AGENDA

DALLAS POLICE & FIRE PENSION SYSTEM

Date: November 4, 2022

The second of two annual public meetings of the Dallas Police and Fire Pension System Board of Trustees as required by Section 3.01 (j-9) of Article 6243a-1 of Vernon's Revised Civil Statutes will be held at **8:30 a.m. on Thursday, November 10, 2022, in the Second Floor Board Room at 4100 Harry Hines Boulevard, Dallas, Texas and via telephone conference for audio at 214-271-5080 access code 588694 or Toll-Free (US & CAN): 1-800-201-5203 and Zoom meeting for visual https://us02web.zoom.us/j/81328247237?pwd=dkZobmltR3lVNHZ6cXpBbDJXd2dHQT09 Passcode: 035779.** Items of the following agenda will be presented to the Board:

1. **Report on the health and performance of the Pension System**

   a. January 1, 2022 Actuarial Valuation
   b. Projected Change in Net Position Bridge Chart

2. **Public comment**

The term "possible action" in the wording of any Agenda item contained herein serves as notice that the Board may, as permitted by the Texas Government Code, Section 551, in its discretion, dispose of any item by any action in the following non-exclusive list: approval, disapproval, deferral, table, take no action, and receive and file. At the discretion of the Board, items on this agenda may be considered at times other than in the order indicated in this agenda.

At any point during the consideration of the above items, the Board may go into Closed Executive Session as per Texas Government Code, Section 551.071 for consultation with attorneys, Section 551.072 for real estate matters, Section 551.074 for personnel matters, and Section 551.078 for review of medical records.

DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #1

Topic: **Report on the health and performance of the Pension System**

a. January 1, 2022 Actuarial Valuation
b. Projected Change in Net Position Bridge Chart

Attendees: Jeff Williams, Vice President and Consulting Actuary, Segal Consulting
Caitlin Grice, Consulting Actuary, Segal Consulting (on phone)

Discussion:

a. Jeff Williams and Caitlin Grice of Segal Consulting, DPFP's actuarial firm, will discuss results of the January 1, 2022 actuarial valuation report, including the GASB No. 68 actuarial valuation.

b. On a quarterly basis staff presents a Change in Net Position Bridge chart based on actual historical data as part of the quarterly financial statement reporting. The Board requested that the same type of information be presented based on projected data. Staff will present similar information contained in the Change in Net Position Bridge chart based on projected data from the January 1, 2022 Actuarial Valuation report.

Sec. 3.01 (j-9) of Article 6243a-1 of Vernon's Revised Civil Statutes
Required Public Meeting – Thursday, November 10, 2022

Dallas Police and Fire Pension System

Annual Valuation Summary as of January 1, 2022

Board of Trustees Meeting

November 10, 2022 / Jeff Williams / Caitlin Grice

Segal

Agenda

Portrait of a Pension Valuation

Summary of January 1, 2022 Actuarial Valuation Results

Summary of Data

Historical Results

Solvency Projection

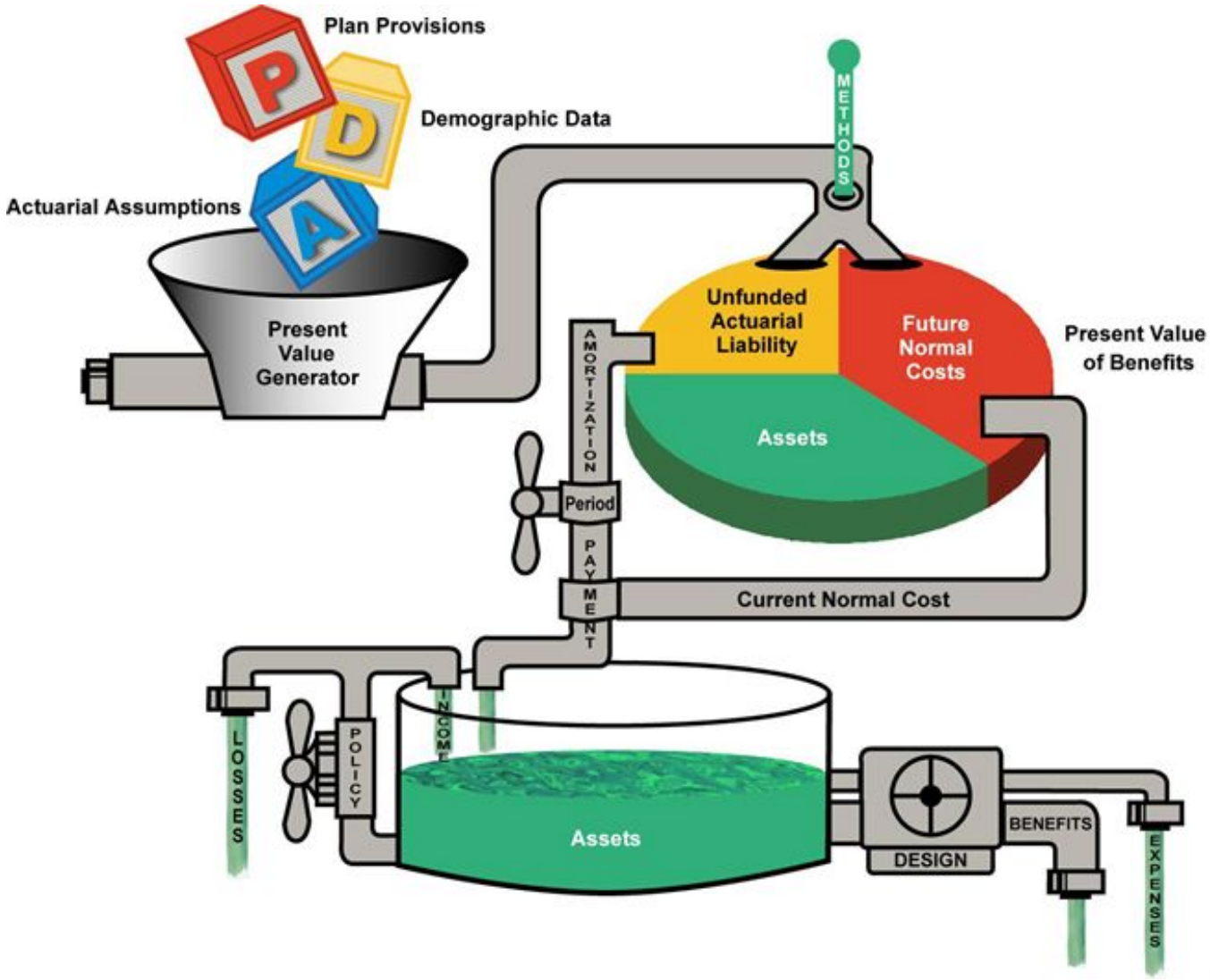
Risk

Importance of Accurate Payroll Projections

GASB Accounting Disclosures

Supplemental Plan Results

Portrait of a Pension Valuation



Combined Plan Results

Summary of 2022 Actuarial Valuation Results

Actuarial Determined Contribution (ADC)

- Board's funding policy adopted December 2019 and amended July 2020 first reflected in 2020 valuation
  - Initial 2020 UAL amortized over closed 25-year period
  - In 2021 and thereafter, future gains/losses amortized over separate, closed 20-year periods
  - Effective amortization period for 2022 ADC is 23 years, in accordance with Texas Code section 802.101
- City's ADC for 2022 is $228.5M (52.3% of computation pay)
  - Increased from $221.3M (51.8% of computation pay) in 2021, primarily due to actual 2021 contributions less than ADC
  - Actual City contributions for 2021 were $165.5M, or 74.8% of the 2021 ADC
    - Contributions were expected to be approximately $165.9M ($5.882M for 26 pay periods, plus $13M)
- ADC will continue to grow as expected City contributions are less than ADC
  - City contributions for 2022 are expected to be approximately $170.1M ($6.043M for 26 pay periods, plus $13M), 74.4% of the 2022 ADC
  - If City's actual contributions differ from ADC by more than 2% for two consecutive years, the Board can recommend change in City's contribution rate
  - Based on expected City contributions and the City's Hiring Plan, unfunded liability is projected to be paid off in **68** years (up from **63** years in the 2021 valuation); this is not considered a reasonable amortization period

Summary of 2022 Actuarial Valuation Results

Funded ratios

- On an actuarial basis, decreased from 41.59% in 2021 to 41.06%
- On a market basis, increased from 37.99% in 2021 to 41.83%

Financial information

- Actuarial value of assets decreased from $2.13B to $2.12B
- Market value of assets increased from $1.94B to $2.16B
- Cash outflow increased from $105.2M in 2020 to $106.9M in 2021
- Rates of return
  - Assumed return of 6.50%
  - Market return of 16.99%
  - Actuarial return of 4.68%

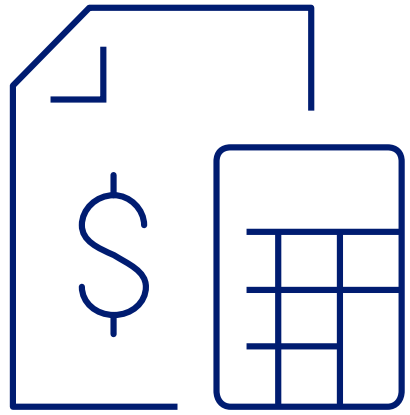
Assumption changes

- Lowered administrative expense assumption from $8.5M to $7.0M
- Lowered COLA assumption from 2.00% to 1.50%; 5 percentage points less than the return assumption
- Delayed COLA start year from 2069 to 2073, based on projected year of 70% funding

Summary of 2022 Actuarial Valuation Results

Reconciliation of City's ADC

- **2021 ADC** — **$221.3M** or **51.8%** of computation pay
  - +$4.9M due to expected payroll growth increase
  - +$4.2M due to actual 2021 contributions less than ADC
  - +$2.7M due to investment loss
  - -$2.2M due to demographic experience gain
- **2022 ADC**, prior to assumption changes — **$230.9M** or **52.8%** of computation pay
  - -$1.5M due to change in administrative expense assumption
  - -$0.8M due to assumption changes
- **2022 ADC**, after assumption changes — **$228.5M** or **52.3%** of computation pay



Note: Total computation pay shown in the valuation report 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.

Summary of 2022 Actuarial Valuation Results

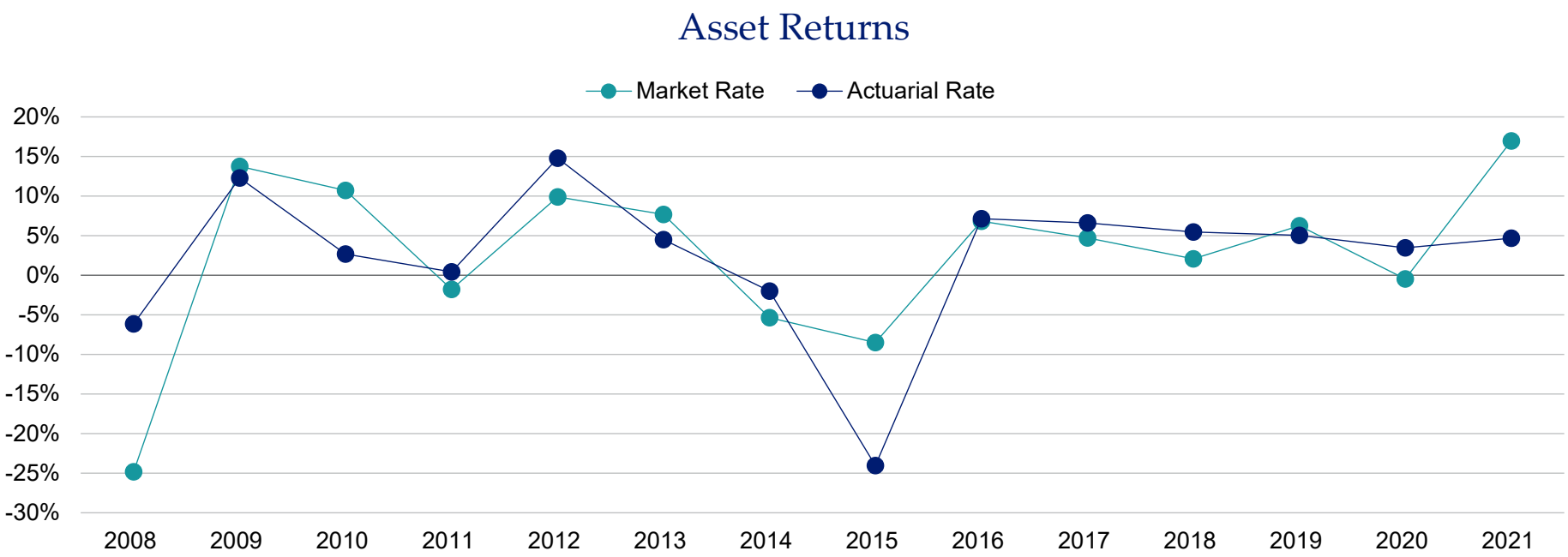
	2022	2021
Total normal cost	$74,657,001	$73,912,721
Administrative expense assumption	6,783,022	8,236,527
Expected member contributions	-58,991,137	-57,704,472
Employer normal cost	$22,448,886	$24,444,776
Total normal cost as % of computation pay	17.09%	17.29%
Employer normal cost as a % of computation pay	5.14%	5.72%
Actuarial accrued liability	$5,158,782,340	$5,115,966,592
Actuarial value of assets	-2,117,978,431	-2,127,834,406
Unfunded liability	$3,040,803,909	$2,988,132,186
Funded ratio (AVA/AAL)	41.06%	41.59%
Computation pay	$436,971,384	$427,440,530
Actuarial Determined Contribution, in dollars	**$228,530,758**	**$221,285,746**
Actuarial Determined Contribution, as a % of computation pay	**52.30%**	**51.77%**
Projected year of full funding, based on City's Hiring Plan Payroll	**2090**	**2084**

Summary of Data

	Year Ended December 31, 2021	2020	Change
Active members			
Number	5,088	5,106	-0.4%
Average age	40.1	40.0	0.1
Average service	12.6	12.6	0.0
Average computation pay	$85,883	$83,713	2.6%
Number in DROP	276	320	-13.8%
Total DROP accounts	$113.6M	$135.4M	-16.1%
Retirees and beneficiaries			
Number[1]	5,071	5,003	1.4%
Average monthly payment[2]	$4,311	$4,273	0.9%
Inactive vested members			
Number	233	241	-3.3%

[1] Excludes beneficiaries with DROP accounts only
[2] Includes benefit supplement, excludes annuitization of DROP balances

Historical Results



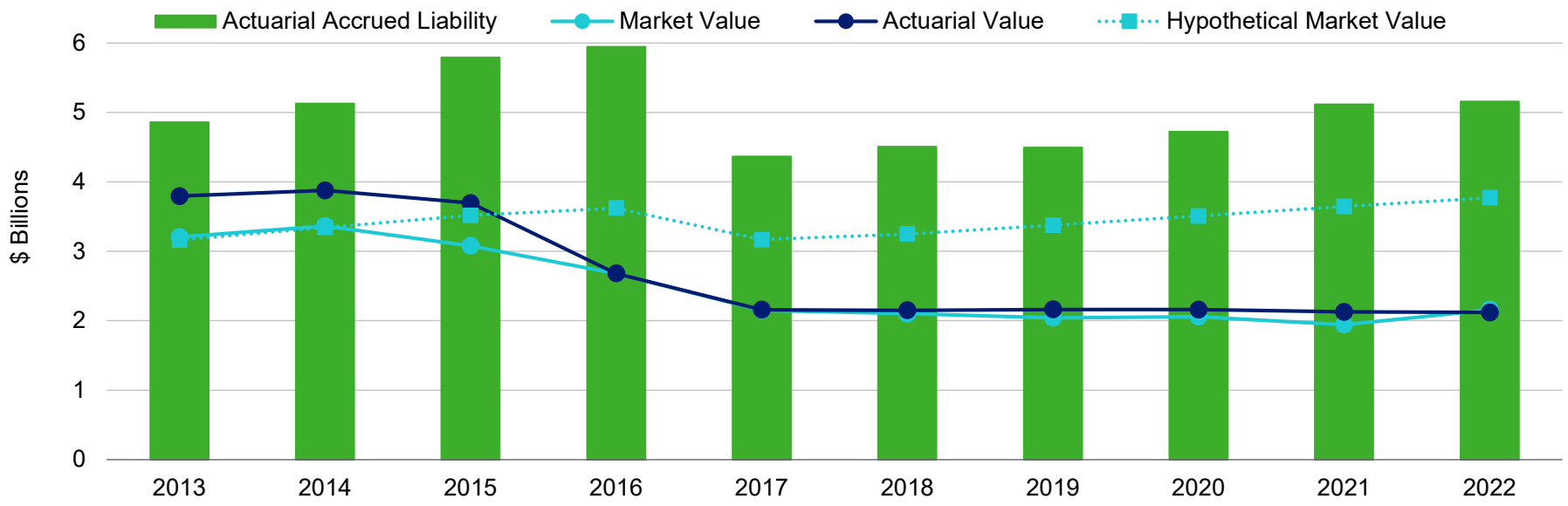
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
MVA	-24.8%	13.8%	10.7%	-1.8%	9.9%	7.7%	-5.3%	-8.5%	6.8%	4.7%	2.1%	6.3%	-0.4%	17.0%
AVA	-6.1%	12.3%	2.7%	0.4%	14.8%	4.5%	-2.0%	-24.0%	7.2%	6.6%	5.5%	5.1%	3.5%	4.7%
Assumed rate	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	7.25%	7.25%	7.25%	7.25%	7.25%	7.0%	6.5%

Average Rates of Return	Actuarial Value	Market Value
Most recent five-year average return:	5.06%	5.77%
Most recent ten-year average return:	-0.46%	3.40%
14-year average return:	0.41%	1.64%

Note: The actuarial returns for 2012 and 2015 include effects of changes in asset method. The returns for 2014 and 2015 include significant write-downs of the Plan's assets.

Historical Results

Asset and Actuarial Accrued Liability Values as of January 1
($ billions)



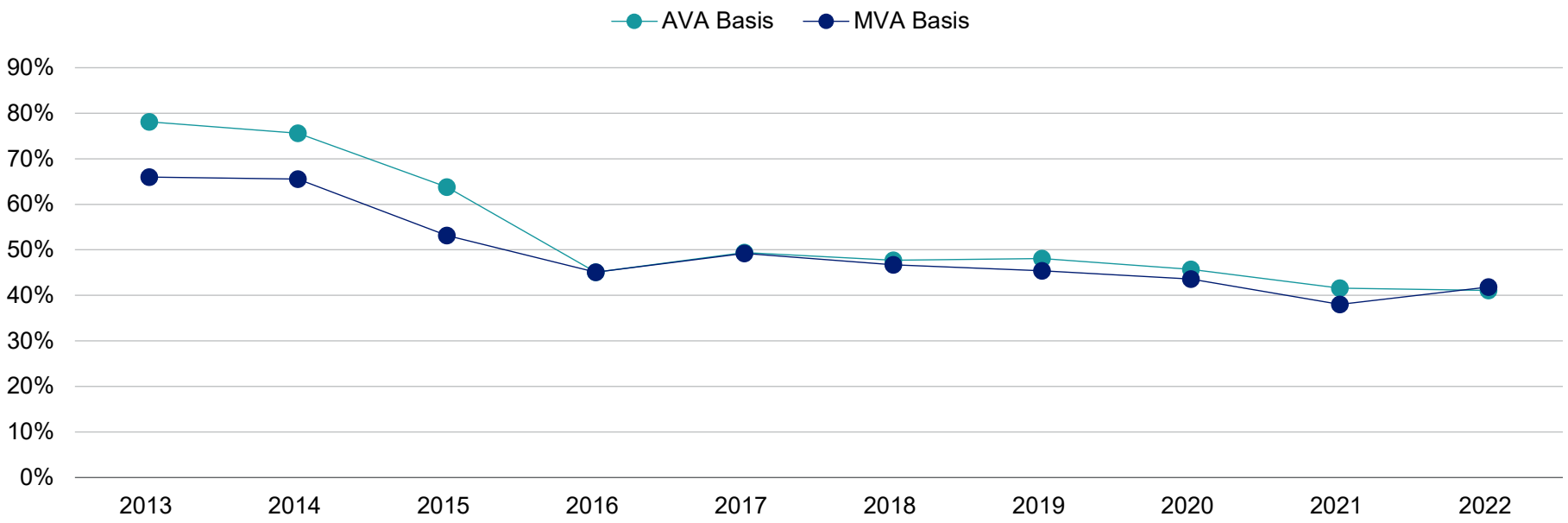
Notes: The significant increase in liability in 2015 is due to the change in discount rate, from 8.50% to 7.25%. The liability decrease in 2017 is attributable to the plan changes implemented following the adoption of HB 3158.

