City of Lansing
Police and Fire Retirement System

Actuarial Valuation
For Funding and Contributions

as of December 31, 2021

October, 2022

BOOMERSHINE CONSULTING GROUP, L.L.C.
ACTUARIAL & RETIREMENT PLAN SOLUTIONS

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Executive Summary

October 18, 2022

City of Lansing Police and Fire Retirement System
124 W. Michigan Avenue
8th Floor
Lansing, MI 48933

Members of the Board:

The following report sets forth the Actuarial Valuation of the City of Lansing Police and Fire Retirement System (the System) as of December 31, 2021. The report is based on participant data and asset summary as submitted by the Plan Administrator and City finance department. We relied on this information without auditing it.

INVESTMENT PERFORMANCE

The total Market Value of Plan Assets for the plan year ending December 31, 2021 is $400,396,056. Plan assets exclude from this a reserve for healthcare benefits. The total yield of the fund for the plan year ending December 31, 2021 was 11.7% on the market value of assets and 9.8% on an actuarial basis, taking into account recognition of prior gains and losses.

The Plan uses a smoothing method to determine the City's contributions. Under this method, asset gains or losses are spread over a 5-year period. The gains and losses are determined every year by comparing actual investment returns with expected asset performance.

Details of the development of the Actuarial Asset Value are shown on page 8.

FUNDING PROGRESS

The Actuarial Accrued Liability as of December 31, 2021 is $500,182,752 compared to the Actuarial Value of Assets of $329,564,511 (excluding healthcare reserve), resulting in a plan funded ratio of 65.9%. Using the market value of assets, this ratio is 69.9%. Details are on page 14.

CONTRIBUTION

The total Actuarially Determined Employer Contribution for fiscal year 2023 is $18,165,988, which is estimated to be 56.5% of payroll. About 15.5% of payroll represents the Normal Cost, with the remaining amount representing a payment towards the System’s unfunded liability. Details are on page 15.

ASSUMPTION AND METHOD CHANGES

There were no changes since the prior valuation.

BENEFIT CHANGES

There were no changes in benefit provisions since the prior valuation. Benefit provisions for each group are summarized on pages 20-22.

Actuarial Certification

The purposes of this report are to establish the City contribution for the next fiscal year, and to evaluate the funding progress of the System.

The accounting report for the System, under GASB 67 and 68, is provided under separate cover, and serves a different purpose. All the figures presented in this report are to be used for funding and contribution purposes.

This report is prepared in accordance with generally accepted actuarial principles and practices. In the opinion of the Retirement Board and its actuary, the actuarial assumptions used are reasonable related to Retirement System experience and expectations, and represent the best estimate of Retirement System experience.

The undersigned are members of the American Academy of Actuaries, and are qualified to render the actuarial opinions presented in this report.

Respectfully Submitted,

BOOMERSHINE CONSULTING GROUP, L.L.C.

Gregory M. Stump, FSA, EA, MAAA, FCA
Chief Actuary

Sunita K. Bhatia, ASA, EA, MAAA, FCA
Senior Consulting Actuary

Section 1: Plan Asset Information

1.1: Summary of Plan Assets

Market Value of Total Fund as of December 31, 2020			$371,572,354
Beginning of Year Adjustment			3,258
Adjusted Market Value of Total Fund as of January 1, 2021			$371,575,612
Receipts:			
Employer Contribution	18,263,635		
Employer Contribution - Healthcare Reserve	1,300,000		
Member Contributions	3,183,712		
Investment Income			
Interest	(162,107)		
Realized Gain/(Loss)	16,532,927		
Market Appreciation/(Depreciation)	26,631,639		
Total Additions		$65,749,806	
Disbursements:			
Member Refunds	205,906		
Distributions to Participants/ Beneficiaries	35,451,762		
Administrative Expenses and Other	1,477		
Investment Expenses	1,270,215		
Other	0		
Total Disbursements		$36,929,360	
Net Increase/(Decrease) in Assets			$28,820,444
Market Value of Total Fund as of December 31, 2021			**$400,396,056**

1.2: Reconciliation of Fund Reserves

	EMPLOYEE SAVINGS FUND	RETIREMENT RESERVE	HEALTHCARE RESERVE	TOTAL
12/31/2020	$26,079,656	$300,460,790	$45,031,908	$371,572,354
1/1/2021	26,079,656	300,464,048	45,031,908	371,575,612
Additions:				
EE Contributions	3,183,712		-	3,183,712
ER Contributions	-	18,263,635	1,300,000	19,653,635
Interest:	3.00%	7.00%	9.60%	
Annual Credits	782,390	18,550,632	4,324,218	23,657,468
Deductions:				
Refunds/Benefits	(205,906)	(35,451,762)	-	(35,657,668)
Adjustment/Transfers	(4,762,769)	22,836,066	-	18,100,054
12/31/2021	**$25,077,083**	**$324,662,847**	**$50,656,126**	**$400,396,056**

