CHEIRON Classic Values, Innovative Advice

Employees' Retirement System of the City of Baltimore

Experience Study Results for July 1, 2014 – June 30, 2018

Produced by Cheiron

November 2019

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LETTER OF TRANSMITTAL

November 18, 2019

Board of Trustees
Employees' Retirement System
Of the City of Baltimore
7 East Redwood Street
12th Floor
Baltimore, Maryland 21202-3470

Dear Board Members:

At your request, we have completed an experience study of the Employees' Retirement System of the City of Baltimore. Our study compares assumed versus actual experience with respect to all demographic and economic assumptions used in the preparation of the Actuarial Valuations for the four year period from July 1, 2014 through June 30, 2018.

This report presents the results of our study as well as alternative assumptions for consideration for changes to several of the actuarial assumptions to be employed for the June 30, 2019 Actuarial Valuation. It also includes the estimated cost impact of these assumption changes.

In preparing our report, we relied on information (some oral and some written) supplied by the System's staff. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

This experience study report was prepared exclusively for the Employees' Retirement System of the City of Baltimore for the purposes as stated above. Other users of this experience study report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This experience study does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

Sincerely,
Cheiron

Kenneth Kent, FSA, FCA, MAAA
Principal Consulting Actuary

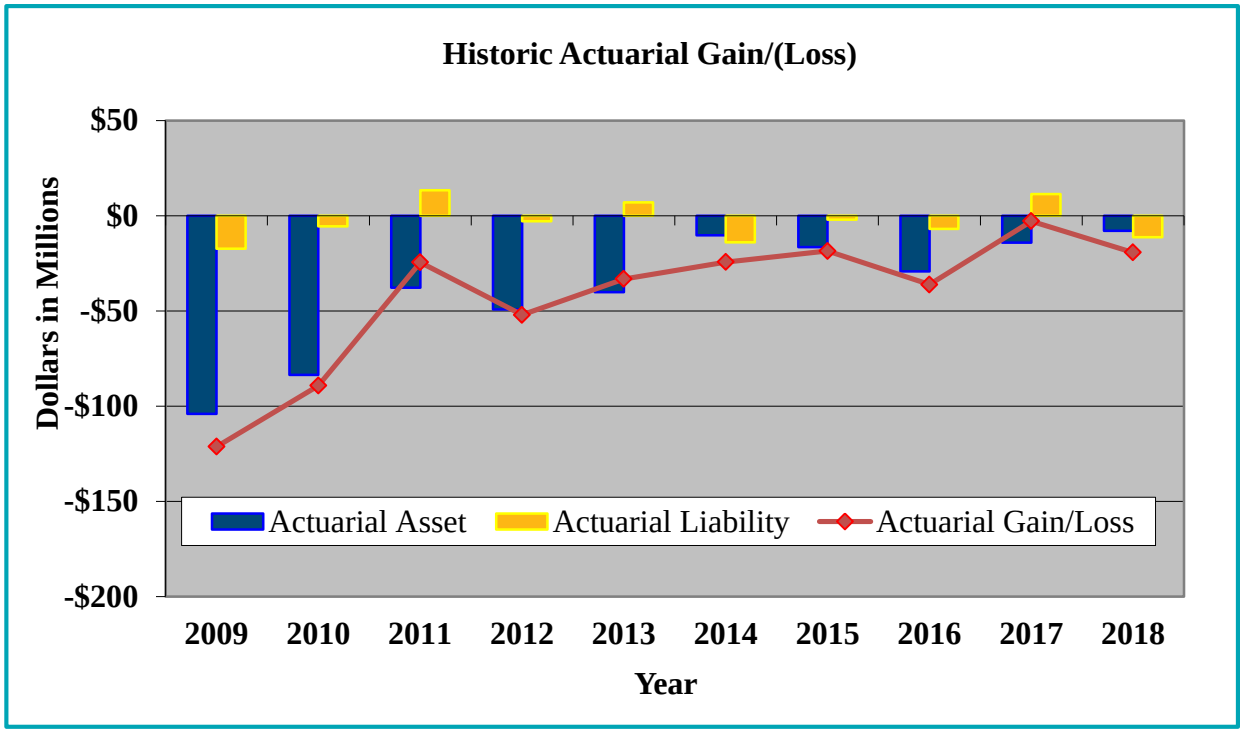
Anu Patel, FSA, MAAA, EA
Principal Consulting Actuary

SECTION I – BOARD SUMMARY

Actuarial assumptions (economic and demographic) are intended to be long-term in nature, and should be both individually reasonable and consistent in the aggregate. The purpose of this experience study is to evaluate whether or not the current assumptions adequately reflect the long-term expectations for the Employees' Retirement System of the City of Baltimore (the System), and if not, to provide alternative assumptions for implementation. It is important to note that frequent and significant changes in the actuarial assumptions are not typically recommended, unless there are known fundamental changes in expectations of the economy, or with respect to the System's membership or assets, that would warrant such changes.

We studied the System's experience with respect to both "demographic" and "economic" assumptions. Demographic assumptions deal with expected membership behavior including rates for retirement, termination, disability, and mortality. Economic assumptions deal with the System wide elements such as investment returns, inflation, salary increases due to merit/seniority, payroll growth, and administrative expenses. Salary increases can be considered either demographic (membership oriented) or economic (given the inflation component). For this study, we included salary experience under the economic portion of the study.

Before summarizing the key results of our experience study, we present in the graph below a historical review of the deviation of actual experience against anticipated experience based on the assumptions used in past actuarial valuations. The blue bars in the graph represent annual investment experience gains or losses (G/(L)), and the gold bars represent the annual liability experience gains or losses (G/(L)).



SECTION I – BOARD SUMMARY

In summary, the graph indicates that for seven out of ten years, the assumptions employed in each year's actuarial valuation produced a liability experience loss, which implies the current assumptions may understate liabilities. During the four years of our study the net gain/loss of liabilities relative to our assumptions was approximately $9.0 million (on average, $2.2 million per year) in actuarial losses. While this level of loss may be considered immaterial relative to the total System liabilities, the consistency suggests more conservative assumptions are appropriate.

On the investment side, the graph indicates that investment performance, based on the smoothed actuarial value of assets, was less than the assumed rate of return for all ten years. The average annual investment loss over the ten-year period was $39.3 million or 2.8% of the average annual market value of assets of $1.4 billion over this ten-year period. These losses are primarily due to the market downturn in 2009 and slower than expected market recovery. The investment assumption was lowered from 7.75% to 7.50% effective for the June 30, 2016 valuation and will be lowered from 7.50% to 7.00% for the upcoming June 30, 2019 valuation. The data supports this policy as well as continual review and reduction of the long-term investment/discount rate assumption.

The alternative assumptions presented are supported by the aggregate experience gains and losses that occurred during the four year period shown in the following table, which demonstrates losses on the asset side and gains and losses on the liability side for each of the past four years with net losses in the aggregate for each of the years covered in the study.

Table I-1

Year End June 30	Liability Gain/(Loss) ($ millions)	Asset Gain/(Loss) ($ millions)	Aggregate Gain/(Loss) ($ millions)
2015	$ (2.1)	$ (16.5)	$ (18.6)
2016	(6.9)	(29.2)	(36.1)
2017	11.3	(14.2)	(2.9)
2018	(11.3)	(7.9)	(19.2)
Total	$ (9.0)	$ (67.8)	$ (76.8)

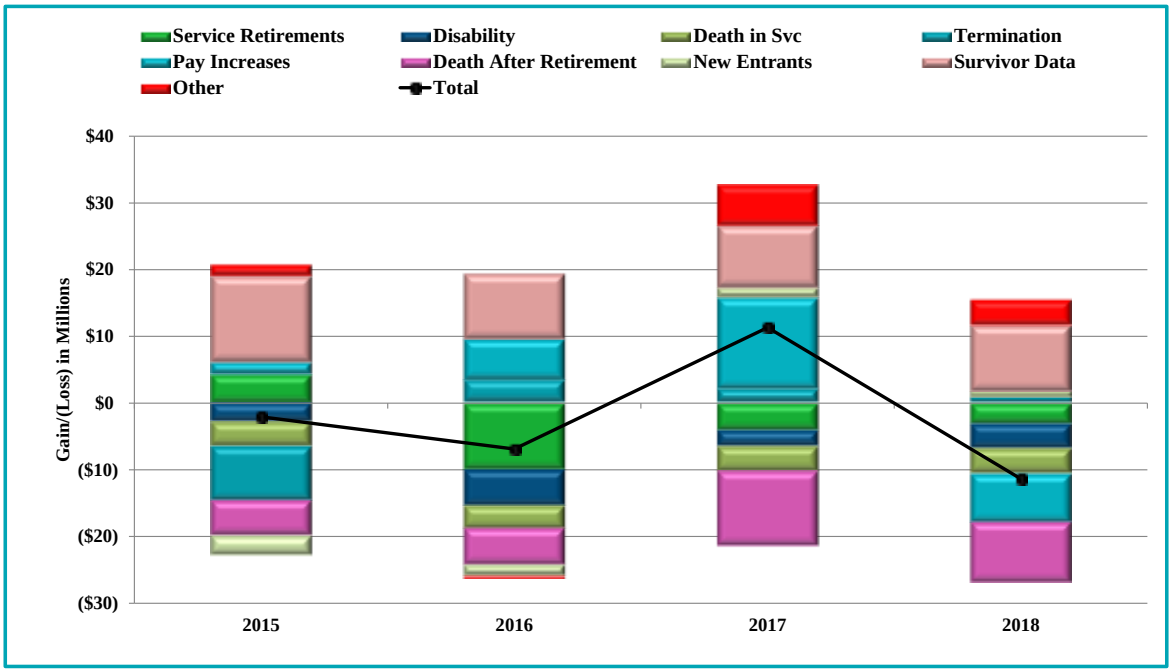
SECTION I – BOARD SUMMARY

Demographic Assumptions

The following table and graph show the liabilities losses by source as presented in the respective valuation reports.

Table I-2

Liability Gain/(Loss)	2015	2016	2017	2018	Total
Age and Service Retirements	$ 4,260,272	$ (9,845,827)	$ (4,022,386)	$ (3,075,729)	$ (12,683,670)
Disability Retirements	(2,782,359)	(5,382,947)	(2,408,817)	(3,661,969)	(14,236,092)
Death in Service Benefits	(3,654,698)	(3,438,876)	(3,744,473)	(3,749,303)	(14,587,350)
Withdrawal from Employment	(8,104,173)	3,387,836	2,028,808	795,204	(1,892,325)
Pay Increases	1,844,095	6,146,641	13,676,041	(7,289,225)	14,377,552
Death after Retirement	(5,274,408)	(5,540,615)	(11,221,059)	(9,078,182)	(31,114,264)
New Entrants	(2,953,695)	(1,623,091)	1,499,733	959,967	(2,117,086)
Survivor Data	12,895,685	9,800,000	9,322,705	9,906,075	41,924,465
Other	1,716,904	(393,094)	6,199,008	3,845,384	11,368,202
Total Actuarial Liability	$ (2,052,377)	$ (6,889,973)	$ 11,329,560	$ (11,347,778)	$ (8,960,568)



During the four years of the study, the net gain/loss on liabilities relative to our assumptions was approximately $8.96. If we examine gains/losses by assumption, there are specific assumptions which produce fairly consistent gains or losses. For example, there have been consistent losses on disability retirements which means more participants are retiring due to disability than anticipated under our assumptions each year. Similarly, we see gains on salary increases in three of the four years which means members are receiving a smaller increase than anticipated under our assumptions each year. The Death in Service and Death after Retirements are both showing

SECTION I – BOARD SUMMARY

consistent losses each year. While in aggregate the annual gains and losses from the demographic assumptions are reasonable, we believe adjustments to these assumptions could be made to reduce the consistent gains and losses on the individual sources.

Summary of principal experience study results and alternatives on demographic assumptions:

1. **Retirement –** Rates of retirement were lower than expected for all tiers. There could be a number of factors impacting members' behavior including the current economic environment, the trend for employees to work longer and beyond traditional retirement ages. It is expected that anticipated future experience is likely to reflect recent experience.

   The changes in retirement assumptions are supported when analyzing the total actual retirements versus expected number of retirements based upon the current assumptions over the four-year testing period. The ratio of actual divided by expected number of retirements during this period demonstrates how well the current assumptions meet the actual experience of the plan. Ideally, this ratio should be about 100% to show that the expected retirements approximately match the actual retirements. However, this ratio analysis must be balanced with the experience graphs (presented within the body of this report) and the data used to determine this ratio, because outlier age groups may skew this ratio accuracy.

   The alternative retirement tables suggested in this report decrease the retirement assumptions for all tiers.

2. **Termination –** Termination rates were higher than expected. The last experience study saw greater than expected terminations for the first seven years of service and smaller than expected for greater than seven years. The current study saw greater than expected terminations for the first fourteen years of service and smaller than expected for greater than 15 years. This trend in higher termination rates continues and at this time could be expected to continue.

   The alternative termination tables suggested in this report increase the termination assumptions for less than 15 years of service and slight decrease for 15 years or more of service.

3. **Disability** – We continued to combine the males and females for the analysis of the disability decrement. The actual rates of disability are higher than the expected rates of disability.

   Based on this information, we are providing alternative tables that increase the expected disability rates for all active participants.

SECTION I – BOARD SUMMARY

4. **Mortality** – Post-retirement mortality assumptions are typically developed separately by gender for both healthy annuitants and disabled annuitants. Pre-retirement mortality assumptions are also developed separately for males and females. Unlike most of the other demographic assumptions that rely exclusively on the experience of the plan, for mortality, standard mortality tables and projection scales serve as the foundation for the assumption which is then modified to better reflect the Systems experience.

   The Society of Actuaries (SOA) recently completed an extensive mortality study of public pension plan experience and issued a set of mortality tables named the Pub-2010 mortality tables which provide new insights into the composition of gender-specific pension mortality by factors such as job category (e.g.,General employees, Teachers, Public Safety), salary/benefit amount, health status (i.e.,healthy or disabled), geographic region and duration since event.

   In addition, there has been a long history of mortality improvement among pensioners in the U.S., and there is an expectation that mortality rates will continue to improve in the future. The recently completed project by the SOA concluded that mortality improvement in the U.S over the recent past "differed quite noticeably" from the prior standard projection scale (Scale AA). As a result, the MP-2018 scale is the most recent mortality improvement projection scale which has replaced Scale AA.

   The steps in our analysis of the mortality assumptions are as follows:

   1. Select a standard mortality table that is based on experience most closely matching the anticipated experience of the System.
   2. Compare actual experience of the System to what would have been predicted by the selected standard table for the period of the experience study.
   3. Adjust the standard table either fully or partially depending on the level of credibility for the System's experience. This adjusted table is called the base table.
   4. Select an appropriate standard mortality improvement projection scale and apply it to the base table.

   Similar to the methodology used to develop the Pub-2010 tables, when actual experience of the System is compared to that of the standard table, the experience is weighted based on the amount of benefit being paid for post-retirement mortality. Mortality studies in the U.S. have consistently shown that individuals with higher pension benefit have longer life expectancies than individual with lower pension benefit. It is important for a pension plan to use assumptions that are weighted to reflect the impact on liability.