As mentioned previously, the decline in assets from January 1, 2014 through January 1, 2016 is primarily the result of write-downs. The actuarial value of assets was set equal to market value as of January 1, 2016. The decline during 2016 reflects the unusually large number of DROP payments made in that year.

The hypothetical market value of assets assumes investment returns were equal to the assumed rates of return (8.5% in 2012-2014, 7.25% in 2015-2019, 7% in 2020 and 6.5% since 2021).

Historical Results

Funded Percentage as of January 1



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AVA	78.1%	75.6%	63.8%	45.1%	49.4%	47.7%	48.1%	45.7%	41.6%	41.1%
MVA	66.0%	65.6%	53.2%	45.1%	49.2%	46.7%	45.4%	43.6%	38.0%	41.8%

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.

Economic Risk

Potential effects of economic conditions:

- Volatile financial markets & investment returns lower than assumed

- High inflationary environment impacting salary increases

- Lingering direct & indirect effects of COVID-19 pandemic

Investment Risk

The risk that returns will be different than expected

Over the past ten years, returns have ranged from -8.5% to 17.0%

Contribution Risk

The risk that actual contributions will be different from expected contributions

Plan contributions set by statute through 2024

If City Hiring Plan projections not met, System is projected to be only 64% funded in 2090 based on 2.5% valuation payroll growth

Longevity Risk

The risk that mortality experience will be different than expected

Valuation includes expectation of future improvement in life expectancy

Demographic Risk

The risk that participant experience will be different than assumed:

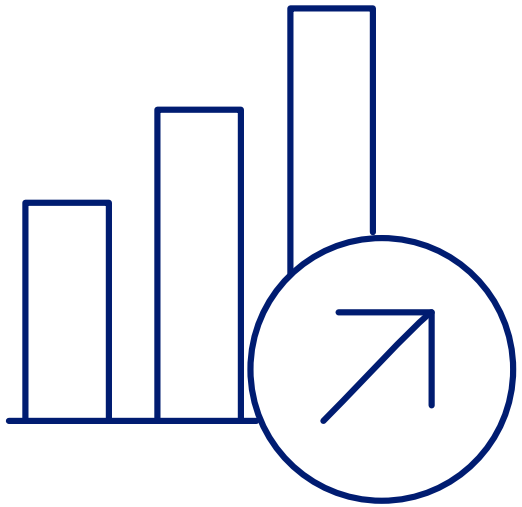
- Actual retirements occurring earlier or later than assumed

- More or less active participant turnover than assumed

Segal

The Importance of Accurate Payroll Projections

- Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability
- Payments should be enough to cover normal cost, interest on the unfunded actuarial accrued liability and, ultimately, the principal balance
- The funding policy adopted by the State in HB 3158 meets this standard, **if** the City's Hiring Plan payroll projections come to fruition
- Assuming the City's Hiring Plan payroll projection is met, the expected full-funding date is 2090, 6 years later than the expected full-funding date from the 2021 valuation
  - Full-funding date may vary on an annual basis due to demographic experience, economic experience, and contributions other than assumed



The Importance of Accurate Payroll Projections

- City's long-term contribution rate is scheduled to be 34.50% of computation pay
  - Through 2024 there is a floor on the City's contribution levels
  - Beginning in 2025, City expected to contribute based solely on pay
- City's Hiring Plan reflects significant growth in payroll over 20 years, from $372M in 2017 to $684M in 2037 (average annual growth of 3.1%)
  - Through the first six years of the policy (2017-2022), valuation payroll based on participant data is cumulatively $17.1M less than the City's projections
  - Differences between actual payroll and City's Hiring Plan payroll will have an impact on when the System is projected to become fully funded
- 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 <u>not</u> met and instead the current valuation payroll of $437.0M increases by the assumed 2.5% payroll growth and City and member contributions are based on this projected payroll beginning in 2025, the System is projected to be only 64% funded in 2090, rather than 100%.

City's Hiring Plan Payroll vs. Projected Valuation Payroll

Year	City's Hiring Plan Payroll	Projected Valuation Payroll[1]	$ Difference
2017	$372,000,000	$357,414,472	-$14,585,528
2018	364,000,000	346,036,690	-17,963,310
2019	383,000,000	363,117,415	-19,882,585
2020	396,000,000	396,954,743	954,743
2021	408,000,000	427,440,530	19,440,530
2022	422,000,000	436,971,384	14,971,384
2023	438,000,000	447,895,669	9,895,669
2024	454,000,000	459,093,060	5,093,060
2025	471,000,000	470,570,387	-429,613
2026	488,000,000	482,334,646	-5,665,354
2027	507,000,000	494,393,013	-12,606,987
2028	525,000,000	506,752,838	-18,247,162
2029	545,000,000	519,421,659	-25,578,341
2030	565,000,000	532,407,200	-32,592,800
2031	581,000,000	545,717,380	-35,282,620
2032	597,000,000	559,360,315	-37,639,685
2033	614,000,000	573,344,323	-40,655,677
2034	631,000,000	587,677,931	-43,322,069
2035	648,000,000	602,369,879	-45,630,121
2036	666,000,000	617,429,126	-48,570,874
2037	684,000,000	632,864,854	-51,135,146
			-$399,432,485

[1] Valuation payroll 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.

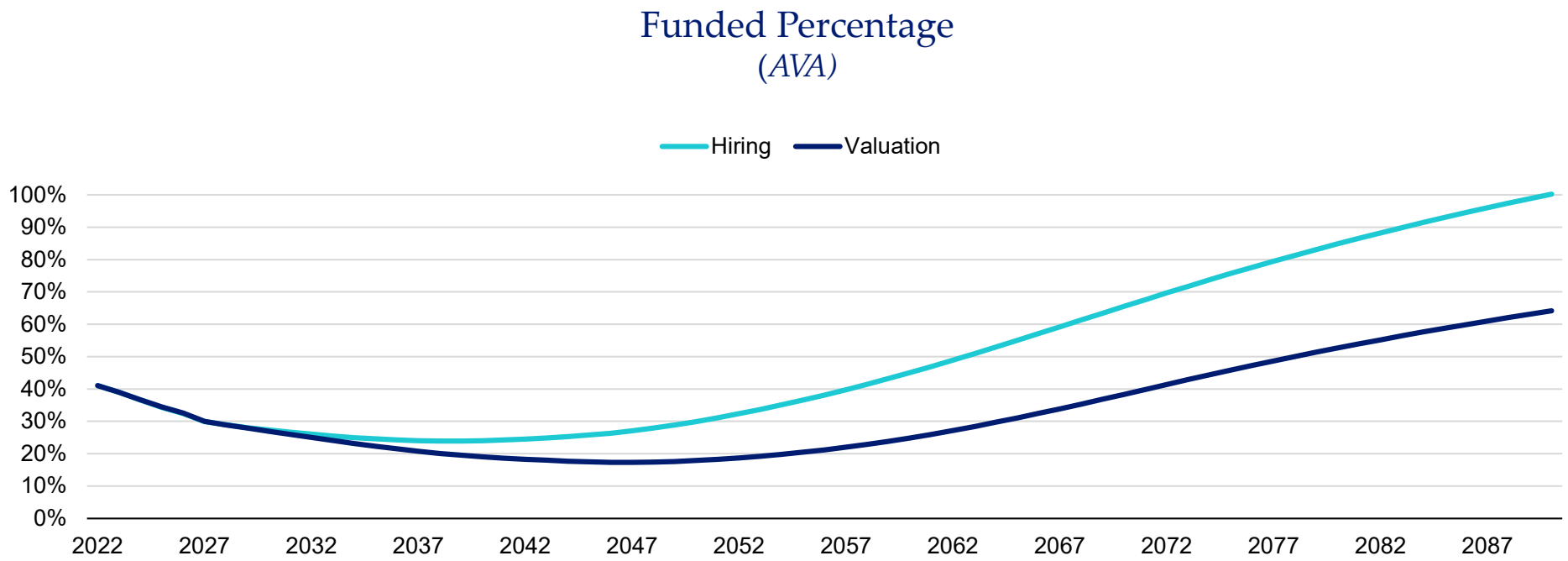
Assumptions

- Valuation payroll projected at 2.5% per year
- Beginning in 2025, the statutory contributions cease and City contributions equal 34.5% of actual computation pay
- Member contributions: 13.5% of computation pay

Findings

- Total City and Member contributions between 2025 and 2037, based on the City's Hiring Plan payroll projections: **$3.61B**
- Total City and Member contributions between 2025 and 2037, based on projected valuation payroll: **$3.42B**
- Difference in total contributions based on these two projections, just for the period of 2025 through 2037: **$191M**
- The **$191M** gap is up from **$184M** last year, because the 2022 projected valuation payroll is slightly lower than expected based on projecting the 2021 computation pay by the payroll growth assumption

Funded Percentage Projection



The projection above anticipates that all actuarial assumptions are met in the future and all contributions are made as expected. Projections are based on the City's Hiring Plan payroll projections through 2037 for the "City's Hiring Plan Payroll" projection. The "Projected Valuation Payroll" uses the actual January 1, 2022 payroll projected forward each year at the 2.50% growth assumption.

Based on the City's Hiring Plan payroll projections, 100% funding is projected by January 1, 2090. Based on the projected valuation payroll, the funded percent is projected to be 64% on January 1, 2090.

GASB 67 Accounting Disclosures – Net Pension Liability

- The Pension System is required to provide disclosures under GASB Statement 67. The components of the net pension liability are as follows:

	Year Ended December 31, 2022	Year Ended December 31, 2021
Total Pension Liability (TPL)	$5.16 billion	$5.12 billion
Plan's Fiduciary Net Position	$2.16 billion	$1.94 billion
City's Net Pension Liability (NPL)	$3.01 billion	$3.18 billion
Plan Fiduciary Net Position as a percentage of the TPL	41.79%	37.95%

- In the event that a pension plan has a projected insolvency date, GASB requires that the unfunded benefits be discounted using a 20-year, tax-exempt general obligation bonds rate rather than the Plan's funding rate
- Based on HB 3158 contribution requirements and the City's Hiring Plan (90% of which was used for projecting computation pay for GASB purposes), City and member contributions are projected to be able to pay the benefits of current members. Therefore, GASB liabilities are determined using the valuation discount rate (6.5%).

Supplemental Plan Results

Supplemental Plan Results

Actuarial Determined Contribution (ADC)

- City of Dallas contributes to the Supplemental Plan each year based on the normal cost (net of member contributions), interest on the unfunded actuarial accrued liability and the principal balance
- Board's funding policy adopted December 2019 and amended July 2020 first reflected in 2020 valuation
  - Initial 2020 UAL amortized over closed 20-year period
  - In 2021 and thereafter, future gains/losses amortized over separate, closed 10-year periods
  - Effective amortization period for 2022 ADC is 16 years
- City's ADC for the Supplemental Plan increased from $2.1M in 2021 to $2.8M in 2022

Changes from prior valuation

- Same assumption changes implemented for the Combined Pension Plan apply to the Supplemental Plan
- Supplemental Plan assets increased from $16.4M to $18.7M
- Funded ratio increased from 43.7% to 45.7%
- Number of active members increased from 45 to 50
- Number of annuitants increased from 141 to 147
- GASB net pension liability (NPL) increased from $21.1M to $22.2M

Caveats

- This presentation is intended for the use of the Board of Trustees for the Dallas Police and Fire Pension System, and is a supplement to Segal's full valuation reports for the System as of January 1, 2022.
- Please refer to the full valuation reports for a description of assumptions and plan provisions reflected in the results shown in this presentation. The reports also include more comprehensive information regarding the System's membership, assets, and experience during the most recent plan year.
- Projections, by their nature, are not a guarantee of future results. They are intended to serve as estimates of future financial outcomes that are based on assumptions about future experience and the information available to us at the time the modeling is undertaken and completed. The projected future results included in this presentation show how the System would be affected if specific investment return, salary, mortality, turnover, disability and retirement assumptions are met. Actual results may differ due to such variables as demographic experience, the economy, contribution patterns, stock market performance and the regulatory environment.
- The calculations included in this presentation were completed under the supervision of Jeffrey S. Williams, FCA, ASA, MAAA, EA.

Questions?

Jeffrey S. Williams, FCA, ASA, MAAA, EA
Vice President and Consulting Actuary
jwilliams@segalco.com
678.306.3147

Caitlin Grice, FCA, ASA, MAAA, EA
Consulting Actuary
cgrice@segalco.com
202.222.5187

Dallas Police and Fire Pension System

Actuarial Valuation and Review as of January 1, 2022

Segal

Segal

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

November 1, 2022

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

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2022. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and calculates the funding requirements for fiscal 2022; 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 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 the financial information on which our calculations were based was prepared by the System's Finance Department. That assistance is gratefully acknowledged.

The actuarial calculations were directed under my supervision. 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. Further, in my opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the System.

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

#9575318v4/14362.001

Table of Contents

Table of Contents

Section 1: Actuarial Valuation Summary

Purpose and basis

This report was prepared by Segal to present a valuation of the Plan as of January 1, 2022. The valuation was performed to determine whether the assets and contributions/contribution rates are sufficient to provide the prescribed benefits and to provide information for required disclosures under Governmental Accounting Standards Board (GASB) Statement No. 67. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the Plan's benefit obligations. 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 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, 2021, provided by the System's IT Department;
- The assets of the Plan as of December 31, 2021, 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 Statements No 67 and 68 as of September 30, 2022 for the City is provided in a separate report.

Section 1: Actuarial Valuation Summary

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 UAL 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 2090.
   c. The effective amortization period of 68 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 plan year ending December 31, 2021 were $165.5 million, 74.8% of the 2021 ADC. In 2020, actual contributions were $162.0 million, 87.3% of the 2020 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 40 years before it starts to decline.
3. The System's normal cost (for benefits accruing each year) plus expenses is 18.64% 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 16.99% for the 2021 plan year. The return on the actuarial value of assets was 4.68% for the 2021 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 $2.7 million.

Section 1: Actuarial Valuation Summary

5. There was a net experience loss for the year of $65.0 million, or 1.3% of the actuarial accrued liability. This loss was primarily due to actual contributions less than the ADC, and to a lesser extent, the investment loss mentioned above, partially offset by a demographic experience gain. The loss due to contributions less than the ADC was equivalent to 1.1% of the actuarial accrued liability and the investment loss was equivalent to 0.7% of actuarial accrued liability. This net experience loss is amortized over 20 years.
6. The following actuarial assumptions were changed with this valuation:
   a. The assumed annual administrative expenses were lowered from $8,500,000 to $7,000,000.
   b. The assumed ad-hoc cost-of-living adjustment (COLA) was lowered from 2.00% to 1.50%, based on the expected market value of return of 6.50% less 5.00%.
   c. The starting year of the ad-hoc COLA was changed from 2069 to 2073, based on when the System is projected to be 70% funded on a market value basis after the COLA is reflected.

   As a result of these assumption changes, the employer normal cost decreased by $2.0 million, and the actuarial accrued liability decreased by $4.2 million. This change in the actuarial accrued liability was amortized over 20 years. The total impact was a decrease in the ADC of $2.3 million, or 0.53% of computation pay.

Changes from prior valuation

7. The City's ADC for the 2022 plan year is $228.5 million, an increase of $7.2 million from last year. The ADC as a percentage of computation pay increased from 51.77% to 52.30%. Page 29 contains a reconciliation of the ADC from the prior valuation to this year.
8. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 41.06%, compared to the prior year funded ratio of 41.59%. 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 41.83%, compared to 37.99% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of System 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 2037. The funded ratio is currently projected to be less than 24% as of January 1, 2038.
9. The actuarial value of assets as of the valuation date is 98.2% 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 gain of $39.9 million is recognized in future years, the System's ADC is likely to decrease unless the net gain is offset by future experience. If the net deferred gains were recognized immediately in the actuarial value of assets, the ADC would decrease from 52.30% to 51.64% of computation pay.

Section 1: Actuarial Valuation Summary

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 2090, the effective amortization period for the UAL is 68 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 2021 actuarial valuation, the projected full funding year was 2084 and the effective period was 63 years.
    b. If the City's Hiring Plan projections are not met and instead the current valuation payroll of $437.0 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 64% funded in 2090, rather than 100%.
    c. The City's Hiring Plan payroll projections are shown in *Section 4, Exhibit I*. From 2017 through 2022, valuation payroll based on participant data was cumulatively $17.1 million less than the City's projections, or 0.73% lower. Even though valuation payroll for 2022 exceeds the City's payroll projection, this remains an area of concern that needs to be carefully monitored.
11. 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 System's future financial condition but have included a brief discussion of some risks that may affect the System in *Section 2*. A more detailed assessment would provide the Board with a better understanding of the inherent risks. This could be important because:
    a. The Plan's asset allocation has potential for a significant amount of investment return volatility.
    b. Retired participants account for almost 70% of the System's liabilities, leaving limited options for reducing costs in the event of adverse experience. Expected employee contributions by active members cover approximately 80% of the total normal cost of the plan; as a result, plan changes that affect active participants may have a limited impact on the funded status of the System.
    c. 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.
12. It is important to note that this actuarial valuation is based on plan assets as of December 31, 2021. 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. Moreover, this actuarial valuation does not include any possible short-term or long-term impacts on mortality of the covered population that may emerge after December 31, 2021 due to COVID-19. While it is impossible to determine how the pandemic

Section 1: Actuarial Valuation Summary

will impact demographic experience of the plan in future valuations, Segal is available to prepare projections of potential outcomes upon request.

GASB

13. This report constitutes an actuarial valuation for the purpose of determining the ADC under the Plan's 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 and employer's financial statements as of December 31, 2021.
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, 2022 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, 2021 is $3.0 billion, a decrease from $3.2 billion as of December 31, 2020.

Section 1: Actuarial Valuation Summary

Summary of key valuation results

		2022	2021
Contributions for plan year beginning January 1:	• Total actuarially determined contributions (City and member)	$287,521,895	$280,836,090
	• Expected member contributions	58,991,137	59,550,344
	• City's actuarially determined contributions (ADC)	228,530,758	221,285,746
	• City's ADC as a percent of computation pay	52.30%	51.77%
	• Actual City contributions	- -	$165,541,265
	• Effective amortization period for determination of ADC[1]	23 years	24 years
Actuarial accrued liability for plan year beginning January 1:	• Retired members and beneficiaries	$3,554,266,474	$3,499,909,200[2]
	• Inactive vested members	24,985,278	26,533,699[2]
	• Active members	1,577,544,138	1,587,784,145
	• Inactive members due a refund of employee contributions	1,986,450	1,739,548
	• Total actuarial accrued liability	5,158,782,340	5,115,966,592
	• Employer normal cost including administrative expenses	22,448,886	24,444,776
Assets for plan year beginning January 1:	• Market value of assets (MVA)	$2,157,840,430	$1,943,700,593
	• Actuarial value of assets (AVA)	2,117,978,431	2,127,834,406
	• Actuarial value of assets as a percentage of market value of assets	98.15%	109.47%
Funded status for plan year beginning January 1:	• Unfunded actuarial accrued liability on market value of assets	$3,000,941,910	$3,172,265,999
	• Funded percentage on MVA basis	41.83%	37.99%
	• Unfunded actuarial accrued liability on actuarial value of assets	$3,040,803,909	$2,988,132,186
	• Funded percentage on AVA basis	41.06%	41.59%
	• Projected year of full funding based on City's Hiring Plan payroll projections	2090	2084
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	$5,163,731,692	$5,122,372,419
	• Plan fiduciary net position	2,157,840,430	1,943,700,593
	• Net pension liability	3,005,891,262	3,178,671,826
	• Plan fiduciary net position as a percentage of total pension liability	41.79%	37.95%

[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.

[2] Prior year numbers re-stated to include liability for DROP-only beneficiaries with "Retired members and beneficiaries"

Section 1: Actuarial Valuation Summary

		2022	2021
Demographic data for plan year beginning January 1:	• Number of retired members and beneficiaries	5,196	5,110
	• Number of inactive vested members	233	241
	• Number of active members	5,088	5,106
	• Number of inactive members due a refund of employee contributions	462	442
	• Total computation pay[1]	$436,971,384	$427,440,530
	• Average computation pay	85,883	83,713

[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.

Section 1: Actuarial Valuation Summary

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 of benefits	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 data	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.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the System. The System uses 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 projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan's assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results that does not mean that the previous assumptions were unreasonable.
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.

