MILLIMAN ACTUARIAL VALUATION

# City of Aurora General Employees' Retirement Plan

## January 1, 2020 Actuarial Valuation

May 2020

Joel E. Stewart, FSA, EA, MAAA
Francine Moyer, ASA, MAAA

Milliman

Issued May 21, 2020

1400 Wewatta Street
Suite 900
Denver, CO 80202-5549
USA

Tel +1 303 299 9400
Fax +1 303 299 9018

milliman.com

May 21, 2020

Board of Trustees
City of Aurora General Employees' Retirement Plan
12100 E. Iliff Avenue, Suite 108
Aurora, Colorado 80014

Dear Members of the Board:

As requested, we have performed an annual actuarial valuation of the City of Aurora General Employees' Retirement Plan as of January 1, 2020, for the plan year ending December 31, 2020. Our findings are set forth in this report. This report reflects the benefit provision and contribution rates in effect as of January 1, 2020.

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by the Plan's staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

All costs, liabilities, rates of interest, and other factors for the Plan have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the City and reasonable expectations); and which, in combination, offer our best estimate of anticipated experience affecting the City. Further, in our opinion, each actuarial assumption used is reasonably related to the experience of the Plan and to reasonable expectations which, in combination, represent our best estimate of anticipated experience under the Plan, and meet the parameters set by Actuarial Standards of Practice.

This valuation report is only an estimate of the Plan's financial condition as of a single date. It can neither predict the Plan's future condition nor guarantee future financial soundness. Actuarial valuations do not affect the ultimate cost of Plan benefits, only the timing of Plan contributions. While the valuation is based on an array of individually reasonable assumptions, other assumption sets may also be reasonable and valuation results based on those assumptions would be different. No one set of assumptions is uniquely correct. Determining results using alternative assumptions is outside the scope of our engagement.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the Plan's funded ratio); and changes in plan provisions or applicable law. Due to the limited scope of our


This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

assignment, we did not perform an analysis of the potential range of future measurements. The Board of Trustees has the final decision regarding the appropriateness of the assumptions and has adopted them.

Actuarial computations presented in this report are for purposes of determining the recommended funding amounts for the Plan. Actuarial computations under GASB Statements No. 67 and No. 68 are for purposes of fulfilling financial accounting requirements. The calculations in the enclosed report have been made on a basis consistent with our understanding of the Plan's funding requirements and goals, and of GASB Statements No. 67 and 68. Results under GASB Statements No. 67 and 68 are not included in this report, but this report will be the basis for determining these disclosures for the Measurement Period ending December 31, 2020 and the Employer Reporting Period ending December 31, 2021. The calculations in this report have been made on a basis consistent with our understanding of the plan provisions described in Appendix A of this report. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes.

Milliman's work is prepared solely for the internal business use of the City of Aurora General Employees' Retirement Plan ("Plan"). To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exception(s):

(a) The Plan may provide a copy of Milliman's work, in its entirety, to the Plan's professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit the Plan.

(b) The Plan may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

On the basis of the foregoing, I hereby certify that, to the best of my knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. I am a member of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.


This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Sincerely,

Joel E. Stewart, FSA, EA, MAAA
Principal and Consulting Actuary

JES:wp



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table of Contents





This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Executive Summary



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Overview

| | Actuarial Valuation For Plan Year Beginning January 1, 2019 | Actuarial Valuation For Plan Year Beginning January 1, 2020 |
|---|---|---|
| **Assets** | | |
| Market Value of Plan Assets | $ 450,368,075 | $ 524,036,473 |
| Actuarial Value of Plan Assets | $ 474,289,088 | $ 504,806,469 |
| Ratio of Actuarial Value to Market Value | 105.3% | 96.3% |
| Return on Market Value of Plan Assets | -3.3% | 19.3% |
| **Liabilities** | | |
| Actuarial Present Value of Future Benefits | $ 596,459,972 | $ 662,199,759 |
| Actuarial Liability | $ 508,917,257 | $ 567,006,106 |
| Assumed Average Annual Long-Term Future Investment Return (Discount Rate) | 7.25% | 7.00% |
| **Unfunded Actuarial Liability (UAL) Relative to:** | | |
| Market Value of Plan Assets | $ 58,549,182 | $ 42,969,633 |
| Actuarial Value of Plan Assets | $ 34,628,169 | $ 62,199,637 |
| **Funded Ratio Relative to:** | | |
| Market Value of Plan Assets | 88.5% | 92.4% |
| Actuarial Value of Plan Assets | 93.2% | 89.0% |
| **Contribution Rates** | | |
| Total Normal Cost Rate | 11.00% | 11.76% |
| Employee Contribution Rate | 7.00% | 7.00% |
| Normal Cost Rate (Employer Portion) | 4.00% | 4.76% |
| UAL Rate | 2.53% | 3.58% |
| Employer Portion of the Actuarially Determined Contribution Rate | 6.53% | 8.34% |
| Employer Contribution Rate | 7.00% | 7.00% |
| **Participant Data** | | |
| Active Participants | 1,754 | 1,816 |
| Retired Participants and Beneficiaries | 1,078 | 1,134 |
| Vested Terminated Participants | 250 | 257 |
| Total Participants | 3,082 | 3,207 |

The Actuarial Present Value of Future Benefits includes the effects of projected future service and pay increases for current active participants, stated in present value terms using the plan's investment return assumption as the discount rate. The Actuarial Accrued Liability is the portion of that amount that is allocated to service already completed as of the valuation date by participants.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

## Purpose of this Report

This report has been prepared for the City of Aurora General Employees' Retirement Plan as of January 1, 2020 to:

1. Review the experience for the plan year ending December 31, 2019. "Experience" encompasses the performance of the plan's assets during the year and changes in plan participant demographics that impact liabilities.
2. Review the plan's funded ratio.
3. Calculate the employer portion of the Actuarially Determined Contribution (ADC) for the plan year ending December 31, 2020 in accordance with the actuarial methods and funding policy as adopted by the Board of Trustees and outlined in City Code.
4. Provide the basis for later financial reporting under Governmental Accounting Standards Board (GASB) Statements Nos. 67 and 68.

## Plan Provisions

The valuation reflects our understanding of the plan provisions in effect as of January 1, 2020. There were no changes made to the plan provisions since the last valuation.

The Board granted a discretionary cost of living increase for the Base Benefit for Tier 2 Participants effective January 1, 2020 equal to 1.50%. This change increased the calculated Actuarial Liability by approximately $4,000. This liability increase is the effect of a single year's cost of living increase for the current retired population. Please see page 4 of this report for quantification of the effect recurring annual increases would have on key actuarial measurements.

Please see Appendix A for a detailed summary of plan provisions.

## Actuarial Methods and Assumptions

The methods and assumptions used in this valuation are detailed in Appendix B. The Board of Trustees reviewed and adopted the use of the assumptions for the January 1, 2020 actuarial valuation at their September 2019 meeting with the review of the 2019 Experience Study.

The assumptions were reviewed and updated with the 2019 Experience Study report dated February 17, 2020. The changes are summarized in both this and the Experience Study report and are effective with this January 1, 2020 actuarial valuation. The changes in assumptions resulted in a net increase to the Actuarial Liability of approximately $36.1 million.

## Plan Experience

Actuarial gains or losses arise when actual experience differs from actuarial assumptions used in the valuation. During the year ending December 31, 2019, the Plan experienced an overall actuarial gain of approximately $7.2 million. The actuarial gain can be broken down as follows.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

| Source of (Gain) or Loss | Amount in Millions |
|---|---|
| Investment experience | $ (8.9) |
| Demographic experience | 1.7 |
| Total (gain)/loss | $ (7.2) |

The investment experience was primarily due to the deferral of two-thirds of the 2019 market value investment gain of $53.8 million and the recognition of one-third of the 2018 market value investment loss of $49.8 million in the smoothed actuarial value of assets that is used to calculate the actuarially determined contribution rate. While the market value of assets for 2019 returned a 19.3%, which is approximately 12% more than the prior valuation's return assumption of 7.25% and resulted in the gain of $53.8 million previously noted, the smoothing of gains and losses over three years in the actuarial value of assets resulted in a net actuarial investment gain of $8.9 million for the 2019 plan year.

The demographic experience was primarily due to retirements different than assumed, both in number and form of payment and salary increases greater than assumed during 2019. These losses were reduced by a gain due to a 2019 Cost of Living Adjustment (COLA) lower than expected (1.50% compared to expected of 2.75%). This resulted in a net loss of approximately $1.7 million. Table 6 contains additional detail on the changes in the unfunded actuarial liability from January 1, 2019 to January 1, 2020.

## Funding Analysis

Table 8 provides the detail on the calculation of the employer portion of the Actuarially Determined Contribution (ADC) to the Plan based on the January 1, 2020 actuarial valuation and the funding policy described in the City Code. The ADC is calculated with each year's actuarial valuation.

Beginning in 2017, employees contribute 7.00% of pay. Per the current City Code, employee contribution rates beyond 2017 may increase or decrease 0.25% each year depending upon the funded ratio, but in no case would increase above 7.00% or decrease below 5.50%. Per the City Code, rate changes are based on a decision flowchart which increases rates (if permitted) when the funded ratio is less than 100% and decreases rates (if permitted) when the funded ratio is greater than 110%. One component used in determining the decision flowchart is the ADC. The City's current funding policy is to contribute the same rate of pay as employees.

The ADC calculated based on methodology adopted by the Board of Trustees consists of a rate related to the unfunded actuarial liability (UAL) and the normal cost rate calculated under the Entry Age Normal actuarial cost method. The normal cost rate includes a component for anticipated administrative expenses to be paid from plan assets.

The UAL-related portion of the ADC rate is determined via an open (i.e., rolling) 20-year level percent of projected payroll amortization calculation. Please note that under the assumptions adopted in this valuation, the rate so calculated pays approximately 98% of the interest on the UAL for 2020. If only the ADC was contributed, the contribution would not amortize any of the UAL's "principal". The normal cost component of the ADC should, when measured as a dollar amount, increase over time as the payroll for the active population increases (the normal cost is calculated as a level percentage of payroll).

Table 14 provides a 30-year projection of employee and City contributions, as well as the funded ratio of the plan and the total normal cost rate. This projection assumes an open population with plan payroll that



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

grows at 3.25% annually, market value asset returns of 7.00% in all future years, and both employees and the City each contributing 7.00% of payroll in all future years.

As shown in Table 14, if all future experience follows assumptions, there are no changes to assumptions, plan provisions or funding policy, and the 7.00% City and employee contributions are made each year, the Plan's funded ratio is expected to improve over the projection period once the 2019 gain has been fully recognized in the actuarial value of assets. That improvement is due to the market value of assets being approximately $20 million higher than the actuarial value of assets used in the calculation of the ADC, combined with the normal cost rate decreasing over time as new hire Tier 2 members replace departing Tier 1 members while the total contribution rate as a percent of payroll remains constant. As noted above, contributing only the ADC would not amortize any of the unfunded actuarial liability's "principal" if experience during that year matched the assumptions used in the actuarial valuation.