   The alternative mortality tables suggested in this report are based on the steps followed above for the appropriate Pub-2010 mortality tables and the MP-2018 mortality improvement projection scale through 2022 until the next experience study is to be performed in response to the Retirement System experience.

The current and alternative assumptions can be found in Appendices A and B.

SECTION I – BOARD SUMMARY

5. **Survivor Data Dropoffs –** over at least the past four years we have seen material gains resulting from reporting on survivors. Each year, when retiree deaths are reported, for those members who have a joint and survivor form of payment we would expect there to be corresponding survivor records added. However, upon death not all retirees with a joint and survivor form of payment have matching survivor records presented resulting in gains compared to expected liabilities. To some degree some of this could be a function of delayed reporting of status changes. In any event the net result is this information seems to mask the experience for post-retirement mortality losses during this study period. To ignore these factors would result in overstating the expected experience losses going forward. Based on these factors, as long as the experience continues to exhibit this source of gains we propose adding a negative load to the actuarial liabilities for participants in pay status. The average gain over the last three years from this source is $9.7 million per year. We propose reducing the retiree liabilities by -5.0% to represent the present value of the average gains from this source.

   We suggest continuing to apply this discount as long as this experience source is demonstrated in the actuarial valuations to be material. If the gain source no longer is a factor because of changes in the way processed data is presented for valuation purpose, than the discount on liabilities should be removed without waiting for the next experience study.

Economic Assumptions

Since the last experience study, the markets continue to demonstrate a heightened degree of volatility with interest rates and inflation rates continuing to be at historic lows. The underlying alternative inflation assumption of 2.55% discussed below influences the direction of a number of different assumptions and benefit provisions. These include the salary growth rate or salary scale, and the long-term investment assumptions and discount rate.

1. **Investment Return Assumption/Discount Rate** - The discount rate assumption is generally the most significant of all the assumptions employed in actuarial valuations. The discount rate is based on the long-term expected return on plan investments. In the short-term, a higher discount rate results in lower expected contributions. But, over the long term, actual contributions will depend on actual investment returns and not the discount rate (or expected investment returns). If actual investment returns are lower than expected, contribution rates will increase in the future. It is important to set a realistic discount rate so that projections of future contributions for budgeting purposes will not be biased, particularly to be too low.

   The current investment return assumption is 7.50% net of expenses. The current liability weighted discount rate is 7.50% applied to measuring on active and terminated vested liabilities and 6.50% applied to measuring retiree participant liabilities. The discount rate is expected to decrease further to 7.00%/6.50% effective with the June 30. 2019 valuation.

   This assumption is defined by City Code based on the definition of *Regular Interest*, which has been amended from time based on advice of the actuary and investment consultant and recommendation by the Board of Trustees.

SECTION I – BOARD SUMMARY

2. **Inflation Assumption** – While this assumption does not have a direct impact on the valuation it is an underlying building block of the investment assumption and needs to be reviewed within this study. The current rate of 2.65%. Because inflation has remained low and long-term bond rates are relatively flat signaling the market expectation that inflation may stay low, we suggest the Board consider the implications of a 0.10% reduction in inflation by reducing the rate to 2.55%. This is still within the generally accepted range used by other public plans.

3. **Salary Increase** - The salary increase rate represents the year over year increase in pay of continuing actives. The current assumption is an annual increase based on the participants' age. Based upon the data, we provide an alternative assumption with lower salary increase.

Listed below are a summary of the assumptions that would be impacted.

Table I-3

Description	Current Assumption	Alternative Assumption
Inflation	2.65%	2.55%
Regular Interest Rate Pre Retirement	7.50%	7.00%
Regular Interest Rate Post Retirement	6.50%	6.50%
Salary Increase Rate	3.50%	3.40%

Cost Impact of Assumption Changes

The alternative assumptions that will ultimately be selected by the Retirement Board are anticipated to be measured for their financial impact and considered for implementation with the July 1, 2019 actuarial valuation which determines the June 30, 2021 fiscal year-end contribution.

In aggregate the changes in demographic and economic assumptions would result in an increase of the System costs from 21.55% to 22.59% as a percent of pay, an increase of 1.03%. If applied to the 2018 valuation results, there is an increase in actuarial liabilities resulting in a decrease of the funded status from 74.1% to 72.8%, a decrease of 1.2%.

The balance of this report presents the rationale for these alternative assumptions. In Section II, we present comments and exhibits supporting the alternative assumptions with respect to the demographic assumptions.

SECTION II – DEMOGRAPHIC ASSUMPTIONS

Part of our analysis is dependent on whether there is sufficient data to represent a true trend in participant behavior. We call this credibility, determining whether there are enough participants exposed to an event like mortality or disability to reflect a real distinction from say national statistics over just the exposures within the System. To determine this we perform statistical analysis and create a "confidence level" around the data. If this confidence level is relatively high we can say the data reflects a real trend.

We calculate the 90 percent confidence interval, which represents the range within which the true decrement rate during the experience study period falls 90% of the time. (If there is insufficient data to calculate a confidence interval, the confidence interval is shown as the entire range of the graph.) We generally propose assumption changes when the current assumption is outside the 90 percent confidence interval of the observed experience. However, adjustments are made to account for differences between future expectations and historical experience, to account for the past experience represented by the current assumption, and to maintain a neutral to slight conservative bias in the selection of the assumption. For mortality rates, we compare the System's experience to that of a standard table and adjust the standard table to the extent the System's experience is large enough to be credible.

We also calculate an r-squared statistic for each assumption. R-squared measures how well the pattern of the assumption fits the pattern of the actual data and can be thought of as the percentage of the variation in actual data explained by the assumption. Ideally, r-squared would equal 100% although this is never the case. Generally, alternative assumption changes should increase the r-squared compared to the current assumption making it closer to 100%.

Also, we aggregate participants for the demographic assumption review when there is insufficient data at individual ages to provide credible information. For example, for the retirement assumption review for, participants 70+ are aggregated because analyzing the retirement trends for active participants 70 and older at each age would not provide enough occurrences of deaths to be considered credible data. By aggregating the data at 70+, there are more participants in this group which reflects a higher level of confidence around the experience – demonstrated by a smaller confidence interval within which the true value is expected.

Typically, we would like the assumptions to fall within the confidence interval, especially if this confidence interval is narrow. At the same time, it is important not to change an assumption too much from the previous assumption because anomalies in the data that occurred for one or two years could skew the results. Suggested alternative assumptions are updated by reviewing the prior assumptions and the current confidence intervals as well as participant behavior that is believed to be inconsistent with the past and future behavior.

When applying the assumptions to the data at the end points (for example, age 70+ retirement assumption review), the current assumptions and alternative assumptions will often fall outside the confidence interval. This is to be expected due to the aggregation of the data at these points and is the one exception to the general goal of choosing assumptions that will be within the confidence interval.

SECTION II – DEMOGRAPHIC ASSUMPTIONS

1. Retirement Rates

A. Current Assumptions

Normal Retirement assumptions for the System start at the later of age 60 and eligibility for Normal Retirement (earlier of age 65 with five years of service or 30 years of service).

The Early Retirement assumptions are defined for retirement prior to age 60 provided a participant meets one of the two Normal Retirement eligibility requirements (earlier of age 65 with five years of service or 30 years of service).

Once a member reaches age 70, we assume 100% probability of retirement.

B. Experience

The current assumptions vary based on age and service. Overall, the actual retirements during the study period were lower than expected (see the Results section outlined in item D below). The experience shows lower ratios of actual to expected retirements at most ages regardless of service.

C. Alternative

We propose modifying the rates for certain ages. The alternative retirement rates are provided in the next section.

D. Results

The following tables and graphs compare three items; the number of people eligible for retirement, the number of people expected to retire based on the current assumptions, and the number of people expected to retire based on the alternative assumptions. They also illustrate how decreasing the retirement assumptions for all participants the assumptions are more in-line with the confidence intervals. For participant retirements above or below 30 years of service, the confidence intervals are relatively narrow at most ages.

The current assumption is separated into those who have less than 30 years of service, those with 30 years of service and those with more than 30 years of service.

In general, retirements over the period of the study have been less than anticipated. We recommend a reduction in some of the retirement rate assumptions to better match expected experience with what has been observed.

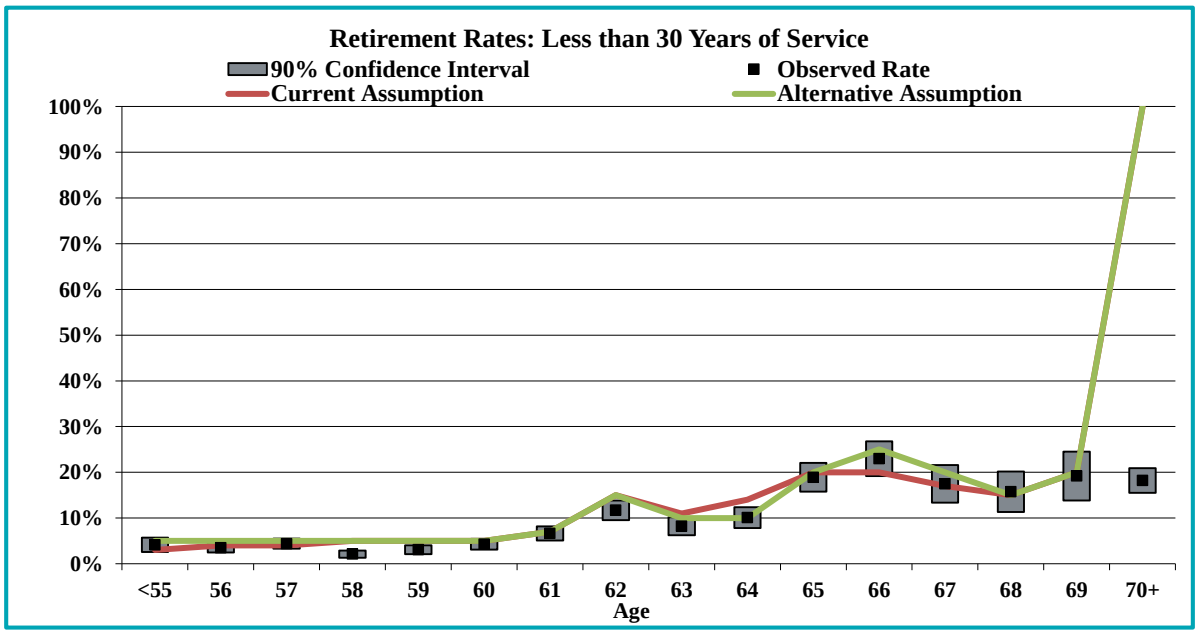
In addition, there is a provision for job removal programs which provide for immediate retirement on an unreduced basis prior to age 55. Because these retirements cannot be assumed based on eligibility, we suggest continuing to assume a load of 1.75% on the active retirement liability.

SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-R1

Retirement Rates - < 30 Years of Service						
		Retirements			Actual to Expected Ratios	
Age	Exposures	Actual	Current	Alternative	Current	Alternative
<=54	8	1	-	-	0%	0%
55	436	18	13	22	138%	83%
56	919	32	37	46	87%	70%
57	932	41	37	47	110%	88%
58	900	19	45	45	42%	42%
59	845	26	42	42	62%	62%
60	772	33	39	39	85%	85%
61	695	46	49	49	95%	95%
62	616	72	92	92	78%	78%
63	537	44	59	54	74%	82%
64	475	48	67	48	72%	101%
65	418	79	84	84	94%	94%
66	331	76	66	83	115%	92%
67	229	40	39	46	103%	87%
68	184	29	28	28	105%	105%
69	146	28	29	29	96%	96%
70	560	102	560	560	18%	18%
Total	**4,963**	**597**	**1,111**	**1,110**	**54%**	**54%**
R-squared			**0.8147**	**0.9471**		

Chart II-R1

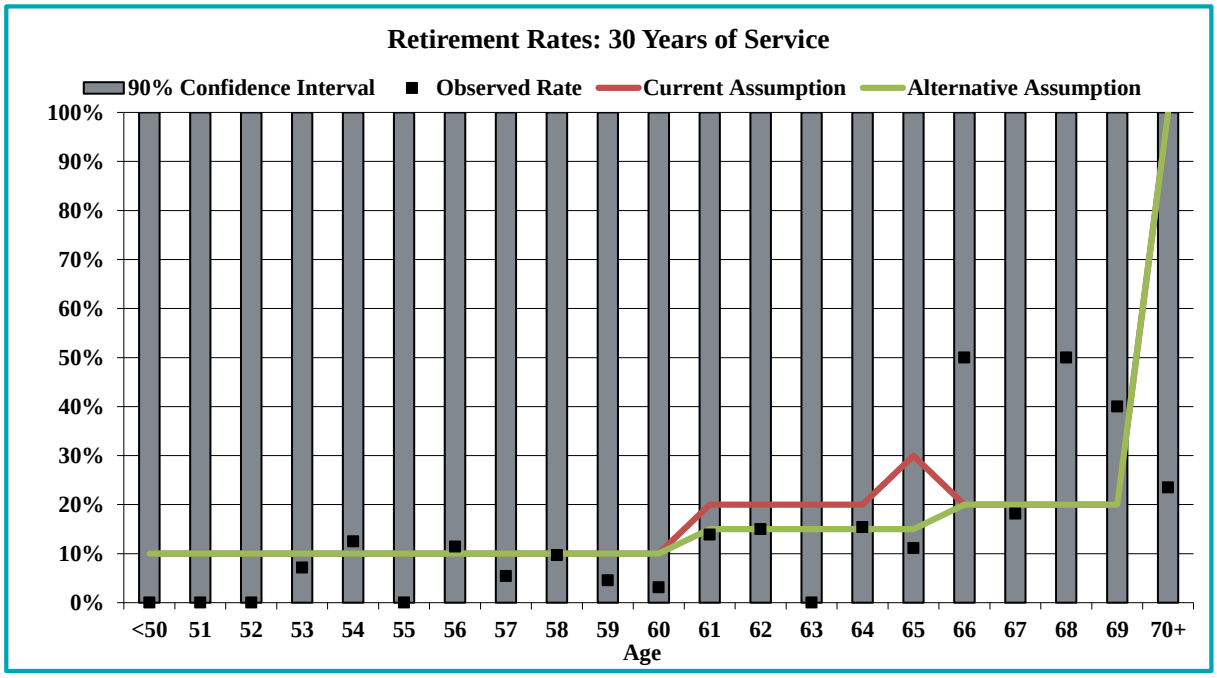


SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-R2

Retirement Rates - 30 Years of Service						
		Retirements			Actual to Expected Ratios	
Age	Exposures	Actual	Current	Alternative	Current	Alternative
50	6	0	1	1	0%	0%
51	8	0	1	1	0%	0%
52	13	0	1	1	0%	0%
53	14	1	1	1	71%	71%
54	16	2	2	2	125%	125%
55	17	0	2	2	0%	0%
56	35	4	4	4	114%	114%
57	37	2	4	4	54%	54%
58	31	3	3	3	97%	97%
59	44	2	4	4	45%	45%
60	32	1	3	3	31%	31%
61	36	5	7	5	69%	93%
62	20	3	4	3	75%	100%
63	12	0	2	2	0%	0%
64	26	4	5	4	77%	103%
65	9	1	3	1	37%	74%
66	4	2	1	1	250%	250%
67	11	2	2	2	91%	91%
68	2	1	0	0	250%	250%
69	5	2	1	1	200%	200%
70	17	4	17	17	24%	24%
Total	**354**	**38**	**64**	**58**	**59%**	**65%**
R-squared			**0.4777**	**0.4438**		

