City of New Orleans Employees' Retirement System

Actuarial Valuation and Review as of January 1, 2019

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June 7, 2019

Board of Trustees
City of New Orleans Employees' Retirement System
1300 Perdido Street, Suite 1E12
New Orleans, LA 70112

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2019. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for fiscal 2019.

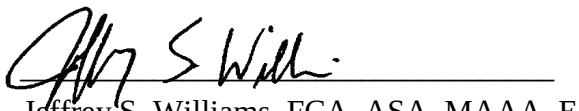
This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Retirement System. The census information and financial information on which our calculations were based was prepared by the staff of the System. That assistance is gratefully acknowledged.

The actuarial calculations were directed under the supervision of Jeffrey S. Williams. I am a member of the American Academy of Actuaries and I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of my knowledge, the information supplied in this actuarial valuation is complete and accurate, except as noted in Section 4. Further, in my opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the System.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

By: 

Jeffrey S. Williams, FCA, ASA, MAAA, EA
Vice President and Consulting Actuary
Enrolled Actuary No. 17-7009

cc: Jesse Evans, Jr.

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Table of Contents

City of New Orleans Employees' Retirement System Actuarial Valuation and Review as of January 1, 2019

Section 1: Actuarial Valuation Summary

Purpose and Basis

This report was prepared by Segal Consulting to present a valuation of the System as of January 1, 2019. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of System assets to cover the estimated cost of settling the System's benefit obligations. 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; and changes in plan provisions or applicable law.

Certain disclosure information required by GASB Statements No 67 and 68 as of December 31, 2018 for the System will be provided in a separate report.

The contribution requirements presented in this report are based on:

- The benefit provisions of the Pension Plan, as administered by the Board;
- The characteristics of covered active participants, inactive vested participants, and retired participants and beneficiaries as of December 31, 2018, provided by the Administrative Office;
- The assets of the Plan as of December 31, 2018, provided by the Administrative Office;
- Economic assumptions regarding future salary increases and investment earnings;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc. and
- The funding policy adopted by the Plan and the employers.

Significant Issues

1. This January 1, 2019 actuarial valuation is the first one completed by Segal Consulting for the City of New Orleans Employees' Retirement System. Presentation of results will differ from prior valuations.
2. Segal Consulting ("Segal") strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance. The funding policy meets this standard.
3. The actuarially determined contribution for the upcoming year is $28,689,759, an increase of $674,264 from last year. The contribution as a percentage of payroll decreased from 23.19% of payroll to 22.32% of payroll, based on a 15-year level dollar amortization of the unfunded actuarial accrued liability.
4. Actual employer contributions made during the fiscal year ending December 31, 2018 were $31,065,227, or 110.9% of the actuarially determined contribution. In the prior fiscal year, actual contributions were $27,169,921, or 101.2% of the prior year actuarially determined contribution.
5. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 61.22%, compared to the prior year funded ratio of 61.65%. This ratio is one measure of funding status, and its history is a measure of funding progress. Using the market value of assets, the funded ratio is 55.55%, compared to 62.22% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of System assets to cover the estimated cost of settling the System's benefit obligation or the need for or the amount of future contributions.
6. Prior actuarial reports showed the funded ratio as actuarial value of assets divided by Projected Benefit Obligation (PBO). The PBO is an accounting measurement used by the Financial Accounting Standards Board, primarily for FAS 87 measurements for single employer corporate pension plans. It is not a standard measurement used in the determination of the funded ratio for public sector pension plans. This report shows the January 1, 2018 funded ratio using the standard actuarial value of assets divided by the actuarial accrued liability.
7. The unfunded actuarial accrued liability is $255.3 million, which is an increase of $13.8 million since the prior valuation.
8. The actuarial loss from investment and other experience is $26.9 million, or 4.1% of actuarial accrued liability.
9. The net experience loss from sources other than investment experience was 3.6% of the actuarial accrued liability. This loss was primarily due to the number of show-up active participants with prior service and retired participants who were included in this year's valuation but were not valued in last year's valuation.

10. The rate of return on the market value of assets was -4.03% for the January 1, 2018 to December 31, 2018 plan year. The return on the actuarial value of assets was 6.60% for the same period due to the recognition of prior years' investment gains and losses. This resulted in an actuarial loss when measured against the assumed rate of return of 7.50%. This actuarial investment loss increased the average employer contribution rate by 0.3% of pay. Given the low fixed income interest rate environment, target asset allocation and expectations of future investment returns for various classes, we advise the Board to closely monitor actual and anticipated investment returns relative to the assumed long-term rate of return on investments of 7.50%.
11. The actuarial value of assets is 110.2% of the market value of assets. The investment experience in the past years has only been partially recognized in the actuarial value of assets. As the deferred net loss is recognized in future years, the cost of the Plan is likely to increase unless the net loss is offset by future experience. The recognition of the market losses of $37.3 million will also have an impact on the future funded ratio. If the net deferred losses were recognized immediately in the actuarial value of assets, the actuarially determined contribution would increase from 22.32% to about 25.40% of payroll.
12. The following Plan changes are included for the first time in this valuation; all changes were effective for employees hired on or after January 1, 2018:

    - Normal Retirement Eligibility was changed, and the Rule of 80 was removed
    - The limit on pensionable annual compensation was lowered to $100,000
    - Early Retirement Option was removed
    - Retirement allowance was changed from 2.5% of annual compensation for the first 25 years, and 4% of annual compensation thereafter, to 1.9% of annual compensation for all years of service
    - The DROP period was reduced from five years to three years
    - The funded percentage necessary for the approval of Cost of Living Adjustments (COLA's) was increased to 95%.

    As a result of these plan changes, the total normal cost decreased by $602,511 and the actuarial accrued liability decreased by $437,937. The total impact was a decrease in the actuarially determined contribution of $648,662, or 0.51% of payroll.
13. This report constitutes an actuarial valuation for the purpose of determining the actuarially determined contribution under the Plan's funding policy and measuring the progress of that funding policy. The Net Pension Liability (NPL) and Pension Expense under Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68, for inclusion in the plan and employer's financial statements as of December 31, 2018, will be provided separately.
14. This actuarial report as of December 31, 2018 is based on financial and demographic data as of that date. Changes subsequent to that date are not reflected and will affect future actuarial costs of the plan.

15. Since the actuarial valuation results are dependent on a given set of assumptions, there is a risk that emerging results may differ significantly as actual experience proves to be different from the assumptions. We have not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the System's future financial condition, but have included a brief discussion of some risks that may affect the System in Section 2. A more detailed assessment of the risks would provide the Board with a better understanding of the inherent risks.