## Evaluation of an Automatic COLA for Tier 2 Base Benefits

As disclosed in Appendix B, this valuation does not include the value of an ad hoc cost-of-living adjustment (COLA) for Tier 2 base benefits in the calculation of the Actuarial Liability and Normal Cost. It is our understanding that Tier 2 base benefits for retirees have been provided the same percentage increase as the automatic COLA provided to Tier 1 base benefits each of the last two years. The following table illustrates the impact on key actuarial measurements of granting recurring future annual 2.5% COLAs on the base benefits of current and future Tier 2 retirees.

| **Assumed Tier 2 COLA:** | **0.0%** | **2.5%** | **Difference** |
|---|---|---|---|
| Unfunded Actuarial Liability (millions) | $ 62.2 | $ 69.4 | $ 7.2 |
| Funded Ratio (Actuarial Value of Assets) | 89.0% | 87.9% | |
| Total Normal Cost Rate (including expenses) | 11.76% | 13.03% | |
| Tier 2 Normal Cost Rate (net of expenses) | 10.55% | 12.75% | 2.20% |
| Employer portion of the ADC (as a % of pay) | 8.34% | 10.03% | 1.69% |

Over time the Plan's Normal Cost Rate will trend towards the Tier 2 rate, as Tier 1 employees retire and are replaced with Tier 2 members. This declining Normal Cost Rate is what allows the Plan to reach 100% funding over the next 20 years (Table 14) even though the current contribution rate is less than the "snapshot" employer portion of the Actuarially Determined Contribution (ADC) at the valuation date.

## Risk Assessment and Disclosure

Appendix D contains a risk assessment and disclosure summary, as required by Actuarial Standard of Practice No. 51 (ASOP 51). This appendix uses the framework of ASOP 51 to communicate important information about significant risks to the Plan and the Plan's maturity.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Valuation Results



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 1

## STATEMENT OF PLAN NET ASSETS

| | December 31, 2018 | December 31, 2019 |
|---|---|---|
| **Cash and Cash Equivalents** | $ 91,499 | $ 165,380 |
| **Receivables** | | |
| Contributions | $ 363,643 | $ 503,975 |
| Interest and dividends | 804,199 | 773,065 |
| Investments sold | 36,124 | 124,373 |
| Other | 3,208 | 22,753 |
| Total receivables | $ 1,207,174 | $ 1,424,166 |
| **Prepaid Expenses** | $ 36,617 | $ 31,265 |
| **Investments** | | |
| Short-term cash investments | $ 6,101,113 | $ 5,867,748 |
| Equity securities and funds | 178,679,875 | 220,340,568 |
| U.S. government and agency obligations | 8,167,713 | 9,846,589 |
| Corporate bonds and funds | 105,926,655 | 115,551,175 |
| Real estate funds | 46,515,033 | 48,703,007 |
| Alternative investments | 104,607,350 | 122,625,988 |
| Total Investments | $ 449,997,739 | $ 522,935,075 |
| **Liabilities** | | |
| Accounts payable and accrued expenses | $ 252,955 | $ 238,356 |
| Securities purchased | 625,499 | 118,718 |
| Benefits and refunds payable | 86,500 | 162,339 |
| Total Liabilities | $ 964,954 | $ 519,413 |
| **Plan Net Assets** | $ 450,368,075 | $ 524,036,473 |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 2

## STATEMENT OF CHANGES IN PLAN NET ASSETS

| | 2018 | 2019 |
|---|---|---|
| Net market value at beginning of year | $ 475,556,466 | $ 450,368,075 |
| Additions: | | |
| Plan member contributions | $ 7,638,089 | $ 8,190,368 |
| City of Aurora contributions | 7,632,330 | 8,187,470 |
| Interest and dividends | 8,207,080 | 7,762,640 |
| Net realized and unrealized gains/(losses) | (21,636,658) | 80,541,599 |
| Other | 10,148 | 31,834 |
| Total | $ 1,850,989 | $ 104,713,911 |
| Deductions: | | |
| Benefit payments | $ 22,256,553 | $ 25,569,802 |
| Contribution refunds | 1,971,763 | 2,509,996 |
| Administrative and miscellaneous expenses | 555,220 | 595,501 |
| Investment expenses | 2,255,844 | 2,370,214 |
| Total | $ 27,039,380 | $ 31,045,513 |
| Net change: | $ (25,188,391) | $ 73,668,398 |
| Net market value at end of year | $ 450,368,075 | $ 524,036,473 |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 3

## DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS

For funding purposes, the Plan's asset valuation method recognizes investment gains and losses over a three-year period. The resulting Actuarial Value of Assets may not be less than 80% or more than 120% of the Market Value of Assets. The Actuarial Value of Assets as of January 1, 2020 is determined below.

**Asset Reconciliation**

| Year | (1) Market Value of Assets Beginning of Year | (2) Contributions (City and Employee) | (3) Benefit Payments | (4) Administrative Expenses | (5) Cash Flow (2)+(3)+(4) | (6) Actual Investment Income | (7) Market Value of Assets End of Year (1)+(5)+(6) |
|---|---|---|---|---|---|---|---|
| 2019 | $450,368,075 | $16,377,838 | $(28,079,798) | $(595,501) | $(12,297,461) | $85,965,859 | $524,036,473 |
| 2018 | 475,556,466 | 15,270,419 | (24,228,316) | (555,220) | (9,513,117) | (15,675,274) | 450,368,075 |
| 2017 | 425,231,226 | 14,648,024 | (22,154,949) | (574,823) | (8,081,748) | 58,406,988 | 475,556,466 |

**Gain/(Loss) Calculation**

| Year | Actual Investment Rate of Return | Actual Investment Return | Expected Investment Return | Difference between Actual and Expected |
|---|---|---|---|---|
| 2019 | 19.3% | $85,965,859 | $32,213,702 | $ 53,752,157 |
| 2018 | -3.3 | (15,675,274) | 34,139,027 | (49,814,301) |
| 2017 | 13.9 | 58,406,988 | 30,541,426 | 27,865,562 |

**Asset Gain/(Loss) Deferred for Systematic Recognition in Subsequent Years**

| | |
|---|---|
| 66⅔% of 2019 Gain/(Loss) | $ 35,834,771 |
| 33⅓% of 2018 Gain/(Loss) | (16,604,767) |
| | $ 19,230,004 |

**Actuarial Value of Assets**

| | | |
|---|---|---|
| 1. | Market value as of January 1, 2020 | $ 524,036,473 |
| 2. | Prior gains/(losses) deferred | 19,230,004 |
| 3. | Preliminary Actuarial Value of Assets (1. - 2.) | $ 504,806,469 |
| 4. | Preliminary Actuarial Value of Assets as a Percentage of Market Value (3. ÷ 1.) | 96.3% |
| 5. | Actuarial Value of Assets as of January 1, 2020 (3., limited to 80% - 120% of Market Value)) | $ 504,806,469 |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 4

## ACTUARIAL BALANCE SHEET

**Requirements**

| Present Value of Projected Benefits | Tier 1 | Tier 2 | Total |
|---|---|---|---|
| Retired Members | | | |
| Healthy Retirees | $ 311,466,590 | $ 593,289 | $ 312,059,879 |
| Disabled Retirees | 5,371,898 | 0 | 5,371,898 |
| Beneficiaries | 12,979,346 | 0 | 12,979,346 |
| Total | $ 329,817,834 | $ 593,289 | $ 330,411,123 |
| Vested Inactive Members | | | |
| Terminated Vested | $ 18,575,430 | $ 806,135 | $ 19,381,565 |
| Deferred Disabled | 1,655,038 | 211,295 | 1,866,333 |
| Total | $ 20,230,468 | $ 1,017,430 | $ 21,247,898 |
| Active Members | | | |
| Retirement | $ 208,749,373 | $ 62,649,803 | $ 271,399,176 |
| Withdrawal | 9,462,282 | 16,466,825 | 25,929,107 |
| Death | 2,603,182 | 1,294,747 | 3,897,929 |
| Disability | 5,751,530 | 3,562,996 | 9,314,526 |
| Total | $ 226,566,367 | $ 83,974,371 | $ 310,540,738 |
| Total Present Value of Projected Benefits | $ 576,614,669 | $ 85,585,090 | $ 662,199,759 |

**Resources**

| | |
|---|---|
| Actuarial Value of Assets | $ 504,806,469 |
| Present Value of Future Normal Costs | 95,193,653 |
| Unfunded Actuarial Liability | 62,199,637 |
| Total | $ 662,199,759 |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 5

## UNFUNDED ACTUARIAL LIABILITY (UAL)

| **Actuarial Liability** | **Tier 1** | **Tier 2** | **Total** |
|---|---|---|---|
| Retired Members | $ 329,817,834 | $ 593,289 | $ 330,411,123 |
| Vested Inactive Members | 20,230,468 | 1,017,430 | 21,247,898 |
| Active Members | 188,014,072 | 27,333,013 | 215,347,085 |
| Total | $ 538,062,374 | $ 28,943,732 | $ 567,006,106 |
| **Actuarial Value of Assets** | | | $ 504,806,469 |
| **Unfunded Actuarial Liability** | | | $ 62,199,637 |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 6

## ANALYSIS OF EXPERIENCE (GAINS) AND LOSSES

| | | |
|---|---|---|
| **Expected Unfunded Actuarial Liability** | | |
| Unfunded Actuarial Liability as of January 1, 2019 | | $ 34,628,169 |
| Normal Cost, including administrative expenses | | 12,229,212 |
| Employee and Employer Contributions | | (16,377,838) |
| Interest at 7.25% (assumption for prior year) | | 2,791,887 |
| Expected Unfunded Actuarial Liability as of January 1, 2020 | | $ 33,271,430 |
| **Changes** | | |
| Investment[1] (Gain)/Loss on an Actuarial Value of Assets Basis | | (8,866,867) |
| Demographic Experience (Gain)/Loss | | |
| Salary (Gain)/Loss | $ 3,269,086 | |
| New Entrant Participants Loss | 827,826 | |
| Retirement (Gain)/Loss | 1,969,190 | |
| Pensioner Mortality (Gain)/Loss | (833,128) | |
| Tier 1 Cost of Living Adjustment (Below)/Above Assumed | (3,205,667) | |
| All Other Demographic Experience | (321,710) | |
| Total Demographic Experience (Gain)/Loss | | 1,705,597 |
| Assumption Changes | | 36,085,838 |
| Plan Changes[2] | | 3,639 |
| **Unfunded Actuarial Liability on January 1, 2020** | | $ 62,199,637 |

[1] The investment (gain)/loss is based on the return on the Actuarial Value of Assets, which recognizes market value returns in any given year that are different than the valuation's investment return assumption systematically over a three year period.

