



City of Aurora General Employees' Retirement Plan January 1, 2018 Actuarial Valuation

Prepared by:

Joel E. Stewart, FSA, EA, MAAA

Consulting Actuary

Katie Antoline, FSA, EA, MAAA

Consulting Actuary

Milliman, Inc.
1400 Wewatta Street, Suite 300
Denver, CO 80202-5549
Tel +1 303 299 9400
Fax +1 303 299 9018
milliman.com



1400 Wewatta Street
Suite 300
Denver, CO 80202-5549
USA

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

milliman.com

June 1, 2018

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 actuarial valuation of the City of Aurora General Employees' Retirement Plan as of January 1, 2018, for the plan year ending December 31, 2018. Our findings are set forth in this report. This report reflects the benefit provision and contribution rates in effect as of January 1, 2018.

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.

Actuarial assumptions (including discount rates, mortality tables, and others identified in this report) and actuarial cost methods are prescribed by the Board of Trustees. The Board is responsible for selecting the Plan's funding policy (as outlined in City Code), actuarial valuation methods, asset valuation methods, and assumptions. The policies methods and assumptions used in this valuation are those that have been so prescribed and are described in the Actuarial Basis of this report. The Board of Trustees is solely responsible for communicating to Milliman any changes required thereto.

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 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, 2018 and the Employer Reporting Period ending December 31, 2019. 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.

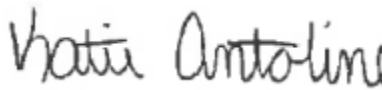
On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet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

We respectfully submit the following report, and we look forward to discussing it with you.

Sincerely,



Joel E. Stewart, FSA, EA, MAAA
Consulting Actuary
JES:kea



Katie Antoline, FSA, EA, MAAA
Consulting Actuary

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EXECUTIVE SUMMARY

Overview

	Actuarial Valuation For Plan Year Beginning	
	January 1, 2017	January 1, 2018
Assets		
Market Value of Plan Assets	\$ 425,231,226	\$ 475,556,466
Actuarial Value of Plan Assets	\$ 435,153,161	\$ 457,124,471
Ratio of Actuarial Value to Market Value	102.3%	96.1%
Return on Market Value of Plan Assets	7.6%	13.9%
Liabilities		
Actuarial Present Value of Future Benefits	\$ 537,535,348	\$ 564,322,916
Actuarial Liability	\$ 455,759,906	\$ 479,969,556
Assumed Average Annual Long-Term Future Investment Return (Discount Rate)	7.25%	7.25%
Unfunded Actuarial Liability (UAL) Relative to:		
Market Value of Plan Assets	\$ 30,528,680	\$ 4,413,090
Actuarial Value of Plan Assets	\$ 20,606,745	\$ 22,845,085
Funded Ratio Relative to:		
Market Value of Plan Assets	93.3%	99.1%
Actuarial Value of Plan Assets	95.5%	95.2%
Contribution Rates		
Total Normal Cost Rate	11.38%	11.20%
Employee Contribution Rate	<u>7.00%</u>	<u>7.00%</u>
Normal Cost Rate (Employer Portion)	4.38%	4.20%
UAL Rate	<u>1.74%</u>	<u>1.81%</u>
Employer-Paid Actuarially Determined Contribution Rate	6.12%	6.01%
Employer Contribution Rate	7.00%	7.00%
Participant Data		
Active Participants	1,733	1,755
Retired Participants and Beneficiaries	945	996
Vested Terminated Participants	241	255
Total Participants	2,919	3,006

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.

Purpose of this Report

This report has been prepared for the City of Aurora General Employees' Retirement Plan as of January 1, 2018 to:

1. Review the experience for the plan year ending December 31, 2017. "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-paid Actuarially Determined Contribution (ADC) for the plan year ending December 31, 2018 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, 2018. Since the last valuation, the plan was amended in Ordinance No. 2017-41 to update the actuarial equivalence definition. This change reduced the calculated Actuarial Liability by less than \$0.1 million. 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, 2018 actuarial valuation at their April 19, 2018 meeting.

Since the last valuation, the administrative expense assumption was updated from \$570,000 to \$585,000 to better anticipate expected future experience. This assumption has no impact on the Actuarial Liability, but does increase the calculated ADC by approximately \$15,000.

Plan Experience

Actuarial gains or losses arise when actual experience differs from actuarial assumptions used in the valuation. During the year ending December 31, 2017, the Plan experienced an overall actuarial loss of approximately \$3.6 million. The actuarial loss can be broken down as follows.

<u>Source of (Gain) or Loss</u>	<u>Amount in Millions</u>
Investment experience	\$ 1.2
Demographic experience	<u>2.4</u>
Total (gain)/loss	\$ 3.6

The investment experience was primarily due to the deferral of two-thirds of the 2017 market value investment gain of \$27.9 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 2017 earned 13.9%, which is slightly less than two times the prior valuation's return assumption of 7.25%, the smoothing of gains

and losses over three years in the actuarial value of assets resulted in a loss of \$1.2 million for the 2017 plan year on an actuarial value of assets basis.

The demographic experience was primarily due to retirements different than assumed, both in number and form of payment, new plan entrants, and salary increases greater than assumed during 2017. This resulted in a loss of approximately \$2.4 million. Table 6 contains additional detail on the changes in the unfunded actuarial liability from January 1, 2017 to January 1, 2018.

