# City of Lansing
# Police and Fire Retirement System

## Actuarial Valuation
## For Funding and Contributions

**as of December 31, 2019**

December, 2020

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

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# Executive Summary

December 14, 2020

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, 2019. 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, 2019 is $335,856,371. Plan assets exclude from this a reserve for healthcare benefits. The total yield of the fund for the plan year ending December 31, 2019 was 16.7% on the market value of assets and 7.1% 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 in Section 1.2.

**FUNDING RECOMMENDATIONS**

The total recommended City contribution for fiscal year 2021 is $16,950,155, which is estimated to be 56.9% of payroll. About 15% of payroll represents the Normal Cost, with the remaining amount representing a payment towards the System’s unfunded liability.

**FUNDING PROGRESS**

The Actuarial Accrued Liability as of December 31, 2019 is $463,371,047 compared to the Actuarial Value of Assets of $286,067,027 (excluding healthcare reserve), resulting in a plan funded ratio of 61.7%. Using the market value of assets, this ratio is 62.5%.

## ASSUMPTION AND METHOD CHANGES

There were no changes in assumptions since the prior valuation.

## BENEFIT CHANGES

There were no changes in benefit provisions since the prior valuation.

## 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 Consultant/Actuary

# Section 1: Plan Asset Information

## 1.1: Summary of Plan Assets

| | | |
|---|---|---|
| Market Value of Total Fund as of January 1, 2019 | | $314,443,307 |
| | | |
| **Receipts:** | | |
| Employer Contribution | 0 | |
| Employer Contribution - Healthcare Reserve | 1,310,000 | |
| Member Contributions | 3,309,934 | |
| Investment Income | | |
| Interest | 36,519 | |
| Realized Gain/(Loss) | 5,500,179 | |
| Market Appreciation/(Depreciation) | 45,896,329 | |
| | | |
| **Total Additions** | | 56,052,961 |
| | | |
| **Disbursements:** | | |
| Member Refunds | 117,429 | |
| Distributions to Participants/ Beneficiaries | 33,360,566 | |
| Administrative Expenses and Other | 0 | |
| Investment Expenses | 1,159,081 | |
| Other | 2,821 | |
| | | |
| **Total Disbursements** | | 34,639,897 |
| | | |
| Net Increase/(Decrease) in Assets | | $21,413,064 |
| | | |
| **Market Value of Total Fund as of December 31, 2019** | | **$335,856,371** |

## 1.2: Reconciliation of Fund Reserves

| | EMPLOYEE SAVINGS FUND | RETIREMENT RESERVE | HEALTHCARE RESERVE | TOTAL |
|---|---|---|---|---|
| **1/1/2019** | $25,966,733 | $250,081,357 | $38,395,217 | $314,443,307 |
| | | | | |
| **Additions:** | | | | |
| **EE Contributions** | 3,309,934 | - | - | 3,309,934 |
| **ER Contributions** | - | - | 1,310,000 | 1,310,000 |
| | | | | |
| **Interest:** | 3.00% | 7.25% | 6.43% | |
| **Annual Credits** | 779,002 | 15,712,257 | 2,468,812 | 18,960,071 |
| | | | | |
| **Deductions:** | | | | |
| **Refunds/Benefits** | (117,429) | (33,360,566) | - | (33,477,995) |
| | | | | |
| **Adjustment/Transfers** | (4,939,053) | 36,250,107 | - | 31,311,054 |
| | | | | |
| **12/31/2019** | **24,999,187** | **$268,683,155** | **$42,174,029** | **$335,856,371** |

