Dallas Police and Fire Pension System Supplemental Plan

Actuarial Valuation and Review as of January 1, 2021

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

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November 8, 2021

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, 2021. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and calculates the funding requirements for fiscal 2021.

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 System's IT Department, under the supervision of John Holt, and the financial information was provided 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. 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.

I 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

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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, 2021. 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 members, and retired members and beneficiaries as of December 31, 2020, provided by the System's IT Department;
- The assets of the Plan as of December 31, 2020, provided by the System's Finance Department;
- Economic assumptions regarding future salary increases and investment earnings;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc.;
- Article 6243a-1, as amended by House Bill 3158 (HB 3158), signed into law by the Governor of Texas on May 31, 2017; and
- The funding policy adopted by the Board of Trustees of the Pension System on December 12, 2019 as amended through July 9, 2020.

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

Certain disclosure information required by GASB Statement No. 68 as of September 30, 2021 for the City will be provided in a separate report.

Valuation highlights

1. Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability (UAL) and the principal UAL balance. The funding policy was changed from an open, 10-year amortization of the UAL to a closed, 20-year amortization of the January 1, 2020 UAL, and beginning January 1, 2021, future gains or losses each year will be amortized over separate, closed, 10-year periods. Amortization will remain on a level percentage of pay basis.
2. The City's actuarial determined contribution (ADC) for the upcoming year is $2,098,588, an increase of $321,277 from last year. The contribution is equal to the sum of the normal cost, administrative expenses, and amortization payments of the UAL.
3. The funded ratio (the ratio of assets to actuarial accrued liability) is 43.69%, compared to the prior year funded ratio of 48.30%. The decrease is attributable to investment losses, demographic experience and assumption changes. 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.
4. Actual City contributions made during the fiscal year ending December 31, 2020 were $1,777,311, 100.0% of the ADC. In the prior fiscal year, actual City contributions were $1,530,262, 81.4% of the prior year ADC. The 2020 contributions would have been sufficient to reduce the UAL, if there had been no investment or demographic losses and no assumption changes. The UAL is $21.1 million, which is an increase of $2.6 million since the prior valuation.
5. The rate of return on the market value of assets, as calculated by the actuary, was -0.73% for the 2020 plan year. This resulted in an actuarial loss when measured against the assumed rate of return of 7.00%. Given the low fixed income interest rate environment, target asset allocation and expectations of future investment returns for various classes, the Board lowered the assumed long-term rate of return on investments from 7.00% to 6.50% with this year's valuation.
6. The net experience loss from sources other than investment experience was 0.9% of the actuarial accrued liability prior to reflection of assumption changes.
7. The following assumption changes were included in this valuation:
    - The discount rate/net investment return rate was lowered from 7.00% to 6.50%.
    - The assumption for ad-hoc COLA timing was updated from a projected beginning date of October 1, 2063 to a projected beginning date of October 1, 2069.

    As a result of these assumption changes, the total normal cost increased by $36,795 (10.2%) and the actuarial accrued liability increased by $1,558,820 (4.3%). The total impact was an increase in the ADC of $169,525.

Section 1: Actuarial Valuation Summary

8. The impact of amortizing the 2020 actuarial experience over 10 years instead of 20 years caused an increase in the ADC of $54,682.
9. 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. 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.
10. 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, 2020. 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, 2021 will be provided separately.
11. 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). The NPL as of December 31, 2020 is $21.1 million, an increase from $18.5 million as of December 31, 2019.

Summary of key valuation results

		2021	2020
Contributions for plan year beginning January 1:	• Total actuarially determined contribution (City and member)	$2,188,112	$1,860,984
	• Expected member contributions	89,524	83,673
	• City's actuarially determined contribution (ADC)	2,098,588	1,777,311
	• Actual City contributions	- -	1,777,311
Actuarial accrued liability for plan year beginning January 1:	• Retired members and beneficiaries	$32,795,992	$31,976,272
	• Inactive vested members	51,306	90,481
	• Active members	4,579,757	3,710,053
	• Inactive members due a refund of employee contributions	53,678	53,678
	• Total actuarial accrued liability	37,480,733	35,830,484
	• Employer normal cost including administrative expenses	462,319	447,930
Assets for plan year beginning January 1	• Actuarial (market) value of assets	$16,374,184	$17,307,433
Funded status for plan year beginning	• Unfunded actuarial accrued liability	$21,106,549	$18,523,051
	• Funded percentage	43.69%	48.30%
	• Effective amortization period	17	20
Key assumptions	• Net investment return	6.50%	7.00%
	• Inflation rate/payroll increase	2.50%	2.50%
GASB information	• Discount rate	6.50%	7.00%
	• Total pension liability	$37,484,432	$35,838,906
	• Plan fiduciary net position	16,374,184	17,307,433
	• Net pension liability	21,110,248	18,531,473
	• Plan fiduciary net position as a percentage of total pension liability	43.68%	48.29%
Demographic data for plan year beginning January 1:	• Number of retired members and beneficiaries	141	139
	• Number of inactive vested members	2	2
	• Number of active members	45	41
	• Number of inactive members due a refund of employee contributions	1	1
	• Total supplemental computation pay[1]	$642,583	$599,187
	• Average supplemental computation pay	14,280	14,614