Funding Analysis

Table 8 provides the detail on the calculation of the employer-paid Actuarially Determined Contribution (ADC) to the Plan based on the January 1, 2018 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 97% of the interest on the UAL for 2018. 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 grows at 3.25% annually, market value asset returns of 7.25% 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. That improvement is due to contributions in excess 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.

VALUATION RESULTS

TABLE 1
STATEMENT OF PLAN NET ASSETS

	<u>December 31, 2016</u>	<u>December 31, 2017</u>
Cash and Cash Equivalents	\$ 126,417	\$ 172,107
Receivables		
Contributions	\$ 277,733	\$ 289,905
Interest and dividends	957,447	974,340
Investments sold	49,292	54,799
Other	<u>5,190</u>	<u>1,863</u>
Total receivables	\$ 1,289,662	\$ 1,320,907
Prepaid Expenses	\$ 29,056	\$ 29,885
Investments		
Short-term cash	\$ 6,882,214	\$ 10,495,569
Equities (including alternative investments)	277,015,771	316,549,518
Fixed income	97,214,314	102,368,353
Real estate funds	<u>43,281,914</u>	<u>45,585,571</u>
Total Investments	\$ 424,394,213	\$ 474,999,011
Liabilities		
Accounts payable	\$ 240,260	\$ 265,058
Securities purchased	277,159	592,355
Benefits payable	<u>90,703</u>	<u>108,031</u>
Total Liabilities	\$ 608,122	\$ 965,444
Plan Net Assets	\$ 425,231,226	\$ 475,556,466

TABLE 2
STATEMENT OF CHANGES IN PLAN NET ASSETS

	<u>2016</u>	<u>2017</u>
Net market value at beginning of year	\$ 402,516,572	\$ 425,231,226
Additions:		
Plan member contributions	\$ 6,709,396	\$ 7,326,872
City of Aurora contributions	6,703,676	7,321,152
Interest and dividends	8,758,056	7,942,591
Net realized and unrealized gains/(losses)	24,281,596	52,764,310
Other	<u>13,392</u>	<u>20,306</u>
Total	\$ 46,466,116	\$ 75,375,231
Deductions:		
Benefit payments	\$ 19,272,014	\$ 20,590,654
Contribution refunds	1,891,573	1,564,295
Administrative and miscellaneous expenses	558,960	574,823
Investment expenses	<u>2,028,915</u>	<u>2,320,219</u>
Total	\$ 23,751,462	\$ 25,049,991
Net change:	\$ 22,714,654	\$ 50,325,240
Net market value at end of year	\$ 425,231,226	\$ 475,556,466

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, 2018 is determined below.

ASSET RECONCILIATION

<u>Year</u>	(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)
2017	\$425,231,226	\$14,648,024	\$(22,154,949)	(574,823)	\$(8,081,748)	\$58,406,988	\$475,556,466
2016	402,516,572	13,413,072	(21,163,587)	N/A*	(7,750,515)	30,465,169	425,231,226
2015	407,945,659	12,272,924	(20,123,726)	N/A*	(7,850,802)	2,421,715	402,516,572

* The Plan paid administrative expenses out of plan assets; however, the Plan's investment return assumption was net of all expenses for 2016 and prior.

GAIN/(LOSS) CALCULATION

<u>Year</u>	<u>Actual Investment Rate of Return</u>	<u>Actual Investment Return</u>	<u>Expected Investment Return</u>	<u>Difference between Actual and Expected</u>
2017	13.9%	\$58,406,988	\$30,541,426	\$ 27,865,562
2016	7.6	30,465,169	30,900,306	(435,137)
2015	0.6	2,421,715	31,317,246	(28,895,531)

Note, the Plan's investment return assumption was net of all expenses for 2016 and prior.

ASSET GAIN/(LOSS) DEFERRED FOR SYSTEMATIC RECOGNITION IN SUBSEQUENT YEARS

66⅔% of 2017 Gain/(Loss)	\$ 18,577,041
33⅓% of 2016 Gain/(Loss)	<u>(145,046)</u>
	\$ 18,431,995

ACTUARIAL VALUE OF ASSETS

1. Market value as of January 1, 2018	\$ 475,556,466
2. Prior gains/(losses) deferred	<u>18,431,995</u>
3. Preliminary Actuarial Value of Assets (1. - 2.)	\$ 457,124,471
4. Preliminary Actuarial Value of Assets as a Percentage of Market Value (3. ÷ 1.)	96.1%
5. Actuarial Value of Assets as of January 1, 2018 (3., limited to 80% - 120% of Market Value))	\$ 457,124,471