Summary of Key Valuation Results

		2019	2018
Contributions for plan year beginning January 1:	• Actuarially determined employer contributions	$28,689,759	$28,015,495
	• Actuarially determined employer contributions as a percent of payroll	22.32%	23.19%
	• Actual employer contributions	--	31,065,227
Actuarial accrued liability for plan year beginning January 1:	• Retired participants and beneficiaries	$427,073,020	$408,342,021
	• Inactive vested participants	18,173,208	16,199,217
	• Active participants	213,106,398	205,225,213
	• Total	658,352,626	629,766,451
	• Normal cost including administrative expenses	9,493,233	9,810,416
Assets for plan year beginning January 1:	• Market value of assets (MVA)	$365,737,309	$391,827,316
	• Actuarial value of assets (AVA)	403,015,342	388,233,310
	• Actuarial value of assets as a percentage of market value of assets	110.19%	99.08%
Funded status for plan year beginning January 1:	• Unfunded actuarial accrued liability on market value of assets	$292,615,317	$237,939,135
	• Funded percentage on MVA basis	55.55%	62.22%
	• Unfunded actuarial accrued liability on actuarial value of assets	$255,337,284	$241,533,141
	• Funded percentage on AVA basis	61.22%	61.65%
	• Amortization period on an AVA basis	15	15
Demographic data for plan year beginning January 1	• Number of retired participants and beneficiaries	2,143	2,078
	• Number of inactive vested participants	328	303
	• Number of active participants	2,873	2,716
	• Total payroll	$128,530,078	$120,808,711
	• Average payroll	44,737	44,480

Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal Consulting ("Segal") relies on a number of input items. These include:

Plan of benefits	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant data	An actuarial valuation for a plan is based on data provided to the actuary by the City. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the City. The City uses an "actuarial value of assets" that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan's assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

- The actuarial valuation is prepared at the request of the City. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- Actuarial results in this report are not rounded, but that does not imply precision.
- If the City is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan's provisions, but they may be subject to alternative interpretations. The City should look to their other advisors for expertise in these areas.

As Segal Consulting has no discretionary authority with respect to the management or assets of the System, it is not a fiduciary in its capacity as actuaries and consultants with respect to the System.

Section 2: Actuarial Valuation Results

Participant Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive vested participants, retired participants and beneficiaries.

This section presents a summary of significant statistical data on these participant groups.

More detailed information for this valuation year and the preceding valuation can be found in *Section 3*, *Exhibits A, B,* and *C*.

PARTICIPANT POPULATION: 2009 – 2018

Year Ended December 31	Active Participants	Inactive Vested Participants*	Retired Participants and Beneficiaries	Total Non-Actives	Ratio of Non-Actives to Actives
2009	2,419	93	1,991	2,084	0.86
2010	2,290	78	2,020	2,098	0.92
2011	2,289	75	2,048	2,123	0.93
2012	2,327	71	2,044	2,115	0.91
2013	2,211	68	2,039	2,107	0.95
2014	2,259	66	2,028	2,094	0.93
2015	2,562	65	2,024	2,089	0.82
2016	2,620	337	2,096	2,433	0.93
2017	2,716	303	2,078	2,381	0.88
2018	2,873	328	2,143	2,471	0.86

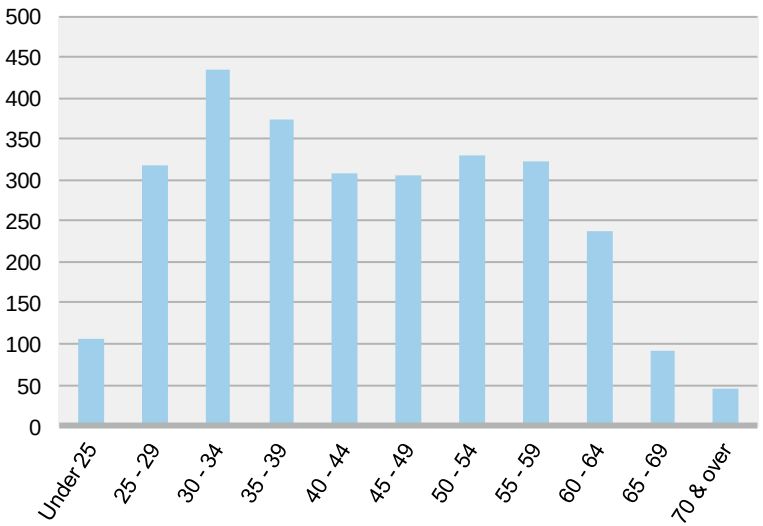
*Excludes terminated participants due a refund of employee contributions

Active Participants

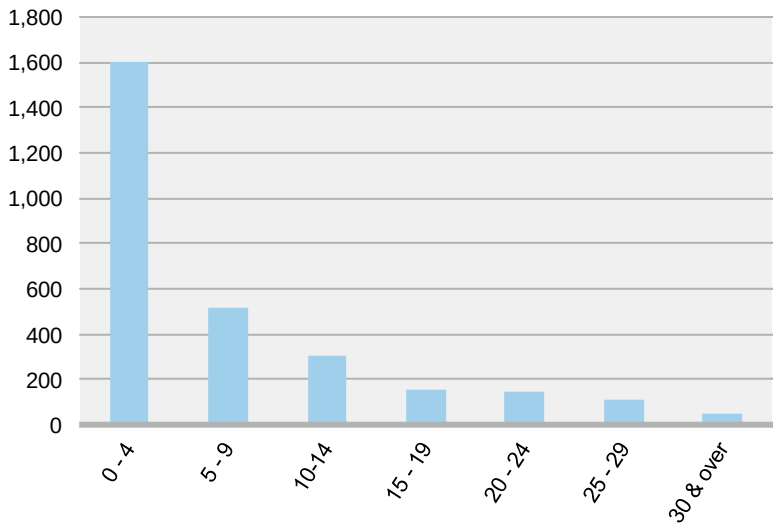
Plan costs are affected by the age, years of service and payroll of active participants. In this year's valuation, there were 2,873 active participants with an average age of 44.2, average years of service of 7.3 years and average payroll of $44,737. The 2,716 active participants in the prior valuation had an average age of 44.1, average service of 7.5 years and average payroll of $44,480.