Section 1: Actuarial Valuation Summary

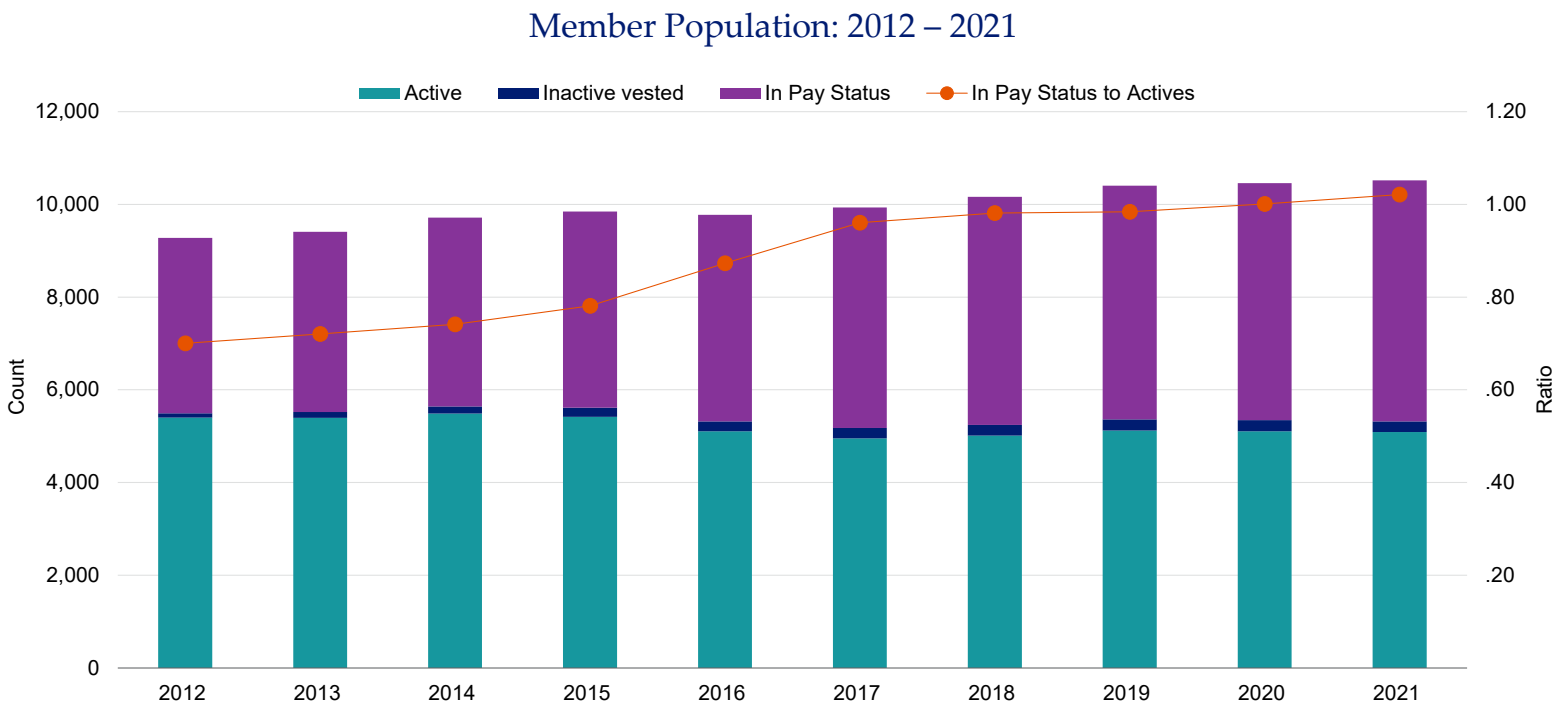
The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

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 of the Plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. 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.
Actuarial results in this report are not rounded, but that does not imply precision.
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's provisions, but they may be subject to alternative interpretations. The Board should look to their other advisors for expertise in these areas.

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

Section 2: Actuarial Valuation Results

Member data



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
In Pay Status	3,783	3,890	4,069	4,230	4,456	4,756	4,919	5,039	5,110	5,196
Inactive Vested[1]	96	122	157	200	215	226	230	242	241	233
Active	5,400	5,397	5,487	5,415	5,104	4,952	5,012	5,121	5,106	5,088
Ratio	0.70	0.72	0.74	0.78	0.87	0.96	0.98	0.98	1.00	1.02

[1] Excludes non-vested terminated participants due a refund of employee contributions

Section 2: Actuarial Valuation Results

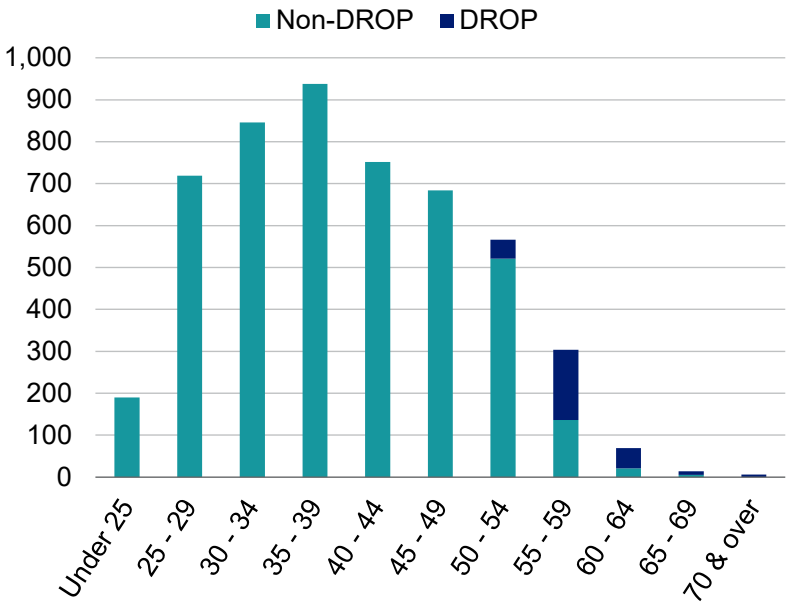
Active members

As of December 31,	2021	2020	Change
Firefighters			
Active participants	1,996	1,985	0.6%
Average age	40.1	40.1	0.0
Average years of service	12.4	12.4	0.0
Average computation pay	$86,575	$84,990	1.9%
Police Officers			
Active participants	3,092	3,121	-0.9%
Average age	40.1	40.0	0.1
Average years of service	12.8	12.7	0.1
Average computation pay	$85,436	$82,867	3.1%
Total			
Active participants	5,088	5,106	-0.4%
Average age	40.1	40.0	0.1
Average years of service	12.6	12.6	0.0
Average computation pay	$85,883	$83,713	2.6%

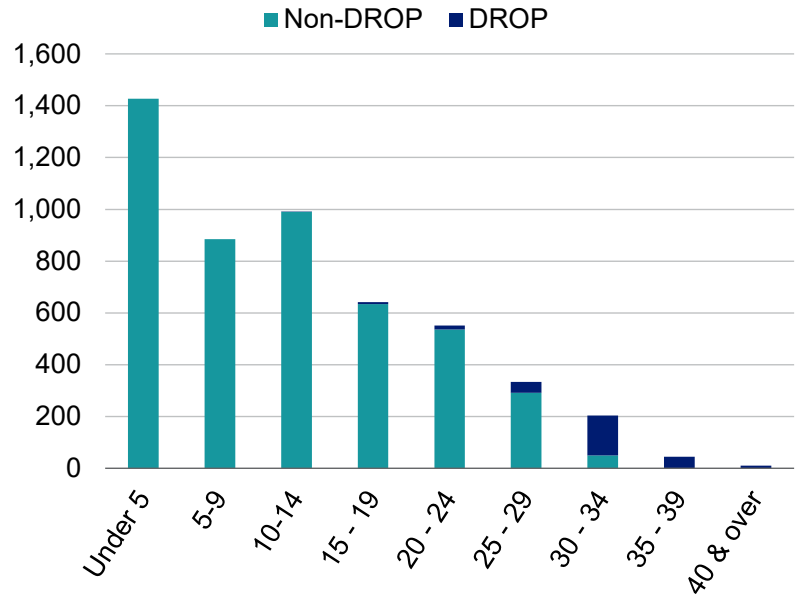
Section 2: Actuarial Valuation Results

Distribution of Active Members as of December 31, 2021

Actives by Age



Actives by Years of Service



The number of active participants in the DROP decreased from 320 at the end of 2020 to 276 at the end of 2021.

Inactive members

In this year's valuation, there were 233 members with a vested right to a deferred or immediate vested benefit. In addition, there were 462 non-vested members entitled only to a return of their employee contributions.

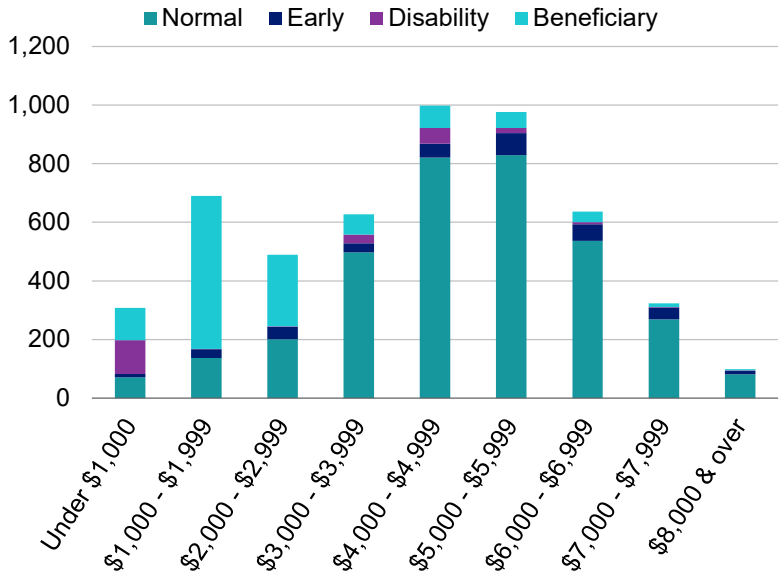
Section 2: Actuarial Valuation Results

Retired members and beneficiaries

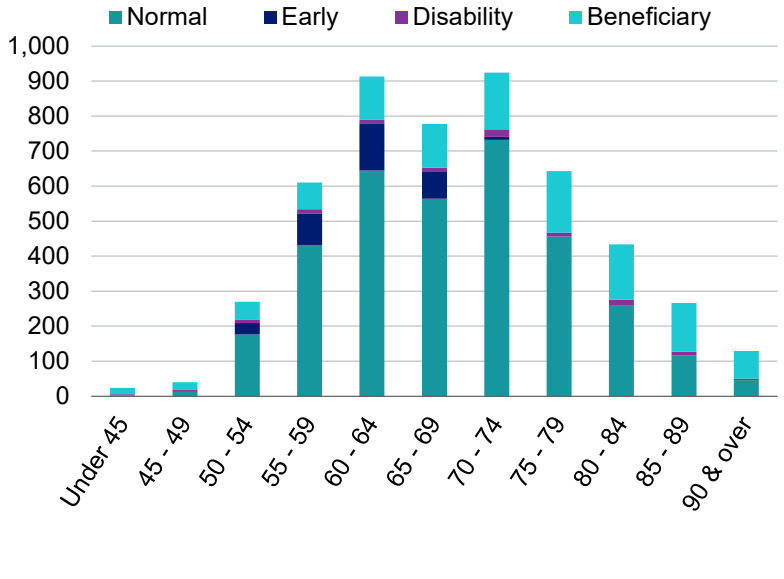
As of December 31,	2021	2020	Change
Retirees	3,902	3,840	1.6%
Beneficiaries[1]	1,169	1,163	0.5%
Average age	69.0	68.9	0.1
Average amount	$4,311	$4,273	0.9%
Total monthly amount	$21,858,592	$21,384,025	2.2%

Distribution of Retired Participants as of December 31, 2021

Retired Participants by Type and Monthly Amount



Retired Participants by Type and Age



[1] Does not include beneficiaries with annuitized DROP accounts only and no lifetime annuity (125 for 2021 and 107 for 2020)

Section 2: Actuarial Valuation Results

Historical plan population

Member Data Statistics: 2012 – 2021

	Active Members			Retired Members and Beneficiaries[1]		
Year Ended December 31	Count	Average Age	Average Service	Count	Average Age[2]	Average Monthly Amount[3]
2012	5,400	41.3	14.5	3,783	--	$3,429
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

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

Section 2: Actuarial Valuation Results

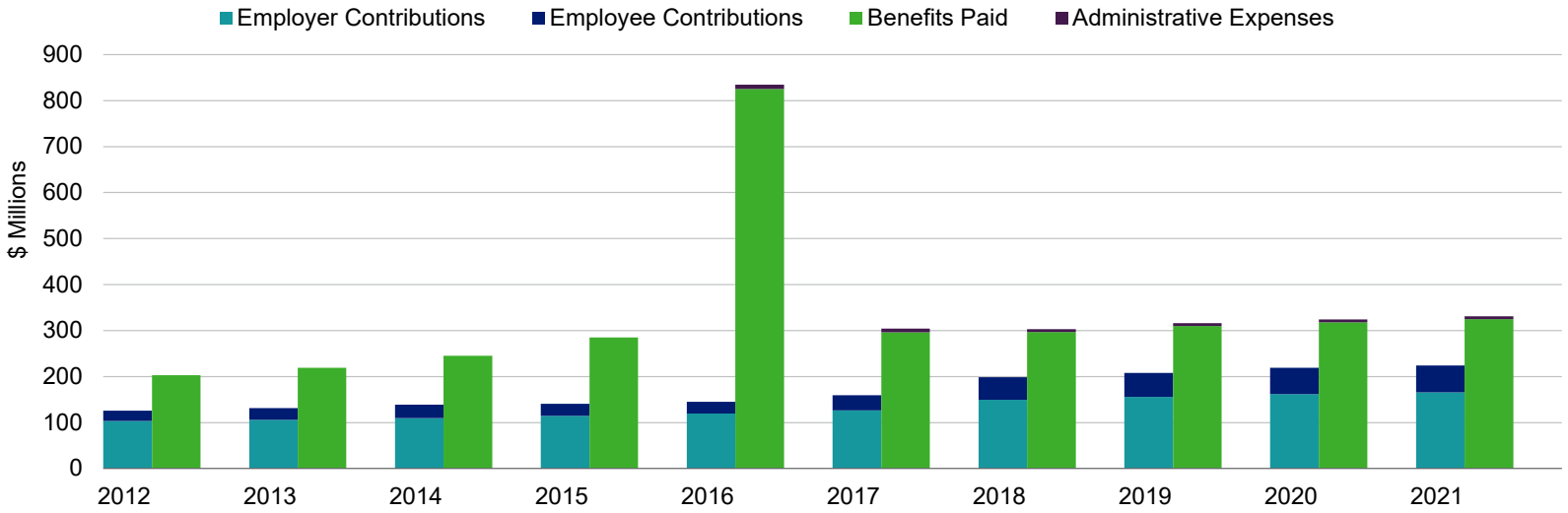
Financial information

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, 2012 – 2021



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, 2021

1	Market value of assets, December 31, 2021				$2,157,840,430
2	Calculation of unrecognized return	**Original Amount[1]**	**Percent Deferred[2]**	**Unrecognized Amount[3]**	
	(a) Year ended December 31, 2021	$198,197,350	80%	$158,557,880	
	(b) Year ended December 31, 2020	-149,294,320	60%	-89,576,592	
	(c) Year ended December 31, 2019	-19,852,697	40%	-7,941,078	
	(d) Year ended December 31, 2018	-105,891,055	20%	-21,178,211	
	(e) Total unrecognized return				$39,861,999
3	Preliminary actuarial value: **(1) - (2e)**				2,117,978,431
4	Adjustment to be within 20% corridor				0
5	Final actuarial value of assets as of December 31, 2021: **(3) + (4)**				2,117,978,431
6	Actuarial value as a percentage of market value: **(5) ÷ (1)**				98.2%
7	Amount deferred for future recognition: **(1) - (5)**				$39,861,999

[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, 2021 recognized in each of the next four years:

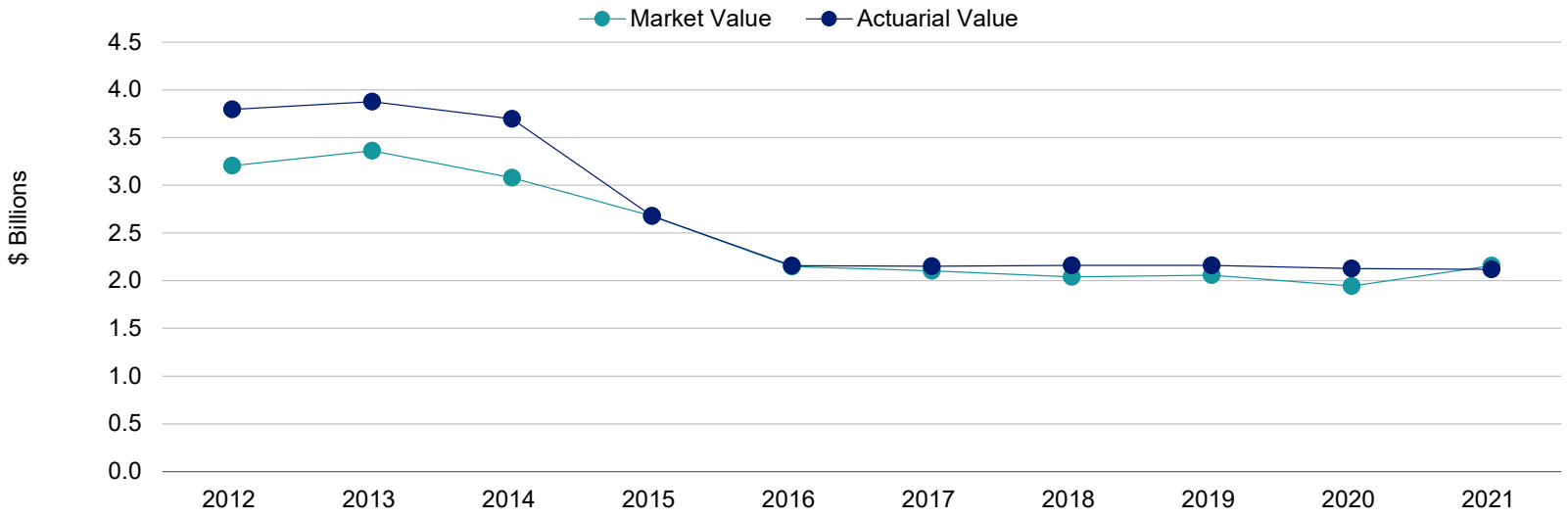
(a) Amount recognized on December 31, 2022	-$15,368,144
(b) Amount recognized on December 31, 2023	5,810,067
(c) Amount recognized on December 31, 2024	9,780,606
(d) Amount recognized on December 31, 2025	39,639,470

Section 2: Actuarial Valuation Results

Both the actuarial value and market value of assets are representations of the Plan's financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the Plan's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

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.

Market Value of Assets vs. Actuarial Value of Assets for Years Ended December 31, 2012 - 2021



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Market Value[1]	$3.21	$3.36	$3.08	$2.68	$2.15	$2.10	$2.04	$2.06	$1.94	$2.16
Actuarial Value[1]	3.80	3.88	3.70	2.68	2.16	2.15	2.16	2.16	2.13	2.12

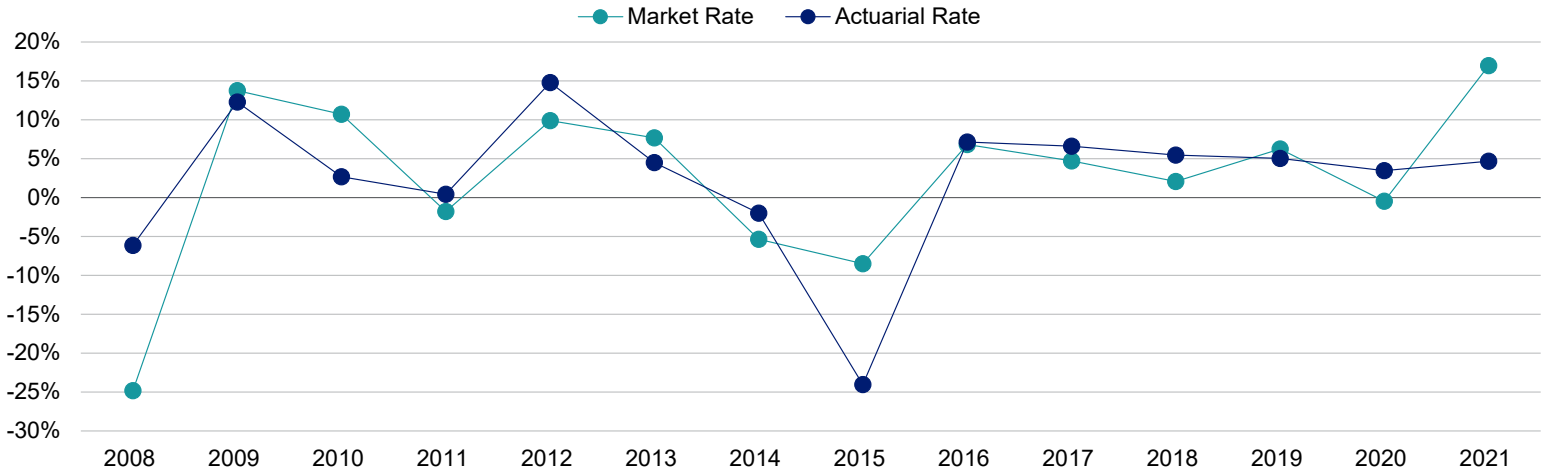
[1] In $ billions

Section 2: Actuarial Valuation Results

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the actual market value investment return for the last 14 years, including averages over select time periods.