Employees Savings Fund

Purpose	Keep track of employee contribution balances, and interest credited to such. Interest is credited at 3% annually.
Relevance to Plan Funding	Does not directly impact plan funding

Retirement Reserve Fund

Purpose	Provides funds to finance regular benefit payments to retirees. Interest is credited at the actuarial assumed rate of return. An adjustment is applied annually to correspond with changes in the market value of plan assets.
Relevance to Plan Funding	Does not directly impact plan funding

Healthcare Reserve

Purpose	Funds invested with pension assets, but segregated to be used for retiree healthcare benefits. Interest is credited annually at a 5-year average rate.
Relevance to Plan Funding	Excluded from pension assets to determine contributions towards pension funds

1.3: Development of Actuarial Value of Assets

Market Value of Total Fund as of January 1, 2021			$371,572,612
Plus: Contributions during 2021			22,747,347
Less: Benefit Payments, Refunds			35,657,668
Less: Administrative Expenses/Other			1,477
Plus: Expected Return during 2021			24,991,979
Expected Market Value as of December 31, 2021			$383,655,793
Actual Market Value of Total Fund as of December 31, 2021			$400,396,056
Investment Gain/(Loss) for 2021 (actual – expected)			16,740,263
Actuarial Value = Market Value			
Less: 80% of 2021 Gain/(Loss)	80% *	$16,740,263	$13,392,210
Less: 60% of 2020 Gain/(Loss)	60% *	9,543,649	5,726,189
Less: 40% of 2019 Gain/(Loss)	40% *	28,548,544	11,419,418
Less: 20% of 2018 Gain/(Loss)	20% *	(37,201,009)	(7,440,202)
Total Deferred Gain/(Loss)			$23,097,615
Actuarial Value of Assets, Total Fund - December 31, 2021			$377,298,441
as % of Market Value of Assets			94.2%
Healthcare Reserve as of December 31, 2021			$50,656,126
Adjusted Healthcare Reserve[1]			47,733,930
Actuarial Value of Assets, Pension Plan - December 31, 2021			**$329,564,511**
Estimated Rate of Return on the Actuarial Value is			9.83%

[1] Takes into account asset smoothing

1.4: Historical Investment Returns

Year	Market Value Return	Actuarial Value Return
2012	12.72%	2.39%
2013	17.20%	12.60%
2014	6.20%	9.60%
2015	-0.10%	7.20%
2016	6.10%	6.29%
2017	15.50%	8.72%
2018	(4.18%)	3.23%
2019	17.18%	7.05%
2020	10.48%	9.95%
2021	11.68%	9.83%
5 Year Compound Return	9.86%	7.73%
10 Year Compound Return	9.06%	7.64%

Section 2: Participant Summary

2.1: Reconciliation of Plan Participants

	Active Participants	Non-vested Terminations Due Refunds	Deferred Vested Terminations	Retired	Disabled	Beneficiary/ EDRO	Total
Participants as of December 31, 2020	360	31	19	525	73	156	1,164
Retired	(19)	0	0	19	0	0	0
Terminated Vested	0	0	0	0	0	0	0
Terminated, Contribution Refund	(20)	20	0	0	0	0	0
Terminated Non-Vested Contribution Refund Due	(7)	0	(1)	0	0	0	(8)
Disabled	(2)	0	0	0	2	0	0
Deceased	0	0	0	(16)	(1)	(9)	(26)
New Beneficiary / EDRO	0	0	0	0	0	16	16
Rehired	2	(2)	0	0	0	0	0
New Hires	41	0	0	0	0	0	41
Data Adjustments	0	0	0	1	0	0	1
Participants as of December 31, 2021	355	49	18	529	74	163	1,188

2.2: Demographic Summary

Active Participants	12/31/2020	12/31/2021
Number of Active Participants	360	355
Average Age	38.1	37.8
Average Service	11.0	10.7
Average Salary	$76,816	$82,300