Distribution of Active Participants as of December 31, 2018

ACTIVES BY AGE



ACTIVES BY YEARS OF SERVICE

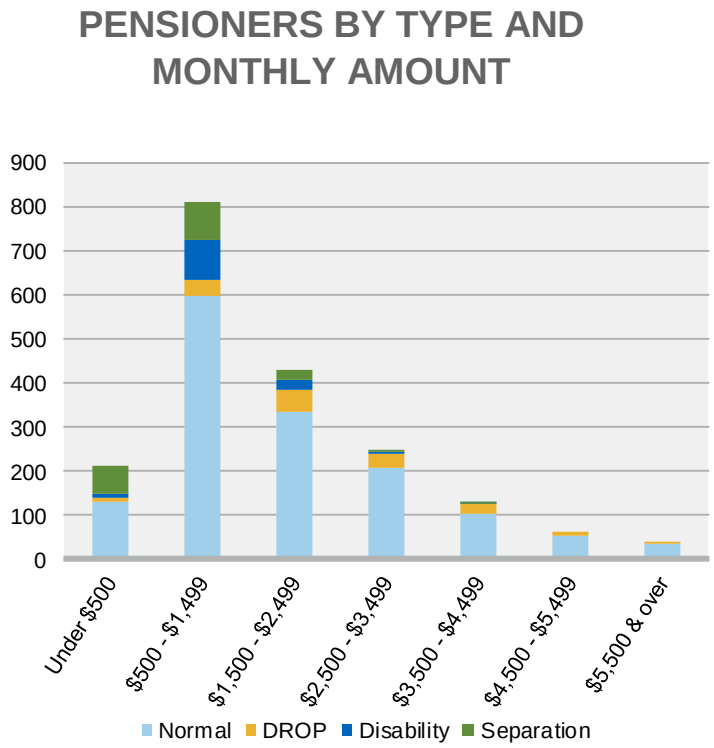


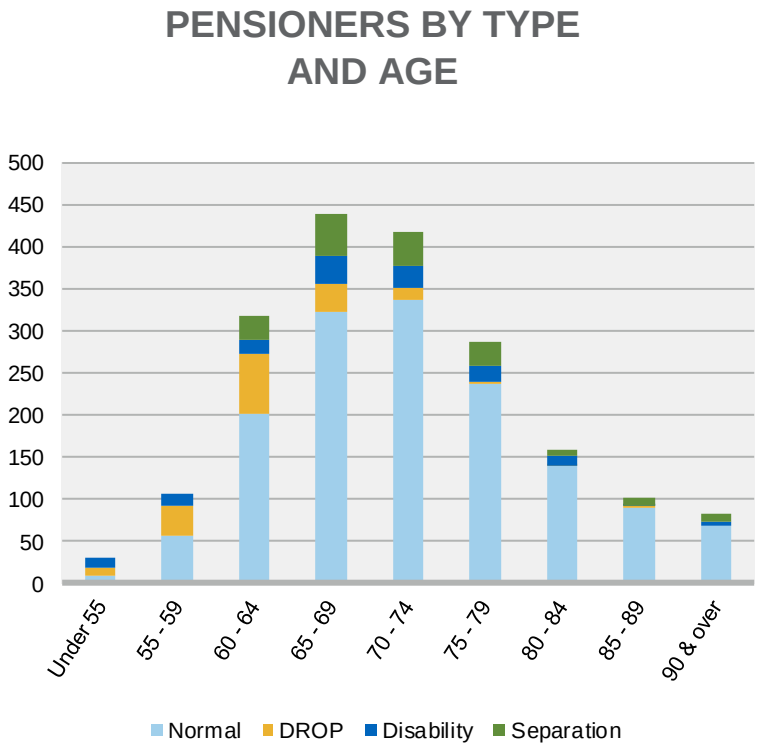
Retired Participants and Beneficiaries

As of December 31, 2018, 1,936 retired participants and 207 beneficiaries were receiving total monthly benefits of $3,792,486. For comparison, in the previous valuation, there were 1,879 retired participants and 208 beneficiaries receiving monthly benefits of $3,653,814.

As of December 31, 2018, the average monthly benefit for retired participants is $1,770, compared to $1,758 in the previous valuation. The average age for retired participants is 72.0 in the current valuation, compared with 72.3 in the prior valuation.

Distribution of Pensioners as of December 31, 2018





Historical Plan Population

The chart below demonstrates the progression of the active population over the last one years. The chart also shows the aging among the retired population over the same time period.

PARTICIPANT DATA STATISTICS: 2009 – 2018

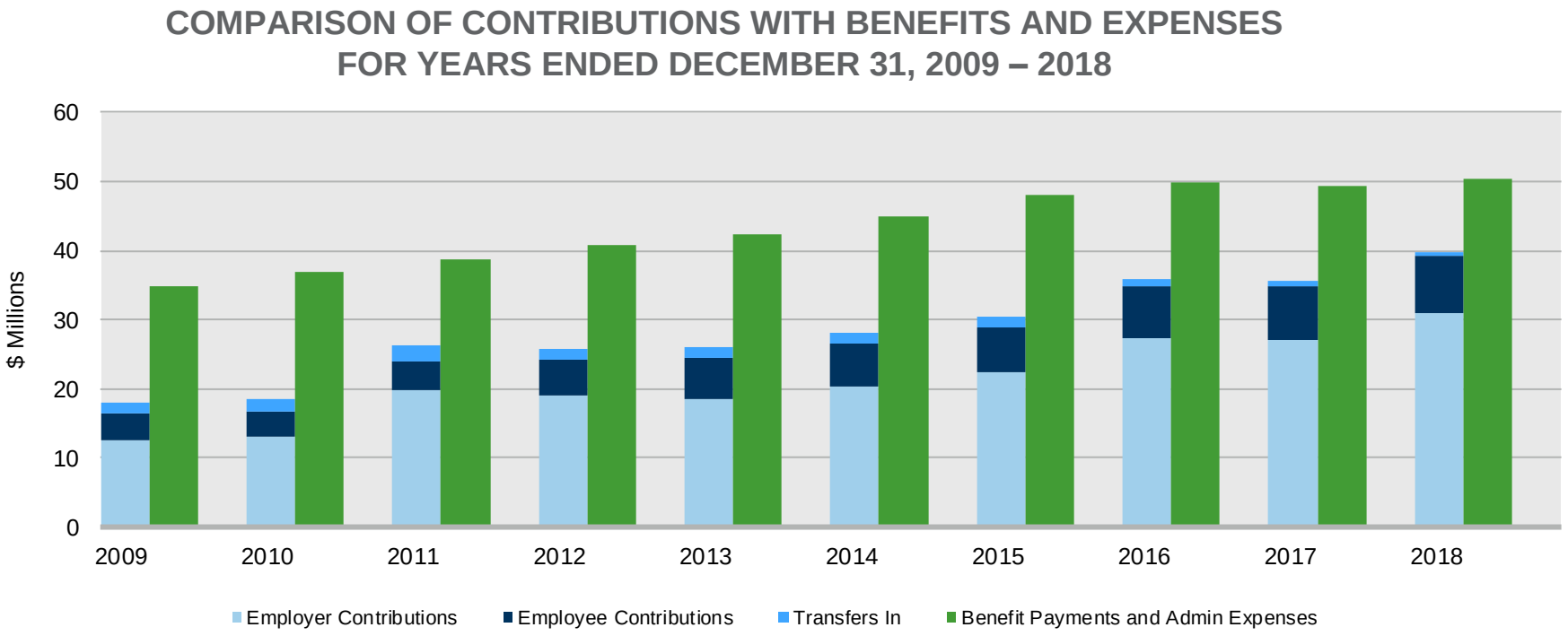
	Active Participants			Retired Participants and Beneficiaries		
Year Ended December 31	Count	Average Age	Average Service	Count	Average Age	Average Monthly Amount
2009	2,419	44.8	9.9	1,991	70.8	$1,358
2010	2,290	45.4	10.1	2,020	70.7	1,513
2011	2,289	45.4	9.5	2,048	70.8	1,473
2012	2,327	45.3	9.4	2,044	71.0	1,521
2013	2,211	45.0	9.4	2,039	71.3	1,557
2014	2,259	44.4	8.6	2,028	71.4	1,617
2015	2,562	44.0	8.3	2,024	71.8	1,629
2016	2,620	44.0	7.8	2,096	71.7	1,707
2017	2,716	44.1	7.5	2,078	72.3	1,758
2018	2,873	44.2	7.3	2,143	72.0	1,770

Note: Average age, service and monthly amounts prior to 2018 are estimated based on valuation reports from the prior actuary.

Financial Information

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and investment earnings (less investment fees) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Additional financial information, including a summary of transactions for the valuation year, is presented in *Section 3, Exhibits D, E* and *F*.