TABLE 4
ACTUARIAL BALANCE SHEET
AS OF JANUARY 1, 2018

Requirements

Present Value of Projected Benefits	Tier 1	Tier 2	Total
Retired Members			
Healthy Retirees	\$ 247,131,045	\$ 164,816	\$ 247,295,861
Disabled Retirees	3,284,532	0	3,284,532
Beneficiaries	<u>11,793,822</u>	<u>0</u>	<u>11,793,822</u>
Total	\$ 262,209,399	\$ 164,816	\$ 262,374,215
Vested Inactive Members			
Terminated Vested	\$ 17,260,871	\$ 80,925	\$ 17,341,796
Deferred Disabled	<u>2,858,771</u>	<u>135,380</u>	<u>2,994,151</u>
Total	\$ 20,119,642	\$ 216,305	\$ 20,335,947
Active Members			
Retirement	\$ 203,425,562	\$ 37,408,260	\$ 240,833,822
Withdrawal	12,660,747	13,844,476	26,505,223
Death	4,817,330	1,600,174	6,417,504
Disability	<u>5,562,198</u>	<u>2,294,007</u>	<u>7,856,205</u>
Total	226,465,837	55,146,917	281,612,754
Total Present Value of Projected Benefits	\$ 508,794,878	\$ 55,528,038	\$ 564,322,916

Resources

Actuarial Value of Assets	\$ 457,124,471
Present Value of Future Normal Costs	84,353,360
Unfunded Actuarial Liability	<u>22,845,085</u>
Total	\$ 564,322,916

TABLE 5
UNFUNDED ACTUARIAL LIABILITY (UAL)
AS OF JANUARY 1, 2018

Actuarial Liability	<u>Tier 1</u>	<u>Tier 2</u>	<u>Total</u>
Retired Members	\$ 262,209,399	\$ 164,816	\$ 262,374,215
Vested Inactive Members	20,119,642	216,305	20,335,947
Active Members	<u>182,772,757</u>	<u>14,486,637</u>	<u>197,259,394</u>
Total	\$ 465,101,798	\$ 14,867,758	\$ 479,969,556
Actuarial Value of Assets			\$ 457,124,471
Unfunded Actuarial Liability			\$ 22,845,085

TABLE 6
ANALYSIS OF EXPERIENCE (GAINS) AND LOSSES
PLAN YEAR

Expected Unfunded Actuarial Liability

Unfunded Actuarial Liability as of January 1, 2017	\$ 20,606,745
Normal Cost, including administrative expenses	11,592,517
Employee and Employer Contributions	(14,648,024)
Interest at 7.25%	<u>1,791,722</u>
Expected Unfunded Actuarial Liability as of January 1, 2018	\$ 19,342,960

Changes

Experience (Gain)/Loss		
Investment ¹ (Gain)/Loss on an Actuarial Value of Assets Basis	1,207,709	
Salary (Gain)/Loss	462,277	
New Entrant Participants Loss	541,940	
Retirement (Gain)/Loss	1,308,160	
Pensioner Mortality (Gain)/Loss	420,174	
Cost of Living Adjustment (Below)/Above Assumed	(1,076,569)	
All Other Demographic Experience	<u>722,142</u>	
Total Experience (Gain)/Loss		3,585,833
Assumption Changes		0
Plan Changes		<u>(83,708)</u>
Unfunded Actuarial Liability on January 1, 2018		\$ 22,845,085

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.

TABLE 7
NORMAL COST
AS OF JANUARY 1, 2018

Entry Age Normal Cost	<u>Tier 1</u>	<u>Tier 2</u>	<u>Total</u>
Retirement	\$ 4,248,232	\$ 3,144,927	\$ 7,393,159
Vested Withdrawal	1,851,934	1,349,967	3,201,901
Death	150,869	132,148	283,017
Disability	<u>234,238</u>	<u>209,492</u>	<u>443,730</u>
Total Normal Cost for Benefits	\$ 6,485,273	\$ 4,836,534	\$ 11,321,807
Assumed Administrative Expenses			<u>585,000</u>
Total Normal Cost			\$ 11,906,807
As a Percentage of Valuation Salary*			11.20%

* Payroll for employees less than the assumed full retirement age (age 70 for Tier 1 and age 75 for Tier 2) as of the valuation date.

