assets at market value		**$1,806,567,341**		**$2,157,840,430**
Net assets at actuarial value		**$2,053,388,085**		**$2,117,978,431**

Exhibit F: Development of the fund through December 31, 2022

Year Ended December 31	City Contributions	Employee Contributions	Net Investment Return[1]	Admin. Expenses[2]	Benefit Payments	Market Value of Assets at Year-End	Actuarial Value of Assets at Year-End	Actuarial Value as a Percent of Market Value
2013	$105,711,435	$26,044,579	$243,514,011	$0	$218,884,493	$3,362,750,503	$3,877,321,261	115.3%
2014	109,791,512	28,969,429	-176,940,296	0	245,176,251	3,079,394,897	3,695,273,876	120.0%
2015	114,885,723	25,676,327	-254,829,470	0	285,003,174	2,680,124,303	2,680,124,303	100.0%
2016	119,423,106	25,518,317	159,355,111	9,492,445	825,092,132	2,149,836,260	2,157,799,730	100.4%
2017	126,318,005	32,977,425	98,457,176	8,089,584	296,153,811	2,103,345,471	2,151,039,343	102.3%
2018	149,356,565	49,332,262	42,822,297	5,861,410	297,081,055	2,041,914,130	2,161,899,662	105.9%
2019	155,721,087	52,268,293	124,259,607	6,445,251	309,860,549	2,057,857,317	2,160,125,611	105.0%
2020	161,950,183	57,305,399	-8,927,336	6,534,350	317,950,620	1,943,700,593	2,127,834,406	109.5%
2021	165,541,265	58,559,980	321,062,889	6,390,829	324,633,468	2,157,840,430	2,117,978,431	98.2%
2022	169,911,420	59,706,574	-240,891,386	6,361,999	333,637,698	1,806,567,341	2,053,388,085	113.7%

[1] On a market basis, net of investment fees
[2] Administrative expenses were subtracted from net investment return prior to the 2016 valuation

Exhibit G: Table of amortization bases

Type	Date Established	Initial Period	Initial Amount	Annual Payment[1]	Years Remaining	Outstanding Balance
2020 unfunded liability	01/01/2020	25	$2,563,846,869	$168,616,287	22	$2,555,558,543
Experience loss	01/01/2021	20	163,324,136	12,047,105	18	159,723,369
Change in assumptions	01/01/2021	20	256,721,167	18,936,251	18	251,061,299
Experience loss	01/01/2022	20	65,011,468	4,678,412	19	64,376,230
Change in assumptions	01/01/2022	20	-4,237,706	-304,957	19	-4,196,298
Experience loss	01/01/2023	20	104,780,847	7,356,420	20	104,780,847
Change in assumptions	01/01/2023	20	64,322,738	4,515,950	20	64,322,738
Total				**$215,845,468**		**$3,195,626,728**

[1] Level percentage of payroll

Section 4: Actuarial Valuation Basis

Exhibit I: Actuarial assumptions, methods and models

Rationale for assumptions

The information and analysis used by the Board in selecting each assumption that has a significant effect on this actuarial valuation is shown in the Experience Study Report for the five-year period ended December 31, 2019, with subsequent changes related to updated capital market assumptions, retirement rates, and the salary scale.

Net investment return

6.50%.

The net investment return assumption was chosen by the System's Board of Trustees, with input from the actuary. This assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes, as well as the System's target asset allocation.

Salary increases

	Rate (%)		
Year	Officers	Corporals, Drivers & Senior Officers	Sergeants, Lieutenants, Captains, Majors, Deputy Chiefs, Assistant Chiefs & Chiefs
2023	7.25%	6.75%	6.25%
2024+	3.00%	3.00%	2.50%

The salary scale assumption is based on the City's pay plan, along with analysis completed in conjunction with an Experience Study Report for the five-year period ended December 31, 2019 and the 2019 and 2023 Meet and Confer Agreements.

Payroll growth

2.50%, used to amortize the unfunded actuarial accrued liability as a level percentage of payroll.

Cost-of-living adjustments

Prior to October 1, 2073: 0.00%

Beginning October 1, 2073: 1.50%, on original benefit

The assumption for the year the COLA begins is updated periodically and set equal to the year the System is projected to be 70% funded on a market value basis after the COLA is reflected.

The COLA assumption will automatically be updated as needed to remain five percentage points less than the net investment return assumption.

