



City of Lansing Employees' Retirement System

Actuarial Valuation For Funding and Contributions

as of December 31, 2021

October, 2022

Table of Contents

EXECUTIVE SUMMARY	3
SECTION 1: PLAN ASSET INFORMATION	5
1.1: Summary of Plan Assets	6
1.2: Reconciliation of Fund Reserves	7
1.3: Development of Actuarial Value of Assets	8
1.4: Historical Investment Returns	9
SECTION 2: PARTICIPANT SUMMARY	10
2.1: Reconciliation of Plan Participants	11
2.2: Demographic Summary	12
SECTION 3: VALUATION SUMMARY	13
3.1: Summary of Actuarial Liability and Funding Progress	14
3.2: Development of Actuarially Determined Employer Contribution (ADEC).....	15
SECTION 4: ACTUARIAL ASSUMPTIONS AND METHODS	16
SECTION 5: SUMMARY OF PLAN BENEFITS	19
GLOSSARY OF TERMS.....	23
APPENDIX I: 20 YEAR PROJECTION OF FUNDING AND CONTRIBUTIONS.....	24
APPENDIX II: HISTORY OF EMPLOYER CONTRIBUTIONS AND FUNDING PROGRESS	25
APPENDIX III: VALUATION SENSITIVITY.....	27
APPENDIX III: RISK ASSESSMENT.....	29
APPENDIX V: BENEFIT COSTS BY GROUP	31

Executive Summary

October 18, 2022

City of Lansing Employees' 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 Employees' 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 the 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 was \$227,090,344. 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 10.4% on the market value of assets and 9.2% 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 \$ 312,083,091 compared to the Actuarial Value of Assets (excluding healthcare reserve) of \$177,428,286, resulting in a plan funded ratio of 56.9%. On a market value basis, this ratio is 59.4%. Details are on page 14.

CONTRIBUTION

The Actuarially Determined Employer Contribution for fiscal year 2023 is \$12,194,686, which is estimated to be 46.6% of payroll. About 6.9% 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 have been no changes since the prior valuation.

BENEFIT CHANGES

There have been no changes since the prior valuation, expect a change in the averaging period for two bargaining units.

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 has been 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.

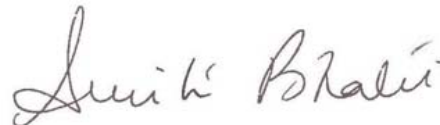
The undersigned are members of the American Academy of Actuaries, and are qualified to render the actuarial opinions presented in this report.

Respectfully Submitted,

BOOMERSHINE CONSULTING GROUP, L.L.C.



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



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Senior Consulting Actuary

Section 1: Plan Asset Information

1.1: Summary of Plan Assets

Market Value of Total Fund as of December 31, 2020		\$215,828,651
	Beginning of Year Adjustment:	953
Market Value of Total Fund as of January 1, 2021		\$215,829,604
Receipts:		
Employer Contribution - Pension Fund	12,737,487	
Employer Contribution - Healthcare Reserve	300,000	
Member Contributions	1,231,084	
Investment Income		
Interest	(111,344)	
Realized Gains/(Loss)	7,731,415	
Market Appreciation (Depreciation)	14,352,831	
Total Additions		36,241,473
Disbursements:		
Member Refunds	16,129	
Distributions to Participants/ Beneficiaries	24,246,290	
Administrative Expenses and Other	4,647	
Investment Expenses	713,667	
Total Disbursements		24,980,733
Net Increase/(Decrease) in Assets		11,260,740
Market Value of Total Fund as of December 31, 2021		\$227,090,344

1.2: Reconciliation of Fund Reserves

	EMPLOYEE SAVINGS FUND	RETIREMENT RESERVE	MEMBER BENEFIT RESERVE	HEALTHCARE RESERVE	TOTAL
12/31/2020	\$11,668,976	\$151,831,186	\$14,421,309	\$37,907,180	\$215,828,651
1/1/2021	\$11,668,976	\$151,832,139	\$14,421,309	\$37,907,180	\$215,829,604
Additions:					
EE Contributions	1,231,084	-	-	-	1,231,084
ER Contributions	-	12,737,487	-	300,000	13,037,487
Interest:					
	3.00%	7.00%	8.54%	8.54%	
Annual Credits	350,069	8,997,204	758,568	3,629,086	13,734,994
Deductions:					
Refunds/Benefits	(16,129)	(23,299,703)	(946,586)	-	(24,262,418)
Adjustment/Transfer	(2,114,522)	9,634,115	-	-	7,519,593
12/31/2021	\$11,119,478	\$159,901,309	\$14,233,291	\$41,836,266	\$227,090,344