As described earlier in this section, the actuarial asset valuation method gradually recognizes fluctuations in the market value rate of return. The goal of this is to stabilize the actuarial rate of return and to produce more level pension plan costs.

Market and Actuarial Rates of Return for Years Ended December 31, 2008 - 2021



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Market rate[1]	-24.8%	13.8%	10.7%	-1.8%	9.9%	7.7%	-5.3%	-8.5%	6.8%	4.7%	2.1%	6.3%	-0.4%	17.0%
Actuarial rate[2]	-6.1%	12.3%	2.7%	0.4%	14.8%	4.5%	-2.0%	-24.0%	7.2%	6.6%	5.5%	5.1%	3.5%	4.7%
Assumed rate	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	7.25%	7.25%	7.25%	7.25%	7.25%	7.0%	6.5%

Average Rates of Return	Actuarial Value	Market Value
Most recent five-year average return:	5.06%	5.77%
Most recent ten-year average return:	-0.46%	3.40%
14-year average return:	0.41%	1.64%

[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.

Section 2: Actuarial Valuation Results

Actuarial experience

To calculate any actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), any ADC requirement will decrease from the previous year. On the other hand, any ADC requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience. If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

Actuarial Experience for Year Ended December 31, 2021

1	Net loss from investments[1]	-$37,767,160
2	Net gain from administrative expenses	2,176,640
3	Net gain from other experience	29,090,801
4	Net loss from contributions less than actuarial determined contribution	-58,511,749
5	Net experience loss: **1 + 2 + 3 + 4**	-$65,011,468

[1] Details on next page

Section 2: Actuarial Valuation Results

Investment experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Plan's investment policy. The rate of return on the market value of assets was 16.99% for the year ended December 31, 2021.

For valuation purposes, the assumed rate of return on the actuarial value of assets is 6.50%. The actual rate of return on an actuarial basis for the 2021 Plan Year was 4.68%. Since the actual return for the year was less than the assumed return, the Plan experienced an actuarial loss during the year ended December 31, 2021 with regard to its investments.

Investment Experience

		Year Ended December 31, 2021	
		Market Value	**Actuarial Value**
1	Net investment income	$321,062,889	$97,067,077
2	Average value of assets	1,890,239,067	2,074,372,880
3	Rate of return: **1 ÷ 2**	16.99%	4.68%
4	Assumed rate of return	6.50%	6.50%
5	Expected investment income: **2 x 4**	122,865,539	134,834,237
6	Actuarial gain/(loss): **1 - 5**	$198,197,350	-$37,767,160

Section 2: Actuarial Valuation Results

Non-investment experience

Administrative expenses

- Administrative expenses for the year ended December 31, 2021 totaled $6,390,829, as compared to the assumption of $8,500,000. This resulted in a gain of $2,176,640 for the year, when adjusted for timing. Because it is expected that expenses will continue at a lower level, we have lowered the assumption to $7,000,000 for the current year.

Mortality experience

- Mortality experience (more or fewer than expected deaths) yields actuarial gains or losses.
- The number of deaths for nondisabled pensioners over the past year was 95 compared to 74.6 projected deaths for the same period. The assumed mortality table is the Pub-2010 Public Safety Retiree Amount-Weighted Table, set back one year for females. The Pub-2010 family of tables were published by the Society of Actuaries in 2019, and the public sector tables are appropriate for the valuation of this plan.

Contributions

- The net loss from total contributions less than the recommended contribution amount, prior to the timing adjustment, is $58,511,749, or 1.1% of the actuarial accrued liability.

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:

- the extent of turnover among members,
- retirement experience (earlier or later than projected),
- the number of disability retirements (more or fewer than projected), and
- salary increases (greater or smaller than projected).

The net gain from this other experience for the year ended December 31, 2021 amounted to $29,090,801, which is 0.6% of the actuarial accrued liability.

Section 2: Actuarial Valuation Results

Actuarial assumptions

The assumption changes reflected in this report are:

- Administrative expenses decreased to $7,000,000 for the year beginning January 1, 2022.
- The ad-hoc COLA assumption was lowered from 2.0% to 1.5%. Ongoing, the COLA assumption will remain at five percentage points less than the investment return assumption.
- Based on a projection of the System's funded ratio, taking into account 2022 data, new long-term assumptions, and the System's near-term asset expectations, the ad-hoc COLA assumption was updated to begin October 1, 2073. Last year, the COLA was assumed to begin October 1, 2069.

These changes decreased the actuarial accrued liability by 0.08% and decreased the employer normal cost by 8.07%.

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.

A summary of plan provisions is in *Section 4, Exhibit II*.

Section 2: Actuarial Valuation Results

Development of Unfunded Actuarial Accrued Liability for Year Ended December 31, 2021

1	Unfunded actuarial accrued liability at beginning of year		$2,988,132,186
2	Total normal cost at beginning of year, including administrative expense assumption		82,149,248
3	Total contributions		-224,101,245
4	Interest on 1, 2 & 3		192,361,707
5	Expected unfunded actuarial accrued liability		$3,038,541,896
6	Changes due to:		
	(a) Net experience loss	$6,499,719	
	(b) Assumptions	-4,237,706	
	Total changes		$2,262,013
7	Unfunded actuarial accrued liability at end of year		$3,040,803,909

Section 2: Actuarial Valuation Results

Actuarially determined contribution

The actuarially determined contribution is equal to the City normal cost payment and a payment on the unfunded actuarial accrued liability (UAL). As of January 1, 2022, the actuarially determined contribution is $228,530,758, or 52.30% 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 68 years.

The contribution requirement as of January 1, 2022 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

		2022		2021	
		Amount	% of Computation Pay	Amount	% of Computation Pay
1	Total normal cost	$74,657,001	17.09%	$73,912,721	17.29%
2	Administrative expenses	6,783,022	1.55%	8,236,527	1.93%
3	Expected member contributions	-58,991,137	-13.50%	-57,704,472	-13.50%
4	Employer normal cost: (1) + (2) + (3)	$22,448,886	5.14%	$24,444,776	5.72%
5	Actuarial accrued liability	$5,158,782,340		$5,115,966,592	
6	Actuarial value of assets	2,117,978,431		2,127,834,406	
7	Unfunded actuarial accrued liability: (5) - (6)	$3,040,803,909		$2,988,132,186	
8	Payment on unfunded actuarial accrued liability	198,998,142	45.54%	189,981,813	44.45%
9	Adjustment for timing[1]	7,083,730	1.62%	6,859,157	1.60%
10	Actuarially determined contribution: (4) + (8) + (9)	$228,530,758	52.30%	$221,285,746	51.77%
11	Total computation pay[2]	$436,971,384		$427,440,530	

[1] Actuarially determined contributions are assumed to be paid at the middle of every month.
[2] 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.

Section 2: Actuarial Valuation Results

Reconciliation of actuarially determined contribution

The chart below details the changes in the actuarially determined contribution from the prior valuation to the current year's valuation.

Reconciliation of Actuarially Determined Contribution from January 1, 2021 to January 1, 2022

		Amount
1	Actuarially Determined Contribution as of January 1, 2021	$221,285,746
2	Effect of expected change in amortization payment due to payroll growth	4,901,476
3	Effect of change in administrative expense assumption	-1,500,000
4	Effect of change in other actuarial assumptions	-841,055
5	Effect of contributions less than actuarially determined contribution	4,239,381
6	Effect of investment loss	2,736,363
7	Effect of other gains and losses on accrued liability	-2,265,436
8	Net effect of other changes, including composition and number of members	-25,718
9	Total change	$7,245,012
10	Actuarially Determined Contribution as of January 1, 2022	$228,530,758

Section 2: Actuarial Valuation Results

History of employer contributions

A history of the most recent years of contributions is shown below.

History of Employer Contributions: 2016 – 2022

Fiscal Year Ended December 31	Actuarially Determined Employer Contribution (ADC)		Actual Employer Contribution		
	Amount	Percentage of Pay	Amount	Percentage of Pay	Percent Contributed
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%	TBD	N/A	N/A

Section 2: Actuarial Valuation Results

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 ten years has ranged from a low of -8.47% to a high of 16.99%.
- **Contribution Risk** (the risk that actual contributions will be different from expected contributions)

  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 minimums on the 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 by 2090. 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 $437.0 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 64% funded in 2090, rather than 100%.

Section 2: Actuarial Valuation Results

- **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.

- **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 and Implications for the Future

  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 $3.8 billion as opposed to the actual value of $2.2 billion.

  – The funded percentage on the actuarial value of assets has ranged from a low of 41.1% to a high of 78.1%.

- **Maturity Measures**

  As pension plans mature, the cash need 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 1.07. For the prior year, benefits and administrative expenses paid were $106.9 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.

Section 2: Actuarial Valuation Results

- 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.

Section 2: Actuarial Valuation Results

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. As noted previously, the funding policy adopted by the State in HB 3158 meets this standard, with full funding projected in 2090, if the City's Hiring Plan payroll projections come to fruition. City and member contributions as well as investment returns will be necessary to increase the assets sufficiently to cover the System's liabilities.

GFOA Solvency Test as of December 31

	2021	2020[1]
Actuarial accrued liability (AAL)		
• Active member contributions	$382,198,948	$352,375,747
• Retirees and beneficiaries	3,554,266,474	3,499,909,200
• Inactive vested members	24,985,278	26,533,699
• Active and inactive non-vested members (employer-financed)	1,197,331,640	1,237,147,946
Total	$5,158,782,340	$5,115,966,592
Actuarial value of assets	$2,117,978,431	$2,127,834,406
Cumulative portion of AAL covered		
• Active member contributions	100.00%	100.00%
• Retirees and beneficiaries	48.84%	50.73%
• Active and inactive members (employer-financed)	0.00%	0.00%

[1] Re-stated December 31, 2020 numbers to include DROP-only beneficiaries with "Retirees and beneficiaries"; the total amount did not change

Section 2: Actuarial Valuation Results

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, 2021	**December 31, 2020[1]**
Liabilities		
• Present value of benefits for retired members and beneficiaries (non-DROP)	$2,690,126,664	$2,629,942,036
• Present value of benefits for retired members and beneficiaries (DROP)	864,139,810	869,967,164
• Present value of benefits for inactive members	26,971,728	28,273,247
• Present value of benefits for active members	2,293,640,796	2,287,518,365
Total liabilities	**$5,874,878,998**	**$5,815,700,812**
Assets		
• Total valuation value of assets	$2,117,978,431	$2,127,834,406
• Present value of future contributions by members	573,986,447	556,423,200
• Present value of future employer contributions for:		
• Entry age cost	142,110,211	143,311,020
• Unfunded actuarial accrued liability	3,040,803,909	2,988,132,186
Total of current and future assets	**$5,874,878,998**	**$5,815,700,812**

[1] Re-stated December 31, 2020 numbers to include DROP-only beneficiaries with "retired members and beneficiaries (DROP)"; the total amount did not change

Section 3: Supplemental Information

Exhibit A: Table of Plan Demographics

Category	Year Ended December 31 2021	2020	Change From Prior Year
Active members in valuation:			
• Number	5,088	5,106	-0.4%
• Average age	40.1	40.0	0.1
• Average years of service	12.6	12.6	0.0
• Total computation pay	$436,971,384	$427,440,530	2.2%
• Average computation pay	85,883	83,713	2.6%
• Account balances	382,198,948	352,375,747	8.5%
• Total active vested members	3,661	3,704	-1.2%
Active members (excluding DROP):			
• Number	4,812	4,786	0.5%
• Average age	39.0	38.8	0.2
• Average years of service	11.5	11.6	-0.1
• Total computation pay	$410,752,408	$396,849,741	3.5%
• Average computation pay	85,360	82,919	2.9%
Active members (DROP only):			
• Number	276	320	-13.8%
• Average age	58.3	58.0	0.3
• Average years of service	31.8	31.2	0.6
• Total computation pay	$26,218,976	$30,590,788	-14.3%
• Average computation pay	94,996	95,596	-0.6%
• DROP account balances	113,584,279	135,389,840	-16.1%
Inactive vested members			
• Number	233	241	-3.3%
• Average age	41.7	41.5	0.2
• Average monthly benefit	$1,219	$1,243	-1.9%
Inactive nonvested members due a refund			
• Number	462	442	4.5%
• Accumulated contribution balance	$1,986,450	$1,739,548	14.2%

Section 3: Supplemental Information

Retired members:			
• Number in pay status	3,786	3,719	1.8%
• Average age	67.9	67.7	0.2
• Average monthly benefit	$4,919	$4,905	0.3%
Disabled members:			
• Number in pay status	116	121	-4.1%
• Average age	69.1	68.4	0.7
• Average monthly benefit	$3,619	$3,612	0.2%
Beneficiaries:			
• Number in pay status	1,169	1,163	0.5%
• Average age	72.9	73.2	-0.3
• Average monthly benefit	$2,408	$2,319	3.8%
Beneficiaries with DROP only:			
• Number	125	107	16.8%

Section 3: Supplemental Information

Exhibit B: Total Members in Active Service as of December 31, 2021 by Age, Years of Service, and Average Pay

		Years of Service								
Age	**Total**	**0-4**	**5-9**	**10-14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35 - 39**	**40 & over**
Under 25	190	189	1	- -	- -	- -	- -	- -	- -	- -
	$64,273	$64,225	$73,263	- -	- -	- -	- -	- -	- -	- -
25 - 29	719	615	104	- -	- -	- -	- -	- -	- -	- -
	$69,342	$67,920	$77,754	- -	- -	- -	- -	- -	- -	- -
30 - 34	846	401	376	69	- -	- -	- -	- -	- -	- -
	$76,827	$68,473	$82,457	$94,692	- -	- -	- -	- -	- -	- -
35 - 39	938	158	253	467	60	- -	- -	- -	- -	- -
	$87,145	$68,993	$82,904	$94,438	$96,060	- -	- -	- -	- -	- -
40 - 44	752	43	109	264	263	72	1	- -	- -	- -
	$92,282	$67,973	$81,965	$93,151	$97,973	$98,538	$85,801	- -	- -	- -
45 - 49	684	18	27	124	184	283	48	- -	- -	- -
	$96,264	$73,876	$83,791	$91,777	$95,599	$100,276	$102,160	- -	- -	- -
50 - 54	566	2	12	45	86	149	197	75	- -	- -
	$96,389	$38,645	$86,336	$93,021	$94,938	$99,173	$99,999	$88,207	- -	- -
55 - 59	304	1	2	16	37	37	79	104	28	- -
	$97,398	$72,394	$91,960	$92,868	$93,177	$98,756	$98,534	$97,405	$101,816	- -
60 - 64	69	- -	1	4	10	9	8	23	12	2
	$97,843	- -	$91,960	$93,280	$92,028	$98,162	$96,361	$98,756	$101,450	$111,321
65 - 69	14	- -	- -	3	1	1	1	1	4	3
	$96,775	- -	- -	$95,066	$89,078	$89,136	$86,631	$95,492	$101,907	$100,564
70 & over	6	- -	- -	- -	- -	- -	- -	- -	1	5
	$108,876	- -	- -	- -	- -	- -	- -	- -	$94,305	$111,791
Total	5,088	1,427	885	992	641	551	334	203	45	10
	$85,883	$67,744	$82,087	$93,688	$96,322	$99,594	$99,793	$94,151	$101,560	$108,329

Section 3: Supplemental Information

Police Members in Active Service as of December 31, 2021 by Age, Years of Service, and Average Pay

		Years of Service								
Age	**Total**	**0-4**	**5-9**	**10-14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35 - 39**	**40 & over**
Under 25	140	140	- -	- -	- -	- -	- -	- -	- -	- -
	$64,194	$64,194	- -	- -	- -	- -	- -	- -	- -	- -
25 - 29	448	378	70	- -	- -	- -	- -	- -	- -	- -
	$69,261	$67,788	$77,219	- -	- -	- -	- -	- -	- -	- -
30 - 34	494	203	255	36	- -	- -	- -	- -	- -	- -
	$77,285	$68,112	$82,072	$95,108	- -	- -	- -	- -	- -	- -
35 - 39	533	59	137	290	47	- -	- -	- -	- -	- -
	$88,434	$68,492	$81,794	$94,495	$95,422	- -	- -	- -	- -	- -
40 - 44	450	31	53	141	181	43	1	- -	- -	- -
	$91,719	$67,939	$82,758	$92,817	$96,641	$95,723	$85,801	- -	- -	- -
45 - 49	416	14	18	80	109	165	30	- -	- -	- -
	$94,820	$72,922	$83,668	$91,979	$95,274	$97,533	$102,741	- -	- -	- -
50 - 54	377	1	9	43	57	86	118	63	- -	- -
	$94,139	$3,600	$86,221	$92,889	$95,434	$96,169	$98,183	$86,043	- -	- -
55 - 59	183	- -	- -	15	26	22	40	72	8	- -
	$96,455	- -	- -	$92,085	$93,061	$98,799	$98,089	$96,694	$98,921	- -
60 - 64	41	- -	- -	4	5	8	4	15	4	1
	$97,418	- -	- -	$93,280	$93,418	$95,869	$98,059	$97,629	$106,036	$106,136
65 - 69	6	- -	- -	1	1	1	- -	- -	2	1
	$95,860	- -	- -	$90,097	$89,078	$89,136	- -	- -	$94,966	$116,918
70 & over	4	- -	- -	- -	- -	- -	- -	- -	1	3
	$102,166	- -	- -	- -	- -	- -	- -	- -	$94,305	$104,786
Total	3,092	826	542	610	426	325	193	150	15	5
	$85,436	$67,324	$81,564	$93,625	$95,721	$96,951	$98,805	$92,314	$99,983	$107,482

Section 3: Supplemental Information

Fire Members in Active Service as of December 31, 2021 by Age, Years of Service, and Average Pay

		Years of Service								
Age	**Total**	**0-4**	**5-9**	**10-14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35 - 39**	**40 & over**
Under 25	50	49	1	- -	- -	- -	- -	- -	- -	- -
	$64,495	$64,316	$73,263	- -	- -	- -	- -	- -	- -	- -
25 - 29	271	237	34	- -	- -	- -	- -	- -	- -	- -
	$69,476	$68,131	$78,857	- -	- -	- -	- -	- -	- -	- -
30 - 34	352	198	121	33	- -	- -	- -	- -	- -	- -
	$76,183	$68,843	$83,270	$94,239	- -	- -	- -	- -	- -	- -
35 - 39	405	99	116	177	13	- -	- -	- -	- -	- -
	$85,448	$69,291	$84,214	$94,345	$98,364	- -	- -	- -	- -	- -
40 - 44	302	12	56	123	82	29	- -	- -	- -	- -
	$93,123	$68,060	$81,213	$93,534	$100,915	$102,714	- -	- -	- -	- -
45 - 49	268	4	9	44	75	118	18	- -	- -	- -
	$98,505	$77,213	$84,038	$91,412	$96,071	$104,113	$101,191	- -	- -	- -
50 - 54	189	1	3	2	29	63	79	12	- -	- -
	$100,877	$73,690	$86,681	$95,863	$93,963	$103,274	$102,712	$99,573	- -	- -
55 - 59	121	1	2	1	11	15	39	32	20	- -
	$98,822	$72,394	$91,960	$104,610	$93,452	$98,692	$98,990	$99,005	$102,974	- -
60 - 64	28	- -	1	- -	5	1	4	8	8	1
	$98,465	- -	$91,960	- -	$90,638	$116,506	$94,662	$100,869	$99,157	$116,506
65 - 69	8	- -	- -	2	- -	- -	1	1	2	2
	$97,462	- -	- -	$97,551	- -	- -	$86,631	$95,492	$108,847	$92,388
70 & over	2	- -	- -	- -	- -	- -	- -	- -	- -	2
	$122,298	- -	- -	- -	- -	- -	- -	- -	- -	$122,298
Total	1,996	601	343	382	215	226	141	53	30	5
	$86,575	$68,321	$82,913	$93,788	$97,512	$103,394	$101,146	$99,348	$102,348	$109,175

Section 3: Supplemental Information

Exhibit C: Reconciliation of Member Data

	Active Members	Inactive Vested Members[1]	Disableds	Retired Members	Beneficiaries[2]	Total
Number as of January 1, 2021	**5,106**	**241**	**121**	**3,719**	**1,163**	**10,350**
• New members	274	N/A	N/A	N/A	N/A	274
• Terminations – with vested rights	-21	21	N/A	N/A	N/A	0
• Terminations – without vested rights	-40	N/A	N/A	N/A	N/A	-40
• Retirements	-147	-17	N/A	164	N/A	0
• New disabilities	0	0	0	N/A	N/A	0
• Deceased	-13	0	-5	-95	-68	-181
• New beneficiaries	N/A	N/A	N/A	N/A	78	78
• Lump sum payouts[3]	-79	-6	N/A	N/A	N/A	-85
• Rehire	8	-6	N/A	-2	N/A	0
• Certain period expired	N/A	N/A	N/A	N/A	-4	-4
Number as of January 1, 2022	**5,088**	**233**	**116**	**3,786**	**1,169**	**10,392**

[1] Excludes non-vested terminated members due a refund of contributions.
[2] Excludes beneficiaries with a DROP only.
[3] Members who terminated and requested a refund of member contributions.