Section 4: Actuarial Valuation Basis

Funding projections

Payroll growth: For purposes of projecting the System's funded status to project when the System will reach 70% funded on a market value basis (and therefore meet COLA requirements), City contributions beginning January 1, 2025 are assumed to be 34.50% of the City's Hiring Plan projections. Beginning in 2038, after the end of the City's Hiring Plan projection, payroll is assumed to increase by 2.50%.

City's Hiring Plan Payroll Projection (in millions)

Year	Payroll	Year	Payroll
2017	$372	2028	$525
2018	364	2029	545
2019	383	2030	565
2020	396	2031	581
2021	408	2032	597
2022	422	2033	614
2023	438	2034	631
2024	454	2035	648
2025	471	2036	666
2026	488	2037	684
2027	507		

Administrative expenses

$7,000,000 per year, payable monthly (equivalent to $6,783,022 at the beginning of the year), or 1% of computation pay, if greater

Mortality rates

Healthy pre-retirement: Pub-2010 Public Safety Employee Amount-Weighted Mortality Table, set forward five years for males, projected generationally using Scale MP-2019

Healthy annuitants and dependent spouses: Pub-2010 Public Safety Retiree Amount-Weighted Mortality Table, set back one year for females, projected generationally using Scale MP-2019

Healthy contingent beneficiaries: Pub-2010 Public Safety Contingent Survivor Amount-Weighted Mortality Table, set back one year for females, projected generationally using Scale MP-2019

Disabled annuitants: Pub-2010 Public Safety Disabled Retiree Amount-Weighted Mortality Table, set forward four years for males and females, projected generationally using Scale MP-2019

The tables above, with adjustments as shown and projected to the measurement date, reasonably reflect the mortality experience of the System as of the measurement date. The mortality tables are then generationally projected using Scale MP-2019 to anticipate future mortality improvement.

Section 4: Actuarial Valuation Basis

Annuitant mortality rates

	Rate (%)[1]			
	Healthy		Disabled	
Age	Male	Female	Male	Female
55	0.306	0.231	0.670	0.643
60	0.508	0.399	1.078	0.976
65	0.881	0.690	1.732	1.481
70	1.568	1.191	2.893	2.248
75	2.826	2.057	5.057	3.552
80	5.103	3.552	8.308	6.134
85	9.135	6.134	14.238	10.592
90	15.860	10.592	22.306	17.403

[1] Mortality rates shown for base table.

Mortality and disability rates before retirement

	Rate (%)			
	Mortality[1]		Disabled[2]	
Age	Male	Female	Male	Female
20	0.037	0.016	0.010	0.010
25	0.041	0.020	0.015	0.015
30	0.047	0.027	0.020	0.020
35	0.059	0.036	0.025	0.025
40	0.082	0.049	0.030	0.030
45	0.120	0.067	0.035	0.035
50	0.175	0.091	0.040	0.040
55	0.264	0.123	--	--
60	0.410	0.168	--	--

[1] Mortality rates shown for base table

[2] 100% of disabilities are assumed to be service-related

Section 4: Actuarial Valuation Basis

Withdrawal rates before retirement

Years of Service	Rate (%)	
	Police	Fire
0	20.0	10.0
1	5.5	5.5
2	5.5	5.5
3	5.5	5.5
4	5.5	5.5
5	5.5	5.5
6	3.5	5.5
7	3.5	1.0
8	3.5	1.0
9	3.5	1.0
10	3.5	1.0
11-14	2.0	1.0
15-24	1.0	1.0
25 & over	0.0	0.0

Retirement rates

DROP active members:

Age	Rate (%) Police	Fire
Under 50	1.00	0.75
50	10.00	0.75
51	15.00	0.75
52-53	15.00	10.00
54	25.00	10.00
55-57	25.00	15.00
58-62	30.00	40.00
63	40.00	50.00
64	50.00	50.00
65 & over	100.00	100.00

75% retirement rate after ten years in DROP.

Non-DROP active members:

Age	Rate (%) Member hired prior to March 1, 2011 with at least 20 years of service as of September 1, 2017	Member hired prior to March 1, 2011 with less than 20 years of service as of September 1, 2017 & Members hired on or after March 1, 2011
Under 50	1.0	1.0
50-51	8.0	2.0
52	10.0	2.0
53	15.0	2.0
54	20.0	2.0
55	35.0	2.0
56-57	40.0	2.0
58-60	75.0	25.0
61	75.0	50.0
62	100.0	100.0

100% retirement rate once benefit multiplier hits 90% maximum.