TABLE 8

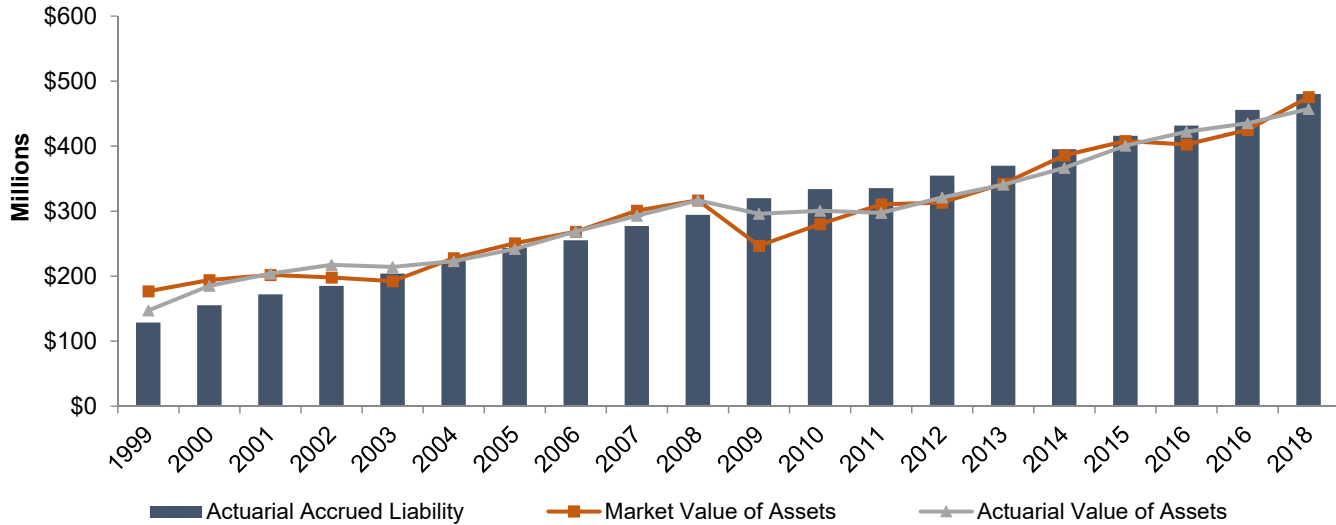
DEVELOPMENT OF EMPLOYER-PAID ACTUARIALLY DETERMINED CONTRIBUTION

	<u>January 1, 2017</u>	<u>January 1, 2018</u>
1. Present Value of Projected Benefits		
a. Retirees and beneficiaries	\$ 242,317,843	\$ 262,374,215
b. Deferred vested members	19,059,168	20,335,947
c. Active members	<u>276,158,337</u>	<u>281,612,754</u>
d. Total [(a) + (b) + (c)]	\$ 537,535,348	\$ 564,322,916
2. Present Value of Future Normal Costs	<u>81,775,442</u>	<u>84,353,360</u>
3. Entry Age Normal Accrued Liability [(1) – (2)]	\$ 455,759,906	\$ 479,969,556
4. Actuarial Value of Assets	<u>435,153,161</u>	<u>457,124,471</u>
5. Unfunded Actuarial Liability (UAL): [(3) – (4)]	\$ 20,606,745	\$ 22,845,085
6. Amortization Period for UAL	20 years	20 years
7. Entry Age Normal Cost	\$ 11,592,517	\$ 11,906,807
8. Amortization of UAL	1,443,501	1,600,297
9. Interest to the middle of the year	<u>443,987</u>	<u>460,231</u>
10. Total Cost: [(7)+(8)+(9)]	\$ 13,480,005	\$ 13,967,335
11. Anticipated Employee Contributions	<u>(7,194,606)</u>	<u>(7,516,388)</u>
12. Employer-Paid Actuarially Determined Contribution: [(10)+(11)]	\$ 6,285,399	\$ 6,450,947
13. Anticipated Total Payroll	\$ 102,780,086	\$ 107,376,973
14. Employer-Paid Actuarially Determined Contribution as a Percent of Anticipated Total Payroll	6.12%	6.01%

HISTORICAL INFORMATION AND PROJECTIONS

TABLE 9
HISTORICAL FUNDING PROGRESS
PLAN ASSETS VS. ACTUARIAL ACCRUED LIABILITY

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

TABLE 10
ANALYSIS OF EXPERIENCE (GAINS) AND LOSSES
HISTORICAL

Plan Year Ending	Actuarial (Gains)/Losses			Changes in Plan Provisions	Changes in Assumption/Methods	Total (Gain)/Loss
	Asset Sources	Liability Sources	Total			
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

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.

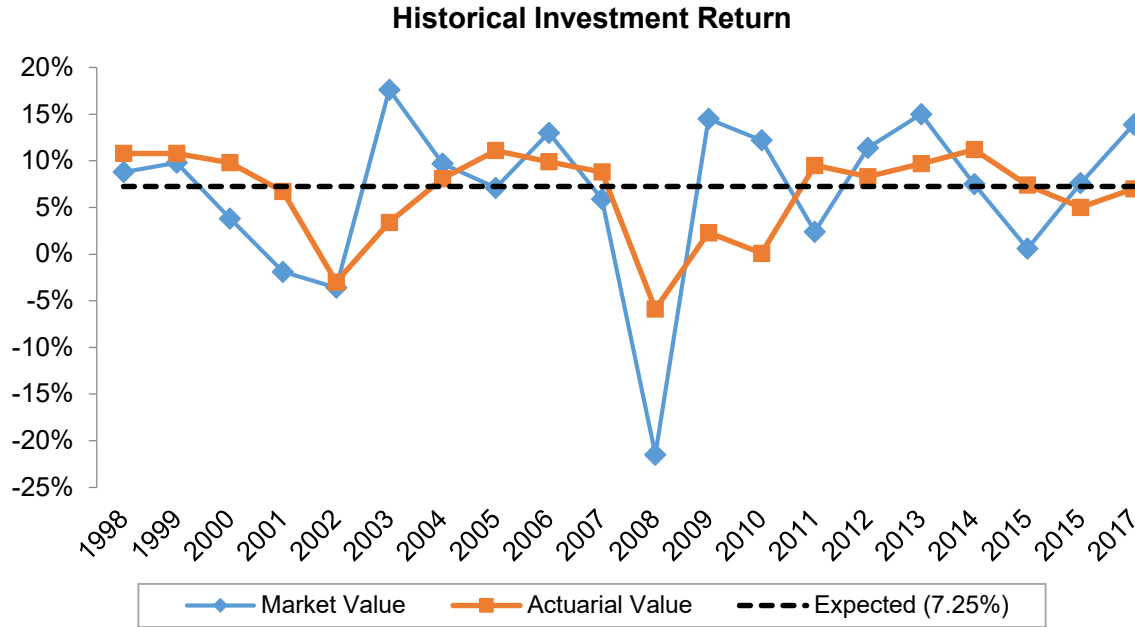
TABLE 11
SOLVENCY TEST

Valuation Date	Actuarial Accrued Liabilities for:			Valuation Assets	Portion of Accrued Liabilities Covered by Valuation Assets		
	(1) Active Member Contributions	(2) Inactive Members	(3) Active Members		(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%