**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. |
| *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 rate determined by the City finance office. |
| *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, 2019 | | | $314,443,307 |
| | | | |
| Plus: Contributions | | | 4,619,934 |
| Less: Benefit Payments, Refunds | | | 33,477,995 |
| Less: Administrative Expenses | | | 0 |
| Plus: Expected Return during 2019 | | | 21,722,581 |
| | | | |
| Expected Market Value as of December 31, 2019 | | | $307,307,827 |
| | | | |
| Actual Market Value of Total Fund as of December 31, 2019 | | | $335,856,371 |
| | | | |
| Investment Gain/(Loss) for 2019 | | | 28,548,544 |
| | | | |
| Actuarial Value = Market Value | | | |
| Less: 80% of 2019 Gain/(Loss) | 80% * | 28,548,544 | 22,838,835 |
| Less: 60% of 2018 Gain/(Loss) | 60% * | (37,201,009) | (22,320,605) |
| Less: 40% of 2017 Gain/(Loss) | 40% * | 23,237,376 | 9,294,950 |
| Less: 20% of 2016 Gain/(Loss) | 20% * | (5,527,792) | (1,105,558) |
| Total Deferred Gain/(Loss) | | | $8,707,622 |
| | | | |
| Actuarial Value of Assets, Total Fund - December 31, 2019 | | | $327,148,749 |
| as % of Market Value of Assets | | | 97.4% |
| Healthcare Reserve as of December 31, 2019 | | | $42,174,029 |
| | | | |
| Adjusted Healthcare Reserve[1] | | | 41,081,722 |
| | | | |
| **Actuarial Value of Assets, Pension Plan - December 31, 2019** | | | **$286,067,027** |
| | | | |
| Estimated Rate of Return on the Actuarial Value is | | 7.05% | |

[1] Takes into account asset smoothing

## 1.4: Historical Investment Returns

| Year | Market Value Return | Actuarial Value Return |
|---|---|---|
| 2010 | 12.00% | 3.20% |
| 2011 | 2.58% | 2.13% |
| 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% |
| | | |
| 5 Year Compound Return | 6.57% | 6.48% |
| 10 Year Compound Return | 8.28% | 6.19% |

# 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, 2018 | 372 | 29 | 20 | 529 | 68 | 153 | 1,171 |
| Retired | (24) | 0 | 0 | 24 | 0 | 0 | 0 |
| Terminated Vested | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Terminated, Contribution Refund | (5) | 0 | 0 | 0 | 0 | 0 | (5) |
| Terminated Non-Vested Contribution Refund Due | (5) | 5 | 0 | 0 | 0 | 0 | 0 |
| Disabled | (2) | 0 | 0 | 0 | 2 | 0 | 0 |
| Deceased | 0 | 0 | 0 | (17) | (1) | (10) | (28) |
| New Beneficiary / EDRO | 0 | 0 | 0 | 0 | 0 | 9 | 9 |
| Rehired | 1 | (1) | 0 | 0 | 0 | 0 | 0 |
| New Hires | 22 | 0 | 0 | 0 | 0 | 0 | 22 |
| Data Adjustments | (3) | 0 | (1) | (1) | 0 | 0 | (5) |
| Participants as of December 31, 2019 | 356 | 33 | 19 | 535 | 69 | 152 | 1,164 |

## 2.2: Demographic Summary

| Active Participants | 12/31/2018 | 12/31/2019 |
|---|---|---|
| Number of Active Participants | 372 | 356 |
| Average Age | 38.6 | 38.2 |
| Average Service | 11.8 | 11.4 |
| Average Salary | $73,647 | $76,254 |

| Inactive Participants | 12/31/2018 | | | 12/31/2019 | | |
|---|---|---|---|---|---|---|
| | Fire | Police | Total | Fire | Police | Total |
| Number of Retired Participants | 230 | 299 | 529 | 230 | 305 | 535 |
| Average Age | 65.7 | 66.8 | 66.3 | 65.8 | 66.2 | 66.0 |
| Current Average Annual Benefit | $55,080 | $48,682 | $51,464 | $56,480 | $50,556 | $53,103 |
| | | | | | | |
| Number of Disabled Participants | 37 | 31 | 68 | 38 | 31 | 69 |
| Average Age | 55.3 | 55.0 | 55.1 | 55.9 | 54.8 | 55.5 |
| Current Average Annual Benefit | $44,358 | $41,679 | $43,137 | $44,647 | $42,444 | $43,657 |
| | | | | | | |
| Number of Beneficiaries/EDROs | 65 | 88 | 153 | 64 | 88 | 152 |
| Average Age | 76.8 | 71.9 | 74.0 | 77.1 | 72.0 | 74.1 |
| Current Average Annual Benefit | $18,533 | $17,175 | $17,752 | $18,716 | $25,192 | $22,466 |
| | | | | | | |
| Number of Deferred Vested Participants | 5 | 15 | 20 | 5 | 14 | 19 |
| Average Age | 46.7 | 47.3 | 47.1 | 47.7 | 47.8 | 47.8 |
| Current Average Annual Benefit | $34,519 | $33,120 | $33,470 | $34,519 | $34,237 | $34,312 |