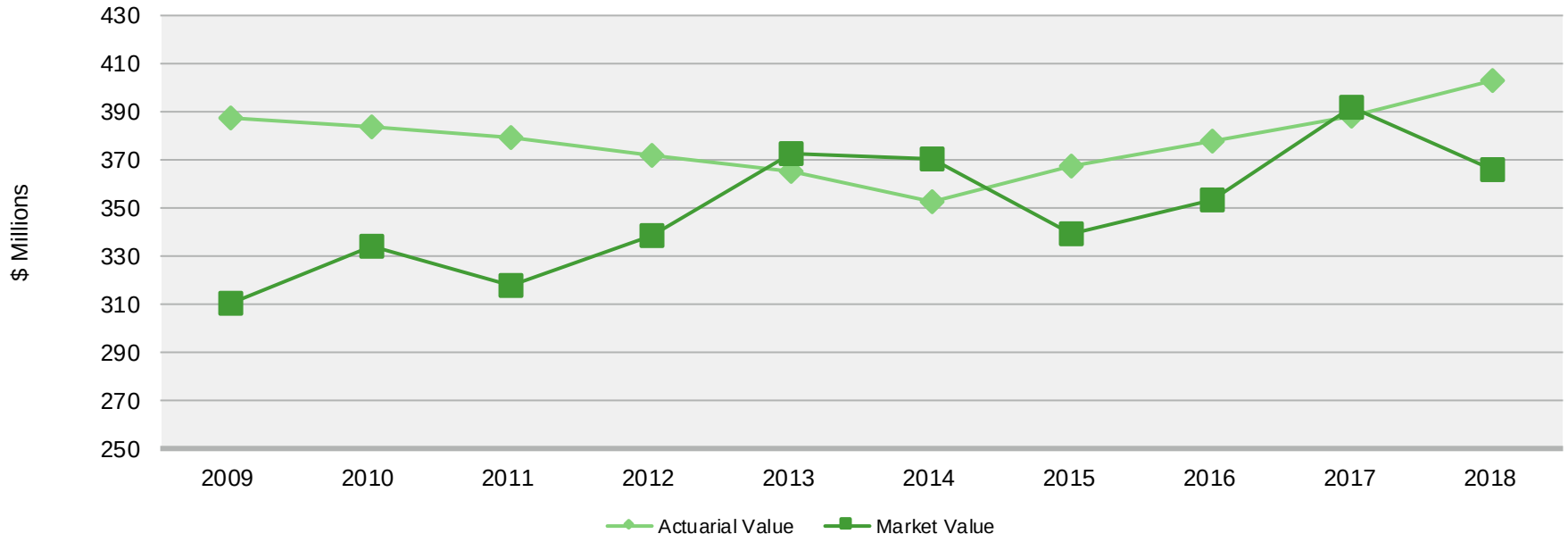
It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

DETERMINATION OF ACTUARIAL VALUE OF ASSETS FOR YEAR ENDED DECEMBER 31, 2018

Plan Year Ending	Beginning Market Value	Net External Cash Flow for Year	Market Value Investment Income for Year	Ending Market Value	Market Value Performance for Year	Adjusted Market Value
2012	$317,609,637	-$14,844,479	$35,842,303	$338,607,461	11.5550%	$409,272,801
2013	338,607,461	-16,283,003	50,131,156	372,455,614	15.1698%	445,644,715
2014	372,455,614	-16,860,619	15,155,075	370,750,070	4.1632%	429,407,743
2015	370,750,070	-17,606,672	-14,044,748	339,098,650	-3.8803%	378,221,771
2016	339,098,650	-14,100,637	28,611,585	353,609,598	8.6167%	382,495,735
2017	353,609,598	-13,688,805	51,906,523	391,827,316	14.9688%	410,327,328
2018	391,827,316	-10,500,391	-15,589,616	365,737,309	-4.0327%	365,737,309
		-$103,884,606	$152,012,278			
				Average Adjusted Market Value		$403,015,342
Actuarial value as a percentage of market value:						110.2%
Amount deferred for future recognition:						-$37,278,033

Both the actuarial value and market value of assets are representations of the Plan's financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the Plan's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

ACTUARIAL VALUE OF ASSETS VS. MARKET VALUE OF ASSETS AS OF DECEMBER 31, 2009 – 2018



Actuarial Experience

To calculate any actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), any contribution requirement will decrease from the previous year. On the other hand, any contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total loss is $26,903,917 which includes $3,441,311 from investment losses and $23,462,606 in losses from all other sources. The net experience variation from individual sources other than investments was 3.6% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

ACTUARIAL EXPERIENCE FOR YEAR ENDED DECEMBER 31, 2018

1	Net gain/(loss) from investments*	-$3,441,311
2	Net gain/(loss) from administrative expenses	114,717
3	Net gain/(loss) from other experience	-23,577,323
4	Net experience gain/(loss): 1 + 2 + 3	-$26,903,917

* Details on next page.

Investment Experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Plan's investment policy. The rate of return on the market value of assets was -4.03% for the year ended December 31, 2018.

For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.50%. The actual rate of return on an actuarial basis for the 2018 plan year was 6.60%. Since the actual return for the year was less than the assumed return, the Plan experienced an actuarial loss during the year ended December 31, 2018 with regard to its investments.

INVESTMENT EXPERIENCE

		Year Ended December 31, 2018		Year Ended December 31, 2017	
		Market Value	Actuarial Value	Market Value	Actuarial Value
1	Net investment income	-$15,589,616	$25,282,423	$51,906,523	-$24,174,107
2	Average value of assets	386,577,121	382,983,115	346,765,196	370,903,606
3	Rate of return: 1 ÷ 2	-4.03%	6.60%	14.97%	6.52%
4	Assumed rate of return	7.50%	7.50%	7.50%	7.50%
5	Expected investment income: 2 x 4	28,993,284	28,723,734	26,007,390	27,817,770
6	Actuarial gain/(loss): 1 – 5	-$44,582,900	-$3,441,311	$25,899,133	-$3,643,663

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the actual market value investment return for the last 20 years, including averages over select time periods.

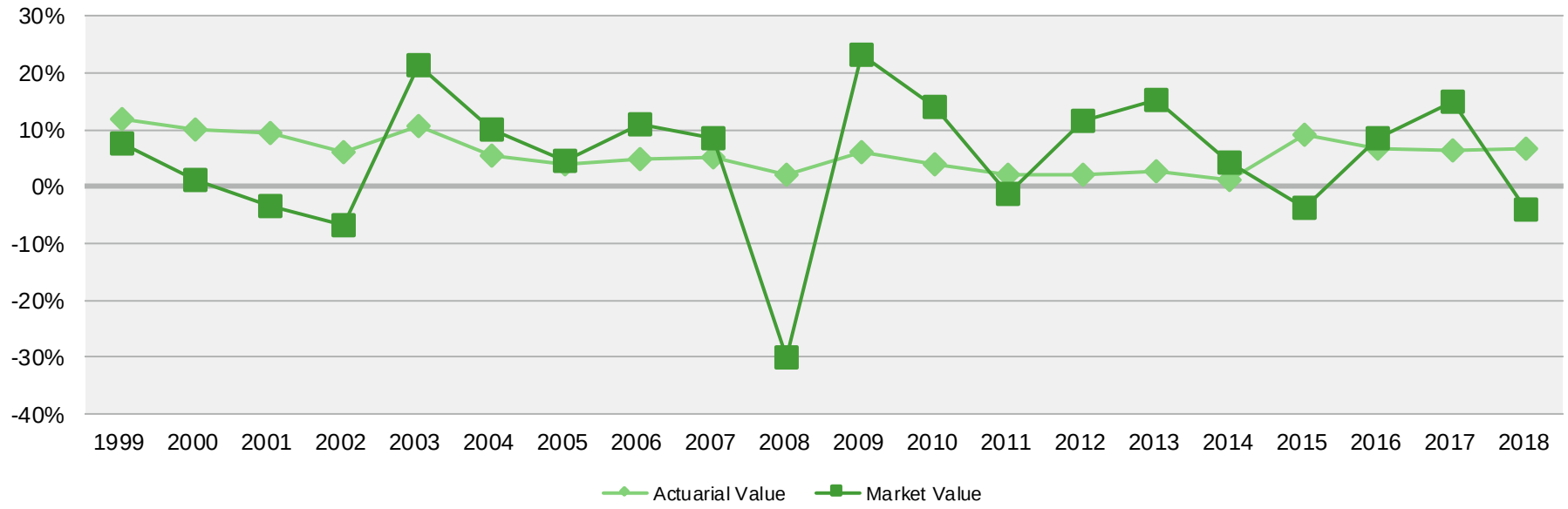
INVESTMENT RETURN – ACTUARIAL VALUE VS. MARKET VALUE: 1999 - 2018