Section 4: Actuarial Valuation Basis

Weighted average retirement age	Age 58, determined as follows: The weighted average retirement age for each participant is calculated as the sum of the product of each potential current or future retirement age times the probability of surviving from current age to that age and then retiring at that age, assuming no other decrements. The overall weighted retirement age is the average of the individual retirement ages based on all the active members included in the January 1, 2023 actuarial valuation.
Retirement rates for inactive vested participants	Terminated vested members who terminated prior to September 1, 2017 are assumed to retire at age 50 Terminated vested members who terminated on or after September 1, 2017 are assumed to retire at age 58 75% of members who terminated prior to age 40 are assumed to take a lump sum cash out at age 40
DROP utilization	No members are assumed to elect to enter DROP
Interest on DROP accounts	2.75% on account balances as of September 1, 2017, payable upon retirement 0.00% on account balances accrued after September 1, 2017
DROP payment period	Based on expected lifetime as of the later of September 1, 2017 or retirement date. Expected lifetime determined based on an 85% male/15% female blend of the current healthy annuitant mortality tables.
DROP annuitization interest	2.75%. Based on United States Department of Commerce Daily Treasury Yield Curve Rates for durations between 5 and 30 years.
Actuarial equivalence	Actuarial equivalence for optional forms of benefit payments are based on an 85% male/15% female blend of the current healthy annuitant mortality tables, along with an interest rate of 6.50%
Unknown data for members	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Family composition	75% of members are assumed to be married. Females are assumed to be three years younger than males. The youngest child is assumed to be ten years old.
Benefit election	Married participants are assumed to receive the Joint and Survivor annuity form of payment and non-married participants are assumed to receive a Life Only annuity.
Actuarial value of assets	Market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the actual market return and the expected return on the market value, and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
Actuarial cost method	Entry Age Actuarial Cost Method. Entry Age is the age at the time the member commenced employment. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis, with Normal Cost determined using the plan of benefits applicable to each participant. Actuarial Liability is allocated by salary.
Amortization methodology	The unfunded actuarial accrued liability as of January 1, 2020 is amortized on a closed, 25-year period. Beginning January 1, 2021, each year's gains and losses are amortized over a closed, 20-year period. Amortization is on a level-percentage-of-pay basis.

Section 4: Actuarial Valuation Basis

Models

Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Deterministic cost projections are based on a proprietary forecasting model. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuary.

The blended discount rate used for calculating total pension liability for GASB is based on a model developed by our Actuarial Technology and Systems unit, comprised of both actuaries and programmers. The model allows the client team, under the supervision of the responsible actuary, control over the entry of future expected contribution income, benefit payments and administrative expenses. The projection of fiduciary net position and the discounting of benefits is part of the model.

Justification for change in actuarial assumptions

Based on past experience and future expectations, the following actuarial assumptions were changed:

- The assumed retirement rate for DROP active members after ten years in DROP was lowered from 100% to 75%.
- The salary scale assumption was updated based on the 2023 Meet and Confer Agreement. Previously, the rates were as follows:

	Rate (%)		
Year	Officers	Corporals, Drivers, Senior Officers & Chiefs	Sergeants, Lieutenants, Captains, Majors, Deputy Chiefs & Assistant Chiefs
2020 – 2022	3.25	3.00	2.50
2023+	2.50	2.50	2.50

Exhibit II: Summary of plan provisions

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan year	January 1 through December 31
Plan status	Ongoing

Members whose participation began before March 1, 2011

Normal retirement	*Benefit earned prior to September 1, 2017:* Age Requirement: 50 Service Requirement: 5 Amount: Greater of 3.0% of Average Computation Pay times years of Pension Service (maximum 96.0%) and $2,200 per month. The $2,200 per month minimum benefit is prorated if the Member retires with less than 20 years of service. Average Computation Pay: 36 consecutive months that reflect the highest civil service rank held by a member, plus Educational Incentive Pay, Longevity Pay and City Service Incentive Pay *Benefit earned beginning September 1, 2017:* Age Requirement: 58 Service Requirement: 5 Amount: Greater of 2.5% of Average Computation Pay times years of Pension Service (maximum 90.0%) and $2,200 per month. The $2,200 per month minimum benefit is prorated if the Member retires with less than 20 years of service. Average Computation Pay: 60 consecutive months that reflect the highest civil service rank held by a member, plus Educational Incentive Pay, Longevity Pay and City Service Incentive Pay

20 and out reduced retirement

If eligible as of September 1, 2017:

Age Requirement: None

Service Requirement: 20 years

Amount: 20 & Out Multiplier times 36-month (Table 1 Benefit) or 60-month (Table 2 Benefit) Average Computation Pay times years of Pension Service

Benefit Accrued Before September 1, 2017

20 & Out Table 1

Age	20 & Multiplier
45 & under	2.00%
46	2.25%
47	2.50%
48	2.75%
49	2.75%
50 & above	3.00%

Benefit Accrued Beginning September 1, 2017

20 & Out Table 2

Age	20 & Multiplier
53 & under	2.00%
54	2.10%
55	2.20%
56	2.30%
57	2.40%
58 & above	2.50%

If not eligible as of September 1, 2017:

Age Requirement: None

Service Requirement: 20 years

Amount: 20 & Out Multiplier times 60-month Average Computation Pay times years of Pension Service

20 & Out Table 2

Age	20 & Multiplier
53 & under	2.00%
54	2.10%
55	2.20%
56	2.30%
57	2.40%
58 & above	2.50%

Section 4: Actuarial Valuation Basis

Early retirement	*If at least age 45 as of September 1, 2017 and less than age 50:* Age Requirement: 45 Service Requirement: 5 Amount: Normal pension accrued prior to September 1, 2017 plus the benefit accrued based on the 20 & Out Table 2 for service beginning September 1, 2017, reduced by 2/3 of 1% for each whole month by which the benefit commencement date precedes age 50.
Non-service-connected disability	Eligibility: Injury or illness (lasting more than 90 days) not related to or incurred while in the performance of the member's job, preventing the member from performing their departmental duties. Amount: 3% of Average Computation Pay for service earned prior to September 1, 2017 and the applicable benefit multiplier from 20 & Out Table 2 times Average Computation Pay for service earned beginning September 1, 2017
Service-connected disability	Eligibility: Injury or illness (lasting more than 90 days) obtained while on duty in the performance of the member's job. Amount: 3% of Average Computation Pay for service earned prior to September 1, 2017 and the applicable benefit multiplier from 20 & Out Table 2 times Average Computation Pay for service earned beginning September 1, 2017; if the member has less than 20 years of service, the benefit will be calculated as if they had 20 years at the time of disability.
Benefit supplement	Age Requirement: 55 Service Requirement: 20 years, waived if member is receiving a service-connected disability Amount: 3% of the total monthly benefit (including any applicable COLA's) payable to the Member when the Member attains age 55. The benefit supplement shall not be less than $75 per month. Beginning September 1, 2017, only those annuitants and their survivors already receiving the supplement will be eligible to maintain their current supplement, which will not change ongoing; no additional retirees will be eligible for the supplement.
Termination benefit	*With less than five years of pension service:* Upon request, the member's contributions will be returned without interest *With at least five years of pension service:* The member may either withdraw contributions or leave contributions in the Plan and receive a monthly benefit to commence no earlier than the member's earliest eligibility for retirement benefits. Retirement benefit is equal to the accrued benefit as of the date of termination.
Pre-retirement death benefit	*While in active service:* The greater of 50% of the Member's accrued benefit or a benefit based on 20 years of service. The benefit may not exceed 45% of Average Computation Pay. *After leaving active service, with fewer than five years:* A lump sum benefit equal to the return of member contributions without interest *After leaving active service, with at least five years:* 50% of the Member's accrued benefit, with no early retirement reduction, or a refund of member contributions

Post-retirement death benefit	50% or 100% of the pension the Member was receiving at the time of their death, depending on the form of joint and survivor annuity chosen; if there are no qualifying survivors, no further benefits will be paid
Qualified surviving children benefit	50% of the pension the Member was receiving at the time of their death, divided equally among the children, paid until the youngest child is 19 years old or for life if the child becomes disabled prior to age 23
Minimum survivor benefit	$1,100 per month, not to exceed the actual amount the Member was receiving upon their death. If there are no Qualified Surviving Children, the minimum benefit to a spouse who is a Qualified Survivor shall be $1,200 per month. If the Member had less than 20 years of Pension Service, the minimum benefit will be prorated based on actual years of Pension Service.
Special survivor benefit	Eligibility: Upon leaving active service or joining DROP: a) the Member was at least 55 years old with at least 20 years of pension service, or b) the sum of the Member's age plus Pension Service was at least 78; **and** Has no Qualified Surviving Children or disabled children currently eligible for survivor benefits; **and** Whose Qualified Surviving Spouse is at least 55 years old. The Qualified Surviving Spouse does not have to be 55 years old at the time of the Member's death. Amount: Once all the eligibility conditions are met, the amount the Qualified Surviving Spouse will receive increases from 50% of the Member's pension benefit to a percentage of the Member's pension benefit based on the Member's applicable benefit multiplier times the number of years of Pension Service the Member worked.
Survivor benefit if no qualified surviving spouse	A lump sum that is the actuarial equivalent of 120 monthly payments of the greater of: 50% of the Member's pension benefit at the time of their death, or a benefit based on 20 years of the Member's service.
DROP	Eligibility: Members in active service who are retirement eligible may elect to enter the Deferred Retirement Option Plan (DROP). Distribution: The DROP account balance will be paid over the expected future lifetime of annuitants. Interest: Based on United States Department of Commerce Daily Treasury Yield Curve Rates for durations between 5 and 30 years; interest rate is based on the expected lifetime of the members at the time they retire. Interest is only paid on DROP account balances as of September 1, 2017.