# Section 3: Valuation Summary

## 3.1: Summary of Actuarial Liability and Funding Progress

| | 12/31/2018 | 12/31/2019 |
|---|---|---|
| **Actuarial Accrued Liability** | | |
| Active Employees | $106,186,357 | $97,062,524 |
| Inactive | 5,054,594 | 5,204,828 |
| Retirees and Beneficiaries | 346,747,454 | 360,203,695 |
| Total Actuarial Accrued Liability | $457,988,405 | $463,371,047 |
| | | |
| Actuarial Value of Assets | 296,163,457 | 286,067,027 |
| | | |
| Net Unfunded Actuarial Accrued Liability | 161,824,949 | 177,304,020 |
| | | |
| Plan Funding Ratio | 64.7% | 61.7% |

## 3.2: Development of Actuarially Determined Employer Contribution (ADEC)

| | | **12/31/2018** | **12/31/2019** |
|---|---|---|---|
| | | FY2020 | FY2021 |
| 1) | Total Entry Age Normal Cost | $7,043,916 | $6,758,711 |
| 2) | Estimated Employee Contributions | 2,627,057 | 2,447,143 |
| 3) | Net City Normal Cost: (1) – (2) | $4,416,859 | $4,311,568 |
| 4) | Valuation Payroll | $29,638,531 | $28,977,408 |
| 5) | City Normal Cost Rate (% of pay): (3) ÷ (4) | 14.9% | 14.9% |
| 6) | Amortization of Unfunded Actuarial Accrued Liability | $10,831,128 | 12,184,933 |
| 7) | Amortization Rate (% of Pay): (6) ÷ (4) | 36.5% | 42.0% |
| 8) | Total Contribution Rate: (5) + (7) | 51.4% | 56.9% |
| 9) | Projected Fiscal Payroll | $30,046,061 | $29,774,287 |
| **10)** | **Actuarially Determined Employer Contribution: (8) x (9)** | **$15,457,647** | **$16,950,155** |

**Estimated Cash Flow for Next Five Years**

| Fiscal Year | City Contribution* | Member Contributions | Benefit Payments |
|---|---|---|---|
| 2022 | $17,200,000 | $2,500,000 | $33,700,000 |
| 2023 | 17,300,000 | 2,500,000 | 34,300,000 |
| 2024 | 17,800,000 | 2,600,000 | 34,800,000 |
| 2025 | 17,700,000 | 2,600,000 | 35,900,000 |
| 2026 | 18,000,000 | 2,700,000 | 37,300,000 |

* These amounts are based on a return of 7.25% each year. If actual returns are lower, the City contributions will be higher. Member contributions shown above do not include any purchases of service.

## Section 4: Actuarial Assumptions and Methods

| | |
|---|---|
| Funding Method: | 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 of thirty years (22 years remaining as of December 31, 2019). |
| 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: | 7.25% 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 2.75% per year. |
| Salary Increases: | Increases in salary are assumed to be equal to inflation, plus 7.25% for those with less than 5 years of service or 1.00% for all others |
| Mortality: | RP2000 with Blue Collar adjustments for males and females. For Disabled members, the disabled versions of these tables are assumed. Each of these tables is projected to 2026 using Scale BB and 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:

| Years of Service | Fire | Police Age | Police Rate |
|---|---|---|---|
| 0 | 4.0% | 20 | 15.0% |
| 1 | 3.2% | 25 | 7.5% |
| 5 | 1.3% | 30 | 3.7% |
| 10 | 0.4% | 35 | 1.9% |
| 15 | 0.1% | 40 | 0.9% |
| 20 | 0.0% | 45 | 0.3% |
| | | 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 | 5.0% | 5.0% |
| 25 | 90.0% | 90.0% |
| 26-29 | 60.0% | 25.0% |
| 30+ | 100.0% | 100.0% |

Also 100% at mandatory retirement ages.