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

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. 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

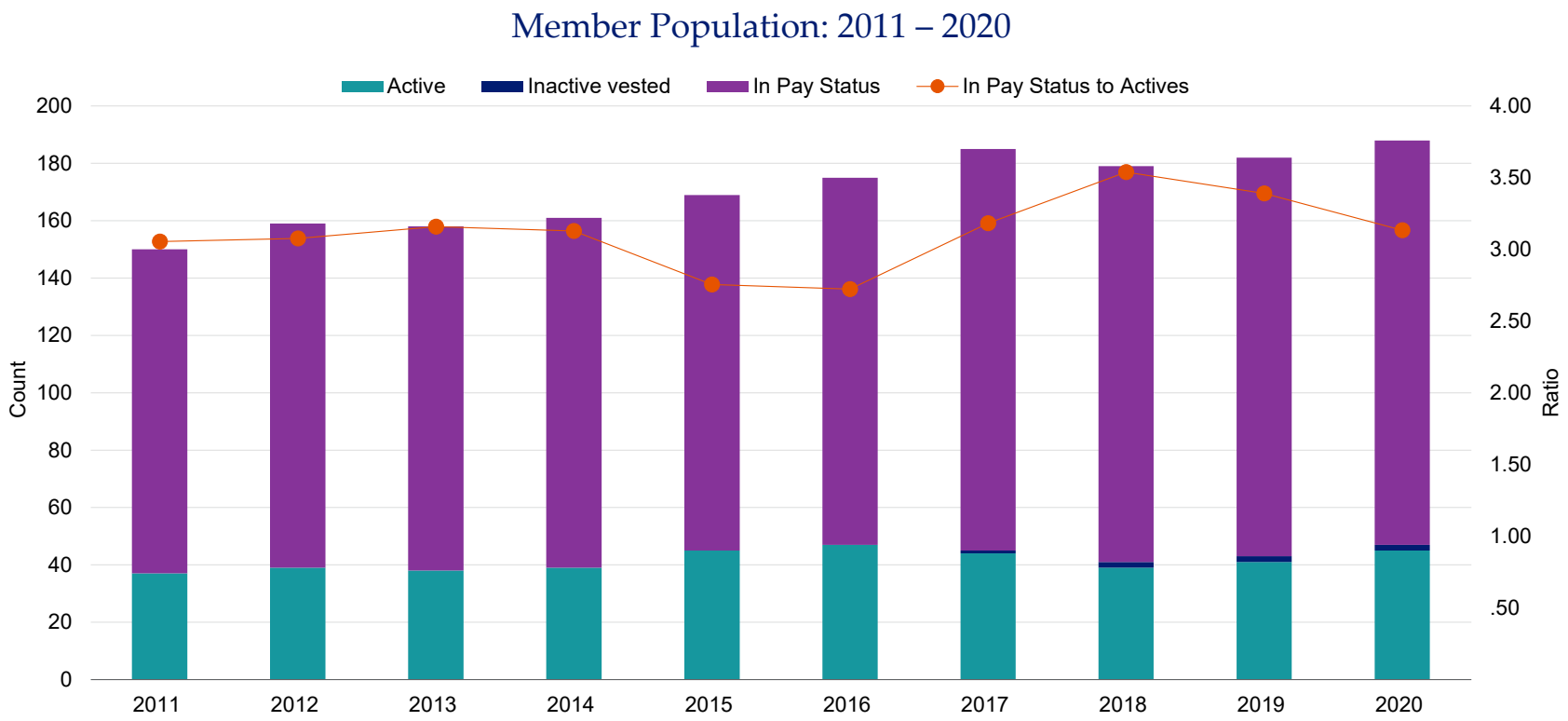
The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

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 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



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
In Pay Status	113	120	120	122	124	128	140	138	139	141
Inactive Vested[1]	0	0	0	0	0	0	1	2	2	2
Active	37	39	38	39	45	47	44	39	41	45
Ratio	3.05	3.08	3.16	3.13	2.76	2.72	3.18	3.54	3.39	3.13

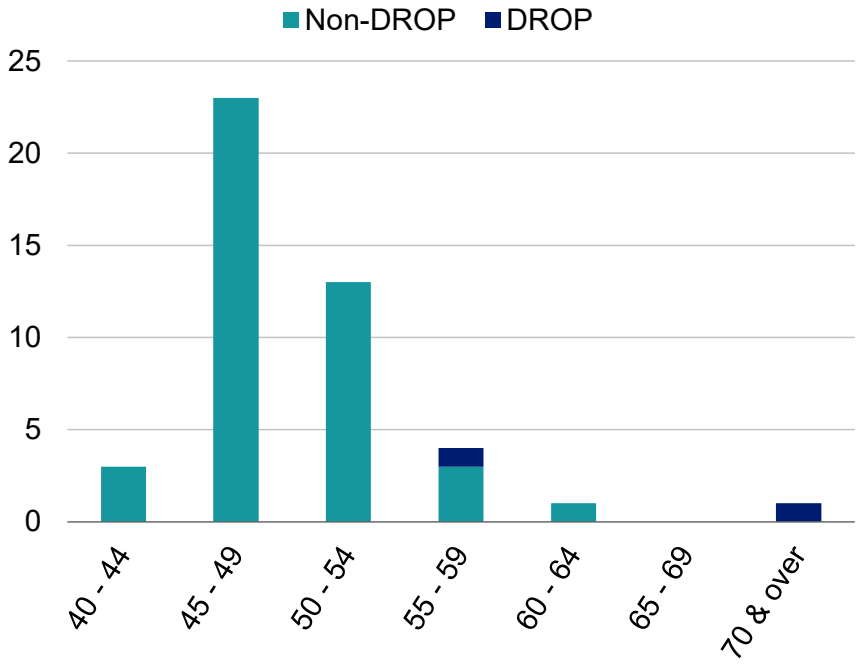
[1] Excludes non-vested terminated participants due a refund of employee contributions