Inactive Participants	12/31/2020			12/31/2021		
	Fire	Police	Total	Fire	Police	Total
Number of Retired Participants	227	298	525	230	299	529
Average Age	65.9	66.5	66.2	65.8	66.8	66.4
Average Annual Benefit	$57,591	$51,750	$54,276	58,838	52,835	55,445
Number of Disabled Participants	38	35	73	39	35	74
Average Age	56.9	54.1	55.6	57.8	54.5	56.2
Average Annual Benefit	$45,205	$45,885	$45,531	45,556	47,961	46,693
Number of Beneficiaries/EDROs	66	90	156	68	95	163
Average Age	76.8	72.1	74.1	76.6	72.2	74.1
Average Annual Benefit	$19,611	$23,717	$21,980	20,698	24,411	22,862
Number of Deferred Vested Participants	6	13	19	5	13	18
Average Age	46.4	46.9	46.7	49.7	47.9	48.4
Average Annual Benefit	$34,201	$36,737	$35,936	34,519	36,737	36,121

Section 3: Valuation Summary

3.1: Summary of Actuarial Liability and Funding Progress

	12/31/2020	12/31/2021
Actuarial Accrued Liability (AAL)		
Active Employees	$106,749,866	$106,225,855
Inactive	5,390,129	5,303,274
Retirees and Beneficiaries	376,439,834	388,653,623
Total Actuarial Accrued Liability	$488,579,829	$500,182,752
Actuarial Value of Assets (AVA)	313,770,079	329,564,511
Unfunded Actuarial Accrued Liability (AAL-AVA)	$174,809,750	$170,618,241
Plan Funding Ratio (AVA/AAL)	**64.2%**	**65.9%**

3.2: Development of Actuarially Determined Employer Contribution (ADEC)

		12/31/2020	12/31/2021
		FY2022	FY2023
1)	Total Entry Age Normal Cost	$7,611,549	$7,520,134
2)	Estimated Employee Contributions	2,544,747	2,657,522
3)	Net City Normal Cost: (1) – (2)	$5,066,802	$4,862,612
4)	Valuation Payroll	$29,636,017	$31,354,796
5)	City Normal Cost Rate (% of pay): (3) ÷ (4)	17.1%	15.5%
6)	Amortization of Unfunded Actuarial Accrued Liability	$12,751,378	$12,860,303
		(20 years)	(19 years)
7)	Amortization Rate (% of Pay): (6) ÷ (4)	43.0%	41.0%
8)	Total Contribution Rate: (5) + (7)	60.1%	56.5%
9)	Projected Payroll	$30,376,917	$32,138,666
10)	**Actuarially Determined Employer Contribution: (8) x (9)**	**$18,263,635**	**$18,165,988**

Estimated Cash Flow for Next Five Years

Fiscal Year	City Contribution*	Member Contributions	Benefit Payments
2024	$18,200,000	$2,700,000	$36,000,000
2025	17,600,000	2,800,000	36,900,000
2026	17,500,000	2,900,000	38,100,000
2027	17,600,000	2,900,000	38,600,000
2028	17,900,000	3,000,000	39,100,000

* These amounts are based on one set of assumptions. If actual experience is less favorable than assumed, the City contributions will be higher. Estimated member contributions shown above do not include any purchases of service.

Section 4: Actuarial Assumptions and Methods

Funding Method and Amortization:	Entry Age Normal Actuarial Cost Method. The contribution equals the sum of the normal cost and the amount necessary to amortize the unfunded actuarial liability as a level percent of payroll over a closed period (19 years remaining as of December 31, 2021).
Asset Smoothing Method:	Investment gains and losses are determined annually and each is spread over a 5-year period. This is done on a total fund basis, with an 80% - 120% corridor around market value. The value of the healthcare reserve is then excluded from the valuation assets.
Investment Return:	7.00% compounded annually, net of investment expenses and including inflation
Cost of Living (inflation):	The cost of living as measured by the Consumer Price Index (CPI) is assumed to increase at the rate of 2.50% per year.
Salary Increases:	Increases in salary are assumed to be equal to inflation, plus 7.25% per year for the first 5 years of service, then 1.00% per year thereafter.
Mortality:	Pub2010S (Below Median), 50% for pre-retirement deaths. For Disabled members, the Pub2010G (Below Median) tables are used). Each of these tables is projected generationally with Scale SSA (2021). A 50% factor is applied to the active population.
Percent Married:	90% of participants are assumed to be married. Male spouses are assumed to be three years older than their female spouse.
Disability:	Rates of disability vary based on the age of the member. 95% of disabilities are assumed to be duty related. Sample rates are shown below:

Age	Rate
20	0.1200%
30	0.6000%
40	0.9375%
50	1.1250%
60	0.0000%

Termination: Rates of termination vary based on the service of the member. Sample Rates are shown below:

Fire		Police	
Years of Service	**Rate**	**Age**	**Rate**
0	2.0%	20	15.0%
1	1.6%	25	8.6%
5	0.7%	30	4.9%
10	0.2%	35	2.8%
15	0.05%	40	1.6%
20	0.00%	45	0.9%
		50+	0.0%

Retirement: Rates of retirement vary based on the service of the member as shown below.