Members whose Participation Began on or After March 1, 2011

Normal retirement	Age Requirement: 58 Service Requirement: 5 Amount: 2.5% of Average Computation Pay for each year of Pension Service, maximum 90% The minimum monthly benefit is $110 times the number of years of Pension Service at retirement, but not greater than $2,200. Average Computation Pay: Average Computation Pay uses the 60 consecutive months that reflects the highest civil service rank held by a member plus Educational Incentive Pay plus Longevity Pay plus City Service Incentive Pay.
Early retirement	Age Requirement: 53 Service Requirement: 5 Amount: Normal pension accrued, reduced by 2/3 of 1% for each whole month by which the benefit commencement date precedes the normal retirement date.
20 and out reduced retirement	Age Requirement: None Service Requirement: 20 years Amount: 20 & Out Multiplier times Average Computation Pay times years of Pension Service
Non-service-connected disability	Eligibility: Injury or illness (lasting more than 90 days) not related to or incurred while in the performance of the member's job, preventing the member from performing their departmental duties. Amount: The Member's accrued benefit, but not less than a pro-rated minimum benefit.
Service-connected disability	Eligibility: Injury or illness (lasting more than 90 days) obtained while on duty in the performance of the member's job.

20 & Out Table 2

Age	20 & Multiplier
53 & under	2.00%
54	2.10%
55	2.20%
56	2.30%
57	2.40%
58 & above	2.50%

	Amount: The greater of 50% of Average Computation Pay and the Member's accrued benefit; if the member has less than 20 years of service, the benefit will be calculated as if they had 20 years of service at the time of disability.
Termination benefit	*With less than five years of pension service:* Upon request, the member's contributions will be returned without interest *With at least five years of pension service:* The member may either withdraw contributions or leave contributions in the Plan and receive a monthly benefit to commence no earlier than the member's earliest eligibility for retirement benefits. Retirement benefit is equal to the accrued benefit as of the date of termination.
Pre-retirement death benefit	*While in active service:* The greater of 50% of the Member's accrued benefit or a benefit based on 20 years of service. The benefit may not exceed 45% of Average Computation Pay. *After leaving active service, with fewer than five years:* A lump sum benefit equal to the return of member contributions without interest *After leaving active service, with at least five years:* 50% of the Member's accrued benefit, with no early retirement reduction, or a refund of member contributions
Post-retirement death benefit	50% or 100% of the pension the Member was receiving at the time of their death, depending on the form of joint and survivor annuity chosen; if there are no qualifying survivors, no further benefits will be paid
Qualified surviving children benefit	50% of the pension the Member was receiving at the time of their death, divided equally among the children, paid until the youngest child is 19 years old or for life if the child becomes disabled prior to age 23
Minimum survivor benefit	$1,100 per month, not to exceed the actual amount the Member was receiving upon their death. If there are no Qualified Surviving Children, the minimum benefit to a spouse who is a Qualified Survivor shall be $1,200 per month. If the Member had less than 20 years of Pension Service, the minimum benefit will be prorated based on actual years of Pension Service.
Special survivor benefit	*Eligibility:* Upon leaving active service or joining DROP: a) the Member was at least 55 years old with at least 20 years of pension service, or b) the sum of the Member's age plus Pension Service was at least 78; **and** Has no Qualified Surviving Children or disabled children currently eligible for survivor benefits; **and** Whose Qualified Surviving Spouse is at least 55 years old. The Qualified Surviving Spouse does not have to be 55 years old at the time of the Member's death. *Amount:* Once all the eligibility conditions are met, the amount the Qualified Surviving Spouse will receive increases from 50% of the Member's pension benefit to a percentage of the Member's pension benefit based on the Member's applicable benefit multiplier times the number of years of Pension Service the Member worked.
Survivor benefit if no qualified surviving spouse	A lump sum that is the actuarial equivalent of 120 monthly payments of the greater of: 50% of the Member's pension benefit at the time of their death, or a benefit based on 20 years of the Member's service.
DROP	Eligibility: Members in active service who are retirement eligible may elect to enter the Deferred Retirement Option Plan (DROP).