Section 3: Supplemental Information

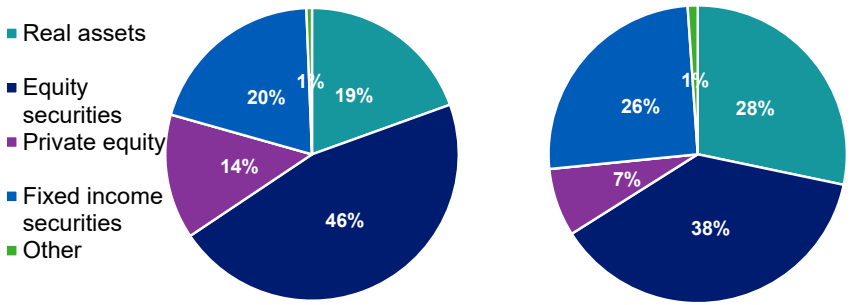
Exhibit D: Summary Statement of Income and Expenses on a Market Value Basis

	Year Ended December 31, 2021		Year Ended December 31, 2020	
Net assets at market value at the beginning of the year		$1,943,700,593		$2,057,857,317
Contribution income:				
• City contributions	$165,541,265		$161,950,183	
• Member contributions	58,559,980		57,305,399	
• Less administrative expenses	-6,390,829		-6,534,350	
Net contribution income		*$217,710,416*		*$212,721,232*
Investment income:				
• Interest, dividends and other income	$28,758,381		$29,937,351	
• Recognition of capital appreciation	303,367,916		-30,451,106	
• Less investment fees	-11,063,408		-8,413,581	
Net investment income		*$321,062,889*		*-$8,927,336*
Total income available for benefits		**$538,773,305**		**$203,793,896**
Less benefit payments:				
• Benefit Payments	-$321,348,320		-$315,674,779	
• Refunds to members	-3,285,148		-2,275,841	
Net benefit payments		*-$324,633,468*		*-$317,950,620*
Change in market value of assets		**$214,139,837**		**-$114,156,724**
Net assets at market value at the end of the year		**$2,157,840,430**		**$1,943,700,593**

Section 3: Supplemental Information

Exhibit E: Summary Statement of Plan Assets

	December 31, 2021	December 31, 2020
Cash equivalents and prepaid expenses	$59,924,644	$88,290,940
Capital assets	11,745,139	11,986,674
Total accounts receivable	9,925,407	19,113,498
Investments:		
• Equity securities	$960,008,108	$694,903,302
• Fixed income securities	416,490,402	469,459,926
• Real assets	405,937,634	520,936,531
• Private equity	287,199,831	136,160,838
• Other	12,828,802	19,964,791
Total investments at market value	$2,082,464,777	$1,841,425,388
Total assets	$2,164,059,967	$1,960,816,500
Total accounts payable	-6,219,537	-17,115,907
Net assets at market value	**$2,157,840,430**	**$1,943,700,593**
Net assets at actuarial value	**$2,117,978,431**	**$2,127,834,406**



Section 3: Supplemental Information

Exhibit F: Development of the Fund through December 31, 2021

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
2012	$103,310,264	$22,490,884	$292,719,981	$0	$203,099,511	$3,206,364,971	$3,795,024,584	118.4%
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[3]	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%

[1] On a market basis, net of investment fees and administrative expenses
[2] Administrative expenses were subtracted from net investment return prior to the 2016 valuation
[3] Unaudited assets were used for the January 1, 2017 actuarial valuation. When the audited financial statements were completed, there were updates to the employer contributions and investment return amounts, resulting in a revision to the market value of assets. Thus, the amounts shown above as of December 31, 2016 differ from the System's and City's Comprehensive Annual Financial Reports. The differences are immaterial to the System's actuarial results.

Section 3: Supplemental Information

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	$164,503,694	23	$2,564,089,180
Experience loss	01/01/2021	20	163,324,136	11,753,273	19	161,728,267
Change in assumptions	01/01/2021	20	256,721,167	18,474,391	19	254,212,700
Experience loss	01/01/2022	20	65,011,468	4,564,304	20	65,011,468
Change in assumptions	01/01/2022	20	-4,237,706	-297,520	20	-4,237,706
Total				**$198,998,142**		**$3,040,803,909**

[1] Level percentage of payroll

Section 3: Supplemental Information

Exhibit H: 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 (APV):	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

Section 3: Supplemental Information

	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 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 (AVA):	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 (ADC):	The employer's periodic required 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;

Section 3: Supplemental Information

	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.
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.

Section 3: Supplemental Information

Normal Cost:	The portion of the Actuarial Present Value of Future Benefits and expenses 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.
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.
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.

Section 4: Actuarial Valuation Basis

Exhibit I: Actuarial Assumptions and Actuarial Cost Method

Rationale for Assumptions	The information and analysis used by the Board in selecting each assumption that has a significant effect on the 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.
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 & Chiefs	Sergeants, Lieutenants, Captains, Majors, Deputy Chiefs & Assistant Chiefs
2020 – 2022	3.25	3.00	2.50
2023+	2.50	2.50	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 Meet and Confer Agreement.

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		

Market Value Asset Returns: -13.00% in 2022 and 6.50% annually thereafter

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 (previously, $8,500,000)

Section 4: Actuarial Valuation Basis

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.

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.

Section 4: Actuarial Valuation Basis

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

Section 4: Actuarial Valuation Basis

Retirement Rates:

DROP Active Members

	Rate (%)	
Age	**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

100% retirement rate after ten years in DROP.

Section 4: Actuarial Valuation Basis

Retirement Rates (continued):

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.

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 participants included in the January 1, 2022 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 the 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.

Section 4: Actuarial Valuation Basis

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 is 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 age and service as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Family Composition:	75% of participants 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.
Survivor Benefit Election:	Married participants are assumed to receive the non-reduced Joint and Survivor annuity form of payment. Non-married participants are assumed to have no beneficiaries and receive a Life Only annuity.
Actuarial Value of Assets:	Set to market value of assets as of December 31, 2015. Thereafter, market value of assets less unrecognized returns in each of the last five years beginning with 2016. 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 liabiity 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.
Justification for Change in Actuarial Assumptions and Methods:	Based on past experience and future expectations, the following actuarial assumptions were changed: • The annual administrative expense assumption was lowered from $8,500,000 to $7,000,000 • The ad-hoc COLA assumption was lowered from 2.00% to 1.50%. • The COLA assumption will automatically be updated as needed to remain five percentage points less than the net investment return assumption. • The ad-hoc COLA assumption was updated to begin October 1, 2073 based on the updated projection of the unfunded actuarial accrued liability; last year, the COLA was assumed to begin October 1, 2069.

Section 4: Actuarial Valuation Basis

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

Average Computation Pay:	**Benefit Earned Prior to September 1, 2017:** • 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:** • 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
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. **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.

Section 4: Actuarial Valuation Basis

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. Survivors who were age 55 on September 1, 2017 and were not receiving the Benefit Supplement because the members were still alive will be eligible for the Benefit Supplement upon the members death.
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.
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

Section 4: Actuarial Valuation Basis

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 if death occurs while in active 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.

Section 4: Actuarial Valuation Basis

Members whose Participation Began On or After March 1, 2011

Average Computation Pay:	• 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
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.
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. • *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.

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

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 if death occurs while in active service.

Section 4: Actuarial Valuation Basis

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

The components of the net pension liability at December 31, 2021 were as follows:

Total pension liability	$5,163,731,692
Plan fiduciary net position	2,157,840,430
Net pension liability	3,005,891,262
Plan fiduciary net position as a percentage of the total pension liability	41.79%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of January 1, 2022, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.50%
Real Rate of return	4.00%
Investment rate of return	6.50%, net of 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.

Section 5: GASB Information

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges 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 and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension Plan's target asset allocation as of December 31, 2021 are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return[1]
Global Equity	55%	6.40%
Emerging Market Equity	5%	8.50%
Private Equity	5%	10.40%
Short-Term Investment Grade Bonds	6%	0.00%
Investment Grade Bonds	4%	0.40%
High Yield Bonds	4%	2.60%
Bank Loans	4%	2.10%
Emerging Markets Debt	4%	2.80%
Real Estate	5%	3.90%
Natural Resources	5%	4.57%
Cash	3%	-0.10%
Total	100%	

Discount rate: The discount rate used to measure the total pension liability 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 Total Pension Liability. The normal cost rate for future members is assumed to be 15.55% for all years. Based on these assumptions, the System's fiduciary net position was projected to

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

Section 5: GASB Information

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 total pension liability.

Actuarial cost method: In accordance with GASB 67, the Total Pension Liability 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.

Section 5: GASB Information

Exhibit 2: Discount rate sensitivity

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability, calculated using the discount rate of 6.50%, as well as what the net pension liability 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 (6.50%)	1% Increase (7.50%)
Net pension liability	$3,619,927,078	$3,005,891,262	$2,495,744,587

Section 5: GASB Information

Exhibit 3: Schedule of Changes in Net Pension Liability

	2021	2020
Total pension liability		
• Service cost	$69,962,845	$56,244,288
• Interest	326,951,204	324,046,016
• Change of benefit terms	0	0
• Differences between expected and actual experience	-26,683,292	70,547,951
• Changes of assumptions	-4,238,016	257,524,962
• Benefit payments, including refunds of employee contributions	-324,633,468	-317,950,620
Net change in total pension liability	**$41,359,273**	**$390,412,597**
Total pension liability – beginning	**5,122,372,419**	**4,731,959,822**
Total pension liability – ending (a)	**$5,163,731,692**	**$5,122,372,419**
Plan fiduciary net position		
• Contributions – employer	$165,541,265	$161,950,183
• Contributions – employee	58,559,980	57,305,399
• Net investment income	321,062,889	-8,927,336
• Benefit payments, including refunds of employee contributions	-324,633,468	-317,950,620
• Administrative expense	-6,390,829	-6,534,350
Net change in plan fiduciary net position	**$214,139,837**	**-$114,156,724**
Plan fiduciary net position – beginning	**1,943,700,593**	**2,057,857,317**
Plan fiduciary net position – ending (b)	**$2,157,840,430**	**$1,943,700,593**
Net pension liability – ending (a) – (b)	**$3,005,891,262**	**$3,178,671,826**
Plan fiduciary net position as a percentage of the total pension liability	**41.79%**	**37.95%**
Covered payroll	**$436,971,384**	**$427,440,530**
Net pension liability as percentage of covered payroll	**687.89%**	**743.65%**

Notes to Schedule:

Benefit changes: None.

Change of Assumptions: The assumption changes in 2020 include lowering the discount rate from 7.00% to 6.50% and updating the expected COLA start date from October 1, 2063 to October 1, 2069. The assumption changes in 2021 include lowering the COLA from 2.00% to 1.50% and updating the expected COLA start date from October 1, 2069 to October 1, 2073.

Section 5: GASB Information

Exhibit 4: 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%

Notes to Schedule:

Methods and assumptions used to establish "actuarially determined contribution" rate for year ended December 31, 2021; these are not the same assumptions used in the January 1, 2022 actuarial valuation or for the Total Pension Liability measured as of December 31, 2021:

Valuation date	Actuarially determined contribution is calculated using a January 1, 2021 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	63 years as of January 1, 2021
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 market 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

[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

Inflation rate	2.50%
Projected salary increases	Inflation plus merit increases, varying by group and year
Retirement rates	Group-specific rates based on age
Cost of living adjustments	2.00% simple increases starting October 1, 2073
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, 2021 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
Interest on DROP Accounts	Beginning January 1, 2018, 2.75% payable upon retirement on active account balances as of September 1, 2017

9575318v4/14362.001

Dallas Police and Fire Pension System Supplemental Plan

Actuarial Valuation and Review as of January 1, 2022

This report has been prepared at the request of the Board of Trustees to assist in administering the Supplemental Plan. This valuation report may not otherwise be copied or reproduced in any form without the consent of the Board of Trustees and may only be provided to other parties in its entirety, unless expressly authorized by Segal. The measurements shown in this actuarial valuation may not be applicable for other purposes.

Segal

Segal

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

November 9, 2022

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

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2022. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for fiscal 2022.

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

The actuarial calculations were directed under my supervision. 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. Further, in my opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the System. Since the members in this Supplemental Plan are a subset of the Dallas Police and Fire Pension System Combined Pension Plan, and since the assets are invested together, the same assumptions are used for both. Changes impacting the larger plan will impact this one as well.

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

#9582035v6/14362.001

Table of Contents

Table of Contents

Section 1: Actuarial Valuation Summary

Purpose and basis

This report was prepared by Segal to present a valuation of the Plan as of January 1, 2022. 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 measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the Plan's benefit obligations. 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 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 vested members, and retired members and beneficiaries as of December 31, 2021, provided by the System's IT Department;
- The assets of the Plan as of December 31, 2021, 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.;
- The requirements of 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 Statements No 67 and 68 as of September 30, 2022 for the City is provided in a separate report.

Section 1: Actuarial Valuation Summary

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 UAL balance. In the Board's funding policy, the UAL as of January 1, 2020 was amortized over a closed, 20-year period, with future gains or losses each year thereafter amortized over separate, closed, 10-year periods. Amortization will remain on a level percentage of pay basis.
2. Actual City contributions made during the fiscal year ending December 31, 2021 were $2,098,588, 100.0% of the actuarially determined contribution (ADC). In the prior fiscal year, actual contributions were $1,777,311, 100.0% of the prior year ADC.
3. The rate of return on the market value of assets, as calculated by the actuary, was 17.14% for the 2021 Plan Year. This resulted in an actuarial gain when measured against the assumed rate of return of 6.50%.
4. The net experience loss from sources other than investment experience was 8.22% of the actuarial accrued liability prior to reflection of assumption changes. Large non-investment gains and losses are not unusual in a small plan of this nature.
5. The following actuarial assumptions were:
   a. The assumed annual administrative expenses were lowered from $65,000 to $55,000.
   b. The ad-hoc cost-of-living assumption was lowered from 2.00% to 1.50%, based on the expected market value of return of 6.50% less 5.00%.
   c. The starting year of the ad-hoc cost-of-living assumption was changed from 2069 to 2073, based on when the System is projected to be 70% funded on a market value basis after the COLA was reflected.

   As a result of these assumption changes, the employer normal cost decreased by $10,191 (1.2%) and the actuarial accrued liability decreased by $4,477 (0.01%). The total impact was a decrease in the ADC of $11,063.

Changes from prior valuation

6. The City's ADC for the upcoming year is $2,806,863, an increase of $708,275 from last year. The contribution is equal to the sum of the normal cost, administrative expenses, and amortization payments of the UAL. The primary reason for the increase in ADC is due to the increase in costs associated with a 164% increase in pay for active members.
7. The funded ratio (the ratio of assets to actuarial accrued liability) is 45.66%, compared to the prior year funded ratio of 43.69%. This ratio is one measure of funding status, and its history is a measure of funding progress. These measurements are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligation or the need for or the amount of future contributions.

Section 1: Actuarial Valuation Summary

Risk

8. 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 probes to be different from assumptions. Segal has not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the System's future financial condition but have included a brief discussion of some risks that may affect the System in *Section 2*.

GASB

9. This report constitutes an actuarial valuation for the purpose of determining the ADC under the Plan's 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 and employer's financial statements as of December 31, 2021. The Net Pensions Liability (NPL) and Pensions Expense under GASB Statement No. 68 for inclusion in the plan and employer's financial statements as of September 30, 2022 will be provided separately.
10. The Net Pension Liability (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).
11. The NPL as of December 31, 2021 is $22.2 million, an increase from $21.1 million as of December 31,2020.

Section 1: Actuarial Valuation Summary

Summary of key valuation results

		2022	2021
Contributions for plan year beginning January 1:	• Total actuarially determined contribution (City and member)	$3,042,984	$2,188,112
	• Expected member contribution	236,121	89,524
	• City's actuarially determined contribution (ADC)	2,806,863	2,098,588
	• Actual City contributions	- -	$2,098,588
Actuarial accrued liability for plan year beginning January 1:	• Retired members and beneficiaries	$32,457,556	$32,795,992
	• Inactive vested members	37,469	51,306
	• Active members	8,319,364	4,579,757
	• Inactive members due a refund of employee contributions	53,678	53,678
	• Total actuarial accrued liability	40,868,067	37,480,733
	• Employer normal cost including administrative expenses	1,072,752	462,319
Assets for plan year beginning January 1	• Actuarial (market) value of assets	$18,660,711	$16,374,184
Funded status for plan year beginning	• Unfunded/(overfunded) actuarial accrued liability	$22,207,356	$21,106,549
	• Funded percentage	45.66%	43.69%
	• Effective Amortization period on an AVA basis	16	17
Key assumptions	• Net investment return	6.50%	6.50%
	• Inflation rate/payroll increase	2.50%	2.50%
GASB information	• Discount rate	6.50%	6.50%
	• Total pension liability	$40,868,067	$37,484,432
	• Plan fiduciary net position	18,660,711	16,374,184
	• Net pension liability	22,207,356	21,110,248
	• Plan fiduciary net position	45.66%	43.68%
Demographic data for plan year beginning January 1:	• Number of retired members and beneficiaries	147	141
	• Number of inactive vested members	1	2
	• Number of active members	50	45
	• Number of inactive members due a refund of employee contributions	1	1
	• Total supplemental computation pay[1]	$1,694,833	$642,583
	• Average supplemental computation pay	33,897	14,280

[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.

Section 1: Actuarial Valuation Summary

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 of benefits	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 data	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.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the System.
Actuarial assumptions	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan's assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results that does not mean that the previous assumptions were unreasonable.
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. 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.