Employees Savings Fund

<i>Purpose</i>	Keep track of employee contribution balances, and interest credited to such. Interest is credited annually at 3.0%.
<i>Relevance to Plan Funding</i>	Does not directly impact plan funding

Retirement Reserve Fund

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

Member Benefit Reserve (MBR)

<i>Purpose</i>	Provides funds to finance supplemental benefit payments to retirees based on prior early retirement programs (while reserve balance is positive). Interest is credited annually at a 5-year average rate.
<i>Relevance to Plan Funding</i>	Actuarial liability for supplemental benefit deemed to be equal to the value of the reserve

Healthcare Reserve

<i>Purpose</i>	Funds invested with pension assets, but segregated to be used for retiree healthcare benefits. Interest is credited annually at the same rate as the MBR.
<i>Relevance to Plan Funding</i>	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			\$215,829,604
Plus: Contributions during 2021			14,268,571
Less: Benefit Payments, Refunds			24,262,419
Less: Admin Expenses/Other			4,647
Plus: Expected Return during 2021			14,363,634
Expected Asset Value			\$220,194,743
Market Value of Total Fund as of December 31, 2021			\$227,090,344
Investment Gain/(Loss) for 2021 (actual – expected)			6,895,601
Less: 80% of 2021 Gain/(Loss)	80%	*6,895,601	\$5,516,482
Less: 60% of 2020 Gain/(Loss)	60%	*5,206,685	3,124,011
Less: 40% of 2019 Gain/(Loss)	40%	*13,352,129	5,340,852
Less: 20% of 2018 Gain/(Loss)	20%	*(21,950,316)	(4,390,063)
Total Deferred Gain/(Loss)			\$9,591,282
Actuarial Value of Assets, Total Fund - December 31, 2021			\$217,499,062
as % of Market Value of Assets			95.8%
Healthcare Reserve as of December 31, 2021			\$41,836,266
Adjusted Healthcare Reserve ¹			\$40,070,776
Actuarial Value of Assets, Pension Plan - December 31, 2021			\$177,428,286
Estimated Return on the Actuarial Value of Assets:			9.23%

¹Takes into account asset smoothing

1.4: Historical Investment Returns

Year	Market Value Return	Actuarial Value Return
2012	12.21%	2.46%
2013	13.49%	10.41%
2014	6.31%	9.01%
2015	2.16%	6.53%
2016	5.91%	7.36%
2017	13.16%	8.49%
2018	(3.65%)	3.04%
2019	14.82%	7.37%
2020	9.80%	8.42%
2021	10.36%	9.23%
5 Year Compound Return	8.69%	7.29%
10 Year Compound Return	8.31%	7.20%

Section 2: Participant Summary

2.1: Reconciliation of Plan Participants

	Active Participants	Due Refund	Vested Terminations	Retired	Disabled	Beneficiary /EDRO	Total
Participants as of December 31, 2020	400	92	67	741	27	170	1,497
Retired	(15)	0	(5)	20	0	0	0
Terminated Vested	(2)	0	2	0	0	0	0
Refund Paid	(2)	(2)	(4)	0	0	0	(8)
Terminated Non-Vested, Due Refund	(33)	33	0	0	0	0	0
Disabled	0	0	0	(27)	(1)	(5)	(33)
Deceased	0	0	0	0	0	0	0
New Beneficiary / EDRO	0	0	0	0	0	9	9
Rehired	2	(2)	0	0	0	0	9
New Hires	47	0	0	0	0	0	47
Data Adjustments	-	-	-	1	-	-	1
Participants as of December 31, 2021	397	121	60	735	26	174	1,513