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return		Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
1999	$35,026,402	11.81%	$27,236,487	7.74%	2009	$22,597,059	6.06%	$59,869,583	23.13%
2000	32,225,447	9.95	4,731,448	1.27	2010	15,192,260	4.02	42,485,923	14.11
2001	33,184,325	9.58	-12,222,626	-3.34	2011	7,943,416	2.10	-4,276,183	-1.30
2002	21,997,488	5.97	-23,149,025	-6.75	2012	7,368,030	1.98	35,842,303	11.56
2003	39,077,908	10.55	65,492,332	21.30	2013	9,336,061	2.57	50,131,156	15.17
2004	21,411,295	5.39	35,797,958	9.93	2014	4,674,189	1.31	15,155,075	4.16
2005	16,282,219	4.02	17,464,439	4.56	2015	31,975,387	9.29	-14,044,748	-3.88
2006	19,664,372	4.94	41,708,472	11.05	2016	24,574,130	6.82	28,611,585	8.62
2007	20,683,262	5.30	33,770,375	8.62	2017	28,383,779	6.52	51,906,523	14.97
2008	7,678,968	1.99	-120,890,979	-30.18	2018	25,282,423	6.60	-15,589,616	-4.03
Total						$424,558,421		$320,030,482	
					Most recent five-year average return		6.33%		3.69%
					Most recent ten-year average return		4.82%		7.53%
					Most recent 15-year average return		4.65%		4.93%
					Most recent 20-year average return		5.77%		4.59%

Note: Each year's yield is weighted by the average asset value in that year.

As described earlier in this section, the actuarial asset valuation method gradually recognizes fluctuations in the market value rate of return. The goal of this is to stabilize the actuarial rate of return and to produce more level pension plan costs.

MARKET AND ACTUARIAL RATES OF RETURN FOR YEARS ENDED DECEMBER 31, 1999 - 2018



Administrative Expenses

Administrative expenses for the year ended December 31, 2018 totaled $243,972 compared to the assumption of $362,426. This resulted in a gain of $114,717 for the year.

Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among participants,
- retirement experience (earlier or later than projected),
- mortality (more or fewer deaths than projected),
- the number of disability retirements (more or fewer than projected), and
- salary increases (greater or smaller than projected).

The net loss from this other experience for the year ended December 31, 2018 amounted to $23,577,323, which is 3.6% of the actuarial accrued liability.

LIABILITY CHANGES DUE TO DEMOGRAPHIC EXPERIENCE FOR YEAR ENDED DECEMBER 31, 2018

Turnover	-$5,603,231
Pay status experience	-13,015,964
Retirement	-12,950,315
New actives	-8,533,653
Disablement	290,282
Active salary/service	1,885,093
Other experience	14,350,465
Total	**-$23,577,323**

Changes in the Actuarial Accrued Liability

The actuarial accrued liability as of January 1, 2019 is $658,352,626, an increase of $28,586,175, or 4.5%, from the actuarial accrued liability as of the prior valuation date. The liability is expected to grow each year with normal cost and interest, and to decline due to benefit payments made. Additional fluctuations can occur due to actual experience that differs from expected (as discussed in the previous subsection).

Actuarial Assumptions

- There are no assumption changes reflected in this report.
- Details on actuarial assumptions and methods are in *Section 4, Exhibit I.*

Plan Provisions

- Normal Retirement Eligibility was changes, and the Rule of 80 was removed
- The limit on pensionable annual compensation was lowered to $100,000
- Early Retirement Option was removed
- Retirement allowance was changed from 2.5% of annual compensation for the first 25 years, and 4% of annual compensation thereafter, to 1.9% of annual compensation for all years of service
- The DROP period was reduced from five years to three years
- These changes decreased the actuarial accrued liability by 0.07% and decreased the normal cost by 6.20%
- The funded percentage necessary for the approval of Cost of Living Adjustments (COLA's) was increased to 95%
- A summary of plan provisions is in *Section 4, Exhibit II.*

Development of Unfunded Actuarial Accrued Liability

DEVELOPMENT FOR YEAR ENDED DECEMBER 31, 2018

1	Unfunded actuarial accrued liability at beginning of year		$241,533,141
2	Normal cost at beginning of year		9,798,675
3	Total contributions		-39,818,999
4	Interest		
	• For whole year on 1 + 2	$18,849,887	
	• For half year on 3	-1,491,400	
	Total interest		17,358,487
5	Expected unfunded/(overfunded) actuarial accrued liability		$228,871,304
6	Changes due to:		
	• (Gain)/loss	$26,903,917	
	• Assumptions	0	
	• Funding method	0	
	• Plan provisions	-437,937	
	Total changes		$26,465,980
7	Unfunded actuarial accrued liability at end of year		$255,337,284

Actuarially Determined Contribution

The actuarially determined contribution is equal to the employer normal cost payment and a payment on the unfunded actuarial accrued liability. As of January 1, 2019, the actuarially determined contribution is $28,689,759, or 22.32% of payroll.

The contribution requirement as of January 1, 2019 is based on the data previously described, the actuarial assumptions and Plan provisions described in *Section 4*, including all changes affecting future costs adopted at the time of the actuarial valuation, actuarial gains and losses, and changes in the actuarial assumptions.

ACTUARIALLY DETERMINED CONTRIBUTION FOR YEAR BEGINNING JANUARY 1

		2019		2018	
		Amount	% of Projected Payroll	Amount	% of Projected Payroll
1.	Total normal cost	$9,107,643	7.09%	$9,447,990	7.82%
2.	Administrative expenses	385,590	0.30%	362,426	0.30%
3.	Expected employee contributions	-7,711,805	-6.00%	-7,248,523	-6.00%
4.	Employer normal cost: (1) + (2) - (3)	1,781,429	1.39%	2,561,893	2.12%
5.	Actuarial accrued liability	658,352,626		629,766,451	
6.	Actuarial value of assets	403,015,342		388,233,310	
7.	Unfunded actuarial accrued liability: (5) - (6)	255,337,284		241,533,141	
8.	Payment on unfunded actuarial accrued liability	26,908,330	20.93%	25,453,602	21.07%
9.	Total recommended contribution: (4) + (8)	28,689,759	22.32%	$28,015,495	23.19%
10.	Projected payroll	$128,530,078		$120,808,711	

*Actuarially determined contributions are assumed to be paid at the beginning of every month.

Reconciliation of Actuarially Determined Contribution

The chart below details the changes in the actuarially determined contribution from the prior valuation to the current year's valuation.

RECONCILIATION OF ACTUARIALLY DETERMINED CONTRIBUTION FROM JANUARY 1, 2018 TO JANUARY 1, 2019

	Amount
Actuarially Determined Contribution as of January 1, 2018	$28,015,495
• Effect of plan changes	-648,662
• Effect of rolling amortization period	-1,073,099
• Effect of investment loss	377,095
• Effect of contributions more than actuarially determined contribution	-372,742
• Effect of other gains and losses on accrued liability	2,571,008
• Net effect of other changes, including composition and number of participants	-179,336
• Total change	$674,264
Actuarially Determined Contribution as of January 1, 2019	$28,689,759

History of Employer Contributions

A history of the most recent years of contributions is shown below.