Active members

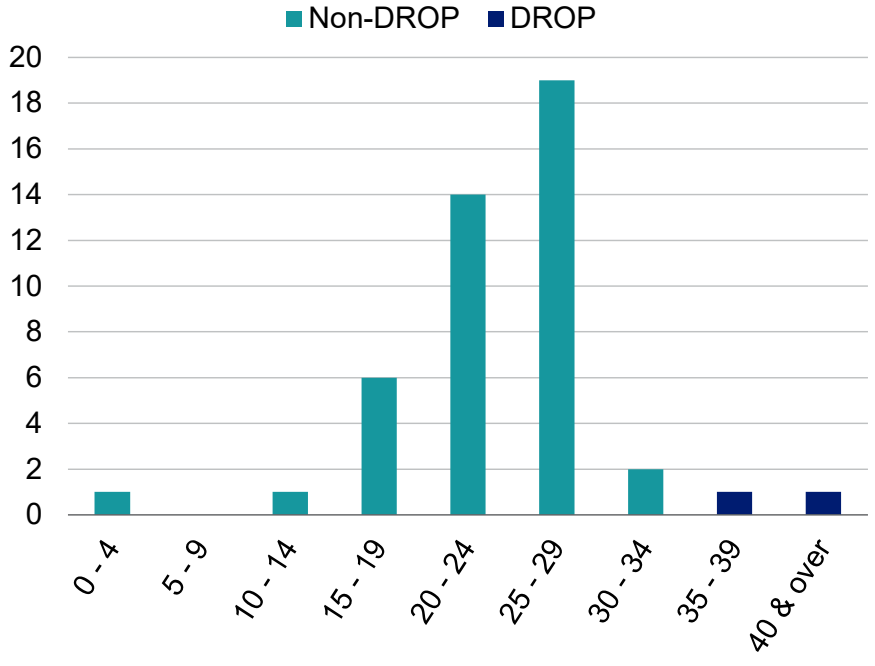
As of December 31,	2020	2019	Change
Police Officer			
Active participants	28	23	21.7%
Average age	51.1	50.6	0.5
Average years of service	24.9	25.2	-0.3
Average computation pay	$12,018	$11,671	2.97%
Firefighters			
Active participants	17	18	-5.6%
Average age	49.7	49.2	0.5
Average years of service	24.2	23.8	0.4
Average computation pay	$18,004	$18,375	-2.0%
Total			
Active participants	45	41	9.8%
Average age	50.6	50.0	0.6
Average years of service	24.6	24.6	0.0
Average computation pay	$14,280	$14,614	-2.3%