2.2: Demographic Summary

Active Participants	<u>12/31/2020</u>	<u>12/31/2021</u>
Number of Active Participants	400	397
Average Age	47.0	47.3
Average Service	8.9	8.9
Average Salary	\$65,869	\$63,902

Inactive Participants	<u>12/31/2020</u>	<u>12/31/2021</u>
Number of Retired Participants	741	735
Average Age	69.7	69.9
Average Annual Benefit	\$27,264	\$27,318
Number of Disabled Participants	27	26
Average Age	64.3	64.6
Average Annual Benefit	\$20,783	\$21,040
Number of Beneficiaries/EDROs	170	174
Average Age	72.5	75.4
Average Annual Benefit	\$14,731	\$15,080
Number of Deferred Vested Participants	67	60
Average Age	54.2	53.8
Average Annual Benefit	\$11,714	\$11,390

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	\$51,072,443	\$50,679,214
Member Benefit Fund	14,421,309	14,225,772
Terminated Vested	7,378,788	6,583,878
<u>Retirees and Beneficiaries</u>	<u>243,578,922</u>	<u>240,594,227</u>
Total Actuarial Accrued Liability	\$316,451,462	\$312,083,091
Actuarial Value of Assets (AVA)	\$173,353,792	\$177,428,286
Unfunded Actuarial Accrued Liability (AAL-AVA)	\$143,097,670	\$134,654,805
Plan Funding Ratio (AVA/AAL)	54.8%	56.9%

3.2: Development of Actuarially Determined Employer Contribution (ADEC)

	12/31/2020	12/31/2021
	FY2022	FY2023
1) Total Entry Age Normal Cost	\$3,184,781	\$2,925,181
2) <u>Estimated Employee Contributions</u>	<u>1,196,127</u>	<u>1,177,495</u>
3) Net City Normal Cost: (1) – (2)	\$1,988,654	\$1,747,686
4) Valuation Payroll	\$26,347,574	\$25,368,948
5) City Normal Cost Rate (% of pay): (3) ÷ (4)	7.5%	6.9%
6) Amortization of the Unfunded Liability	\$10,438,162 (20 years)	\$10,149,569 (19 years)
7) Amortization Rate (% of Pay): (6) ÷ (4)	39.6%	40.0%
8) Total Contribution Rate: (5) + (7)	47.2%	46.9%
9) Projected Payroll	\$27,006,263	\$26,003,172
10) Actuarially Determined Employer Contribution: (8) x (9)	\$12,737,487	\$12,194,686

Estimated Cash Flow for Next Five Years

Fiscal Year	City Contribution*	Member Contributions	Benefit Payments
2024	\$12,400,000	\$1,200,000	\$24,600,000
2025	\$12,300,000	\$1,200,000	\$24,700,000
2026	\$12,400,000	\$1,300,000	\$24,800,000
2027	\$12,500,000	\$1,300,000	\$25,000,000
2028	\$12,800,000	\$1,300,000	\$25,100,000

* These amounts are based on one set of assumptions. If actual experience is less favorable than assumed, then City contributions will be higher. Estimated member contributions above do not include 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 (20 years remaining as of December 31, 2020).

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 adjusted value of the healthcare reserve is then excluded from the valuation assets.

Investment Return: 7.00% compounded annually, net of investment expenses

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 increase with inflation annually, plus an additional amount that varies based on the service of the member as shown below:

<u>Years of Service</u>	<u>UAW</u>	<u>Years of Service</u>	<u>All Others</u>
0-9	3.25%	0-5	7.50%
10-18	1.00%	6-15	1.00%
19 +	0.50%	16+	0.00%

Mortality: Pub2010G Tables (below median), 50% for pre-retirement deaths. For Disabled members, the disabled versions of these tables are assumed. Each of these tables is projected generationally with Scale SSA (2021).

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 as shown below. Half of all disabilities are assumed to be duty related. Disability rates are assumed to stop when retirement rates begin.

Sample rates are shown below:

<u>Age</u>	<u>Rate</u>
20	0.0004
30	0.0004
40	0.0013
50	0.0041
60	0.0090

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

<u>Years of Service</u>	<u>UAW</u>	<u>All Others</u>
0	12.0%	24.0%
1	9.0%	20.9%
2	7.0%	18.2%
3	7.0%	15.8%
5	5.0%	12.0%
10	2.0%	6.0%
15	1.0%	2.5%
20+	1.0%	2.5%

Retirement: Rates of retirement vary based on the age of the member as shown below. Rate is applied only if the member is eligible to retire.