[2] Tier 2 retirees received a cost of living increase on the Base Benefit effective January 1, 2020 equal to 1.5%. City Code allows the Board to grant a discretionary cost of living increase for the Base Benefit for Tier 2 retirees.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

## Table 7

### NORMAL COST

| **Entry Age Normal Cost** | **Tier 1** | **Tier 2** | **Total** |
|---|---|---|---|
| Retirement | $ 4,075,572 | $ 4,859,611 | $ 8,935,183 |
| Vested Withdrawal | 1,464,559 | 1,706,055 | 3,170,614 |
| Death | 78,215 | 100,927 | 179,142 |
| Disability | 232,048 | 316,854 | 548,902 |
| Total Normal Cost for Benefits | $ 5,850,394 | $ 6,983,447 | $ 12,833,841 |
| Interest to Mid-Year | | | 441,585 |
| Assumed Administrative Expenses (mid-year) | | | 585,000 |
| Total Normal Cost | | | $ 13,860,426 |
| As a Percentage of Valuation Salary* | | | 11.76% |

* Payroll for employees less than the assumed full retirement age (age 70) as of the valuation date.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 8

## DEVELOPMENT OF EMPLOYER PORTION OF THE ACTUARIALLY DETERMINED CONTRIBUTION

| | January 1, 2019 | January 1, 2020 |
|---|---|---|
| 1. Present Value of Projected Benefits | | |
| a. Retirees and beneficiaries | $ 291,980,950 | $ 330,411,123 |
| b. Deferred vested members | 20,170,870 | 21,247,898 |
| c. Active members | 284,308,152 | 310,540,738 |
| d. Total [(a) + (b) + (c)] | $ 596,459,972 | $ 662,199,759 |
| 2. Present Value of Future Normal Costs | 87,542,715 | 95,193,653 |
| 3. Entry Age Normal Accrued Liability [(1) – (2)] | $ 508,917,257 | $ 567,006,106 |
| 4. Actuarial Value of Assets | 474,289,088 | 504,806,469 |
| 5. Unfunded Actuarial Liability (UAL): [(3) – (4)] | $ 34,628,169 | $ 62,199,637 |
| 6. Amortization Period for UAL | 20 years | 20 years |
| 7. Entry Age Normal Cost (mid-year) | $ 12,218,711 | $ 13,860,426 |
| 8. Amortization of UAL (mid-year) | 2,926,438 | 4,420,683 |
| 9. Total Cost: [(7)+(8)] | $ 15,145,149 | $ 18,281,109 |
| 10. Anticipated Employee Contributions | (7,835,164) | (8,342,760) |
| 11. Employer Portion of the Actuarially Determined Contribution: [(9)+(10)] | $ 7,309,985 | $ 9,938,349 |
| 12. Anticipated Total Payroll | $ 111,930,915 | $ 119,182,291 |
| 13. Employer Portion of the Actuarially Determined Contribution as a Percent of Anticipated Total Payroll | 6.53% | 8.34% |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

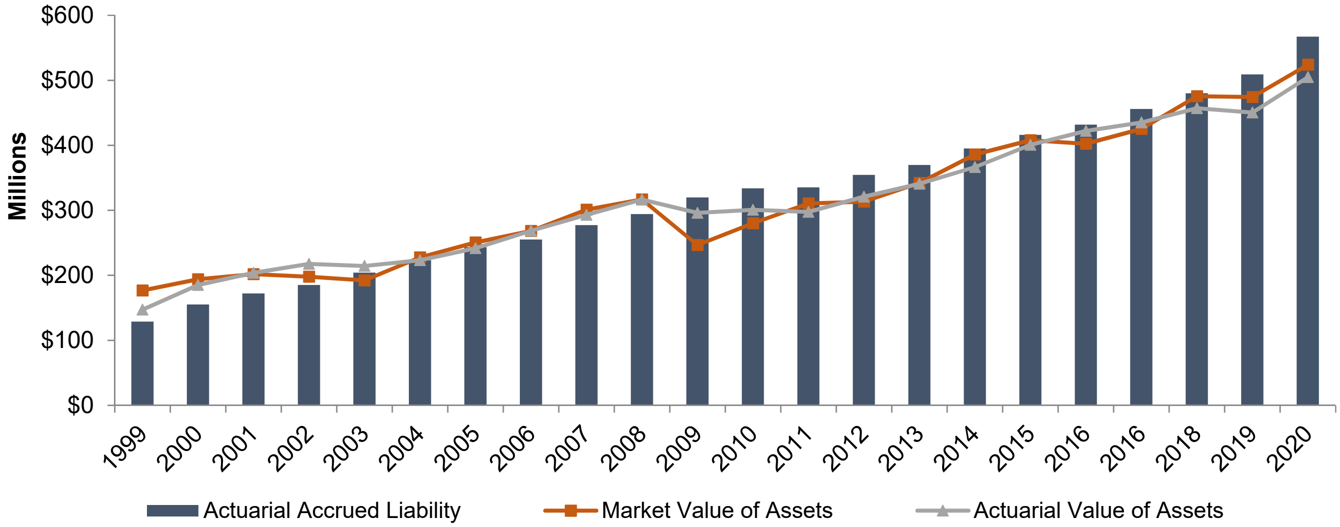
# Historical Information and Projections



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 9

## HISTORICAL FUNDING PROGRESS
## PLAN ASSETS VS. ACTUARIAL ACCRUED LIABILITY




| Jan. 1, | (A) Market Value of Assets (MVA) | (B) Actuarial Value of Assets (AVA) | (C) Actuarial Liability | (C) - (A) MVA Funding (Surplus)/ Shortfall | (A) / (C) MVA Funded Ratio | (C) - (B) AVA Funding (Surplus)/ Shortfall | (B) / (C) AVA Funded Ratio |
|---|---|---|---|---|---|---|---|
| 1999 | $176,771,147 | $147,257,777 | $128,684,022 | $(48,087,125) | 137% | $(18,573,755) | 114% |
| 2000 | 193,982,980 | 185,264,480 | 155,169,044 | (38,813,936) | 125 | (30,095,436) | 119 |
| 2001 | 201,890,615 | 203,862,059 | 172,005,869 | (29,884,746) | 117 | (31,856,190) | 119 |
| 2002 | 198,007,236 | 217,476,110 | 184,999,951 | (13,007,285) | 107 | (32,476,159) | 118 |
| 2003 | 192,230,162 | 214,320,251 | 203,999,260 | 11,769,098 | 94 | (10,320,991) | 105 |
| 2004 | 227,797,938 | 223,140,793 | 223,126,549 | (4,671,389) | 102 | (14,244) | 100 |
| 2005 | 250,609,598 | 241,818,542 | 243,234,592 | (7,375,006) | 103 | 1,416,050 | 99 |
| 2006 | 268,374,886 | 268,566,265 | 255,005,107 | (13,369,779) | 105 | (13,561,158) | 105 |
| 2007 | 300,988,913 | 292,889,736 | 277,052,492 | (23,936,421) | 109 | (15,837,244) | 106 |
| 2008 | 316,737,760 | 316,567,579 | 294,142,225 | (22,595,535) | 108 | (22,425,354) | 108 |
| 2009 | 246,684,838 | 296,021,806 | 319,750,886 | 73,066,048 | 77 | 23,729,080 | 93 |
| 2010 | 280,221,050 | 300,704,227 | 333,831,950 | 53,610,900 | 84 | 33,127,723 | 90 |
| 2011 | 310,556,618 | 297,494,555 | 335,310,191 | 24,753,573 | 93 | 37,815,636 | 89 |
| 2012 | 313,281,809 | 320,996,231 | 354,416,941 | 41,135,132 | 88 | 33,420,710 | 91 |
| 2013 | 342,120,905 | 340,856,093 | 369,696,290 | 27,575,385 | 93 | 28,840,197 | 92 |
| 2014 | 385,882,442 | 366,577,369 | 395,063,666 | 9,181,224 | 98 | 28,486,297 | 93 |
| 2015 | 407,945,659 | 400,748,065 | 415,852,539 | 7,906,880 | 98 | 15,104,474 | 96 |
| 2016 | 402,516,572 | 422,124,860 | 431,659,846 | 29,143,274 | 93 | 9,534,986 | 98 |
| 2017 | 425,231,226 | 435,153,161 | 455,759,906 | 30,528,680 | 93 | 20,606,745 | 95 |
| 2018 | 475,556,466 | 457,124,471 | 479,969,556 | 4,413,090 | 99 | 22,845,085 | 95 |
| 2019 | 450,368,075 | 474,289,088 | 508,917,257 | 58,549,182 | 89 | 34,628,169 | 93 |
| 2020 | 524,036,473 | 504,806,469 | 567,006,106 | 42,969,633 | 92 | 62,199,637 | 89 |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 10

## ANALYSIS OF EXPERIENCE (GAINS) AND LOSSES (HISTORICAL)

| | Actuarial (Gains)/Losses | | | | | |
|---|---|---|---|---|---|---|
| Plan Year Ending | Asset Sources | Liability Sources | Total | Changes in Plan Provisions | Changes in Assumption/ Methods | Total (Gain)/Loss |
| December 31, 2010 | 23,485,448 | (8,080,563) | 15,404,885 | 0 | (15,247,082)* | 157,803 |
| December 31, 2011 | (4,483,174) | (5,162,188) | (9,645,362) | 0 | 975,975* | (8,669,387) |
| December 31, 2012 | (1,064,320) | (6,771,318) | (7,835,638) | 0 | 0 | (7,835,638) |
| December 31, 2013 | (5,791,149) | (5,712,203) | (11,503,352) | 0 | 8,841,210* | (2,662,142) |
| December 31, 2014 | (12,639,488) | (1,020,194) | (13,659,682) | 0 | 0 | (13,659,682) |
| December 31, 2015 | 1,452,303 | (6,389,686) | (4,937,383) | 0 | 956,983 | (3,980,400) |
| December 31, 2016 | 11,641,132 | (5,754,735) | 5,886,397 | 0 | 6,996,522 | 12,882,919 |
| December 31, 2017 | 1,207,709 | 2,378,124 | 3,585,833 | (83,708) | 0 | 3,502,125 |
| December 31, 2018 | 6,124,973 | 7,094,194 | 13,219,167 | 4,302 | 0 | 13,223,469 |
| December 31, 2019 | (8,866,867) | 1,705,597 | (7,161,270) | 3,639 | 36,085,838 | 28,928,207 |

Values for plan year ending December 31, 2015 and earlier as reported by the prior actuary.

* Net “non-recurring” changes. Prior actuary’s report did not delineate between plan and assumption/method changes.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 11

## SOLVENCY TEST

| | Actuarial Accrued Liabilities for: | | | | Portion of Accrued Liabilities Covered by Valuation Assets | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | | | | |
| Valuation Date | Active Member Contributions | Inactive Members | Active Members | Valuation Assets | (1) | (2) | (3) |
| January 1, 1999 | 36,370,601 | 43,901,137 | 48,412,284 | 147,257,777 | 100% | 100% | 100% |
| January 1, 2000 | 38,805,144 | 49,290,698 | 67,073,202 | 185,264,480 | 100% | 100% | 100% |
| January 1, 2001 | 41,631,805 | 56,856,612 | 73,517,451 | 203,862,059 | 100% | 100% | 100% |
| January 1, 2002 | 44,768,076 | 60,305,096 | 79,926,779 | 217,476,110 | 100% | 100% | 100% |
| January 1, 2003 | 48,736,137 | 66,075,645 | 89,187,478 | 214,320,251 | 100% | 100% | 100% |
| January 1, 2004 | 53,289,266 | 71,919,853 | 97,917,430 | 223,140,793 | 100% | 100% | 100% |
| January 1, 2005 | 58,118,119 | 80,238,773 | 104,877,700 | 241,818,542 | 100% | 100% | 99% |
| January 1, 2006 | 59,491,429 | 96,596,749 | 98,916,929 | 268,566,265 | 100% | 100% | 100% |
| January 1, 2007 | 61,700,894 | 108,083,741 | 107,267,857 | 292,889,736 | 100% | 100% | 100% |
| January 1, 2008 | 65,237,335 | 115,157,203 | 113,747,687 | 316,567,579 | 100% | 100% | 100% |
| January 1, 2009 | 68,764,295 | 131,939,654 | 119,046,937 | 296,021,806 | 100% | 100% | 80% |
| January 1, 2010 | 72,311,211 | 138,108,376 | 123,412,363 | 300,704,227 | 100% | 100% | 73% |
| January 1, 2011 | 74,768,249 | 142,446,528 | 118,095,414 | 297,494,555 | 100% | 100% | 68% |
| January 1, 2012 | 74,788,283 | 162,428,901 | 117,199,757 | 320,996,231 | 100% | 100% | 71% |
| January 1, 2013 | 74,453,807 | 179,793,207 | 115,449,276 | 340,856,093 | 100% | 100% | 75% |
| January 1, 2014 | 75,409,870 | 205,480,329 | 114,173,467 | 366,577,369 | 100% | 100% | 75% |
| January 1, 2015 | 74,299,208 | 226,648,240 | 114,905,091 | 400,748,065 | 100% | 100% | 87% |
| January 1, 2016 | 74,856,178 | 239,245,818 | 117,557,850 | 422,124,860 | 100% | 100% | 92% |
| January 1, 2017 | 73,701,869 | 261,377,011 | 120,681,026 | 435,153,161 | 100% | 100% | 83% |
| January 1, 2018 | 75,156,324 | 282,710,162 | 122,103,070 | 457,124,471 | 100% | 100% | 81% |
| January 1, 2019 | 74,072,180 | 312,151,820 | 122,693,257 | 474,289,088 | 100% | 100% | 72% |
| January 1, 2020 | 72,242,119 | 351,659,021 | 143,104,966 | 504,806,469 | 100% | 100% | 57% |