Section 1: Actuarial Valuation Summary

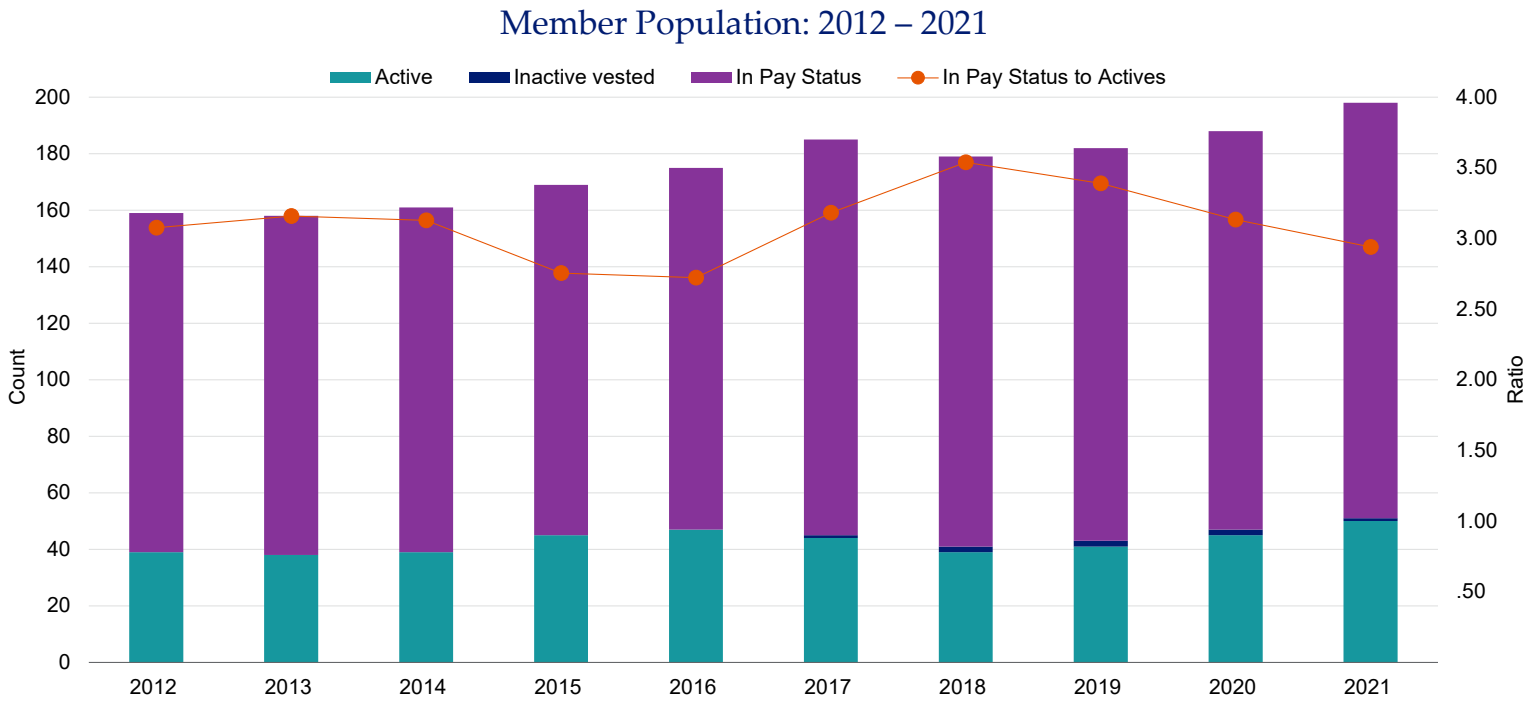
The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

The actuarial valuation is prepared at the request of the Board. Segal is not responsible for the use or misuse of its report, particularly by any other party.
An actuarial valuation is a measurement of the Plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. 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.
Actuarial results in this report are not rounded, but that does not imply precision.
If a 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's provisions, but they may be subject to alternative interpretations. The Board should look to their other advisors for expertise in these areas.

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

Section 2: Actuarial Valuation Results

Member data



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
In Pay Status	120	120	122	124	128	140	138	139	141	147
Inactive Vested[1]	0	0	0	0	0	1	2	2	2	1
Active	39	38	39	45	47	44	39	41	45	50
Ratio	3.08	3.16	3.13	2.76	2.72	3.18	3.54	3.39	3.13	2.94

[1] Excludes non-vested terminated participants due a refund of employee contributions

Section 2: Actuarial Valuation Results

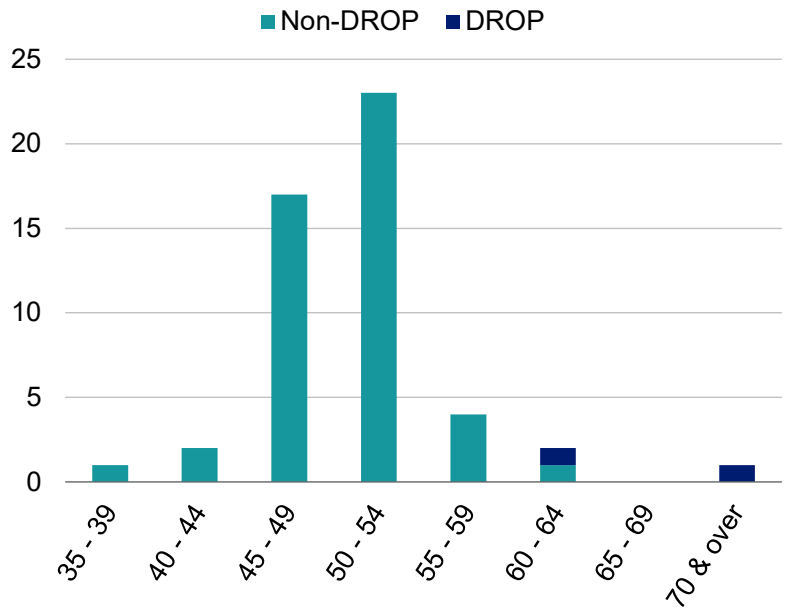
Active members

As of December 31,	2021	2020	Change
Police Officer			
Active Participants	33	28	17.9%
Average Age	50.9	51.1	-0.2
Average years of service	24.6	24.9	-0.3
Average Supplemental Computation pay	$31,525	$12,018	162.3%
Firefighters			
Active Participants	17	17	0.0%
Average Age	50.7	49.7	1.0
Average years of service	25.2	24.2	1.0
Average Supplemental Computation pay	$38,500	$18,004	113.8%
Total			
Active participants	50	45	11.1%
Average age	50.8	50.6	0.2
Average years of service	24.8	24.6	0.2
Average Supplemental Computation pay	$33,897	14,280	137.4%

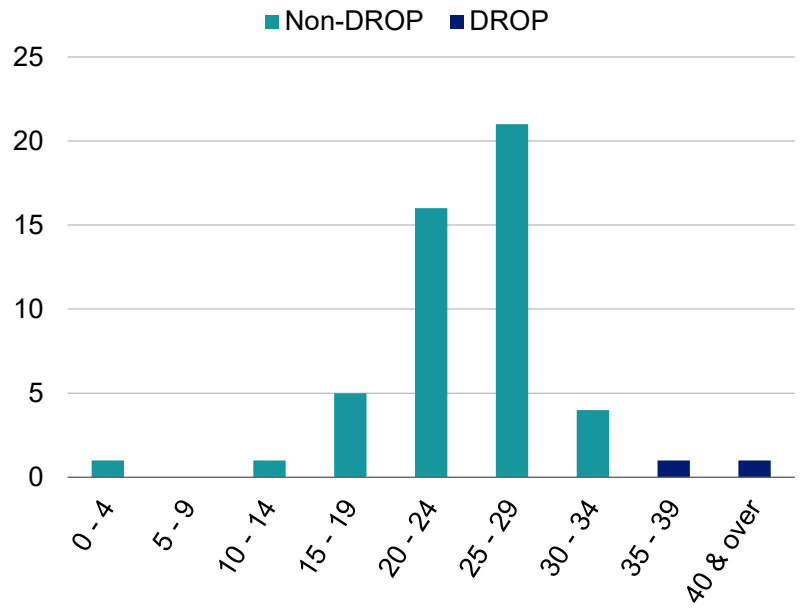
Section 2: Actuarial Valuation Results

Distribution of Active Members as of December 31, 2021

Actives by Age



Actives by Years of Service

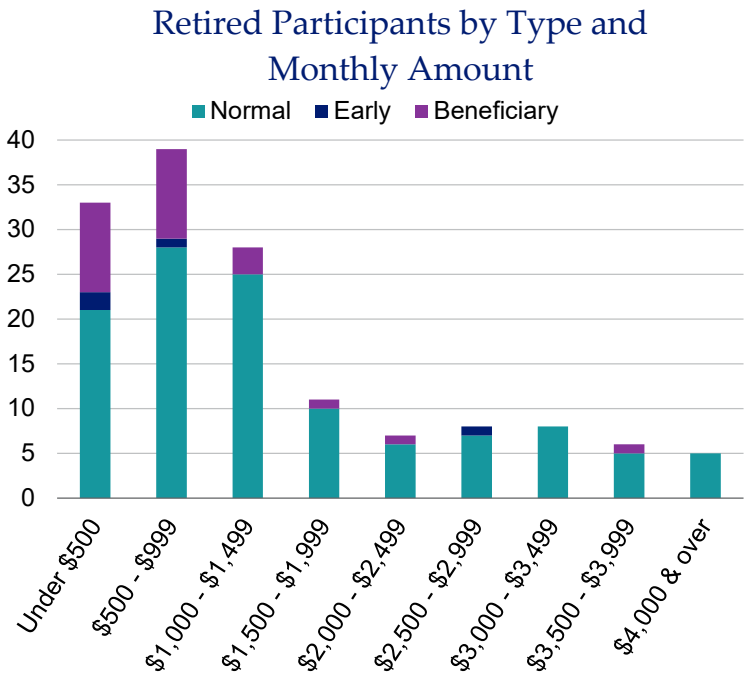


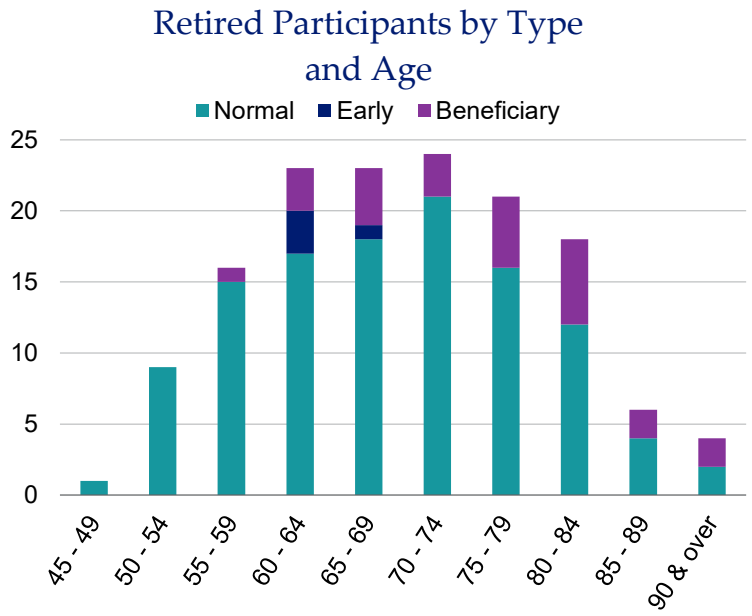
Section 2: Actuarial Valuation Results

Retired members and beneficiaries

As of December 31,	2021	2020	Change
Retirees	119	118	0.8%
Average age	68.3	68.9	-0.6
Average amount	$1,565	$1,453	7.7%
Beneficiaries[1]	26	23	13.0%
Total monthly amount	$207,402	$204,878	1.2%

Distribution of Retired Participants as of December 31, 2021





[1] Does not include beneficiaries with annuitized DROP accounts only and no lifetime annuity (2 for 2021 and 0 for 2020)

Section 2: Actuarial Valuation Results

Financial information

It is desirable to have level and predictable plan costs from one year to the next. However, the Board has approved an asset valuation method that uses market value. Under this valuation method, the full value of market fluctuation is recognized in a single year and, as a result, the asset value and the plan costs are relatively volatile. The Supplemental Plan is small compared to the Combined Pension Plan, and City contributions to the plan are less than 2% of the total amount that the City contributes to the System. Thus, some volatility can be withstood. The Board has the option to adopt an asset "smoothing" method in the future should they decide the current method (using market value) is producing undesirable fluctuations.

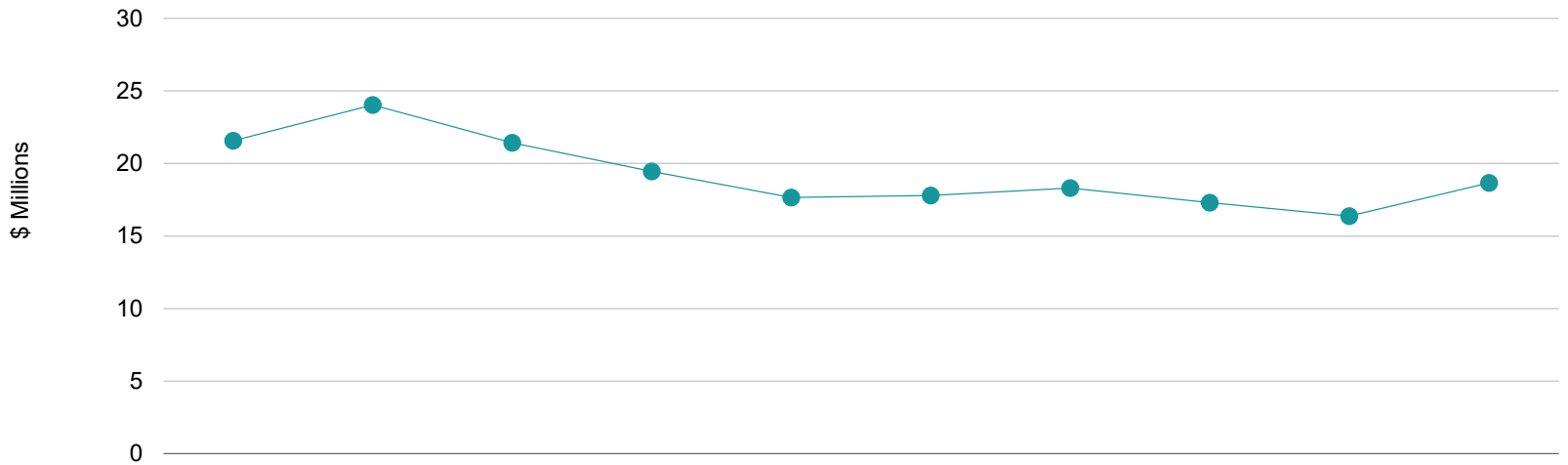
Determination of Actuarial Value of Assets for Year Ended December 31, 2021

1	Actuarial value of assets = Market value of assets	$18,660,711

Section 2: Actuarial Valuation Results

The actuarial value (equal to the market value of assets) is a representation of the Plan's financial status. The actuarial asset value is significant because the Plan's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

Actuarial Value of Assets (equal to Market Value of Assets)
for Years Ended December 31, 2012 - 2021



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Actuarial Value[1]	$21.56	$24.04	$21.44	$19.46	$17.66	$17.81	$18.32	$17.31	$16.37	$18.66

[1] In $ millions

Section 2: Actuarial Valuation Results

Actuarial experience

To calculate any actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), any ADC requirement will decrease from the previous year. On the other hand, any ADC requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience. If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

Actuarial Experience for Year Ended December 31, 2021

1	Net gain from investments[1]	$1,716,206
2	Net gain from administrative expenses	9,949
3	Net gain from contributions, based on timing	143,190
4	Net loss from other experience	-3,511,629
5	Net experience loss: **1 + 2 + 3 + 4**	-$1,642,284

[1] Details on next page

Section 2: Actuarial Valuation Results

Investment experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Plan's investment policy.

For valuation purposes, the assumed rate of return on the actuarial value of assets is 6.50%. The actual rate of return on an actuarial (market) basis for the 2021 Plan Year was 17.14%. Since the actual return for the year was greater than the assumed return, the Plan experienced an actuarial gain during the year ended December 31, 2021 with regard to its investments.

Investment Experience

		Year Ended December 31, 2021
		Actuarial (Market) Value
1	Net investment income	$2,764,978
2	Average value of assets	16,134,959
3	Rate of return: **1 ÷ 2**	17.14%
4	Assumed rate of return	6.50%
5	Expected investment income: **2 x 4**	1,048,772
6	Actuarial gain/(loss): **1 - 5**	$1,716,206

Section 2: Actuarial Valuation Results

Non-investment experience

Administrative expenses

- Administrative expenses for the year ended December 31, 2021 totaled $55,359, as compared to the assumption of $65,000. This resulted in a gain of $9,949 for the year, when adjusted for timing. Because it is expected that expenses will continue at a lower level, the assumption has been lowered to $55,000 for the current year.

Mortality experience

- Mortality experience (more or fewer than expected deaths) yields actuarial gains or losses.
- The number of deaths for nondisabled pensioners over the past year was two compared to 2.4 projected deaths for the same period. The assumed mortality table is the Pub-2010 Public Safety Retiree Amount-Weighted Table, set back one year for females. The Pub-2010 family of tables were published by the Society of Actuaries in 2019, and the public sector tables are appropriate for the valuation of this plan.

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:

- the extent of turnover among members,
- retirement experience (earlier or later than projected),
- the number of disability retirements (more or fewer than projected), and
- salary increases (greater or smaller than projected).

The net loss from this other experience for the year ended December 31, 2021 amounted to $3,511,629, which is 8.6% of the actuarial accrued liability.

Section 2: Actuarial Valuation Results

Actuarial assumptions

The following actuarial assumptions were approved by the board and changed with this valuation:

- The assumed annual administrative expenses were lowered from $65,000 to $55,000.
- The ad-hoc cost-of-living assumption was lowered from 2.00% to 1.50%, based on the expected market value of return of 6.50% less 5.00%.
- The starting year of the ad-hoc cost-of-living assumption was changed from 2069 to 2073, based on when the System is projected to be 70% funded on a market value basis after the COLA was reflected.

These changes decreased the actuarial accrued liability by 0.01% and decreased the employer normal cost by 1.2%.

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.

A summary of plan provisions is in *Section 4, Exhibit II*.

Section 2: Actuarial Valuation Results

Development of Unfunded Actuarial Accrued Liability for Year Ended December 31, 2021

1	Unfunded actuarial accrued liability at beginning of year		$21,106,549
2	Total normal cost at beginning of year, including administrative expense assumption		462,319
3	Total contributions		-2,326,481
4	Interest on 1, 2 & 3		1,327,162
5	Expected unfunded actuarial accrued liability		$20,569,549
6	Changes due to:		
	(a) Net experience loss	$1,642,284	
	(b) Assumptions	-4,477	
	Total changes		$1,637,807
7	Unfunded actuarial accrued liability at end of year		$22,207,356

Section 2: Actuarial Valuation Results

Actuarially determined contribution

The actuarially determined contribution is equal to the city normal cost payment and a payment on the unfunded actuarial accrued liability (UAL). As of January 1, 2022, the actuarially determined contribution is $2,806,863.

The funding policy used to calculate the actuarially determined contribution based on a closed, 20-year amortization of the UAL as of January 1, 2020, and a closed, 10-year amortization of any changes in the UAL thereafter. Amortization is on a level-percentage-of-pay basis. The payment on the unfunded actuarial accrued liability accounts for nearly 70% of the City's recommended contribution.

The contribution requirement as of January 1, 2022 are 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

		2022	2021
1	Total normal cost	$1,019,457	$399,334
2	Administrative expenses	53,295	62,985
3	Expected member contributions	-228,802	-86,749
4	Employer normal cost: (1) + (2) + (3)	$843,950	$375,570
5	Actuarial accrued liability	$40,868,067	$37,480,733
6	Actuarial value of assets	18,660,711	16,374,184
7	Unfunded actuarial accrued liability: (5) - (6)	$22,207,356	$21,106,549
8	Payment on unfunded/(overfunded) actuarial accrued liability	1,875,909	1,657,968
9	Adjustment for timing[1]	87,004	65,050
10	Actuarially determined contribution: (4) + (8) + (9)	$2,806,863	$2,098,588

[1] Actuarially determined contributions are assumed to be paid at the middle of every year.

Section 2: Actuarial Valuation Results

Reconciliation of actuarially determined contribution

The chart below details the changes in the actuarially determined contribution from the prior valuation to the current year's valuation.

Reconciliation of Actuarially Determined Contribution from January 1, 2021 to January 1, 2022

		Amount
1	Actuarially Determined Contribution as of January 1, 2021	$2,098,588
2	Effect of expected change in amortization payment due to payroll growth	42,775
3	Effect of change in administrative expense assumption	-10,000
4	Effect of change in other actuarial assumptions	-1,063
5	Effect of investment gain	-209,140
6	Effect of other gains and losses on accrued liability	409,272
7	Net effect of other changes, including composition and number of members	476,431
8	Total change	$708,275
9	Actuarially Determined Contribution as of January 1, 2022	$2,806,863

Section 2: Actuarial Valuation Results

History of employer contributions

A history of the most recent years of contributions is shown below.

The contribution deficiencies for calendar years 2017 through 2019 represent contributions directed to the Excess Benefit Plan and Trust.

History of Employer Contributions: 2013 – 2022

Fiscal Year Ended December 31	City's Actuarially Determined Contribution (ADC)	Actual Employer Contribution	Percent Contributed
2013	$1,935,588	$1,935,588	100.00%
2014	1,817,136	1,817,136	100.00%
2015	2,442,790	2,442,790	100.00%
2016	3,063,584	3,063,584	100.00%
2017	2,086,639	2,077,059	99.54%
2018	2,273,581	1,979,285	87.06%
2019	1,881,055	1,530,262	81.35%
2020	1,777,311	1,777,311	100.00%
2021	2,098,588	2,098,588	100.00%
2022	2,806,863	N/A	N/A

Section 2: Actuarial Valuation Results

Risk

Since the actuarial valuation results are dependent on a given set of assumptions and data as of a specific date, there is a risk that emerging results may differ significantly as actual experience differs from the assumptions.