**Changes in assumptions and methods**

The assumptions above are based on the most recent experience study, covering 2012 through 2015. No changes in assumptions were made since the last valuation. The next assumption review will cover experience from 2015 to 2020, with any changes implemented as of 12/31/2020.

## 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, formerly FOP), 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 24 highest consecutive months of credited service as a police officer, or firefighter. If the member has less than 24 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.<br>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).<br>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

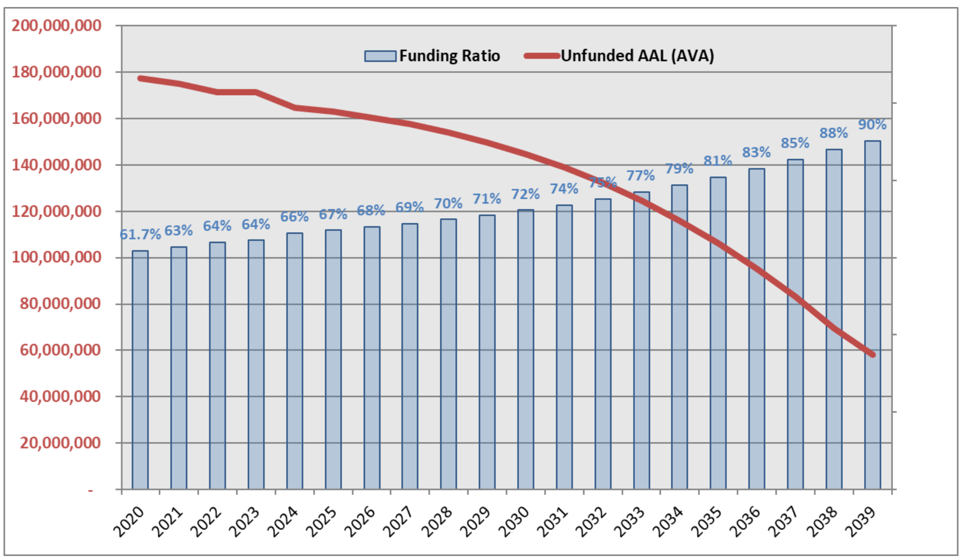
| | |
|---|---|
| Actuarial Accrued Liability (AAL): | The portion of benefits deemed to be accrued by participants based on past service. The AAL serves as the asset **funding** target, when annual contributions are determined. |
| Actuarial Value of Assets (AVA): | The smoothed value of assets, used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

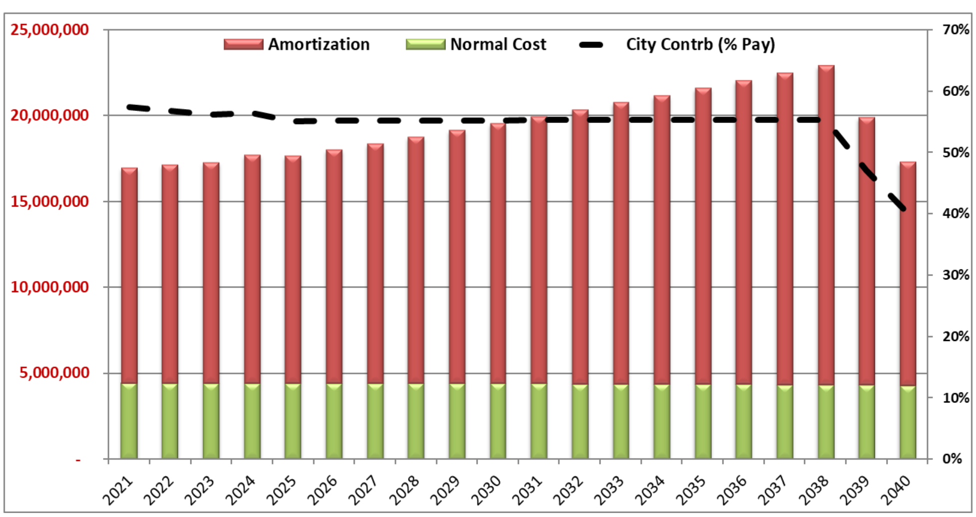
The graphs below show a projection of expected funding progress and City contributions to the Fund. We can see that the Plan is on a path to eventually reducing the unfunded liability (top graph, red line) and improving the funding ratio. During this time, the City contribution rate is expected to remain near 55% 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