<u>Age</u>	<u>UAW</u>	<u>Age</u>	<u>Others</u>
50-54	60%	50-54	50%
55-57	40%	55	5%
58	50%	56	10%
59-64	20%	57	15%
65+	100%	58	20%
	50% of the ages 55-		
UAW Females	64 rates applies	59-64	25%
		65-69	20%
		70+	100%

Changes in assumptions 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: Teamsters, UAW, Exempt, District Court (except Judges), Executive Pay, Newly hired elected officials do not become members of this Plan.

Normal Retirement Age (All Members - New Plan): Age 50 with 25 years of service or at age 58 with 8 years of service.

Normal Retirement Age (Old Plan): UAW - Age 50 with 25 years of service or at age 58 with 8 years of service. All Others - 8 years of service and attainment of the earlier of age 58 or the age at which age plus service is at least 65.

Normal Form of Benefit: Single life annuity

<u>Member Contributions:</u>	<u>Old Plan</u>	<u>New Plan</u>
UAW	2.95%	3.00% effective 10/18/2013
Teamsters 214	3.75%	6.50% (5.00% for hires after September 2012)
Teamsters 243 (formerly Teamsters 580)	3.50%	6.50% (5.00% for hires after 5/9/2014 for T243 CTP and Supervisors)
District Court Teamsters	3.50%	5.50% (5.00% for hires after 4/1/2014 for DCT243)
District Court Exempt	4.50%	4.50% (5.50% for hires after 12/1/2003)
Exempt	3.75%	6.50%
Executive Pay Plan, Council Staff, Mayoral Staff	3.75%	6.50%
Non-Bargaining	3.75%	6.50% (5.00% for hires after 1/1/2017)
Elected Officials	3.25%	No Defined Benefit Plan

Compensation: Member's Salary, wages, and longevity bonus. In addition, Compensation may include up to 80 hours of compensatory time for members not eligible for overtime pay.

Final Average Compensation: The average of the highest annual compensation paid over 2 consecutive years (T214 @3 years; DCT @5 years) of credited service within the last 10 years of credited service immediately preceding a member's termination of employment.

Normal Retirement Benefit Formula (New Plan):

UAW*	2.75% of Final Average Compensation times years of credited service; 1.70% of Final Average Compensation times years of credited service for new hires after October 21, 2013.
	1.50% of Final Average Compensation times years of credited service for new hires after January 9, 2017, and for Service after this date for the post 10/18/2013 hires.

*UAW members hired on or after October 21, 2013 but prior to the ratification of the 2016-2019 agreement (January 9, 2017) have a 1.70% of pay multiplier for credited service prior to the ratification of the 2016-2019 agreement (January 9, 2017) and a 1.50% multiplier for credited service following the ratification of the 2016-2019 agreement (January 9, 2017), except the pension shall not exceed 110% of base wage. UAW members hired on or after ratification of the 2016- 2019 agreement (January 9, 2017) will have a benefit multiplier of 1.50% of pay, except the pension shall not exceed 110% of base wage.

Teamsters 214 & Teamsters 243 (formerly Teamsters 580)	1.80% of Final Average Compensation times years of credited service; 1.25% of Final Average Compensation times years of credited service for employees hired after 9/30/2012 in Teamsters 214 and hired after 05/19/2014 in T243 (CTP and Sup).
All Others	1.60% of Final Average Compensation times years of credited service; 1.25% of Final Average Compensation times years of credited service for new hires after 4/1/14 in DCT243, after 6/1/14 for District Court Exempt and after 1/1/2017 for Non-Bargaining Personnel;

Normal Retirement Benefit Formula (Old Plan):

UAW and Elected Officials	2.75% of Final Average Compensation times for the first 35 years of credited service, plus 1.5% of Final Average Compensation for the next 5 years of service, plus 1.0% of Final Average Compensation for service in excess of 40 years, with a maximum of 100% of Final Average Compensation.
District Court Teamsters	2.30% of Final Average Compensation times years of credited service.
All Others	2.80% of Final Average Compensation times for the first 35 years of credited service, plus 1.5% of Final Average Compensation for the next 5 years of service, plus 1.0% of Final Average Compensation for service in excess of 40 years, with a maximum of 100% of Final Average Compensation.