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

TABLE 12

HISTORICAL INVESTMENT RETURN



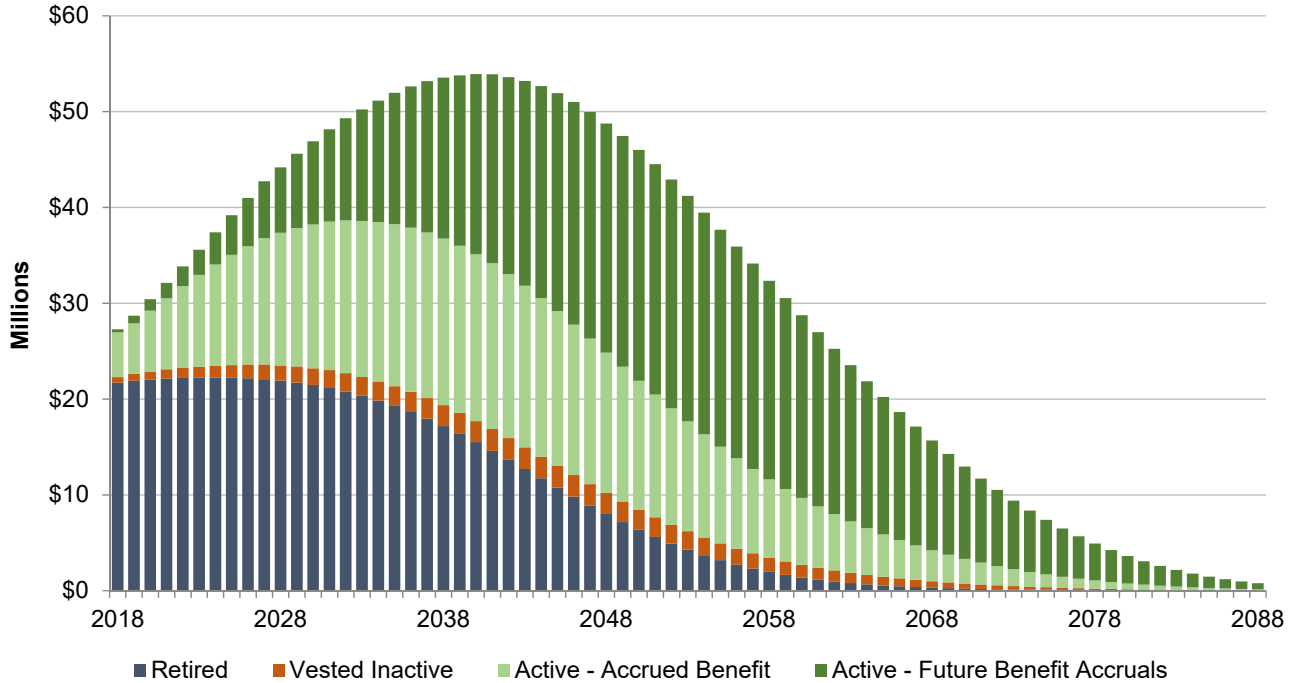
Annual Rate of Investment Return*

For One-Year Period			For Period Ending December 31, 2017		
Plan Year Ending December 31,	Market	Actuarial	Period	Market	Actuarial
2017	13.9%	7.0%	1 year	13.9%	7.0%
2016	7.6%	5.0%	2 years	10.7%	6.0%
2015	0.6%	7.4%	3 years	7.2%	6.5%
2014	7.5%	11.2%	4 years	7.3%	7.6%
2013	15.0%	9.7%	5 years	8.8%	8.0%
2012	11.4%	8.3%	6 years	9.2%	8.1%
2011	2.4%	9.5%	7 years	8.2%	8.3%
2010	12.2%	0.1%	8 years	8.7%	7.2%
2009	14.5%	2.3%	9 years	9.3%	6.7%
2008	-21.5%	-5.9%	10 years	5.8%	5.3%
2007	5.9%	8.8%	11 years	5.8%	5.6%
2006	13.0%	9.9%	12 years	6.4%	6.0%
2005	7.1%	11.1%	13 years	6.4%	6.4%
2004	9.7%	8.1%	14 years	6.7%	6.5%
2003	17.6%	3.4%	15 years	7.4%	6.3%
2002	-3.6%	-3.0%	16 years	6.6%	5.7%
2001	-1.9%	6.7%	17 years	6.1%	5.7%
2000	3.8%	9.8%	18 years	6.0%	6.0%
1999	9.8%	10.8%	19 years	6.2%	6.2%
1998	8.8%	10.8%	20 years	6.3%	6.4%

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

TABLE 13

TWENTY-YEAR PROJECTION OF BENEFIT PAYMENTS FOR CURRENT PARTICIPANTS



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

<u>Plan Year</u>	<u>Projected Benefit Payments and Contribution Refunds</u>	<u>Plan Year</u>	<u>Projected Benefit Payments and Contribution Refunds</u>
2018	\$ 27,277,000	2028	\$ 44,172,000
2019	28,688,000	2029	45,600,000
2020	30,406,000	2030	46,898,000
2021	32,122,000	2031	48,153,000
2022	33,835,000	2032	49,306,000
2023	35,578,000	2033	50,219,000
2024	37,392,000	2034	51,144,000
2025	39,177,000	2035	51,949,000
2026	40,988,000	2036	52,618,000
2027	42,729,000	2037	53,174,000

* 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.