Distribution of Active Members as of December 31, 2020

Actives by Age



Actives by Years of Service

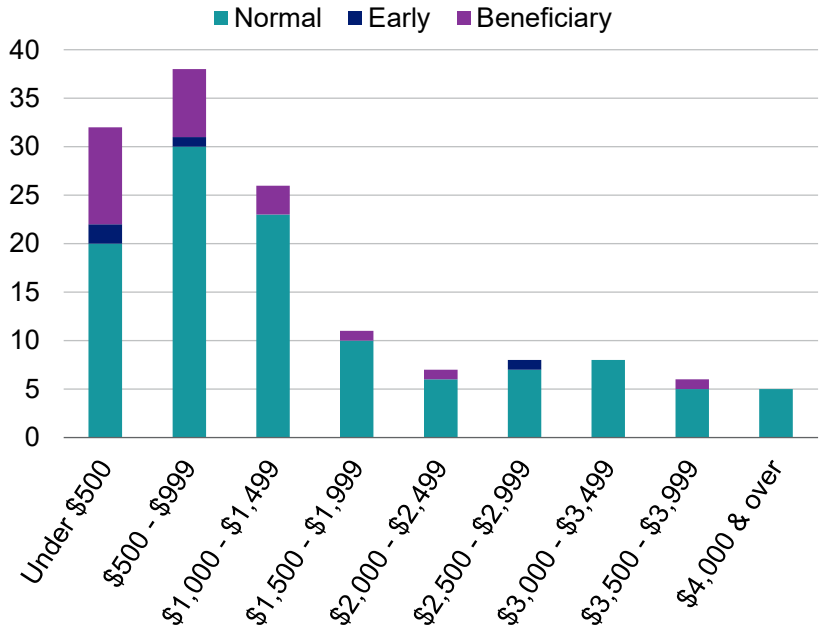


Retired members and beneficiaries

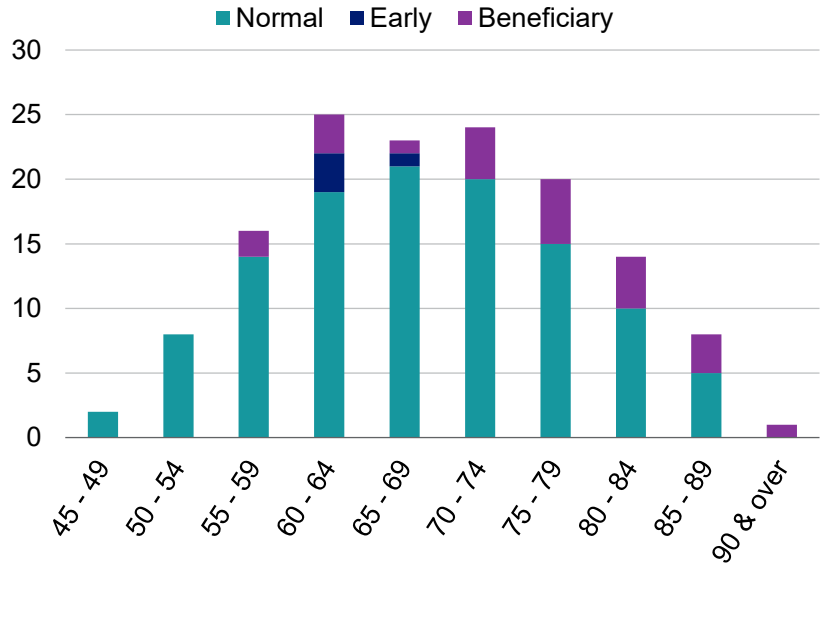
As of December 31,	2020	2019	Change
Retirees	118	116	1.7%
Average age	68.9	68.8	0.1
Average amount	$1,453	$1,485	-2.2%
Beneficiaries	23	23	0.0%
Total monthly amount	$204,878	$206,420	-0.7%

Distribution of Retired Participants as of December 31, 2020

Retired Participants by Type and Monthly Amount



Retired Participants by Type and Age



Section 2: Actuarial Valuation Results

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.

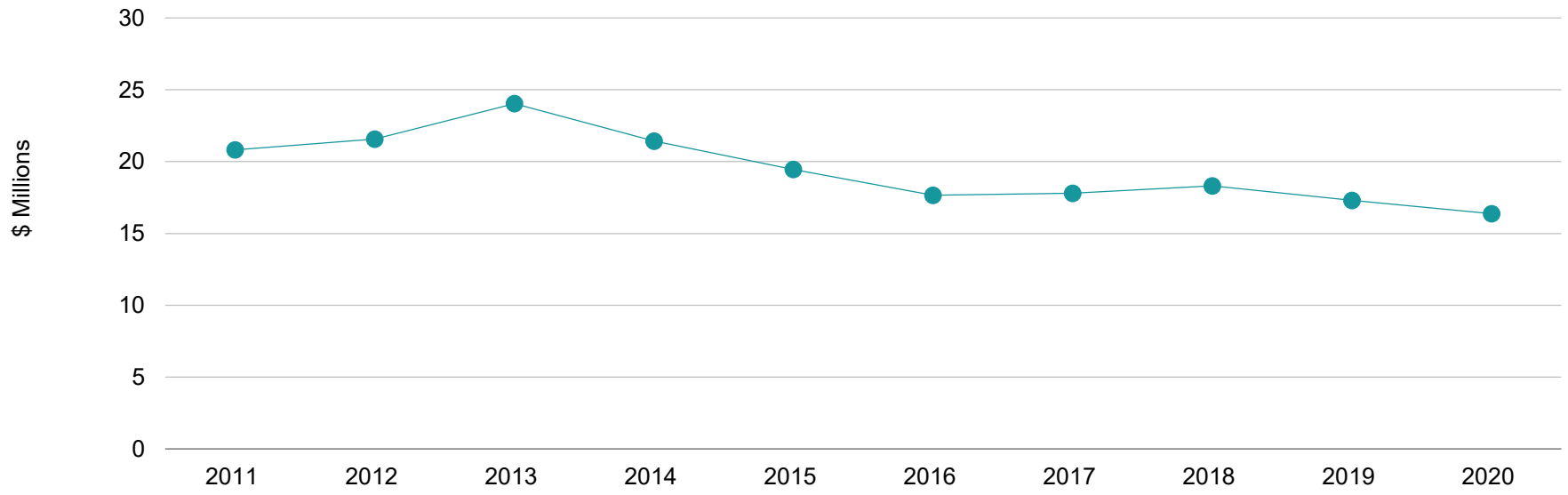
Determination of Actuarial Value of Assets for Year Ended December 31, 2020

1	Actuarial value of assets = Market value of assets	$16,374,184

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) as of December 31



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actuarial Value[1]	$20.82	$21.56	$24.04	$21.44	$19.46	$17.66	$17.81	$18.32	$17.31	$16.37

[1] In $ millions

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, 2020

1	Net loss from investments[1]	-$1,305,878
2	Net gain from administrative expenses	9,980
3	Net gain from contributions, based on timing	167,519
4	Net loss from other experience	-45,417
5	Net experience loss: **1 + 2 + 3 + 4**	-$1,173,796

[1] Details on next page

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 was 7.00% for the year ended December 31, 2020. The actual rate of return on an actuarial (market) basis for the 2020 plan year was -0.73%. 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, 2020 with regard to its investments.