Termination Prior to Retirement

Eligibility	Vesting is after 8 years of credited service
Form of Benefit	Benefit is payable as a Life Annuity beginning at age 58 for new Plan Members and at the age at which age plus service equals 65 for Old Plan Members (except UAW).

Duty Disability

Eligibility	Members are eligible for Duty Disability Retirement benefits immediately upon employment.
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 additional service granted to age 60. During the worker's compensation period, the disability benefit may not exceed the difference between the member's final compensation and the worker's compensation amount. Upon the attainment of age 60, disabled retirees are transferred to service retirement status.

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 minimum benefit equal to 25% of final average compensation.

Death incurred in the Line of Duty

Eligibility	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	Benefit is paid upon termination of the survivor's workers' compensation period as a Life Annuity and is equal to the survivor's weekly workers' compensation converted to an annual basis.

Non-Duty Pre-Retirement Death

Eligibility	The non-duty pre-retirement death benefit is payable upon the death of a member after earning 8 years of credited service.
Benefit Amount	Benefit is paid to the surviving spouse as a Joint and Survivor benefit and is computed in the same manner as the Normal Retirement Benefit.

Optional Benefit Forms

Prior to retirement, a member may elect to convert the retirement allowance into a benefit of equivalent actuarial value in accordance with one of the optional forms described below.

- a. Cash Refund Annuity - If a member dies before receiving the total value of accumulated member contributions, the remaining member contributions are payable to designated beneficiary(ies) at the time of death.
- b. 50% or 100% Joint and Survivor Annuity
- c. Social Security Level Income ("Equating Pension") - Any member who retires prior to age 65 may elect to have his retirement allowance actuarially equated to provide an increase retirement allowance to age 65, and a reduced retirement allowance payable thereafter. 'The increased retirement allowance shall approximate the sum of the member's reduced retirement allowance 'payable after age 65 and the member's estimated Social Security Primary Insurance Amount.

Post - Retirement Benefit Adjustments

One-time post-retirement benefit increases were granted in 1984, 1987 and 1998.

Effective January 1, 1999, and each January 1 thereafter, certain eligible retirees and beneficiaries receive annual benefit increases, financed by the Members' Benefit Fund reserve while it maintains a positive balance. Retirees/Beneficiaries must meet both of the following conditions:

- 1) Has been retired at least 6 months as of the January 1 increase date
- 2) Age 60 as of the January 1 increase date

For a retiree/beneficiary who elected a 50% or 100% Joint and Survivor Annuity, the maximum annual increase is equal to \$200 (\$100 for the beneficiary if 50% option is elected) times a ratio of the original Joint and Survivor benefit to the original straight life annuity benefit.

For all other retirees/beneficiaries, the maximum annual increase is \$200.

Changes in Plan provisions since the prior valuation

Final average pay period was changed to three years or 5 years for several bargaining units.