Chart II-R2

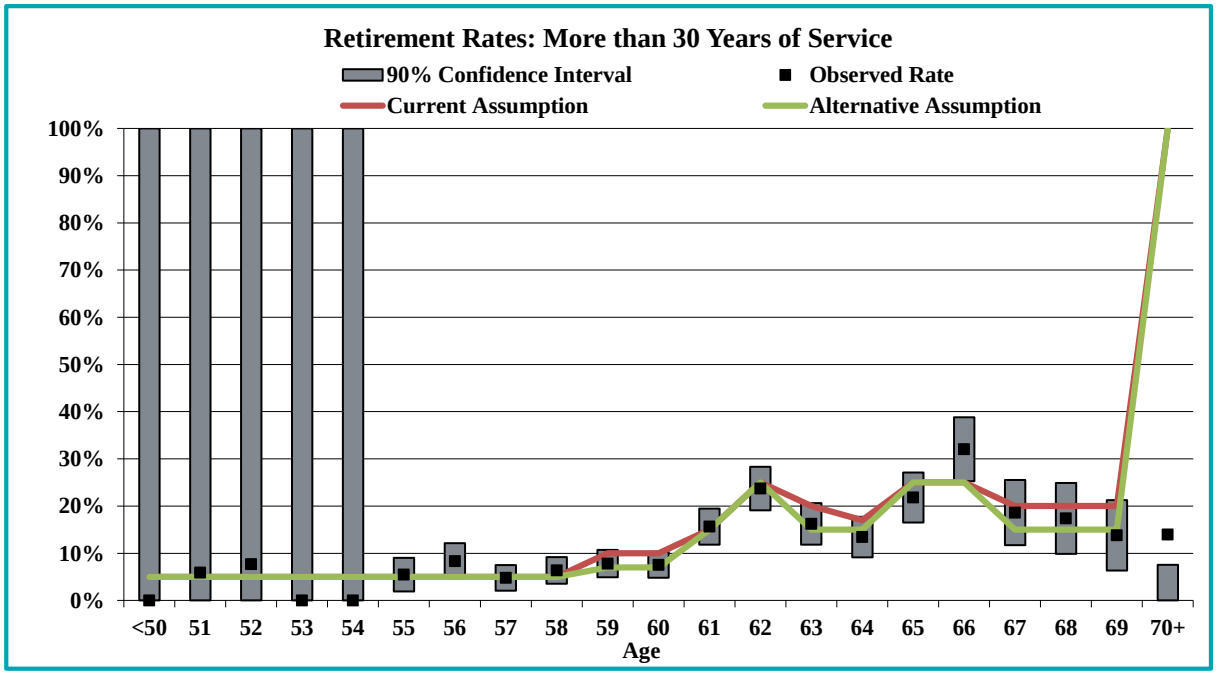


SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-R3

Retirement Rates - 30+ Years of Service						
		Retirements			Actual to Expected Ratios	
Age	Exposures	Actual	Current	Alternative	Current	Alternative
50	4	0	0	0	0%	0%
51	17	1	1	1	118%	118%
52	39	3	2	2	154%	154%
53	57	0	3	3	0%	0%
54	89	0	4	4	0%	0%
55	110	6	6	6	109%	109%
56	144	12	7	7	167%	167%
57	167	8	8	8	96%	96%
58	204	13	10	10	127%	127%
59	231	18	23	16	78%	111%
60	252	19	25	18	75%	108%
61	243	38	36	36	104%	104%
62	232	55	58	58	95%	95%
63	191	31	38	29	81%	108%
64	171	23	29	26	79%	90%
65	165	36	41	41	87%	87%
66	128	41	32	32	128%	128%
67	86	16	17	13	93%	124%
68	69	12	14	10	87%	116%
69	58	8	12	9	69%	92%
70	229	32	229	229	14%	14%
Total	**2,886**	**372**	**596**	**558**	**62%**	**67%**
R-squared			**0.9379**	**0.9569**		

Chart II-R3



SECTION II – DEMOGRAPHIC ASSUMPTIONS

The current and alternative assumptions are summarized in Appendix A and B, respectively.

2. Rates of Termination of Employment

A. Current Assumptions

The current termination assumptions are based on service with lower rates of turnover the longer a participant has been employed with the City.

B. Experience

Overall, the actual terminations appear higher than expected for participants for all years of service.

C. Alternative

We propose slight modifications to the rates. The alternative termination rates are provided in the next section.

D. Results

The following tables and graphs compare three items; the number of people eligible for the termination decrement, the number of people expected to terminate based on the current assumptions, and the number of people expected to terminate based on the alternative assumptions.

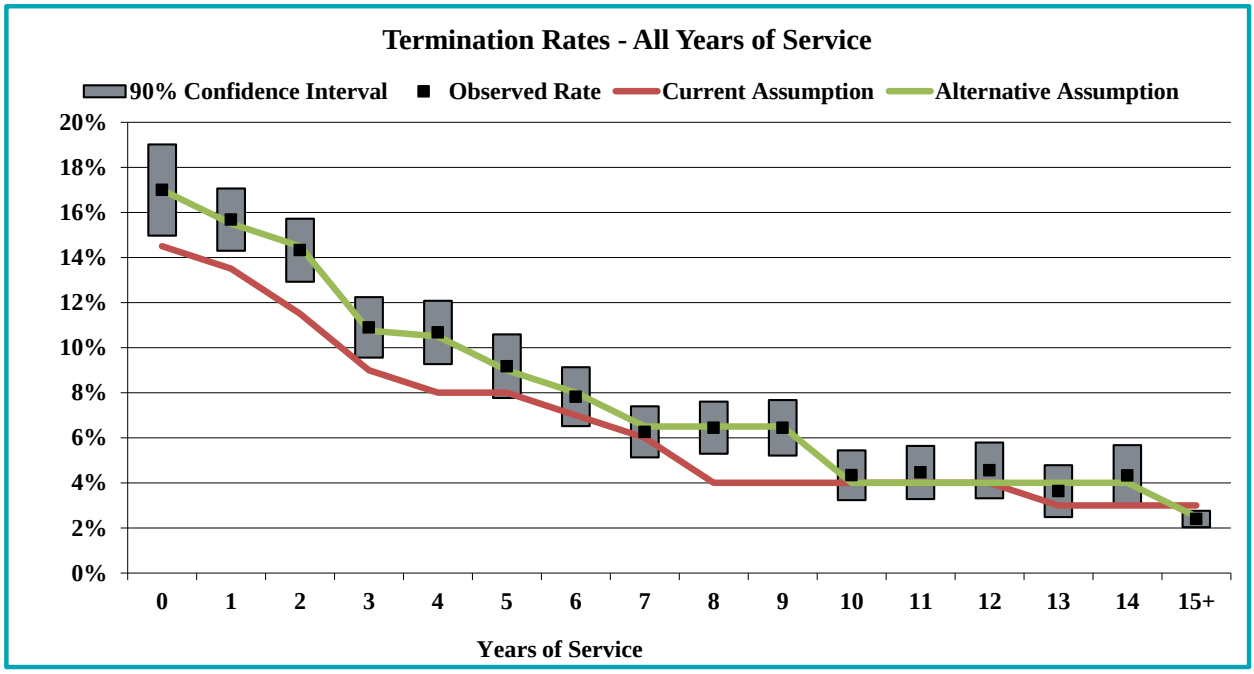
The alternative assumptions bring the rates either within the confidence intervals or closer to the confidence intervals on the graph.

SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-T1

Termination Rates - All Years of Service						
		Terminations			Actual to Expected Ratios	
Svc	Exposures	Actual	Current	Alternative	Current	Alternative
0	930	158	135	158	117%	100%
1	1,882	295	254	292	116%	101%
2	1,690	242	194	245	125%	99%
3	1,450	158	131	156	121%	101%
4	1,312	140	105	138	133%	102%
5	1,134	104	91	102	115%	102%
6	1,138	89	80	91	112%	98%
7	1,230	77	74	80	104%	96%
8	1,226	79	49	80	161%	99%
9	1,072	69	43	70	161%	99%
10	923	40	37	37	108%	108%
11	830	37	33	33	111%	111%
12	769	35	31	31	114%	114%
13	716	26	21	29	121%	91%
14	624	27	19	25	144%	108%
15+	4,683	112	140	117	80%	96%
Total	**21,609**	**1,688**	**1,436**	**1,682**	**118%**	**100%**
R-squared			**0.9788**	**0.9994**		

Chart II-T1



SECTION II – DEMOGRAPHIC ASSUMPTIONS

3. Disability Rates

A. Current Assumptions

The current disability assumptions vary by age with higher expected incidence of disability the older the participant.

B. Experience

Overall, the actual number of participants becoming disabled was higher than expected.

C. Alternative

We propose increasing the rates from ages 40 to 64.

D. Results

The following tables and graphs compare three items; the number of people eligible to become disabled, the number of people expected to become disabled based on the current assumptions, and the number of people expected to become disabled based on the alternative assumptions. The alternative assumptions bring the ratios closer to one, which implies the number of people we expect to become disabled is closer to the actual number of people who were disabled. The alternative assumptions bring the rates within the confidence intervals where we have credible amounts of data on the graph. The data is not credible at the younger ages as illustrated by the wider confidence intervals.

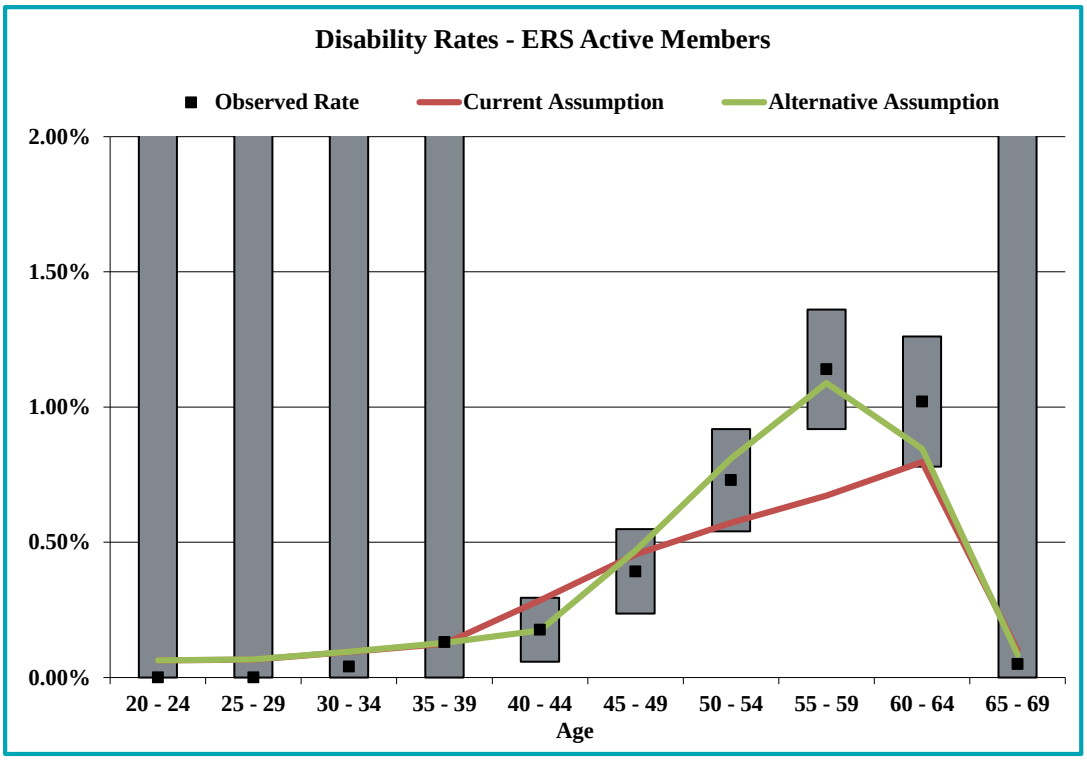
We are not proposing any changes to the form of payment elected by disabled retirees at this time. The current assumptions are summarized in Appendix A.

SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-D1

Disability Incidence Rates - ERS Actives						
Age Band	Exposures	Disabilities			Actual to Expected Ratios	
		Actual	Current	Alternative	Current	Alternative
20 - 24	143	0	0	0	0%	0%
25 - 29	1,182	0	1	1	0%	0%
30 - 34	2,500	1	2	2	42%	42%
35 - 39	3,058	4	4	4	105%	102%
40 - 44	3,403	6	10	6	62%	101%
45 - 49	4,333	17	20	20	86%	84%
50 - 54	5,483	40	31	44	128%	90%
55 - 59	6,229	71	42	68	170%	105%
60 - 64	4,704	48	37	40	128%	121%
65 - 69	2,017	1	2	2	50%	59%
70 +	863	2	0	0	77250%	4585%
Total	**33,915**	**190**	**149**	**187**	**127%**	**101%**
R-squared			**0.8370**	**0.8786**		

Chart II-D1



SECTION II – DEMOGRAPHIC ASSUMPTIONS

4. Mortality Rates

A. Current Assumptions

Active Lives

For non-line-of-duty mortality the RP-2000 Healthy Mortality with projections using 50% of the AA scale projected 15 years with a three-year set forward for both males and females. For line-of-duty mortality, 0.005% at all ages.

See sample rates below

Age	Non-Line-of-Duty Death* Male	Non-Line-of-Duty Death* Female	Line-of-Duty Death*
25	0.000365	0.000211	0.000050
30	0.000608	0.000365	0.000050
35	0.000928	0.000551	0.000050
40	0.001223	0.000837	0.000050
45	0.001687	0.001271	0.000050
50	0.002546	0.001942	0.000050
55	0.004570	0.003694	0.000050
60	0.008876	0.007366	0.000050
65	0.016084	0.012950	0.000050
69	0.024553	0.019903	0.000050

* Rates for individuals who are the age shown as of June 30, 2018

Retired Healthy Lives

RP 2000 Healthy Mortality with projections using 50% of the AA scale projected 15 years with a two-year set forward for both males and females.

Retired Disabled Lives

RP 2000 Disabled Mortality with generational projections using 50% of the AA scale projected 15 years with a four-year set forward for both males and females.