Investment Experience

		Year Ended December 31, 2020
		Actuarial (Market) Value
1	Net investment income	-$122,726
2	Average value of assets	16,902,172
3	Rate of return: **1 ÷ 2**	-0.73%
4	Assumed rate of return	7.00%
5	Expected investment income: **2 x 4**	1,183,152
6	Actuarial loss: **1 - 5**	-$1,305,878

Non-investment experience

Administrative expenses

- Administrative expenses for the year ended December 31, 2020 totaled $55,352, as compared to the assumption of $65,000. This resulted in a gain of $9,980 for the year, when adjusted for timing.

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 four compared to 2.3 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, 2020 amounted to $45,417, which is 0.1% of the actuarial accrued liability.

Actuarial assumptions

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

- The net investment return assumption was lowered from 7.00% to 6.50%

Based on a projection of the System's funded ratio, taking into account 2021 data, new long-term assumptions, and the System's near-term asset expectations, the ad-hoc COLA assumption was updated to begin October 1, 2069. Last year, the COLA was assumed to begin October 1, 2063.

These changes increased the actuarial accrued liability by 4.37% and increased the total normal cost by 10.15%.

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, 2020

1	Unfunded actuarial accrued liability at beginning of year		$18,523,051
2	Total normal cost at beginning of year, including administrative expense assumption		447,930
3	Total contributions		-2,022,548
4	Interest on 1, 2 & 3		1,257,981
5	Expected unfunded actuarial accrued liability		$18,206,414
6	Changes due to:		
	(a) Net experience loss	$1,341,315	
	(b) Assumptions	1,558,820	
	Total changes		$2,900,135
7	Unfunded actuarial accrued liability at end of year		$21,106,549

Actuarially determined contribution

The actuarially determined contribution is equal to the employer normal cost payment and a payment on the unfunded actuarial accrued liability. As of January 1, 2021, the actuarially determined contribution is $2,098,588.

The funding policy used to calculate the actuarially determined contribution as of January 1, 2021 is based on a closed amortization period of 20 years for the January 1, 2020 unfunded actuarial accrued liability, with each year's actuarial gain or loss amortized over closed, 10-year periods beginning January 1, 2021. Amortization is on a level-percentage-of-pay basis. The payment on the unfunded actuarial accrued liability accounts for nearly 80% of the City's recommended contribution.

The contribution requirement as of January 1, 2021 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

		2021	2020
1	Total normal cost	$399,334	$385,092
2	Administrative expenses	62,985	62,838
3	Expected member contributions	-86,749	-80,890
4	Employer normal cost: (1) + (2) + (3)	$375,570	$367,040
5	Actuarial accrued liability	$37,480,733	$35,830,484
6	Actuarial value of assets	16,374,184	17,307,433
7	Unfunded actuarial accrued liability: (5) - (6)	$21,106,549	$18,523,051
8	Payment on unfunded actuarial accrued liability	1,657,968	1,351,151
9	Adjustment for timing[1]	65,050	59,120
10	Actuarially determined contribution: (4) + (10) + (11)	$2,098,588	$1,777,311

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

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, 2020 to January 1, 2021

		Amount
Actuarially Determined Contribution as of January 1, 2020		$1,777,311
1	Effect of expected change in amortization payment due to payroll growth	34,941
2	Effect of change in amortization methodology under amended funding policy	54,682
3	Effect of change in actuarial assumptions, including COLA timing	169,525
4	Effect of investment loss	162,653
5	Effect of other gains and losses on accrued liability	-24,976
6	Net effect of other changes, including composition and number of members	-75,518
Total change		$321,277
Actuarially Determined Contribution as of January 1, 2021		$2,098,588

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: 2012 – 2021

Fiscal Year Ended December 31	City's Actuarially Determined Contribution (ADC)[1]	Actual Employer Contribution	Percent Contributed
2012	$1,954,022	$1,954,022	100.00%
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	N/A	N/A

[1] Prior to 2015, this amount was the Annual Required Contribution (ARC)

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.

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.

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	$398,858	$202,902
• Retirees and beneficiaries	32,795,992	31,976,272
• Active and inactive members (employer-financed)	4,285,883	3,651,310
Total	$37,480,733	$35,830,484
Actuarial value of assets	$16,374,184	$17,307,433
Cumulative portion of AAL covered		
• Active member contributions	100.00%	100.00%
• Retirees and beneficiaries	48.71%	53.49%
• Active and inactive members (employer-financed)	0.00%	0.00%