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
2018	7.5	7.5	107.4	480.0	457.1	22.9	11.2%	95%
2019	7.8	7.8	110.9	498.6	487.5	11.1	11.1%	98%
2020	8.0	8.0	114.5	517.6	518.5	(0.9)	11.0%	100%
2021	8.3	8.3	118.2	536.5	540.5	(4.0)	10.9%	101%
2022	8.5	8.5	122.0	555.3	562.9	(7.6)	10.9%	101%
2023	8.8	8.8	126.0	574.0	585.7	(11.7)	10.8%	102%
2024	9.1	9.1	130.1	592.7	608.9	(16.2)	10.7%	103%
2025	9.4	9.4	134.3	611.1	632.4	(21.3)	10.7%	103%
2026	9.7	9.7	138.7	629.5	656.5	(27.0)	10.6%	104%
2027	10.0	10.0	143.2	647.7	680.9	(33.2)	10.6%	105%
2028	10.3	10.3	147.8	665.8	706.0	(40.2)	10.5%	106%
2029	10.7	10.7	152.7	684.2	732.1	(47.9)	10.5%	107%
2030	11.0	11.0	157.6	702.9	759.2	(56.3)	10.5%	108%
2031	11.4	11.4	162.7	722.1	787.7	(65.6)	10.4%	109%
2032	11.8	11.8	168.0	741.9	817.7	(75.8)	10.4%	110%
2033	12.1	12.1	173.5	762.4	849.4	(87.0)	10.4%	111%
2034	12.5	12.5	179.1	784.0	883.2	(99.2)	10.4%	113%
2035	12.9	12.9	184.9	806.8	919.2	(112.4)	10.3%	114%
2036	13.4	13.4	191.0	831.0	957.9	(126.9)	10.3%	115%
2037	13.8	13.8	197.2	856.8	999.6	(142.8)	10.3%	117%
2038	14.2	14.2	203.6	884.5	1,044.5	(160.0)	10.3%	118%
2039	14.7	14.7	210.2	914.6	1,093.2	(178.6)	10.3%	120%
2040	15.2	15.2	217.0	947.2	1,146.2	(199.0)	10.3%	121%
2041	15.7	15.7	224.1	982.8	1,203.8	(221.0)	10.3%	122%
2042	16.2	16.2	231.4	1,021.6	1,266.6	(245.0)	10.2%	124%
2043	16.7	16.7	238.9	1,064.4	1,335.3	(270.9)	10.2%	125%
2044	17.3	17.3	246.6	1,111.4	1,410.5	(299.1)	10.2%	127%
2045	17.8	17.8	254.6	1,163.2	1,492.7	(329.5)	10.2%	128%
2046	18.4	18.4	262.9	1,220.4	1,582.8	(362.4)	10.2%	130%

Note: These projections are based on the actuarial methods, assumptions and plan provisions disclosed in this report, including the use of a 7.25% 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% of compensation are made each year.

APPENDIX A

PLAN SUMMARY

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, 2017. 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. 2017-41, effective November 18, 2017.

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.

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:

Tier 1 Participants

- (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)

Tier 2 Participants: 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.

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 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:

<u>Years of Credited Service</u>	<u>Vested Percentage</u>
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:

<u>Years of Credited Service</u>	<u>Tier 1 Vested Percentage</u>	<u>Tier 2 Vested Percentage</u>
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.

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

Tier 1 Participants

- (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%.

Tier 2 Participants

- (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%.

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 actuarial equivalence definition was updated per Ordinance No. 2017-41.

APPENDIX B

ACTUARIAL PROCEDURES AND ASSUMPTIONS

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 plan year and 7.75% for plan years prior to 2017. 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, 2017)

7.25% 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, 2017)

2.75% per annum, compounded annually.

Several sources were considered in selecting the inflation assumption, and 2.75% is intended to be a reasonable forward-looking assumption.

Compensation Increase (Inflation and Real Wage Growth adopted January 1, 2017; Merit adopted January 1, 2014)

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

Years of Service	Percentage Increase at Age			
	Inflation	Real Wage Growth	Merit	Total
0-1	2.75%	0.50%	2.75%	6.00%
2	2.75	0.50	2.25	5.50
3	2.75	0.50	1.75	5.00
4-7	2.75	0.50	1.25	4.50
8	2.75	0.50	0.75	4.00
9	2.75	0.50	0.50	3.75
10+	2.75	0.50	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 2018.