SECTION II – DEMOGRAPHIC ASSUMPTIONS

See sample rates below

	Retirees and Beneficiaries*		Disabled Members	
Age	Male	Female	Male	Female
55	0.004067	0.003275	0.035243	0.019556
60	0.007763	0.006412	0.042824	0.02562
65	0.014467	0.011715	0.053651	0.034033
70	0.024368	0.019903	0.069235	0.047093
75	0.042215	0.032115	0.093052	0.063837
80	0.074656	0.053410	0.125150	0.088989

* Rates for individuals who are the age shown as of June 30, 2018

B. Experience

Active Lives

Deaths among active lives is typically too small of a group and may not provide meaningful statistics on pre-retirement mortality in a four-year period. We have combined the terminated vested group of participants with the actives to provide a larger sampling of data. Together, there were about 38,000 exposures in total which provides a large enough sampling to analyze this group. The actual mortality rates were less than the expected rates.

Retired Healthy Lives

For mortality for retirees and beneficiaries we have about 32,400 exposures to compare actual versus expected experience. The tables in the next section show actual and expected experience among members for retirees and beneficiaries combined. The actual mortality among retirees and beneficiaries were lower than expected for both males and females.

Retired Disabled Lives

Mortality for disabled lives gives us an even smaller group to analyze actual versus expected experience. However, based upon the data, the actual mortality among disabled lives was slightly less than expected for males under age 70 and higher than expected for males over age 70. For females, actual mortality among disabled lives was slightly higher than expected under age 70 and lower than expected over age 70.

C. Alternatives

In general, we propose updating from the Retired Pensioners 2000 (RP 2000) mortality tables to the Public Retirement Plans (Pub-2010) mortality tables as these mortality tables are based on more recent mortality experience based exclusively on public-sector plan experience.

SECTION II – DEMOGRAPHIC ASSUMPTIONS

Active Lives

The active mortality measurement is too small statistically to create an entirely new mortality table. However, the data is large enough to use a current mortality table and adjust accordingly to the current mortality experience. We propose the use of the standard Pub-2010 Total General Employee Below-Median mortality table as published by the Society of Actuaries adjusted by 125% for males and 185% for females and with future improvement through 2022 using scale MP-2018 for non-line-of-duty mortality. We recommend no change to the line-of-duty mortality rates.

Retired Healthy Lives

We propose the standard Pub-2010 General Retiree Below-Median Weighted mortality table as published by the Society of Actuaries adjusted by 115% for males and 125% for females and with future improvement through 2022 using SOA's Scale MP-2018.

Retired Disabled Lives

We propose the Pub-2010 General Disabled Annuitant mortality table as published by the Society of Actuaries adjusted by 163% for males and 145% for females and with future improvement through 2022 using SOA's Scale MP-2018.

D. Results

The following tables and graphs compare three things; the number of people exposed to the mortality assumption, the number of people expected to die based on the current assumptions, and the number of people expected to die based on the alternative assumptions. Note, for the annuitant analysis, the experience is weighted based on the amount of benefit being paid. Also, the tables show the calculation of actual-to-expected (A/E) ratios. As you can see, the alternative assumptions bring the ratios closer to 100% of the actual experience for the active and disabled mortality review. While there is not much variation between the current and alternative mortality tables used for retirees and beneficiaries, we still recommend updating the mortality table to the more recently published Pub-2010 tables.

The current assumptions are summarized in Appendix A.

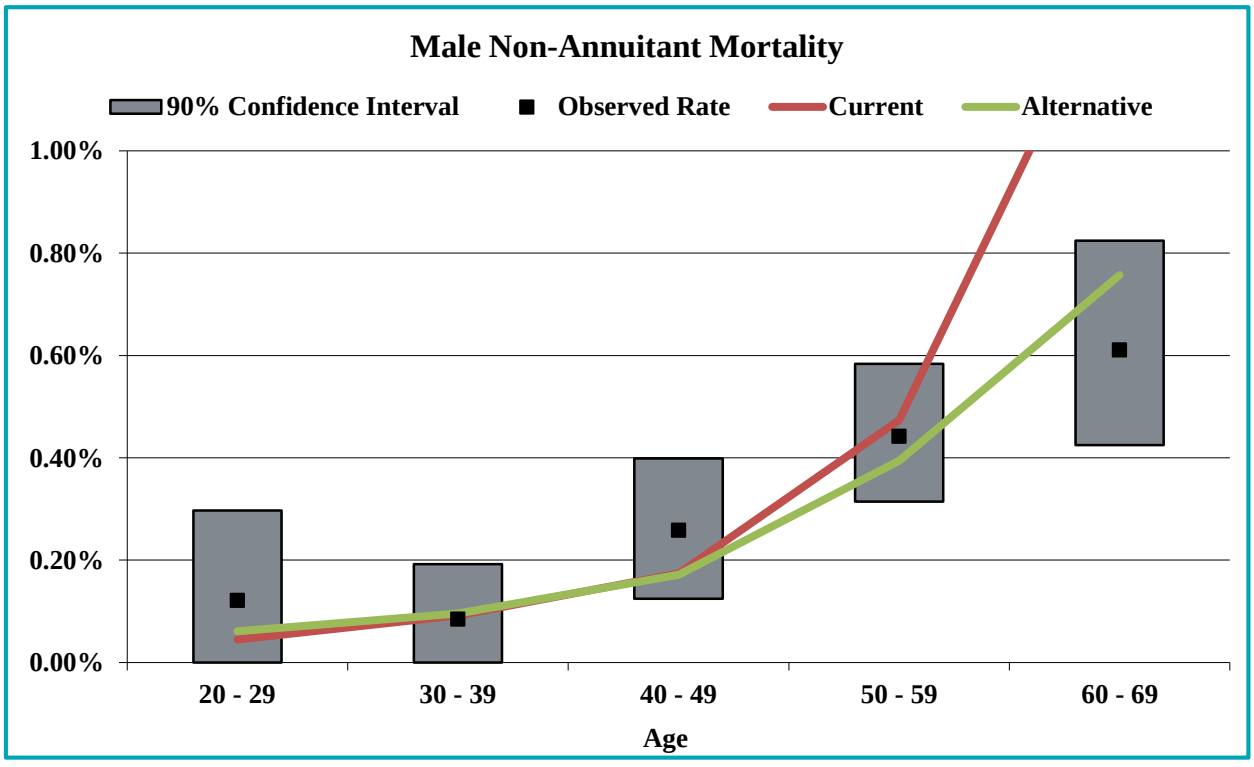
SECTION II – DEMOGRAPHIC ASSUMPTIONS

Active Mortality Analysis

Table II-M1 – Active Males

Non-Annuitant Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratio	
				Actual	Current	Alternative	Current	Alternative
20 - 29	673	1	25,344,735	30,722	11,435	15,403	269%	199%
30 - 39	2,597	4	118,647,077	100,663	109,232	113,960	92%	88%
40 - 49	4,013	13	175,097,790	452,752	304,359	300,110	149%	151%
50 - 59	6,681	38	278,736,705	1,232,496	1,320,228	1,099,076	93%	112%
60 - 69	4,002	44	182,145,100	1,112,195	2,484,057	1,378,696	45%	81%
70 +	548	11	20,221,852	269,440	76,315	279,717	353%	96%
Total	**18,514**	**111**	**800,193,260**	**3,198,269**	**4,305,626**	**3,186,963**	**74%**	**100%**

Chart II-M1

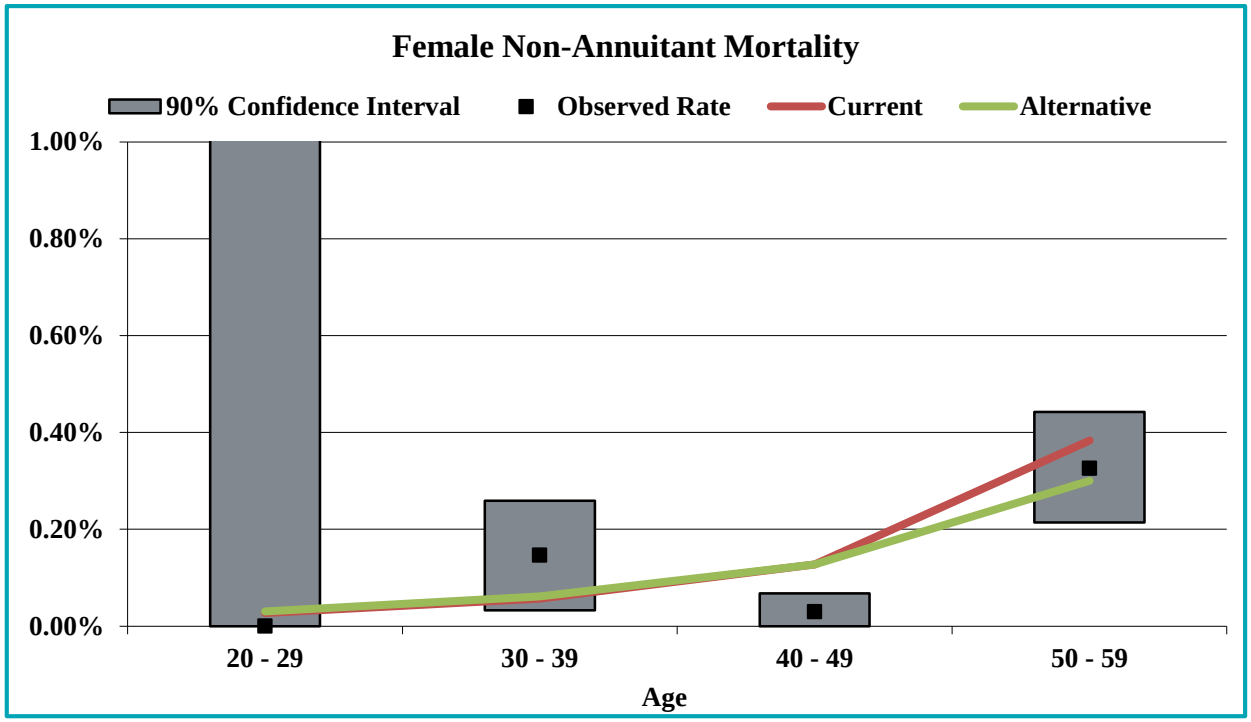


SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-M2 – Active Females

Non-Annuitant Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratio	
				Actual	Current	Alternative	Current	Alternative
20 - 29	654	0	25,958,759	0	7,037	7,960	0%	0%
30 - 39	3,088	7	144,792,334	212,207	81,724	89,276	260%	238%
40 - 49	4,450	4	195,503,265	57,977	249,110	249,230	23%	23%
50 - 59	7,013	37	270,312,289	881,749	1,036,364	811,187	85%	109%
60 - 69	3,899	44	150,551,033	1,038,568	1,672,050	891,095	62%	117%
70 +	488	8	15,629,306	75,971	28,735	211,019	264%	36%
Total	**19,592**	**100**	**802,746,985**	**2,266,472**	**3,075,019**	**2,259,767**	**74%**	**100%**

Chart II-M2

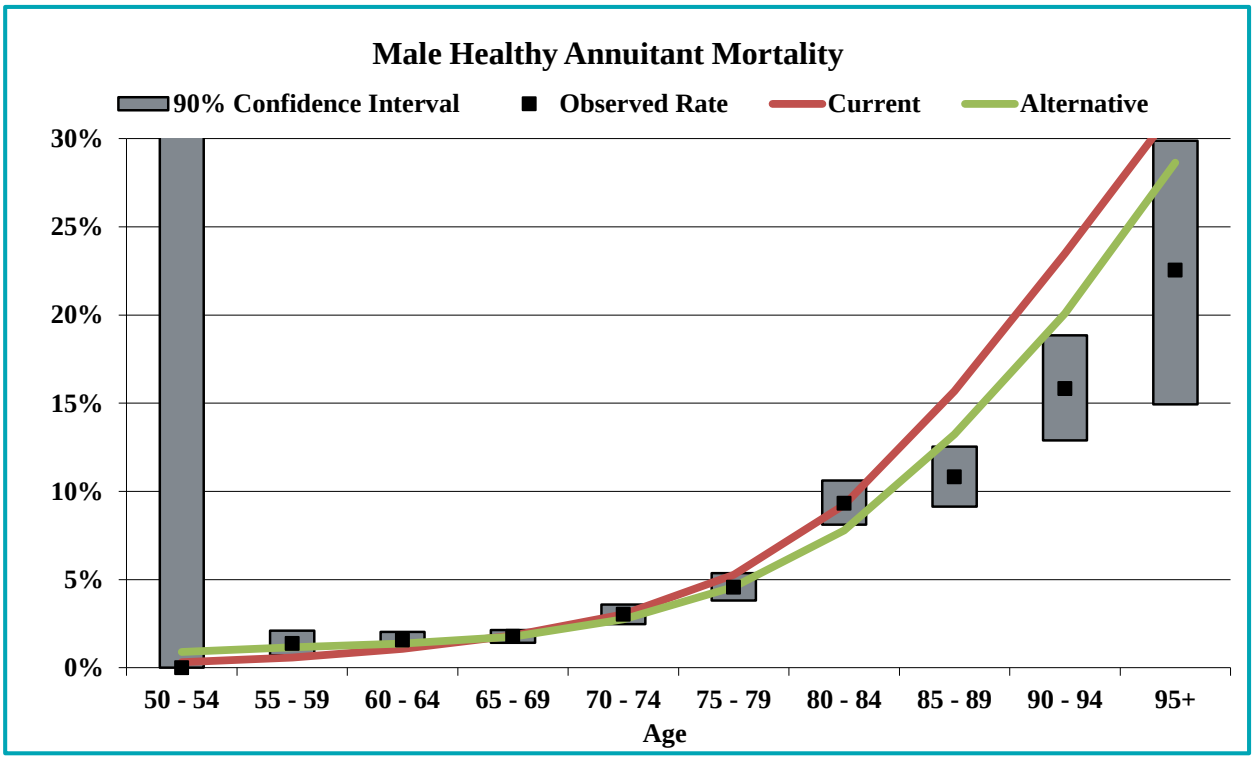


SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-M3 - Inactives Males

Healthy Annuitant Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Alternative	Current	Alternative
50 - 54	87	-	184,131	-	567	1,659	0%	0%
55 - 59	711	13	1,055,241	14,371	6,042	12,231	238%	117%
60 - 64	1,916	36	3,273,417	51,216	35,223	44,915	145%	114%
65 - 69	3,269	68	5,952,714	105,242	108,954	104,521	97%	101%
70 - 74	2,628	100	4,642,881	140,213	140,977	127,210	99%	110%
75 - 79	1,992	105	3,426,828	156,601	180,506	156,848	87%	100%
80 - 84	1,431	131	2,330,651	217,384	215,041	181,373	101%	120%
85 - 89	941	112	1,387,773	150,130	217,719	183,597	69%	82%
90 - 94	419	78	639,725	101,284	150,281	128,575	67%	79%
95 +	87	21	114,336	25,774	36,303	32,739	71%	79%
Total	**13,481**	**664**	**23,007,697**	**962,216**	**1,091,611**	**973,668**	**88%**	**99%**