Glossary of Terms

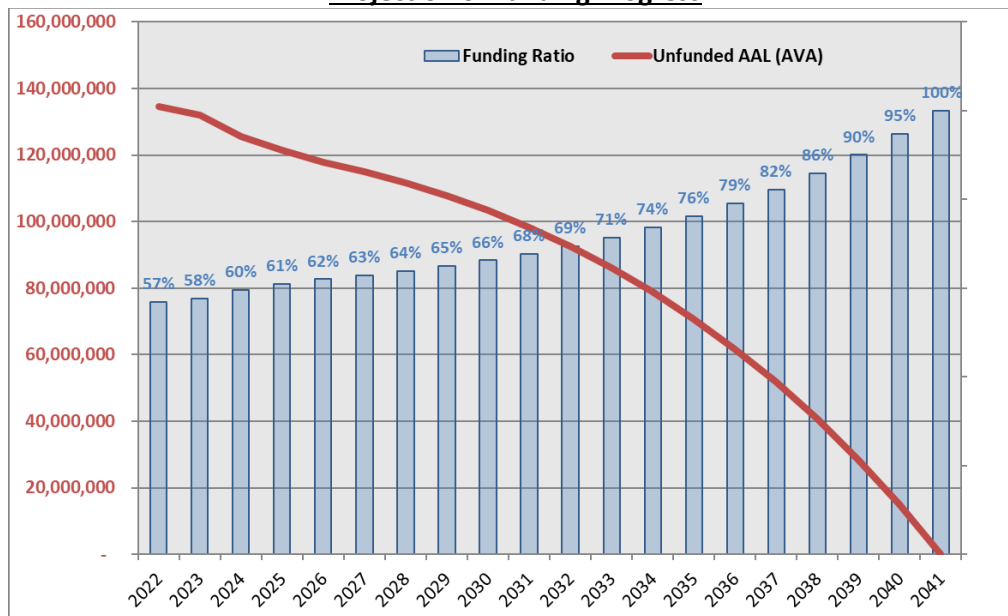
Actuarial Accrued Liability (AAL):	The portion of benefits deemed to be accrued by participants based on past service. The AAL serves as the asset funding target, when annual contributions are determined.
Actuarial Value of Assets (AVA):	The smoothed value of assets, used to compute the Unfunded AAL. 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

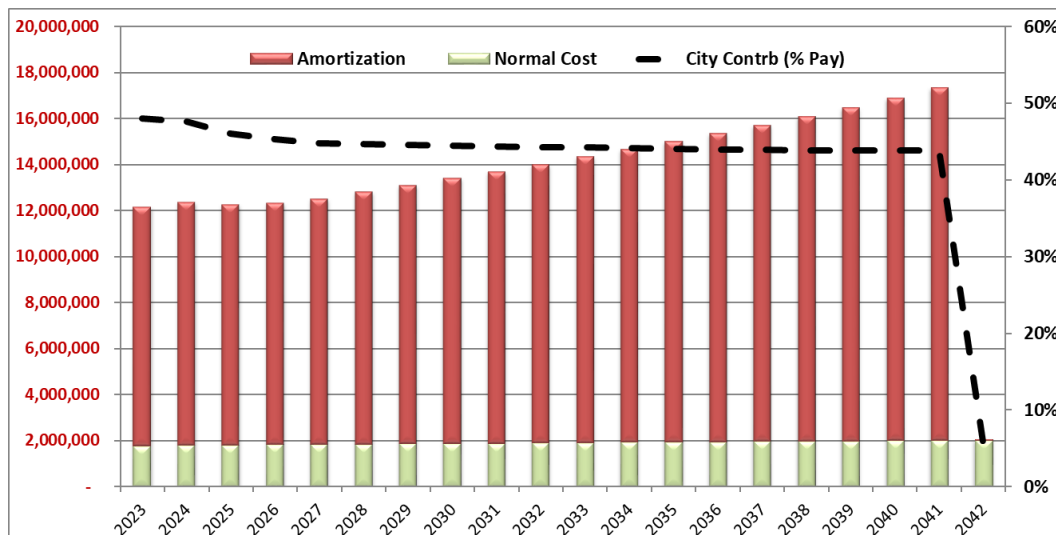
The graphs below show a projection of expected funding progress and City contributions to the Fund. We can see that the Plan is on a path to eliminating the unfunded liability (top graph, red line) and significantly improving the funding ratio. During this time, the City contribution rate is expected to remain over 40% 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	\$9,361,000	\$9,361,000	
6/30/2015	10,548,000	10,548,000	(1)
6/30/2016	10,182,000	10,182,000	
6/30/2017	10,247,000	10,247,000	(2)
6/30/2018	10,185,060	10,843,000	
6/30/2019	10,880,932	10,880,932	(3)
6/30/2020	10,698,401	10,698,401	(4)
6/30/2021	12,349,529	12,349,529	
6/30/2022	12,737,487	12,737,487	(5)
6/30/2023	12,194,686	To be determined	

(1) Fiscal year 2015 Contribution reflects changes made to assumed return and inflation from 7.8% and 3.3% to 7.6% and 3.1%, respectively.

(2) Reflects changes made to actuarial assumptions based on an Experience Study completed in 2016, including assumed return of 7.40%, with 2.925% underlying inflation.