Years of Service	Fire	Police
10-24	40%	40%
25	90%	90%
26-29	60%	25%
30+	100%	100%

Also 100% at mandatory retirement ages.

Changes in assumptions and methods since the prior valuation

None

The assumptions outlined above are based on the 2015 – 2019 experience study. The next study will cover 2020 – 2024.

Section 5: Summary of Plan Benefits

All benefits are subject to the language in the City Ordinance and relevant collective bargaining agreements.

Employee Group Covered: Police Officers (CCLP-S and CCLP-NS), and Fire Fighters (IAFF)

Normal Retirement: Age 55 or 25 years of service, except a firefighter whose membership commenced on or after May 19, 2014, and a police officer whose membership commenced on or after August 1, 2014, full retirement is at age 50 with 25 years of service

Mandatory Retirement: Age 60 - Police Officers; age 70 - Firefighters

Normal Form of Benefit: Monthly life annuity with 50% of the benefit payable to the spouse upon the member's death.

	Group	Contribution Rate (% of Pay)
Member Contribution Rates:	Fire	10.00%
	Police, Supervisor	9.52%
	Police, Non-Supervisor	9.00%
Hires after 5/19/2014	Fire	7.00%
Hires after 8/1/2014	Police, Supervisor and Non- Supervisor	7.00%

Included Compensation: For a police officer member, Included Compensation is defined as annual base salary, overtime pay (including holiday pay), longevity, gun allowance, clothing allowances, sick leave reimbursement (buy-back), shift premium and retroactive pay (prorated by effective date). For a Police Supervisory Division Unit member, the definition also includes compensatory time buy-back (up to a maximum of 160 hours), provided that the compensatory time was earned in the same 24 months on which final average compensation is based. For a firefighter member, Included Compensation is defined as annual base salary, overtime pay, acting pay, ambulance wage differential pay, longevity, holiday pay, field training instructor pay and retroactive pay (prorated by effective date).

Final Average Compensation: Final Average Compensation means the monthly average of the member's final compensation that is included in Included Compensation, paid during the period of the member's 36 highest consecutive months of credited service as a police officer, or firefighter (24 months for police officers hired before July 1, 1999). If the member has less than 24 (36) months of credited service, the member's final average compensation shall be the monthly average of the Included Compensation paid for his or her total period of credited service.

Normal Retirement Benefit Formula: 3.2% of Final Average Compensation times years of credited service, not to exceed 25 years. Pension benefit is capped at 110% of Base Wage for firefighters, Police – Non-Supervisors and Police – Supervisors (115% of Base Pay for Police-Supervisors prior to July 15, 2019).

Benefit Multiplier is changed to 2.5% and Pension Benefit is capped at 110% of Base Wage for hires on or after May 20, 2014 for firefighters and August 1, 2014 for police officers.

Termination Prior to Retirement	
Eligibility	Vesting is after 10 years of credited service
Benefit Amount	Benefit is payable beginning at age 55 and computed in the same manner as the Normal Retirement Benefit, but based on credited service and Final Average Compensation at date of termination.
Duty Disability	
Eligibility	Members are eligible for Duty Disability Retirement benefits immediately upon employment.
Benefit Amount (Before Retirement Eligibility)	The Duty Disability Retirement Benefit payable to members is equal to 2/3 of Final Average Compensation.
Benefit Amount (After Retirement Eligibility)	Benefit is paid at the effective date of disability retirement as a Life Annuity and is equal to the accrued Retirement Benefit. In computing the benefit amount, credited service is increased to include the period of disability, and Final Average Compensation is calculated using current rates of compensation for those with similar rank. The Disability Benefit will be offset by any workers' compensation payable on account of the disability.
Non-Duty Disability	
Eligibility	Members are eligible for Non-Duty Disability Retirement benefits after completing 10 years of service.
Benefit Amount	Benefit is paid at the effective date of disability retirement as a Life Annuity and is equal to the accrued Retirement benefit, with a maximum benefit equal to 2/3 of the annual rate of compensation of either a full-paid police patrol officer or a full-paid firefighter as of the date of retirement, whichever is higher.
Death incurred in the Line of Duty	
Eligibility	The Death in Line of Duty Benefit is payable to the survivors of a member who died as a result of an injury or disease arising out of and in the course of duty.
Benefit Amount - Fire	Accumulated Contributions will be paid to the designated survivor or legal representative (if no designated survivor). Benefit is payable to the surviving spouse, equal to the greater of 80% of the deceased member's Final Average Compensation, or 80% of the top paid base salary for the rank the officer held at the time of his or her death. Benefit is payable to the surviving children under age 21, if there is no surviving spouse.
Benefit Amount - Police	A benefit is payable to the widow(er), equal to the greater of 80% of the deceased member's Final Average Compensation, or 80% of the top paid base salary for the rank the officer held at the time of his or her death. Benefit is paid to surviving children if there is no surviving spouse.
Non-Duty Pre-Retirement Death	
Eligibility	The non-duty pre-retirement death benefit is payable upon the death of a member after earning 10 years of credited service.
Benefit Amount	50% of the accrued retirement benefit, computed in the same manner as the Retirement Benefit payable as a Life Annuity and no less than 20% of the deceased member's final average compensation.