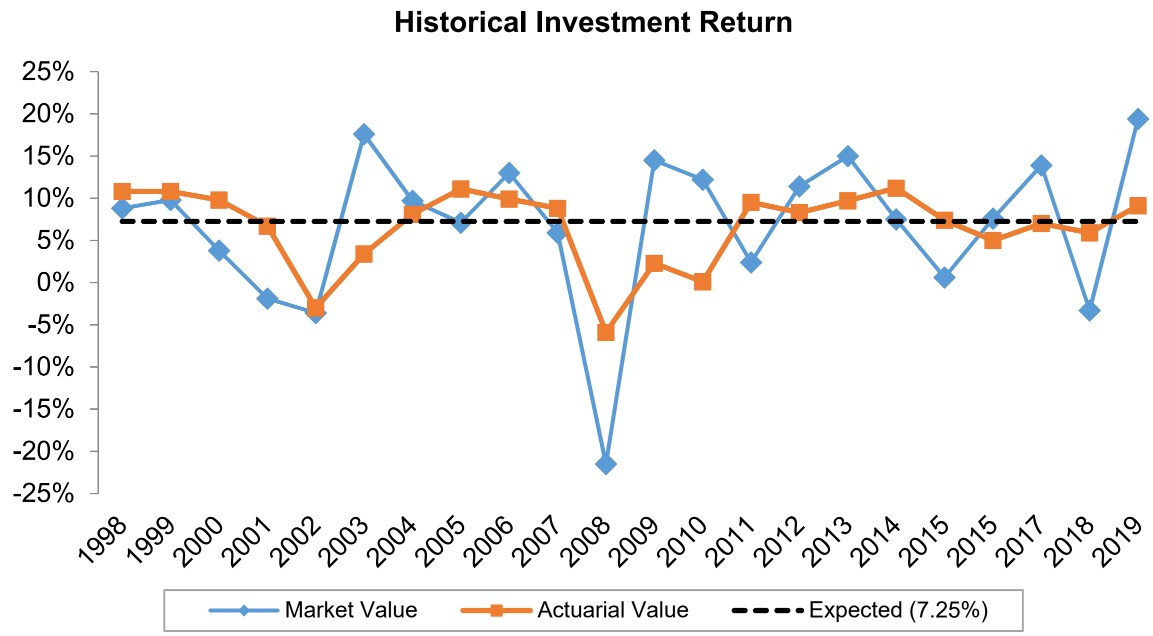
Values for January 1, 2016 and earlier as reported by the prior actuary.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 12

## HISTORICAL INVESTMENT RETURN




Annual Rate of Investment Return*

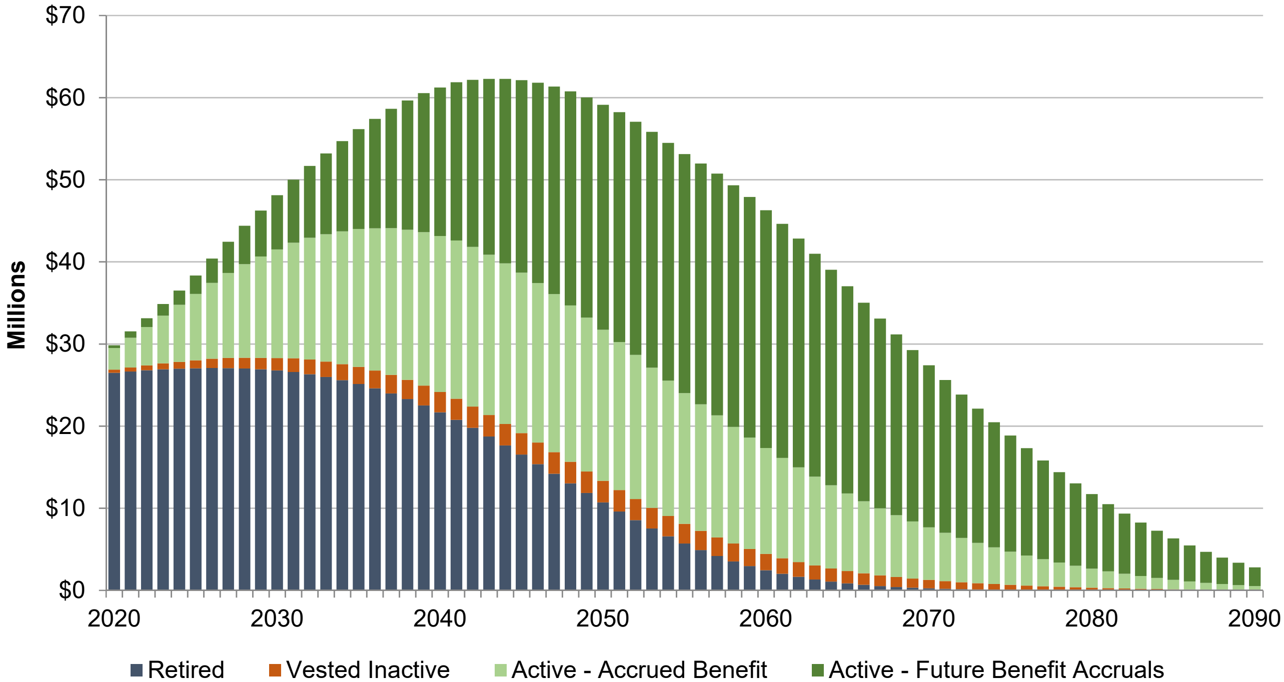
| For One-Year Period | | | For Period Ending December 31, 2019 | | |
|---|---|---|---|---|---|
| Plan Year Ending December 31, | Market | Actuarial | Period | Market | Actuarial |
| 2019 | 19.3% | 9.1% | 1 year | 19.3% | 9.1% |
| 2018 | -3.3% | 5.9% | 2 years | 7.4% | 7.5% |
| 2017 | 13.9% | 7.0% | 3 years | 9.5% | 7.3% |
| 2016 | 7.6% | 5.0% | 4 years | 9.0% | 6.7% |
| 2015 | 0.6% | 7.4% | 5 years | 7.3% | 6.9% |
| 2014 | 7.5% | 11.2% | 6 years | 7.3% | 7.6% |
| 2013 | 15.0% | 9.7% | 7 years | 8.4% | 7.9% |
| 2012 | 11.4% | 8.3% | 8 years | 8.8% | 7.9% |
| 2011 | 2.4% | 9.5% | 9 years | 8.0% | 8.1% |
| 2010 | 12.2% | 0.1% | 10 years | 8.4% | 7.3% |
| 2009 | 14.5% | 2.3% | 11 years | 9.0% | 6.8% |
| 2008 | -21.5% | -5.9% | 12 years | 6.0% | 5.7% |
| 2007 | 5.9% | 8.8% | 13 years | 6.0% | 5.9% |
| 2006 | 13.0% | 9.9% | 14 years | 6.5% | 6.2% |
| 2005 | 7.1% | 11.1% | 15 years | 6.6% | 6.5% |
| 2004 | 9.7% | 8.1% | 16 years | 6.8% | 6.6% |
| 2003 | 17.6% | 3.4% | 17 years | 7.4% | 6.4% |
| 2002 | -3.6% | -3.0% | 18 years | 6.7% | 5.9% |
| 2001 | -1.9% | 6.7% | 19 years | 6.2% | 5.9% |
| 2000 | 3.8% | 9.8% | 20 years | 6.1% | 6.1% |
| 1999 | 9.8% | 10.8% | 21 years | 6.3% | 6.3% |
| 1998 | 8.8% | 10.8% | 22 years | 6.4% | 6.5% |

* *For 2016 and prior, rates reflect total investment return, net of investment related and administrative expenses.*


This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 13

## TWENTY-YEAR PROJECTION OF BENEFIT PAYMENTS FOR CURRENT PARTICIPANTS




### Detail of Total Projected Benefit Payments and Contribution Refunds for Next 20 Years*

| Plan Year | Projected Benefit Payments and Contribution Refunds | Plan Year | Projected Benefit Payments and Contribution Refunds |
|---|---|---|---|
| 2020 | $ 29,842,000 | 2030 | $ 48,117,000 |
| 2021 | 31,536,000 | 2031 | 50,000,000 |
| 2022 | 33,137,000 | 2032 | 51,675,000 |
| 2023 | 34,859,000 | 2033 | 53,199,000 |
| 2024 | 36,502,000 | 2034 | 54,693,000 |
| 2025 | 38,331,000 | 2035 | 56,156,000 |
| 2026 | 40,403,000 | 2036 | 57,394,000 |
| 2027 | 42,436,000 | 2037 | 58,635,000 |
| 2028 | 44,398,000 | 2038 | 59,637,000 |
| 2029 | 46,244,000 | 2039 | 60,535,000 |

* *This valuation, including the projected benefit payments shown, reflects only participants as of the valuation date and does not reflect any projected payments to future new entrants.*