Actuarial balance sheet

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

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

Actuarial Balance Sheet

	Year Ended	
	December 31, 2020	**December 31, 2019**
Liabilities		
• Present value of benefits for retired members and beneficiaries (non-DROP)	$26,046,226	$24,988,459
• Present value of benefits for retired members and beneficiaries (DROP)	6,749,766	6,987,813
• Present value of benefits for inactive vested members	104,984	144,159
• Present value of benefits for active members	5,954,139	5,133,845
Total liabilities	**$38,855,115**	**$37,254,276**
Assets		
• Total valuation value of assets	$16,374,184	$17,307,433
• Present value of future contributions by members	361,988	318,919
• Present value of future employer contributions for:		
• Entry age cost	1,012,394	1,104,873
• Unfunded actuarial accrued liability	21,106,549	18,523,051
Total of current and future assets	**$38,855,115**	**$37,254,276**

Section 3: Supplemental Information

Exhibit A: Table of Plan Demographics

Category	Year Ended December 31 2020	2019	Change From Prior Year
Active members in valuation:			
• Number	45	41	9.8%
• Average age	50.6	50.0	0.6
• Average years of service	24.6	24.6	0.0
• Total supplemental computation pay	$642,583	$599,187	7.2%
• Average supplemental computation pay	14,280	14,614	-2.3%
• Account balances	398,858	202,902	96.6%
• Total active vested members	44	40	10.0%
Active members (excluding DROP):			
• Number	43	38	13.2%
• Average age	49.8	48.9	0.9
• Average years of service	23.7	23.3	0.4
• Total supplemental computation pay	$615,196	$540,088	13.9%
• Average supplemental computation pay	14,307	14,213	0.7%
Active members (DROP):			
• Number	2	3	-33.3%
• Average age	66.5	62.8	3.7
• Average years of service	44.2	40.4	3.8
• Total supplemental computation pay	$27,837	$59,099	-52.9%
• Average supplemental computation pay	13,694	19,700	-30.5%
• DROP account balances	120,124	136,599	-12.1%
Inactive vested members			
• Number	2	2	0.0%
• Average age	48.4	48.3	0.1
• Average monthly benefit	$271	$319	-15.0%
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	118	116	1.7%
• Average age	67.8	67.9	-0.1
• Average monthly benefit	$1,572	$1,591	-1.2%
Beneficiaries:			
• Number in pay status	23	23	0.0%
• Average age	74.7	73.6	1.1
• Average monthly benefit	$841	$950	-11.5%

Exhibit B: Reconciliation of Member Data

	Active Members	Inactive Vested Members[1]	Retired Members	Beneficiaries	Total
Number as of January 1, 2020	**41**	**2**	**116**	**23**	**182**
• New members	10	N/A	N/A	N/A	10
• Terminations – with vested rights	-1	1	0	0	0
• Terminations – without vested rights	0	N/A	N/A	N/A	0
• Retirements	-5	-1	6	N/A	0
• Return to work	0	0	0	N/A	0
• Deceased	0	0	-4	-1	-5
• New beneficiaries	0	0	0	1	1
Number as of January 1, 2021	**45**	**2**	**118**	**23**	**188**

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

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

	Year Ended December 31, 2020		Year Ended December 31, 2019	
Net assets at market value at the beginning of the year		$17,307,433		$18,317,893
Contribution income:				
• City contributions	$1,777,311		$1,530,262	
• Member contributions	245,237		110,660	
• Less administrative expenses	-55,352		-54,598	
Net contribution income		*$1,967,196*		*$1,586,324*
Investment income:				
• Investment, dividends and other income	$255,493		$322,981	
• Recognition of capital appreciation	-306,946		-85,530	
• Less investment fees	-71,273		-68,456	
Net investment income		*-$122,726*		*$168,995*
Total income available for benefits		**$1,844,470**		**$1,755,319**
Less benefit payments:				
• Benefits paid to members	-$2,777,719		-$2,764,781	
• Refunds to members	0		-998	
Net benefit payments		*-$2,777,719*		*-$2,765,779*
Change in market value of assets		**-$933,249**		**-$1,010,460**
Net assets at market value at the end of the year		**$16,374,184**		**$17,307,433**

Exhibit D: Summary Statement of Plan Assets

	December 31, 2020	December 31, 2019
Cash equivalents and prepaid expenses	$745,068	$750,383
Capital assets	101,153	102,947
Invested securities lending collateral	0	108,762
Total accounts receivable	$119,804	$480,312
Investments:		
• Equity securities	$5,864,138	$4,636,273
• Real assets	4,396,071	4,736,110
• Fixed income securities	3,961,671	4,637,555
• Private equity	1,149,032	2,234,396
• Other	168,478	216,800
Total investments at market value	$15,539,390	$16,461,134
Total assets	$16,505,415	$17,903,538
Total accounts payable	-131,231	-596,105
Net assets at market value	**$16,374,184**	**$17,307,433**
Net assets at actuarial value	**$16,374,184**	**$17,307,433**