Optional Benefit Forms

Prior to retirement, a member may elect a full benefit or a reduced benefit of either 93% or 86% of the original amount, thereby providing the spouse a benefit of either 50%, 75% or 86%, respectively.

Refund of Accumulated Contributions

A member who terminates employment prior to being vested shall
be paid his/her accumulated contributions.

Ad Hoc Cost-of-Living Adjustments

One-time cost of living increases were granted in 1973, 1984 and 1987.

Post Retirement Benefit Adjustments

Effective January 1, 1995 and each January 1 thereafter, the annual benefit amount will be increased by $525 for each retiree who meets each of the following conditions:

1) 25 or more years of credited service at the time of retirement
2) Age 60 as of the January 1 increase date
3) Has been retired at least 6 months as of the January 1 increase date

The $525 amount is reduced for retirees who elected the 75% or 86% optional forms of benefit ($488.25 and $451.50, respectively).

Spouses of deceased members are also eligible for benefit increases each January 1 if:

1) The deceased member had at least 25 years of credited service at the time of retirement
2) The deceased member would have attained at least age 60 as of the January 1 increase date
3) The deceased member had been deceased at least 6 months as of the January 1 increase date.

The spouse's annual benefit increase amount is adjusted based on the form of payment elected by the deceased member, according to the following schedule:

Spouse Benefit %	Annual Benefit Increase
50%	$262.50
75%	$393.75
86%	$451.50

The benefit increases accumulate from year to year, but cumulative benefit increases shall not exceed cumulative increases in the Consumer Price Index.

Changes in Plan provisions since the prior valuation

None.

Glossary of Terms

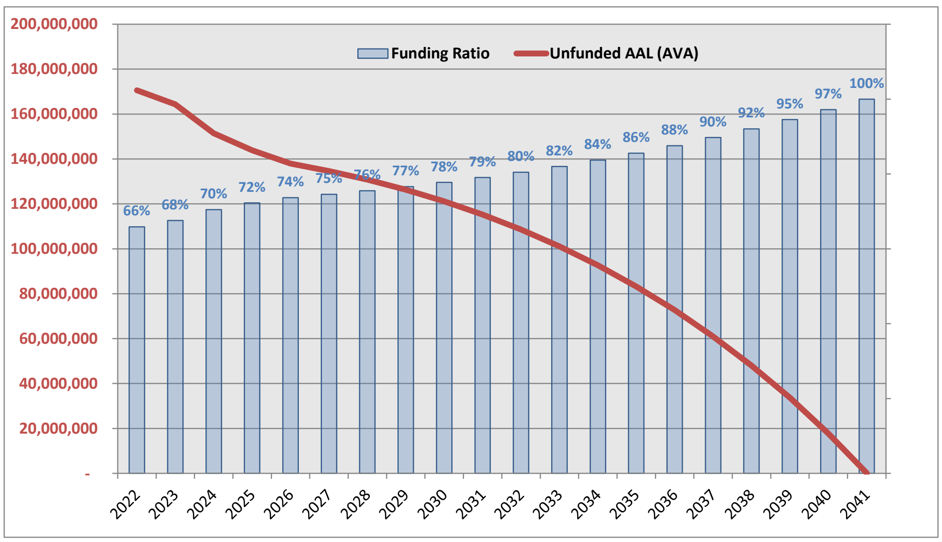
Actuarial Accrued Liability (AAL):	The portion of benefits deemed to be accrued by participants based on past service. The AAL serves as the asset **funding** target, when annual contributions are determined.
Actuarial Value of Assets (AVA):	The smoothed value of assets, used to compute the Unfunded AAL. The purpose of the AVA is to control volatility in annual **cash contributions**.
Amortization of Unfunded Liability:	The portion of the **annual cash contribution** that represents a portion of the Unfunded AAL. The amortization can be positive or negative.
Actuarially Determined Employer Contribution (ADEC):	The contribution determined by the actuary for **funding purposes**.
Market Value of Assets (MVA):	The total value of Plan assets available to pay benefits.
Normal Cost:	That portion of the annual contribution that represents one year's accrual of benefits. In funding calculations, this is known as the Service Cost.
Unfunded Actuarial Accrued Liability:	The difference between the Actuarial Value of Assets and the Actuarial Accrued Liability, used for **funding purposes**.