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table 14

## 30-YEAR PROJECTION OF CONTRIBUTIONS AND FUNDED RATIO (MILLIONS)

| (1) Valuation as of January 1, | (2) Employer Contribution | (3) Employee Contribution | (4) Total Payroll | (5) Actuarial Liability | (6) Actuarial Value of Assets | (7) Unfunded Actuarial Liability | (8) Normal Cost Rate (w/Exp.) | (9) Funded Ratio |
|---|---|---|---|---|---|---|---|---|
| 2020 | 8.3 | 8.3 | 119.2 | 567.0 | 504.8 | 62.2 | 11.7% | 89% |
| 2021 | 8.6 | 8.6 | 123.1 | 589.5 | 528.6 | 60.9 | 11.7% | 90% |
| 2022 | 8.9 | 8.9 | 127.1 | 612.3 | 569.3 | 43.0 | 11.6% | 93% |
| 2023 | 9.2 | 9.2 | 131.2 | 635.3 | 592.7 | 42.6 | 11.5% | 93% |
| 2024 | 9.5 | 9.5 | 135.4 | 658.5 | 616.4 | 42.1 | 11.5% | 94% |
| 2025 | 9.8 | 9.8 | 139.8 | 682.1 | 640.7 | 41.4 | 11.4% | 94% |
| 2026 | 10.1 | 10.1 | 144.4 | 705.9 | 665.5 | 40.4 | 11.4% | 94% |
| 2027 | 10.4 | 10.4 | 149.1 | 729.6 | 690.5 | 39.1 | 11.3% | 95% |
| 2028 | 10.8 | 10.8 | 153.9 | 753.4 | 715.8 | 37.6 | 11.3% | 95% |
| 2029 | 11.1 | 11.1 | 158.9 | 777.2 | 741.5 | 35.7 | 11.3% | 95% |
| 2030 | 11.5 | 11.5 | 164.1 | 801.3 | 767.8 | 33.5 | 11.2% | 96% |
| 2031 | 11.9 | 11.9 | 169.4 | 825.7 | 794.8 | 30.9 | 11.2% | 96% |
| 2032 | 12.2 | 12.2 | 174.9 | 850.4 | 822.4 | 28.0 | 11.2% | 97% |
| 2033 | 12.6 | 12.6 | 180.6 | 875.6 | 851.0 | 24.6 | 11.1% | 97% |
| 2034 | 13.1 | 13.1 | 186.5 | 901.6 | 880.9 | 20.7 | 11.1% | 98% |
| 2035 | 13.5 | 13.5 | 192.6 | 928.5 | 912.1 | 16.4 | 11.1% | 98% |
| 2036 | 13.9 | 13.9 | 198.8 | 956.4 | 944.8 | 11.6 | 11.1% | 99% |
| 2037 | 14.4 | 14.4 | 205.3 | 985.6 | 979.5 | 6.1 | 11.1% | 99% |
| 2038 | 14.8 | 14.8 | 211.9 | 1,016.2 | 1,016.2 | 0.0 | 11.0% | 100% |
| 2039 | 15.3 | 15.3 | 218.8 | 1,048.6 | 1,055.4 | (6.8) | 11.0% | 101% |
| 2040 | 15.8 | 15.8 | 226.0 | 1,083.1 | 1,097.3 | (14.2) | 11.0% | 101% |
| 2041 | 16.3 | 16.3 | 233.3 | 1,120.1 | 1,142.5 | (22.4) | 11.0% | 102% |
| 2042 | 16.9 | 16.9 | 240.9 | 1,159.7 | 1,191.3 | (31.6) | 11.0% | 103% |
| 2043 | 17.4 | 17.4 | 248.7 | 1,202.7 | 1,244.2 | (41.5) | 11.0% | 103% |
| 2044 | 18.0 | 18.0 | 256.8 | 1,249.3 | 1,301.8 | (52.5) | 11.0% | 104% |
| 2045 | 18.6 | 18.6 | 265.1 | 1,300.1 | 1,364.6 | (64.5) | 11.0% | 105% |
| 2046 | 19.2 | 19.2 | 273.7 | 1,355.5 | 1,433.1 | (77.6) | 11.0% | 106% |
| 2047 | 19.8 | 19.8 | 282.6 | 1,416.0 | 1,508.0 | (92.0) | 11.0% | 106% |
| 2048 | 20.4 | 20.4 | 291.8 | 1,482.1 | 1,589.8 | (107.7) | 10.9% | 107% |
| 2049 | 21.1 | 21.1 | 301.3 | 1,554.5 | 1,679.3 | (124.8) | 10.9% | 108% |

Note: These projections are based on the actuarial methods, assumptions and plan provisions disclosed in this report, including the use of a 7.00% future return on the market value of assets and a 3.25% future wage inflation. In addition, the projections assume future experience follows assumptions, there are no changes to assumptions, plan provisions or funding policy, and employee and employer contributions of 7.00% of compensation are made each year.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Appendix A
# Plan Summary



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

All actuarial calculations are based upon our understanding of the provisions of the City of Aurora General Employees' Retirement Plan, as amended through December 31, 2019. This summary does not attempt to cover all of the detailed provisions.

**Plan Year**

The Plan Year is the 12-month period beginning January 1 and ending December 31.

**Effective Date**

The original effective date of the Plan is March 1, 1967. The Plan was most recently amended by Ordinance No. 2018-04, effective April 7, 2018.

**Employee**

All full and part-time career service and Council-appointed employees of the City, other than police officers, firefighters, elected officials, certain executive-level personnel and temporary employees.

**Participation**

An Employee shall become a Participant upon completion of one hour of service.

**Plan Tier**

Participants in the plan prior to January 1, 2012 are Tier 1 participants. Participants who first enter the plan after December 31, 2011 are Tier 2 participants.

**Final Average Monthly Compensation**

An employee's compensation from the city during the 36 highest paid consecutive calendar months of the last ten years of credit service, divided by 36.

**Compensation**

Compensation means the total base pay, including acting pay, longevity credit, 414(h) and 457 contributions and Section 125 elective pre-tax employee contributions. Overtime, vacation and sick leave pay, and bonuses are excluded.

Compensation is limited under Internal Revenue Code Section 401(a)(17).

**Credited Service**

A participant's credited service is the elapsed time period from employment commencement date to the date of termination of such employment. Generally, one day of credited service shall be credited for each day in the elapsed period.

**Employee Contributions**

Beginning in 2017, employees contribute 7.00% of pay. Rates beyond 2017 may increase or decrease 0.25% each year upon the financial condition of the fund but in no case would the rate increase above 7.00% or decrease below 5.50%. Rate changes are based on a decision flowchart designed to keep the funded ratio between 100% and 110%. The employee's contribution account is credited with interest of 4.0% compounded biweekly.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

**Employer (City) Contributions**

The city contributes to the trust an amount equal to the contributions of the employee. Currently, the City contributes 7.00% of payroll.

**Normal Retirement Date**

Tier 1 Participants: 65th Birthday

Tier 2 Participants: 67th Birthday

**Normal Retirement Pension**

Each participant who becomes eligible for a Normal Retirement Pension under the Plan will be entitled to receive a monthly retirement pension benefit beginning at the participant's Normal Retirement Date and payable in the Normal Benefit Form equal to 1.75% of Final Average Monthly Compensation multiplied by Years of Credited Service.

In lieu of a monthly pension, the participant may elect to receive a lump sum equal to the participant's contribution accumulated and vested city contributions.

**Normal Benefit Form**

Life Annuity

**Early Retirement Pension**

(a) Eligibility

Termination on or after age 50 with 10 or more years of credited service, and not eligible for Normal Retirement Pension or Special Early Retirement Pension

(b) Amount (Base Benefit)

A participant's Early Retirement Pension is a monthly pension benefit equal to his Normal Retirement Pension based on Final Average Monthly Compensation and Credited Service at his date of retirement, and reduced as follows:

<u>Tier 1 Participants</u>

(i) After age 55: 2% per year prior to the earlier of age 65 (Normal Retirement) or Rule of 80 (age plus service equal to 80 or more)

(ii) Under age 55 with less than 25 years of credited service: 2% per year for each year that the participant's years of credited service are less than 25 (up to a max of 20%), then further reduced by 6% per year for each year the commencement precedes age 55

(iii) Under age 55 with at least 25 years of credited service: 6% per year prior to Rule of 80 (age plus service equal to 80 or more)

<u>Tier 2 Participants:</u> 6% per year prior to the earlier of age 67 (Normal Retirement) or Rule of 80 (age plus service equal to 80 or more)

For determining Rule of 80 date for early retirement reductions, service is determined at date of retirement and age is projected forward.

In lieu of a monthly pension, the participant may elect to receive a lump sum equal to the participant's contribution accumulated and vested city contributions.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

**Special Early Retirement Pension – Rule of 80**

(a) Eligibility

Termination on or after age 50 with age plus credited service equal to 80 or more, and not eligible for Normal Retirement Pension

(b) Amount (Base Benefit)

A participant's Special Early Retirement Pension is a monthly pension benefit equal to his Normal Retirement Pension based on Final Average Monthly Compensation and Credited Service at his date of retirement, without reduction.

In lieu of a monthly pension, the participant may elect to receive a lump sum equal to the participant's contribution accumulated and vested city contributions.

**Deferred Vested Pension**

(a) Eligibility

5 or more years of Credited Service.

(b) Amount (Base Benefit)

A participant's Deferred Vested Pension shall be equal to the participant's Accrued Benefit, payable at Normal Retirement Date. If a participant terminates employment after completing 10 years of credited service, the participant may retire with an Early Retirement Benefit any time after attainment of age 50 and prior to the participant's normal retirement date.

In lieu of a monthly pension, the participant may elect to receive a lump sum equal to the participant's contribution accumulated and vested city contributions.

**Money Purchase Pension**

(a) Eligibility

Eligible for a Normal Retirement, Early Retirement, Special Early Retirement, or Deferred Vested Pension, and the monthly money purchase pension is greater than the monthly pension calculated pursuant to any of these pensions.

(b) Amount (Base Benefit)

A participant's Money Purchase Pension shall be a monthly amount equal to the Actuarial Equivalent of the participant's contribution accumulation and vested city contributions as of the date the pension commences. The Money Purchase Pension is payable in lieu of a Normal Retirement, Early Retirement, Special Early Retirement, or Deferred Vested Pension.

**Disability Retirement Pension**

(a) Eligibility

Termination due to Disability, and the Participant received long-term disability insurance payments from the City until his Normal Retirement Date.

(b) Amount (Base Benefit)

A participant's Disability Retirement Pension shall be equal to the participant's Normal Retirement Pension based on the higher of the Final Average Monthly Compensation or the monthly rate of compensation on the date of disablement, and Credited Service the participant would have accrued



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

had he continued employment through his Normal Retirement Date (or date of discontinuance of disability benefits, if earlier).

**Supplemental Benefit**

(a) Eligibility

In receipt of a monthly benefit under a Normal Retirement, Early Retirement, Special Early Retirement, Deferred Vested, Disability Retirement, or Money Purchase Pension.

(b) Amount (Supplemental Benefit)

A monthly amount equal to $176.00. This benefit is reduced proportionally if the years of credited service are less than 20.

**Termination before Vested Benefit**

If a participant terminates employment prior to 5 years of Credited Service, the participant will receive a refund of accumulated employee and vested employer contributions, if any.

**Vesting Schedule**

(a) For Defined Benefit:

| Years of Credited Service | Vested Percentage |
|---|---|
| Less than 5 | 0% |
| 5 or more | 100% |

Participants are fully vested at Normal Retirement Date.

(b) For Vesting in City Contributions:

Participants are vested in the City's contributions and interest according to the following schedule:

| Years of Credited Service | Tier 1 Vested Percentage | Tier 2 Vested Percentage |
|---|---|---|
| 0 | 25% | 0% |
| 1 | 30% | 0% |
| 2 | 35% | 0% |
| 3 | 40% | 0% |
| 4 | 45% | 0% |
| 5 | 50% | 50% |
| 6 | 55% | 55% |
| 7 | 60% | 60% |
| 8 | 65% | 65% |
| 9 | 70% | 70% |
| 10 | 75% | 75% |
| 11 | 80% | 80% |
| 12 | 85% | 85% |
| 13 | 90% | 90% |
| 14 | 95% | 95% |
| 15+ | 100% | 100% |

Participants are 100% vested in Employee contributions and interest immediately.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

**Optional Benefit Forms**

Optional Benefit Forms are available for base benefits and equal to the Actuarial Equivalent of the Normal Benefit Form. Such distribution may be as a Joint & 50%, 75%, or 100% Survivor Annuity with Pop-up feature, a 10 or 15 Year Certain and Life Annuity or a Partial Lump Sum up to 20% of the actuarial equivalent of the accrued benefit.

The Supplemental Benefit is paid as a monthly benefit as long as a monthly Base Benefit is being received by a participant or a participant's beneficiary.

**Pre-Retirement Death Benefit**

If a participant dies prior to completing 5 years of service, the Participant's beneficiary will receive a refund of accumulated employee and vested employer contributions, if any. If a Participant dies after completing 5 years of service, the participant's beneficiary will receive a monthly benefit equal to the supplemental benefit plus the larger of the actuarial equivalent of 60% of the defined benefit formula benefit or the actuarial equivalent of the vested employee and employer contributions. Benefit payments may begin at any time after the date the participant would have attained the earliest retirement age.

**Lump Sum Death Benefit**

Upon the death of a Retired member receiving a monthly pension, $6,250 shall be paid in a single sum to the member's designated beneficiary.

In addition, upon the last to die of a Retired member and any beneficiary receiving a monthly pension, a lump sum shall be paid to the estate. This amount shall be equal to the excess, if any, of the participant's contribution accumulation and vested city contributions on the date the pension commenced over the total monthly benefits paid from the time of pension commencement to the date of death.