Chart II-M3

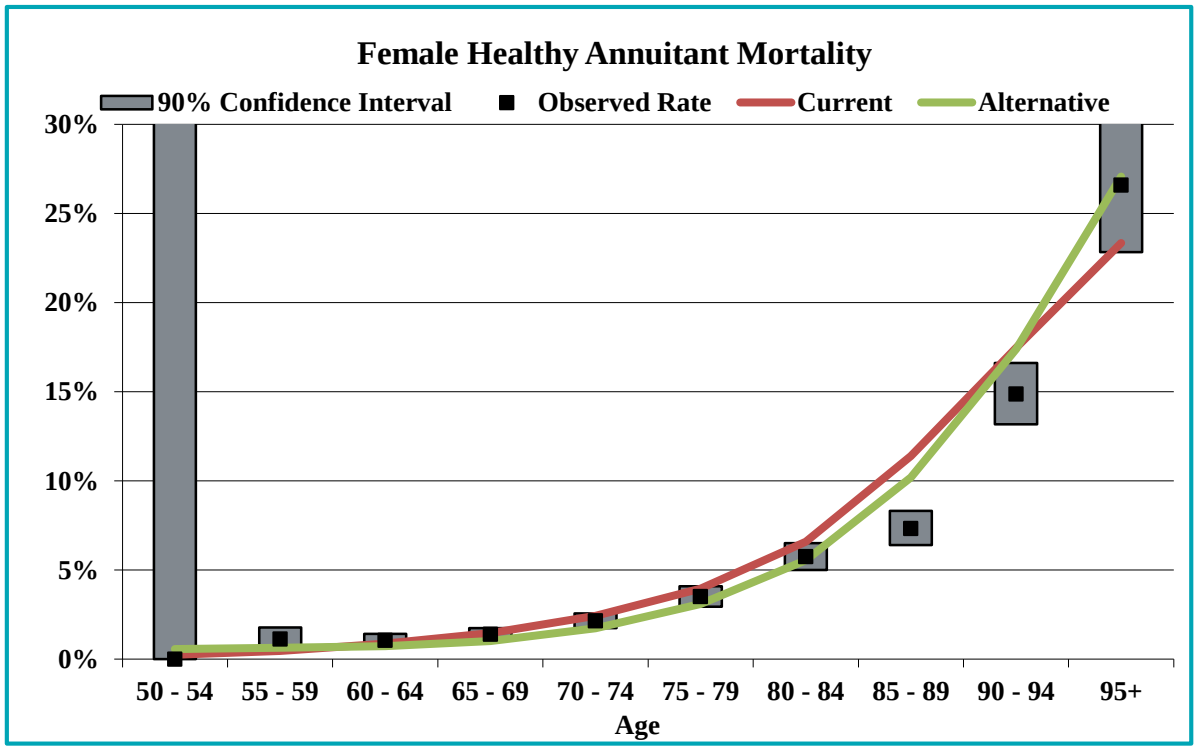


SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-M4 – Inactives Females

Healthy Annuitant Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Alternative	Current	Alternative
50 - 54	176	0	212,567	0	522	1,209	0%	0%
55 - 59	904	11	1,179,498	13,174	5,460	7,576	241%	174%
60 - 64	2,187	24	2,901,022	30,304	25,240	21,193	120%	143%
65 - 69	3,521	56	4,489,318	62,872	65,489	45,335	96%	139%
70 - 74	3,225	77	3,709,543	79,251	90,213	64,339	88%	123%
75 - 79	2,792	115	2,682,160	93,954	105,906	82,863	89%	113%
80 - 84	2,594	147	2,165,317	124,364	142,616	120,071	87%	104%
85 - 89	1,985	166	1,615,725	118,480	184,151	164,557	64%	72%
90 - 94	1,131	179	796,277	118,457	139,111	138,592	85%	85%
95 +	359	93	220,032	58,512	51,360	59,575	114%	98%
Total	**18,874**	**868**	**19,971,460**	**699,368**	**810,067**	**705,309**	**86%**	**99%**

Chart II-M4

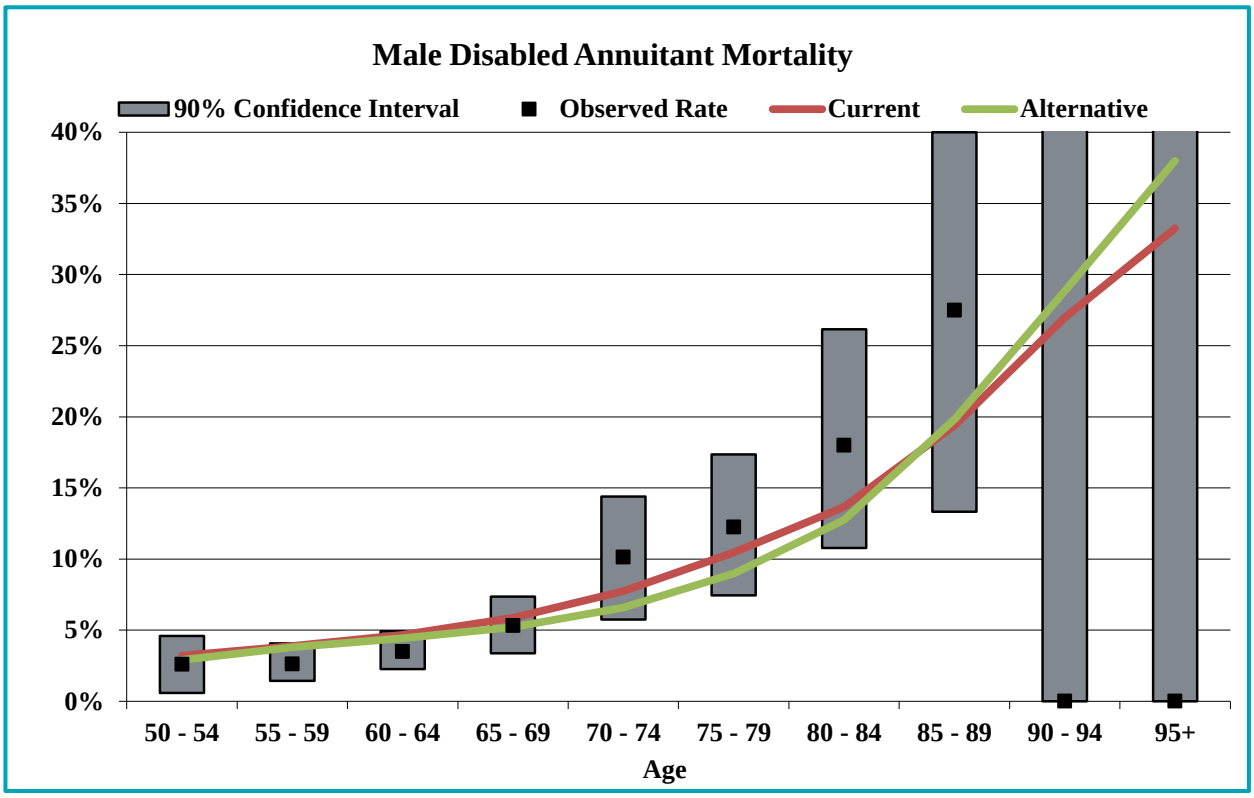


SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-M5 – Disabled Males

Disabled Annuitant Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Alternative	Current	Alternative
50 - 54	174	4	135,750	3,526	4,357	3,926	81%	90%
55 - 59	417	13	387,707	10,176	15,019	14,702	68%	69%
60 - 64	487	17	469,201	16,357	21,897	20,773	75%	79%
65 - 69	326	21	345,604	18,374	20,254	17,978	91%	102%
70 - 74	139	18	138,842	14,072	10,746	9,144	131%	154%
75 - 79	121	17	104,815	12,828	10,964	9,401	117%	136%
80 - 84	65	9	77,539	13,952	10,593	9,883	132%	141%
85 - 89	30	11	35,745	9,827	6,932	7,089	142%	139%
90 - 94	11	0	19,857	0	5,357	5,729	0%	0%
95 +	6	0	6,640	0	2,207	2,522	0%	0%
Total	**1,776**	**110**	**1,721,701**	**99,111**	**108,327**	**101,149**	**91%**	**98%**

Chart II-M5

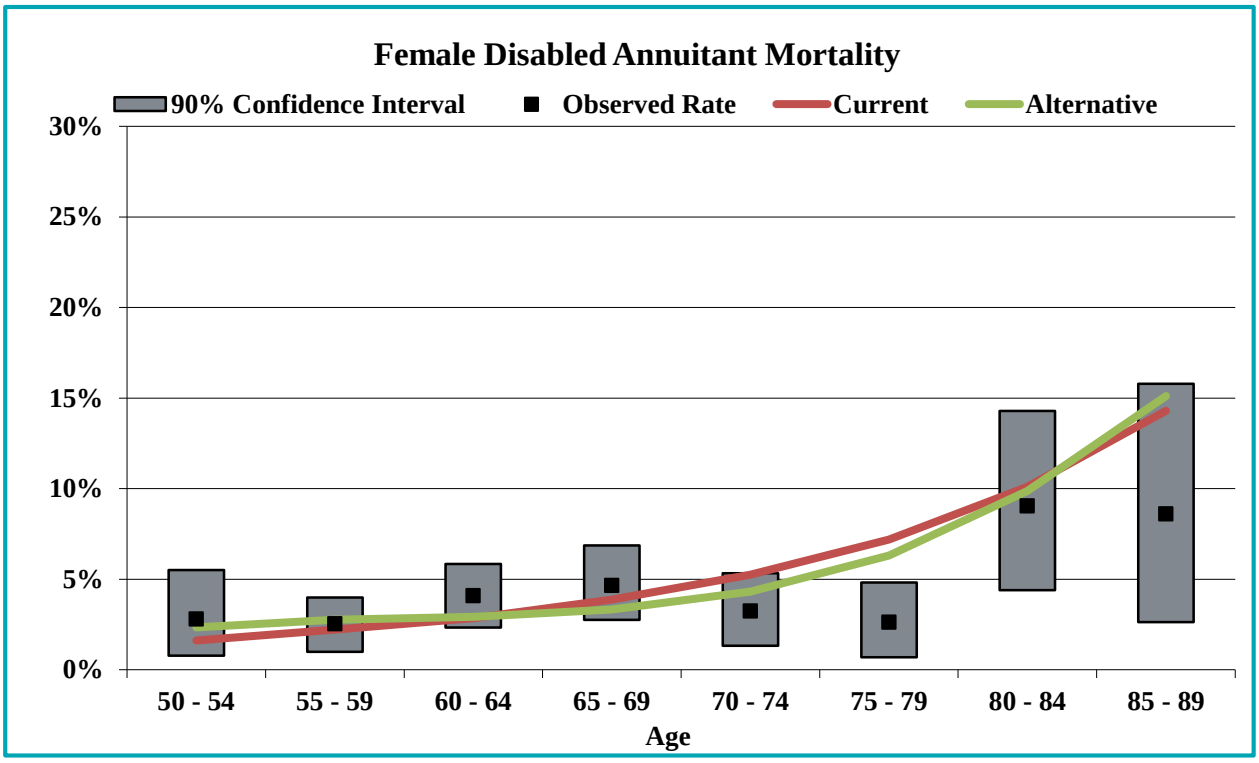


SECTION II – DEMOGRAPHIC ASSUMPTIONS

Table II-M6 – Disabled Females

Disabled Annuitant Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Alternative	Current	Alternative
50 - 54	127	4	89,422	2,499	1,448	2,099	173%	119%
55 - 59	300	9	232,294	5,901	5,165	6,424	114%	92%
60 - 64	342	12	258,865	10,577	7,392	7,587	143%	139%
65 - 69	291	16	219,839	10,213	8,543	7,319	120%	140%
70 - 74	225	9	197,438	6,408	10,379	8,517	62%	75%
75 - 79	145	4	103,974	2,730	7,484	6,567	36%	42%
80 - 84	91	9	51,935	4,700	5,247	5,133	90%	92%
85 - 89	38	6	26,711	2,301	3,822	4,038	60%	57%
90 - 94	31	6	24,774	6,250	4,855	5,275	129%	118%
95 +	9	2	5,943	1,477	1,417	1,782	104%	83%
Total	**1,599**	**77**	**1,211,193**	**53,057**	**55,751**	**54,740**	**95%**	**97%**

Chart II-M6



SECTION III – ECONOMIC ASSUMPTIONS

In section III, we present information with respect to the economic assumptions including the following:

1. Inflation
2. Rate of Investment Return/Discount Rate
3. Rate of Salary Growth

All of these assumptions are interrelated with their foundation as a reflection of the underlying inflation during the period. For example, the rate of investment return may be split into two components. One is the "real rate" of return to the investor and the other compensates for inflation.

Similarly, the rate of salary growth may be separated into the inflation rate plus components for "productivity" or real wage increase and merit and seniority scale.

In developing recommendations for these assumptions, several factors are considered:

- historical data in general (i.e. the markets)
- historical experience of the plan
- outlook for the future
- assumptions used by other public sector plans

1. Inflation

A. Current Assumptions

The inflation rate is an underlying aspect of all economic assumptions. In a growing economy, wages, and investments are expected to grow at the underlying inflation rate plus some additional real growth rate, whether it reflects productivity in terms of wages or risk premiums in terms of investments. The difference between other economic assumptions relative to the long-term underlying rate of inflation is an important measure. The current assumption for inflation is 2.65%.

B. Experience

1. *Historical Experience in General*

Based on the Consumer Price Index for all Urban Consumers – U.S. City Average (CPI-U), Table III-1 on the next page shows the inflation rates for the past 20 years. The current 2.65% rate of inflation exceeds the rate of inflation over the last five years (as shown in Table III-1) but it is generally accepted that this is a historically unusual period for this measurement.