HISTORY OF EMPLOYER CONTRIBUTIONS: 2010 – 2019

Fiscal Year Ended December 31	Actuarially Determined Employer Contribution (ADEC)*		Actual Employer Contribution		Percent Contributed
	Amount	Percentage of Payroll	Amount	Percentage of Payroll	
2010	$21,281,308	23.81%	$13,031,810	14.58%	61.24%
2011	20,850,837	24.27%	19,917,899	23.18%	95.53%
2012	18,828,419	20.11%	19,010,841	20.30%	100.97%
2013	20,228,129	21.78%	18,544,682	19.97%	91.68%
2014	20,871,424	22.58%	20,306,887	21.97%	97.30%
2015	21,891,996	22.51%	22,447,281	23.08%	102.54%
2016	22,713,296	21.49%	27,304,527	25.83%	120.21%
2017	26,857,512	23.25%	27,169,921	23.52%	101.16%
2018	28,015,495	23.19%	31,065,227	25.71%	110.89%
2019	28,689,759	22.32%	- -	- -	- -

*Prior to 2012, this amount was the Annual Required Contribution (ARC)

Risk

Since the actuarial valuation results are dependent on a given set of assumptions and data as of a specific date, there is a risk that emerging results may differ significantly as actual experience differs from the assumptions.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a brief discussion of some risks that may affect the Plan. A more detailed assessment of the risks would provide the Board with a better understanding of the risks inherent in the Plan. This assessment may include scenario testing, sensitivity testing, stress testing and stochastic modeling.

- Investment Risk (the risk that returns will be different than expected)

  If the actual return on market value for the next Plan Year were 1% different from the assumed (either higher or lower), the projected unfunded actuarial liability would change by 0.2%, or about $515,000.

  Since the Plan's assets are much larger than contributions, investment performance may create volatility in contribution requirements. For example, for each 1% difference in return from the assumed return, the actuarially determined contribution would increase or decrease by $54,000 (0.04% of payroll).

  The market value rate of return over the last 20 years has ranged from a low of -30.18% to a high of 23.13%.

- Longevity Risk (the risk that mortality experience will be different than expected)

  The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the actuarially determined contribution.

- Contribution Risk (the risk that actual contributions will be different from actuarially determined contribution)

  The Plan's funding policy requires payment of the actuarially determined contribution. As long as this policy is adhered to, contribution risk is negligible.

- Demographic Risk (the risk that participant experience will be different than assumed)

  Examples of this risk include:

  - Actual retirements occurring earlier or later than assumed. The value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply.
  - More or less active participant turnover than assumed.

- Actual Experience Over the Last 20 years and Implications for the Future

  Past experience can help demonstrate the sensitivity of key results to the Plan's actual experience.

  If all investment returns were equal to the assumed return over the last ten years, the market value of assets as of the current valuation date would be approximately $415.7 million as opposed to the actual value of $365,737,309.

- Maturity Measures

  As pension plans mature, the cash need to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities.

  Currently the Plan has a non-active to active participant ratio of 0.86. For the prior year benefits paid were $10,500,391 more than contributions received. As the Plan matures, more cash will be needed from the investment portfolio to meet benefit payments.

GFOA Solvency Test

The Actuarial Accrued Liability represents the present value of benefits earned, calculated using the plan's actuarial cost method. The Actuarial Value of Assets reflects the financial resources available to liquidate the liability. The portion of the liability covered by assets reflects the extent to which accumulated plan assets are sufficient to pay future benefits, and is shown for liabilities associated with employee contributions, pensioner liabilities, and other liabilities. The Government Finance Officers Association (GFOA) recommends that the funding policy aim to achieve a funded ratio of 100 percent.

GFOA SOLVENCY TEST AS OF DECEMBER 31

	2019	2018
Actuarial accrued liability (AAL)		
• Active member contributions	$47,308,349	$43,286,072
• Retirees and beneficiaries	427,073,020	408,342,021
• Active and inactive members (employer-financed)	183,971,257	178,138,358
Total	$658,352,626	$629,766,451
Actuarial value of assets	$403,015,342	$388,233,310
Cumulative portion of AAL covered		
• Active member contributions	100.00%	100.00%
• Retirees and beneficiaries	83.29%	84.48%
• Active and inactive members (employer-financed)	0.00%	0.00%

Section 3: Supplemental Information

EXHIBIT A – TABLE OF PLAN COVERAGE

Category	Year Ended December 31		Change From Prior Year
	2018	2017	
Active participants in valuation:			
• Number	2,873	2,716	5.8%
• Average age	44.2	44.1	0.1
• Average years of service	7.3	7.5	-0.2
• Total payroll	$128,530,078	$120,808,711	6.4%
• Average payroll	44,737	44,480	0.6%
• Account balances	47,308,349	43,286,072	9.3%
• Total active vested participants	1,258	1,245	1.0%
Inactive vested participants	328	303	8.3%
Retired participants:			
• Number in pay status	1,799	1,723	4.4%
• Average age	72.0	71.9	0.1
• Average monthly benefit	$1,893	$1,869	2.4%
Disabled participants:			
• Number in pay status	137	147	-6.8%
• Average age	69.6	70.4	-0.8
• Average monthly benefit	$1,205	$1,210	-0.4%
Beneficiaries:			
• Number in pay status	207	208	-0.5%
• Average age	73.9	79.1	-5.2
• Average monthly benefit	$1,074	$1,151	-6.7%

EXHIBIT B – PARTICIPANTS IN ACTIVE SERVICE AS OF DECEMBER 31, 2018
BY AGE, YEARS OF SERVICE, AND AVERAGE PAYROLL

	Years of Service									
Age	Total	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	106	106	- -	- -	- -	- -	- -	- -	- -	- -
	$26,965	$26,965	- -	- -	- -	- -	- -	- -	- -	- -
25 - 29	318	291	25	2	- -	- -	- -	- -	- -	- -
	35,181	35,106	36,428	$30,427	- -	- -	- -	- -	- -	- -
30 - 34	435	329	80	26	- -	- -	- -	- -	- -	- -
	42,652	41,637	48,464	37,615	- -	- -	- -	- -	- -	- -
35 - 39	374	218	88	49	18	1	- -	- -	- -	- -
	48,649	46,605	55,118	49,591	$40,663	$22,556	- -	- -	- -	- -
40 - 44	309	161	61	35	35	15	2	- -	- -	- -
	46,561	42,462	54,024	48,132	48,231	54,359	$33,720	- -	- -	- -
45 - 49	305	140	47	43	23	41	11	- -	- -	- -
	50,617	45,627	60,993	51,490	45,435	55,318	59,693	- -	- -	- -
50 - 54	330	109	63	44	37	32	37	8	- -	- -
	49,289	45,775	47,614	48,075	48,292	54,715	59,388	$53,214	- -	- -
55 - 59	323	108	57	50	22	38	30	16	2	- -
	45,358	37,001	49,880	40,862	43,188	51,048	55,209	70,543	$46,737	- -
60 - 64	237	102	46	30	11	7	24	10	7	- -
	46,213	42,918	50,666	44,503	41,039	46,717	55,441	50,507	42,152	- -
65 - 69	91	37	24	15	6	3	3	- -	2	1
	44,132	44,940	43,203	40,870	42,894	39,830	45,473	- -	74,556	$40,898
70 & over	45	16	13	10	4	2	- -	- -	- -	- -
	47,492	53,720	44,602	41,753	55,026	30,077	- -	- -	- -	- -
Total	2,873	1,617	504	304	156	139	107	34	11	1
	$44,737	$40,842	$50,775	$45,696	$45,711	$52,542	$56,492	$60,573	$48,877	$40,898