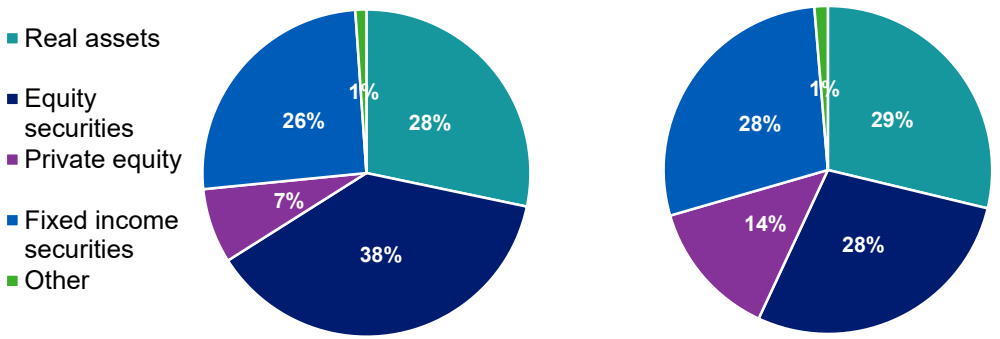


Exhibit E: Development of the Fund through December 31, 2020

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
2011	$1,543,717	$26,791	$252,054	$0	$2,119,029	$20,822,569
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

[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

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	$1,335,288	19	$18,373,933
Experience loss	01/01/2021	10	1,173,796	138,607	10	1,173,796
Change in assumptions	01/01/2021	10	1,558,820	184,073	10	1,558,820
Total				**$1,657,968**		**$21,106,549**

[1] Level percentage of payroll

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;

	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% (previously 7.00%) 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 Scale:	**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, 2069:* 0.00% *Beginning October 1, 2069:* 2.00%, on original benefit The assumption for the year the COLA begins will be updated on an annual basis 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:	$65,000 per year, payable monthly (equivalent to $62,985 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]		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 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 participants included in the January 1, 2021 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.
Benefit Election:	Married participants are assumed to receive the Joint and Survivor annuity form of payment and non-married participants are assumed to receive a Life Only annuity.
Actuarial Value of Assets:	Market value of assets
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 net investment return assumption was lowered from 7.00% to 6.50% • The ad-hoc COLA assumption was updated to begin October 1, 2069 based on the updated projection of the unfunded actuarial accrued liability; last year, the COLA was assumed to begin October 1, 2063. As a result of an amendment to the System's funding policy, the amortization methodology was changed as follows: • Effective with the January 1, 2021 actuarial valuation, future gains and losses, along with assumption, plan, and method changes, will be amortized over closed, 10-year periods.

Exhibit II: Summary of Plan Provisions

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

Plan Year:	January 1 through December 31
Plan Status:	Ongoing

Members whose Participation Began Before March 1, 2011

Normal Retirement:	**Benefit Earned Prior to September 1, 2017:** • *Age Requirement:* 50 • *Service Requirement:* 5 • *Amount:* Greater of 3.0% of Average Supplemental Computation Pay times years of Pension Service (maximum 96.0%) • *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 36 consecutive months of Supplemental Computation Pay. **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 • *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

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. If at least age 53 after September 1, 2017 • *Age Requirement:* 53 • *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% per month from age 58 for the post-September 1, 2017 benefit.
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 COLAs) 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.

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 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
Special Survivor Benefit	• *Eligibility:* Upon leaving active service or joining DROP: a) the Member was at least 55 years old with at least 20 years of pension service, or b) the sum of the Member's age plus Pension Service was at least 78; **and** Has no Qualified Surviving Children or disabled children currently eligible for survivor benefits; **and** Whose Qualified Surviving Spouse is at least 55 years old. The Qualified Surviving Spouse does not have to be 55 years old at the time of the Member's death. • *Amount:* Once all the eligibility conditions are met, the amount the Qualified Surviving Spouse will receive increases from 50% of the Member's pension benefit to a percentage of the Member's pension benefit based on the Member's applicable benefit multiplier times the number of years of Pension Service the Member worked.
Survivor Benefit if No Qualified Surviving Spouse:	A lump sum that is the actuarial equivalent of 120 monthly payments of the greater of: 50% of the Member's pension benefit at the time of their death, or a benefit based on 20 years of the Member's service.
DROP:	• *Eligibility:* Members in active service who are retirement eligible may elect to enter the Deferred Retirement Option Plan (DROP). • *Distribution:* The DROP account balance will be paid over the expected future lifetime of annuitants. • *Interest:* Based on United States Department of Commerce Daily Treasury Yield Curve Rates for durations between 5 and 30 years; interest rate is based on the expected lifetime of the members at the time they retire. Interest is only paid on DROP account balances as of September 1, 2017.

Members whose Participation Began On or After March 1, 2011

Normal Retirement:	• *Age Requirement:* 58 • *Service Requirement:* 5 • *Amount:* 2.5% of Average Supplemental Computation Pay for each year of Pension Service, maximum 90% • *Average Supplemental Computation Pay:* – Supplemental Average 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.
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.