SECTION III – ECONOMIC ASSUMPTIONS

Table III-1

Urban Consumers Average (CPI-U)	
Year Ending June 30,	**Increase in CPI-U**
1999	1.96%
2000	3.73%
2001	3.25%
2002	1.07%
2003	2.11%
2004	3.27%
2005	2.53%
2006	4.32%
2007	2.69%
2008	5.02%
2009	-1.43%
2010	1.05%
2011	3.56%
2012	1.66%
2013	1.75%
2014	2.07%
2015	0.12%
2016	1.00%
2017	1.63%
2018	2.87%
1999-2018	2.20%
2009-2018	1.42%
2014-2018	1.54%

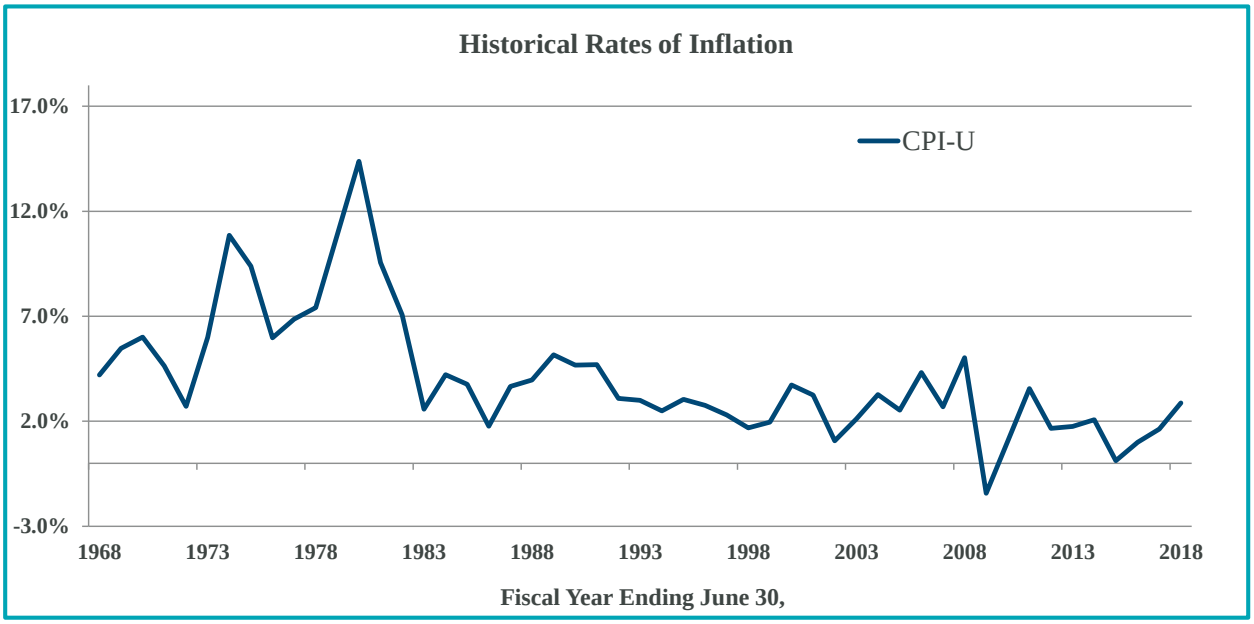
The inflation rates have declined significantly over the past 20 years, especially in the past eight years due in part to the Federal Reserve's decision to keep treasury rates low to stimulate the economy. However, there are indications that this rate will increase in the future.

2. *Market Expectations*

While the market data implies a lower rate the historic data shows much more volatility in the rates and continues to support the current assumption. Over the last 30 years, the geometric average inflation rate has been 2.60%.

SECTION III – ECONOMIC ASSUMPTIONS

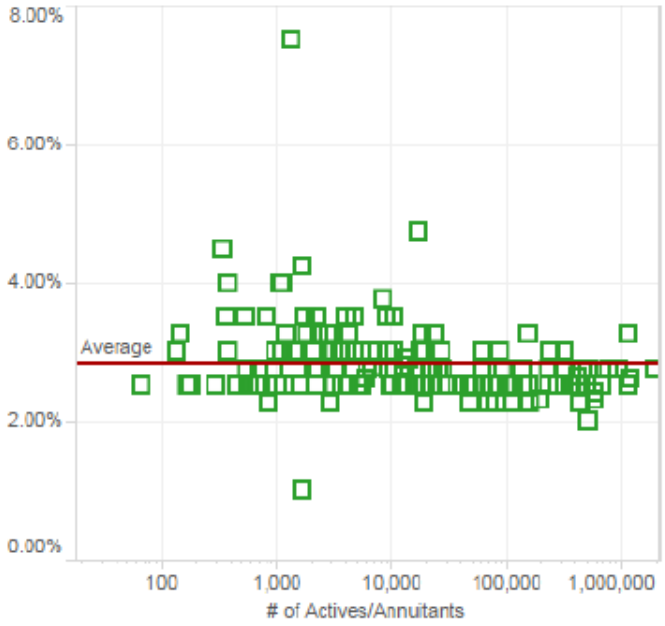
Chart III-1



The *National Conference on Public Employee Retirement Systems* (NCPERS) January 2019 Public Retirement Systems Study includes the following graphic of respondents' inflation assumptions:

SECTION III – ECONOMIC ASSUMPTIONS

Chart III-2



While this shows that the current 2.65% assumption is lower than the average inflation assumptions used among the 167 systems that responded to this study, with 2.80% as the average the average continues to decline each year.

Based on these considerations, we believe a reasonable range for long-term price inflation for use in the System's actuarial valuations is between 2.0% and 3.0%. Given the markets and forecasters indicate lower expectations of future inflation we propose a reduction in the inflation rate from 2.65% to 2.55% in response to the continued general trend in inflation.

2. Rate of Investment Return/Discount Rate

A. Current Assumptions

The Retirement Systems' assets are assumed to earn 7.50% net of expenses. The investment consultants have generally trended their expectation down to a value closer to 7.00% or lower over the long term. The discount rate for measuring liabilities is a liability weighted value based on the *regular interest rate* defined in the City code of 7.50% for active liability and 6.50% for liability of participants in pay status. Based on the 2018 Actuarial Valuation this liability weighted discount rate was 6.93%.

SECTION III – ECONOMIC ASSUMPTIONS

B. Experience

1. Historical Experience in General

Table III-2 provides the rates of investment returns experienced by the Retirement System during the last ten fiscal years. Rates of return were computed as the ratio of the net investment earnings to market value of asset.

Current Assumption: 7.50% per annum pre-retirement; 7.00% effective June 30, 2019
6.50% per annum post-retirement

Table III-2

Investment Returns on Market Value of Assets	
Year Ending June 30,	**Return**
2009	-19.30%
2010	11.20%
2011	19.59%
2012	1.62%
2013	12.38%
2014	15.73%
2015	4.25%
2016	2.68%
2017	10.95%
2018	8.71%
Compounded Averages up to June 30, 2018	
Last 5 Years (2014 - 2018)	8.36%
Last 10 Years (2009 - 2018)	6.24%

The investment returns on a five-year basis are higher than the current assumption while the investment returns on a ten-year basis are lower than the current assumption as the ten-year average still incorporates the financial market decline during 2008 and 2009. This is reflected in the difference between the five- and ten-year averages as of June 30, 2018.

However long-term investment return expectations on assets should not be the sole measure used in the determination of the value of liabilities under the Retirement System. The higher this assumption the greater the risk that the measure of liabilities could be understated and the Retirement System costs will increase in the future. Reducing the investment return/discount rate increases the liability measurement; reducing the risk of future Retirement System cost increases.

The expected return and discount rate measuring pre-retirement liabilities will be reduced from 7.50% to 7.00% effective for the June 30, 2019 valuation.

SECTION III – ECONOMIC ASSUMPTIONS

2. Outlook for the future

The first table shows expected average annual rates of return on the asset classes in which this System invests. The rates were provided to us by the investment consultant, Marquette Associates, Inc. The total rate of return includes both income (dividends and interest) and capital appreciation. The table also shows the "real" rate of return, net of the 2.55% long-term inflation assumptions.

Table III-3

Asset Class Benchmark	FYE 2018 Benchmark Mean Return	Real Rate of Return
U.S. Equity - S&P 500	7.46%	4.91%
Non U.S Equity	7.53%	4.98%
Real Estate	8.29%	5.74%
Fixed Income	4.32%	1.77%
Defensive Equity	6.40%	3.85%
Private Equity	10.70%	8.15%

Table III-4

Asset Class	Allocation
U.S. Equity - S&P 500	29%
Non U.S Equity	21%
Real Estate	13%
Fixed Income	23%
Defensive Equity	5%
Private Equity	9%

The investment consultant (Marquette Associates, Inc.) has provided, that based on their projected returns by class and the asset allocation, the System's portfolio is predicted to produce a long-term return rate of 7.92%. We believe that by utilizing an assumption that is below the expected return rate the Board can reduce the downside risk with the current asset allocation and/or reduce the risk within the asset allocation.

Taking into account that the System pays investment advisors to assist in developing and maintaining its portfolio includes the cost of investments. For purposes of setting the actuarial assumption for return, it is important that we take these fees into consideration and use a net return. During the study period the System has paid investment fees as follows:

SECTION III – ECONOMIC ASSUMPTIONS

Table III-5

Plan Year Ending June 30,	Market Value of Assets*	Investment Expenses	Expenses as a % of MVA
2015	$ 1,499,236,391	$ 9,321,676	0.62%
2016	1,531,934,267	9,138,196	0.60%
2017	1,516,932,382	8,914,009	0.59%
2018	1,627,026,498	8,639,822	0.53%
Total	$ 6,175,129,538	$ 36,013,703	0.58%

* Asset value as of the beginning of the year

The net real rate of return assumption from this development would be around 7.34% (7.92% minus 0.58% for expenses).

The System applies rates to the valuation of liabilities that are supported by the assets. For active participants the assumption is 7.50%, and for retirees the assumption is 6.50%. The liability weighted rate of return in each of the four years measured is shown below.

	June 30,			
	2015	2016	2017	2018
Liability Weighted Return	7.09%	6.94%	6.93%	6.93%

As more and more of the liabilities of the System shift to participants in pay status, the average interest rate declines. This in turn lowers the long-term expected rate of return and allows for the target asset allocation to be adjusted to better secure funds to meet a higher proportion of benefit payments.

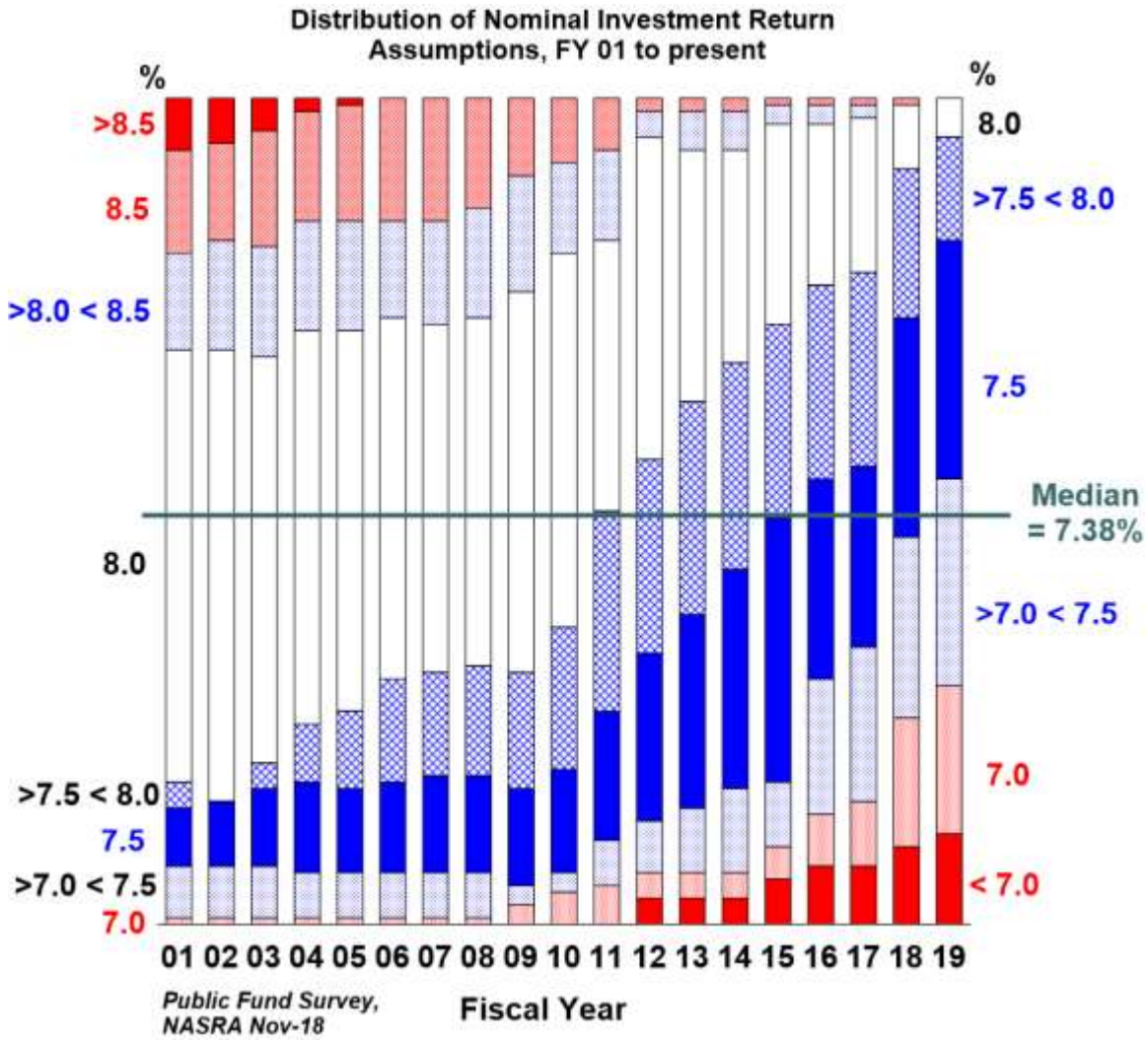
While the liability weighted return is below the net investment return, the opportunity to create additional margin and reduce the frequency and magnitude of future investment losses is an important consideration.

3. Other Public Sector Plans

The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The Public Fund Survey covers 126 large retirement systems. Chart II-2 shows the change in the distribution of assumptions since 2001. The median assumption is now 7.38% and the number of systems using a discount rate of 7.00% or lower has increased significantly. The System's expected return is 7.00% effective for the June 30, 2019 valuation.

SECTION III – ECONOMIC ASSUMPTIONS

Chart III- 3



C. Alternatives

Based on historical returns; both in the general markets and actual for the Retirement System, as well as other plans' assumptions, the Retirement System's expected 7.00% assumption effective for June 30, 2019 valuation is within the range of acceptable investment return assumptions.

SECTION III – ECONOMIC ASSUMPTIONS

3. Salary Increase

A. Current Assumptions

The current salary increase assumption is an age-based assumption.

B. Experience

The average salary increase over the testing period is 3.87%, slightly lower than the expected rate of 3.94%. If we compare the actual salary increases to the salary increase that we expected, we can see that the actual increase was relatively in line with expectation. The Table III-6 on the following page shows the total salary increase rate experienced during the four-year study period for sample ages.

C. Recommendations

Given that actual increases have been slightly lower the expected salary increase rate for most ages and salary increases are a reflection of the underlying rates of inflation and based upon the data, we recommend lowering salary increase rate assumptions by 0.10% to take into account for the suggested decrease in the inflation rate and to better reflect actual experience.

D. Results

The following Table III–6 shows a sample of age-based salary increase rate that might be applied when analyzing the data over the Fiscal Years 2014 through 2018.