The contributions of this Plan can fluctuate significantly from year to year, due to its nature as an excess pay plan and the fact the covered population is small. The assets are likely to fluctuate considerably from year to year as well, since there is no smoothing method in place. As mentioned previously, City contributions to this Plan are less than 2% of the total amount that the City contributes to the System, and therefore some volatility can be withstood. As long as the City continues to contribute the ADC, risk associated with this Plan should be minimal.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a brief discussion of some risks that may affect the Plan. Upon request, a more detailed assessment of the risks can be provided to enable a better understanding of the risks inherent in the Plan. This assessment may include scenario testing, sensitivity testing, stress testing and stochastic modeling.

Section 2: Actuarial Valuation Results

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%. As noted, previously the funded policy adopted by the City meets this standard.

GFOA Funded Liability by Type as of December 31

	2021	2020
Actuarial accrued liability (AAL)		
• Active member contributions	$505,321	$398,858
• Retirees and beneficiaries	32,457,556	32,795,992
• Inactive vested members	37,469	51,306
• Active and inactive non-vested members (employer-financed)	7,867,721	4,234,577
Total	$40,868,067	$37,480,733
Actuarial value of assets	$18,660,711	$16,374,184
Cumulative portion of AAL covered		
• Active member contributions	100.00%	100.00%
• Retirees and beneficiaries	55.94%	48.71%
• Active and inactive members (employer-financed)	0.00%	0.00%

Section 2: Actuarial Valuation Results

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, 2021	**December 31, 2020**
Liabilities		
• Present value of benefits for retired members and beneficiaries (non-DROP)	$26,049,401	$26,046,226
• Present value of benefits for retired members and beneficiaries (DROP)	6,408,155	6,749,766
• Present value of benefits for inactive members	91,147	104,984
• Present value of benefits for active members	12,621,352	5,954,139
Total liabilities	**$45,170,055**	**$38,855,115**
Assets		
• Total valuation value of assets	$18,660,711	$16,374,184
• Present value of future contributions by members	1,042,500	361,988
• Present value of future employer contributions for:		
• Entry age cost	3,259,488	1,012,394
• Unfunded actuarial accrued liability	22,207,356	21,106,549
Total of current and future assets	**$45,170,055**	**$38,855,115**

Section 3: Supplemental Information

Exhibit A: Table of Plan Demographics

Category	Year Ended December 31 2021	2020	Change From Prior Year
Active members in valuation:			
• Number	50	45	11.1%
• Average age	50.8	50.6	0.2
• Average years of service	24.8	24.6	0.2
• Total covered payroll	$1,694,833	$642,583	163.8%
• Average covered payroll	33,897	14,280	137.4%
• Account balances	505,321	398,858	26.7%
• Total active vested members	49	44	11.4%
Active members (excluding DROP):			
• Number	48	43	11.6%
• Average Age	50.1	49.8	0.3
• Average years of service	23.9	23.7	0.2
• Total supplemental computation pay	$1,653,015	$615,196	168.7%
• Average supplemental computation pay	$34,438	14,307	140.5%
Active members (DROP):			
• Number	2	2	0.0%
• Average Age	67.5	66.5	1.0
• Average years of service	45.2	44.2	1.0
• Total Supplemental computation pay	$41,818	$27,837	50.2%
• Average supplemental computation pay	20,909	13,694	52.7%
• DROP account balances	131,400	120,124	9.4%
Inactive vested members			
• Number	1	2	-50.0%
• Average age	47.8	48.4	-0.6
• Average monthly benefit	$447	$271	64.9%
Inactive nonvested members due a refund			
• Number	1	1	0.0%
• Accumulated contribution balance	$53,678	$53,678	0.0%

Section 3: Supplemental Information

Retired members:			
• Number in pay status	119	118	0.8%
• Average age	68.3	67.8	0.5
• Average monthly benefit	$1,565	$1,572	-0.4%
Beneficiaries:			
• Number in pay status	26	23	13.0%
• Average age	75.1	74.7	0.4
• Average monthly benefit	$812	$841	-3.4%
Beneficiaries with DROP only:			
• Number	2	0	N/A

Section 3: Supplemental Information

Exhibit B: Reconciliation of Member Data

	Active Members	Inactive Vested Members[1]	Retired Members	Beneficiaries	Total
Number as of January 1, 2021	**45**	**2**	**118**	**23**	**188**
• New members	8	N/A	N/A	N/A	8
• Terminations – with vested rights	0	0	0	0	0
• Terminations – without vested rights	0	N/A	N/A	N/A	0
• Retirements	-3	-1	4	N/A	0
• Return to work	1	0	-1	N/A	0
• New beneficiaries	0	0	0	4	4
• Deceased	0	0	-2	-1	-3
• Lump sum cash-outs	-1	0	0	0	-1
Number as of January 1, 2022	**50**	**1**	**119**	**26**	**196**

[1] Excludes non-vested terminated members due a refund of contributions.

Section 3: Supplemental Information

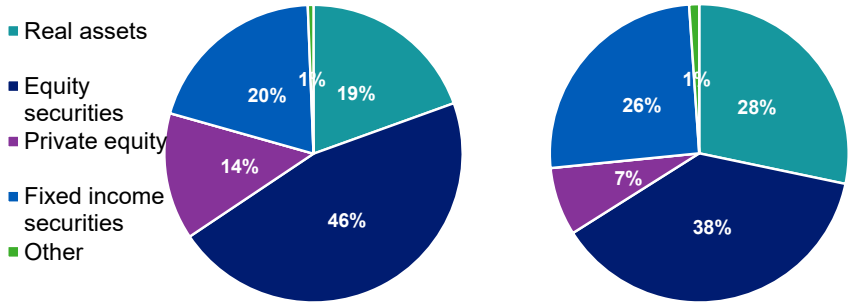
Exhibit C: Summary Statement of Income and Expenses on a Market Value Basis

	Year Ended December 31, 2021		Year Ended December 31, 2020	
Net assets at market value at the beginning of the year		$16,374,184		$17,307,433
Contribution income:				
• City contributions	$2,098,588		$1,777,311	
• Member contributions	227,893		245,237	
• Less administrative expenses	-55,359		-55,352	
Net contribution income		*$2,271,122*		*$1,967,196*
Investment income:				
• Investment, dividends and other income	$249,114		$255,493	
• Recognition of capital appreciation	2,611,699		-306,946	
• Less investment fees	-95,835		-71,273	
Net investment income		*$2,764,978*		*-$122,726*
Total income available for benefits		**$5,036,100**		**$1,844,470**
Less benefit payments:				
• Benefits paid to members	-$2,749,573		-$2,777,719	
• Refunds to members	0		0	
Net benefit payments		*-$2,749,573*		*-$2,777,719*
Change in market value of assets		**$2,286,527**		**-$933,249**
Net assets at market value at the end of the year		**$18,660,711**		**$16,374,184**

Section 3: Supplemental Information

Exhibit D: Summary Statement of Plan Assets

	December 31, 2021		December 31, 2020	
Cash equivalents and prepaid expenses		$519,085		$745,068
Capital assets		101,740		101,153
Total accounts receivable		39,057		119,804
Investments:				
• Equity securities	$8,315,876		$5,864,138	
• Fixed income securities	3,607,764		3,961,671	
• Real assets	3,516,353		4,396,071	
• Private equity	2,487,810		1,149,032	
• Other	111,127		168,478	
Total investments at market value		$18,038,930		$15,539,390
Total assets		$18,698,812		$16,505,415
Total accounts payable		-38,101		-131,231
Net assets at market value		**$18,660,711**		**$16,374,184**
Net assets at actuarial value		**$18,660,711**		**$16,374,184**



Section 3: Supplemental Information

Exhibit E: Development of the Fund through December 31, 2021

Year Ended December 31	City Contributions	Member Contributions	Net Investment Return[1]	Admin. Expenses[2]	Benefit Payments	Actuarial (Market) Value of Assets at Year-End
2012	$1,954,022	$26,688	$578,432	$0	$1,819,155	$21,562,556
2013	1,935,588	34,039	2,712,000	0	2,207,338	24,036,845
2014	1,817,136	49,104	-1,091,374	0	3,372,841	21,438,870
2015	2,442,790	43,358	-1,828,695	0	2,639,617	19,456,706
2016	2,985,478	34,612	1,176,323	78,047	5,911,533	17,663,539
2017	2,077,059	66,095	735,567	68,528	2,668,579	17,805,153
2018	1,979,285	73,880	1,220,482	52,636	2,708,271	18,317,893
2019	1,530,262	110,660	168,995	54,598	2,765,779	17,307,433
2020	1,777,311	245,237	-122,726	55,352	2,777,719	16,374,184
2021	2,098,588	227,893	2,764,978	55,359	2,749,573	18,660,711

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

Section 3: Supplemental Information

Exhibit F: Table of Amortization Bases

Type	Date Established	Initial Period	Initial Amount	Annual Payment[1]	Years Remaining	Outstanding Balance
2020 unfunded liability	01/01/2020	20	$18,523,051	$1,368,670	18	$18,146,157
Experience loss	01/01/2021	10	1,173,796	142,073	9	1,102,476
Change in assumptions	01/01/2021	10	1,558,820	188,675	9	1,464,106
Experience loss	01/01/2022	10	1,499,094	177,020	10	1,499,094
Change in assumptions	01/01/2022	10	-4,477	-529	10	-4,477
Total				**$1,875,909**		**$22,207,356**

[1] Level percentage of payroll

Section 3: Supplemental Information

Exhibit G: 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 (APV):	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

Section 3: Supplemental Information

	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 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 (AVA):	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 (ADC):	The employer's periodic required 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;

Section 3: Supplemental Information

	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.
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.

Section 3: Supplemental Information

Normal Cost:	The portion of the Actuarial Present Value of Future Benefits and expenses 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.
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.
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.

Section 4: Actuarial Valuation Basis

Exhibit I: Actuarial Assumptions and Actuarial Cost Method

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.
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 & Chiefs** / **Sergeants, Lieutenants, Captains, Major, Deputy Chiefs & Assistant Chiefs** 2020-2022: 3.25 / 3.00 / 2.50 2023+: 2.50 / 2.50 / 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 Meet and Confer Agreement.
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: 1.5*0%, 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.
Administrative Expenses:	$55,000 per year, payable monthly (equivalent to $53,295 at the beginning of the year), or 1% of computation pay, if greater

Section 4: Actuarial Valuation Basis

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.

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.

Section 4: Actuarial Valuation Basis

Mortality and Disability Rates Before Retirement:

	Rate (%)			
	Mortality[1]		Disability[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

Section 4: Actuarial Valuation Basis

Retirement Rates:

DROP Active Members

	Rate (%)	
Age	**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

100% retirement rate after ten years in DROP.

Section 4: Actuarial Valuation Basis

Retirement Rates (continued):

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.

Weighted Average Retirement Age	Age 56, 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, 2022 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 the 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.

Section 4: Actuarial Valuation Basis

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 age and service as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Family Composition:	75% of participants 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.
Survivor Benefit Election:	Married participants are assumed to receive the non-reduced Joint and Survivor annuity form of payment. Non-married participants are assumed to have no beneficiaries and receive a Life Only annuity.
Actuarial Value of Assets:	Market value of assets
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 liabiity as of January 1, 2020 is amortized on a closed, 20-year period. Beginning January 1, 2021, each year's gains and losses are amortized over a closed, 10-year period. Amortization is on a level-percentage-of-pay basis.
Justification for Change in Actuarial Assumptions and Methods:	Based on past experience and future expectations, the following actuarial assumptions were changed: • The annual administrative expense assumption was lowered from $65,000 to $55,000. • The ad-hoc COLA assumption was lowered from 2.00% to 1.50%. • The COLA assumption will automatically be updated as needed to remain five percentage points less than the net investment return assumption. • The ad-hoc COLA assumption was updated to begin October 1, 2073 based on the updated projection of the unfunded actuarial accrued liability; last year, the COLA was assumed to begin October 1, 2069.

Section 4: Actuarial Valuation Basis

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

Average Supplemental Computation Pay:	**Benefit Earned Prior to September 1, 2017:** • Supplemental Computation Pay is the current rate of pay received by the member, minus the rate of pay the member would receive for the highest civil service rank the member held. • Average Supplemental Computation Pay is determined based on the highest 36 consecutive months of Supplemental Computation Pay. **Benefit Earned Beginning September 1, 2017:** • Supplemental Computation Pay is the current rate of pay received by the member, minus the rate of pay the member would receive for the highest civil service rank the member held. • Average Supplemental Computation Pay is determined based on the highest 60 consecutive months of Supplemental Computation Pay.
Normal Retirement:	**Benefit Earned Prior to September 1, 2017:** • *Age Requirement:* 50 • *Service Requirement:* 5 • *Amount:* Greater of 3.0% of Average Supplemental 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. **Benefit Earned Beginning September 1, 2017:** • *Age Requirement:* 58 • *Service Requirement:* 5 • *Amount:* Greater of 2.5% of Average Supplemental 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.

Section 4: Actuarial Valuation Basis

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 Supplemental 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 Supplemental 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 Supplemental Computation Pay for service earned prior to September 1, 2017 and the applicable benefit multiplier from 20 & Out Table 2 times Average Supplemental 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 Supplemental Computation Pay for service earned prior to September 1, 2017 and the applicable benefit multiplier from 20 & Out Table 2 times Average Supplemental 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. Survivors who were age 55 on September 1, 2017 and were not receiving the Benefit Supplement because the members were still alive will be eligible for the Benefit Supplement upon the members death.
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.
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 Supplemental 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

Section 4: Actuarial Valuation Basis

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 if death occurs while in active 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

Average Supplemental Computation Pay:	• Supplemental Computation Pay is the current rate of pay received by the member, minus the rate of pay the member would receive for the highest civil service rank the member held. • Average Supplemental Computation Pay is determined based on the highest 60 consecutive months of Supplemental Computation Pay.

Section 4: Actuarial Valuation Basis

Normal Retirement:	• *Age Requirement:* 58 • *Service Requirement:* 5 • *Amount:* 2.5% of Average Supplemental 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.
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 Supplemental 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. • *Amount:* The greater of 50% of Average Supplemental Computation Pay and the Member's accrued benefit.
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.

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

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 Supplemental 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.

Section 4: Actuarial Valuation Basis

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 the Actuarially Determined Contribution.
Forms of Benefits:	50% or 100% Joint and Survivor Pension

Section 5: GASB Information

Exhibit 1: Net Pension Liability

The components of the net pension liability at December 31, 2021 were as follows:

Total pension liability	$40,868,067
Plan fiduciary net position	18,660,711
Net pension liability	22,207,356
Plan fiduciary net position as a percentage of the total pension liability	45.66%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of January 1, 2022, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.50%
Salary increases	4.00%
Investment rate of return	6.50%, net of 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.

Section 5: GASB Information

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges 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 and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension Plan's target asset allocation as of December 31, 2021 are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return[1]
Global Equity	55%	6.40%
Emerging Market Equity	5%	8.50%
Private Equity	5%	10.40%
Short-Term Investment Grade Bonds	6%	0.00%
Investment Grade Bonds	4%	0.40%
High Yield Bonds	4%	2.60%
Bank Loans	4%	2.10%
Emerging Markets Debt	4%	2.80%
Real Estate	5%	3.90%
Natural Resources	5%	4.57%
Cash	3%	-0.10%
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 equal the employee's normal cost plus a 20-year amortization payment on the unfunded actuarial accrued liability as of January 1, 2020 and 10-year amortization payments on each year's actuarial gain or loss beginning January 1, 2021, and member contributions equal 13.50% of supplemental computation pay. Based on those assumptions, the System's Fiduciary Net Position (FNP) was projected to be available to make all projected future benefit payments for current plan members.

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

Section 5: GASB Information

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 Total Pension Liability 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.

Section 5: GASB Information

Exhibit 2: Discount Rate Sensitivity

Sensitivity of the Net Pension Liability to changes in the discount rate. The following presents the Net Pension Liability (NPL), calculated using the discount rate of 6.50%, as well as what the NPL would be if it were calculated using a discount rate that is 1-percentage-point lower (5.50%) or 1-percentage-point higher (7.50%) than the current rate.

	1% Decrease (5.50%)	Current Discount Rate (6.50%)	1% Increase (7.50%)
Net pension liability	$26,116,152	$22,207,356	$18,880,863

Section 5: GASB Information

Exhibit 3: Schedule of Changes in Net Pension Liability

	2021	2020
Total Pension Liability		
• Service cost	$394,035	$379,127
• Interest	2,372,739	2,438,042
• Change of benefit terms	0	0
• Differences between expected and actual experience	3,370,911	46,754
• Changes of assumptions	-4,477	1,559,322
• Benefit payments, including refunds of member contributions	-2,749,573	-2,777,719
Net change in Total Pension Liability	**$3,383,635**	**$1,645,526**
Total Pension Liability – beginning	**37,484,432**	**35,838,906**
Total Pension Liability – ending	**$40,868,067**	**$37,484,432**
Plan Fiduciary Net Position		
• Contributions – employer	$2,098,588	$1,777,311
• Contributions – employee	227,893	245,237
• Net investment income	2,764,978	-122,726
• Benefit payments, including refunds of member contributions	-2,749,573	-2,777,719
• Administrative expense	-55,359	-55,352
Net change in Plan Fiduciary Net Position	**$2,286,527**	**-$933,249**
Plan Fiduciary Net Position – beginning	**16,374,184**	**17,307,433**
Plan Fiduciary Net Position – ending	**$18,660,711**	**$16,374,184**
Net Pension Liability – ending	**$22,207,356**	**$21,110,248**
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	**45.66%**	**43.68%**
Covered payroll	**$1,631,396**	**$626,782**
Plan Net Pension Liability as percentage of covered payroll	**1,361.25%**	**3,368.04%**

Notes to Schedule:

Benefit changes: None.

Section 5: GASB Information

Change of Assumptions: The assumption changes in 2020 include lowering the discount rate from 7.00% to 6.50% and updating the expected COLA start date from October 1, 2063 to October 1, 2069. The assumption changes in 2021 include lowering the COLA from 2.00% to 1.50% and updating the expected COLA start date from October 1, 2069 to October 1, 2073.

Section 5: GASB Information

Exhibit 4: Schedule of Employer Contributions

Year Ended December 31	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions	Contribution Deficiency (Excess)	Covered Payroll	Contributions as a Percentage of Covered Payroll
2015	$2,442,790	$2,442,790	$0	$556,725	438.78%
2016	3,063,584	3,063,584	0	724,503	422.85%
2017	2,086,639	2,077,059	9,580	525,048	395.59%
2018	2,273,581	1,979,285	294,296	916,199	216.03%
2019	1,881,055	1,530,262	350,793	621,622	246.17%
2020	1,777,311	1,777,311	0	584,068	304.30%
2021	2,098,588	2,098,588	0	626,782	334.82%

The contribution deficiencies for calendar years 2017 through 2019 represent contributions redirected to the Excess Benefit Plan and Trust.