**Cost of Living Adjustment**

<u>Tier 1 Participants</u>

(a) Base Benefit: The monthly amount of the base benefit provided by the Plan shall be increased annually on the first day of each January by the change in the U.S. Consumer Price Index for Urban Wage Earners and Clerical Works (CPI-W) for the averages of the third quarter, rounded to the nearest ½%. The benefit cannot be decreased and annual increases may not exceed 5%.

(b) Supplemental Benefit: Annual cost of living increases are discretionary and may be granted on an annual basis as determined by the board. The annual increase or decrease cannot exceed plus or minus 5%.

<u>Tier 2 Participants</u>

(a) Base Benefit: Annual cost of living increases are discretionary and may be granted on an annual basis as determined by the Board. The annual increase cannot exceed the lesser of 5% or the increase which applies to Tier 1 participants.

(b) Supplemental Benefit: Annual cost of living increases are discretionary and may be granted on an annual basis as determined by the Board. The annual increase or decrease cannot exceed plus or minus 5%.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

**Actuarial Equivalence**

Actuarial Equivalence is calculated using the Society of Actuaries' RP-2000 (no collar) Combined Healthy Mortality Table, blended 50% male, 50% female, a 7.25% interest rate, and a Cost-of-Living assumption of 2.75% for Tier 1 benefits and 0.25% for Tier 2 benefits.

**Plan Changes**

The Board granted a discretionary cost of living increase for the Base Benefit for Tier 2 Participants effective January 1, 2020 equal to 1.50%.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Appendix B
# Actuarial Procedures and Assumptions



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

The actuarial assumptions used in the valuation are intended to estimate future experience affecting projected benefit flow and investment earnings. Any variations in future experience from that expected from these assumptions will result in corresponding changes in the estimated costs of the Plan's benefits.

The tables in this section give rates of decrement, referred to in actuarial notation by the general symbol "q'." The underlying theory is described more fully in Jordan, *Life Contingencies*, Society of Actuaries (Second Edition, 1967), page 277. Any age referred to in a table is always the age of the person at his or her nearest birthday.

**Actuarial Cost Method**

The actuarial cost method we use to calculate the funding requirements of the Plan is called the **entry age normal actuarial cost method**.

Under this cost method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit age. The portion of this actuarial present value allocated to a valuation year is called the Normal Cost. The portion of the actuarial present value not provided for at the valuation date by future Normal Costs is called the actuarial accrued liability.

**Actuarial Value of Assets**

The actuarial value of assets is determined by calculating the expected return on the prior year's market value of assets, adjusted for cash flows of contributions, administrative expenses, and benefit payments for the year, and assuming a 7.25% interest return for the 2017 - 2019 plan years. The difference between this expected value and the actual return for the plan year is recognized over 3 years. The actuarial value of assets is then the actual market value minus the gains and losses for prior years that are still deferred. The resulting value is limited to between 80% and 120% of the market value of assets.

**Actuarially Determined Contribution (Adopted January 1, 2017)**

The method for calculating the Actuarially Determined Contribution (ADC) was adopted by the Board of Trustees. The ADC is calculated using a 20-year amortization of the unfunded actuarial accrued liability or funding excess to determine the amortization component of the ADC. On each valuation date, the newly determined unfunded actuarial accrued liability or funding excess is amortized over an open (or rolling) 20-year amortization period as a level percent of projected pay.

**Investment Earnings (Adopted January 1, 2020)**

7.00% per annum, compounded annually, net of investment expenses.

The investment return assumption was selected based on the Plan's asset allocation and capital market assumptions from several sources, including published studies summarizing the expectations of various investment experts. This information was then used to develop forward looking long-term expected returns, producing a range of reasonable expectations according to industry experts. Based on the resulting range of potential assumptions, in our professional judgement the selected investment return assumption is reasonable and is not expected to have any significant bias.

**Inflation (Adopted January 1, 2020)**

2.50% per annum, compounded annually.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Several sources were considered in selecting the inflation assumption, and 2.50% is intended to be a reasonable forward-looking assumption.

**Compensation Increase (Inflation and Real Wage Growth adopted January 1, 2020; Merit adopted January 1, 2014)**

Annual salary increases are based on a table graded by service. Rates are as follows:

| Years of | Percentage Increase at Age | | | |
|---|---|---|---|---|
| Service | Inflation | Real Wage Growth | Merit | Total |
| 0-1 | 2.50% | 0.75% | 2.75% | 6.00% |
| 2 | 2.50 | 0.75 | 2.25 | 5.50 |
| 3 | 2.50 | 0.75 | 1.75 | 5.00 |
| 4-7 | 2.50 | 0.75 | 1.25 | 4.50 |
| 8 | 2.50 | 0.75 | 0.75 | 4.00 |
| 9 | 2.50 | 0.75 | 0.50 | 3.75 |
| 10+ | 2.50 | 0.75 | 0.00 | 3.25 |

**Total Payroll Growth Rate (Adopted January 1, 2014)**

3.25% per annum.

**Expenses (Adopted January 1, 2018)**

Expenses other than investment expenses are assumed to be $585,000 per year, payable mid-year.

**Employee Contribution Rate**

7.00% of compensation, the current employee contribution rate for 2020.

Per guidance provided in the City Code, actual future rates may increase or decrease 0.25% each year depending upon the financial condition of the Plan. Per the City Code, the contribution rate may not exceed 7.00% or be less than 5.50%.

**Contribution Accumulation Rate (Adopted January 1, 2010)**

4.00% per annum, compounded biweekly.

The contribution accumulation rate is established by the Board at a rate of at least three percent per annum compounded annually. The current rate is 4.00% per annum, compounded biweekly. The Retirement Board reviews this rate in December of each year and has the authority to change it.

**Mortality (Adopted January 1, 2020)**

Healthy Lives (post-retirement) – Pub-2010 General Employees Retiree Mortality Table (amount-weighted), projected generationally using Scale MP2018

Healthy Lives (pre-retirement) – Pub-2010 General Employees Mortality Table (amount-weighted), projected generationally using Scale MP2018

Disabled Lives – Pub-2010 Disabled Retiree (Non Safety) Mortality Table (amount-weighted), projected generationally using Scale MP2018



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

The assumption included a margin for future mortality improvements at the time of the most recent experience study completed as of December 31, 2018.

**Retirement (Adopted January 1, 2020)**

For active participants, table of rates by age, based on Tier and eligibility for unreduced retirement, as follows:

| | Reduced | | Unreduced | |
|---|---|---|---|---|
| **Age** | **Tier 1** | **Tier 2** | **Tier 1** | **Tier 2** |
| 50 | 2.0% | 2.0% | 3.0% | 3.0% |
| 51 | 3.0 | 3.0 | 3.0 | 3.0 |
| 52 | 3.0 | 3.0 | 10.0 | 10.0 |
| 53 | 3.0 | 3.0 | 10.0 | 10.0 |
| 54 | 3.0 | 3.0 | 10.0 | 10.0 |
| 55 | 3.0 | 3.0 | 8.0 | 8.0 |
| 56 | 6.0 | 6.0 | 8.0 | 8.0 |
| 57 | 6.0 | 6.0 | 8.0 | 8.0 |
| 58 | 6.0 | 6.0 | 8.0 | 8.0 |
| 59 | 6.0 | 6.0 | 8.0 | 8.0 |
| 60 | 6.0 | 6.0 | 8.0 | 8.0 |
| 61 | 6.0 | 6.0 | 15.0 | 15.0 |
| 62 | 15.0 | 15.0 | 25.0 | 25.0 |
| 63 | 15.0 | 15.0 | 20.0 | 20.0 |
| 64 | 15.0 | 15.0 | 15.0 | 15.0 |
| 65 | N/A | 30.0 | 30.0 | 30.0 |
| 66 | N/A | 30.0 | 30.0 | 30.0 |
| 67 | N/A | N/A | 30.0 | 30.0 |
| 68 | N/A | N/A | 50.0 | 50.0 |
| 69 | N/A | N/A | 50.0 | 50.0 |
| 70+ | N/A | N/A | 100.0 | 100.0 |

Current and future vested inactive members are assumed to retire as follows:

- Tier 1: Earlier of age 55 with 10 or more years of service, or age 65
- Tier 2: Normal retirement age (67)



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

**Disablement (Adopted January 1, 2014)**

Graduated rates based on age and gender. Sample rates are as follows:

| Age | Male | Female |
|---|---|---|
| 30 | 0.03% | 0.11% |
| 35 | 0.05 | 0.16 |
| 40 | 0.06 | 0.21 |
| 45 | 0.10 | 0.35 |
| 50 | 0.14 | 0.48 |
| 55 | 0.25 | 0.87 |
| 60 | 0.36 | 1.26 |

**Withdrawal Rates (Adopted January 1, 2020)**

Graduated rates based on years of service, age and gender are used. Sample rates are as follows:

| Years of Service | Male | Female |
|---|---|---|
| 0-1 | 20.0% | 23.0% |
| 1-2 | 17.6 | 19.8 |
| 2-3 | 14.3 | 16.5 |
| 3-4 | 11.0 | 13.0 |
| 4-5 | 9.9 | 12.1 |
| **At Five or More Years of Service:** | | |
| **Age** | | |
| 30 | 8.5% | 11.0% |
| 40 | 5.8 | 7.2 |
| 50 | 3.8 | 3.9 |
| 60 | 2.3 | 1.7 |

**Marital Assumptions**

85% of active and deferred vested members not currently receiving benefits are assumed to be married. Male spouses are assumed to be three years older than their female spouses.

**Form of Payment Election Assumption (Adopted in 2020)**

Current inactive vested members are assumed to take a monthly annuity at retirement in lieu of a lump sum distribution (refund of contribution accumulation plus vested city contributions). 0% of retirements from active service and 30% of terminations from active service are assumed to take lump sums. 100% of members who opt for a monthly annuity are assumed to elect the normal form of payment.

**Post Retirement Cost of Living Adjustment Assumption (Adopted January 1, 2020 for Tier 1 Base Benefits; Adopted January 1, 2011 for all other benefits)**

Tier 1 Participants: 2.50% per annum for base benefits; 0.00% per annum for supplemental benefits

Tier 2 Participants: 0.00% per annum for base benefits; 0.00% per annum for supplemental benefits



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

### Development of Demographic Assumptions

An experience study was performed based on data over the five year period ending December 31, 2018, as documented in the Experience Study report dated February 17, 2020. The demographic assumptions are reviewed annually and refined as necessary based on demographic experience and expectations of future experience. Assumptions for which participant data are limited, such as retiree mortality, were also drawn from published actuarial tables. The assumptions used in this valuation are based on the Experience Study report noted above, and were approved by the Board of Trustees at their September 2019 meeting reviewing the 2019 Experience Study.

### Changes in Actuarial Assumptions and Methods as of January 1, 2020

The following assumption changes were made effective January 1, 2020, as documented in the 2019 Experience Study report dated February 17, 2020.