	Distribution: The DROP account balance will be paid over the expected future lifetime of annuitants. Interest: Based on United States Department of Commerce Daily Treasury Yield Curve Rates for durations between 5 and 30 years; interest rate is based on the expected lifetime of the members at the time they retire. Interest is only paid on DROP account balances as of September 1, 2017.

All Members

Cost of living	The Board may grant an ad hoc COLA based on the actual market return over the prior five years less 5%, not to exceed 4% of the base benefit, if, after granting a COLA, the funded ratio on a market value of assets basis is no less than 70%.
Member contributions	13.5% of computation pay for all members
City contributions	The City will contribute 34.5% of computation payroll each year. However, in no case shall the City's total contribution amount be less than: $5,173,000 for the biweekly pay periods beginning with the first biweekly pay period that begins after September 1, 2017 and ends on the last day of the first biweekly pay period that ends after December 31, 2017; $5,344,000 for the following 26 pay periods; $5,571,000 for the following 26 pay periods; $5,724,000 for the following 26 pay periods; $5,882,000 for the following 26 pay periods; $6,043,000 for the following 26 pay periods; $5,812,000 for the following 26 pay periods; and $6,024,000 for the following 26 pay periods. An additional 1/26th of $13 Million will be paid biweekly beginning with the first biweekly pay period that begins after September 1, 2017 and ending with the last biweekly pay period that ends after December 31, 2024.
Forms of benefits	50% or 100% Joint and Survivor Pension

Section 5: GASB Information

Exhibit 1: Net Pension Liability

Measurement date and reporting date for the Plan under GASB 67	December 31, 2022	December 31, 2021
Components of the Net Pension Liability		
Total Pension Liability	$5,254,660,197	$5,163,731,692
Plan Fiduciary Net Position	1,806,567,341	2,157,840,430
Net Pension Liability	3,448,092,856	3,005,891,262
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	34.38%	41.79%

Actuarial assumptions. The Total Pension Liability as of January 1, 2023, which was determined based on the results of an actuarial valuation as of January 1, 2023, used the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.50%
Real rate of return	4.00%
Net investment rate of return	6.50%, net pension plan investment expense, including inflation

Other assumptions used to determine the total pension liability are based on the results of an experience study for the period January 1, 2015 through December 31, 2019 and are detailed in *Section 4, Exhibit I* of this report.

Determination of discount rate and investment rates of return

The long-term expected rate of return on pension plan investments was determined using a building-block method in which expected future real rates of return (expected returns, net of inflation) are developed for each major asset class. These returns are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage, adding expected inflation. The target allocation (approved by the Board) and projected arithmetic real rates of return for each major asset class, after deducting inflation, but before investment expenses, used in the derivation of the long-term expected investment rate of return assumption are summarized in the following table:

Section 5: GASB Information

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return[1]
Global Equity	55%	7.01%
Emerging Market Equity	5%	8.71%
Private Equity	5%	9.96%
Short-Term Investment Grade Bonds	6%	0.96%
Investment Grade Bonds	4%	1.61%
High Yield Bonds	4%	3.71%
Bank Loans	4%	3.21%
Emerging Markets Debt	4%	3.71%
Real Estate	5%	3.61%
Natural Resources	5%	4.86%
Cash	3%	0.71%
Total	100%	

Discount rate. The discount rates used to measure the Total Pension Liability (TPL) was 6.50%. The projection of cash flows used to determine the discount rate assumed City contributions will be made in accordance with the provisions of House Bill 3158, including statutory minimums through 2024 and 34.50% of computation pay thereafter. Members are expected to contribute 13.50% of computation pay. For cash flow purposes, projected payroll is based on 90% of the City's Hiring Plan payroll projections through 2037, increasing by 2.50% per year thereafter. This payroll projection is used for cash flow purposes only and does not impact the TPL. The normal cost rate for future members is assumed to be 16.75% for all years. Based on these assumptions, the System's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the TPL.