EXHIBIT C – RECONCILIATION OF PARTICIPANT DATA

	Active Participants	Inactive Vested Participants	Disableds	Retired Participants	Beneficiaries	Total
Number as of January 1, 2018	**2,716**	**303**	**147**	**1,723**	**208**	**5,097**
• New participants	483	N/A	N/A	N/A	N/A	483
• Terminations – with vested rights	-48	48	0	0	0	0
• Terminations – without vested rights	-63	N/A	N/A	N/A	N/A	-63
• Retirements	-63	-29	N/A	92	N/A	0
• New disabilities	-1	0	1	N/A	N/A	0
• Return to work	2	-1	0	-1	N/A	0
• Died with beneficiary	0	0	0	-72	0	-72
• Died without beneficiary	0	0	-11	0	-16	-27
• Lump sum cash-outs	-284	-13	0	0	0	-297
• Rehire	0	0	N/A	0	N/A	0
• Certain period expired	N/A	N/A	0	0	0	0
• Data adjustments	131	20	0	57	0	208
• Active participants no longer accruing benefits	0	0	N/A	N/A	N/A	0
• New beneficiaries	0	0	0	0	15	15
Number as of January 1, 2019	**2,873**	**328**	**137**	**1,799**	**207**	**5,344**

EXHIBIT D – SUMMARY STATEMENT OF INCOME AND EXPENSES ON A MARKET VALUE BASIS

	Year Ended December 31, 2018		Year Ended December 31, 2017	
Net assets at market value at the beginning of the year		$391,827,316		$353,609,598
Contribution income:				
• Employer contributions	$31,065,227		$27,169,921	
• Employer contributions	8,246,577		7,677,009	
• Other contributions	507,195		729,180	
• Less administrative expenses	-243,972		-296,496	
Net contribution income		*$39,575,027*		*$35,279,614*
Investment income:				
• Interest, dividends and other income	$6,204,635		$5,121,449	
• Asset appreciation	-20,855,301		47,696,851	
• Less investment fees	-938,950		-911,777	
Net investment income		*-$15,589,616*		*$51,906,523*
Total income available for benefits		**$23,985,411**		**$87,186,137**
Less benefit payments		-$50,075,418		-$48,968,419
Change in market value of assets		**-$26,090,007**		**$38,217,718**
Net assets at market value at the end of the year		**$365,737,309**		**$391,827,316**

EXHIBIT E – SUMMARY STATEMENT OF PLAN ASSETS

	December 31, 2018	December 31, 2017
Cash equivalents	$33,356,057	$33,986,190
Total accounts receivable	$2,081,766	$3,477,329
Investments:		
• Stocks and Equity	$210,556,930	$207,380,801
• Fixed Income	69,183,824	101,075,840
• Alternatives	60,642,549	46,630,956
Total investments at market value	$340,383,303	$355,087,597
Total assets	$375,821,126	$392,551,116
Total accounts payable	-10,083,817	-723,800
Net assets at market value	**$365,737,309**	**$391,827,316**
Net assets at actuarial value	**$403,015,342**	**$388,233,310**

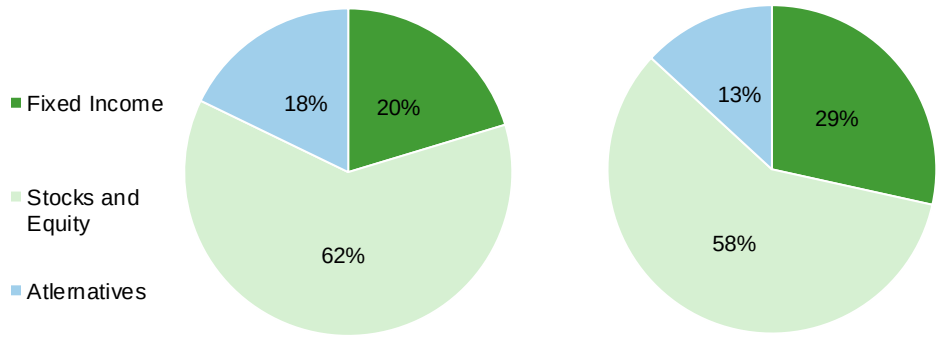


EXHIBIT F – DEVELOPMENT OF THE FUND THROUGH DECEMBER 31, 2018

Year Ended December 31	Employer Contributions	Employee Contributions	Other Contributions	Net Investment Return[1]	Admin. Expenses[2]	Benefit Payments	Market Value of Assets at Year-End	Actuarial Value of Assets at Year-End	Actuarial Value as a Percent of Market Value
2009	$12,614,236	$3,855,051	$1,418,335	$59,869,583	- -	$34,943,049	$310,155,431	$387,146,017	124.8%
2010	13,031,810	3,781,490	1,792,875	42,485,923	- -	36,838,681	334,408,848	384,105,611	114.9%
2011	19,917,899	4,087,034	2,281,255	-4,276,183	- -	38,809,216	317,609,637	379,526,159	119.5%
2012	19,010,841	5,155,380	1,685,729	35,842,303	- -	40,696,429	338,607,461	372,049,545	109.9%
2013	18,544,682	5,953,535	1,483,869	50,131,156	- -	42,265,089	372,455,614	365,102,483	98.0%
2014	20,306,887	6,193,573	1,677,851	15,155,075	- -	45,038,930	370,750,070	352,915,906	95.2%
2015	22,447,281	6,490,092	1,622,658	-14,044,748	- -	48,166,703	339,098,650	367,274,453	108.3%
2016	27,304,527	7,444,419	1,106,421	28,611,585	- -	49,956,004	353,609,598	377,748,008	106.8%
2017	27,169,921	7,677,009	729,180	51,906,523	296,496	48,968,419	391,827,316	388,233,310	99.1%
2018	31,065,227	8,246,577	507,195	-15,589,616	243,972	50,075,418	365,737,309	403,015,342	110.2%

[1] On a market basis, net of investment fees

[2] Information not available in prior actuary's reports

EXHIBIT G – DEFINITION OF PENSION TERMS

The following list defines certain technical terms for the convenience of the reader:

Actuarial Accrued Liability for Actives:	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial Accrued Liability for Pensioners and Beneficiaries:	The single-sum value of lifetime benefits to existing pensioners and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial Cost Method:	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
Actuarial Gain or Loss:	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.
Actuarially Equivalent:	Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV):	The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits:	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation:	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).
Actuarial Value of Assets (AVA):	The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.
Actuarially Determined:	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
Actuarially Determined Contribution (ADC):	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
Amortization Method:	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization Payment:	The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Assumptions or Actuarial Assumptions:	The estimates upon which the cost of the Fund is calculated, including: Investment return - the rate of investment yield that the Fund will earn over the long-term future;

	Mortality rates - the death rates of employees and pensioners; life expectancy is based on these rates; Retirement rates - the rate or probability of retirement at a given age or service; Disability rates – the probability of disability retirement at a given age; Withdrawal rates - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; Salary increase rates - the rates of salary increase due to inflation and productivity growth.
Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Open Amortization Period.
Decrements:	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.
Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
Funded Ratio:	The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.
GASB 67 and GASB 68:	Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.