- The inflation assumption was reduced from 2.75% to 2.50%. This change also reduced the investment return assumption from 7.25% to 7.00%.
    - In addition, the real wage growth assumption changed from 0.50% to 0.75%, maintaining a total payroll growth assumption of 3.25% when combined with the inflation assumption change.
- The mortality assumption was updated to relevant tables from the Pub-2010 study released by the Society of Actuaries in January 2019.
- The assumptions for withdrawal and retirement from active employment, and the retirement for current and future vested inactive members were modified as disclosed in this and the 2019 Experience Study reports.
- The percentage of active members electing a refund of contributions upon termination of employment was modified as disclosed in this and the 2019 Experience Study reports.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Appendix C
# Member Data



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

| Valuation Date | January 1, 2019 | January 1, 2020 | Percentage Change |
|---|---|---|---|
| Active Participants | | | |
| Number | 1,754 | 1,816 | 3.5% |
| *Tier 1* | *758* | *673* | |
| *Tier 2* | *996* | *1,143* | |
| Average Anticipated Total Payroll (for year following valuation date) | $63,815 | $65,629 | |
| *Tier 1* | *$71,606* | *$74,923* | |
| *Tier 2* | *$57,885* | *$60,156* | |
| Average Age | 45.8 | 45.6 | |
| *Tier 1* | *52.9* | *53.2* | |
| *Tier 2* | *40.5* | *41.1* | |
| Average Credited Service | 9.1 | 8.5 | |
| *Tier 1* | *17.5* | *17.9* | |
| *Tier 2* | *2.7* | *2.9* | |
| Vested Terminated Participants | | | |
| Number | 231 | 240 | 3.9% |
| Average Final Average Compensation | $49,904 | $50,545 | |
| Average Age | 50.9 | 51.2 | |
| Retired Members and Beneficiaries | | | |
| Number | 1,078 | 1,134 | 5.2% |
| Average Monthly Benefit | $1,853 | $1,918 | |
| Average Age | 70.7 | 70.8 | |
| Deferred Disabled | | | |
| Number | 16 | 14 | -12.5% |
| Average Monthly Benefit | $2,018 | $1,845 | |
| Average Age | 54.7 | 54.9 | |
| Deferred Beneficiaries | | | |
| Number | 3 | 3 | 0.0% |
| Average Monthly Benefit | $436 | $516 | |
| Average Age | 38.0 | 39.0 | |
| Total Participants | 3,082 | 3,207 | 4.1% |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table C-1

## RECONCILIATION OF MEMBER DATA

| | Actives | Inactive Deferred Participants | Retiree and Beneficiaries | Disabled Retirees | Total |
|---|---|---|---|---|---|
| **Included in January 1, 2019 valuation:** | 1,754 | 250 | 1,049* | 29 | 3,082 |
| **Change due to:** | | | | | |
| **New entrants** | 327 | 0 | 0 | N/A | 327 |
| **Rehired** | 0 | 0 | 0 | 0 | 0 |
| **Termination** | | | | | |
| **Nonvested** | (147) | N/A | N/A | N/A | (147) |
| **Vested** | (25) | 25 | 0 | N/A | 0 |
| **Retirement** | (73) | (11) | 81 | 3 | 0 |
| **Disabled** | (2) | 2 | 0 | 0 | 0 |
| **Death with no Beneficiary** | (1) | (1) | (29) | (1) | (32) |
| **Death with a Beneficiary** | 0 | 0 | 0 | 0 | 0 |
| **Alternate Payee** | 0 | 0 | 2 | 0 | 2 |
| **Lump sum/Refund of Contributions** | (17) | (9) | 0 | 0 | (26) |
| **Other** | 0 | 1 | 0 | 0 | 1 |
| **Net change** | 62 | 7 | 54 | 2 | 125 |
| **Included in January 1, 2020 valuation:** | 1,816 | 257 | 1,103* | 31 | 3,207 |

* There are eight total participants as of January 1, 2020 who are both a retiree and a beneficiary.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table C-2

## SUMMARY OF ACTIVE MEMBERS

Number of Members by Age and Service Groups

| | Years of Service | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Age | <1 | 1-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40&Up | Total |
| 0-24 | 26 | 25 | - | - | - | - | - | - | - | - | 51 |
| 25-29 | 82 | 95 | 20 | - | - | - | - | - | - | - | 197 |
| 30-34 | 53 | 98 | 43 | 15 | 2 | - | - | - | - | - | 211 |
| 35-39 | 37 | 87 | 56 | 26 | 12 | - | - | - | - | - | 218 |
| 40-44 | 26 | 69 | 36 | 26 | 27 | 4 | - | - | - | - | 188 |
| 45-49 | 38 | 60 | 42 | 36 | 28 | 17 | 5 | - | - | - | 226 |
| 50-54 | 25 | 52 | 33 | 47 | 33 | 17 | 8 | 4 | 1 | - | 220 |
| 55-59 | 16 | 44 | 42 | 40 | 31 | 30 | 15 | 9 | 12 | - | 239 |
| 60-64 | 16 | 31 | 22 | 38 | 34 | 15 | 16 | 11 | 12 | 3 | 198 |
| 65-69 | 4 | 12 | 7 | 9 | 10 | 6 | 3 | 1 | 1 | - | 53 |
| 70&Up | 2 | 1 | 1 | 5 | 2 | - | 1 | 1 | 2 | - | 15 |
| Total | 325 | 574 | 302 | 242 | 179 | 89 | 48 | 26 | 28 | 3 | 1,816 |

Average Anticipated Total Payroll by Age and Service Groups

| | Years of Service | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | <1 | 1-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40&Up | Average |
| 0-24 | 38,861 | 47,580 | - | - | - | - | - | - | - | - | 43,135 |
| 25-29 | 48,452 | 55,976 | 54,334 | - | - | - | - | - | - | - | 52,677 |
| 30-34 | 50,439 | 61,289 | 59,361 | 60,083 | 77,988 | - | - | - | - | - | 58,243 |
| 35-39 | 58,560 | 60,368 | 69,330 | 71,657 | 65,439 | - | - | - | - | - | 63,989 |
| 40-44 | 60,502 | 67,675 | 73,185 | 80,405 | 71,130 | 71,828 | - | - | - | - | 70,083 |
| 45-49 | 65,302 | 66,942 | 64,742 | 79,393 | 74,011 | 69,914 | 70,374 | - | - | - | 69,416 |
| 50-54 | 57,581 | 69,345 | 65,696 | 76,747 | 74,791 | 78,919 | 66,705 | 82,850 | 63,809 | - | 70,723 |
| 55-59 | 56,754 | 67,435 | 65,835 | 79,855 | 70,539 | 76,876 | 82,002 | 79,386 | 88,948 | - | 72,549 |
| 60-64 | 52,636 | 74,600 | 62,413 | 74,386 | 76,105 | 75,126 | 72,501 | 73,564 | 84,995 | 91,299 | 72,384 |
| 65-69 | 36,119 | 43,668 | 67,771 | 77,671 | 64,931 | 70,267 | 94,003 | 98,323 | 79,132 | - | 63,628 |
| 70&Up | 82,090 | 25,446 | 21,431 | 58,432 | 42,234 | - | 35,539 | 51,360 | 112,484 | - | 59,970 |
| Average | 53,466 | 62,521 | 65,157 | 75,753 | 72,124 | 74,969 | 74,856 | 77,106 | 87,686 | 91,299 | 65,629 |

## HISTORICAL SUMMARY

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Number | 1,650 | 1,733 | 1,755 | 1,754 | 1,816 |
| Anticipated Total Payroll | $95,867,365 | $102,780,086 | $107,376,973 | $111,930,915 | $119,182,291 |
| Average Total Payroll | $58,101 | $59,308 | $61,183 | $63,815 | $65,629 |
| Average Age | 47.1 | 46.4 | 46.3 | 45.8 | 45.6 |
| Average Service | 10.4 | 9.6 | 9.5 | 9.1 | 8.5 |



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table C-3

## SUMMARY OF INACTIVE VESTED MEMBERS*

Number of Members by Age and Service Groups

| | | | | | Years of Service | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Age** | **<5** | **5-9** | **10-14** | **15-19** | **20-24** | **25-29** | **30-34** | **35-39** | **40&Up** | **Total** |
| **0-29** | - | 1 | - | - | - | - | - | - | - | 1 |
| **30-34** | - | 6 | - | - | - | - | - | - | - | 6 |
| **35-39** | - | 19 | 8 | - | - | - | - | 1 | - | 28 |
| **40-44** | - | 19 | 12 | 3 | - | - | - | - | 1 | 35 |
| **45-49** | - | 32 | 8 | 4 | 2 | 1 | - | - | - | 47 |
| **50-54** | - | 26 | 7 | 5 | 1 | 1 | - | 1 | 1 | 42 |
| **55-59** | - | 28 | 3 | 4 | - | 2 | - | - | 1 | 38 |
| **60-64** | - | 41 | 1 | 1 | 3 | - | - | - | - | 46 |
| **65&Up** | 1 | 7 | 3 | - | - | - | - | - | - | 11 |
| **Total** | 1 | 179 | 42 | 17 | 6 | 4 | - | 2 | 3 | 254 |

Average Final Average Compensation by Age and Service Groups

| | | | | | Years of Service | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Age** | **<5** | **5-9** | **10-14** | **15-19** | **20-24** | **25-29** | **30-34** | **35-39** | **40&Up** | **Average** |
| **0-29** | - | 50,903 | - | - | - | - | - | - | - | 50,903 |
| **30-34** | - | 51,087 | - | - | - | - | - | - | - | 51,087 |
| **35-39** | - | 49,009 | 53,764 | - | - | - | - | 28,909 | - | 49,649 |
| **40-44** | - | 56,347 | 56,873 | 52,288 | - | - | - | - | 39,068 | 55,686 |
| **45-49** | - | 54,243 | 72,614 | 52,238 | 58,784 | 65,010 | - | - | - | 57,621 |
| **50-54** | - | 51,010 | 58,132 | 48,762 | 37,921 | 56,408 | - | 22,596 | 50,151 | 51,050 |
| **55-59** | - | 44,936 | 52,211 | 47,134 | - | 36,817 | - | - | 48,159 | 45,400 |
| **60-64** | - | 45,410 | 47,182 | 51,348 | 33,282 | - | - | - | - | 44,787 |
| **65&Up** | 44,507 | 37,749 | 38,731 | - | - | - | - | - | - | 38,631 |
| **Average** | 44,507 | 49,193 | 57,629 | 49,971 | 42,556 | 48,763 | - | 25,752 | 45,793 | 50,233 |

### HISTORICAL SUMMARY

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| **Deferred Vested** | | | | | |
| Number | 220 | 215 | 228 | 231 | 240 |
| Average Final Average Compensation | | $46,648 | $48,405 | $49,904 | $50,545 |
| Average Service | | 8.8 | 8.7 | 8.6 | 8.6 |
| Average Age | 50.6 | 50.2 | 50.4 | 50.9 | 51.2 |
| **Deferred Disabled** | | | | | |
| Number | 22 | 20 | 21 | 16 | 14 |
| Average Final Average Compensation | | $43,428 | $42,974 | $42,070 | $44,887 |
| Average Service | | 25.6 | 26.8 | 29.8 | 27.4 |
| Average Age | 58.4 | 56.5 | 55.9 | 54.7 | 54.9 |

* Does not include 3 deferred beneficiaries.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table C-4

## SUMMARY OF RETIREES AND BENEFICIARIES

Members in Pay Status

| Age | Number of Members | Monthly Benefit Amount |
|---|---|---|
| < 55 | 11 | $15,813 |
| 55 - 59 | 86 | 156,499 |
| 60 - 64 | 173 | 386,026 |
| 65 - 69 | 307 | 658,043 |
| 70 - 74 | 254 | 460,475 |
| 75 - 79 | 137 | 249,604 |
| 80 - 84 | 83 | 134,282 |
| 85 - 89 | 60 | 86,533 |
| 90 & Up | 23 | 27,943 |
| Total | 1,134* | $2,175,218 |

**HISTORICAL SUMMARY**

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Number | 858 | 945 | 996 | 1,078 | 1,134 |
| Total Monthly Benefit | $1,477,830 | $1,629,446 | $1,778,459 | $1,997,450 | $2,175,218 |
| Average Monthly Benefit | $1,722 | $1,724 | $1,786 | $1,853 | $1,918 |
| Average Age | 70.4 | 70.4 | 70.7 | 70.7 | 70.8 |