Appendix I: 20 Year Projection of Funding and Contributions

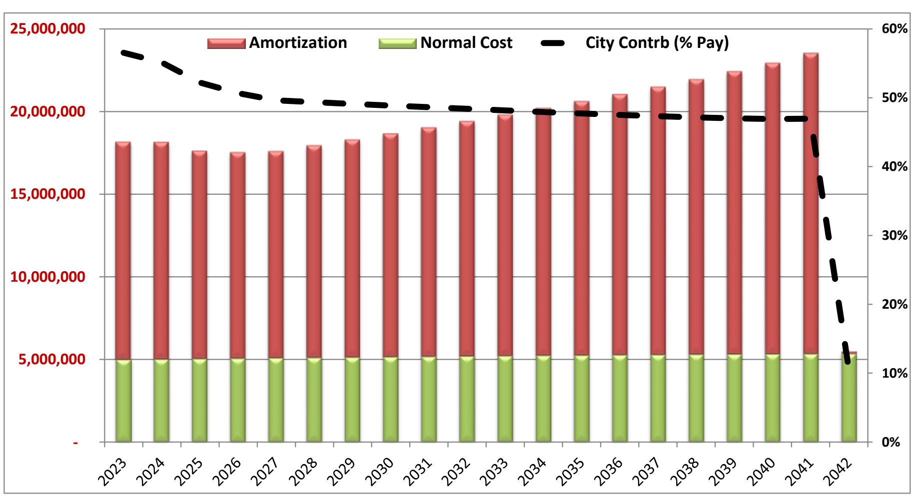
The graphs below show a projection of expected funding progress and City contributions to the Fund. We can see that the Plan is on a path to eliminating the unfunded liability (top graph, red line) and significantly improving the funding ratio. During this time, the City contribution rate is expected to remain close to 50% of payroll, before eventually declining. The actual funding progress and contributions over this time period will differ from what is shown here, due to the actual experience of the Plan.

As shown in the second graph the majority of the contribution is currently, and is expected to continue to be, a payment towards the unfunded actuarial liability.

Projection of Funding Progress



Projection of City Contributions



Appendix II: History of Employer Contributions and Funding Progress

History of Employer Contributions

Fiscal Year Ending	Actuarially Determined Employer Contribution	Actual Employer Contribution	
6/30/2014	$11,248,857	$11,248,857	
6/30/2015	11,050,091	11,050,091	(2)
6/30/2016	10,884,312	10,884,312	
6/30/2017	11,521,768	11,521,768	
6/30/2018	12,562,547	12,686,000	(3)
6/30/2019	13,554,239	13,554,239	(4)
6/30/2020	15,457,647	15,457,647	(5)
6/30/2021	16,950,155	16,950,155	
6/30/2022	18,263,635	18,263,635	(6)
6/30/2023	18,133,458	To Be determined	

(2) Fiscal year 2015 ADEC reflects changes made to assumed return and inflation from 7.8% and 3.3% to 7.6% and 3.1%, respectively. ADEC also reflects change in asset smoothing to immediately recognize all investment gains and losses prior to 12/31/2012.

(3) Reflects changes made to actuarial assumptions as of 12/31/2016, including return assumption of 7.35%, with underlying 2.85% inflation.

(4) Reflects changes made to the discount rate and the rate of inflation as of 12/31/2017.

(5) Paid in calendar year 2020, so not reflected in System assets as of 12/31/2019

(6) Reflects changes made to actuarial assumptions as of 12/31/2020, including return assumption of 7.00%, with underlying 2.50% inflation.