Investment Return:	The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Net Pension Liability (NPL):	The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.
Normal Cost:	That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated.
Open Amortization Period:	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the actuarial assumptions are realized.
Plan Fiduciary Net Position:	Market value of assets.
Total Pension Liability (TPL):	The actuarial accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.
Unfunded Actuarial Accrued Liability:	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

Section 4: Actuarial Valuation Basis

EXHIBIT I – ACTUARIAL ASSUMPTIONS AND ACTUARIAL COST METHOD

Rationale for Assumptions	The information and analysis used in selecting each demographic assumption that has a significant effect on this actuarial valuation is from the 2006 – 2010 Actuarial Experience Study as performed by the prior actuary.
Net Investment Return:	7.50%
Salary Increases:	5.00%, compounded annually
Mortality Rates:	*Healthy*: RP 2000 Combined Healthy Mortality Table, set forward six years for males under age 70 and set forward four years for females under age 65, without projection *Disabled*: RP 2000 Disability Mortality Table, without projection No provision was made for future mortality improvement after the measurement date based on the professional judgment of the prior actuary.
Termination Rates before Retirement:	

	Rate (%)				
	Mortality[1]			Withdrawal after 5 years of Service[3]	
Age	Male	Female	Disability[2]	Male	Female
20	0.0378	0.0201	0.1650	24.04	17.63
30	0.0841	0.0435	0.1650	12.25	12.83
40	0.1616	0.1029	0.1350	6.68	6.00
50	0.4200	0.2424	0.5250	5.00	4.00
60	1.4409	0.8619	0.9150	5.00	4.00
70	2.2206	1.6742	0.9150	5.00	4.00
80	6.4368	4.5879	0.9150	0.00	0.00
90	18.3408	13.1682	0.9150	0.00	0.00

[1] Mortality rates shown for base table.

[2] All disabilities are assumed to be Ordinary Disabilities.

[3] For the first five years of service, turnover is as shown on the next page.

Turnover during first five years of service		
	Rate %	
Years of Service	Male	Female
0 but less than 1	40.0	35.0
1 but less than 2	35.0	30.0
2 but less than 3	20.0	20.0
3 but less than 4	20.0	20.0
4 but less than 5	15.0	15.0

Retirement Rates:	Employees are assumed to retire or enter DROP one year after the earliest of: • 30 years of service, • Age 60 and 10 years of service, • Age 65 and 20 years of service, or • Age plus service equaling 80. Employees who meet the criteria prior to the valuation date are assumed to retire three years after the valuation date.
Weighted Average Retirement Age:	Age 60, determined as follows: The weighted average retirement age for each participant is calculated as the sum of the product of each potential current or future retirement age times the probability of surviving from current age to that age and then retiring at that age, assuming no other decrements. The overall weighted retirement age is the average of the individual retirement ages based on all the active participants included in the January 1, 2018 actuarial valuation.
Retirement Age for Inactive Vested Participants:	62
Administrative Expenses:	0.3% of payroll
Unknown Data for Participants:	Same as those exhibited by participants with similar known characteristics. If not specified, participants are assumed to be male.
Benefit Election:	All participants are assumed to elect the life only form of payment.
Actuarial Value of Assets:	Market value of assets is averaged for the seven-year period ending on the valuation date by reflecting the actual cash flow and adjusting each prior year's market value to the current valuation date using the actuarial interest assumption in effect for each of the seven years.

Actuarial Cost Method:	Entry Age Actuarial Cost Method. Entry Age is the age at date of employment, or, if date is unknown, current age minus years of service. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by service, with Normal Cost determined using the plan of benefits applicable to each participant.
Justification for Change in Actuarial Assumptions:	There have been no changes in actuarial assumptions since the last valuation.

EXHIBIT II – SUMMARY OF PLAN PROVISIONS

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year:	January 1 through December 31
Plan Status:	Ongoing
Normal Retirement:	
Members Hired Prior to January 1, 2018	
Eligibility	Age 65 and 5 years of service
Amount	2.5% of average compensation times creditable service for the first 25 years plus 4.0% of average compensation times creditable service thereafter
Average Annual Compensation	Average annual compensation for highest consecutive 60 month period. Compensation for purposes of calculating a pension is capped at $200,000 per year.
Members Hired on or After January 1, 2018	
Eligibility	Age 65 and 5 years of service
Amount	1.9% of average compensation times creditable service
Average Annual Compensation	Average annual compensation for highest consecutive 60 month period. Compensation for purposes of calculating a pension is capped at $100,000 per year, adjusted for inflation as determined by the Trustees from time to time.
Unreduced Early Retirement:	
Members Hired Prior to January 1, 2018	
Eligibility	Any age with 30 years of service or age plus service equals 80
Amount	Normal Retirement amount, unreduced
Members Hired on or After January 1, 2018	
Eligibility	Any age with 30 years of service or age 62 with 20 years of service
Amount	Normal Retirement amount, unreduced

Early Retirement:	
Members Hired Prior to January 1, 2018	
Eligibility	Age 60 and 10 years of service
Amount	Normal Retirement amount, reduced by 3% per year prior to age 62
Minimum Retirement Benefit:	$3,600 per year for any member with at least 10 years of creditable service
Ordinary Disability:	
Eligibility	Any age with 10 years of service
Amount	75% of the benefit the member would have earned had they worked until age 65
Accidental Disability:	
Eligibility	Disability occurs as a result of an accident sustained while in the actual performance of duty, without willful negligence on the member's part
Amount	65% of the member's compensation for the 12 months preceding the accident, offset by any payments received from Workers Compensation
Vesting:	5 years of service
Spouse's Pre-Retirement Death Benefit:	
Death while an Active Member	
Member had less than three years of service at date of death	Refund of member contributions plus interest
Member had at least three years of service at date of death	Refund of member contributions plus interest plus 25% of the member's base pensionable earnings in the year preceding death plus 5% of the member's base pensionable earnings for each full year in excess of three years
Death after Separation from Service	
Not Retirement Eligible	Refund of member contributions plus interest
Retirement Eligible	Survivor's portion of 100% Joint and Survivor benefit with Pop-Up, payable as if member retired immediately prior to death
Post-Retirement Death Benefit:	Based on form of payment chosen by member upon retirement
Optional Forms of Benefits:	Life Only Annuity; 50% or 100% Joint and Survivor Pension with Pop-Up

DROP:	Members eligible for Normal Retirement or Unreduced Early Retirement may elect to defer receipt of their retirement benefits while continuing employment*. Upon the effective date of participating in the DROP, a member's years of service and Average Monthly Compensation become frozen for purposes of determining pension benefits. Additional service beyond the date of DROP participation no longer accrues any additional benefits under the Retirement System. Benefits that would have been payable are accumulated at interest to date of termination and paid in a single lump sum or in substantially equal payments over a period designated by the member but not to exceed 119 months. The interest rate shall be determined annually by the Trustees and credited as of each December 31st. *Members with at least 10 years of creditable service as of January 1, 2018 have a maximum DROP period of five (5) years; all other members have a maximum DROP period of three (3) years.
Contribution Rates:	
Member	6.0% of pensionable compensation
Employer	Actuarial Determined Contribution less member contributions
Changes in Plan Provisions:	The following plan provisions were effective January 1, 2018 for participants hired or on after January 1, 2018 and are reflected for the first time in this valuation: • Benefit multiplier changed to 1.90% for all years of service • 80 point provision eliminated for retirement eligibility • Age 60 with 10 years of service early retirement eligibility eliminated • Age 62 with 20 years of service retirement eligibility added • Pensionable earnings capped at $100,000, periodically adjusted for inflation by the Trustees • DROP period changed to 36 months • The funded percentage necessary for the approval of Cost of Living Adjustments (COLA's) was increased to 95%