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 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
Special Survivor Benefit	• *Eligibility:* Upon leaving active service or joining DROP: a) the Member was at least 55 years old with at least 20 years of pension service, or b) the sum of the Member's age plus Pension Service was at least 78; **and** Has no Qualified Surviving Children or disabled children currently eligible for survivor benefits; **and** Whose Qualified Surviving Spouse is at least 55 years old. The Qualified Surviving Spouse does not have to be 55 years old at the time of the Member's death. • *Amount:* Once all the eligibility conditions are met, the amount the Qualified Surviving Spouse will receive increases from 50% of the Member's pension benefit to a percentage of the Member's pension benefit based on the Member's applicable benefit multiplier times the number of years of Pension Service the Member worked.
Survivor Benefit if No Qualified Surviving Spouse:	A lump sum that is the actuarial equivalent of 120 monthly payments of the greater of: 50% of the Member's pension benefit at the time of their death, or a benefit based on 20 years of the Member's service.
DROP:	• *Eligibility:* Members in active service who are retirement eligible may elect to enter the Deferred Retirement Option Plan (DROP). • *Distribution:* The DROP account balance will be paid over the expected future lifetime of annuitants. • *Interest:* Based on United States Department of Commerce Daily Treasury Yield Curve Rates for durations between 5 and 30 years; interest rate is based on the expected lifetime of the members at the time they retire. Interest is only paid on DROP account balances as of September 1, 2017.

All Members

Cost of Living:	The Board may grant an ad hoc COLA based on the actual market return over the prior five years less 5%, not to exceed 4% of the base benefit, if, after granting a COLA, the funded ratio on a market value of assets basis is no less than 70%.
Member Contributions:	13.5% of supplemental computation pay for all members
City Contributions:	The City will contribute the Actuarially Determined Contribution based on a closed, 20-year amortization period, established January 1, 2020.
Optional Forms of Benefits:	50% or 100% Joint and Survivor Pension
Changes in Plan Provisions:	None

Section 5: GASB Information

Exhibit 1: Net Pension Liability

The components of the net pension liability at December 31, 2020 were as follows:

Total pension liability	$37,484,432
Plan fiduciary net position	16,374,184
Net pension liability	21,110,248
Plan fiduciary net position as a percentage of the total pension liability	43.68%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of January 1, 2021, 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, 2020 are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return[1]
Global Equity	40%	6.80%
Emerging Market Equity	10%	9.20%
Private Equity	5%	10.55%
Short-Term Investment Grade Bonds	12%	-0.10%
Investment Grade Bonds	4%	0.40%
High Yield Bonds	4%	3.10%
Global Bonds	4%	0.50%
Bank Loans	4%	2.30%
Emerging Markets Debt	4%	3.30%
Real Estate	5%	3.65%
Natural Resources	5%	7.90%
Cash	3%	-0.20%
Total	100%	

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

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 that City contributions will equal the employer'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 will equal 13.50% of supplemental computation pay. Based on those assumptions, the System's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

With this year's valuation, the long-term expected rate of return on investments was lowered from 7.00% to 6.50%.

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.

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	$24,651,489	$21,110,248	$18,093,251

Exhibit 2: Schedule of Changes in Net Pension Liability

	2020	2019
Total pension liability		
• Service cost	$379,127	$212,383
• Interest	2,438,042	2,222,866
• Change of benefit terms	0	0
• Differences between expected and actual experience	46,754	3,007,115
• Changes of assumptions	1,559,322	1,331,588
• Benefit payments, including refunds of employee contributions	-2,777,719	-2,765,779
Net change in total pension liability	**$1,645,526**	**$4,008,173**
Total pension liability – beginning	**35,838,906**	**31,830,733**
Total pension liability – ending (a)	**$37,484,432**	**$35,838,906**
Plan fiduciary net position		
• Contributions – employer	$1,777,311	$1,530,262
• Contributions – employee	245,237	110,660
• Net investment income	-122,726	168,995
• Benefit payments, including refunds of employee contributions	-2,777,719	-2,765,779
• Administrative expense	-55,352	-54,598
Net change in plan fiduciary net position	**-$933,249**	**-$1,010,460**
Plan fiduciary net position – beginning	**17,307,433**	**18,317,893**
Plan fiduciary net position – ending (b)	**$16,374,184**	**$17,307,433**
Net pension liability – ending (a) – (b)	**$21,110,248**	**$18,531,473**
Plan fiduciary net position as a percentage of the total pension liability	**43.68%**	**48.29%**
Covered payroll	**$626,782**	**$584,068**
Net pension liability as percentage of covered payroll	**3368.04%**	**3,172.83%**

Notes to Schedule:

Benefit changes: None.

Change of Assumptions: The assumption changes in 2019 were based on the recommendations in the experience study for the period January 1, 2015 to December 31, 2019 and included lowering the discount rate from 7.25% to 7.00% and changes to the salary scale, mortality rates, withdrawal rates, retirement rates, and DROP annuitization rates. The expected COLA start date was also updated from October 1, 2050 to October 1, 2063. 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.

Exhibit 3: 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%

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, 2020; these are not the same assumptions used in the January 1, 2021 actuarial valuation or for the Total Pension Liability measured as of December 31, 2020:

Valuation date	Actuarially determined contribution is calculated using a January 1, 2020 valuation date as of the beginning of the year in which contributions are reported
Actuarial cost method	Entry age
Amortization method	20-year level percent of payroll, using 2.50% annual increases
Remaining amortization period	20 years
Asset valuation method	At market value
Investment rate of return	7.00%, including inflation, net of pension plan investment expense
Inflation rate	2.50%
Projected salary increases	Inflation plus merit increases, varying by group and service
Retirement rates	Group-specific rates based on age
Cost-of-living adjustments	2.00% simple increases starting October 1, 2063

Section 5: GASB Information

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	
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