**Historical Employer Contributions**

| Fiscal Year Ending | Actuarially Determined Employer Contribution | Actual Employer Contribution | |
|---|---|---|---|
| 6/30/2012 | $9,242,173 | $9,057,080 | (1) |
| 6/30/2013 | 10,133,599 | 10,133,599 | (2) |
| 6/30/2014 | 11,248,857 | 11,248,857 | |
| 6/30/2015 | 11,050,091 | 11,050,091 | (3) |
| 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 | (4) |
| 6/30/2019 | 13,554,239 | 13,554,239 | (5) |
| 6/30/2020 | 15,457,647 | 15,457,647 | (6) |
| 6/30/2021 | 16,950,155 | To Be determined | |

(1) The FY 2012 City contribution was reduced by $185,093 in recognition of additional contributions by International Association of Firefighters (IAFF) employees, which were negotiated and contributed after the establishment of the June 30, 2012 ADEC from the December 31, 2010 valuation.

(2) Fiscal year 2013 ADEC reflects changes made to actuarial assumptions based on an Experience Study. Changes included a decrease in the assumed rate of return from 8.0% to 7.8%. A closed amortization period was also adopted as of 12/31/2011, beginning at 30 years and decreasing each year until 15 years is reached.

(3) 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.

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

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

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

**Historical Funding Progress**

| Valuation Date | Actuarial Value of Assets (AVA) | Actuarial Accrued Liability (AAL) | Percentage Funded | Unfunded Actuarial Accrued Liability | |
|---|---|---|---|---|---|
| 12/31/2010 | $276,377,041 | $359,293,016 | 76.9% | $82,915,975 | |
| 12/31/2011 | 264,492,738 | 372,547,509 | 71.0% | 108,054,771 | (1) |
| 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 | |

(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.

# Appendix III: Valuation Sensitivity

The figures shown on this page are based on the return assumption of 7.00% with Pub2010 mortality (projected generationally), and in compliance with the State's Uniform assumptions and amortization. The following shows the impact of both a change in the assumptions as well as a decreased amortization period.

| **Actuarial Accrued Liability<br>Uniform Assumptions** | **12/31/2019** |
|---|---|
| Total Actuarial Accrued Liability | $474,185,748 |
| Actuarial Value of Assets | 286,064,770 |
| Unfunded Actuarial Accrued Liability | 188,120,977 |
| Plan Funding Ratio | 60.3% |

| | **City Contribution<br>Uniform Assumptions** | **FY2021** |
|---|---|---|
| 1) | Total Entry Age Normal Cost | 7,965,925 |
| 2) | Estimated Employee Contributions | 2,447,143 |
| 3) | Net City Normal Cost: (1) – (2) | 5,518,782 |
| 4) | Valuation Payroll | 28,977,408 |
| 5) | City Normal Cost Rate (% of pay): (3) ÷ (4) | 19.2% |
| 6) | Amortization of Unfunded Actuarial Accrued Liability (18 years) | 14,428,539 |
| 7) | Amortization Rate (% of Pay): (6) ÷ (4) | 49.6% |
| 8) | Total Contribution Rate: (5) + (7) | 68.8% |
| 9) | Projected Fiscal Payroll | 29,774,287 |
| **10)** | **Total City Contribution for FY2021: (8) x (9)** | **$20,495,873** |