Notes to Schedule:

Methods and assumptions used to establish "actuarially determined contribution" rate for year ended December 31, 2021; these are not the same assumptions used in the January 1, 2022 actuarial valuation or for the Total Pension Liability measured as of December 31, 2021:

Valuation date	Actuarially determined contribution is calculated using a January 1, 2021 valuation date as of the beginning of the fiscal year in which contributions are reported
Actuarial cost method	Entry age
Amortization method	20-year level percent of payroll for UAL as of January 1, 2020, 10-year level percent of payroll for changes to the UAL thereafter, using 2.50% annual increases
Remaining amortization period	17 years as of January 1, 2021
Asset valuation method	At 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

Section 5: GASB Information

Cost-of-living adjustments	1.50% simple increases starting October 1, 2073
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, 2021 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
Interest on DROP Accounts	Beginning January 1, 2018, 2.75% payable upon retirement on active account balances as of September 1, 2017

DALLAS POLICE & FIRE PENSION SYSTEM

Projected Change in Net Position Bridge Chart

November 10, 2022

12-31-2021 Actual Compared to Data Projections from the 1-1-2022 Valuation

	Investment Income	Contributions	Benefit Payments	Admin Expenses
2021 Projected	$104,441,853	$227,088,000	$350,271,158	$8,500,000
2021 Actual	$321,062,889	$224,101,245	$324,633,468	$6,390,829

- <u>Ending Net Position</u>

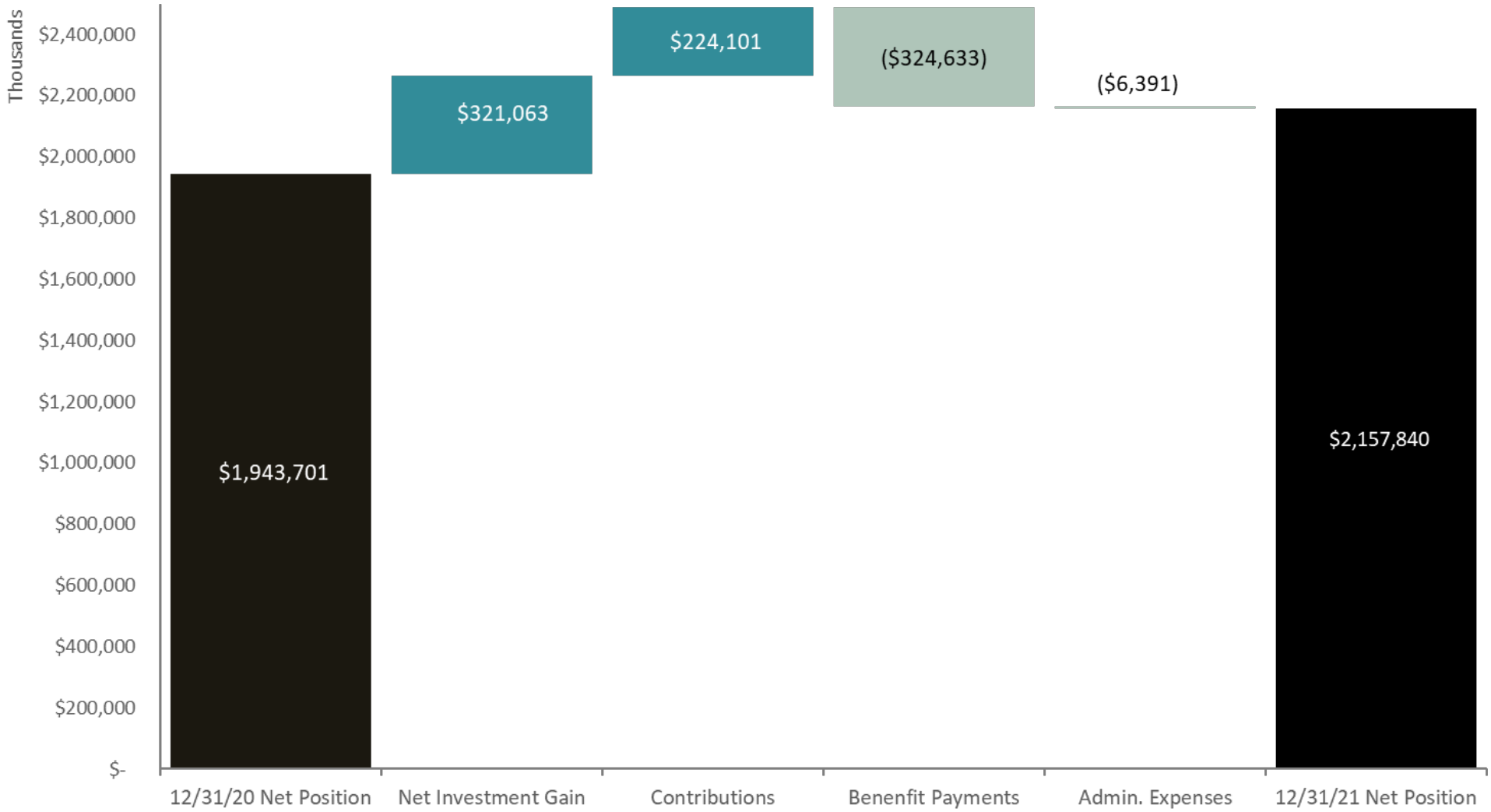
  Projection: $1.92 Billion

  Actual: $2.16 Billion

- Actual ending Net Position is $242 million more than projected in the prior year valuation.

2021 Change in Net Fiduciary Position

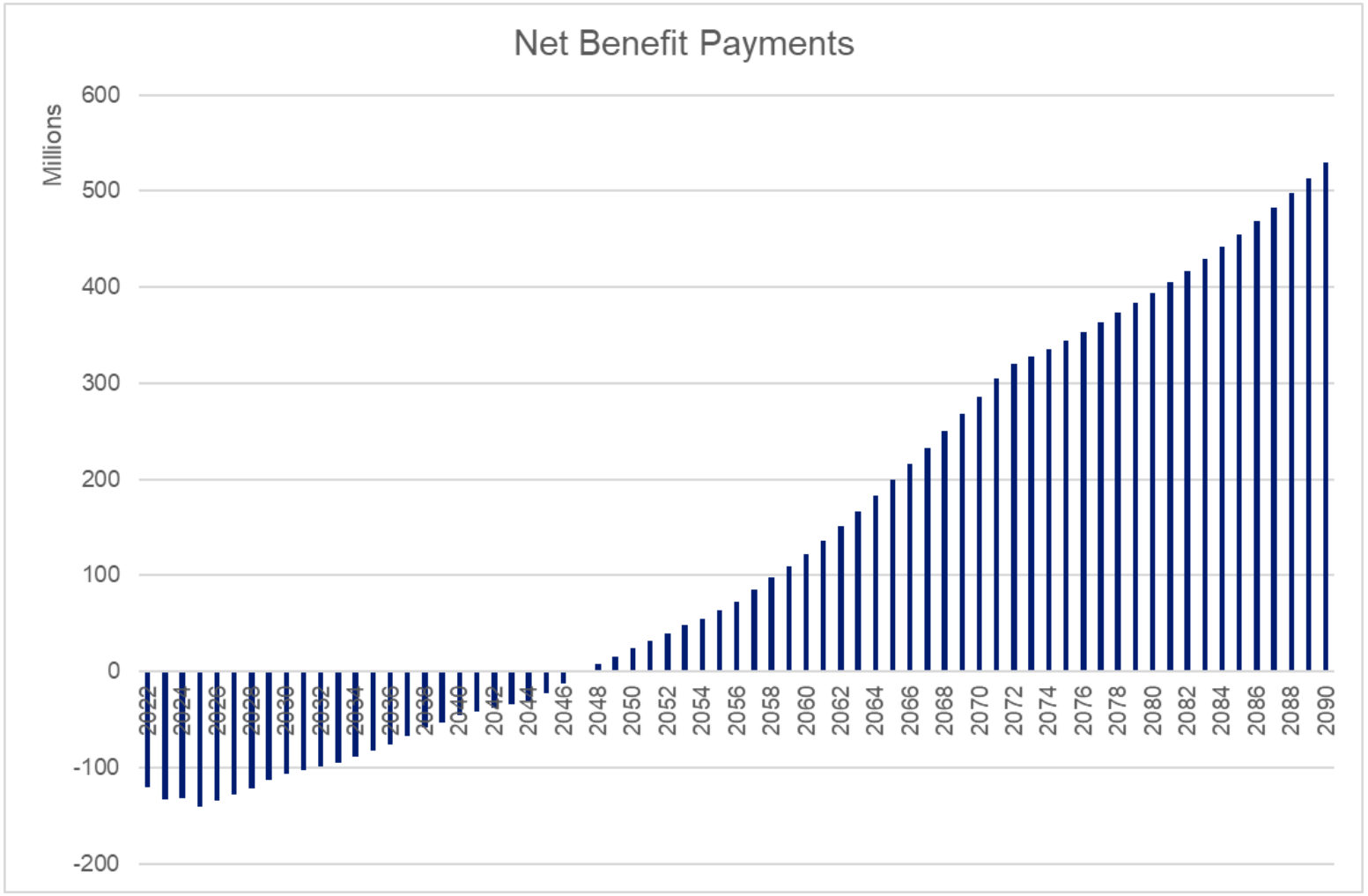
December 31, 2020 – December 31, 2021



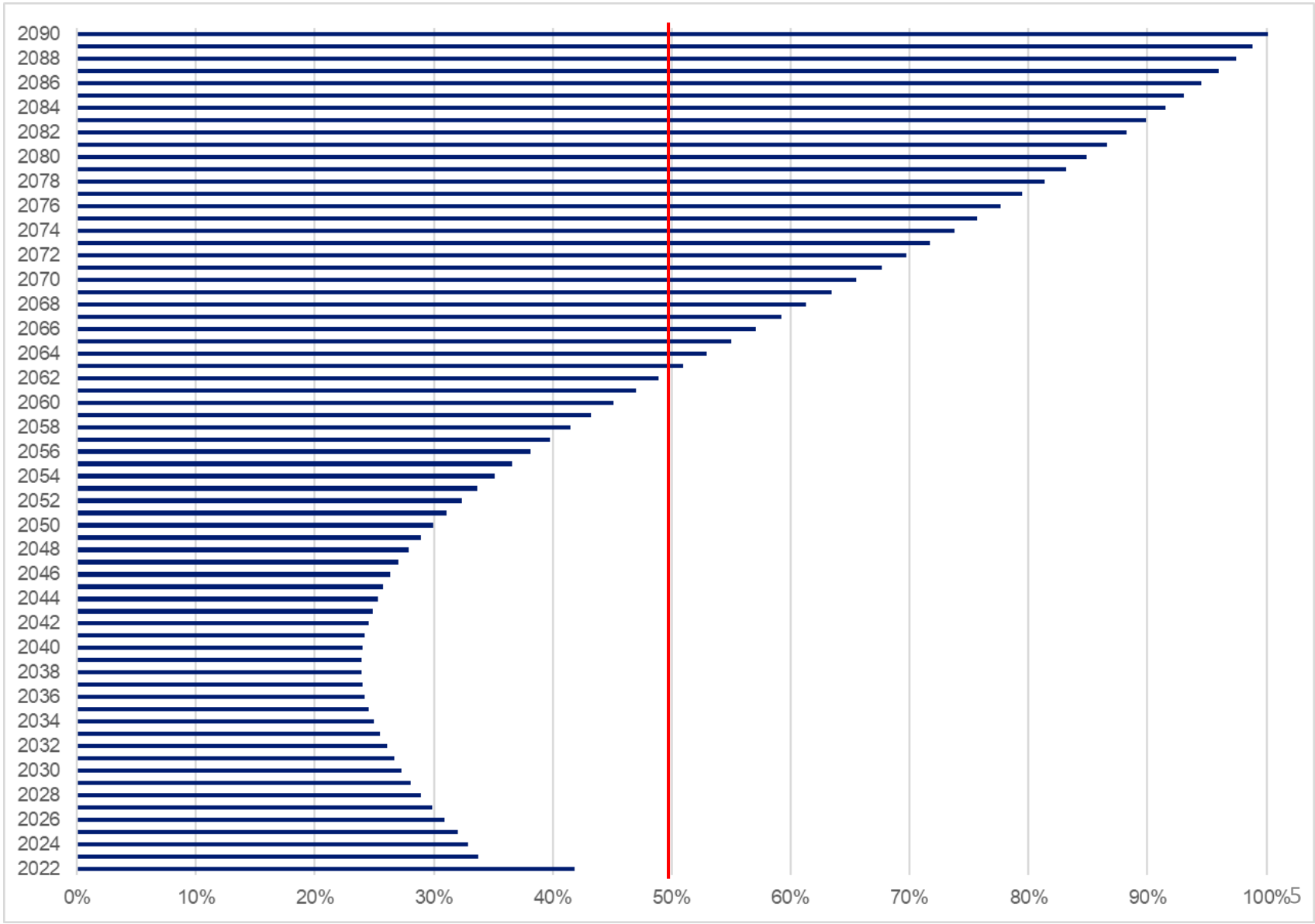
Dollars do not foot due to rounding.

Net Benefit Payments

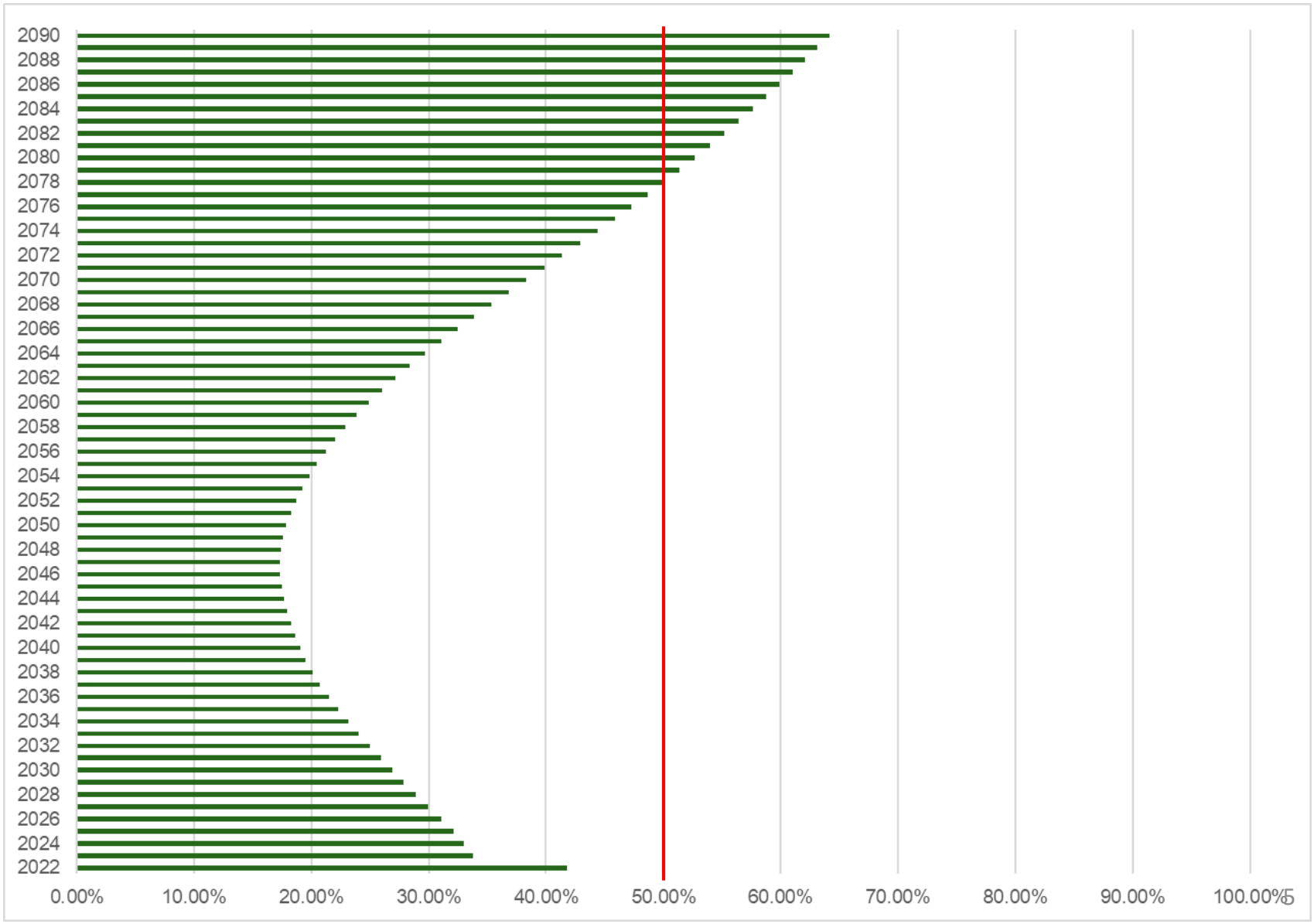
Benefit payments exceed contributions until 2047 using the Hiring Plan assumptions.



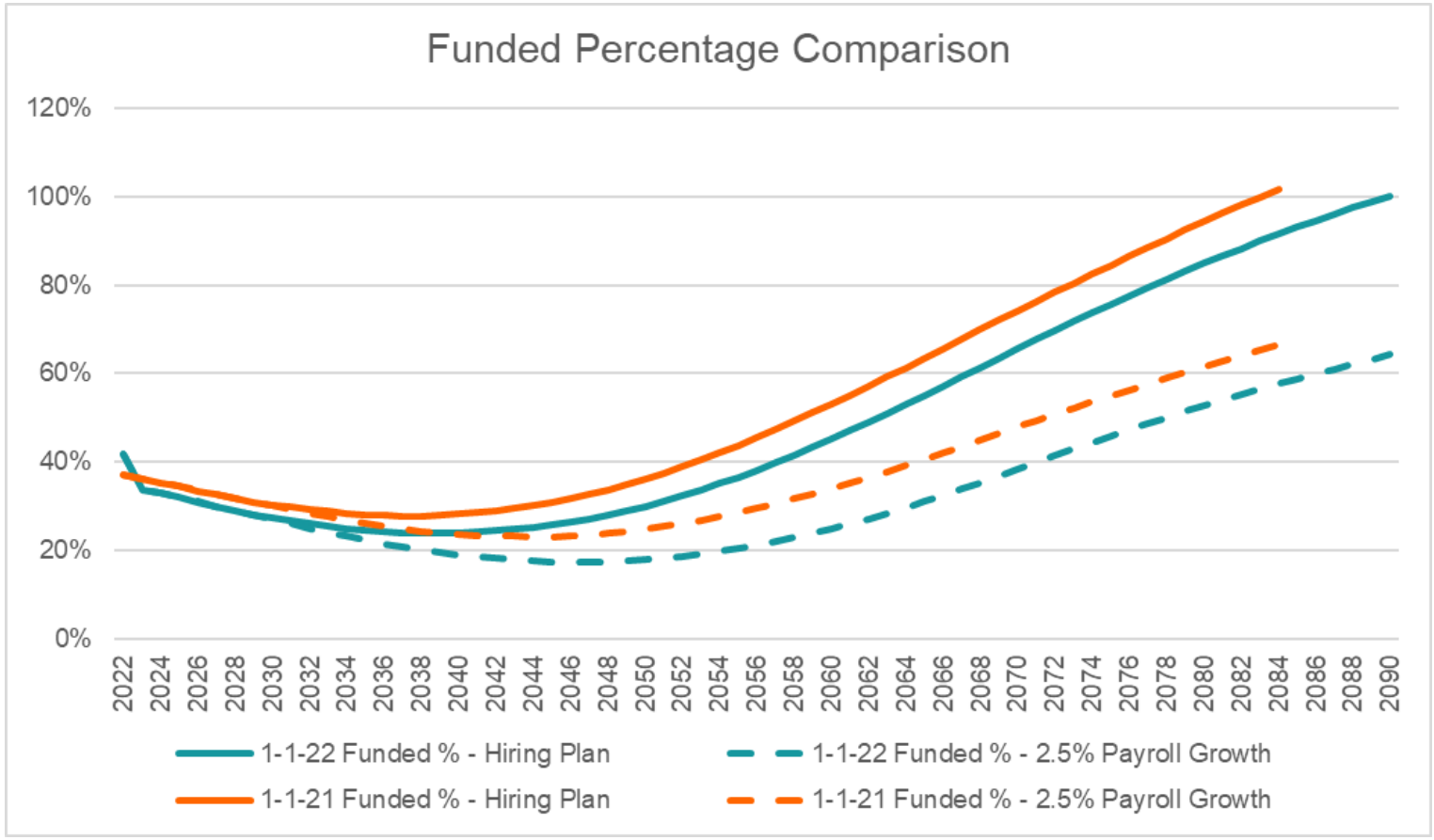
Projected Funded Percentage – City Hiring Plan Assumptions



Projected Funded Percentage - 2.5% growth on actual computation pay



Funded % Comparisons



Although 2021 ended with higher net assets than anticipated in the prior year, the projected funded path has declined due to a negative 13% return factored in for 2022 compared to a positive 5.75% estimated for 2022 when the prior valuation was prepared.

Conclusion

- The projected change in Net Position charts and tables are based on the 1-1-2022 Actuarial Valuation and assumes all assumptions are met.
  - The funded percentage is projected to decline for the next 16 years before it begins to increase.
  - The funded percentage is projected to be below 30% for 24 years, below 40% for 35 years. Projections show the funded level below 50% for 41 years until 2063.
  - The timeline to achieve full funding increased primarily due to the negative investment return assumed for 2022.
- If the City does not meet the Hiring Plan projections, and contributions are at the actual level plus the payroll growth assumption of 2.5%, the projected results are as follows:
  - The funded percentage is projected to drop below 30% for 38 years and not achieve 40% funded until 2072.
- Takeaway: As we knew when HB 3158 was passed, HB 3158 created a path to solvency, but the path is narrow with many risks and little room for error. Any early disruption in achieving the assumptions (both investment returns as well as hiring projections) could have a catastrophic impact on the funding of the plan.
  - The anticipated negative investment returns in 2022 will drive the funded percentages lower than projected a year ago and extend the time to achieve higher levels of funding.

DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #2

Topic: **Public Comment**

Discussion: Comments from the public will be received by the Board.

Sec. 3.01 (j-9) of Article 6243a-1 of Vernon's Revised Civil Statutes
Required Public Meeting – Thursday, November 10, 2022