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, 2014)

Healthy Lives (post-retirement) – RP-2000 Combined Healthy Mortality Tables projected to 2020 using Scale BB; males set forward 1 year, females with 85% multiplier

Healthy Lives (pre-retirement) – RP-2000 Healthy Non-Annuitant Mortality Table with no projection of future mortality improvements

Disabled Lives – RP-2000 Disabled Mortality table with no projection of future mortality improvements

The assumption included a margin for future mortality improvements at the time of the most recent experience study completed by the prior actuary as of December 31, 2012.

Retirement (Adopted January 1, 2014)

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

Age	Reduced		Unreduced	
	Tier 1	Tier 2	Tier 1	Tier 2
50	2.0%	1.5%	3.0%	3.0%
51	3.0	1.5	3.0	3.0
52	3.0	1.5	10.0	10.0
53	3.0	1.5	10.0	10.0
54	3.0	1.5	10.0	10.0
55	3.0	2.5	8.0	8.0
56	6.0	2.5	8.0	8.0
57	6.0	2.5	8.0	8.0
58	6.0	2.5	8.0	8.0
59	6.0	2.5	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	6.0	6.0	20.0	20.0
64	6.0	6.0	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
70-74	N/A	N/A	100.0	75.0
75+	N/A	N/A	100.0	100.0

Current and future vested inactive members are assumed to retire at the earliest age eligible for retirement benefits.

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, 2005)

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	16.0	18.0
2-3	13.0	15.0
3-4	11.0	13.0
4-5	9.0	11.0
At Five or More Years of Service:		
Age		
30	7.7%	10.0%
40	5.3	6.5
50	3.4	3.5
60	2.1	1.5

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 2014)

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). 12% of retirements from active service and 50% 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, 2017 for Tier 1 Base Benefits; Adopted January 1, 2011 for all other benefits)

Tier 1 Participants: 2.75% 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

Development of Demographic Assumptions

Demographic assumptions were reviewed at the April 19, 2018 meeting of the Board of Trustees. In addition, an experience study was performed based on data over the five year period ending December 31, 2012, as documented in the Experience Study report completed by GRS in 2014. 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 recommendations from both the April 19, 2018 meeting as well as the Experience Study report completed by GRS in 2014, as approved by the Board of Trustees at their April 19, 2018 meeting.

Changes in Actuarial Assumptions and Methods as of January 1, 2018

- The administrative expense assumption was updated to \$585,000 to better reflect anticipated experience.

APPENDIX C

MEMBER DATA

Valuation Date	January 1, 2017	January 1, 2018	Percentage Change
Active Participants			
Number	1,733	1,755	1.3%
Average Anticipated Total Payroll (for year following valuation date)	\$59,308	\$61,183	
Average Age	46.4	46.3	
Average Credited Service	9.6	9.5	
Vested Terminated Participants			
Number	215	228	6.0%
Average Final Average Compensation	\$46,648	\$48,405	
Average Age	50.2	50.4	
Retired Members and Beneficiaries			
Number	945	996	5.4%
Average Monthly Benefit	\$1,724	\$1,786	
Average Age	70.4	70.7	
Deferred Disabled			
Number	20	21	5.0%
Average Monthly Benefit	\$1,756	\$1,856	
Average Age	56.5	55.9	
Deferred Beneficiaries			
Number	6	6	0.0%
Average Monthly Benefit	\$566	\$581	
Average Age	46.1	47.1	
Total Participants	2,919	3,006	3.0%

TABLE C-1
RECONCILIATION OF MEMBER DATA
(January 1, 2017 to January 1, 2018)

	Actives	Inactive Deferred Participants	Retiree and Beneficiaries	Disabled Retirees	Total
Included in January 1, 2017 valuation:	1,733	241	920	25	2,919
Change due to:					
New entrants	225	0	0	N/A	225
Rehired	1	(1)	0	0	0
Termination					
Nonvested	(112)	N/A	N/A	N/A	(112)
Vested	(27)	27	0	N/A	0
Retirement	(56)	(8)	63	1	0
Disabled	(2)	2	0	0	0
Death with no Beneficiary	(1)	0	(13)	0	(14)
Death with a Beneficiary	0	0	2	(2)	0
Alternate Payee	0	0	0	0	0
Lump sum/Refund of Contributions	(6)	(6)	0	0	(12)
Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Net change	22	14	52	(1)	87
Included in January 1, 2018 valuation:	1,755	255	972*	24	3,006

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

TABLE C-2

SUMMARY OF ACTIVE MEMBERS AS OF JANUARY 1, 2018

Number of Members by Age and Service Groups

Age	Years of Service										Total	
	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40&Up		
0-24	30	32	1	-	-	-	-	-	-	-	-	63
25-29	50	94	13	2	-	-	-	-	-	-	-	159
30-34	34	104	23	20	-	-	-	-	-	-	-	181
35-39	31	81	39	30	10	-	-	-	-	-	-	191
40-44	19	82	33	34	29	4	-	-	-	-	-	201
45-49	21	65	34	44	33	13	4	-	-	-	-	214
50-54	15	52	20	53	33	19	14	7	1	-	-	214
55-59	17	37	28	46	41	23	20	19	16	2	-	249
60-64	9	33	24	39	44	20	10	17	11	2	-	209
65-69	-	9	9	6	13	6	4	3	3	1	-	54
70&Up	-	5	5	3	1	1	-	-	5	-	-	20
Total	226	594	229	277	204	86	52	46	36	5	-	1,755