## 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.

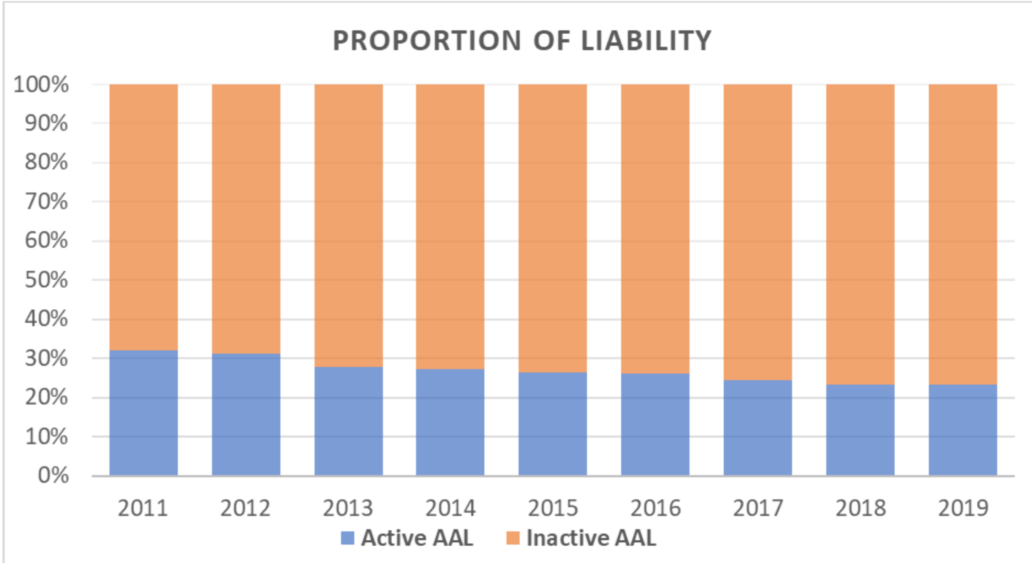
The liabilities in Appendix III versus the body of this Report is an example of the impact of long-term investment return and longevity risk.

### Plan Maturity

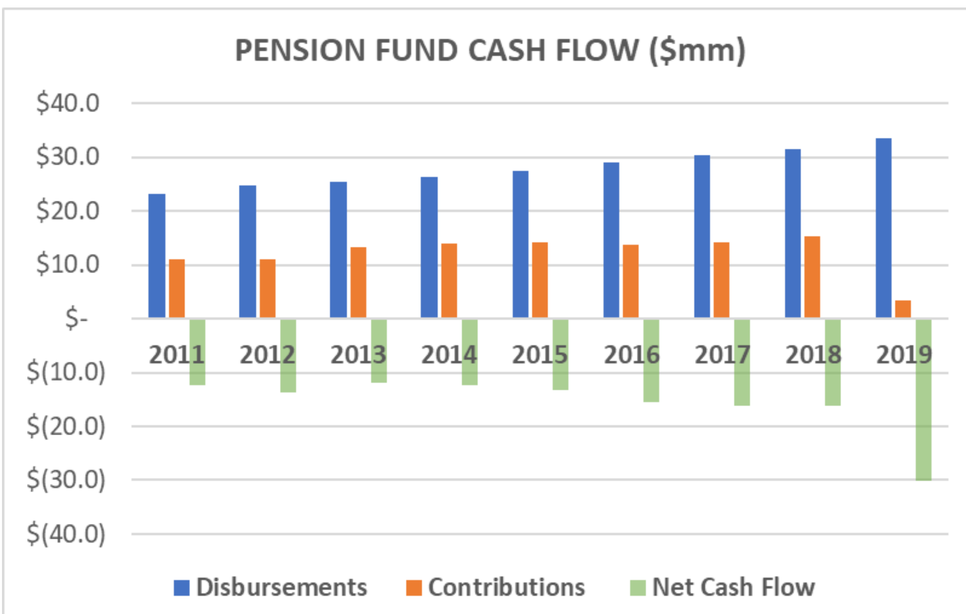
Another challenging risk faced by many pension plans is the maturing of the plan over time. This can be seen in the number of inactive (retirees, beneficiaries, etc.) versus the number of active employees in the plan population, as well as the liability of each group. As the plan matures, several risks 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 under 70% to just under 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 nine-year negative net cash flow of more than $140 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.