(3) Reflects decrease in assumed return to 7.25%.

(4) Paid in calendar year 2021, so not reflected in System assets as of 12/31/2019

(5) 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	\$167,569,807	\$293,974,433	57.0%	\$126,404,626	(1)
12/31/2013	172,687,582	313,258,746	55.1%	140,571,164	
12/31/2014	177,259,421	309,924,744	57.2%	132,665,323	(2)
12/31/2015	176,031,902	308,794,993	57.0%	132,763,091	
12/31/2016	176,160,086	309,520,574	56.9%	133,360,488	
12/31/2017	178,646,143	305,030,296	58.6%	126,384,153	(3)
12/31/2018	172,090,691	303,408,333	56.7%	131,317,642	(4)
12/31/2019	160,693,641	310,674,588	51.7%	149,980,947	
12/31/2020	173,353,792	316,451,462	54.8%	143,097,670	(5)
12/31/2021	177,428,286	312,083,091	56.9%	134,654,805	

- (1) Reflects changes made to actuarial assumptions based on an Experience Study, including a reduction in the assumed investment 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.
- (3) Reflects changes made to actuarial assumptions based on an Experience Study completed in 2016, including assumed return of 7.40%, with 2.925% underlying inflation.
- (4) Reflects changes made to actuarial assumptions, assumed return of 7.25%, with 2.75% underlying inflation.
- (5) Reflects changes made to actuarial assumptions based on an Experience Study completed in 2021, including assumed return of 7.00%, with 2.50% underlying 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	\$316,130,166
Actuarial Value of Assets	177,428,286
Unfunded Actuarial Accrued Liability	138,701,880
Plan Funding Ratio	56.1%

City Contribution State Uniform Assumptions	FY2023
	6.85%
1) Total Entry Age Normal Cost	\$3,004,422
2) <u>Estimated Employee Contributions</u>	<u>1,177,495</u>
3) Net City Normal Cost: (1) – (2)	1,826,927
4) Valuation Payroll	\$25,368,948
5) City Normal Cost Rate (% of pay): (3) ÷ (4)	7.2%
6) Amortization of Unfunded Actuarial Accrued Liability (17 years)	11,144,821
7) Amortization Rate (% of Pay): (6) ÷ (4)	43.9%
8) Total Contribution Rate: (5) + (7)	51.1%
9) Projected Payroll	\$26,003,172
10) Total City Contribution w/Uniform Assumptions: (8) x (9)	\$13,296,042

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.

<i>As of 12/31/2021 (\$ mm)</i>		
	Current Return Assumption	2% Lower
Actuarial Liability	\$312.1	\$370.6
Plan Assets	\$177.4	\$177.4
Unfunded Liability	\$134.7	\$193.2
Funding Ratio	57%	48%
Employer Contribution (EOY)	\$12.2	\$15.9
Total Contribution Rate	46.9%	61.2%

Appendix III: 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):

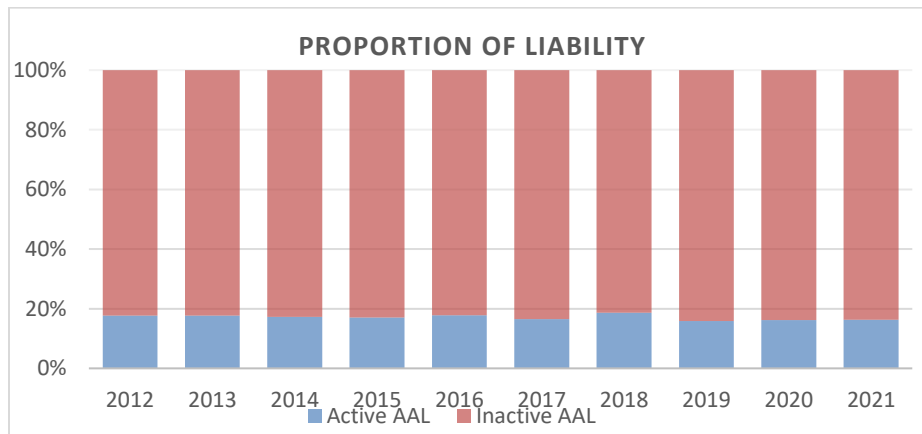
- Investment Return Risk: Future investment returns may be unfavorable compared to what is assumed for Plan funding purposes.
- Investment Volatility Risk: Investment returns will vary from year to year and over time, with a possible single or multiple year significant drop in plan assets. This impacts 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.