SECTION III – ECONOMIC ASSUMPTIONS

Chart III-4

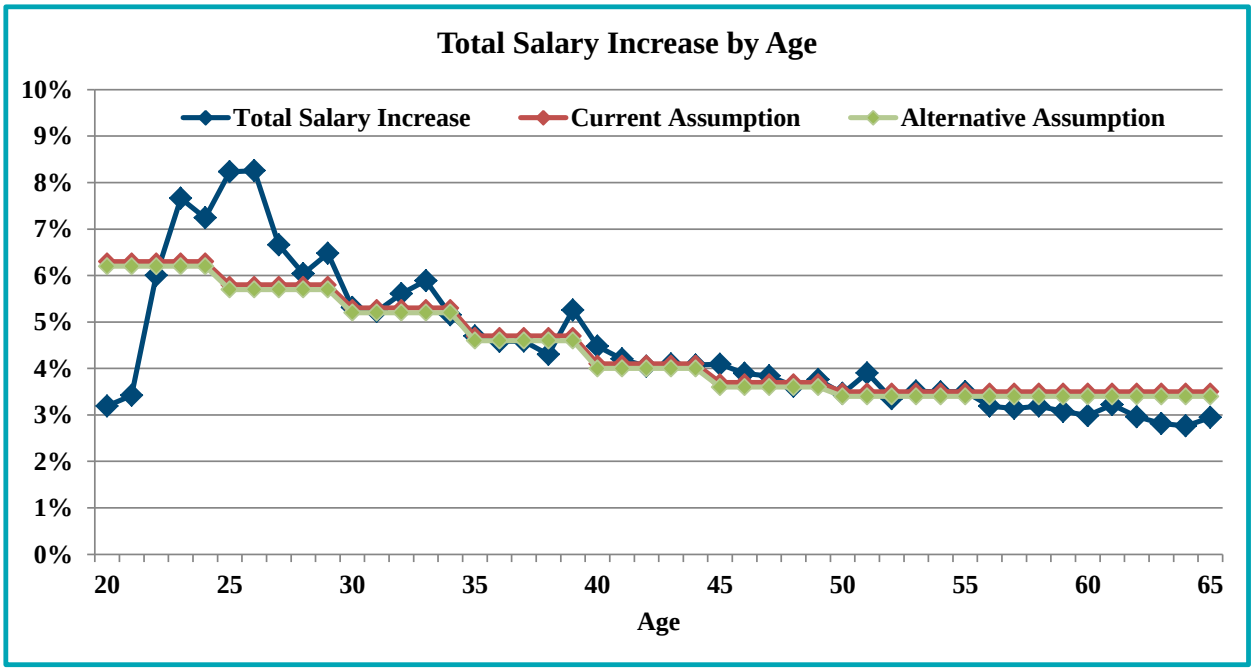


Table III-6

Average Salary Increases 2014 through 2018			
Age	Observed Rate	Current Rate	Alternative Rate
20	3.19%	6.30%	6.20%
25	8.23%	5.80%	5.70%
30	5.31%	5.30%	5.20%
35	4.69%	4.70%	4.60%
40	4.48%	4.10%	4.00%
45	4.09%	3.70%	3.60%
50	3.46%	3.50%	3.40%
55	3.50%	3.50%	3.40%
60	2.99%	3.50%	3.40%
65	2.95%	3.50%	3.40%

SECTION IV – COST IMPACT

In this section we illustrate the financial implication of making the alternative economic assumptions, discussed in this report, on the June 30, 2018 valuation results.

Table IV - 1
Changes in Liability and Total Normal Cost due to Assumption Changes

	Liability	Normal Cost
Mortality	$ 106,165,398	$ 1,049,975
Disability	1,696,300	111,376
Termination	11,324,764	(1,463,351)
Retirement	(8,618,105)	(210,828)
Salary Scale	(2,764,376)	(310,750)
Survivor Data	(66,586,342)	0
All Changes	**$ 41,217,639**	**$ (823,578)**

Table IV - 2
Impact on June 30, 2018 Liabilities resulting from Assumption Changes ($ millions)

	Current Assumptions	Alternative Assumptions
Actuarial Accrued Liability	$ 2,410.6	$ 2,451.8
Actuarial Value of Assets	1,785.4	1,785.4
Unfunded/(Surplus) AAL	$ 625.26	$ 666.48
Funded Percent	74.1%	72.8%
Contribution Amount	$ 87.0	$ 91.1
Contribution Rate	21.55%	22.59%
Difference due to changes in assumptions		
Actuarial Accrued Liability		$ 41.2
Actuarial Value of Assets		0
Unfunded/(Surplus) AAL		$ 41.2
Funded Percent		-1.2%
Contribution Amount		$ 4.2
Contribution Rate		1.0%

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS AND METHODS

A. Long-Term Assumptions Used to Determine System Costs and Liabilities

1. Demographic Assumptions

Withdrawal:

Service	Rate
0	14.50%
1	13.50
2	11.50
3	9.00
4	8.00
5	8.00
6	7.00
7	6.00
8	4.00
9	4.00
10	4.00
11	4.00
12	4.00
13	3.00
14	3.00
15+	3.00

Disability:

Age	Non-Line-of-Duty Disability	Line-of-Duty Disability (Classes A&B)	Line-of-Duty Disability (Class C)
25	0.00050	0.00004	0.00008
30	0.00059	0.00004	0.00008
35	0.00073	0.00005	0.00010
40	0.00190	0.00006	0.00013
45	0.00332	0.00009	0.00018
50	0.00394	0.00012	0.00023
55	0.00567	0.00013	0.00025
60	0.00715	0.00034	0.00068
65	0.00130	0.00000	0.00000
69	0.00078	0.00000	0.00000

Workers compensation offset is included in the above rates.

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS AND METHODS

Pre-retirement mortality:

1. Non-Line-of-Duty - RP 2000 Healthy Mortality with projections using 50% of the AA scale projected 15 years with a three-year set forward for both males and females (effective 6/30/2015).

2. Line-of-Duty - 0.005% at all ages (effective 6/30/1999).

Age	Non-Line-of-Duty Death* Male	Non-Line-of-Duty Death* Female	Line-of-Duty Death*
25	0.000365	0.000211	0.000050
30	0.000608	0.000365	0.000050
35	0.000928	0.000551	0.000050
40	0.001223	0.000837	0.000050
45	0.001687	0.001271	0.000050
50	0.002546	0.001942	0.000050
55	0.004570	0.003694	0.000050
60	0.008876	0.007366	0.000050
65	0.016084	0.012950	0.000050
69	0.024553	0.019903	0.000050

*Rates for individuals who are the age shown as of June 30, 2018.

Post-retirement mortality:

1. Retirees and Beneficiaries – RP 2000 Healthy Mortality with projections using 50% of the AA scale projected 15 years with a two-year set forward for both males and females. Given the requirement for experience studies performance every five years, these projections are sufficient until the next measurement period.

2. Disabled members – RP 2000 Disabled Mortality with generational projections using 50% of the AA scale projected 15 years with a four-year set forward for both males and females.

Sample rates (rates first effective 6/30/2015)

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS AND METHODS

	Retirees and Beneficiaries*		Disabled Members	
Age	Male	Female	Male	Female
55	0.004067	0.003275	0.035243	0.019556
60	0.007763	0.006412	0.042824	0.02562
65	0.014467	0.011715	0.053651	0.034033
70	0.024368	0.019903	0.069235	0.047093
75	0.042215	0.032115	0.093052	0.063837
80	0.074656	0.053410	0.125150	0.088989

*Rates for individuals who are the age shown as of June 30, 2018.

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS AND METHODS

Service Retirement:

Early Retirement prior to the later of age 60 and eligibility for Normal Retirement (earlier of age 65 with 5 years of service and 30 years of service).

	Rates of Retirement		
Age	Less than 30 yos		More than
45 -49	0.00	0.10	0.00
50-54	0.00	0.10	0.05
55	0.03	0.10	0.05
56-57	0.04	0.10	0.05
58	0.05	0.10	0.05
59	0.05	0.10	0.10
60	0.05	0.10	0.10
61	0.07	0.20	0.15
62	0.15	0.20	0.25
63	0.11	0.20	0.20
64	0.14	0.20	0.17
65	0.20	0.30	0.25
66	0.20	0.20	0.25
67	0.17	0.20	0.20
68	0.15	0.20	0.20
69	0.20	0.20	0.20
70	1.00	1.00	1.00

Normal Retirement is assumed on or after the later of age 60 and eligibility for Normal Retirement (earlier of age 65 with five years of service and 30 years of service).

Terminated vested participants are assumed to retire at age 65.

Joint and Survivor Forms of Payment:

The 40% Joint & Survivor form of payment is assumed for all benefits. All benefits with Joint & Survivor Forms of Payment for retirees had their survivor benefits increased by 4% to account for children's benefits.

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS AND METHODS

2. Economic Assumptions

Discount rate:

A liability weighted discount rate is expected on the basis that a 7.50% rate is applied in measuring active and terminated vested participant liabilities, and a 6.50% rate is applied for measuring retiree participant liabilities. The weighted discount rate this year is 6.93%.

Investment return:

The investment return assumption is 7.50% net of all expenses.

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS AND METHODS

Salary increases:

Salary increases are assumed to vary with age. Sample rates are as follows:

Age	Salary
20	0.063
25	0.058
30	0.053
35	0.047
40	0.041
45	0.037
50	0.035
55	0.035
60	0.035
65	0.035
69	0.035

Social security wage base:

3.00% per year compounded annually (effective 6/30/2011).

Inflation:

2.65% (effective 6/30/2015).

Cost-of-Living adjustment assumption:

1.5% for inactives in pay status under age 65 and 2.0% over age 65.

Percent married:

Males 90%, females 80%.

Spouse age:

A husband is assumed to be four years older than his wife.

Remarriage rates:

None.

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS AND METHODS

Expenses:

Administrative expenses are expected to be equal to the prior years' actual expenses rounded up to the next hundred thousand dollars and added as part of the annual normal cost for the year.

Job Elimination Benefit:

A liability load of 1.75% is applied to active retirement benefits to account for the value of this benefit.

New Entrant Assumption:

A liability load of 0.5% is applied to active benefits to account for future new entrants who may have previous years of service restored or transferred into the System (effective 6/30/2015).

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

Entry Age Normal Funding Method

The Entry Age Normal actuarial funding method was used for active employees, whereby the normal cost is computed as the level annual percentage of pay required to fund the retirement benefits between each member's date of hire and assumed retirement. The actuarial liability is the difference between the present value of future benefits and the present value of future normal cost. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets.

Actuarial Assumptions and Methods

Method of Funding:

The Entry Age Normal Funding Method was approved by the Board of Trustees effective date of 7/1/2012.

The current unfunded actuarial liability is amortized as a level dollar over 20 years. The 20-year period decreases each year from 2011 until 2031, at which time the unfunded liability will be fully paid.

Asset Valuation:

The actuarial value of assets is equal to the market value, adjusted for 20% of the five year aggregate investment surpluses and deficits. This calculation is done in the following steps:

1. The investment gain or loss for the current year is calculated; this equals the actual investment earnings during the year minus the expected earnings. Expected earnings are calculated using a weighted average of the pre- and post-retirement interest rate assumptions multiplied by the mean market value of assets during the year.

2. The current net excess earnings are computed by adding the investment gain or loss for the current year to the remaining excess earnings for the prior valuation. One-fifth of the excess earnings are recognized in the actuarial value as of the current valuation and four-fifths are deferred to future years.

3. The net assets are then adjusted to account for the Normal Cost Reserve held for the plan changes made during 2001.

4. The present value of the prior year's City contributions is added to the net assets to account for the one-year lag between required contributions and when the contributions are actually received.

5. The actuarial value of assets will not be greater than 120% nor less than 80% of the market value of assets as of the valuation date.

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS AND METHODS

All changes from the current assumptions found in Appendix A are highlighted below.

A. Long-Term Assumptions Used to Determine System Costs and Liabilities

1. Demographic Assumptions

Withdrawal:

Service	Rate
0	17.00%
1	15.50
2	14.50
3	10.75
4	10.50
5	9.00
6	8.00
7	6.50
8	6.50
9	6.50
10	4.00
11	4.00
12	4.00
13	4.00
14	4.00
15+	2.50

Disability:

Age	Non-Line-of-Duty Disability	Line-of-Duty Disability (Classes A&B)	Line-of-Duty Disability (Class C)
25	0.00050	0.00004	0.00008
30	0.00059	0.00004	0.00008
35	0.00101	0.00006	0.00013
40	0.00129	0.00002	0.00006
45	0.00283	0.00006	0.00014
50	0.00692	0.00020	0.00040
55	0.00963	0.00022	0.00043
60	0.00947	0.00048	0.00093
65	0.00079	0.00000	0.00000
69	0.00079	0.00000	0.00000

Workers compensation offset is included in the above rates.

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS AND METHODS

Pre-retirement mortality:

1. Non-Line-of-Duty – Pub-2010 Total General Employee Below-Median mortality tables adjusted by 125% for males and 185% for females with future mortality improvement through 2022 using scale MP-2018 for non-line-of-duty mortality.

2. Line-of-Duty - 0.005% at all ages. (effective 6/30/1999).

Age	Non-Line-of-Duty Death* Male	Non-Line-of-Duty Death* Female	Line-of-Duty Death*
25	0.000518	0.000226	0.00005
30	0.000674	0.000363	0.00005
35	0.000902	0.000583	0.00005
40	0.001271	0.000908	0.00005
45	0.001832	0.001348	0.00005
50	0.002678	0.001944	0.00005
55	0.003878	0.002850	0.00005
60	0.005721	0.004393	0.00005
65	0.008472	0.007007	0.00005
69	0.011665	0.010285	0.00005

*Rates for individuals who are the age shown as of June 30, 2018.

Post-retirement mortality:

1 Retirees and Beneficiaries – Pub-2010 General Retiree Below-Median Weighted mortality tables adjusted by 115% for males and 125% for females with future mortality improvement through 2022 using SOA's Scale MP-2018.

2 Disabled members – Pub-2010 General Disabled Annuitant mortality tables adjusted by 163% for males and 145% for females with future mortality improvement through 2022 using SOA's Scale MP-2018.

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS AND METHODS

	Retirees and Beneficiaries*		Disabled Members	
Age	Male	Female	Male	Female
55	0.010045	0.005765	0.033406	0.024785
60	0.012233	0.006648	0.040073	0.028299
65	0.014949	0.008659	0.049310	0.032604
70	0.023702	0.014508	0.062827	0.040508
75	0.038893	0.025035	0.082293	0.055942
80	0.065591	0.044199	0.115647	0.084194

Service Retirement:

Early Retirement prior to the later of age 60 and eligibility for Normal Retirement (earlier of age 65 with 5 years of service and 30 years of service).

	Rates of Retirement		
Age	Less than 30 yos	30 yos	More than 30 yos
45-49	0.00	0.10	0.00
50-54	0.00	0.10	0.05
55	0.05	0.10	0.05
56-57	0.05	0.10	0.05
58	0.05	0.10	0.05
59	0.05	0.10	0.07
60	0.05	0.10	0.07
61	0.07	0.15	0.15
62	0.15	0.15	0.25
63	0.10	0.15	0.15
64	0.10	0.15	0.15
65	0.20	0.15	0.25
66	0.25	0.20	0.25
67	0.20	0.20	0.15
68	0.15	0.20	0.15
69	0.20	0.20	0.15
70	1.00	1.00	1.00

Normal Retirement is assumed on or after the later of age 60 and eligibility for Normal Retirement (earlier of age 65 with five years of service and 30 years of service).

Terminated vested participants are assumed to retire at age 65.

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS AND METHODS

Joint and Survivor Forms of Payment:

The 40% Joint & Survivor form of payment is assumed for all benefits. All benefits with Joint & Survivor Forms of Payment for retirees had their survivor benefits increased by 4% to account for children's benefits.