* There are eight total participants as of January 1, 2020 who are both a retiree and a beneficiary.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Table C-5

### SCHEDULE OF RETIREES AND BENEFICIARIES ADDED TO AND REMOVED FROM ROLLS

| Plan Year Ending | Number Added to Rolls | Allowances Added to Rolls* | Number Removed from Rolls | Annual Allowances Removed from Rolls | Number of Annual Allowances | Annual Allowances | % Increase in Annual Allowances | Average Annual Allowances |
|---|---|---|---|---|---|---|---|---|
| 12/31/1998 | 24 | 336,386 | 10 | 92,939 | 334 | 3,142,316 | 8.4 | 9,408 |
| 12/31/1999 | 26 | 494,602 | 12 | 86,138 | 348 | 3,550,780 | 13.0 | 10,204 |
| 12/31/2000 | 29 | 424,053 | 7 | 40,491 | 370 | 4,059,627 | 14.3 | 10,972 |
| 12/31/2001 | 34 | 522,592 | 19 | 141,937 | 385 | 4,440,282 | 9.4 | 11,533 |
| 12/31/2002 | 29 | 519,243 | 17 | 141,245 | 397 | 4,818,280 | 8.5 | 12,137 |
| 12/31/2003 | 16 | 439,456 | 17 | 114,998 | 396 | 5,142,738 | 6.7 | 12,987 |
| 12/31/2004 | 42 | 432,739 | 17 | 155,755 | 421 | 5,731,232 | 11.4 | 13,613 |
| 12/31/2005 | 53 | 1,360,120 | 12 | 148,221 | 462 | 6,943,131 | 21.1 | 15,028 |
| 12/31/2006 | 44 | 983,775 | 9 | 91,156 | 497 | 7,835,750 | 12.9 | 15,766 |
| 12/31/2007 | 36 | 797,303 | 19 | 196,227 | 514 | 8,436,826 | 7.7 | 16,414 |
| 12/31/2008 | 54 | 1,429,071 | 16 | 271,603 | 552 | 9,594,295 | 13.7 | 17,381 |
| 12/31/2009 | 41 | 604,010 | 19 | 213,688 | 574 | 9,984,617 | 4.1 | 17,395 |
| 12/31/2010 | 59 | 1,188,630 | 19 | 231,051 | 614 | 10,942,196 | 9.6 | 17,821 |
| 12/31/2011 | 67 | 1,844,967 | 19 | 255,630 | 662 | 12,531,532 | 14.5 | 18,930 |
| 12/31/2012 | 66 | 1,573,353 | 13 | 144,397 | 715 | 13,960,488 | 11.4 | 19,525 |
| 12/31/2013 | 55 | 1,246,991 | 13 | 180,841 | 757 | 15,026,638 | 7.6 | 19,850 |
| 12/31/2014 | 75 | 1,893,779 | 18 | 243,569 | 814 | 16,676,848 | 11.0 | 20,488 |
| 12/31/2015 | 65 | 1,496,283 | 21 | 439,176 | 858 | 17,733,955 | 6.3 | 20,669 |
| 12/31/2016 | 99 | 1,961,129 | 12 | 141,738 | 945** | 19,553,346 | 10.3 | 20,691 |
| 12/31/2017 | 64 | 1,981,956 | 13 | 193,799 | 996** | 21,341,503 | 9.1 | 21,427 |
| 12/31/2018 | 99 | 2,869,920 | 17 | 242,026 | 1,078** | 23,969,397 | 12.3 | 22,235 |
| 12/31/2019 | 86 | 2,632,899 | 30 | 499,676 | 1,134** | 26,102,620 | 8.9 | 23,018 |

* Includes Cost of Living adjustments

** There are eight total participants as of January 1, 2017, January 1, 2018, January 1, 2019, and January 1, 2020 who are both a retiree and a beneficiary.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

# Appendix D
# Risk Assessment and Disclosure


This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

The purpose of this appendix is to identify, assess, and provide illustrations of risks that are significant to the Plan. Historical data is included.

The results of the actuarial valuation are based on one set of reasonable assumptions. However, it is almost certain that future experience will not exactly match the assumptions. As an example, investments may perform better or worse than assumed in any single year and over any longer time horizon. It is therefore important to consider the potential impacts of these potential differences when making decisions that may affect the future financial health of the Plan, or of the Plan's participants.

In addition, as plans mature they accumulate larger pools of assets and liabilities. This increases the potential risk to plan funding and the finances of those who are responsible for plan funding. As an example, it is more difficult for a plan sponsor to deal with the effects of a 10% investment loss on a plan with $1 Billion in assets and liabilities than if the same plan sponsor is responsible for a 10% investment loss on a plan with $1 Million in assets and liabilities. Since pension plans make long-term promises and rely on long-term funding, it is important to consider how mature the plan is today, and how mature it may become in the future.

Actuarial Standard of Practice No. 51 (ASOP 51) addresses these issues by providing actuaries with guidance for assessing and disclosing the risk associated with measuring pension liabilities and the determination of pension plan contributions. Specifically, it directs the actuary to:

- Identify risks that may be significant to the plan.
- Assess the risks identified as significant to the plan. The assessment does not need to include numerical calculations.
- Disclose plan maturity measures and historical information that are significant to understanding the plan's risks.

ASOP 51 states that if in the actuary's professional judgment, a more detailed assessment would be significantly beneficial in helping the individuals responsible for the plan to understand the risks identified by the actuary, then the actuary should recommend that such an assessment be performed.

This appendix uses the framework of ASOP 51 to communicate important information about significant risks to the Plan, the Plan's maturity, and relevant historical Plan data.

A summary of maturity statistics and historical information is below.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

| | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| **Assets and Payroll** | | | | |
| Market Value of Assets (MVA) | $425,231,226 | $475,556,466 | $450,368,075 | $524,036,473 |
| Covered Payroll | $102,780,086 | $107,376,973 | $111,930,915 | $119,182,291 |
| Ratio, MVA to Covered Payroll | 4.1 | 4.4 | 4.0 | 4.4 |
| **Actuarial Liability** | | | | |
| For Retirees and Beneficiaries | $242,317,843 | $262,374,215 | $291,980,950 | $330,411,123 |
| For Deferred Vested Participants | 19,059,168 | 20,335,947 | 20,170,870 | 21,247,898 |
| For Active Participants | 194,382,895 | 197,259,394 | 196,765,437 | 215,347,085 |
| Total | $455,759,906 | $479,969,556 | $508,917,257 | $567,006,106 |
| In Pay Liability as a % of Total | 53.2% | 54.7% | 57.4% | 58.3% |
| **Duration (years)** | | | 13.9 | 15.1 |
| **Cash Flow Measures** | | | | |
| Prior Year MVA | $402,516,572 | $425,231,226 | $475,556,466 | $450,368,075 |
| Benefit Payments | 21,163,587 | 22,154,949 | 24,228,316 | 28,079,798 |
| Contributions (City + Member) | 13,413,072 | 14,648,024 | 15,270,419 | 16,377,838 |
| Benefit Payments as a % of Contributions | 157.8% | 151.2% | 158.7% | 171.4% |
| Benefit Payments as a % of Prior MVA | 5.3% | 5.2% | 5.1% | 6.2% |
| Net Cash Flow as a % of Prior MVA | -1.9% | -1.8% | -1.9% | -2.6% |

**Liquidity Risk**

- **Identification:** This is the potential that assets must be liquidated at a loss earlier than planned in order to pay for the plan's benefits and operating costs. This risk is heightened for plans with negative cash flow, in which contributions do not exceed annual benefit payments plus expenses.

- **Assessment:** This Plan has high cash flow requirements because benefit payments are approximately 171% of Plan contributions. As a result, there is liquidity risk that assets may need to be liquidated at a loss before planned in order to pay benefits.

**Maturity Risk**

- **Identification:** This is the potential for total plan liabilities to become more heavily weighted toward inactive liabilities over time.

- **Assessment:** The Plan is subject to maturity risk because as Plan assets and liabilities continue to grow, the impact of any gains or losses on the assets or liabilities also becomes larger. Currently assets are equal to 4.4 times payroll indicating a one-year loss of 10% would be equal to 44% of payroll. Last year's net cash flow was equal to -2.6% of the beginning of year assets, which means asset needed to return 2.6% last year to remain level.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

**Retirement Risk**

- **Identification:** This is the potential for participants to retire and receive subsidized benefits more valuable than expected.
- **Assessment:** The plan has valuable early retirement subsidies, including unreduced benefits for Rule of 80 retirements. In addition, retiring participants have the option to take an annuity or receive a refund of contributions plus the City match. When participants retire earlier than expected or elect a form of payment more valuable than the valuation form of payment assumption, the plan occurs a loss.

**Contribution Risk**

- **Identification:** This is the potential for the City to fail to fund less than the actuarially determined contribution for one or more years. Beginning in 2017, employees contribute 7.00% of pay. Per the current City Code, this contribution may increase or decrease depending on the funding ratio, but in no case would increase above 7.00% or decrease below 5.50%. Per the City Code, rate changes are based on a decision flowchart. The City's current funding policy is to contribute the same rate of pay as employees. The current employee plus City contribution rate is 14.00% of pay and is not able to be increased under current City Code, since 7.00% is the maximum allowable employee contribution rate.
- **Assessment:** The Plan is subject to the contribution risk that the actuarially determined contribution will not be met if it ever exceeds 14.00% (total City plus Employee contribution). If contributions are deferred to the future, investment income is lost in the intervening period and the Plan becomes more expensive. The City has made contributions at or in excess to the actuarially determined contribution for the last five years.

**Investment Risk**

- **Identification:** The potential that investment returns will be different than expected.
- **Assessment:** To the extent that actual investment returns differ from the assumed investment return, the plan's future assets, funding contributions and funded status may differ significantly from those presented in this valuation. In addition, as discussed under the liquidity and maturity risk assessments above, this risk will be exacerbated as the Plan matures and possibly needs to liquidate assets in a down market to pay benefits to participants, losing the recovery on those assets when the market goes back up.
- **Additional Assessment:** This is one of the most substantial risks the plan faces. You may wish to explore asset/liability modeling or other plan forecasts to see what impact investment volatility has on the Plan's funded status.

**Interest Rate Risk**

- **Identification:** The potential that interest rates will be different than expected.
- **Assessment:** The pension liabilities reported herein have been calculated by computing the present value of expected future benefit payments using the interest rate described in Appendix B. If interest rates in future valuations are different from that used in this valuation, future pension liabilities,



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

funding contributions and funded status may differ significantly from those presented in this valuation. As a general rule, using a higher interest rate to compute the present value of future benefit payments will result in a lower pension liability, and vice versa. One aspect that can be used to estimate the impact of different interest rates is the plan's duration.

If the interest rate changes by 1%, the estimated percentage change in pension liability is the Plan's duration in years. The approximate duration of this Plan is 15.1 years. As such, if the interest rate changes by 1%, the estimated change in pension liability is 15.1%.

**Demographic Risk**

- **Identification:** The potential that mortality or other demographic experience will be different than expected.
- **Assessment:** The pension liabilities reported herein have been calculated by assuming that participants will follow patterns of demographic experience (e.g. mortality, withdrawal, disability, retirement, form of payment election, etc.) as described in Appendix B. If actual demographic experience or future demographic assumptions are different from what is assumed to occur in this valuation, future pension liabilities, funding contributions and funded status may differ significantly from those presented in this valuation.



This work product was prepared solely for the City of Aurora for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.