Plan Maturity

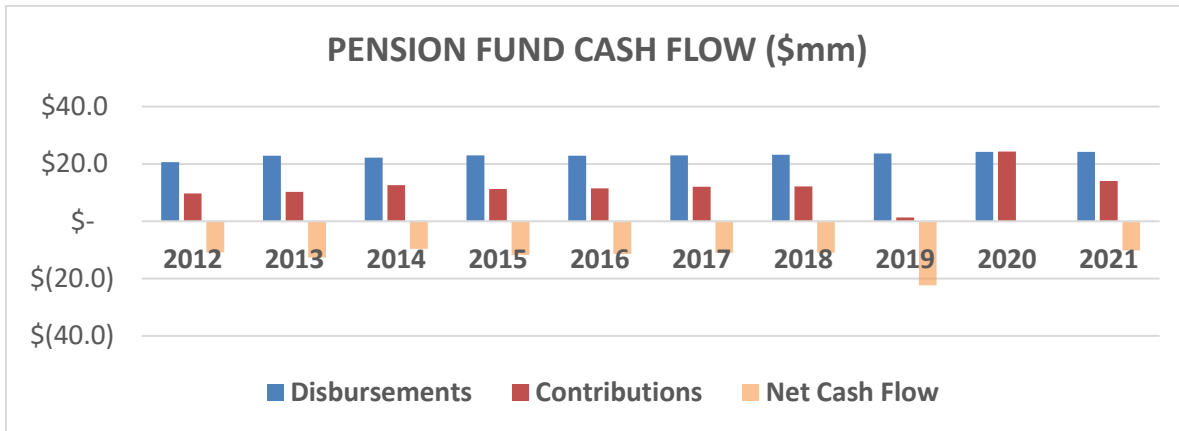
Another challenging risk faced by many pension plans is the maturing of the plan over time. This can be seen in the number of inactive (retirees, beneficiaries, etc.) versus the number of active employees in the plan population, as well as the liability of each group. As the plan matures, several risks 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 show some of these plan maturity measures in recent years, showing how the plan is maturing over time.



The System's actuarial liability has been at least 80% inactive for the last decade, and has increased slightly over that time period. This is evidence of a very mature plan. As demonstrated by recent funding and as shown in the projections herein, funding progress is limited with this level of population maturity.



The fund has experienced significant negative cash flow (disbursements greater than contributions) in recent years, with a total ten-year negative net cash flow of more than \$110 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
T214, T243, T243DC (II), Council Staff	86	1.80%	928,070	14.1%	544,293	8.3%
T214,T243,T243DC (III)	150	1.25%	774,263	9.0%	355,619	4.1%
UAW I	61	2.75%	573,897	15.9%	471,333	13.1%
UAW II	19	1.7%/1.5%	111,816	10.6%	78,783	7.5%
NBU, Exec	32	1.60%	306,742	9.9%	143,539	4.6%
Non Bargaining (Hired after 1/1/2017)	1	1.25%	7,826	11.2%	3,294	4.7%
<u>UAW III</u>	<u>48</u>	<u>1.50%</u>	<u>222,568</u>	<u>9.5%</u>	<u>150,825</u>	<u>6.4%</u>
All ERS Employees	397	N/A	\$2,925,181	11.6%	\$1,747,686	6.9%

UAW I: hired before 10/21/2013
UAW II: hired on or after 10/21/2013
UAW III: hired on or after 1/9/2017
T214 I: hired before 12/8/2008
T214 II: hired after 12/8/2008 and before 1/1/2015
T214 III: hired on or after 1/1/2015
T243 I: all except District Court
T243 II: hired on or after 5/19/2014
T243DC I: District Court hired before 4/1/2014
T243DC II: District Court hired on or after 4/1/2014 and before 7/1/2016
T243DC III: District Court hired on or after 7/1/2016
Non-Bargaining IV: Hires after 1/1/2017