Actuarial cost method: In accordance with GASB 67, the TPL for active members is valued as the total present value of benefits once they enter the DROP. For the funding valuation, the liability for these members accumulates from their entry age until they are assumed to leave active service.

[1] The real rates of return are provided by Segal Macro Advisors and are net of inflation.

Discount rate sensitivity

Sensitivity of the Net Pension Liability to changes in the discount rate. The following presents the Net Pension Liability (NPL), of the Pension System as of December 31, 2022, calculated using the discount rate of 6.50%, as well as what the System's NPL would be if it were calculated using a discount rate that is one-percentage-point lower (5.50%) or one-percentage-point higher (7.50%) than the current rate.

	1% Decrease (5.50%)	Current Discount Rate (6.50%)	1% Increase (7.50%)
Pension Systems' Net Pension Liability as of December 31, 2022	$4,080,685,916	$3,448,092,856	$2,923,062,610

Exhibit 2: Schedule of changes in Net Pension Liability

	December 31, 2022	December 31, 2021
Total Pension Liability		
Service cost	$71,625,266	$69,962,845
Interest	329,454,977	326,951,204
Change of benefit terms	0	0
Differences between expected and actual experience	-42,455,842	-26,683,292
Changes of assumptions	65,941,802	-4,238,016
Benefit payments, including refunds of member contributions	-333,637,698	-324,633,468
Net change in Total Pension Liability	$90,928,505	$41,359,273
Total Pension Liability – beginning	5,163,731,692	5,122,372,419
Total Pension Liability – ending	$5,254,660,197	$5,163,731,692
Plan Fiduciary Net Position		
Contributions – employer	$169,911,420	$165,541,265
Contributions – employee	59,706,574	58,559,980
Net investment income	-240,891,386	321,062,889
Benefit payments, including refunds of member contributions	-333,637,698	-324,633,468
Administrative expense	-6,361,999	-6,390,829
Net change in Plan Fiduciary Net Position	-$351,273,089	$214,139,837
Plan Fiduciary Net Position – beginning	2,157,840,430	1,943,700,593
Plan Fiduciary Net Position – ending	$1,806,567,341	$2,157,840,430
Net Pension Liability – ending	$3,448,092,856	$3,005,891,262
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	34.38%	41.79%
Covered payroll[1]	$462,820,226	$436,971,384
Plan Net Pension Liability as percentage of covered payroll	745.02%	687.89%

Notes to Schedule:

Benefit changes: None.

Change of Assumptions: The assumption changes in 2021 include lowering the COLA from 2.0% to 1.5% and updating the expected COLA start date from October 1, 2069 to October 1, 2073. The assumption changes in 2022 include updating the salary scale for the 2023 Meet and Confer agreement and lowering DROP Active retirement rates for participants in DROP for ten years from 100% to 75%.

[1] Covered payroll represents compensation earnable and pensionable compensation. Only compensation earnable and pensionable compensation that would possibly go into the determination of the retirement benefits are included.

Exhibit 3: Schedule of employer contributions

Year Ended December 31	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions[1]	Contribution Deficiency (Excess)	Covered Payroll	Contributions as a Percentage of Covered Payroll
2015[2]	--	$114,885,723	--	$383,006,330	30.00%
2016	$261,859,079	119,345,000	$142,514,079	365,210,426	32.68%
2017	168,865,484	126,318,005	42,547,479	357,414,472	35.34%
2018	157,100,128	149,356,565	7,743,563	346,036,690	43.16%
2019	152,084,297	155,721,087	-3,636,790	363,117,415	42.88%
2020	185,428,764	161,950,183	23,478,581	396,954,743	40.80%
2021	221,285,746	165,541,265	55,744,481	427,440,530	38.73%
2022	228,530,758	169,911,420	58,619,338	436,971,384	38.88%

[1] The City's contributions are based on statutory rates set by State law and not Actuarially Determined Contributions
[2] The Actuarially Determined Contribution was not directly calculated as a dollar amount by the prior actuary for 2015

Section 5: GASB Information

Notes to Schedule:

Methods and assumptions used to establish "actuarially determined contribution" rate for year ended December 31, 2022 (these are not the same assumptions used in the January 1, 2023 actuarial valuation or for the Total Pension Liability measured as of December 31, 2022)**:**