History of Funding Progress

Valuation Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Percentage Funded	Unfunded Actuarial Accrued Liability	
12/31/2012	$257,898,061	$373,083,911	69.1%	$115,185,850	
12/31/2013	277,267,947	383,879,280	72.2%	106,611,333	(2)
12/31/2014	288,785,965	395,089,321	73.1%	106,303,356	
12/31/2015	292,531,481	410,189,555	71.3%	117,658,075	
12/31/2016	294,311,956	424,264,103	69.4%	129,952,147	(3)
12/31/2017	302,362,351	441,891,242	68.4%	139,528,892	(4)
12/31/2018	296,163,457	457,988,405	64.7%	161,824,949	
12/31/2019	286,067,027	463,371,047	61.7%	177,304,020	
12/31/2020	313,770,079	488,579,829	64.2%	174,809,750	(5)
12/31/2021	329,564,511	500,182,752	65.9%	170,618,241	

(1) Reflects changes made to actuarial assumptions, based on Experience Study, including a reduction in the assumed return 8.0% to 7.8%.

(2) Reflects changes made to assumed return and inflation from 7.8% and 3.3% to 7.6% and 3.1%, respectively. AVA also reflects change in asset smoothing to immediately recognize all investment gains and losses prior to 12/31/2012.

(3) Reflects changes made to actuarial assumptions as of 12/31/2016, including return assumption of 7.35%, with underlying 2.85% inflation.

(4) Reflects changes made to actuarial assumptions as of 12/31/2017, return assumption of 7.25%, with underlying 2.75% inflation.

(5) Reflects changes made to actuarial assumptions as of 12/31/2020, return assumption of 7.00%, with underlying 2.50% inflation.

Appendix III: Valuation Sensitivity

The figures shown on this page are based on the same assumptions, except for the amortization period and investment return assumption. The valuation is otherwise in compliance with the State's Act 202 Uniform assumptions and amortization. The following shows the impact of the two changes.

Actuarial Accrued Liability State Uniform Assumptions	**12/31/2021**
	6.85%
Total Actuarial Accrued Liability	$507,986,309
Actuarial Value of Assets	329,564,511
Unfunded Actuarial Accrued Liability	$178,421,798
Plan Funding Ratio	64.9%

	City Contribution State Uniform Assumptions	**FY2023**
		6.85%
1)	Total Entry Age Normal Cost	$7,770,562
2)	Estimated Employee Contributions	2,657,522
3)	Net City Normal Cost: (1) – (2)	$5,113,040
4)	Valuation Payroll	$31,354,796
5)	City Normal Cost Rate (% of pay): (3) ÷ (4)	16.3%
6)	Amortization of Unfunded Actuarial Accrued Liability (17 years)	$14,336,352
7)	Amortization Rate (% of Pay): (6) ÷ (4)	45.7%
8)	Total Contribution Rate: (5) + (7)	62.0%
9)	Projected Payroll	$32,138,666
10)	**Total City Contribution for FY2023 w/Uniform Assumptions: (8) x (9)**	**$19,935,627**

To further illustrate the investment risk the System is subject to, the following table shows the impact of an investment return assumption of 5.00%, with all others factors being held the same as the valuation basis. This would have a significant impact on funding and contributions. This would also be true if actual returns were 2% lower in future years.

As of 12/31/2021 ($ mm)	**Current Return Assumption**	**2% Lower**
Actuarial Liability	$500.2	$615.2
Plan Assets	$329.6	$329.6
Unfunded Liability	$170.6	$285.6
Funding Ratio	66%	54%
Employer Contribution (EOY)	$18.2	$28.2
Total Contribution Rate	56.7%	87.9%

Appendix IV: Risk Assessment

There are a number of risks inherent in managing a pension plan/trust. Some of the most substantial risks include (not an all-inclusive list):

- Investment Return Risk: Future investment returns may be unfavorable compared to what is assumed for Plan funding purposes.
- Investment Volatility Risk: Investment returns will vary from year to year and over time, with a possible single or multiple year significant drop in plan assets. This impacts contribution amounts as well as compound returns.
- Longevity Risk: Plan members and beneficiaries may live longer than projected, and thus be entitled to additional years of benefit payments versus what had been expected.
- Other Demographic Risks: Future demographic experience may be unfavorable compared to expected rates of retirement, termination, and disability. Future salary increases may also be higher than expected, thereby increasing the liability of pay-related benefits.