Average Anticipated Total Payroll by Age and Service Groups

Age	Years of Service										Average	
	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40&Up		
0-24	39,065	43,079	42,308	-	-	-	-	-	-	-	-	41,155
25-29	46,209	50,161	50,729	64,056	-	-	-	-	-	-	-	49,140
30-34	53,494	53,377	61,172	56,282	-	-	-	-	-	-	-	54,710
35-39	56,406	59,422	62,660	59,712	61,274	-	-	-	-	-	-	59,736
40-44	53,550	59,436	66,904	71,090	62,002	63,348	-	-	-	-	-	62,525
45-49	53,099	60,551	66,875	67,355	68,945	62,288	59,542	-	-	-	-	63,605
50-54	46,466	62,853	66,855	74,764	62,910	72,776	70,696	78,006	70,570	-	-	66,963
55-59	55,927	62,314	59,153	66,240	60,323	74,661	75,148	70,314	75,807	85,046	-	65,751
60-64	71,039	66,351	67,359	68,245	70,066	58,968	74,138	75,529	63,827	82,395	-	68,237
65-69	-	41,484	69,511	58,006	56,871	61,137	76,740	69,958	94,947	60,848	-	61,401
70&Up	-	35,394	59,488	46,312	46,119	33,499	-	-	101,502	-	-	60,024
Average	50,750	56,534	63,612	67,090	64,233	66,776	72,677	73,388	77,165	79,146	-	61,183

HISTORICAL SUMMARY

	2014	2015	2016	2017	2018
Number	1,605	1,643	1,650	1,733	1,755
Anticipated Total Payroll			\$95,867,365	\$102,780,086	\$107,376,973
Average Total Payroll	\$52,402	\$56,021	\$58,101	\$59,308	\$61,183
Average Age	47.5	47.3	47.1	46.4	46.3
Average Service	11.0	10.5	10.4	9.6	9.5

TABLE C-3

**SUMMARY OF INACTIVE VESTED MEMBERS
AS OF JANUARY 1, 2018***

Number of Members by Age and Service Groups

Age	Years of Service									Total
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40&Up	
0-29	-	-	-	-	-	-	-	-	-	-
30-34	-	11	1	-	-	-	-	1	-	13
35-39	-	19	9	1	-	-	-	1	-	30
40-44	-	17	8	3	1	1	-	-	-	30
45-49	-	28	6	4	1	-	-	-	-	39
50-54	-	23	7	3	1	2	-	1	1	38
55-59	-	35	3	4	3	-	-	-	1	46
60-64	-	33	6	3	4	1	-	-	1	48
65&Up	-	2	2	1	-	-	-	-	-	5
Total	-	168	42	19	10	4	-	3	3	249

Average Final Average Compensation by Age and Service Groups

Age	Years of Service									Average
	<5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40&Up	
0-29	-	-	-	-	-	-	-	-	-	-
30-34	-	40,271	46,860	-	-	-	-	50,295	-	41,549
35-39	-	47,367	49,687	55,839	-	-	-	28,909	-	47,730
40-44	-	60,837	59,185	45,156	61,756	65,010	-	-	-	58,998
45-49	-	51,643	58,013	59,417	37,921	-	-	-	-	53,069
50-54	-	47,183	57,776	43,353	111,216	36,817	-	22,596	50,151	49,403
55-59	-	42,417	49,804	45,636	31,611	-	-	-	48,159	42,599
60-64	-	43,898	44,523	37,173	45,254	42,340	-	-	58,589	43,943
65&Up	-	38,546	33,091	37,747	-	-	-	-	-	36,204
Average	-	47,135	52,447	46,886	48,674	45,246	-	33,933	52,300	47,947

HISTORICAL SUMMARY

	2015	2016	2017	2018
<u>Deferred Vested</u>				
Number	215	220	215	228
Average Final Average Compensation			\$46,648	\$48,405
Average Service			8.8	8.7
Average Age	50.5	50.6	50.2	50.4
<u>Deferred Disabled</u>				
Number	23	22	20	21
Average Final Average Compensation			\$43,428	\$42,974
Average Service			25.6	26.8
Average Age	57.1	58.4	56.5	55.9

* Does not include 6 deferred beneficiaries.

TABLE C-4
SUMMARY OF RETIREES AND BENEFICIARIES
AS OF JANUARY 1, 2018

Members in Pay Status

<u>Age</u>	<u>Number of Members</u>	<u>Monthly Benefit Amount</u>
< 55	17	\$21,147
55 - 59	81	146,989
60 - 64	154	331,126
65 - 69	262	526,356
70 - 74	215	358,258
75 - 79	116	188,738
80 - 84	79	116,033
85 - 89	49	63,462
90 & Up	<u>23</u>	<u>26,350</u>
Total	996*	\$1,778,459

HISTORICAL SUMMARY

	2015	2016	2017	2018
Number	814	858	945	996
Total Monthly Benefit	\$1,389,737	\$1,477,830	\$1,629,446	\$1,778,459
Average Monthly Benefit	\$1,707	\$1,722	\$1,724	\$1,786
Average Age	70.2	70.4	70.4	70.7

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

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

* Includes Cost of Living adjustments

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