Valuation date	Actuarially determined contribution is calculated using a January 1, 2022 valuation date as of the beginning of the fiscal year in which contributions are reported
Actuarial cost method	Entry age
Amortization method	25-year level percent of payroll for UAL as of January 1, 2020, 20-year level percent of payroll for changes to the UAL thereafter, using 2.50% annual increases
Remaining amortization period	68 years as of January 1, 2022
Asset valuation method	Market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the actual market return and the expected return on the actuarial value, and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
Investment rate of return	6.50%, including inflation, net of pension plan investment expense
Inflation rate	2.50%
Projected salary increases	Inflation plus merit increases, varying by group and year
Retirement rates	Group-specific rates based on age
Mortality:	
Pre-retirement	Pub-2010 Public Safety Employee Amount-Weighted Mortality Table, set forward five years for males, projected generationally using Scale MP-2019
Healthy annuitant and dependent spouses	Pub-2010 Public Safety Retiree Amount-Weighted Mortality Table, set back one year for females, projected generationally using Scale MP-2019
Healthy contingent beneficiaries	Pub-2010 Public Safety Contingent Survivor Amount-Weighted Mortality Table, set back one year for females, projected generationally using Scale MP-2019
Disabled	Pub-2010 Public Safety Disabled Retiree Amount-Weighted Mortality Table, set forward four years for males and females, projected generationally using Scale MP-2019
Other information:	See *Section 4* of the January 1, 2022 actuarial valuation for a full outline of assumptions. See *Exhibit 2* of this section for the history of changes to plan provisions and assumptions over the last two years.
DROP Utilization	0% of Police and Fire members are assumed to elect to enter DROP

Section 5: GASB Information

Interest on DROP Accounts	Beginning January 1, 2018, 2.75% payable upon retirement on active account balances as of September 1, 2017

Appendix: Definition of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Actuarial accrued liability for actives	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial accrued liability for retirees and beneficiaries	Actuarial Present Value of lifetime benefits to existing retirees and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial cost method	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
Actuarial gain or loss	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield actuarial liabilities that are larger than projected.
Actuarially equivalent	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial present value	The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.
Actuarial present value of future benefits	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund of

Appendix: Definition of Pension Terms

	member contributions or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial valuation	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan, as well as Actuarially Determined Contributions.
Actuarial value of assets	The value of the Plan's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the Actuarially Determined Contribution.
Actuarially determined	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the Plan.
Actuarially determined contribution	The employer's contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
Amortization method	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the Unfunded Actuarial Accrued Liability. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the Unfunded Actuarial Accrued Liability. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization payment	The portion of the pension plan contribution, or ADC, that is intended to pay off the Unfunded Actuarial Accrued Liability.
Assumptions or actuarial assumptions	The estimates upon which the cost of the Plan is calculated, including: Investment return - the rate of investment yield that the Plan will earn over the long-term future; Mortality rates - the rate or probability of death at a given age for employees and retirees; Retirement rates - the rate or probability of retirement at a given age or service; Disability rates - the rate or probability of disability retirement at a given age; Withdrawal rates - the rate or probability at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; Salary increase rates - the rates of salary increase due to inflation, real wage growth and merit and promotion increases.

Appendix: Definition of Pension Terms

Closed amortization period	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 20 years, it is 19 years at the end of one year, 18 years at the end of two years, etc. See Open Amortization Period.
Decrements	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined benefit plan	A retirement plan in which benefits are defined by a formula based on the member's compensation, age and/or years of service.
Defined contribution plan	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer normal cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience study	A periodic review and analysis of the actual experience of the Plan that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified based on recommendations from the Actuary.
Funded ratio	The ratio of the Actuarial Value of Assets (AVA) to the Actuarial Accrued Liability (AAL). Plans sometimes also calculate a market funded ratio, using the Market Value of Assets (MVA), rather than the AVA.
GASB 67 and GASB 68	Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.
Investment return	The rate of earnings of the Plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Net Pension Liability (NPL)	The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.
Normal cost	The portion of the Actuarial Present Value of Future Benefits and expenses, if applicable, allocated to a valuation year by the Actuarial Cost Method. Any payment with respect to an Unfunded Actuarial Accrued Liability is not part of the Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of member contributions and employer Normal Cost unless otherwise specifically stated.

Appendix: Definition of Pension Terms

Open amortization period	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in each future year in determining the Amortization Period.
Plan Fiduciary Net Position	Market value of assets.
Service costs	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Total Pension Liability (TPL)	The actuarial accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.
Unfunded actuarial accrued liability	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus or an Overfunded Actuarial Accrued Liability.
Valuation date or actuarial valuation date	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Benefits is determined. The expected benefits to be paid in the future are discounted to this date.