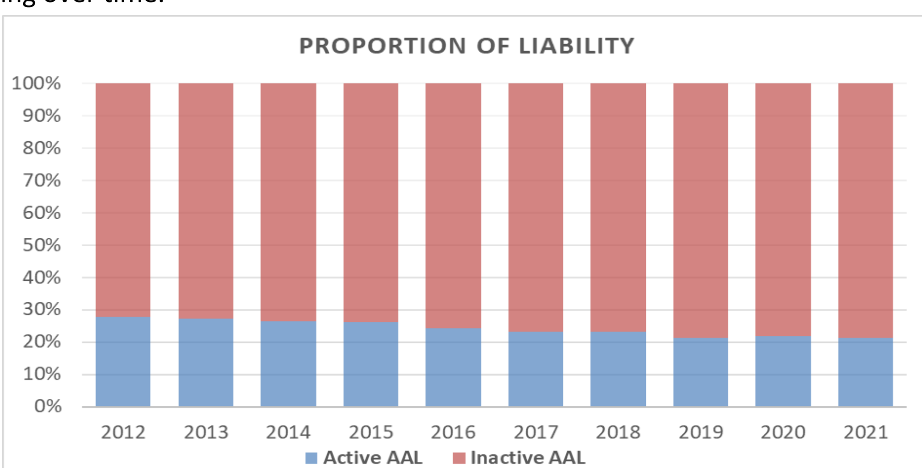
The liabilities in Appendix III versus the body of this Report is an example of the impact of long-term investment return and longevity risk.

Plan Maturity

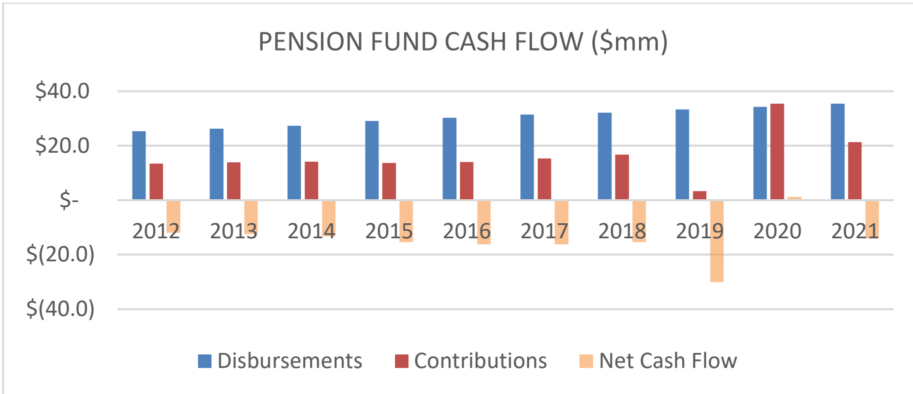
Another challenging risk faced by many pension plans is the maturing of the plan over time. This can be seen in the number of inactive (retirees, beneficiaries, etc.) versus the number of active employees in the plan population, as well as the liability of each group. As the plan matures, several risks emerge, including:

- Higher ratio of assets to payroll, which leads to a greater degree of contribution rate volatility.
- Negative cash flow (benefit payments exceeding contributions), which exacerbates the impact of an economic downturn.
- Greater degree of longevity risk (as illustrated above).
- Higher ratio of Actuarial Accrued Liability to Normal Cost, which causes more contribution volatility when demographic experience is unfavorable.

The following graphs illustrate some of these plan maturity measures in recent years, showing how the plan is maturing over time.



The System's actuarial liability has been steadily increasing in inactive proportion, from about 70% to about 80% inactive currently. This is evidence of a very mature plan, which carries with it the risks described above.



The fund has experienced negative cash flow (disbursements greater than contributions) for at least the last decade, with a total ten-year negative net cash flow of about $144 million. This is another indication of a very mature plan. However, continued City contributions at the actuarially determined amounts will lead to funding improvement and a lower level of risk associated with negative cash flows.

Note: The employer contributions for fiscal years 2020 and 2021 were both made in calendar year 2020, so they were not reflected in the System assets as of 12/31/2019, but are reflected in the assets as of 12/31/2020.

Appendix V: Benefit Costs by Group

Employee Group(s)	# Employees	Benefit Multiplier	Total Normal Cost	% of Pay	Net City Normal Cost	% of Pay
Police I	94	3.20%	$2,635,013	29.1%	$1,797,127	19.8%
Police II	94	2.50%	1,379,438	19.7%	890,098	12.7%
Fire I	82	3.20%	2,167,472	25.1%	1,303,420	15.1%
Fire II	85	2.50%	1,338,211	20.1%	871,966	13.1%
All Police and Fire Employees in Valuation	355	N/A	$7,520,134	24.0%	$4,862,496	15.5%