2. Economic Assumptions

Discount rate:

A liability weighted discount rate is expected on the basis that a 7.00% rate is applied in measuring active participant liabilities, and a 6.50% rate is applied for measuring non-active participant liabilities. The weighted discount rate after reflecting the change in Regular Interest Rate measured as of June 30, 2018 is 6.72%.

Investment return:

The investment return assumption is 7.0% net of all expenses.

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS AND METHODS

Salary increases:

Salary increases are assumed to vary with age. Sample rates are as follows:

Age	Salary
20	6.20%
25	5.70
30	5.20
35	4.60
40	4.00
45	3.60
50	3.40
55	3.40
60	3.40
65	3.40
69	3.40

Social security wage base:

3.00% per year compounded annually.

Inflation:

2.55% (effective 6/30/2019).

Cost-of-Living adjustment assumption:

1.5% for inactives in pay status under age 65 and 2.0% over age 65.

Percent married:

Males 90%, females 80%.

Spouse age:

A husband is assumed to be four years older than his wife.

Remarriage rates:

None.

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS AND METHODS

Expenses:

Investment expenses are assumed to be paid out of investment earnings.

Administrative expenses are expected to be equal to the prior years' actual expenses rounded up to the next hundred thousand dollars and added as part of the annual normal cost for the year.

Job Elimination Benefit:

A liability load of 1.75% is applied to active retirement benefits to account for the value of this benefit.

New Entrant Assumption:

A liability load of 0.5% is applied to active benefits to account for future new entrants who may have previous years of service restored or transferred into the System.

Survivor Data Assumption

The present value of the annual expected gain from this source of experience is reduced from the actuarial liability for participants in pay status. A liability load of -5.0% is applied to retiree liabilities to account for this.

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

Entry Age Normal Funding Method

The Entry Age Normal actuarial funding method was used for active employees, whereby the normal cost is computed as the level annual percentage of pay required to fund the retirement benefits between each member's date of hire and assumed retirement plus administrative expenses. The actuarial liability is the difference between the present value of future benefits and the present value of future normal cost. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets.

Actuarial Assumptions and Methods

Method of Funding:

The Entry Age Normal Funding Method was approved by the Board of Trustees effective date of 7/1/2012.

The current unfunded actuarial liability is amortized as a level dollar over 20 years. The 20-year period decreases each year from 2011 until 2031, at which time the unfunded liability will be fully paid.

Asset Valuation:

The actuarial value of assets is equal to the market value, adjusted for 20% of the five year aggregate investment surpluses and deficits. This calculation is done in the following steps:

1. The investment gain or loss for the current year is calculated; this equals the actual investment earnings during the year minus the expected earnings. Expected earnings are calculated using a weighted average of the pre- and post-retirement interest rate assumptions multiplied by the mean market value of assets during the year.

2. The current net excess earnings are computed by adding the investment gain or loss for the current year to the remaining excess earnings for the prior valuation. One-fifth of the excess earnings are recognized in the actuarial value as of the current valuation and four-fifths are deferred to future years.

3. The net assets are then adjusted to account for the Normal Cost Reserve held for the plan changes made during 2001.

4. The present value of the prior year's City contributions is added to the net assets to account for the one-year lag between required contributions and when the contributions are actually received.

5. The actuarial value of assets will not be greater than 120% nor less than 80% of the market value of assets as of the valuation date.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

Effective Date

The System was effective January 1, 1926 and has been periodically amended.

Eligibility

Any regular and permanent officer, agent, or employee of the City with the exception of those required to join the Maryland State or any other Retirement System shall become a Class D member of the Employees' Retirement System upon completion of one year of service. The Board of Estimates may authorize prospective membership for any class of part-time employees. There are four classes of members as follows:

1. Class A – Members who were hired before July 1, 1979, and entered membership on or after January 1, 1954, or who elected, prior to April 1, 1954, to contribute at the higher Class A rate. Any Class B member may elect to become a Class A member by bringing his accumulated contributions and interest up to what they would be if he had elected Class A membership on January 1, 1954.

2. Class B – Members as of January 1, 1954 who did not elect Class A membership – there are no remaining active Class B participants as of June 30, 2011.

3. Class C – Members who were hired on or after July 1, 1979 and before July 1, 2014, or any other members who may have elected to transfer during various open transfer periods.

4. Class D – Members who were hired or rehired on or after July 1, 2014. Class D Members have the option to participate in both the Employees' Retirement System and the new Retirement Savings Plan (RSP) as hybrid members or opt out of the System and participate only in the RSP as non-hybrid members. The City contributes 3% of pay to RSP for hybrid members and 4% of pay for non-hybrid members. Members also have the option to make voluntary deferrals to the City's Deferred Compensation Plan, with the City matching 50% of the first 2% of compensation deferred by the member.

Member Contributions

Class A and Class B members currently contribute at the rate of 4% of earnable compensation, and contributions are not required upon attaining age 60 and completing 35 years of service. Class C members (except participants of Detention Services and Department of Education) began making contributions at 1.0% of compensation starting July 1, 2013 increasing 1.0% each year until they reach 5.0% of compensation. As of June 30, 2018, Class C and Class D members make contributions at 5.0% of pay from date of participation. Interest is credited on contributions at a rate of 5.25% per annum for Class A and B members and 3.00% for Class C and Class D members.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

Compensation

Earnable compensation is the annual salary authorized for the member, not including overtime, differential pay, environmental pay, hazardous duty pay, pay for conversion of leave or other fringe benefits, or any additional payment. Average Final Compensation is the average of the member's annual earnable compensation on January 1 for the three successive years of service when the member's earnable compensation is the highest or, if the member is in service on January 1 for less than three successive years, than the average during total service.

Covered Compensation

The covered compensation (for Class C only) is the average of the FICA wage base for the 35-year period ending with the calendar year which ends immediately prior to the earlier of: (1) January 1, employment, or (2) January 1, of the calendar year in which the member attains age 65.

Military Service Credit

A. Military Service Prior to Employment:
   1. Classes A and B

      A maximum of three- years' service credit is granted provided the member has acquired 10 years of service and has reached the age of 60 or has acquired 20 years of service, regardless of age.

   2. Classes C and D

      A maximum of three-years' service credit is granted provided the member has acquired 10 years of service and has reached the age of 62 or has acquired 20 years of service, regardless of age.

B. Military Service Within Employment:
   1. Classes A and B

      Upon retirement or death, any member who, because of military duty, had a break in employment shall receive service credit for the period of absence as provided by the Veterans' Reemployment Rights Act.

Retirement Eligibility

A. Service Retirement:
   1. Classes A and B – Age 60 with five years of service or 30 years of membership service.

   2. Classes C and D – Age 65 with five years of service or 30 years of service, regardless of age. Early retirement allowed at age 55 with five years of service payable at age 65 or reduced for payment before 65.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

B. Non-Line-of-Duty Disability Retirement:
Five years of membership service and determined by a hearing examiner to be mentally or physically incapacitated for the performance of duty and that incapacity is likely to be permanent.

C. Line-of-Duty Disability Retirement:
Totally and permanently incapacitated for duty as the result of an accident while in performance of duty and certified by a hearing examiner as mentally or physically incapacitated for the performance of duty and that such incapacity is likely to be permanent.

D. Dismemberment Disability Retirement:
1. Classes C and D – Loss of any two or more of hands, feet, sight of eye(s) as a direct result of bodily injury from an accident while in actual performance of duty as determined by a hearing examiner.

Termination of Employment

1. Classes A and B
    1. Eligible for Termination Retirement Allowance, deferred to age 60, upon completion of (1) 15 years of membership service, or (2) five years of service, if removed from a position without fault.
    2. Eligible for a Termination Retirement Allowance, payable immediately, upon completing 20 years of service, if removed from a position without fault.
    3. Eligible for a refund of accumulated contributions if not eligible for any other benefits.

2. Classes C and D
    1. Eligible for a Termination Retirement Allowance, deferred to age 65, upon completion of (1) 10 years of service, or (2) five years of service, if removed from a position without fault.
    2. Eligible for an immediate benefit if removed without fault after 20 years of service.

Retirement Allowances

A. Service Retirement:
1. Classes A and B

    The sum of:
    a. An annuity of the actuarial equivalent of a member's accumulated contributions; and
    b. A pension, which together with the annuity shall equal 1.935% (Class A) or 1.785% (Class B) of Average Final Compensation times years of service.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

2. Class C

   A pension of (1) 1.60% of Average Final Compensation, times years of service up to 30 years, plus (2) 0.25% of Average Final Compensation in excess of Covered Compensation, times years of service up to 30 years, plus (3) 1.85% of Average Final Compensation, times years of service in excess of 30 years.

3. Class D

   A pension of 1.00% of Average Final Compensation, times years of service. If the member retires at or after age 62 with at least 20 years of service, the member receives an enhanced benefit of 1.10% of Average Final Compensation times years of service.

B. Early Retirement:

1. Classes C and D

   If a member is age 55 with five years of service, the member may retire at any time, with a benefit reduced for early commencement. The reduction factor is 1/180 for each of the first 60 months prior to age 65 and 1/360 for each additional month preceding age 65. If the member has 30 years of service at retirement, then there is no reduction factor applied to the benefit.

C. Non-Line-of-Duty Disability Retirement:

1. Classes A and B

   A benefit equal to the service retirement benefit if age 60; otherwise, an annuity of the actuarial equivalent of a member's accumulated contributions plus a pension which, together with the annuity, shall equal 1.90% (Class A) or 1.75% (Class B) of Average Final Compensation times years of service.

   The member will receive the benefit as calculated above, if the benefit exceeds 25% of the member's Average Final Compensation. Otherwise, the member shall receive 25% of the member's Average Final Compensation.

   This benefit is offset by:

   a. Workers' compensation (excluding amounts paid to third parties);
   b. Earnings in excess of base amount (current earnable compensation in same job grade and step adjusted for longevity) with a $1.00 reduction for each $2.00 of the first $5,000 of excess and a $2.00 reduction for each $5.00 of additional excess earnings.

2. Classes C and D

   The ordinary disability pension shall be equal to the greater of:

   1. The member's accrued service retirement benefit; or
   2. 15% of the member's average final compensation.

   This benefit is offset by:

   a. Workers' compensation (excluding amounts paid to third parties);
   b. Unemployment compensation.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

D. Line-of-Duty Disability Retirement:
An annuity of the actuarial equivalent of a member's accumulated contributions, plus a pension equal to 66-2/3% of Average Final Compensation.

This benefit is offset by:
Same offsets are applied as for non-line of duty disability.

E. Dismemberment Disability Retirement:
1. Classes C and D
A pension, equal to 100% of Average Final Compensation. Same offsets as for Class C Line-of-Duty Disability benefits.

F. Termination Retirement Allowance (Deferred Payment):
Determined the same as for Service Retirement, but based on membership service and Average Final Compensation at the time of termination.

G. Termination Retirement Allowance (Immediate Payment):
Determined the same as if the member had retired with a non-line-of-duty retirement allowance.

H. Job Removal Retirement Benefit (Immediate Payment):
Unreduced retirement benefit based on actual years of service credit is provided to any member who is removed from a permanent position without fault, provided they had 20 years of service.

Option Methods of Receiving Benefit Payments

A. Maximum Service Retirement:
Joint & Survivor form of payment to unmarried spouse or dependent children until the last marries, dies or attains age 18 (age 22 if a full-time student). The percent continued to the spouse is 40%.

B. Cash refund to retiree's beneficiary based on present value of allowance at retirement less payments made.

C. Joint and 100% to Contingent Beneficiary

D. Joint and 50% to Contingent Beneficiary

E. Some other periodic benefit subject to the approval of the Board of Trustees

These options are available for service, termination, non-line-of-duty disability and line-of-duty disability retirement. Any option and/or beneficiary may be changed by the retired member within 30 days after retirement.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

Non-Line-of-Duty-Death Benefits

1. Classes A and B
   - The member's accumulated contributions will be returned; plus, if one or more years of membership service, 50% of the greater of Average Final Compensation or current annual earnable compensation, or
   - If (1) eligible for service retirement, or (2) would have become eligible for service retirement within 90 days, or (3) if retired on account of service, non-line-of-duty disability, or line-of-duty disability and dies within 30 days of retirement, or (4) entitled to a deferred allowance at age 60; and the member's designated beneficiary or his partner(s) is his spouse with whom he has been living for at least five years, such beneficiary may elect an allowance equal to the greater of 40% of the participant's accrued benefit or the amount that would have been paid under the Joint and 100% Contingent Option.

   This benefit is offset by workers' compensation (excluding amounts paid to third parties). If no beneficiary and if intestate without heirs, then contributions shall remain part of the System.

2. Classes C and D
   - If (1) eligible for service retirement, or (2) would have become eligible for service retirement within 90 days, or (3) if retired on account of service, ordinary disability, or accidental disability and dies within 30 days of retirement, or (4) entitled to a deferred allowance at age 65, or (5) has 20 years of service and dies anytime between effective retirement date at age 65 and no later than 30 days following the attainment of age 65; the member's designated beneficiary shall receive an allowance equal to the greater of 40% of the participant's accrued benefit or the amount that would have been paid under the Joint and 100% Contingent Option, or
   - If (1) not eligible under paragraph (1) above, and (2) if one or more years of service, 50% of the greater of Average Final Compensation or current annual earnable compensation, shall be paid as a lump sum.

Line-of-Duty Death Benefits

If a member's death was the result of injuries in the line of duty, a refund of contributions shall be payable, if applicable. In addition, an annual pension of 100% of current earnable compensation (not less than $10,000 on June 30, 1994) shall be payable to:

A. The spouse, provided there is no voluntary separation agreement renouncing rights of inheritance during her widowhood;
B. If no eligible spouse, or if the spouse dies or remarries, the child or children equally until age 18 (age 22 if full-time student(s));
C. If no eligible spouse or child surviving, then to the deceased's father and / or mother equally, or to the survivor;

APPENDIX C – SUMMARY OF PLAN PROVISIONS

D. For Classes A and B, any member who retires and dies within 30 days after the effective date of line-of-duty disability retirement shall receive the above benefits if death is the result of injuries in the line of duty.

This benefit is offset by workers' compensation (excluding amounts paid to third parties). If no beneficiary and if intestate without heirs, then contributions shall remain part of the System.

Post-Retirement Benefit Increases

Annual post-retirement benefit increases of a fixed 1.5% for participants in pay status under age 65 and 2.0% for participants in pay status age 65 and over.

Hybrid Employer Contributions

Section 5.3 (C) of Article 22 of the City Code identifies a provision that would impact the City's contribution rate to the Retirement Savings Plan (Savings Plan) of 3% for hybrid members of Plan D. If the Class D funded status falls below 85% half of the 3.0% or 1.5% of the City contributions to the Savings Plan will be diverted to funding the Retirement System. As a result in this report we track and provide specific information of the funded status for Class D members.

The funded ratio is defined as the ratio of the adjusted market value basis of assets attributable to Class D members of the June 30th preceding the actuarial valuation over the Employees Retirement System liabilities attributable to Class D members on that date. To determine this value in time for appropriate implementation of the appropriate City contribution rate before the beginning of the fiscal year we roll forward the liabilities for Class D members and the estimated adjusted asset value. This calculation is summarized in Section IV of this report.